ARDENT
CONSULTING ENGINEERS
AN EMPLOYEE OWNED COMPANY

BELLWAY HOMES LTD

WOODFORDS, SHIPLEY ROAD

SOUTHWATER, HORSHAM

DRAINAGE TECHNICAL NOTE

REPORT REF. 2108061_B-ACE-XX-XX-RP-C-0001

October 2025

HEAD OFFICE: 3rd Floor, The Hallmark Building, 52-56 Leadenhall Street, London, EC3M 5JE **T** | 020 7680 4088
EDINBURGH: Suite 35 4-5 Lochside Way Edinburgh EH12 9DT **T** | 0131 516 8111
ESSEX: 1 - 2 Crescent Court, Billericay, Essex, CM12 9AQ **T** | 01277 657 677
KENT: Suite 10, Building 40, Churchill Business Centre, Kings Hill, Kent, ME19 4YU **T** | 01732 752 155
MIDLANDS: Office 3, The Garage Studios, 41-43 St Mary's Gate, Nottingham, NG1 1PU **T** | 0115 697 0940
SOUTH WEST: Temple Studios, Bristol, England, BS1 6QA **T** | 0117 456 4994
SUFFOLK: Suffolk Enterprise Centre, 44 Felaw Street, Ipswich, IP2 8SJ **T** | 01473 407 321
MANCHESTER: Chancery Place, 50 Brown Street, Manchester M2 2JG **T** | 0207 680 4088

Email: enquiries@ardent-ce.co.uk

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REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
A	PRELIMINARY	DC	TR	BB	15/09/25
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Distribution

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1. INTRODUCTION

Scope

1.1. Ardent Consulting Engineers (ACE) has been instructed by Bellway Homes to prepare a Drainage Strategy in respect of the development proposals for the land known as 'Woodfords, Shipley Road' in Southwater – Horsham, West Sussex.

1.2. The site benefits from outline planning and this report has been prepared to demonstrate a suitable drainage strategy can be implemented for the site.

Development Proposal

1.3. Reserved matters application for the erection of up to 73 no. dwellings, open space and child play provision, residential parking facilities and associated infrastructure, including access arrangements following outline application DC/21/2180.

1.4. An extract of the proposed site plan from DHA is shown in **Figure 1-1** and the full site plan, ref. 102108-BEL-SL-01, is shown in **Appendix A.**

Figure 1-1 DHA Site Layout

Outline Planning Consent

1.5. An Outline Planning Application was submitted DC/20/2564 on 22nd December 2020 for the erection of up to 73 new dwellings (C3 use) and retention of existing farmhouse building, associated public open space, landscaping, drainage and highways infrastructure works, including vehicular access from Shipley Road with all matter reserved except access. The application was refused on 29th April 2021 on two core reasons related to the impact of the development on the Arun Valley Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar Site by means of water abstraction within the Sussex North Water Supply Zone (SNWSZ). The second reason is related to whether the proposed development would provide a suitable location for housing having regard its position within the countryside and the spatial strategy for the District.

1.6. An Outline Planning Application was submitted DC/21/2180 on 22nd September 2021 for an outline application for the erection of up to 73 new dwellings (up to 100% affordable housing) and retention of existing farmhouse building, associated public open space, landscaping, drainage and highway infrastructure works, including vehicular access from Shipley Road, with all matters reserved except for access. The application was granted permission 11th July 2024.

1.7. The outline application was supported by a Flood Risk Assessment (FRA) produced by Motion Consulting Ltd, dated 13th September 2021. The Proposed Reserved Matters Drainage Strategy follows the principles set out in the approved Outline Planning FRA report and the associated strategy plans.

1.8. The relevant Outline Planning Condition's that relate to the drainage requirements are as follows:

1.8.1. Condition 6; No development shall commence until a drainage strategy detailing the proposed means of foul and surface water disposal has been submitted to and approved in writing by the Local Planning Authority. The development shall be carried out in accordance with the approved scheme.

1.8.2. Condition 17; No part of the development hereby permitted shall be occupied until a verification report demonstrating that the SuDS drainage system has been constructed in accordance with the approved design

drawings has been submitted to and approved by the Local Planning Authority. The development shall be maintained accordance with the approved report.

2. Existing Conditions

Existing Site Description

2.1. The site is located within Southwater, in the district of Horsham (HDC).

2.2. The development is circa 4.16 hectares (ha) in total and is centred approximately at Ordnance Survey 515645mE, 125058mN

2.3. The site is located directly south of Southwater. The developable site area is a combination of an open grass land pasture and ten structures of varying sizes: four buildings names "Brick/Wooden Building"; three named "Shed"; one names "Summer house"; one named "Wooden Stables; and one unnamed residential building. There is a sand menage, roughly 0.1ha in size, immediately north of the buildings, assumed for equestrian purposes. The boundaries consists of hedgerows, ditches and with Shipley Road on the western boundary.

2.4. The topography shows is steeply undulating with local high points sloping to the boundaries. The highest point on-site is found within the northern corner at 50.926m AOD. The land falls east and south towards the lowest point on the field, being 43.82m AOD and 42.75m AOD respectively with gradients of circa 1:20 to 1:35. The topography can be found in **Appendix B.**

2.5. A ground investigation titled "Phase II Site Investigation Report" was carried out by Leap Environmental Ltd on 8th March 2022, (ref. LP2826), to allow assessment of the underlying ground condition at the site of the proposed development. The full report is shown in **Appendix C.**

2.6. As per the Phase II report, the boreholes and trial pits show the site is underlain by stiff silty clays (Weald Clay Formation). Topsoil is found to be at an average depth of 0.3m bgl.

2.7. In line with FRA at Outline Planning and the finding of Leap Enivronmental's Ground Investigation the site is assessed to be at very low/negligible risk of groundwater flooding. As such, no further assessment of flood risk is required in relation to ground water flooding and no measures are deemed necessary to manage flood risk from this source.

Existing Drainage

2.8. The site is surrounded by existing watercourses. It is assumed the rainfall flows towards the watercourse along the eastern side, due to the topography.

2.9. The nearest foul and surface Southern Water manholes are approximately 40m North of the site located within Rascals Close. There are no surface Southern Water manholes located within Shipley Road.

2.10. The nearest available foul Southern Water manhole located within Shipley Road is approximately 120m North of the site.

2.11. The Southern Water sewer records can be found in the FRA at Outline Planning with **Appendix D**.

Proposed Drainage at Outline Planning (DC/21/2180)

2.12. The following section covers the FRA, outlined in Motion Consulting's FRA, dated 13th September 2021, submitted as part of the Outline Planning application (DC/21/2180), shown as **Appendix D.**

2.13. The outline planning FRA proposes for the site to be split into two catchments, in which both catchments will discharge into the existing watercourse, via attenuation ponds, restricted to Q_{Bar}.

2.14. The outline planning FRA proposed for the discharges rates to be based upon the IH124 HR Wallingford method with FSR data and impermeable areas. The total discharge rate from the catchments is 7.9 l/s.

2.15. The attenuation volumes were based on a 40% Climate Change, default C_v values and FSR data.

Pre-Application Advice with Lead Local Flood Authority (LLFA)

2.16. On 4th April 2025, a Pre-Application Advice meeting took place between Ardent and WSCC (West Sussex County Council); the latter are represented as the LLFA.

2.17. Within the meeting, WSCC accepted the following:

- The discharge rate to be restricted to Q_{Bar}, as per the FRA at Outline Planning.
- A C_v (coefficient of runoff) value of 1 to be used to for drainage simulations. A reduced freeboard is supported within the attenuation basins.
- A full network model is required at this stage.

2.18. For the full discussion with WSCC, refer to **Appendix E**.

3. Surface Water Drainage

Technical Standards

3.1. The surface water drainage strategy for the proposed development is in accordance with the following technical standards and best practice guidance, which are referred to throughout this section:

- West Sussex Local Flood Risk Management Strategy: 2025 – 2030
- The CIRIA SuDS Manual (C753);
- Non-statutory technical standards for sustainable drainage systems. A Best Practice Guidance was published by the Association of SuDS Authorities (ASA), formerly known as the Local Authority SuDS Officer Organisation (LASOO), in July 2015 to accompany this document;
- BS8582 Code of practice for surface water management for development sites; and
- The National Planning Policy Framework.

Surface Water Drainage Options Consideration

3.2. In line with CIRIA guidance C753 (The SuDS manual), the drainage hierarchy needs to be considered and is listed below in order of preference:

- Store rainwater for later use;
- Use infiltration techniques, such as porous surfaces in non-clay areas;
- Attenuate rainwater for gradual release to a watercourse;
- Discharge rainwater direct to a watercourse;
- Discharge rainwater to a surface water drain; and
- Discharge rainwater to a combined sewer.

Store rainwater for later use

3.3. There is potential to reuse a percentage of the rainwater within the site by installing water butts on houses. However, their value is limited to domestic watering during dry periods where there is garden water in the container. Water butts do not guarantee that storage will always be available, unless the system is designed so that any water stores above a set threshold drainage slowly to the downstream drainage system or to a soakaway. However, there is no robust evidence regarding

the potential effectiveness of such components during significant events. Modelling would be required, therefore other options need to be considered in parallel.

Use infiltration techniques, such as porous surfaces in non-clay areas

3.4. Ground investigations confirmed infiltration is unlikely to be suitable given the clay soils encountered, therefore infiltration has been discounted in line with the Outline Planning application.

Attenuate rainwater for gradual release to a watercourse

3.5. The surface water drainage strategy for the proposed development will mimic the existing greenfield drainage, with gradual release of surface water runoff to the watercourses on site. This is achieved through flow restrictions within the network.

3.6. Attenuation will be provided within the development with the use of online basins and offline geo-cellular storage tanks, prior to discharge into the watercourse in line with the outline strategy. Conveyance swales are provided at the outfall from the basins to provide additional treatment.

3.7. In line with national and local planning guidance, the development will discharge at equivalent greenfield run off rates, with surface water attenuation provided up to the 1 in 100 year plus climate change event.

Sustainable Drainage Systems (SuDS) Hierarchy

3.8. **Table 3-1** below appraises the constrains and opportunities for the use of SuDS techniques within the site and it adopts the managements train approach otline in CIRIA C753 'The SuDS Manual'.

Type:	**Store Water for Re-use**
Constraints:	Water butts do not guarantee storage will always be available.
Opportunities:	Potential to install onto all the dwellings.
Type:	**Infiltration Devices** (Source Control)
Constraints:	Clay soils encountered across the site from the ground investigation. This would preclude the use of all infiltration devices.
Opportunities:	None, due to the presence of impermeable geology.
Type:	**Permeable Paving** (Source Control)
Constraints:	Clay soils limit infiltration, making permeable paving unsuitable for soakaway use. Long-term maintenance in private areas cannot be guaranteed.
Opportunities:	Could be considered in private driveways or parking areas with lined systems and controlled outfall, subject to maintenance arrangements.
Type:	**Swales, ditches etc.** (Permeable Conveyance)
Constraints:	Swales require a minimum 1 in 3 side slope which have a significant land take in a parcel which has a high development density. No space for additional perimeter swales due to root protection areas.
Opportunities:	Conveyance swales are provided at the outfalls from the basins in both catchments
Type:	**Attenuation Basin / Ponds** (end of pipe treatment)
Constraints:	Attenuation basins have a significant land take.
Opportunities:	The drainage strategy at outline planning accommodates two basins (one basin per catchment) to allow treatment and storage
Type:	**Attenuation Tanks** (end of pipe treatment)
Constraints:	None.
Opportunities:	The site layout has potential to accommodate geo-cellular tanks within private shared areas.

Table 3-1: C753 SuDS Hierarchy, Site Assessment

Proposed Surface Water Drainage Strategy

3.9. After consideration of the CIRIA C753 approach, the most viable SuDS options are attenuation basins, attenuation tanks and swales; conveyances swales are provided at the outfall from the basin. Surface water runoff from the site will discharge into the ditch along the eastern boundary.

3.10. The greenfield runoff rates have been calculated using Flow with FEH statistical method, as shown in **Appendix F. Table 3-2** has summarised the greenfield rate per hectare.

3.11. For the purposes of using the most up to date information, FEH data has been acquired and used for the drainage simulations. This falls inline with WSCC's Surface Water Drainage Proforma, which states that "in calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable" – this is shown in **Appendix G.**

	1 in 2 YEAR	Q_{Bar}	1 in 30 YEAR	1 in 100 YEAR
GREENFIELD RATE PER HECTARE	6.70	7.70	18.40	24.40

Table 3-2 Greenfield Rates Per Hectare with FEH Statistical Method

3.12. It is proposed to discharge into the existing watercourses at Q_{Bar} with a restricted rate of 7.70 l/s/ha. This use of Q_{Bar} has been agreed with the LLFA; refer to **Appendix E.**

3.13. Surface water design calculations have been carried out for the storm events for the following storm events; 1 in 2, 1 in 30 and 1 in 100 year plus climate change allowance.

3.14. The model has been simulated using 45% in line with current upper allowances for the Adur and Ouse Management Catchments peak rainfall allowances.

3.15. The impermeable area of the proposed development has been measured based upon the reserved matters site layout, as shown in **Appendix I.** The proposed impermeable area is 1.41ha which includes an allowance of 10% for urban creep.

3.16. A C_v values of 1 has been used. WSCC has supported a reduced freeboard within the attenuation basin; refer to **Appendix E.**

3.17. The proposed strategy is split into two catchments. These are summarized in **Table 3-3** below.

Catchment	Developable Area (ha)	Impermeable Area (ha) – includes 10% UC	Discharge rate based on Q_{Bar} (l/s)	Attenuation Storage Required (m^3)
A	1.74	0.74	13.40	585
B	1.06	0.67	8.20	1,028

Table 3-3 Drainage Design with Catchments

3.18. The Surface Water Drainage Strategy is shown is **Appendix H** and indicated how the site will be drained, including the location of the attenuation features and the discharge locations.

3.19. Flow Network modelling has been undertaken to demonstrate that the proposed drainage strategy can restrict the site to equivalent greenfield runoff rates and accommodate the surface water runoff on site. Copies of the surface water drainage calculations are included in **Appendix I**. The total attenuation required for the site is 1,613m^3, as shown in **Table 3-3.**

Ancient Woodland Buffer and Root Protection Area (RPA)

3.20. An ancient woodland is located North East of the proposed site, in which the 15m buffer encroaches within the proposed site; refer to **Appendix J**.

3.21. The point of the proposed connection to the existing watercourse falls within the 15m buffer and tree RPA zone. The point of connection follows the drainage strategy at outline planning and the invert level of the connection allows for the proposed strategy to meet the volume requirements.

3.22. In order to minimise impact within the buffer and surrounding tree RPA's, it is proposed to connect to the existing watercourse via a conveyance swale. This type of connection is supported by WSCC and is preferred over a piped connection.

3.23. The surrounding hydrology should not be affected, as there is no groundwater at the connection point with the existing watercourse and the discharge rates are being restricted to greenfield. The conveyance swale is to be hand dug in line with the arboricultural statement.

Surface Water Runoff Quality

3.24. An assessment of the water quality of surface water runoff has been carried out in line with CIRIA C753, refer to **Appendix K**.

3.25. In determining the necessary SuDS treatment methods, reference is made to Table 26.2, Table 26.3 and Table 26.4 of the SuDS Manual (CIRIA C753), which have been duplicated in **Appendix K**.The tables outline the 'Simple Index Approach' which sets out the water treatment criteria in relation to land use and SuDS performance evidence. To ensure sufficient treatment is proposed for surface waters, the total pollution mitigation index of the selected SuDS methods must equal or exceed the pollution hazard index for the site.

Exceedance Routes

3.26. As a results of heavy or extreme storm events it is sometimes unavoidable for the capacity of sewers and other drainage systems to be exceeded. Drainage exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or pipe system becomes overloaded, blocked or when the outfall is restricted due to flood levels in the receiving water.

3.27. As the proposed attenuation features will be located within their respective lowest lying areas of the site, it will be intention to ensure flows are directed away from residential units. The routes will ultimately mimic the current flow routes associated with the existing site as a result of the topography.

Maintenance During Construction

3.28. Once SuDS are constructed, they will not be subjected to construction traffic without appropriate protection. All buried storage will be fenced off. If construction access is required across areas where buried storage is installed, the full depth of cover over will be required, and additional temporary geogrid reinforcement may be provided if necessary.

Future Maintenance

3.29. It is the intention that the main sewers will be adopted by Southern Water under a S104 agreement.

3.30. It is intended that the SuDS components and connecting pipework are managed by a private management company.

3.31. All of the plot drainage will remain private.

3.32. A maintenance plan is also included in **Appendix L**. These have been informed by the guidance outlines within CIRIA C753 and would be supplemented by manufacturer's specifications.

4. FOUL WATER DRAINAGE

4.1. The foul network will drain, via pumping station, to existing Southern Water manhole 5201. The outline drainage strategy can be found in **Appendix D**.

4.2. The peak rate of 3.38 l/s, based on the following assumptions as dictated by Sewers for Adoption 7th Edition:

- 4000 litres per dwelling per day
- 4000 x 73 = 292, 000
- 312000/86400 = 3.38 l/s

4.3. A Pre-Planning Development Enquiry has been completed with Southern Water.

5. CONCLUSION

5.1. The development proposals are to construct a total of 73 residential dwellings and associated infrastructure.

5.2. The greenfield runoff rates have been calculated as part of the Surface Water Drainage Strategy, using Flow with FEH data. These rates differ to what were agreed at outline planning.

5.3. The surface water drainage strategy comprises of a pipe surface water network within the roads. The pipe network discharges via a combination of an attenuation basin and a conveyance swale, into an existing watercourse, restricted to QBar rates.

5.4. The quality of surface water runoff has been assessed based on guidance within CIRIA C753 SuDS manual. The results demonstrate that all surfaces within the development will receive adequate treatment prior to discharge of run-off into the existing watercourses.

5.5. Surface water design calculations have been carried out for the 1 in 1, 1 in 30 plus climate change and 1 in 100 plus climate change allowance storm events using FEH data.

5.6. A 45% allowance for climate change was applied to the rainfall intensities, which is an increase from the 40% allowance set out within the FRA and approved at outline planning stage.

5.7. It it proposed to drain the foul water sewers, via pumping station, to an existing Southern Water manhole located on Shipley Road. We are currently waiting for a response for the pre-development enquiry, to confirm point of connection and capacity from proposed flows.

Appendix A

Bellway

N

S

dha architecture

dha architecture ltd
Brooklands Farm Business Park
Bottle Lane
Binfield
Berkshire
RG42 5QX
t. 0118 934 9666
e. surname@dhaarchitecture.co.uk
w. www.dhaarchitecture.co.uk

shipley road, southwater

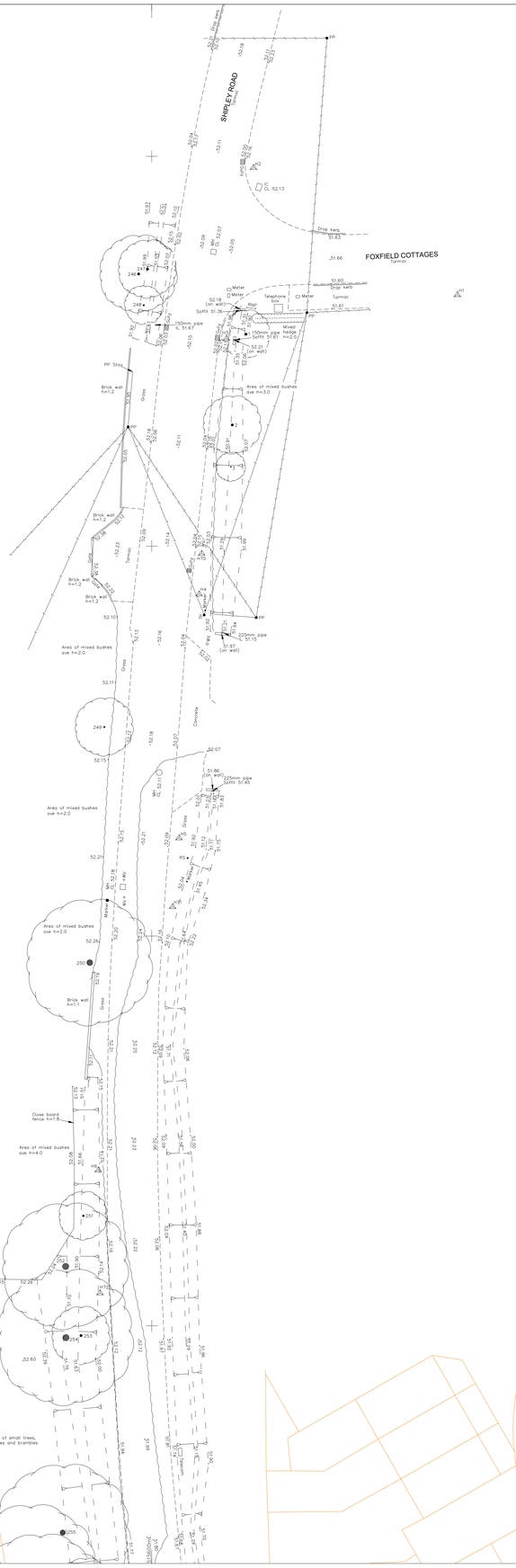
rev	date	by	details
A	22.09.25	SP	Units 22-24 pushed back and road widened.

Presentation Planning Layout

09.09.2025 created
1:500 @ A1 scaling
JeH contact

reference 102108-BEL-SL-01 A revision

Appendix B



Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.811	51.279
H2	515610.683	125318.854	52.165
H3	515607.683	125301.326	52.155
H4	515604.877	125275.096	52.134
H5	515602.817	125250.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.006	51.551
H8	515607.697	125134.783	50.966
H9	515604.709	125090.890	50.044
H10	515596.598	125060.757	49.357
H11	515578.902	125028.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124946.037	46.193
H15	515493.072	124913.489	45.644
H16	515483.304	124894.502	45.428
H17	515442.852	124817.632	44.160
H18	515423.465	124731.296	43.424
H19	515605.630	125006.527	47.936
H20	515594.883	125027.280	48.845
H21	515604.890	125045.109	49.342
H22	515614.384	125025.237	48.671
H23	515631.772	125083.115	49.893
H24	515620.073	125132.649	51.071
H25	515640.261	125126.218	50.382
H26	515649.295	125123.250	49.859
H27	515666.949	125118.444	48.978
H28	515687.676	125108.985	48.024
H29	515698.671	125104.910	47.542
H30	515715.301	125099.629	46.871
H31	515734.545	125093.294	46.117
H32	515754.001	125087.314	45.450
H33	515775.945	125077.516	44.247
H34	515788.979	125080.621	43.866
H35	515766.516	125061.250	44.526
H36	515752.911	125047.433	45.054
H37	515723.259	125015.579	45.791
H38	515695.570	124987.172	45.705
H39	515675.641	124963.895	45.336
H40	515659.082	124941.341	44.725
H41	515642.207	124913.069	44.238
H42	515616.664	124864.601	42.868
H43	515588.782	124876.456	43.949
H44	515568.736	124883.467	44.439
H45	515546.903	124891.338	44.989
H46	515529.290	124895.874	45.504
H47	515511.157	124903.072	45.870
H48	515518.756	124931.627	46.716
H49	515547.841	124970.288	47.439
H50	515573.354	124952.919	46.718
H51	515602.321	124947.252	46.131
H52	515621.853	124951.623	45.899
H53	515634.651	124974.227	46.255
H54	515616.519	124989.134	46.931
H55	515609.131	124970.923	46.909
H56	515597.567	124970.212	47.078
H57	515579.096	125006.089	48.479
H58	515583.833	124962.680	47.004
H59	515573.354	124972.100	47.563
H60	515562.756	124968.277	47.523
H61	515550.069	124975.151	47.523
H62	515561.462	124989.716	48.070
H63	515573.104	125002.806	48.356
H64	515582.007	125017.122	48.765
H65	515581.958	124983.925	47.647
H70	515605.139	125279.255	52.142
H71	515602.159	125243.012	52.114
H72	515594.718	125203.375	52.042
H73	515605.355	125160.318	51.414
H74	515607.377	125120.162	50.687
H75	515600.900	125073.556	49.418
H76	515579.635	125028.971	48.783
H77	515562.042	125003.778	48.201

Any setting-out should be undertaken using these control stations and any setting-out using GPS should be transformed to this control.

Tree Schedule

1	Maple	d=0.25	h=7	123	Oak	d=0.5	h= 15	246	Ash	d=0.25	h=12
2	Ash	d=0.25	h=7	124	Ash	d=0.25	h=12	247	Ash	d=0.25	h=10
3	Ash	d=0.1	h=6	125	Oak	d=0.5	h= 15	248	Unknown	d=0.15	h=8
4	Hawthorn	d=0.15	h=7	126	Oak	d=0.5	h= 15	249	Eucalyptus	d=0.15	h=9
5	Maple	d=0.35	h=10	127	Oak	d=0.5	h= 15	250	Oak	d=0.6	h=12
6	Ash	d=0.5	h=15	128	Oak	d=0.5	h= 15	251	Hawthorn	d=0.2	h=8
7	Ash	d=0.5	h=15	129	Maple	d=0.25	h=9	252	Ash	d=0.65	h=12
8	Maple	d=0.3	h=10	130	Oak	d=0.4	h= 15	253	Ash	d=0.25	h=10
9	Oak	d=0.55	h=15	131	Oak	d=0.45	h= 15	254	Oak	d=0.65	h=15
10	Oak	d=0.55	h=15	132	Maple	d=0.25	h=9	255	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h=10	133	Ash	d=0.25	h= 10	256	Oak	d=0.25	h=12
12	Oak	d=0.55	h=15	134	Ash	d=0.25	h= 10	257	Oak	d=0.55	h=15
13	Oak	d=0.65	h=15	135	Ash	d=0.2	h= 10	258	Oak	d=0.55	h=15
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17	Oak	d=0.55	h=15	139	Oak	d=0.65	h=15	262	Oak	d=0.65	h=15
18	Oak	d=0.7	h=15	140	Oak	d=0.6	h=15	263	Oak	d=0.5	h=15
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23	Maple	d=0.25	h=10	145	Oak	d=0.45	h=12	268	Oak	d=0.45	h=10
24	Maple	d=0.25	h=10	146	Oak	d=0.65	h=15	269	Oak	d=0.25	h=10
25	Oak	d=0.4	h=12	147	Oak	d=0.65	h=15	270	Hawthorn	d=0.25	h=7
26	Oak	d=0.4	h=12	148	Oak	d=0.7	h=15	271	Ash	d=0.3	h=12
27	Oak	d=0.45	h=12	149	Oak	d=0.5	h=15	272	Ash	d=0.3	h=12
28	Copper beech	d=0.35	h=12	150	Oak	d=0.5	h=15	273	Oak	d=0.5	h=15
29	Ash	d=0.15	h=9	151	Oak	d=0.5	h=15	274	Oak	d=0.45	h=15
30	Ash	d=0.15	h=9	152	Maple	d=0.25	h=9	275	Oak	d=0.55	h=15
31	Oak	d=0.45	h=12	153	Oak	d=0.55	h=15	276	Oak	d=0.25	h=12
32	Oak	d=0.45	h=12	154	Oak	d=0.65	h=15	277	Oak	d=0.3	h=12
33	Sweet chestnut	d=0.35	h=8	155	Oak	d=0.4	h=12	278	Oak	d=0.6	h=15
34	Hawthorn	d=0.15	h=7	156	Oak	d=0.6	h=15	279	Unknown	d=0.2	h=8
35	Sycamore	d=0.4	h=12	157	Maple	d=0.25	h=9	280	Unknown	d=0.2	h=8
36	Sycamore	d=0.5	h=12	158	Maple	d=0.25	h=9	281	Ash	d=0.3	h=12
37	Sycamore	d=0.45	h=12	159	Oak	d=0.45	h=15	282	Ash	d=0.3	h=12
38	Sweet chestnut	d=0.35	h=10	160	Oak	d=0.6	h=15	283	Hawthorn	d=0.25	h=7
39	Sweet chestnut	d=0.35	h=10	161	Hawthorn	d=0.2	h=7	284	Oak	d=0.7	h=15
40	Unknown	d=0.1	h=7	162	Hawthorn	d=0.15	h=5	285	Maple	d=0.25	h=10
41	Sweet chestnut	d=0.35	h=10	163	Hawthorn	d=0.2	h=5	286	Oak	d=0.65	h=15
42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=5	287	Oak	d=0.25	h=12
43	Cypress	d=0.15	h=5	165	Oak	d=0.5	h=12	288	Oak	d=0.25	h=12
44	Cypress	d=0.15	h=5	166	Oak	d=0.45	h=12	289	Oak	d=0.25	h=12
45	Cypress	d=0.15	h=5	167	Oak	d=0.55	h=15	290	Unknown	d=0.2	h=8
46	Unknown	d=0.15	h=7	168	Oak	d=0.65	h=15	291	Unknown	d=0.2	h=8
47	Ash	d=0.15	h=7	169	Oak	d=0.75	h=15	292	Unknown	d=0.2	h=8
48	Ash	d=0.15	h=7	170	Fruit	d=0.3	h=6	293	Unknown	d=0.2	h=8
49	Ash	d=0.2	h=10	171	Fruit	d=0.3	h=6	294	Unknown	d=0.2	h=8
50	Oak	d=0.45	h=12	172	Oak	d=0.5	h=12	295	Oak	d=0.45	h=12
51	Ash	d=0.2	h=10	173	Hawthorn	d=0.25	h=7	296	Oak	d=0.45	h=12
52	Oak	d=0.45	h=12	174	Hawthorn	d=0.25	h=7	297	Oak	d=0.45	h=12
53	Oak	d=0.45	h=12	175	Unknown	d=0.35	h=10	298	Oak	d=0.65	h=15
54	Hawthorn	d=0.2	h=7	176	Oak	d=0.65	h=15	299	Oak	d=0.45	h=12
55	Ash	d=0.3	h=10	177	Oak	d=0.65	h=15	300	Oak	d=0.45	h=12
56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7	301	Oak	d=0.6	h=15
57	Oak	d=0.5	h=12	179	Oak	d=0.45	h=15	302	Unknown	d=0.3	h=8
58	Oak	d=0.45	h=12	180	Oak	d=0.45	h=15	303	Oak	d=0.6	h=15
59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15	304	Oak	d=0.6	h=15
60	Ash	d=0.2	h=10	182	Oak	d=0.6	h=15	305	Oak	d=0.7	h=15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h=15				
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h=15				
63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15				
64	Cypress	d=0.25	h=10	186	Oak	d=0.75	h=15				
65	Cypress	d=0.15	h=10	187	Oak	d=0.6	h=15				
66	Cypress	d=0.2	h=10	188	Oak	d=0.6	h=12				
67	Cypress	d=0.15	h=10	189	Oak	d=0.55	h=15				
68	Cypress	d=0.25	h=10	190	Oak	d=0.6	h=15				
69	Oak	d=0.6	h=15	191	Oak	d=0.7	h=15				
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=9				
71	Hawthorn	d=0.2	h=7	193	Oak	d=0.75	h=15				
72	Hawthorn	d=0.2	h=7	194	Oak	d=0.2	h=10				
73	Oak	d=0.55	h=15	195	Unknown	d=0.2	h=9				
74	Oak	d=0.65	h=15	196	Sycamore	d=0.3	h=11				
75	Oak	d=0.6	h=15	197	Cypress	d=0.1	h=7				
76	Oak	d=0.6	h=15	198	Cypress	d=0.1	h=7				
77	Ash	d=0.2	h=10	199	Cypress	d=0.1	h=7				
78	Hawthorn	d=0.2	h=7	200	Cypress	d=0.1	h=7				
79	Oak	d=0.6	h=15	201	Cypress	d=0.1	h=7				
80	Ash	d=0.15	h=8	202	Cypress	d=0.1	h=7				
81	Ash	d=0.15	h=8	203	Cypress	d=0.1	h=7				
82	Oak	d=0.7	h=15	204	Cypress	d=0.1	h=7				
83	Oak	d=0.6	h=15	205	Eucalyptus	d=0.15	h=12				
84	Oak	d=0.45	h=15	206	Eucalyptus	d=0.3	h=12				
85	Oak	d=0.45	h=15	207	Eucalyptus	d=0.5	h=15				
86	Hawthorn	d=0.15	h=6	208	Fruit	d=0.45	h=8				
87	Hawthorn	d=0.15	h=6	209	Stump	d=0.75					
88	Hawthorn	d=0.15	h=6	210	Sump	d=0.45					
89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=12				
90	Oak	d=0.55	h=15	212	Maple	d=0.2	h=8				
91	Oak	d=0.5	h=15	213	Maple	d=0.2	h=8				
92	Oak	d=0.5	h=15	214	Sweet chestnut	d=0.2	h=10				
93	Oak	d=0.45	h=15	215	Maple	d=0.2	h=8				
94	Oak	d=0.65	h=15	216	Maple	d=0.2	h=8				
95	Oak	d=0.65	h=15	217	Maple	d=0.2	h=8				
96	Oak	d=0.75	h=15	218	Sweet chestnut	d=0.2	h=10				
97	Unknown	d=0.2	h=9	219	Sweet chestnut	d=0.15	h=8				
98	Oak	d=0.75	h=15	220	Maple	d=0.15	h=8				
99	Oak	d=0.65	h=15	221	Maple	d=0.15	h=8				
100	Oak	d=0.45	h=15	222	Maple	d=0.15	h=8				
101	Oak	d=0.55	h=15	223	Maple	d=0.15	h=8				
102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8				
103	Oak	d=0.3	h=10	225	Maple	d=0.2	h=9				
104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7				
105	Oak	d=0.65	h=15	227	Maple	d=0.15	h=7				
106	Oak	d=0.25	h=10	228	Maple	d=0.15	h=7				
107	Oak	d=0.25	h=10	229	Maple	d=0.25	h=8				
108	Oak	d=0.25	h=10	230	Fruit	d=0.25	h=8				
109	Ash	d=0.3	h=12	231	Ash	d=0.35	h=12				
110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9				
111	Ash	d=0.3	h=12	233	Copper beech	d=0.25	h=8				
112	Ash	d=0.25	h=10	234	Silver birch	d=0.2	h=5				
113	Ash	d=0.3	h=12	235	Cypress	d=0.25	h=6				
114	Ash	d=0.3	h=12	236	Cypress	d=0.1	h=5				
115	Oak	d=0.5	h=15	237	Fruit	d=0.4	h=4				
116	Oak	d=0.6	h=15	238	Stump	d=0.6					
117	Oak	d=0.5	h=15	239	Oak	d=1	h= 15				
118	Maple	d=0.2	h=9	240	Ash	d=0.3	h=12				
119	Maple	d=0.2	h=9	241	Cherry	d=0.1	h=3				
120	Maple	d=0.2	h=9	242	Stump	d=0.45					
121	Maple	d=0.2	h=9	243	Stump	d=0.45					
122	Maple	d=0.2	h=9	244	Stump	d=0.45					
				245	Fruit	d=0.45	h=6				

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line 64
Survey Station H5
Gate
Level 115.28
Ordnance Survey Benchmark OSBM
Foul Drainage 100mm FW MH CL 117.10 IL 116.75
Storm Drainage 100mm SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricty Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

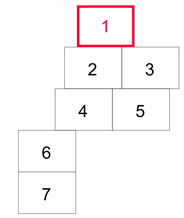
All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Digital Data added and shown in orange, pen colour 30.

Sheet Layout



Rev C: Visual check survey carried out and new internal fences surveyed. Survey control updated to reference centre of site March 2024
Rev B: Western side of Shipley Road added Nov 2020
Rev A: Additional ditches and site boundary added Oct 2020

HOOK SURVEY

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/01	C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 3 survey stations with a scale factor of 1.000, only the fixed survey stations H16, H59 & H60 are true Ordnance Survey positions.

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

Registered Member
@hooksurvey
THE SURVEY ASSOCIATION

www.hooksurvey.com

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64
Survey Station — H5
Gate
Level — 15.28
Ordnance Survey Benchmark — OSBM
Foul Drainage — 100mm — FM MH CL 117.10 IL 116.75
Storm Drainage — 100mm — SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Digital Data added and shown in orange, pen colour 30.

Tree Schedule

1	Maple	d=0.25	h=7	123	Oak	d=0.5	h=15	246	Ash	d=0.25	h=12
2	Ash	d=0.25	h=7	124	Ash	d=0.25	h=12	247	Ash	d=0.25	h=10
3	Ash	d=0.1	h=6	125	Oak	d=0.5	h=15	248	Unknown	d=0.15	h=8
4	Hawthorn	d=0.15	h=7	126	Oak	d=0.5	h=15	249	Eucalyptus	d=0.15	h=9
5	Maple	d=0.35	h=10	127	Oak	d=0.5	h=15	250	Oak	d=0.6	h=12
6	Ash	d=0.5	h=15	128	Oak	d=0.5	h=15	251	Hawthorn	d=0.2	h=8
7	Ash	d=0.5	h=15	129	Maple	d=0.25	h=9	252	Ash	d=0.65	h=12
8	Maple	d=0.3	h=10	130	Oak	d=0.4	h=15	253	Ash	d=0.25	h=10
9	Oak	d=0.55	h=15	131	Oak	d=0.45	h=15	254	Oak	d=0.65	h=15
10	Oak	d=0.55	h=15	132	Maple	d=0.25	h=9	255	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h=10	133	Ash	d=0.25	h=10	256	Oak	d=0.25	h=12
12	Oak	d=0.55	h=15	134	Ash	d=0.25	h=10	257	Oak	d=0.55	h=15
13	Oak	d=0.65	h=15	135	Ash	d=0.2	h=10	258	Oak	d=0.55	h=15
14	Oak	d=0.6	h=15	136	Ash	d=0.2	h=10	259	Oak	d=0.25	h=12
15	Oak	d=0.5	h=12	137	Ash	d=0.2	h=10	260	Oak	d=0.65	h=15
16	Oak	d=0.45	h=15	138	Oak	d=0.65	h=15	261	Unknown	d=0.2	h=8
17	Oak	d=0.55	h=15	139	Oak	d=0.65	h=15	262	Oak	d=0.65	h=15
18	Oak	d=0.7	h=15	140	Oak	d=0.6	h=15	263	Oak	d=0.5	h=15
19	Oak	d=0.6	h=15	141	Oak	d=0.6	h=15	264	Oak	d=0.5	h=15
20	Oak	d=0.4	h=15	142	Oak	d=0.55	h=15	265	Oak	d=0.5	h=15
21	Oak	d=0.6	h=12	143	Oak	d=0.55	h=15	266	Oak	d=0.5	h=15
22	Oak	d=0.6	h=12	144	Oak	d=0.45	h=15	267	Oak	d=0.45	h=15
23	Maple	d=0.25	h=10	145	Oak	d=0.45	h=12	268	Oak	d=0.45	h=10
24	Maple	d=0.25	h=10	146	Oak	d=0.65	h=15	269	Oak	d=0.25	h=10
25	Oak	d=0.4	h=12	147	Oak	d=0.65	h=15	270	Hawthorn	d=0.25	h=7
26	Oak	d=0.4	h=12	148	Oak	d=0.7	h=15	271	Ash	d=0.3	h=12
27	Oak	d=0.45	h=12	149	Oak	d=0.5	h=15	272	Ash	d=0.3	h=12
28	Copper beech	d=0.35	h=12	150	Oak	d=0.5	h=15	273	Oak	d=0.5	h=15
29	Ash	d=0.15	h=9	151	Oak	d=0.5	h=15	274	Oak	d=0.45	h=15
30	Ash	d=0.15	h=9	152	Maple	d=0.25	h=9	275	Oak	d=0.55	h=15
31	Oak	d=0.45	h=12	153	Oak	d=0.55	h=15	276	Oak	d=0.25	h=12
32	Oak	d=0.45	h=12	154	Oak	d=0.65	h=15	277	Oak	d=0.3	h=12
33	Sweet chestnut	d=0.35	h=8	155	Oak	d=0.4	h=12	278	Oak	d=0.6	h=15
34	Hawthorn	d=0.15	h=7	156	Oak	d=0.6	h=15	279	Unknown	d=0.2	h=8
35	Sycamore	d=0.4	h=12	157	Maple	d=0.25	h=9	280	Unknown	d=0.2	h=8
36	Sycamore	d=0.5	h=12	158	Maple	d=0.25	h=9	281	Ash	d=0.3	h=12
37	Sycamore	d=0.45	h=12	159	Oak	d=0.45	h=15	282	Ash	d=0.3	h=12
38	Sweet chestnut	d=0.35	h=10	160	Oak	d=0.6	h=15	283	Hawthorn	d=0.25	h=7
39	Sweet chestnut	d=0.35	h=10	161	Hawthorn	d=0.2	h=7	284	Oak	d=0.7	h=15
40	Unknown	d=0.1	h=7	162	Hawthorn	d=0.15	h=5	285	Maple	d=0.25	h=10
41	Sweet chestnut	d=0.35	h=10	163	Hawthorn	d=0.2	h=5	286	Oak	d=0.65	h=15
42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=5	287	Oak	d=0.25	h=12
43	Cypress	d=0.15	h=5	165	Oak	d=0.5	h=12	288	Oak	d=0.25	h=12
44	Cypress	d=0.15	h=5	166	Oak	d=0.45	h=12	289	Oak	d=0.25	h=12
45	Cypress	d=0.15	h=5	167	Oak	d=0.55	h=15	290	Unknown	d=0.2	h=8
46	Unknown	d=0.15	h=7	168	Oak	d=0.65	h=15	291	Unknown	d=0.2	h=8
47	Ash	d=0.15	h=7	169	Oak	d=0.75	h=15	292	Unknown	d=0.2	h=8
48	Ash	d=0.15	h=7	170	Fruit	d=0.3	h=6	293	Unknown	d=0.2	h=8
49	Ash	d=0.2	h=10	171	Fruit	d=0.3	h=6	294	Unknown	d=0.2	h=8
50	Oak	d=0.45	h=12	172	Oak	d=0.5	h=12	295	Oak	d=0.45	h=12
51	Ash	d=0.2	h=10	173	Hawthorn	d=0.25	h=7	296	Oak	d=0.45	h=12
52	Oak	d=0.45	h=12	174	Hawthorn	d=0.25	h=7	297	Oak	d=0.45	h=12
53	Oak	d=0.45	h=12	175	Unknown	d=0.35	h=10	298	Oak	d=0.65	h=15
54	Hawthorn	d=0.2	h=7	176	Oak	d=0.65	h=15	299	Oak	d=0.45	h=12
55	Ash	d=0.3	h=10	177	Oak	d=0.65	h=15	300	Oak	d=0.45	h=12
56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7	301	Oak	d=0.6	h=15
57	Oak	d=0.5	h=12	179	Oak	d=0.45	h=15	302	Unknown	d=0.3	h=8
58	Oak	d=0.45	h=12	180	Oak	d=0.45	h=15	303	Oak	d=0.6	h=15
59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15	304	Oak	d=0.6	h=15
60	Ash	d=0.2	h=10	182	Oak	d=0.6	h=15	305	Oak	d=0.7	h=15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h=15				
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h=15				
63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15				
64	Cypress	d=0.25	h=10	186	Oak	d=0.75	h=15				
65	Cypress	d=0.15	h=10	187	Oak	d=0.6	h=15				
66	Cypress	d=0.2	h=10	188	Oak	d=0.6	h=12				
67	Cypress	d=0.15	h=10	189	Oak	d=0.55	h=15				
68	Cypress	d=0.25	h=10	190	Oak	d=0.6	h=15				
69	Oak	d=0.6	h=15	191	Oak	d=0.7	h=15				
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=9				
71	Hawthorn	d=0.2	h=7	193	Oak	d=0.75	h=15				
72	Hawthorn	d=0.2	h=7	194	Oak	d=0.2	h=10				
73	Oak	d=0.55	h=15	195	Unknown	d=0.2	h=9				
74	Oak	d=0.65	h=15	196	Sycamore	d=0.3	h=11				
75	Oak	d=0.6	h=15	197	Cypress	d=0.1	h=7				
76	Oak	d=0.6	h=15	198	Cypress	d=0.1	h=7				
77	Ash	d=0.2	h=10	199	Cypress	d=0.1	h=7				
78	Hawthorn	d=0.2	h=7	200	Cypress	d=0.1	h=7				
79	Oak	d=0.6	h=15	201	Cypress	d=0.1	h=7				
80	Ash	d=0.15	h=8	202	Cypress	d=0.1	h=7				
81	Ash	d=0.15	h=8	203	Cypress	d=0.1	h=7				
82	Oak	d=0.7	h=15	204	Cypress	d=0.1	h=7				
83	Oak	d=0.6	h=15	205	Eucalyptus	d=0.15	h=12				
84	Oak	d=0.45	h=15	206	Eucalyptus	d=0.3	h=12				
85	Oak	d=0.45	h=15	207	Eucalyptus	d=0.5	h=15				
86	Hawthorn	d=0.15	h=6	208	Fruit	d=0.45	h=8				
87	Hawthorn	d=0.15	h=6	209	Stump	d=0.75					
88	Hawthorn	d=0.15	h=6	210	Stump	d=0.45					
89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=12				
90	Oak	d=0.55	h=15	212	Maple	d=0.2	h=8				
91	Oak	d=0.5	h=15	213	Maple	d=0.2	h=8				
92	Oak	d=0.5	h=15	214	Sweet chestnut	d=0.2	h=10				
93	Oak	d=0.45	h=15	215	Maple	d=0.2	h=8				
94	Oak	d=0.65	h=15	216	Maple	d=0.2	h=8				
95	Oak	d=0.65	h=15	217	Maple	d=0.2	h=8				
96	Oak	d=0.75	h=15	218	Sweet chestnut	d=0.2	h=10				
97	Unknown	d=0.2	h=9	219	Sweet chestnut	d=0.15	h=8				
98	Oak	d=0.75	h=15	220	Maple	d=0.15	h=8				
99	Oak	d=0.65	h=15	221	Maple	d=0.15	h=8				
100	Oak	d=0.45	h=15	222	Maple	d=0.15	h=8				
101	Oak	d=0.55	h=15	223	Maple	d=0.15	h=8				
102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8				
103	Oak	d=0.3	h=10	225	Maple	d=0.2	h=9				
104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7				
105	Oak	d=0.65	h=15	227	Maple	d=0.15	h=7				
106	Oak	d=0.25	h=10	228	Maple	d=0.15	h=7				
107	Oak	d=0.25	h=10	229	Maple	d=0.25	h=8				
108	Oak	d=0.25	h=10	230	Fruit	d=0.25	h=8				
109	Ash	d=0.3	h=12	231	Ash	d=0.35	h=12				
110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9				
111	Ash	d=0.3	h=12	233	Copper beech	d=0.25	h=8				
112	Ash	d=0.25	h=10	234	Silver birch	d=0.2	h=5				
113	Ash	d=0.3	h=12	235	Cypress	d=0.25	h=6				
114	Ash	d=0.3	h=12	236	Cypress	d=0.1	h=5				
115	Oak	d=0.5	h=15	237	Fruit	d=0.4	h=4				
116	Oak	d=0.6	h=15	238	Stump	d=0.6					
117	Oak	d=0.5	h=15	239	Oak	d=1	h=15				
118	Maple	d=0.2	h=9	240	Ash	d=0.3	h=12				
119	Maple	d=0.2	h=9	241	Cherry	d=0.1	h=3				
120	Maple	d=0.2	h=9	242	Stump	d=0.45					
121	Maple	d=0.2	h=9	243	Stump	d=0.45					
122	Maple	d=0.2	h=9	244	Stump	d=0.45					
				245	Fruit	d=0.45	h=6				

Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.611	51.279
H2	515610.683	125318.854	52.165
H3	515607.683	125301.326	52.155
H4	515604.877	125275.096	52.134
H5	515602.817	125250.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.006	51.551
H8	515607.697	125134.783	50.966
H9	515604.709	125090.890	50.044
H10	515596.598	125060.757	49.357
H11	515578.902	125028.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124946.037	46.193
H15	515493.072	124913.489	45.644
H16	515483.304	124894.502	45.428
H17	515442.852	124817.632	44.160
H18	515423.465	124731.296	43.424
H19	515605.630	125006.527	47.936
H20	515594.883	125027.280	48.845
H21	515604.890	125045.109	49.342
H22	515614.384	125025.237	48.941
H23	515631.772	125083.115	49.893
H24	515620.073	125132.649	51.071
H25	515640.261	125126.218	50.382
H26	515649.295	125123.250	49.859
H27	515668.949	125118.444	48.978
H28	515687.676	125108.985	48.024
H29	515698.671	125104.910	47.542
H30	515715.301	125099.629	46.871
H31	515734.545	125093.294	46.117
H32	515754.001	125087.314	45.450
H33	515775.945	125077.516	44.247
H34	515788.979	125080.621	43.866
H35	515766.516	125061.250	44.526
H36	515752.911	125047.433	45.054
H37	515723.259	125015.579	45.791
H38	515695.570	124987.172	45.705
H39	515675.641	124963.895	45.336
H40	515659.082	124941.341	44.725
H41	515642.207	124913.069	44.238
H42	515616.664	124864.601	42.868
H43	515588.782	124876.456	43.949
H44	515568.736	124883.467	44.439
H45	515546.903	124891.338	44.989
H46	515529.290	124895.874	45.504
H47	515511.157	124903.072	45.870
H48	515518.756	124931.627	46.716
H49	515547.841	124970.288	47.439
H50	515573.354	124952.919	46.718
H51	515602.321	124947.252	46.131
H52	515621.853	124951.623	45.899
H53	515634.651	124974.227	46.255
H54	515616.519	124989.134	46.931
H55	515609.131	124970.923	46.909
H56	515597.567	124970.212	47.078
H57	515579.096	125006.089	48.479
H58	515583.833	124962.680	47.004
H59	515573.354	124972.100	47.563
H60	515562.756	124968.277	47.523
H61	515550.069	124975.151	47.523
H62	515561.462	124989.716	48.070
H63	515573.104	125002.806	48.356
H64	515582.007	125017.122	48.765
H65	515581.958	124983.925	47.647
H70	515605.139	125279.255	52.142
H71	515602.159	125243.012	52.114
H72	515594.718	125203.375	52.042
H73	515605.355	125160.318	51.414
H74	515607.377	125120.162	50.687
H75	515600.900	125073.556	49.418
H76	515579.635	125028.971	48.783
H77	515562.042	125003.778	48.201

Any setting-out should be undertaken using these control stations and any setting-out using GPS should be transformed to this control.

Sheet Layout

1
2 3
4 5
6
7

Rev C: Visual check survey carried out and new internal fences surveyed. Survey control updated to reference centre of site — March 2024
Rev B: Western side of Shipley Road added — Nov 2020
Rev A: Additional ditches and site boundary added — Oct 2020

HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

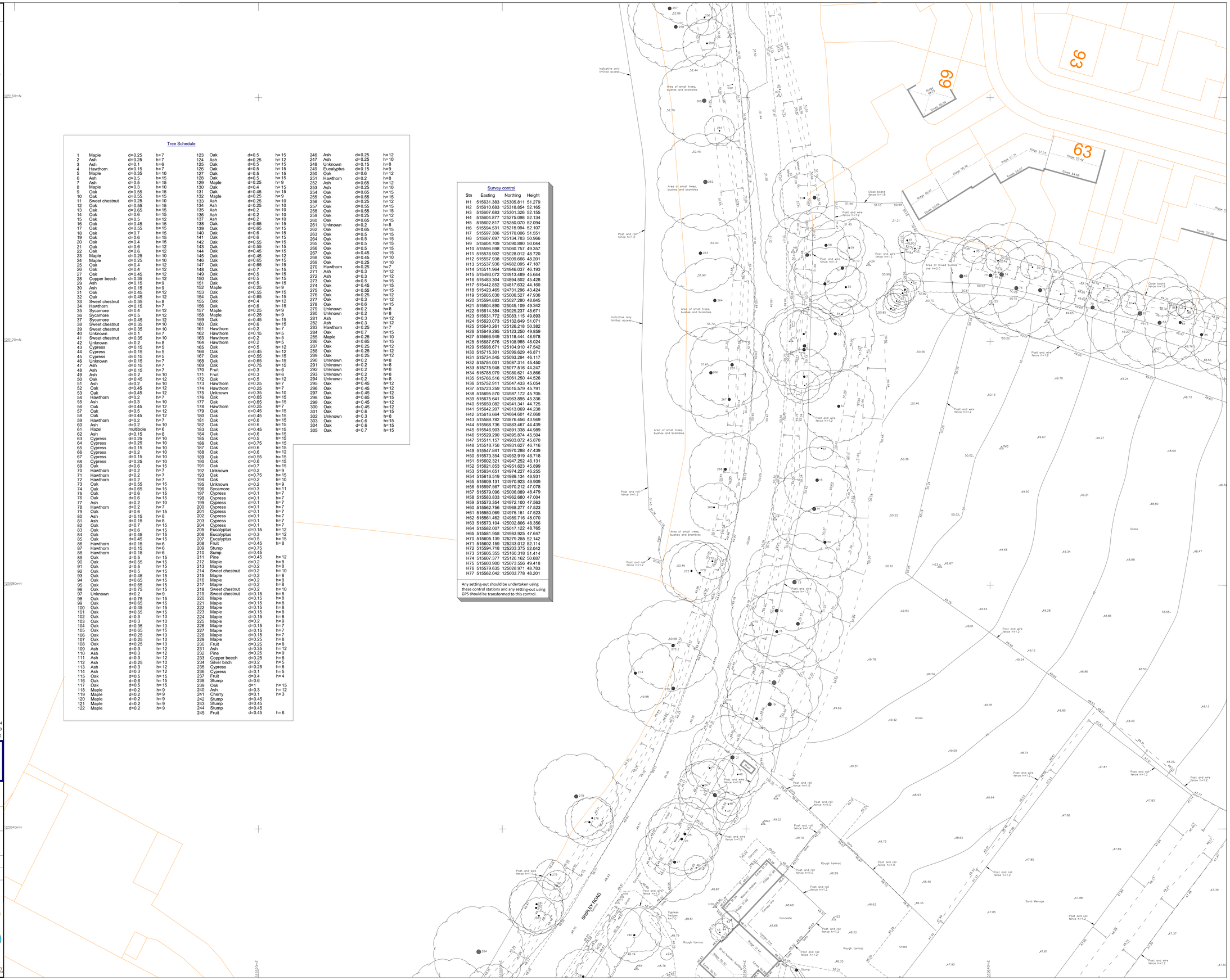
Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/02	C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

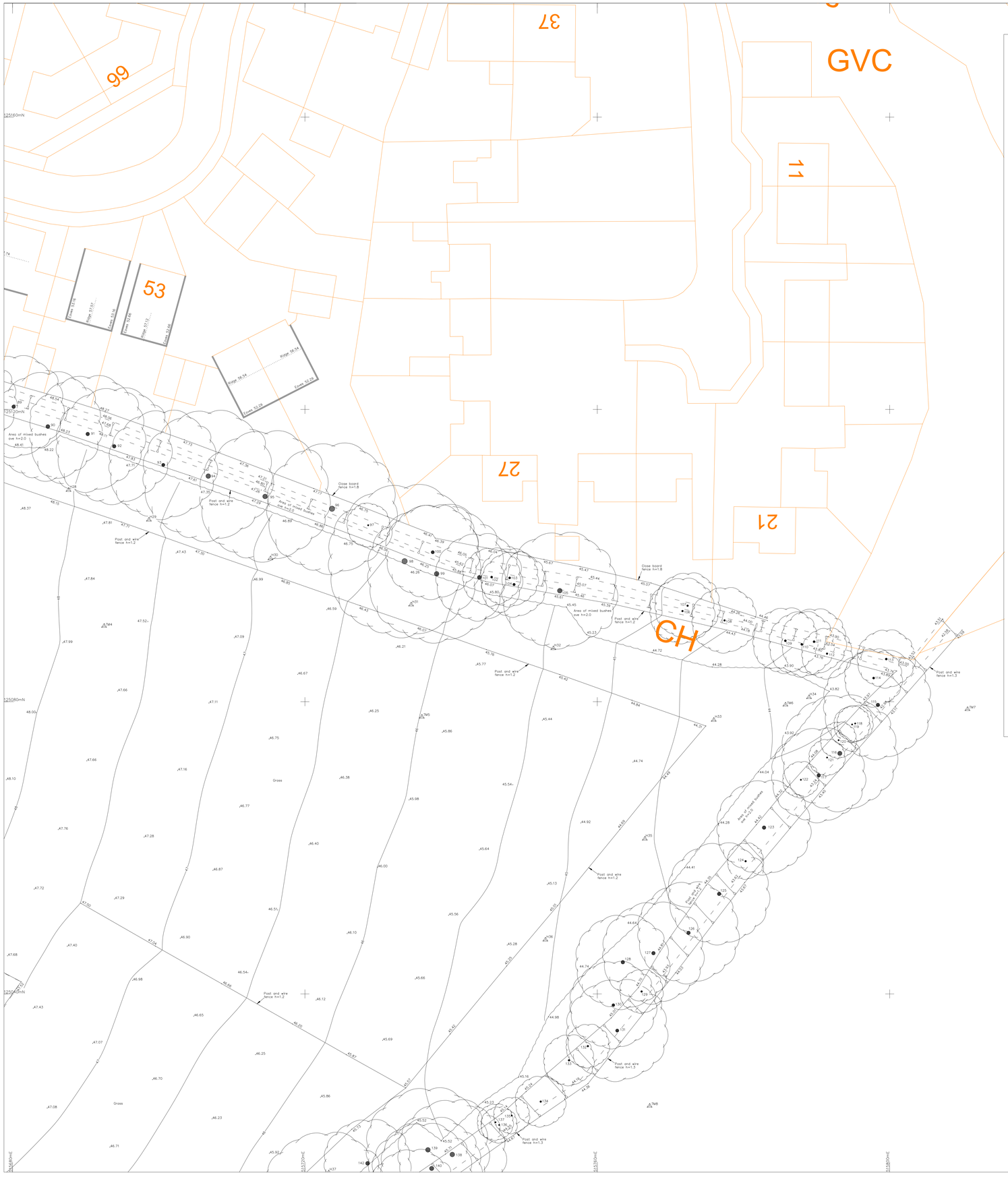
Grid & Levels related to :
Ordnance survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 3 survey stations with a scale factor of 1.000, only the fixed survey stations H16, H59 & H60 are true Ordnance Survey positions.

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com





Tree Schedule

1	Maple	d=0.25	h= 7	123	Oak	d=0.5	h= 15	246	Ash	d=0.25	h=12
2	Ash	d=0.25	h= 7	124	Ash	d=0.25	h= 12	247	Ash	d=0.25	h=10
3	Ash	d=0.1	h= 6	125	Oak	d=0.5	h= 15	248	Unknown	d=0.15	h=8
4	Hawthorn	d=0.15	h= 7	126	Oak	d=0.5	h= 15	249	Eucalyptus	d=0.15	h=9
5	Maple	d=0.35	h= 10	127	Oak	d=0.5	h= 15	250	Oak	d=0.6	h=12
6	Ash	d=0.5	h= 15	128	Oak	d=0.5	h= 15	251	Hawthorn	d=0.2	h=8
7	Ash	d=0.5	h= 15	129	Maple	d=0.25	h= 9	252	Ash	d=0.65	h=12
8	Maple	d=0.3	h= 10	130	Oak	d=0.4	h= 15	253	Ash	d=0.25	h=10
9	Oak	d=0.55	h= 15	131	Oak	d=0.45	h= 15	254	Oak	d=0.65	h=15
10	Oak	d=0.55	h= 15	132	Maple	d=0.25	h= 9	255	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h= 10	133	Ash	d=0.25	h= 10	256	Oak	d=0.25	h=12
12	Oak	d=0.55	h= 15	134	Ash	d=0.25	h= 10	257	Oak	d=0.55	h=15
13	Oak	d=0.65	h= 15	135	Ash	d=0.2	h= 10	258	Oak	d=0.55	h=15
14	Oak	d=0.6	h= 15	136	Ash	d=0.2	h= 10	259	Oak	d=0.25	h=12
15	Oak	d=0.5	h= 12	137	Ash	d=0.2	h= 10	260	Oak	d=0.65	h=15
16	Oak	d=0.45	h= 15	138	Oak	d=0.65	h= 15	261	Unknown	d=0.2	h=8
17	Oak	d=0.55	h= 15	139	Oak	d=0.65	h= 15	262	Oak	d=0.65	h= 15
18	Oak	d=0.7	h= 15	140	Oak	d=0.6	h= 15	263	Oak	d=0.5	h=15
19	Oak	d=0.6	h= 15	141	Oak	d=0.6	h= 15	264	Oak	d=0.5	h=15
20	Oak	d=0.4	h= 15	142	Oak	d=0.55	h= 15	265	Oak	d=0.5	h=15
21	Oak	d=0.6	h= 12	143	Oak	d=0.55	h= 15	266	Oak	d=0.5	h=15
22	Oak	d=0.6	h= 12	144	Oak	d=0.45	h= 15	267	Oak	d=0.45	h=15
23	Maple	d=0.25	h= 10	145	Oak	d=0.45	h= 12	268	Oak	d=0.45	h=10
24	Maple	d=0.25	h= 10	146	Oak	d=0.65	h= 15	269	Oak	d=0.25	h=10
25	Oak	d=0.4	h= 12	147	Oak	d=0.65	h= 15	270	Hawthorn	d=0.25	h=7
26	Oak	d=0.4	h= 12	148	Oak	d=0.7	h= 15	271	Ash	d=0.3	h=12
27	Oak	d=0.45	h= 12	149	Oak	d=0.5	h= 15	272	Ash	d=0.3	h=12
28	Copper beech	d=0.35	h= 12	150	Oak	d=0.5	h= 15	273	Oak	d=0.5	h=15
29	Ash	d=0.15	h= 9	151	Oak	d=0.5	h= 15	274	Oak	d=0.45	h=15
30	Ash	d=0.15	h= 9	152	Maple	d=0.25	h= 9	275	Oak	d=0.55	h=15
31	Oak	d=0.45	h= 12	153	Oak	d=0.55	h= 15	276	Oak	d=0.25	h=12
32	Oak	d=0.45	h= 12	154	Oak	d=0.65	h= 15	277	Oak	d=0.3	h=12
33	Sweet chestnut	d=0.35	h= 8	155	Oak	d=0.4	h= 12	278	Oak	d=0.6	h=15
34	Hawthorn	d=0.15	h= 7	156	Oak	d=0.6	h= 15	279	Unknown	d=0.2	h=8
35	Sycamore	d=0.4	h= 12	157	Maple	d=0.25	h= 9	280	Unknown	d=0.2	h=8
36	Sycamore	d=0.5	h= 12	158	Maple	d=0.25	h= 9	281	Ash	d=0.3	h=12
37	Sycamore	d=0.45	h= 12	159	Oak	d=0.45	h= 15	282	Ash	d=0.3	h=12
38	Sweet chestnut	d=0.35	h= 10	160	Oak	d=0.6	h= 15	283	Hawthorn	d=0.25	h=7
39	Sweet chestnut	d=0.35	h= 10	161	Hawthorn	d=0.2	h= 7	284	Oak	d=0.7	h= 15
40	Unknown	d=0.1	h= 7	162	Hawthorn	d=0.15	h= 5	285	Maple	d=0.25	h=10
41	Sweet chestnut	d=0.35	h= 10	163	Hawthorn	d=0.2	h= 5	286	Oak	d=0.65	h=15
42	Unknown	d=0.2	h= 8	164	Hawthorn	d=0.2	h= 5	287	Oak	d=0.25	h=12
43	Cypress	d=0.15	h= 5	165	Oak	d=0.5	h= 12	288	Oak	d=0.25	h=12
44	Cypress	d=0.15	h= 5	166	Oak	d=0.45	h= 12	289	Oak	d=0.25	h=12
45	Cypress	d=0.15	h= 5	167	Oak	d=0.55	h= 15	290	Unknown	d=0.2	h=8
46	Unknown	d=0.15	h= 7	168	Oak	d=0.65	h= 15	291	Unknown	d=0.2	h=8
47	Ash	d=0.15	h= 7	169	Oak	d=0.75	h= 15	292	Unknown	d=0.2	h=8
48	Ash	d=0.15	h= 7	170	Fruit	d=0.3	h= 6	293	Unknown	d=0.2	h=8
49	Ash	d=0.2	h= 10	171	Fruit	d=0.3	h= 6	294	Unknown	d=0.2	h=8
50	Oak	d=0.45	h= 12	172	Oak	d=0.5	h= 12	295	Oak	d=0.45	h=12
51	Ash	d=0.2	h= 10	173	Hawthorn	d=0.25	h= 7	296	Oak	d=0.45	h=12
52	Oak	d=0.45	h= 12	174	Hawthorn	d=0.25	h= 7	297	Oak	d=0.45	h=12
53	Oak	d=0.45	h= 12	175	Unknown	d=0.35	h= 10	298	Oak	d=0.65	h=15
54	Hawthorn	d=0.2	h= 7	176	Oak	d=0.65	h= 15	299	Oak	d=0.45	h=12
55	Ash	d=0.3	h= 10	177	Oak	d=0.65	h= 15	300	Oak	d=0.45	h=12
56	Oak	d=0.45	h= 12	178	Hawthorn	d=0.25	h= 7	301	Oak	d=0.6	h=15
57	Oak	d=0.5	h= 12	179	Oak	d=0.45	h= 15	302	Unknown	d=0.3	h=8
58	Oak	d=0.45	h= 12	180	Oak	d=0.45	h= 15	303	Oak	d=0.6	h= 15
59	Hawthorn	d=0.2	h= 7	181	Oak	d=0.6	h= 15	304	Oak	d=0.6	h= 15
60	Ash	d=0.2	h= 10	182	Oak	d=0.6	h= 15	305	Oak	d=0.7	h= 15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h= 15				
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h= 15				
63	Cypress	d=0.25	h= 10	185	Oak	d=0.5	h= 15				
64	Cypress	d=0.25	h= 10	186	Oak	d=0.75	h= 15				
65	Cypress	d=0.15	h= 10	187	Oak	d=0.6	h= 15				
66	Cypress	d=0.2	h= 10	188	Oak	d=0.6	h= 12				
67	Cypress	d=0.15	h= 10	189	Oak	d=0.55	h= 15				
68	Cypress	d=0.25	h= 10	190	Oak	d=0.6	h= 15				
69	Oak	d=0.6	h= 15	191	Oak	d=0.7	h= 15				
70	Hawthorn	d=0.2	h= 7	192	Unknown	d=0.2	h= 9				
71	Hawthorn	d=0.2	h= 7	193	Oak	d=0.75	h= 15				
72	Hawthorn	d=0.2	h= 7	194	Oak	d=0.2	h= 10				
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74	Oak	d=0.65	h= 15	196	Sycamore	d=0.3	h= 11				
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77	Ash	d=0.2	h= 10	199	Cypress	d=0.1	h= 7				
78	Hawthorn	d=0.2	h= 7	200	Cypress	d=0.1	h= 7				
79	Oak	d=0.6	h= 15	201	Cypress	d=0.1	h= 7				
80	Ash	d=0.15	h= 8	202	Cypress	d=0.1	h= 7				
81	Ash	d=0.15	h= 8	203	Cypress	d=0.1	h= 7				
82	Oak	d=0.7	h= 15	204	Cypress	d=0.1	h= 7				
83	Oak	d=0.6	h= 15	205	Eucalyptus	d=0.15	h= 12				
84	Oak	d=0.45	h= 15	206	Eucalyptus	d=0.3	h= 12				
85	Oak	d=0.45	h= 15	207	Eucalyptus	d=0.5	h= 15				
86	Hawthorn	d=0.15	h= 6	208	Fruit	d=0.45	h=8				
87	Hawthorn	d=0.15	h= 6	209	Stump	d=0.75					
88	Hawthorn	d=0.15	h= 6	210	Stump	d=0.45					
89	Oak	d=0.5	h= 15	211	Pine	d=0.45	h= 12				
90	Oak	d=0.55	h= 15	212	Maple	d=0.2	h=8				
91	Oak	d=0.5	h= 15	213	Maple	d=0.2	h=8				
92	Oak	d=0.5	h= 15	214	Sweet chestnut	d=0.2	h= 10				
93	Oak	d=0.45	h= 15	215	Maple	d=0.2	h=8				
94	Oak	d=0.65	h= 15	216	Maple	d=0.2	h=8				
95	Oak	d=0.65	h= 15	217	Maple	d=0.2	h=8				
96	Oak	d=0.75	h= 15	218	Sweet chestnut	d=0.2	h= 10				
97	Unknown	d=0.2	h= 9	219	Sweet chestnut	d=0.15	h=8				
98	Oak	d=0.75	h= 15	220	Maple	d=0.15	h=8				
99	Oak	d=0.65	h= 15	221	Maple	d=0.15	h=8				
100	Oak	d=0.45	h= 15	222	Maple	d=0.15	h=8				
101	Oak	d=0.55	h= 15	223	Maple	d=0.15	h=8				
102	Oak	d=0.3	h= 10	224	Maple	d=0.15	h=8				
103	Oak	d=0.3	h= 10	225	Maple	d=0.2	h=9				
104	Oak	d=0.35	h= 10	226	Maple	d=0.15	h= 7				
105	Oak	d=0.65	h= 15	227	Maple	d=0.15	h= 7				
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107	Oak	d=0.25	h= 10	229	Maple	d=0.25	h=8				
108	Oak	d=0.25	h= 10	230	Fruit	d=0.25	h=8				
109	Ash	d=0.3	h= 12	231	Ash	d=0.35	h= 12				
110	Ash	d=0.3	h= 12	232	Pine	d=0.25	h=9				
111	Ash	d=0.3	h= 12	233	Copper beech	d=0.25	h=8				
112	Ash	d=0.25	h= 10	234	Silver birch	d=0.2	h=5				
113	Ash	d=0.3	h= 12	235	Cypress	d=0.25	h=6				
114	Ash	d=0.3	h= 12	236	Cypress	d=0.1	h=5				
115	Oak	d=0.5	h= 15	237	Fruit	d=0.4	h=4				
116	Oak	d=0.6	h= 15	238	Stump	d=0.6					
117	Oak	d=0.5	h= 15	239	Oak	d=1	h= 15				
118	Maple	d=0.2	h=9	240	Ash	d=0.3	h= 12				
119	Maple	d=0.2	h=9	241	Cherry	d=0.1	h= 3				
120	Maple	d=0.2	h=9	242	Stump	d=0.45					
121	Maple	d=0.2	h=9	243	Stump	d=0.45					
122	Maple	d=0.2	h=9	244	Stump	d=0.45					
				245	Fruit	d=0.45	h=6				

Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.811	51.279
H2	515610.683	125318.854	52.165
H3	515607.683	125301.326	52.155
H4	515604.877	125275.098	52.134
H5	515602.817	125250.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.006	51.551
H8	515607.697	125134.783	50.966
H9	515604.709	125090.890	50.044
H10	515596.598	125060.757	49.357
H11	515578.902	125028.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124946.037	46.193
H15	515493.072	124913.489	45.644
H16	515483.304	124894.502	45.428
H17	515442.852	124817.632	44.160
H18	515423.465	124731.296	43.424
H19	515605.630	125006.527	47.936
H20	515594.883	125027.280	48.845
H21	515604.890	125045.109	49.342
H22	515614.384	125025.237	48.671
H23	515631.772	125083.115	49.893
H24	515620.073	125132.649	51.071
H25	515640.261	125126.218	50.382
H26	515649.295	125123.250	49.859
H27	515666.949	125118.444	48.978
H28	515687.676	125108.985	48.024
H29	515698.671	125104.910	47.542
H30	515715.301	125099.629	46.871
H31	515734.545	125093.294	46.117
H32	515754.001	125087.314	45.450
H33	515775.945	125077.516	44.247
H34	515788.979	125080.621	43.866
H35	515766.516	125061.250	44.526
H36	515752.911	125047.433	45.054
H37	515723.259	125015.579	45.791
H38	515695.570	124987.172	45.705
H39	515675.641	124963.895	45.336
H40	515659.082	124941.341	44.725
H41	515642.207	124913.069	44.238
H42	515616.664	124864.601	42.868
H43	515588.782	124876.456	43.949
H44	515568.736	124883.467	44.439
H45	515546.903	124891.338	44.989
H46	515529.290	124895.874	45.504
H47	515511.157	124903.072	45.870
H48	515518.756	124931.627	46.716
H49	515547.841	124970.288	47.439
H50	515573.354	124952.919	46.718
H51	515602.321	124947.252	46.131
H52	515621.853	124951.623	45.899
H53	515634.651	124974.227	46.255
H54	515616.519	124989.134	46.931
H55	515609.131	124970.923	46.909
H56	515597.567	124970.212	47.078
H57	515579.096	125006.089	48.479
H58	515583.833	124962.680	47.004
H59	515573.354	124972.100	47.563
H60	515562.756	124968.277	47.523
H61	515550.069	124975.151	47.523
H62	515561.482	124989.716	48.070
H63	515573.104	125002.806	48.356
H64	515582.007	125017.122	48.765
H65	515581.958	124983.925	47.647
H70	515605.139	125279.255	52.142
H71	515602.159	125243.012	52.114
H72	515594.718	125203.375	52.042
H73	515605.355	125160.318	51.414
H74	515607.377	125120.162	50.687
H75	515600.900	125073.556	49.418
H76	515579.635	125028.971	48.783
H77	515562.042	125003.778	48.201

Any setting-out should be undertaken using these control stations and any setting-out using GPS should be transformed to this control.

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line 64
Survey Station H5
Gate
Level J15.28
Ordnance Survey Benchmark OSBM FM MH CL 117.10 IL 116.75
Foul Drainage 100mm FW MH CL 117.10 IL 116.75
Storm Drainage 100mm SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforcorr Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Digital Data added and shown in orange, pen colour 30.

Sheet Layout

1
2 3
4 5
6
7

Rev C: Visual check survey carried out and new internal fences surveyed, Survey control updated to reference centre of site March 2024
Rev B: Western side of Shipley Road added Nov 2020
Rev A: Additional ditches and site boundary added Oct 2020

HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/03	C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :-
Ordnance survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 3 survey stations with a scale factor of 1.000, only the fixed survey stations H16, H59 & H60 are true Ordnance Survey positions.

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Registered Member
@hooksurvey
THE SURVEY ASSOCIATION

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line 6·4
Survey Station H15
Gate
Level 115.28
Ordnance Survey Benchmark OSBM
Foul Drainage 100mm FW MH CL 117.10 IL 116.75
Storm Drainage 100mm SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
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Cover Level	CL
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Unable To Lift	UTL
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0 5 10
Scale

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Sheet Layout

1
2 3
4 5
6
7

Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.811	51.279
H2	515610.683	125318.854	52.165
H3	515607.683	125301.326	52.155
H4	515604.877	125275.098	52.134
H5	515602.817	125250.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.006	51.551
H8	515607.697	125134.783	50.966
H9	515604.709	125090.890	50.044
H10	515596.598	125060.757	49.357
H11	515578.902	125028.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124946.037	46.193
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H30	515715.301	125099.629	46.871
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H70	515605.139	125279.255	52.142
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Rev C: Visual check survey carried out and new internal fences surveyed, Survey control updated to reference centre of site — March 2024
Rev B: Western side of Shipley Road added — Nov 2020
Rev A: Additional ditches and site boundary added — Oct 2020

HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/04	C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

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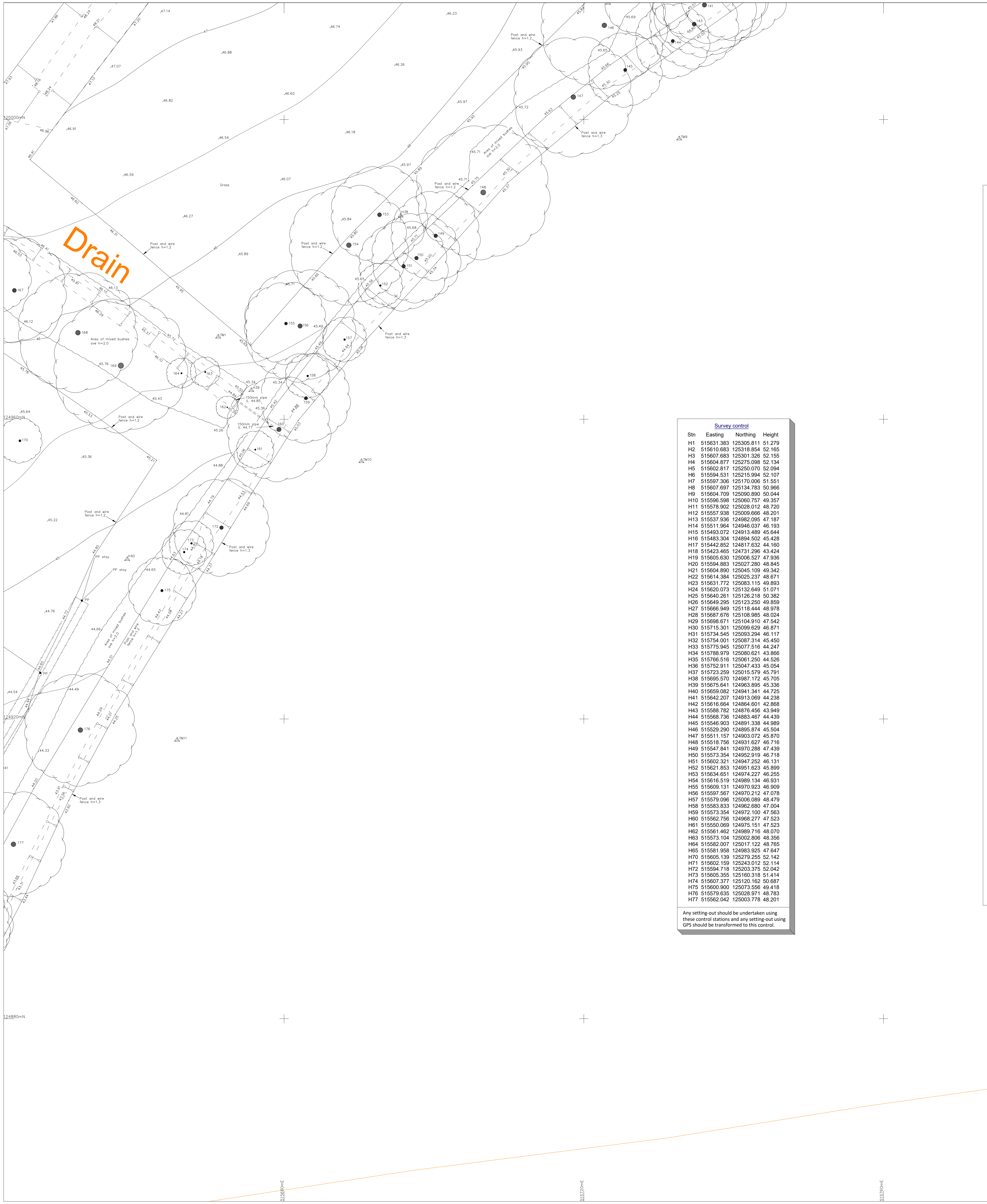
Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Registered office

THE SURVEY ASSOCIATION



Survey control

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H77	515562.042	125003.778	48.201

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Tree Schedule

1	Maple	d=0.25	h=7
2	Ash	d=0.25	h=7
3	Ash	d=0.1	h=6
4	Hawthorn	d=0.15	h=7
5	Maple	d=0.35	h=10
6	Ash	d=0.5	h=15
7	Ash	d=0.5	h=15
8	Maple	d=0.3	h=10
9	Oak	d=0.55	h=15
10	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h=10
12	Oak	d=0.55	h=15
13	Oak	d=0.65	h=15
14	Oak	d=0.6	h=15
15	Oak	d=0.5	h=12
16	Oak	d=0.45	h=15
17	Oak	d=0.55	h=15
18	Oak	d=0.7	h=15
19	Oak	d=0.6	h=15
20	Oak	d=0.4	h=15
21	Oak	d=0.6	h=12
22	Oak	d=0.6	h=12
23	Maple	d=0.25	h=10
24	Maple	d=0.25	h=10
25	Oak	d=0.4	h=12
26	Oak	d=0.4	h=12
27	Oak	d=0.45	h=12
28	Copper beech	d=0.35	h=12
29	Ash	d=0.15	h=9
30	Ash	d=0.15	h=9
31	Oak	d=0.45	h=12
32	Oak	d=0.45	h=12
33	Sweet chestnut	d=0.35	h=8
34	Hawthorn	d=0.15	h=7
35	Sycamore	d=0.4	h=12
36	Sycamore	d=0.5	h=12
37	Sycamore	d=0.45	h=12
38	Sweet chestnut	d=0.35	h=10
39	Sweet chestnut	d=0.35	h=10
40	Unknown	d=0.1	h=7
41	Sweet chestnut	d=0.35	h=10
42	Unknown	d=0.2	h=8
43	Cypress	d=0.15	h=5
44	Cypress	d=0.15	h=5
45	Cypress	d=0.15	h=5
46	Unknown	d=0.15	h=7
47	Ash	d=0.15	h=7
48	Ash	d=0.15	h=7
49	Ash	d=0.2	h=10
50	Oak	d=0.45	h=12
51	Ash	d=0.2	h=10
52	Oak	d=0.45	h=12
53	Oak	d=0.45	h=12
54	Hawthorn	d=0.2	h=7
55	Ash	d=0.3	h=10
56	Oak	d=0.45	h=12
57	Oak	d=0.5	h=12
58	Oak	d=0.45	h=12
59	Hawthorn	d=0.2	h=7
60	Ash	d=0.2	h=10
61	Hazel	multibole	h=6
62	Ash	d=0.15	h=8
63	Cypress	d=0.25	h=10
64	Cypress	d=0.25	h=10
65	Cypress	d=0.15	h=10
66	Cypress	d=0.2	h=10
67	Cypress	d=0.15	h=10
68	Cypress	d=0.25	h=10
69	Oak	d=0.6	h=15
70	Hawthorn	d=0.2	h=7
71	Hawthorn	d=0.2	h=7
72	Hawthorn	d=0.2	h=7
73	Oak	d=0.55	h=15
74	Oak	d=0.65	h=15
75	Oak	d=0.6	h=15
76	Oak	d=0.6	h=15
77	Ash	d=0.2	h=10
78	Hawthorn	d=0.2	h=7
79	Oak	d=0.6	h=15
80	Ash	d=0.15	h=8
81	Ash	d=0.15	h=8
82	Oak	d=0.7	h=15
83	Oak	d=0.6	h=15
84	Oak	d=0.45	h=15
85	Oak	d=0.45	h=15
86	Hawthorn	d=0.15	h=6
87	Hawthorn	d=0.15	h=6
88	Hawthorn	d=0.15	h=6
89	Oak	d=0.5	h=15
90	Oak	d=0.55	h=15
91	Oak	d=0.5	h=15
92	Oak	d=0.5	h=15
93	Oak	d=0.45	h=15
94	Oak	d=0.65	h=15
95	Oak	d=0.65	h=15
96	Oak	d=0.75	h=15
97	Unknown	d=0.2	h=9
98	Oak	d=0.75	h=15
99	Oak	d=0.65	h=15
100	Oak	d=0.45	h=15
101	Oak	d=0.55	h=15
102	Oak	d=0.3	h=10
103	Oak	d=0.3	h=10
104	Oak	d=0.35	h=10
105	Oak	d=0.65	h=15
106	Oak	d=0.25	h=10
107	Oak	d=0.25	h=10
108	Oak	d=0.25	h=10
109	Ash	d=0.3	h=12
110	Ash	d=0.3	h=12
111	Ash	d=0.3	h=12
112	Ash	d=0.25	h=10
113	Ash	d=0.3	h=12
114	Ash	d=0.3	h=12
115	Oak	d=0.5	h=15
116	Oak	d=0.6	h=15
117	Oak	d=0.5	h=15
118	Maple	d=0.2	h=9
119	Maple	d=0.2	h=9
120	Maple	d=0.2	h=9
121	Maple	d=0.2	h=9
122	Maple	d=0.2	h=9
123	Oak	d=0.5	h=15
124	Ash	d=0.25	h=12
125	Oak	d=0.5	h=15
126	Oak	d=0.5	h=15
127	Oak	d=0.5	h=15
128	Oak	d=0.5	h=15
129	Maple	d=0.25	h=9
130	Oak	d=0.4	h=15
131	Oak	d=0.45	h=15
132	Maple	d=0.25	h=9
133	Ash	d=0.25	h=10
134	Ash	d=0.25	h=10
135	Ash	d=0.2	h=10
136	Ash	d=0.2	h=10
137	Ash	d=0.2	h=10
138	Oak	d=0.65	h=15
139	Oak	d=0.65	h=15
140	Oak	d=0.6	h=15
141	Oak	d=0.6	h=15
142	Oak	d=0.55	h=15
143	Oak	d=0.55	h=15
144	Oak	d=0.45	h=15
145	Oak	d=0.45	h=12
146	Oak	d=0.65	h=15
147	Oak	d=0.65	h=15
148	Oak	d=0.7	h=15
149	Oak	d=0.5	h=15
150	Oak	d=0.5	h=15
151	Oak	d=0.5	h=15
152	Maple	d=0.25	h=9
153	Oak	d=0.55	h=15
154	Oak	d=0.65	h=15
155	Oak	d=0.4	h=12
156	Oak	d=0.6	h=15
157	Maple	d=0.25	h=9
158	Maple	d=0.25	h=9
159	Oak	d=0.45	h=15
160	Oak	d=0.6	h=15
161	Hawthorn	d=0.2	h=7
162	Hawthorn	d=0.15	h=5
163	Hawthorn	d=0.2	h=5
164	Hawthorn	d=0.2	h=5
165	Oak	d=0.5	h=12
166	Oak	d=0.45	h=12
167	Oak	d=0.55	h=15
168	Oak	d=0.65	h=15
169	Oak	d=0.75	h=15
170	Fruit	d=0.3	h=6
171	Fruit	d=0.3	h=6
172	Oak	d=0.5	h=12
173	Hawthorn	d=0.25	h=7
174	Hawthorn	d=0.25	h=7
175	Unknown	d=0.35	h=10
176	Oak	d=0.65	h=15
177	Oak	d=0.65	h=15
178	Hawthorn	d=0.25	h=7
179	Oak	d=0.45	h=15
180	Oak	d=0.45	h=15
181	Oak	d=0.6	h=15
182	Oak	d=0.6	h=15
183	Oak	d=0.45	h=15
184	Oak	d=0.6	h=15
185	Oak	d=0.5	h=15
186	Oak	d=0.75	h=15
187	Oak	d=0.6	h=15
188	Oak	d=0.6	h=12
189	Oak	d=0.55	h=15
190	Oak	d=0.6	h=15
191	Oak	d=0.7	h=15
192	Unknown	d=0.2	h=9
193	Oak	d=0.75	h=15
194	Oak	d=0.2	h=10
195	Unknown	d=0.2	h=9
196	Sycamore	d=0.3	h=11
197	Cypress	d=0.1	h=7
198	Cypress	d=0.1	h=7
199	Cypress	d=0.1	h=7
200	Cypress	d=0.1	h=7
201	Cypress	d=0.1	h=7
202	Cypress	d=0.1	h=7
203	Cypress	d=0.1	h=7
204	Cypress	d=0.1	h=7
205	Eucalyptus	d=0.15	h=12
206	Eucalyptus	d=0.3	h=12
207	Eucalyptus	d=0.5	h=15
208	Fruit	d=0.45	h=8
209	Stump	d=0.75	
210	Sump	d=0.45	
211	Pine	d=0.45	h=12
212	Maple	d=0.2	h=8
213	Maple	d=0.2	h=8
214	Sweet chestnut	d=0.2	h=10
215	Maple	d=0.2	h=8
216	Maple	d=0.2	h=8
217	Maple	d=0.2	h=8
218	Sweet chestnut	d=0.2	h=10
219	Sweet chestnut	d=0.15	h=8
220	Maple	d=0.15	h=8
221	Maple	d=0.15	h=8
222	Maple	d=0.15	h=8
223	Maple	d=0.15	h=8
224	Maple	d=0.15	h=8
225	Maple	d=0.2	h=9
226	Maple	d=0.15	h=7
227	Maple	d=0.15	h=7
228	Maple	d=0.15	h=7
229	Maple	d=0.25	h=8
230	Fruit	d=0.25	h=8
231	Ash	d=0.35	h=12
232	Pine	d=0.25	h=9
233	Copper beech	d=0.25	h=8
234	Silver birch	d=0.2	h=5
235	Cypress	d=0.25	h=6
236	Cypress	d=0.1	h=5
237	Fruit	d=0.4	h=4
238	Stump	d=0.6	
239	Oak	d=1	h=15
240	Ash	d=0.3	h=12
241	Cherry	d=0.1	h=3
242	Stump	d=0.45	
243	Stump	d=0.45	
244	Stump	d=0.45	
245	Fruit	d=0.45	h=6
246	Ash	d=0.25	h=12
247	Ash	d=0.25	h=10
248	Unknown	d=0.15	h=8
249	Eucalyptus	d=0.15	h=9
250	Oak	d=0.6	h=12
251	Hawthorn	d=0.2	h=8
252	Ash	d=0.65	h=12
253	Ash	d=0.25	h=10
254	Oak	d=0.65	h=15
255	Oak	d=0.55	h=15
256	Oak	d=0.25	h=12
257	Oak	d=0.55	h=15
258	Oak	d=0.55	h=15
259	Oak	d=0.25	h=12
260	Oak	d=0.65	h=15
261	Unknown	d=0.2	h=8
262	Oak	d=0.65	h=15
263	Oak	d=0.5	h=15
264	Oak	d=0.5	h=15
265	Oak	d=0.5	h=15
266	Oak	d=0.5	h=15
267	Oak	d=0.45	h=15
268	Oak	d=0.45	h=10
269	Oak	d=0.25	h=10
270	Hawthorn	d=0.25	h=7
271	Ash	d=0.3	h=12
272	Ash	d=0.3	h=12
273	Oak	d=0.5	h=15
274	Oak	d=0.45	h=15
275	Oak	d=0.55	h=15
276	Oak	d=0.25	h=12
277	Oak	d=0.3	h=12
278	Oak	d=0.6	h=15
279	Unknown	d=0.2	h=8
280	Unknown	d=0.2	h=8
281	Ash	d=0.3	h=12
282	Ash	d=0.3	h=12
283	Hawthorn	d=0.25	h=7
284	Oak	d=0.7	h=15
285	Maple	d=0.25	h=10
286	Oak	d=0.65	h=15
287	Oak	d=0.25	h=12
288	Oak	d=0.25	h=12
289	Oak	d=0.25	h=12
290	Unknown	d=0.2	h=8
291	Unknown	d=0.2	h=8
292	Unknown	d=0.2	h=8
293	Unknown	d=0.2	h=8
294	Unknown	d=0.2	h=8
295	Oak	d=0.45	h=12
296	Oak	d=0.45	h=12
297	Oak	d=0.45	h=12
298	Oak	d=0.65	h=15
299	Oak	d=0.45	h=12
300	Oak	d=0.45	h=12
301	Oak	d=0.6	h=15
302	Unknown	d=0.3	h=8
303	Oak	d=0.6	h=15
304	Oak	d=0.6	h=15
305	Oak	d=0.7	h=15

Hook Survey Legend

Hedge		Telephone line	—T———T—
Undergrowth		Power line	
Tree		Banking	
Bush		Contour line	—— 64 ——
Building		Survey Station	H5
Glass Building		Gate	
Open Building		Level	.115.28

Ordnance Survey Benchmark — OSBM

Foul Drainage — 100mm — FW MH CL 117.10 IL 116.75

Storm Drainage — 100mm — SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Digital Data added and shown in orange, pen colour 30.

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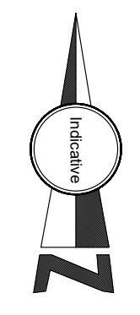
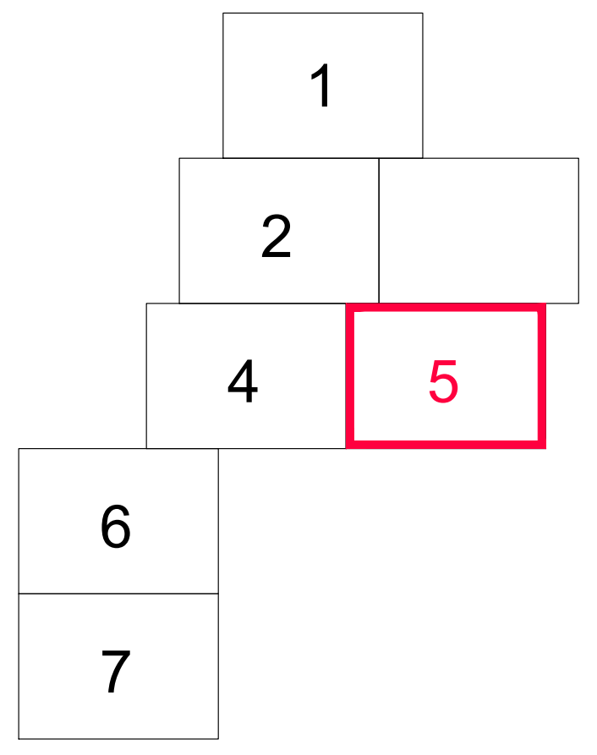


Sheet Layout



Rev C: Visual check survey carried out and new internal fences surveyed, Survey control updated to reference centre of site — March 2024

Rev B: Western side of Shipley Road added — Nov 2020

Rev A: Additional ditches and site boundary added — Oct 2020

HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. : S19/7188	Dwg No. : S19/7188/05	Revision : C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 3 survey stations with a scale factor of 1.000, only the fixed survey stations H16, H59 & H60 are true Ordnance Survey positions.

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Registered Member
@hooksurvey
THE SURVEY ASSOCIATION

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64
Survey Station — H5
Gate
Level — 15.28
Ordnance Survey Benchmark — OSBM
Foul Drainage — 100mm — FW MH CL 117.10 IL 116.75
Storm Drainage — 100mm — SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Digital Data added and shown in orange, pen colour 30.

Grid North

Tree Schedule

1	Maple	d=0.25	h=7	123	Oak	d=0.5	h=15	246	Ash	d=0.25	h=12
2	Ash	d=0.25	h=7	124	Ash	d=0.25	h=12	247	Ash	d=0.25	h=10
3	Ash	d=0.1	h=6	125	Oak	d=0.5	h=15	248	Unknown	d=0.15	h=8
4	Hawthorn	d=0.15	h=7	126	Oak	d=0.5	h=15	249	Eucalyptus	d=0.15	h=9
5	Maple	d=0.35	h=10	127	Oak	d=0.5	h=15	250	Oak	d=0.6	h=12
6	Ash	d=0.5	h=15	128	Oak	d=0.5	h=15	251	Hawthorn	d=0.2	h=8
7	Ash	d=0.5	h=15	129	Maple	d=0.25	h=9	252	Ash	d=0.65	h=12
8	Maple	d=0.3	h=10	130	Oak	d=0.4	h=15	253	Ash	d=0.25	h=10
9	Oak	d=0.55	h=15	131	Oak	d=0.45	h=15	254	Oak	d=0.65	h=15
10	Oak	d=0.55	h=15	132	Maple	d=0.25	h=9	255	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h=10	133	Ash	d=0.25	h=10	256	Oak	d=0.25	h=12
12	Oak	d=0.55	h=15	134	Ash	d=0.25	h=10	257	Oak	d=0.55	h=15
13	Oak	d=0.65	h=15	135	Ash	d=0.2	h=10	258	Oak	d=0.55	h=15
14	Oak	d=0.6	h=15	136	Ash	d=0.2	h=10	259	Oak	d=0.25	h=12
15	Oak	d=0.5	h=12	137	Ash	d=0.2	h=10	260	Oak	d=0.65	h=15
16	Oak	d=0.45	h=15	138	Oak	d=0.65	h=15	261	Unknown	d=0.2	h=8
17	Oak	d=0.55	h=15	139	Oak	d=0.65	h=15	262	Oak	d=0.65	h=15
18	Oak	d=0.7	h=15	140	Oak	d=0.6	h=15	263	Oak	d=0.5	h=15
19	Oak	d=0.6	h=15	141	Oak	d=0.6	h=15	264	Oak	d=0.5	h=15
20	Oak	d=0.4	h=15	142	Oak	d=0.55	h=15	265	Oak	d=0.5	h=15
21	Oak	d=0.6	h=12	143	Oak	d=0.55	h=15	266	Oak	d=0.5	h=15
22	Oak	d=0.6	h=12	144	Oak	d=0.45	h=15	267	Oak	d=0.45	h=15
23	Maple	d=0.25	h=10	145	Oak	d=0.45	h=12	268	Oak	d=0.45	h=10
24	Maple	d=0.25	h=10	146	Oak	d=0.65	h=15	269	Oak	d=0.25	h=10
25	Oak	d=0.4	h=12	147	Oak	d=0.65	h=15	270	Hawthorn	d=0.25	h=7
26	Oak	d=0.4	h=12	148	Oak	d=0.7	h=15	271	Ash	d=0.3	h=12
27	Oak	d=0.45	h=12	149	Oak	d=0.5	h=15	272	Ash	d=0.3	h=12
28	Copper beech	d=0.35	h=12	150	Oak	d=0.5	h=15	273	Oak	d=0.5	h=15
29	Ash	d=0.15	h=9	151	Oak	d=0.5	h=15	274	Oak	d=0.45	h=15
30	Ash	d=0.15	h=9	152	Maple	d=0.25	h=9	275	Oak	d=0.55	h=15
31	Oak	d=0.45	h=12	153	Oak	d=0.55	h=15	276	Oak	d=0.25	h=12
32	Oak	d=0.45	h=12	154	Oak	d=0.65	h=15	277	Oak	d=0.3	h=12
33	Sweet chestnut	d=0.35	h=8	155	Oak	d=0.4	h=12	278	Oak	d=0.6	h=15
34	Hawthorn	d=0.15	h=7	156	Oak	d=0.6	h=15	279	Unknown	d=0.2	h=8
35	Sycamore	d=0.4	h=12	157	Maple	d=0.25	h=9	280	Unknown	d=0.2	h=8
36	Sycamore	d=0.5	h=12	158	Maple	d=0.25	h=9	281	Ash	d=0.3	h=12
37	Sycamore	d=0.45	h=12	159	Oak	d=0.45	h=15	282	Ash	d=0.3	h=12
38	Sweet chestnut	d=0.35	h=10	160	Oak	d=0.6	h=15	283	Hawthorn	d=0.25	h=7
39	Sweet chestnut	d=0.35	h=10	161	Hawthorn	d=0.2	h=7	284	Oak	d=0.7	h=15
40	Unknown	d=0.1	h=7	162	Hawthorn	d=0.15	h=5	285	Maple	d=0.25	h=10
41	Sweet chestnut	d=0.35	h=10	163	Hawthorn	d=0.2	h=5	286	Oak	d=0.65	h=15
42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=5	287	Oak	d=0.25	h=12
43	Cypress	d=0.15	h=5	165	Oak	d=0.5	h=12	288	Oak	d=0.25	h=12
44	Cypress	d=0.15	h=5	166	Oak	d=0.45	h=12	289	Oak	d=0.25	h=12
45	Cypress	d=0.15	h=5	167	Oak	d=0.55	h=15	290	Unknown	d=0.2	h=8
46	Unknown	d=0.15	h=7	168	Oak	d=0.65	h=15	291	Unknown	d=0.2	h=8
47	Ash	d=0.15	h=7	169	Oak	d=0.75	h=15	292	Unknown	d=0.2	h=8
48	Ash	d=0.15	h=7	170	Fruit	d=0.3	h=6	293	Unknown	d=0.2	h=8
49	Ash	d=0.2	h=10	171	Fruit	d=0.3	h=6	294	Unknown	d=0.2	h=8
50	Oak	d=0.45	h=12	172	Oak	d=0.5	h=12	295	Oak	d=0.45	h=12
51	Ash	d=0.2	h=10	173	Hawthorn	d=0.25	h=7	296	Oak	d=0.45	h=12
52	Oak	d=0.45	h=12	174	Hawthorn	d=0.25	h=7	297	Oak	d=0.45	h=12
53	Oak	d=0.45	h=12	175	Unknown	d=0.35	h=10	298	Oak	d=0.65	h=15
54	Hawthorn	d=0.2	h=7	176	Oak	d=0.65	h=15	299	Oak	d=0.45	h=12
55	Ash	d=0.3	h=10	177	Oak	d=0.65	h=15	300	Oak	d=0.45	h=12
56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7	301	Oak	d=0.6	h=15
57	Oak	d=0.5	h=12	179	Oak	d=0.45	h=15	302	Unknown	d=0.3	h=8
58	Oak	d=0.45	h=12	180	Oak	d=0.45	h=15	303	Oak	d=0.6	h=15
59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15	304	Oak	d=0.6	h=15
60	Ash	d=0.2	h=10	182	Oak	d=0.6	h=15	305	Oak	d=0.7	h=15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h=15				
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h=15				
63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15				
64	Cypress	d=0.25	h=10	186	Oak	d=0.75	h=15				
65	Cypress	d=0.15	h=10	187	Oak	d=0.6	h=15				
66	Cypress	d=0.2	h=10	188	Oak	d=0.6	h=12				
67	Cypress	d=0.15	h=10	189	Oak	d=0.55	h=15				
68	Cypress	d=0.25	h=10	190	Oak	d=0.6	h=15				
69	Oak	d=0.6	h=15	191	Oak	d=0.7	h=15				
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=9				
71	Hawthorn	d=0.2	h=7	193	Oak	d=0.75	h=15				
72	Hawthorn	d=0.2	h=7	194	Oak	d=0.2	h=10				
73	Oak	d=0.55	h=15	195	Unknown	d=0.2	h=9				
74	Oak	d=0.65	h=15	196	Sycamore	d=0.3	h=11				
75	Oak	d=0.6	h=15	197	Cypress	d=0.1	h=7				
76	Oak	d=0.6	h=15	198	Cypress	d=0.1	h=7				
77	Ash	d=0.2	h=10	199	Cypress	d=0.1	h=7				
78	Hawthorn	d=0.2	h=7	200	Cypress	d=0.1	h=7				
79	Oak	d=0.6	h=15	201	Cypress	d=0.1	h=7				
80	Ash	d=0.15	h=8	202	Cypress	d=0.1	h=7				
81	Ash	d=0.15	h=8	203	Cypress	d=0.1	h=7				
82	Oak	d=0.7	h=15	204	Cypress	d=0.1	h=7				
83	Oak	d=0.6	h=15	205	Eucalyptus	d=0.15	h=12				
84	Oak	d=0.45	h=15	206	Eucalyptus	d=0.3	h=12				
85	Oak	d=0.45	h=15	207	Eucalyptus	d=0.5	h=15				
86	Hawthorn	d=0.15	h=6	208	Fruit	d=0.45	h=8				
87	Hawthorn	d=0.15	h=6	209	Stump	d=0.75					
88	Hawthorn	d=0.15	h=6	210	Sump	d=0.45					
89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=12				
90	Oak	d=0.55	h=15	212	Maple	d=0.2	h=8				
91	Oak	d=0.5	h=15	213	Maple	d=0.2	h=8				
92	Oak	d=0.5	h=15	214	Sweet chestnut	d=0.2	h=10				
93	Oak	d=0.45	h=15	215	Maple	d=0.2	h=8				
94	Oak	d=0.65	h=15	216	Maple	d=0.2	h=8				
95	Oak	d=0.65	h=15	217	Maple	d=0.2	h=8				
96	Oak	d=0.75	h=15	218	Sweet chestnut	d=0.2	h=10				
97	Unknown	d=0.2	h=9	219	Sweet chestnut	d=0.15	h=8				
98	Oak	d=0.75	h=15	220	Maple	d=0.15	h=8				
99	Oak	d=0.65	h=15	221	Maple	d=0.15	h=8				
100	Oak	d=0.45	h=15	222	Maple	d=0.15	h=8				
101	Oak	d=0.55	h=15	223	Maple	d=0.15	h=8				
102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8				
103	Oak	d=0.3	h=10	225	Maple	d=0.2	h=9				
104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7				
105	Oak	d=0.65	h=15	227	Maple	d=0.15	h=7				
106	Oak	d=0.25	h=10	228	Maple	d=0.15	h=7				
107	Oak	d=0.25	h=10	229	Maple	d=0.25	h=8				
108	Oak	d=0.25	h=10	230	Fruit	d=0.25	h=8				
109	Ash	d=0.3	h=12	231	Ash	d=0.35	h=12				
110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9				
111	Ash	d=0.3	h=12	233	Copper beech	d=0.25	h=8				
112	Ash	d=0.25	h=10	234	Silver birch	d=0.2	h=5				
113	Ash	d=0.3	h=12	235	Cypress	d=0.25	h=6				
114	Ash	d=0.3	h=12	236	Cypress	d=0.1	h=5				
115	Oak	d=0.5	h=15	237	Fruit	d=0.4	h=4				
116	Oak	d=0.6	h=15	238	Stump	d=0.6					
117	Oak	d=0.5	h=15	239	Oak	c=1	h=15				
118	Maple	d=0.2	h=9	240	Ash	d=0.3	h=12				
119	Maple	d=0.2	h=9	241	Cherry	d=0.1	h=3				
120	Maple	d=0.2	h=9	242	Stump	d=0.45					
121	Maple	d=0.2	h=9	243	Stump	d=0.45					
122	Maple	d=0.2	h=9	244	Stump	d=0.45					
				245	Fruit	d=0.45	h=6				

Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.811	51.279
H2	515610.683	125318.854	52.165
H3	515607.683	125301.326	52.155
H4	515604.877	125275.098	52.134
H5	515602.817	125250.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.006	51.551
H8	515607.697	125134.783	50.966
H9	515604.709	125090.890	50.044
H10	515596.598	125060.757	49.357
H11	515578.902	125028.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124946.037	46.193
H15	515493.072	124913.489	45.644
H16	515483.304	124894.502	45.428
H17	515442.852	124817.632	44.160
H18	515423.465	124731.296	43.424
H19	515605.630	125006.527	47.936
H20	515594.883	125027.280	48.845
H21	515604.890	125045.109	49.342
H22	515614.384	125025.237	48.671
H23	515631.772	125083.115	49.893
H24	515620.073	125132.649	51.071
H25	515640.261	125126.218	50.382
H26	515649.295	125123.250	49.859
H27	515666.949	125118.444	48.978
H28	515687.676	125108.985	48.024
H29	515698.671	125104.910	47.542
H30	515715.301	125099.629	46.871
H31	515734.545	125093.294	46.117
H32	515754.001	125087.314	45.450
H33	515775.945	125077.516	44.247
H34	515788.979	125080.621	43.866
H35	515766.516	125061.250	44.526
H36	515752.911	125047.433	45.054
H37	515723.259	125015.579	45.791
H38	515695.570	124987.172	45.705
H39	515675.641	124963.895	45.336
H40	515659.082	124941.341	44.725
H41	515642.207	124913.069	44.238
H42	515616.664	124864.601	42.868
H43	515588.782	124876.456	43.949
H44	515568.736	124883.467	44.439
H45	515546.903	124891.338	44.989
H46	515529.290	124895.874	45.504
H47	515511.157	124903.072	45.870
H48	515518.756	124931.627	46.716
H49	515547.841	124970.288	47.439
H50	515573.354	124952.919	46.718
H51	515602.321	124947.252	46.131
H52	515621.853	124951.623	45.899
H53	515634.651	124974.227	46.255
H54	515616.519	124989.134	46.931
H55	515609.131	124970.923	46.909
H56	515597.567	124970.212	47.078
H57	515579.096	125006.089	48.479
H58	515583.833	124962.680	47.004
H59	515573.354	124972.100	47.563
H60	515562.756	124968.277	47.523
H61	515550.069	124975.151	47.523
H62	515561.462	124989.716	48.070
H63	515573.104	125002.808	48.356
H64	515582.007	125017.122	48.765
H65	515581.958	124983.925	47.647
H70	515605.139	125279.255	52.142
H71	515602.159	125243.012	52.114
H72	515594.718	125203.375	52.042
H73	515605.355	125160.318	51.414
H74	515607.377	125120.162	50.687
H75	515600.900	125073.556	49.418
H76	515579.635	125028.971	48.783
H77	515562.042	125003.778	48.201

Any setting-out should be undertaken using these control stations and any setting-out using GPS should be transformed to this control.

Sheet Layout

1
2 3
4 5
6
7

Rev C: Visual check survey carried out and new internal fences surveyed. Survey control updated to reference centre of site — March 2024
Rev B: Western side of Shipley Road added — Nov 2020
Rev A: Additional ditches and site boundary added — Oct 2020

HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/06	C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 3 survey stations with a scale factor of 1.000, only the fixed survey stations H16, H59 & H60 are true Ordnance Survey positions.

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Registered site inspector
Chartered Surveyors
@hooksurveying
THE SURVEY ASSOCIATION

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64 —
Survey Station H5
Gate
Level 15.28
Ordnance Survey Benchmark OSBM
Foul Drainage — 100mm — FW MH C. 118.10 I. 116.75
Storm Drainage — 100mm — SW MH C. 117.10 I. 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Ordnance Survey Digital Data added and shown in orange, pen colour 30.

Sheet Layout

1
2 3
4 5
6
7

Rev C: Visual check survey carried out and new internal fences surveyed, Survey control updated to reference centre of site March 2024
Rev B: Western side of Shipley Road added Nov 2020
Rev A: Additional ditches and site boundary added Oct 2020

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Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/07	C
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 3 survey stations with a scale factor of 1.000, only the fixed survey stations H16, H59 & H60 are true Ordnance Survey positions.

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DA2 7ER
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Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Tree Schedule

1	Maple	d=0.25	h= 7	123	Oak	d=0.5	h= 15	246	Ash	d=0.25	h= 12
2	Ash	d=0.25	h= 7	124	Ash	d=0.25	h= 12	247	Ash	d=0.25	h= 10
3	Ash	d=0.1	h= 6	125	Oak	d=0.5	h= 15	248	Unknown	d=0.15	h= 8
4	Hawthorn	d=0.15	h= 7	126	Oak	d=0.5	h= 15	249	Eucalyptus	d=0.15	h= 9
5	Maple	d=0.35	h= 10	127	Oak	d=0.5	h= 15	250	Oak	d=0.6	h= 12
6	Ash	d=0.5	h= 15	128	Oak	d=0.5	h= 15	251	Hawthorn	d=0.2	h= 8
7	Ash	d=0.5	h= 15	129	Maple	d=0.25	h= 9	252	Ash	d=0.65	h= 12
8	Maple	d=0.3	h= 10	130	Oak	d=0.4	h= 15	253	Ash	d=0.25	h= 10
9	Oak	d=0.55	h= 15	131	Oak	d=0.45	h= 15	254	Oak	d=0.65	h= 15
10	Oak	d=0.55	h= 15	132	Maple	d=0.25	h= 9	255	Oak	d=0.55	h= 15
11	Sweet chestnut	d=0.25	h= 10	133	Ash	d=0.25	h= 10	256	Oak	d=0.25	h= 12
12	Oak	d=0.55	h= 15	134	Ash	d=0.25	h= 10	257	Oak	d=0.55	h= 15
13	Oak	d=0.65	h= 15	135	Ash	d=0.2	h= 10	258	Oak	d=0.55	h= 15
14	Oak	d=0.6	h= 15	136	Ash	d=0.2	h= 10	259	Oak	d=0.25	h= 12
15	Oak	d=0.5	h= 12	137	Ash	d=0.2	h= 10	260	Oak	d=0.65	h= 15
16	Oak	d=0.45	h= 15	138	Oak	d=0.65	h= 15	261	Unknown	d=0.2	h= 8
17	Oak	d=0.55	h= 15	139	Oak	d=0.65	h= 15	262	Oak	d=0.65	h= 15
18	Oak	d=0.7	h= 15	140	Oak	d=0.6	h= 15	263	Oak	d=0.5	h= 15
19	Oak	d=0.6	h= 15	141	Oak	d=0.6	h= 15	264	Oak	d=0.5	h= 15
20	Oak	d=0.4	h= 15	142	Oak	d=0.55	h= 15	265	Oak	d=0.5	h= 15
21	Oak	d=0.6	h= 12	143	Oak	d=0.55	h= 15	266	Oak	d=0.5	h= 15
22	Oak	d=0.6	h= 12	144	Oak	d=0.45	h= 15	267	Oak	d=0.45	h= 15
23	Maple	d=0.25	h= 10	145	Oak	d=0.45	h= 12	268	Oak	d=0.45	h= 10
24	Maple	d=0.25	h= 10	146	Oak	d=0.65	h= 15	269	Oak	d=0.25	h= 10
25	Oak	d=0.4	h= 12	147	Oak	d=0.65	h= 15	270	Hawthorn	d=0.25	h= 7
26	Oak	d=0.4	h= 12	148	Oak	d=0.7	h= 15	271	Ash	d=0.3	h= 12
27	Oak	d=0.45	h= 12	149	Oak	d=0.5	h= 15	272	Ash	d=0.3	h= 12
28	Copper beech	d=0.35	h= 12	150	Oak	d=0.5	h= 15	273	Oak	d=0.5	h= 15
29	Ash	d=0.15	h= 9	151	Oak	d=0.5	h= 15	274	Oak	d=0.45	h= 15
30	Ash	d=0.15	h= 9	152	Maple	d=0.25	h= 9	275	Oak	d=0.55	h= 15
31	Oak	d=0.45	h= 12	153	Oak	d=0.55	h= 15	276	Oak	d=0.25	h= 12
32	Oak	d=0.45	h= 12	154	Oak	d=0.65	h= 15	277	Oak	d=0.3	h= 12
33	Sweet chestnut	d=0.35	h= 8	155	Oak	d=0.4	h= 12	278	Oak	d=0.6	h= 15
34	Hawthorn	d=0.15	h= 7	156	Oak	d=0.6	h= 15	279	Unknown	d=0.2	h= 8
35	Sycamore	d=0.4	h= 12	157	Maple	d=0.25	h= 9	280	Unknown	d=0.2	h= 8
36	Sycamore	d=0.5	h= 12	158	Maple	d=0.25	h= 9	281	Ash	d=0.3	h= 12
37	Sycamore	d=0.45	h= 12	159	Oak	d=0.45	h= 15	282	Ash	d=0.3	h= 12
38	Sweet chestnut	d=0.35	h= 10	160	Oak	d=0.6	h= 15	283	Hawthorn	d=0.25	h= 7
39	Sweet chestnut	d=0.35	h= 10	161	Hawthorn	d=0.2	h= 7	284	Oak	d=0.7	h= 15
40	Unknown	d=0.1	h= 7	162	Hawthorn	d=0.15	h= 5	285	Maple	d=0.25	h= 10
41	Sweet chestnut	d=0.35	h= 10	163	Hawthorn	d=0.2	h= 5	286	Oak	d=0.65	h= 15
42	Unknown	d=0.2	h= 8	164	Hawthorn	d=0.2	h= 5	287	Oak	d=0.25	h= 12
43	Cypress	d=0.15	h= 5	165	Oak	d=0.5	h= 12	288	Oak	d=0.25	h= 12
44	Cypress	d=0.15	h= 5	166	Oak	d=0.45	h= 12	289	Oak	d=0.25	h= 12
45	Cypress	d=0.15	h= 5	167	Oak	d=0.55	h= 15	290	Unknown	d=0.2	h= 8
46	Unknown	d=0.15	h= 7	168	Oak	d=0.65	h= 15	291	Unknown	d=0.2	h= 8
47	Ash	d=0.15	h= 7	169	Oak	d=0.75	h= 15	292	Unknown	d=0.2	h= 8
48	Ash	d=0.15	h= 7	170	Fruit	d=0.3	h= 6	293	Unknown	d=0.2	h= 8
49	Ash	d=0.2	h= 10	171	Fruit	d=0.3	h= 6	294	Unknown	d=0.2	h= 8
50	Oak	d=0.45	h= 12	172	Oak	d=0.5	h= 12	295	Oak	d=0.45	h= 12
51	Ash	d=0.2	h= 10	173	Hawthorn	d=0.25	h= 7	296	Oak	d=0.45	h= 12
52	Oak	d=0.45	h= 12	174	Hawthorn	d=0.25	h= 7	297	Oak	d=0.45	h= 12
53	Oak	d=0.45	h= 12	175	Unknown	d=0.35	h= 10	298	Oak	d=0.65	h= 15
54	Hawthorn	d=0.2	h= 7	176	Oak	d=0.65	h= 15	299	Oak	d=0.45	h= 12
55	Ash	d=0.3	h= 10	177	Oak	d=0.65	h= 15	300	Oak	d=0.45	h= 12
56	Oak	d=0.45	h= 12	178	Hawthorn	d=0.25	h= 7	301	Oak	d=0.6	h= 15
57	Oak	d=0.5	h= 12	179	Oak	d=0.45	h= 15	302	Unknown	d=0.3	h= 8
58	Oak	d=0.45	h= 12	180	Oak	d=0.45	h= 15	303	Oak	d=0.6	h= 15
59	Hawthorn	d=0.2	h= 7	181	Oak	d=0.6	h= 15	304	Oak	d=0.6	h= 15
60	Ash	d=0.2	h= 10	182	Oak	d=0.6	h= 15	305	Oak	d=0.7	h= 15
61	Hazel	multibole	h= 6	183	Oak	d=0.45	h= 15				
62	Ash	d=0.15	h= 8	184	Oak	d=0.6	h= 15				
63	Cypress	d=0.25	h= 10	185	Oak	d=0.5	h= 15				
64	Cypress	d=0.25	h= 10	186	Oak	d=0.75	h= 15				
65	Cypress	d=0.15	h= 10	187	Oak	d=0.6	h= 15				
66	Cypress	d=0.2	h= 10	188	Oak	d=0.6	h= 12				
67	Cypress	d=0.15	h= 10	189	Oak	d=0.55	h= 15				
68	Cypress	d=0.25	h= 10	190	Oak	d=0.6	h= 15				
69	Oak	d=0.6	h= 15	191	Oak	d=0.7	h= 15				
70	Hawthorn	d=0.2	h= 7	192	Unknown	d=0.2	h= 9				
71	Hawthorn	d=0.2	h= 7	193	Oak	d=0.75	h= 15				
72	Hawthorn	d=0.2	h= 7	194	Oak	d=0.2	h= 10				
73	Oak	d=0.55	h= 15	195	Unknown	d=0.2	h= 9				
74	Oak	d=0.65	h= 15	196	Sycamore	d=0.3	h= 11				
75	Oak	d=0.6	h= 15	197	Cypress	d=0.1	h= 7				
76	Oak	d=0.6	h= 15	198	Cypress	d=0.1	h= 7				
77	Ash	d=0.2	h= 10	199	Cypress	d=0.1	h= 7				
78	Hawthorn	d=0.2	h= 7	200	Cypress	d=0.1	h= 7				
79	Oak	d=0.6	h= 15	201	Cypress	d=0.1	h= 7				
80	Ash	d=0.15	h= 8	202	Cypress	d=0.1	h= 7				
81	Ash	d=0.15	h= 8	203	Cypress	d=0.1	h= 7				
82	Oak	d=0.7	h= 15	204	Cypress	d=0.1	h= 7				
83	Oak	d=0.6	h= 15	205	Eucalyptus	d=0.15	h= 12				
84	Oak	d=0.45	h= 15	206	Eucalyptus	d=0.3	h= 12				
85	Oak	d=0.45	h= 15	207	Eucalyptus	d=0.5	h= 15				
86	Hawthorn	d=0.15	h= 6	208	Fruit	d=0.45	h= 8				
87	Hawthorn	d=0.15	h= 6	209	Stump	d=0.75					
88	Hawthorn	d=0.15	h= 6	210	Sump	d=0.45					
89	Oak	d=0.5	h= 15	211	Pine	d=0.45	h= 12				
90	Oak	d=0.55	h= 15	212	Maple	d=0.2	h= 8				
91	Oak	d=0.5	h= 15	213	Maple	d=0.2	h= 8				
92	Oak	d=0.5	h= 15	214	Sweet chestnut	d=0.2	h= 10				
93	Oak	d=0.45	h= 15	215	Maple	d=0.2	h= 8				
94	Oak	d=0.65	h= 15	216	Maple	d=0.2	h= 8				
95	Oak	d=0.65	h= 15	217	Maple	d=0.2	h= 8				
96	Oak	d=0.75	h= 15	218	Sweet chestnut	d=0.2	h= 10				
97	Unknown	d=0.2	h= 9	219	Sweet chestnut	d=0.15	h= 8				
98	Oak	d=0.75	h= 15	220	Maple	d=0.15	h= 8				
99	Oak	d=0.65	h= 15	221	Maple	d=0.15	h= 8				
100	Oak	d=0.45	h= 15	222	Maple	d=0.15	h= 8				
101	Oak	d=0.55	h= 15	223	Maple	d=0.15	h= 8				
102	Oak	d=0.3	h= 10	224	Maple	d=0.15	h= 8				
103	Oak	d=0.3	h= 10	225	Maple	d=0.2	h= 9				
104	Oak	d=0.35	h= 10	226	Maple	d=0.15	h= 7				
105	Oak	d=0.65	h= 15	227	Maple	d=0.15	h= 7				
106	Oak	d=0.25	h= 10	228	Maple	d=0.15	h= 7				
107	Oak	d=0.25	h= 10	229	Maple	d=0.25	h= 8				
108	Oak	d=0.25	h= 10	230	Fruit	d=0.25	h= 8				
109	Ash	d=0.3	h= 12	231	Ash	d=0.35	h= 12				
110	Ash	d=0.3	h= 12	232	Pine	d=0.25	h= 9				
111	Ash	d=0.3	h= 12	233	Copper beech	d=0.25	h= 8				
112	Ash	d=0.25	h= 10	234	Silver birch	d=0.2	h= 5				
113	Ash	d=0.3	h= 12	235	Cypress	d=0.25	h= 6				
114	Ash	d=0.3	h= 12	236	Cypress	d=0.1	h= 5				
115	Oak	d=0.5	h= 15	237	Fruit	d=0.4	h= 4				
116	Oak	d=0.6	h= 15	238	Stump	d=0.6					
117	Oak	d=0.5	h= 15	239	Oak	d=1	h= 15				
118	Maple	d=0.2	h= 9	240	Ash	d=0.3	h= 12				
119	Maple	d=0.2	h= 9	241	Cherry	d=0.1	h= 3				
120	Maple	d=0.2	h= 9	242	Stump	d=0.45					
121	Maple	d=0.2	h= 9	243	Stump	d=0.45					
122	Maple	d=0.2	h= 9	244	Stump	d=0.45					
				245	Fruit	d=0.45	h= 6				

Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.811	51.279
H2	515610.683	125318.854	52.165
H3	515607.683	125301.326	52.155
H4	515604.877	125275.098	52.134
H5	515602.817	125250.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.006	51.551
H8	515607.697	125134.783	50.966
H9	515604.709	125090.890	50.044
H10	515596.598	125060.757	49.357
H11	515578.902	125028.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124946.037	46.193
H15	515493.072	124913.489	45.644
H16	515483.304	124894.502	45.428
H17	515442.852	124817.632	44.160
H18	515423.465	124731.296	43.424
H19	515605.630	125006.527	47.936
H20	515594.883	125027.280	48.845
H21	515604.890	125045.109	49.342
H22	515614.384	125025.237	48.671
H23	515631.772	125083.115	49.893
H24	515620.073	125132.649	51.071
H25	515640.261	125126.218	50.382
H26	515649.295	125123.250	49.859
H27	515666.949	125118.444	48.978
H28	515687.676	125108.985	48.024
H29	515698.671	125104.910	47.542
H30	515715.301	125099.629	46.871
H31	515734.545	125093.294	46.117
H32	515754.001	125087.314	45.450
H33	515775.945	125077.516	44.247
H34	515788.979	125080.621	43.866
H35	515766.516	125061.250	44.526
H36	515752.911	125047.433	45.054
H37	515723.259	125015.579	45.791
H38	515695.570	124987.172	45.705
H39	515675.641	124963.895	45.336
H40	515659.082	124941.341	44.725
H41	515642.207	124913.069	44.238
H42	515616.664	124864.601	42.868
H43	515588.762	124876.456	43.949
H44	515568.736	124883.467	44.439
H45	515546.903	124891.338	44.989
H46	515529.290	124895.874	45.504
H47	515511.157	124903.072	45.870
H48	515518.756	124931.627	46.716
H49	515547.841	124970.288	47.439
H50	515573.354	124952.919	46.718
H51	515602.321	124947.252	46.131
H52	515621.853	124951.623	45.899
H53	515634.651	124974.227	46.255
H54	515616.519	124989.134	46.931
H55	515609.131	124970.923	46.909
H56	515597.567	124970.212	47.078
H57	515579.096	125006.089	48.479
H58	515583.833	124962.680	47.004
H59	515573.354	124972.100	47.563
H60	515562.756	124968.277	47.523
H61	515550.069	124975.151	47.523
H62	515561.462	124989.716	48.070
H63	515573.104	125002.806	48.356
H64	515582.007	125017.122	48.765
H65	515581.958	124983.925	47.647
H70	515605.139	125279.255	52.142
H71	515602.159	125243.012	52.114
H72	515594.718	125203.375	52.042
H73	515605.355	125160.318	51.414
H74	515607.377	125120.162	50.687
H75	515600.900	125073.556	49.418
H76	515579.635	125028.971	48.783
H77	515562.042	125003.778	48.201

Any setting-out should be undertaken using these control stations and any setting-out using GPS should be transformed to this control.

Appendix C

Phase II Site Investigation Report

at Woodfords, Shipley Road, Southwater, RH13 9BQ

for Reside Developments Ltd

Report Reference: LP2826

Report Date: 8th March 2022

Leap Environmental Ltd
Head Office
The Atrium, Curtis Road,
Dorking, Surrey, RH4 1XA
tel +44 (0) 1306 646510
www.leapenvironmental.com

Regional Offices: Kent, Midlands, South Coast, Thames Valley

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EXECUTIVE SUMMARY

LEAP have been commissioned to undertake a Phase II intrusive site investigation of a site referred to as Woodfords, Shipley Road, Southwater. The site comprises two fields along with a residential property and stable block. The fields are in use as horse paddocks and the centre of the north field is occupied by a riding school. Two earth bunds are present in the northern section of the site. Overhead cables are present in the southern portion of the site. The intrusive investigation was limited to the northern and southern fields only.

It is proposed to redevelop the site with 72 No residential properties along with associated access roads and garages. A central section of the site will be green space occupied by large trees. Several attenuation basins/ponds are proposed along the sites south-eastern boundary.

A previous desk study undertaken by LEAP identified several potential contaminant sources associated with the sites current and former land use. These included: heavy metals, PAH and asbestos around the existing buildings and associated with the soil bunds in the north of the site; pesticides and herbicides associated with the sites former agricultural land use. The potential for hydrocarbon contamination was also noted but considered to be very localised to the area of three fuel tanks observed during the walkover.

The site is mapped as being underlain by Weald Clay Formation. The ground conditions encountered on site comprised topsoil to around 0.3m bgl over stiff silty clay which became laminated and slightly gravelly with depth to between 1.5m and 2.2m bgl over interbedded extremely weak to weak siltstones and mudstones. No groundwater was encountered during the investigation.

An allowable bearing capacity of 125kPa is recommended for the stiff clays below about 1.0m. Foundations will require deepening to NHBC guidance for HIGH VCP Soils. Deepening may be terminated where the siltstone is encountered at depth. Suspended floor slabs are recommended given the high VCP of the clays.

Soil sulphates in the clay soils fall within BRE design class DS-1, however, elevated sulphate and sulphur concentrations within the mudstone fall within design class DS-5 and site conditions ACEC class AC-4s. It may be possible to reduce this with further testing.

A preliminary design CBR value of 2.5% is recommended for the clay soils.

A geo-environmental risk assessment has been carried out. Contamination testing of the shallow soils within the two fields has not identified any contaminants at concentrations considered to pose a risk to human health. Furthermore, preliminary sampling of the existing soil bunds did not encounter elevated contaminant concentrations however further confirmatory testing is recommended.

However, investigation has not been completed in the area of the existing properties or the riding school and sampling beneath the fuel tanks was not possible at the time of the investigation. As such further sampling is recommended in these in accessible areas once the site is vacated.

As with any redevelopment site, there is always the risk of hitherto undetected contamination, and further investigations should be carried out prior to redevelopment.

Much of the natural soils on site will be expected to be classified as inert waste.

Signed:	Susan Haynes BSc
Signed:	Adam Carr BSc MSc FGS
Countersigned:	Georgina Donbroski BEng MSc DIC CEng MICE Registered Ground Engineering Professional
Date:	8 March 2022
Revision:	Issue 1

A INTRODUCTION

1 Authority

Leap Environmental Ltd (hereafter referred to as LEAP) has been appointed by Reside Developments LTD to undertake Phase II intrusive Site Investigation of a site referred to as Woodfords, Shipley Road (Figure 1, Appendix B). The instruction was given in an email dated 22nd December 2021 and signed by Steve O'Halloran of Reside Developments LTD.

2 Objective

LEAP understands that the site is currently owned by the residents of Woodfords, Mr & Mrs Jones and it is proposed to redevelop the site with 73 No. 2 storey residential dwellings as per the attached layout in Figure 2.

The proposed development has been assessed in accordance with BS EN 1997[1], as being a Geotechnical Category 1 structure.

The objectives of this report are to:

- Provide information on the geotechnical and environmental quality of the ground present on the site with respect to the proposed development;
- Assess the potential health and other environmental risks posed by the site to the proposed development and to other specifically identified receptors; and
- Assess the potential for offsite contamination to adversely affect the proposed development.

3 Previous Studies

The site has been the subject of previous investigations by LEAP and the reader is referred to these earlier reports which should be read in conjunction with this report.

- LP2354 Phase 1 Desk Study of Woodfords, Shipley Road Issue 3 20th September 2021 (Original Issue 10th Nov 2020) by LEAP

[1] BS EN 1997-1(2004)+A1:2013 Eurocode 7:Geotechnical Design: General Rules

4 Scope of Works

This report describes a two stage process whereby the site is investigated and risks are assessed. The terms geotechnical and geoenvironmental are referred to throughout the report.

Geoenvironmental refers principally to the chemical nature of the ground and the degree of soil, water and/or land gas contamination and the impact that contamination may have on current or future development and also on the wider environment.

Geotechnical refers to all other aspects of the ground conditions and the impact they may have on the physical construction of existing or future development, principally foundations, slope stability, drainage, pavement and road design and groundwater control.

The investigation comprises the second phase of a two stage process.

4.1 Phase 1 Scope

The first part of this report presents a summary of the LEAP desk study ref: LP2354, which provided a review of previous site investigation and remediation validation reports, where they have been made available by the Client or where LEAP has been able to locate that information from third party sources. The previous reports referred to are detailed above. The following publicly accessible sources of information[2] was also been reviewed in the production of LP2354:

- BGS '*Geology of Britain*' online viewer accessed on 30th September 2020.
- BGS Borehole log TQ12SE21. located 500m to the South-West of the site boundary.
- Defra 'MAGIC' website accessed on 30th September 2020.
- Groundsure.io website accessed on 30th September 2020.
- Envirocheck report (259838226)
- Unexploded WWII aerial delivered bomb (UXB) regional risk maps produced by Zetica
- Interrogation of the World Wide Web on 30th September 2020 for general information pertaining to the site history

[2] The report contains British Geological Survey materials ©UKRI 2019 and public sector information licensed under the Open Government Licence v3.0.

- Interrogation of Horsham District Planning records for the site

A site reconnaissance was carried out on 02nd October 2020.

The desk study and site reconnaissance in LP2354 have been used to develop an initial conceptual site model, which forms the basis for the site investigation strategy. The initial site conceptual model was used to identify geotechnical and geoenvironmental hazards and the qualitative degree of risk associated with them. In terms of the geoenvironmental assessment the conceptual site model was used to identify potential sources of contamination, potential receptors and pathways by which the two may be connected. These are known as possible contaminant linkages and it is these contaminant linkages that are key to contaminated land risk assessment.

The Phase I investigation is also referred to as a Preliminary Investigation[3] .

4.2 Intrusive Investigation Scope

The current investigation comprises the Phase II intrusive investigation, onsite monitoring and laboratory analysis. The results of this and previous investigation reports are used to validate and/or update the initial site conceptual model. This phase of site investigation comprised the following tasks:

- 14 No. 3.0m deep machine excavated trial pits;
- 2 No. samples taken from the soils bunds;
- 4 No. in-situ dynamic cone penetrometer CBR tests
- In-situ geotechnical testing comprising field vane tests in the trial pits;
- Geotechnical Laboratory Testing including Atterberg Limit Tests, and Sulphate Tests; and
- Chemical Laboratory tests including 10 No. LEAP standard soil suite tests, 3 No. Pesticides screens and 3 No. Waste Acceptance Criteria Tests.

The intrusive works were completed by contractors who have been scrutinised and are on LEAP's approved contractor list. The machine excavated trial pits were carried out by Darren Spillane and supervised by LEAP.

Selected samples of soil were scheduled for laboratory testing for a wide range of potential contaminants including metals, non-metals, polyaromatic and petroleum hydrocarbons and

[3] BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice.

volatile organic compounds and pesticides. The laboratory testing has been carried out by The Environmental Laboratory Ltd at its laboratories in East Sussex. An additional 3 samples have been tested for Waste Acceptance Criteria purposes, as requested by the client.

Selected soil samples have been classified by laboratory analysis for geotechnical design purposes. The laboratory testing has been carried out by Geolabs Ltd at its laboratories in Watford.

The final stage in the geoenvironmental assessment comprises a quantitative risk assessment and revision of the preliminary Conceptual Site Model. Preliminary recommendations for remediation have been provided, based on various development assumptions which are detailed in the following section and in the text of this report. The risk assessment has been carried out in accordance with UK industry standards and in particular in accordance with LCRM[4] and BS10175:2011+A2:2017.

The final stage of the geotechnical assessment is the provision of preliminary soil parameters for use in geotechnical design, and broad recommendations for appropriate foundation options. It is intended that the Geotechnical Information section of this report will fulfil the general requirements of the Ground Investigation Report as set out in Section 6 of BS EN 1997-2:2007[5].

5 Limitations

This report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted and may be subject to amendment in the light of

[4] Environment Agency. Land Contamination Risk Management (LCRM),. https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

[5] BS EN 1997 Eurocode 7- Geotechnical Design- Part 2: Ground Investigation and Testing (2007)

additional information becoming available. These conclusions may not be appropriate for alternative schemes.

This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk.

Full details of the limitations are provided in Appendix A.

B PHASE I – DESK STUDY

A short summary of the Phase 1 Desk Study pertinent information is presented in this section and the reader is directed to our earlier report; LP2354 Phase 1 Desk Study for a full account.

6 Environmental Setting

6.1 Site Location and Description

Table 1 Site location and description details

	Classification / Information
Site Address	Woodfords, Shipley Road, Southwater RH13 9BQ
National Grid Reference	TQ156250
Site Size	c. 3.8 Ha
Elevation	c. 46 m AOD
Topography	Reasonably level and a slight < 2° slope down towards the south east
Description	The site comprises a central residential property with outbuildings, swimming pool and stable. The northern field contains a riding school, and the southern field is used as a paddock. Additionally, there is a static home, believed to be used in conjunction to the main residence. Overhead power cables are located in the south-east of site.
Structures	Building onsite of various ages and constructions. Diagonal cracking was noted along back wall of the garage building adjacent to the oil tank. A disused well was observed on site during the walkover. The well was covered at the time of the walkover and as such its depth is unknown. An ~1.5m deep swimming pool was present in the garden of the property near the centre of the site.
Surface Water Features	The site is bounded and traversed by several drainage ditches: A central drainage ditch with culverted sections, feeds a stream ~140m to the east of the site. Boundary drainage ditches were visibly dry. The western drainage ditch is culverted below the access road and sandbags were noted. Drainage ditches around stables were wet with c.10 cm water, no significant rainfall prior to visit.
Boundaries	The site is bounded by dry drainage ditches, barb wire fences and a mixture of hedgerow and trees, many of which exceed 5m in height.`
Surrounding area	The site is located within the Shipley Parish on the suburban perimeter of Southwater, still designated a village in name but more in keeping with the character of a town. Envirocheck listed no contemporary trade directory entries (including Fuel Stations) with 250m of the site.

	The immediate surrounding areas are; residential, woodland (inc ancient), drainage and agricultural land

6.1.1 Environmental Desk Study

Table 2 Summary of the environmental setting

	Classification / Information	Additional notes
Geology	Superficial: None Bedrock: Weald Clay- Mudstone	Unspecified crystals noted in local borehole records
Hydrogeology	Weald Clay- Unproductive Not within a Source Protection Zone No licence abstractions within 1km	Faults may act as conduits for groundwater Disused well noted onsite
Hydrology	Nearest Surface Water: Onsite central drainage ditch and culvert 3 discharge consents within 250m of the site, the nearest is 64m west of the site and is for the discharge of final treated effluent into the ditch to Lackenhurst Gill from a Domestic Property including farmhouse	The closest surface water feature for which the Environment Agency have surface water quality data is 800m to the east Blakes Gill Tributary
Flooding	Not within an EA flood zone 2 or 3 Low risk of groundwater flooding mapped 445m N off site	
Designated Environmentally Sensitive Sites	Ancient Woodland adjoins the North East corner of the site: Pollards Hill Wood	
Ground Workings, Mining/Extraction and natural cavities	None within 250m	Historic Brickyard c500m to the North

7 Site Usage

7.1 Current Land Use

The site is currently used as a residential property with 2 above ground oil tanks, swimming pool and stable with associated menage and paddock. Additionally, there is a static home, believed to be used in conjunction to the main residence with an above ground propane tank.

A sign was noted on the access gate for 'J Jones Designs and Construction ltd' and mini digger and mini dumper were also noted on site. Construction materials and equipment were stored around the stables.

The fields themselves are separated into paddocks by electric fences and are used for grazing horses.

Discussions with the current resident indicate an outfall drain from a cesspit associated with the property crosses the southern field of the site in a roughly northwest to southeast alignment. Scaring in the grass was visible in the approximate location of the drain.

There is 1 active contemporary trade directory entry reported in the Envirocheck report database search within 500m. This relates to a dry cleaners, 445m to the north-east.

7.2 Evidence of Onsite Contamination

The walkover completed as part of the Desk Study Ref LP2354 identified the following features as possible sources of contamination:

- Northern Field soil bund: mixture of soils and wastes; glass- reinforced window glass, hexagonal bottle and wine bottles, bricks, concrete, ceramic, plastics, metal can, aerosol can 'mite spray' – insecticide, grey brown soil containing road subbase gravel, orange clay and the remains of burning.
- East side of menage soil bund; evidence of mixed waste burning including plastics. The mound may comprise soil removed to level and construct the menage.
- Central tree line hummocky ground;
- Above ground propane tank (c.750-1500 litres)
- Disconnected above ground single skinned unbunded oil tank [near stables] (c.900 litres)
- Above ground double skinned, bunded 2500litre oil tank [rear of main residence]
- Construction materials [around stable area]

There are 3 above ground fuel storage tanks located on site. The site has a swimming pool, so whilst not seen on walkover it is assumed associated chemicals are stored on site. A sketch plan showing the location of the above features is presented in Figure 3, Appendix B.

7.3 Land Use Desk Study

Table 3 Summary of the site land use.

A summary of the land uses	Classification / Information
Neighbouring Land Use	No sources of contamination identified within 500m of the site
Site History	Site is a farmhouse and arable lands from 1875 – present times, an orchard was mapped onsite briefly in the 1990's. The surrounding area is farmlands, woodlands in 1875, with a brickpit c.800m north and a train station c.1km

	north. These became discussed around the 1980's and were repurposed into the Country Park and Downs Link Footpath respectively. There has been much residential development in Southwater Village and Woodfords now sits on the suburban margin of what is effectively now a small town.
Unexploded Ordnance	Low Risk
Waste Planning and Landfill Records	No Landfills or Waste Management, Treatment or Transfer sites identified within 500m
Other Regulatory Records	No Pollution incidents to controlled waters (major incidents within 250m) No Pollution prevention and controls (within 250m) No Registered radioactive substances No Hazardous Substances
Radon	The site is not within a radon affected area (less than 1% of homes are above the action level for radon).

7.4 Previous Investigations

The site has been the subject of 1 No. reports undertaken by LEAP, the findings of which are summarised above. LEAP has not been made aware of any other reports.

The preliminary geoenvironmental risk assessment completed as part of LEAPs previous investigation noted a limited number of potential contaminant linkage with the potential to impact future residents or controlled water receptors. These comprised heavy metals, PAH and asbestos around the existing structures and within the soil bunds present on site, and pesticides associated with historical agricultural activities. The risk of contamination associated with the tanks was considered to be very localised to the areas of the tanks due to the low permeability of the underlying soils. The bonfire areas were also noted to be a potential source of metals, PAH and VOC contamination.

The Geotechnical Risk Assessment indicated the risk of high volume change potential soils on site potentially resulting in the need to deepen foundations near trees. The assessment also noted that the Weald Clay is known to locally contain pyrite which, when weathered, can result in ground conditions aggressive to concrete.

On the basis of the initial review and preliminary risk assessment, the site was given a Geotechnical Classification of **Geotechnical Category 1** in accordance with EN1997-1 §2.1(14)-(21).

C PHASE II - INTRUSIVE INVESTIGATION

8 Investigation Rationale

The key objective of the intrusive investigation was to aid the design and construction of the proposed development (Figure 2).

To achieve the investigation rationale, the scope of works comprised a total of 20 investigation locations across the site: 14 No. machine excavated trial pits to a maximum depth of around 3.0m, 2 No. shallow samples from the soil bunds and 4 No. DCP CBR tests.

The scope of the investigation was non-targeted to give general coverage and, in accordance with BS10175, took into consideration the proposed development plans and the preliminary geoenvironmental and geotechnical risk assessments that were developed in the previous desk study. Investigation was not possible within the extent of the existing riding school, stables or residential properties at the time of the investigation.

The investigation locations were located to provide general coverage and preliminary information on the ground conditions on site. At this preliminary stage the location spacings may not meet the requirements of BS8004:2015+A1:2020[6] Clause 4.2.1.1 for low rise buildings and further investigation may be required for the detailed design stage.

The spacing of the investigation locations was generally consistent with the recommended density of 25 to 50m for an exploratory investigation after BS10175 Section 7.7 although investigation in the area of the existing buildings and gardens was not possible at the time of the investigation.

The site investigation locations are provided in Figure 4, Appendix B and Table 4 provides a summary of the rationale, proposed scope and what was achieved in the field:

Table 4 Rationale and Scope for Investigation Locations

Trial Hole/Test Location	Rationale	Proposed Depth (m bgl)	Achieved Depth (m bgl)	Additional Comments
TP1-TP14	To provide information on the ground conditions and enable sampling for geotechnical and environmental testing.	3.0	2.7 – 3.2	Located to assess potential pesticide and metal concentrations across the northern and southern fields.

[6] BS 8004:2015+A1:2020 Code of Practice for foundations

Trial Hole/Test Location	Rationale	Proposed Depth (m bgl)	Achieved Depth (m bgl)	Additional Comments
Bund1-2	Enable sampling of the material making up the bund.	0.5	0.5	To provide preliminary information on make up of the soil bunds.
DCP1-DCP4	Assess the California Bearing Ratio of the shallow soils in the area of the proposed roads.	0.9	0.9	

Several of the potential contaminant sources were situated within the area of the site which was still in use or was only accessible via pedestrian gates. Therefore, investigation around the tanks, swimming pool, stable area and residential properties was not possible and should be undertaken once the site has been vacated. The currently inaccessible area is presented in Figure 4 Appendix B.

9 Site Work

9.1 Date and Weather Conditions

The intrusive investigations were undertaken in a single phase between 27th and 28th of January 2022. At the time of the investigations, the weather was dry and bright.

The Met Office Climate summaries indicate that the three months preceding the site works were particularly dry with November and December 2021 and January 2022 experiencing 20%, 90% and <30% of average seasonal rainfall respectively.

9.2 Site Work Methods

9.2.1 Trial Pitting

Trial pits were dug by a backhoe excavator. The trial pits had a target depth of 3m bgl and were typically 0.6m wide by 2.0m long. Trial pit dimensions are included as Appendix F. Spoil was replaced in reverse order. Trial pits were left mounded to allow for future settlement.

9.2.2 Hand Pitting

Hand pits were excavated using hand tools. Spoil was reinstated in reverse order.

9.2.3 Soil Logging and Sampling

Soil samples were recovered from the boreholes and trial pits for field screening, logging and sampling.

Boreholes were logged in general accordance with the requirements of BS 5930:[7] and BS EN ISO 14688[8]. Borehole logs are presented in Appendix F.

Visual and olfactory evidence of contamination was noted if encountered. These observations were used to aid scheduling of samples for chemical laboratory analyses, and are included on the borehole logs in Appendix F and summarised in Section 10.1.2.

Samples were collected with a clean sampling trowel or by hand (using dedicated nitrile gloves for each sampling location). Samples were placed into laboratory supplied sampling containers, specific to the type of analyses required.

All sample containers were sealed and labelled with a unique location identity, depth and date of sampling.

9.3 Sampling and Field Tests

9.3.1 Soil Sampling

Geoenvironmental soil samples were selected to ensure that near-surface exposure of human health via direct contact was targeted, as well as to spatially and vertically delineate possible sources of contamination. Environmental samples were also taken from the bunds to assess whether they present a potential source of contamination and their classification for waste disposal purposes.

Geotechnical soil samples were targeted to characterise the geological sequence, and to obtain characteristic soils properties and specific geotechnical design parameters as per the proposed development.

9.3.2 Field Vane Test

In-situ field vane tests were undertaken in cohesive soils in the trial pits in accordance with BS EN ISO 22476-9 (Draft). The results are recorded on the trial pits logs in Appendix F.

9.3.3 In-situ California Bearing Ratio Test – Dynamic Cone Penetrometer

4 No. in-situ CBR tests have been undertaken across the site using the Dynamic Cone Penetrometer (DCP), recording blow counts over 900mm of penetration from test level. The

[7] BS5930:2015+A1:2020 Code of Practice for Ground Investigation

[8] BS EN ISO 14688 Parts 1-2 (2018) Geotechnical Investigation and Testing. Identification and classification of soil

test method and interpretation of the results have been undertaken in accordance with DMRB CS229[9] using a modified DCP. The results are attached in Appendix G.

9.4 Laboratory Analysis

9.4.1 Geotechnical Laboratory Testing

Selected samples of the soils have been classified by laboratory analysis for geotechnical design purposes. The laboratory testing has been carried out by Geolabs Ltd at its laboratories in Watford, in accordance with BS1377[10] and BS EN ISO17892[11]. The sampling technique, type, storage and transport and the number of laboratory tests have been undertaken where possible in accordance with BS EN 1997-2:2007 and BS EN ISO 22475[12].

The following laboratory tests have been undertaken:-

Table 5 Geotechnical Laboratory Testing

Test	Number of tests	
	Weald Clay - Clay	Weald Clay – Mudstone
Moisture Content	11	-
Atterberg Limit Test	11	-
Sulphate Determination	3	1
pH	3	1

The geotechnical laboratory test results are provided in Appendix I.

9.4.2 Chemical Soil Analysis

Selected samples of soil were subjected to laboratory testing.

The suite of soil and groundwater contaminant analysis took into account the potential contaminants of concern identified in the CSM (heavy metals, PAHs, asbestos and pesticides). Soil samples were also analysed for pH and total organic carbon (TOC) to support the

[9] CS 229 Data for Pavement Assessment. Design Manual for Roads and Bridges; Pavement; Inspection and Assessment

[10] BS1377 Parts 1-9:1990 Methods of test for Soils for Civil Engineering Purposes

[11] BS EN ISO 17892 Parts 1-12 Geotechnical Investigation and Testing. Laboratory testing of soil

[12] BS EN ISO 22475 Parts1-3 Geotechnical Investigation and Testing. Sampling methods and groundwater measurements

selection of assessment criteria in the subsequent quantitative risk assessment (QRA) for human health.

The laboratory testing also included selected samples for waste classification purposes to support the client with future materials management options.

Sampling techniques and storage have been undertaken as per BS 10175:2011+A1:2013 Code of Practice for Investigation of Potentially Contaminated Sites. The laboratory testing was carried out by The Environmental Laboratory Ltd at its laboratories in East Sussex. Where available, the tests for soils procedures were UKAS and MCERTS accredited.

The following analyses were completed on selected soil samples based on field observations and for general vertical and lateral coverage:

- 10 No. metals (As, Cd, Cr, CrVI, Cu, Pb, Hg, Ni, Se, Zn)
- 10 No. USEPA 16 PAHs
- 10 No. Asbestos identification
- 3 No. organochlorine and organophosphorus pesticide suites.
- 10 No. pH
- 10 No. TOC
- 3 No. Waste Acceptance Criteria tests

The laboratory test results are summarised in Section F and Appendix J, and the laboratory analytical certificates are provided in Appendix K.

9.5 Constraints to the Scope

Access was restricted to the central portion of the site, where the existing properties and gardens are positioned. Furthermore, do to field boundaries, gates and low trees some areas were inaccessible to the excavator. The investigation locations were therefore positioned in the paddock areas to the north and south of the property. No investigation was undertaken within the extent of the riding school.

10 Ground Conditions

The ground conditions are described in detail in the logs attached in Appendix D. In summary the soil conditions were as follows:

Table 6: Summary of soils encountered

Depth From (m)	Depth To (m)	Soil Type	Description

0.0	0.20 / 0.30	**TOPSOIL**	Greyish brown to dark brown silty clayey TOPSOIL with rootlets.
0.20 / 0.30	0.85 / 1.80	**CLAY**	Firm to stiff orangish brown to brown mottled grey to light grey occasionally laminated slightly silty CLAY.
0.85 / 1.8	1.5 / 2.2	**CLAY**	Firm to stiff light orangish brown and light grey occasionally finely laminated slightly gravelly slightly silty CLAY. Gravel is fine to coarse tabular laminated siltstone and mudstone.
1.80 / 2.70	2.7 / 3.2	**MUDSTONE & SILTSTONE**	Interbedded very weak to weak brown to orangish brown thinly laminated ironstained SILTSTONE and MUDSTONE & Extremely weak to very weak blue grey thinly laminated silty MUDSTONE.

The ground conditions encountered generally comprised topsoil over firm to stiff silty clays which became slightly gravelly with depth to between 1.8m and 2.7m bgl over interbedded very weak siltstones and extremely weak mudstones which were recovered as tabular gravel. The depth to rock head varied slightly across the site with slightly shallow depth to rock in the southern portion of the site. In the northern area the siltstone and mudstones were encountered between 1.8m and 2.7m bgl. In the southern field rock was encountered between 1.5m and 2.1m bgl. The rock at depth was generally very weak to weak siltstone although occasional bands of extremely weak bluish grey mudstone were encountered in several of the excavations. Fossil rich bands were observed within the mudstone in trial pits TP2, TP3 and TP9.

Relic shear surfaces were noted within the clays at between 0.5m and 1.4m bgl in trial pits TP1, TP2, TP5, TP8 and TP13. These surfaces represent layers where the soils have previously sheared and exhibit what is referred to as residual strength. Potentially desiccated soils were encountered in TP2 and TP13 adjacent to the tree line.

The topsoil encountered in trial pits TP9, TP10, TP11, TP12 and TP14 (all located in the south section of the site) appeared reworked and contained rare fine brick gravel. Furthermore, fine charcoal fragments were noted in the topsoil encountered in TP9.

10.1 Soil bunds

Two soil bunds were noted on site during the previous walkover. Bund 1 located on the north western boundary of the site was ~57m in length, ~1.5m high and between 3m and 4m in width. Bund 2 adjacent to the riding school was ~48m long by 4m to 5m wide and ~1.5m to 2m tall. Excavations were undertaken into the undisturbed sections of the soil bunds, one per bund to provide a preliminary assessment of their contents and enable sampling for preliminary classification. Bund 1 was found to comprise topsoil over reworked natural clays with occasional wood fragments noted in both the clay and the topsoil. Machine access was not available to Bund 2 and as such a shallow hand excavation was undertaken on top of the bund.

The hand pit encountered silty clayey topsoil over reworked natural clay soils. Following the removal of fences additional sampling of the bunds is recommended to confirm their contents.

10.1.1 Groundwater

No groundwater strikes or seepages were encountered in any of the trial pits during the investigation.

10.1.2 Visual and Olfactory Evidence of Contamination

With the exception of the fine brick and charcoal noted in trials pits 9, 10, 11, 12 and 14 no visual or olfactory evidence for contamination was observed within any of the excavations during the investigation.

D GEOTECHNICAL INFORMATION

11 Strata Encountered

11.1 Topsoil

The site is underlain by silty clayey topsoil with abundant rootlets which was noted to appear reworked in the south section of the site.

11.2 Clay – Weald Clay Formation

The topsoil was underlain were underlain by firm to stiff clays to 1.5-2.2m. The results of the geotechnical laboratory testing are summarised in Table 7 below.

Table 7: Summary of Geotechnical Test Results for Clay

Test	Range
Moisture Content (%)	18.4 – 36.9
Liquid Limit (%)	43 - 79
Plastic Limit (%)	23 – 29
Plasticity Index (%)	20 - 50
Undrained shear strength (kN/m^2)*	100 - 205
Water Soluble Sulphate Content (g/l)	<0.010 – 1.9
Acid Soluble Sulphate Content (%)	0.016 – 1.4
Total sulphur (%)	0.023 – 0.84
pH	6.0 – 8.4

*Measured using a hand shear vane apparatus

Hand shear vane testing undertaken within the trial pits at depths of between 1.4m and 1.7m bgl returned undrained shear strengths of between 100 and 205kPa indicating stiff to very stiff soils.

The results of Atterberg limited testing indicate the cohesive soils beneath the site comprise intermediate to very high plasticity clays. An A line plot summarising the plasticity testing results is present in Figure 5 Appendix B.

11.3 Siltstone & Mudstone – Weald Clay Formation

The clays were underlain by interbedded grey and brown siltstones and occasional blue grey mudstones to the full depth of investigation. Laboratory testing of the siltstone and mudstone was beyond the scope of works, however, based on the field tests the siltstone and mudstone

are classified as extremely weak to weak. The brown and grey mudstones and siltstones were generally very weak to weak whilst the blue mudstones were extremely weak.

E GEOTECHNICAL APPRAISAL

12 Geotechnical Design

The foregoing geotechnical appraisal does not constitute a Geotechnical Design Report in accordance with BSEN1997. The following recommendations are for preliminary design purposes only.

For the detailed design, the short-term and long-term design situations must be considered. Where relevant, the following limit states should be considered:-

- Loss of equilibrium of the structure or the ground, considered as a rigid body, in which the strengths of structural material and the ground are significant in providing resistance (EQU)
- Internal failure or excessive deformation of the structure or structural elements in which the strength of structural materials is significant in providing resistance (STR)
- Failure or excessive deformation of the ground, in which the strength of soil or rock is significant in providing resistance (GEO)
- Loss of equilibrium of the structure or the ground due to uplift by water pressure or other vertical actions (UPL)
- Hydraulic heave, internal erosion and piping in the ground caused by hydraulic gradients (HYD)

The following factors should also be considered.

- Overall stability and ground movements
- Nature and size of the proposed construction including the design life
- Conditions with regards to the surroundings (e.g. neighbouring structures, traffic, utilities, vegetation, contamination etc.)
- Ground and groundwater conditions
- Influence of the environment.

13 Geotechnical Appraisal

13.1 Swelling and Shrinkage

Based on the laboratory test results in Section D, an overall classification of NHBC **HIGH** Volume Change Potential (VCP) is recommended for the clay soils.

Foundations will therefore require deepening in accordance with NHBC Chapter 4.2 where clay soils are encountered near trees. Foundation depths should be calculated based on the

mature height of the tree, however, the existing height is relevant for trees which are to be removed. Deepening may be terminated where the rock is encountered at depth.

13.2 Sulphates

The potential for high levels of sulphates within the natural soils on site has been identified due to the underlying geology. In particular, construction activities that may substantially disturb previously unweathered strata and expose sulfur minerals such as pyrite to air, water and bacteria can result in the relatively rapid oxidation of such minerals producing high levels of sulphates. In accordance with the BRE[13] methodology, four samples, three of the clay and one of the mudstone were therefore tested for water and acid soluble sulphate, total potential sulphate (TPS) and pH.

Based on the results of the testing, oxidisable sulphides (OS) are locally >0.3%, indicating pyrite is present. Using highest sulphate class calculated from both the water soluble sulphate and TPS, the soils are classified as Design Sulphate Class DS-5 and assuming static groundwater, the ACEC class is AC-4s. It should be noted that the DS-5 classification is based on the one sample of the mudstone tested with all other samples tested exhibiting significantly lower sulphate concentrations, It may be possible to reduce the sulphate classification with further testing.

13.3 Groundwater

No groundwater strikes or seepages were encountered in any of the excavations completed on site. However, it should be noted that the investigation was undertaken towards the end of a particularly dry winter and as such shallower groundwater may be anticipated during wet winter months. Slight groundwater seepages along the interface between the clays and the underlying mudstone are often encountered onsite underlain by the Weald Clay.

Long term groundwater monitoring was beyond the scope of works and would be required to fully assess the groundwater regime.

13.4 Bearing Capacity and Foundations

13.4.1 Shallow Foundations

Allowable Bearing Capacity or Pressure is a conservative estimate of the ultimate bearing resistance of the ground, selected on the basis of the soil/rock description, and taking a presumed degree of settlement into account. It has traditionally been used to check simple

[13] Building Research Establishment Special Digest 1: 2005. Concrete in aggressive ground. Part 1: Assessing the aggressive chemical environment.

foundation designs. The use of this method is acceptable under BS EN 1997-1[14] as a "prescriptive method", with the allowable bearing pressures now termed "presumed bearing resistance".

The presumed bearing resistance is highly dependent on proposed depth of foundation, width of foundation and the structure's tolerance for settlement. The following section provides a preliminary presumed bearing resistance assuming a stated depth and width of foundation and assumes that settlements of up to 25mm can be tolerated by the structure. Should alternative foundation depths and dimensions be required, or the proposed structure have different long term movement requirements then the following assessment should be re-evaluated.

All loads should be transferred beneath any topsoil, made ground, loose, soft, low strength, desiccated or disturbed soils and transferred onto the stiff clays below about 1.0m depth. On the basis of the findings of the intrusive investigation to date, a preliminary presumed bearing resistance of 125kPa may be assumed for a 600mm wide foundation on the stiff clays below about 1.0m and this capacity could be increased further should foundations extend to the mudstone at depth. Foundations will require deepening in the clay soils near trees to NHBC HIGH VCP precautions.

It is noted that one proposed structure, Plot 73, is in close proximity to the existing swimming pool. Care should be taken to ensure foundations do not load the infilled pool. At this stage foundations in this area should extend below the depth of infill into the natural soils at depth.

Further information may be required for the detailed design stage, including the foundation design details and further investigation to meet the requirements of BS EN 1997 and BS 8004[15] particularly in the area of the site currently occupied by properties.

Where foundations are stepped or span different soil types, allowance should be made for nominal reinforcement.

13.5 Floor Slabs

With reference to NHBC Standard 5.2, suspended floor slabs are recommended:-

- Where the depth of fill exceeds 600mm
- Where foundations are deepened below 1.5m in accordance with NHBC Standards Chapter 4.2
- Where desiccated soils are encountered
- Where vibratory ground improvement techniques have been used

[14] BS EN 1997-1(2004)+A1:2013 Eurocode 7:Geotechnical Design: General Rules

[15] BS 8004:2015+A1:2020 Code of Practice for foundations

- On sloping sites
- Where foundations have been piled.

Given the high VCP of the clay soils suspended floor slabs are recommended on site.

13.6 Roads

13.6.1 Test Results

A series of 4 No. dynamic cone CBR tests were carried out along the line of the proposed access road. The results were in the range 2.9 – 7.6%

Based on the results of plasticity testing the shallow soils are assessed as marginally frost susceptible.

13.6.2 Recommendations

TRRL 1132 Structural Design of Bituminous Roads indicates that for soils with plasticity ranging from 20% to 50% a CBR of 2% to 4% should be anticipated. A preliminary design CBR value of 2.5% is recommended for a silty clay subgrade.

Further confirmatory testing may be required if the proposed roads are to be adopted.

High plasticity clays such as the Weald Clay soften rapidly when exposed to moisture. As such excavation to formation level during the wet winter months should be avoided and where possible prolonged exposure of the formation level to the elements should be avoided. Where significant softening does occur over excavation and replacement with suitably compacted granular fill is recommended.

13.7 Excavations

Excavations in the silty clays should be stable in the short term. However, the site is gently sloping, and relic shear surfaces were noted in some excavation to a maximum depth of 1.4m bgl. As such excavations may be unstable where these surfaces intersect the excavation face. Therefore, excavations perpendicular to the slope should be avoided and should be kept short (say around 5m) and be backfilled as soon as possible.

Furthermore, although no groundwater seepages were encountered during this investigation the works were undertaken during a period of particularly dry weather. As such the potential for minor groundwater seepages particularly at the boundary between the clay soils and the underlying mudstone should be anticipated. Excavations will therefore be unstable in the long term and should be backfilled as soon as possible. Allowance should be made for light pumping.

Appropriate Health and Safety precautions must be adhered to where man entry into excavations is required. Even stiff clay soils at shallow depth can collapse, particularly following wet weather. Alternative foundation methods may need to be adopted where trench footings cannot be safely or satisfactorily constructed.

13.8 Filling

The preliminary recommendations contained within this report assume that ground levels are to remain at a similar level across the site for the proposed development, and that no significant changes in level are proposed.

An existing swimming pool is located within the garden of the Woodfords property at the centre of the site. Prior to redevelopment the pool will have to be excavated and backfilled with suitable compacted granular fill.

13.9 Slope Stability

The site is gently sloping at an angle of ~2° to the southeast. Provided no significant level changes are proposed, no slope stability issues are anticipated. However, if significant levels changes are proposed, then global stability checks are recommended.

13.10 Retaining Walls

LEAP is not aware that any retaining walls are proposed on site.

13.11 Settlement

Based on the presumed bearing resistance given in Section 13.4, settlements should be within typical tolerable limits for the low rise development proposed.

If soft clays are encountered at formation level or below, significant settlement should be anticipated and serviceable limit state analyses will be required.

At this stage it is assumed that ground levels will remain at the current level for the proposed development. If significant level raises are proposed, this may induce significant settlement in the natural soils and detailed settlement analyses will be required.

Where foundations are stepped or span different soil types, differential settlement should be anticipated and allowance should be made for nominal reinforcement.

13.12 Heave and Uplift

In accordance with NHBC Standards Chapter 4.2, precautions against heave should be used where foundations are within the influence of trees and the resulting foundation depth is greater than 1.5m. Compressible material must be provided against the inside faces of all external wall foundations greater than 1.5m in depth. For pier and beam foundations, additional voids are required below ring beams.

14 Geotechnical Recommendations

Further assessment including a geotechnical design report will be required once the details of the proposed construction are known.

Further intrusive investigation is recommended within the previously inaccessible areas, and additional sulphate testing may enable a reduction in the Design Sulphate Classification.

F GEO-ENVIRONMENTAL QUANTITATIVE RISK ASSESSMENT

15 Revised Conceptual Site Model

15.1 Introduction

The preliminary conceptual site model completed as part of the desk study identified a number of plausible contaminant linkages. The revised CSM provides an updated understanding of the site based on the findings of the site investigation and analytical results and was used to inform the quantitative risk assessment (QRA) undertaken in Sections 16 onwards in the context of the proposed residential land use.

No evidence for visual or olfactory evidence for hydrocarbon contamination was encountered within any of the excavations on site. However, it should be noted that investigation was limited to the area of the site not currently occupied by residential buildings and private gardens, and it was not possible to undertake trial holes in the vicinity of the fuel tanks.

15.2 Distribution of Contamination

The exploratory logs are provided in Appendix F and a summary of the laboratory analytical results in Appendix J.

The ground conditions encountered on site comprised topsoil over firm to stiff clays of the Weald Clay Formation. No made ground was encountered on site with the exception of two soil bunds situated in the northern portion of the site. Based on one excavation into the undisturbed portion each of the two bunds they appeared to comprise reworked natural soils with rare wood fragments.

The topsoil in the southern portion of the site appeared reworked with fine brick gravel noted in several excavations (Trial pits 9, 10, 11, 12, and 14). Fine charcoal fragments were also noted within the topsoil in TP9. No other visual evidence for contamination was observed within the soils.

16 Human Health Risk Assessment

16.1 Rationale and Approach

The generic quantitative risk assessment (GQRA) for human health was conducted in line with the CLEA methodology by comparing the soil analytical results from the ground investigation with Generic Assessment Criteria (GAC). The GACs were selected using the rationale and assumptions provided in Appendix L.

Sets of soil GACs are available for SOMs of 1%, 2.5% and 6%. In this case, TOC in the Made Ground samples that were analysed ranged from 0.48 to 2.7%. Using the conversion of SOM = TOC x 1.72, this equates to a SOM range of 0.83 to 4.6%. 1% SOM was considered to be appropriate to maintain conservatism.

For some contaminants of concern, direct contact will be the dominant pathway for exposure. In order to support with development options, human exposure to all unsaturated soils, irrespective of depth, has been considered for the purpose of this assessment. This will maximise the information available to the design team on the suitability of all unsaturated material and can support with their materials management options.

The risk assessment did not include statistical analysis. CL:AIRE 2020[16] provides guidance on the appropriate sample sizes for particular statistical distributions of data and non-targeted soil sampling approaches. The number of soil samples collected in the site investigation indicates that statistics are not appropriate to use in this case.

The potential risks to human health from the inhalation of vapours derived from groundwater were discounted in the CSM.

The focus of the GQRA was chronic risks to human health because these often occur at lower doses than acute responses to exposure. Groundworkers during construction and future maintenance may be exposed to unacceptable levels of contamination. The CLEA assessment approach is designed to evaluate long term chronic exposure to contaminants and therefore, this approach is not appropriate for groundworkers who will be exposed for short durations on a site. As such, a GQRA was not undertaken to evaluate the potential for unacceptable exposure to groundworkers and future maintenance workers. A qualitative evaluation is however, provided in Section 16.2.

16.2 Evaluation of Potential Risks to Future Residents

The samples analysed comprised six samples of the topsoil, two of the underlying natural clay soils and two from the soil bunds. The laboratory analytical results were assessed to determine the potential risks to future site users under a generic residential land use scenario assuming that homegrown produce are consumed (resi HGP). The quantitative risk assessment is provided in Appendix J and the laboratory certificates are provided in Appendix K. Summary tables are provided below.

[16] CL;AIRE, 2020 'Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration.' CL:AIRE, Buckinghamshire. ISBN 978-1-905046-35-5.

Table 8: Summary of Soil Contamination Test Results for the shallow soils

Determinand	Number of samples	Number >LOD	Maximum Conc. (mg/kg unless otherwise stated)	Generic Assessment Criteria (mg/kg)	Number of Exceedances
METALS					
Arsenic	8	8	19.7	37	0
Cadmium	8	0	<0.5	22	0
Chromium	8	8	32.3	910	0
Hexavalent Chromium	8	0	<0.8	21	0
Copper	8	8	22.9	2,400	0
Lead	8	8	39.8	200	0
Mercury[1]	8	0	<0.5	40	0
Nickel	8	0	16.1	130	0
Selenium	8	0	<1.0	250	0
Zinc	8	8	68	3,700	0
ASBESTOS					
Asbestos	8	0	None detected	Presence	0
HYDROCARBONS					
Benzo(a)pyrene[2]	8	0	<0.1	5.0	0
Naphthalene	8	0	<0.1	2.3	0
Total PAHs	8	1	0.5	n.v.	-

Notes to table

1. *Assessment criterion based on inorganic mercury*
2. *As a surrogate marker for genotoxic PAH*
3. *As a marker compound for threshold PAH*

n.v. – no appropriate value

None of the metals or PAH compounds tested for were recorded at concentrations in excess of the Generic Assessment Criteria (GAC) values for a residential development with private gardens. Furthermore, all pesticides tested for were recorded below the laboratory limit of detection. No asbestos was detected within any of the samples tested.

It is noted that no investigation was possible around the existing properties, gardens and fuel tanks. As such there remains the potential for as yet unidentified contamination and further sampling in these areas is recommended once the current occupants have vacated.

Table 9: Summary of Soil Contamination Test Results for the soils bunds

Determinand	Number of samples	Number >LOD	Maximum Conc. (mg/kg unless otherwise stated)	Generic Assessment Criteria (mg/kg)	Number of Exceedances
METALS					
Arsenic	2	2	20	37	0
Cadmium	2	0	<0.5	22	0
Chromium	2	2	33.1	910	0
Hexavalent Chromium	2	0	<0.8	21	0
Copper	2	2	33.4	2,400	0
Lead	2	2	33.3	200	0
Mercury[1]	2	0	<0.5	40	0
Nickel	2	2	33.1	130	0
Selenium	2	0	<1.0	250	0
Zinc	2	2	107	3,700	0
ASBESTOS					
Asbestos	2	0	None detected	Presence	0
HYDROCARBONS					
Benzo(a)pyrene[2]	2	1	1.2	5.0	0
Naphthalene	2	0	<0.1	2.3	0
Total PAHs	2	1	12.6	n.v.	-

Notes to table

1. *Assessment criterion based on inorganic mercury*
2. *As a surrogate marker for genotoxic PAH*
3. *As a marker compound for threshold PAH*

n.v. – no appropriate value

Preliminary laboratory testing of the samples taken from the two soil bunds recorded none of the contaminants tested for at concentrations considered to pose a risk to future residents. Additional confirmatory testing is recommended to fully assess the contents of the bunds prior to redevelopment.

16.3 Evaluation of Potential Risks to Groundworkers

There is a legal duty for employers to ensure that suitable health and safety controls should be in place to protect groundworkers and they should evaluate the potential for exposure including using data provided in this report which should be included in any future Health and Safety file for the site under The Construction (Design and Management) Regulations 2015.

The investigation works completed to date have not encountered any contaminants at concentrations that would pose a risk to construction or groundworkers. Assuming that appropriate PPE is utilised and site hygiene in maintained the risk to construction workers is considered negligible.

17 Controlled Waters Risk Assessment

17.1 Evaluation of Potential Risks to Controlled Waters

The site is underlain by the Weald Clay Formation which is designated as a non-aquifer. Furthermore, no groundwater was encountered during the investigation undertaken on site. Given the very low contaminant concentrations recorded on site the risk to groundwater is considered very low.

A drainage ditch a cross the centre of the site on a roughly northwest to southeast alignment. No in situ fuel tanks were located in the vicinity of the drainage ditch. One decommissioned tank had been placed ~8 – 10m from the central ditch for disposal. During the investigation no staining or odours were noted associated with this tank. Given the very low contaminant concentrations encountered the risk to surface water receptors posed by the site is considered negligible. This assessment would require revision should contamination associated with tank be encountered during the further investigation works. Care should be taken to ensure that excess sediment does not enter the surface water system during the construction phase.

18 Waste Disposal

It is anticipated that the proposed development will generate waste soils and materials will need to be removed from site as part of the construction process.

Where soils are to be disposed off-site, it is the duty of the waste producer, in this case Reside Developments, to ensure that all waste is disposed of appropriately and that any that is sent to landfill is sent to an appropriately licensed one. All waste sent to landfill must be classified and must be pre-treated. There are various forms of pre-treatment that are acceptable. In this case it could include "reduction in volume", which could be achieved by segregating the Made Ground and re-using part of it on site.

Where made ground soil is to be re-used on site then it is recommended that this is carried out under the CL:AIRE Definition of Waste Industry Code of Practice (DoWCoP) for re-use of soils[17].

All of the samples tested have been screened using the HazWasteOnline© tool for a waste classification purposes. Based on the results of this screening it is considered that the soils would be classified as non-hazardous for waste disposal purposes.

As a preliminary classification three samples, one of the natural clay soils and one each from the two soils bunds were tested for waste acceptance criteria to indicate whether it will be accepted at landfill. The results indicate that both the natural soils and the soil bund waste would be accepted as inert waste however it is recommended that this is confirmed with a haulier/receiving site.

It is strongly advised that detailed discussions be held with remediation/groundworks contractors and that receiving landfill sites are identified in advance of commencing any waste removal.

19 Geo-Environmental Conclusions

The investigation to date was limited to the paddocks to the north and south of the developed area and encountered topsoil over firm to stiff clays over mudstones and siltstones at depth. No groundwater was encountered during the investigation. No made ground was encountered on site although the topsoil appeared reworked over much of the southern half of the site.

Chemical testing of the shallow soils and earth bunds have encountered no contaminants at concentrations considered to pose a risk to future residents or construction workers. However, investigation to date has been limited to the paddocks with no investigation around the existing properties. As such there remains the potential for as yet unidentified contamination in these areas of the site.

20 Geoenvironmental Recommendations

Access to the central portion of the site around the stables and existing properties was limited as these areas were still in use at the time of the investigation. Further sampling beneath the footprint of these structures and around the fuel tanks is recommended following their demolition. At this stage remedial measures to mitigate the risk to future residents is not considered necessary however this assessment may require revision following the additional

[17] The Definition of Waste: Development Industry Code of Practice. Version 2 2011. CL:AIRE

investigation. For preliminary costing purposes it may be prudent to allow for removal of some contaminated soils around the three fuel tanks.

It is unknown whether importation of natural soils will be required as part of the development. Importing of uncontaminated natural materials will require a Materials Management Plan (MMP) to be produced and a declaration made to CL:AIRE under DoWCoP.

APPENDIX A – Limitations

Limitations

LIMITATIONS

This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk. Unless explicitly agreed otherwise in writing, this report has been prepared under LEAP's standard terms and conditions, as included in the quotation for this works.

This report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed. LEAP cannot be held responsible for any disclosures or changes in regulation that are provided post production of this report, and will not automatically update the report.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development and site usage, timescales or clients specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an overall assessment of ground conditions on site. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7[18], although this is subject to the restrictions imposed on the investigation as listed above. For geotechnical design, Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and

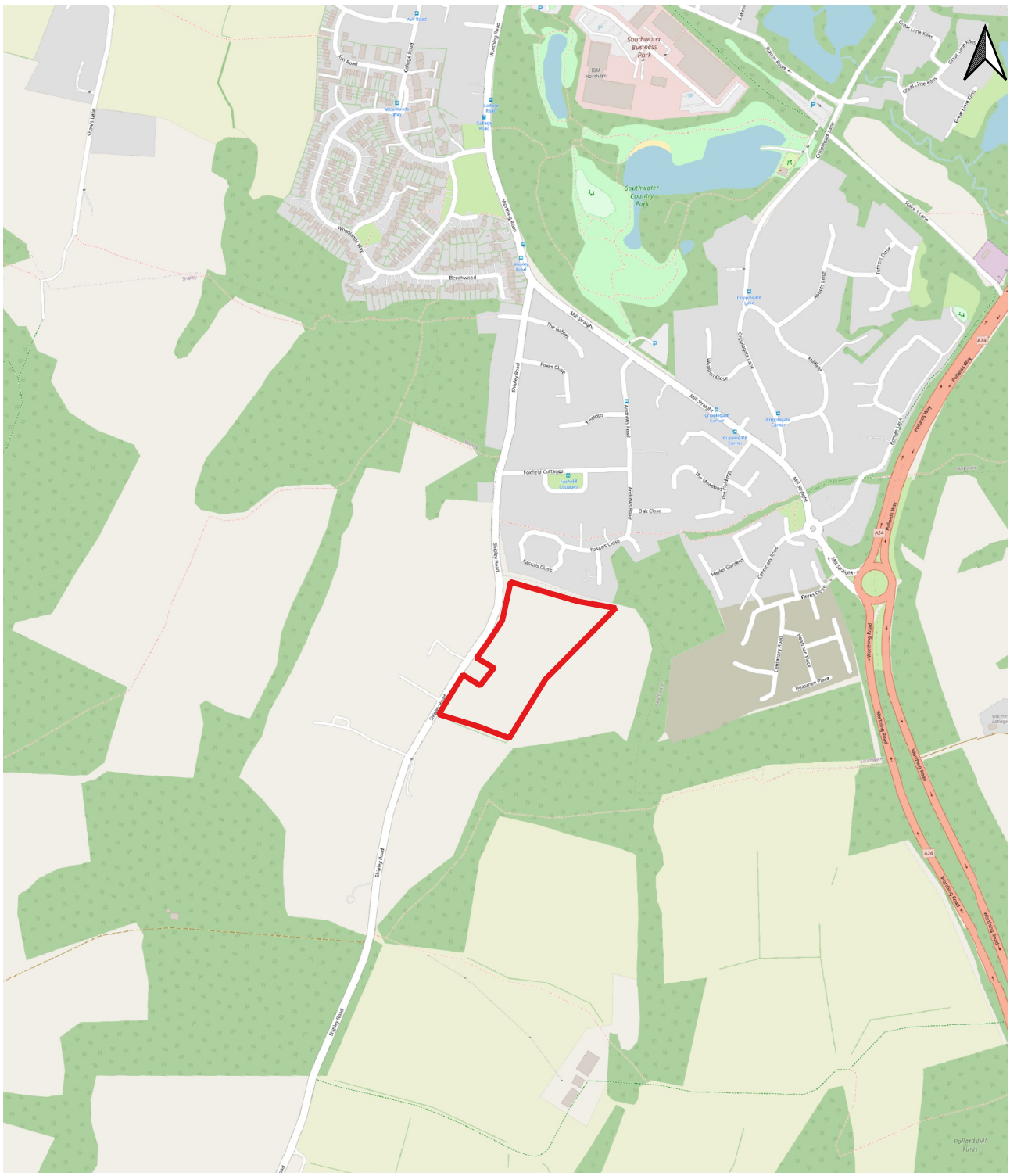
[18] BS EN 1997 Eurocode 7- Geotechnical Design - Part 1: General Rules (2004) and Part 2: Ground Investigation and Testing (2007)

structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this report will not meet the requirements of a Geotechnical Design Report (GDR), and should therefore be used for preliminary guidance only.

The presence of asbestos may be noted during the site walkover survey, intrusive investigations and/or from the results of contamination testing. However, this report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

APPENDIX B – Figures and Drawings

Figures and Drawings



Basemap: © OpenStreetMapcontributors
Note 1: Elevations not shown

leap environmental	Client:	Reside	Title:	Site Location	Project ID:	LP2826
	Project:	Woodfords, Shipley Road, Southwater	Date:	23/02/22	Figure No.	1

FOR ILLUSTRATIVE PURPOSES ONLY

CDM 2015 Health & Safety Information

Indicative Accommodation Schedule

Market	
2no.	2-Bedroom Flats
11no.	2-Bedroom Houses
1no.	2-Bedroom Bungalow
16no.	3-Bedroom Houses
3no.	3-Bedroom Bungalows
10no.	4-Bedroom Houses
Affordable	
6no.	1-Bedroom Flats
3no.	2-Bedroom Flats
3no.	2-Bedroom Houses
11no.	3-Bedroom Houses
2no.	4-Bedroom Houses
Total:	**73 Dwellings**

Car Parking: 1 spaces per Flat
2 spaces per 2 & 3 bed house & 4 bed affordable
3 spaces per market 4 bed Houses
36 visitor/unallocated spaces
Spaces marked on open fields/ car barns

Cycle Parking: 1 space per flat, 2 spaces per house within either car barn/garages, garden sheds or shared stores

Rev	Date	Revision Details	Dr	Ch

ECE Architecture

Client's Name: Reside Developments

Job Title: Shipley Road, Southwater

Drawing Title: Proving Site Layout

Scale: 1:500 @ A0 / 1:1000 @ A2

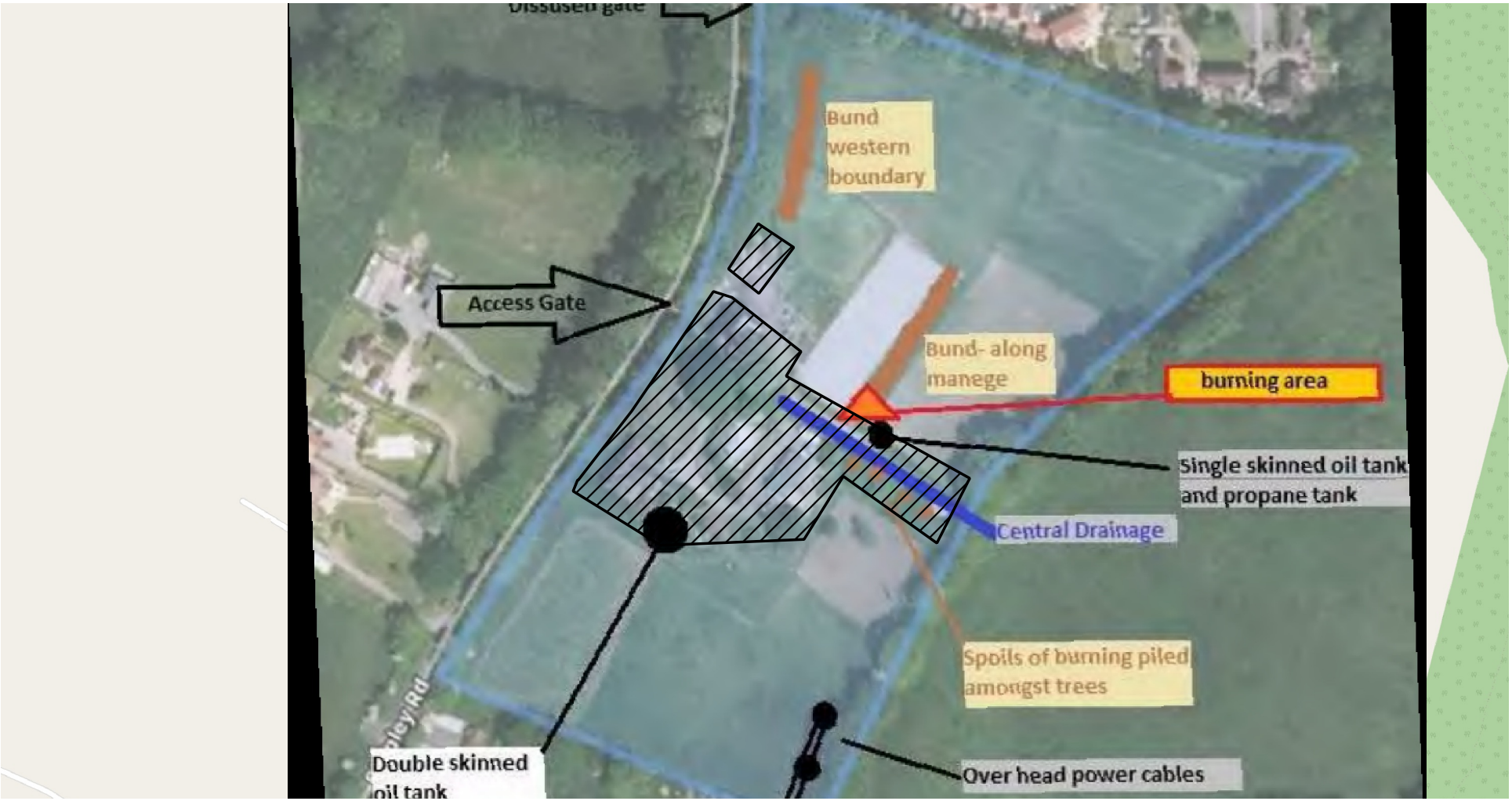
Drawn: KE | Checked: AK | Date: 07/09/20

Job No: 6769 | Drawing No: PL-11 | Rev:

Status: INFORMATION

Client supplied image, ©ECE Architecture

leap environmental	Client:	Reside Developments	Date:	23/02/22	Project ID:	LP2826
	Project:	Woodfords, Shipley Road, Southwater	Title:	Proposed Layout	Fig. No.	2

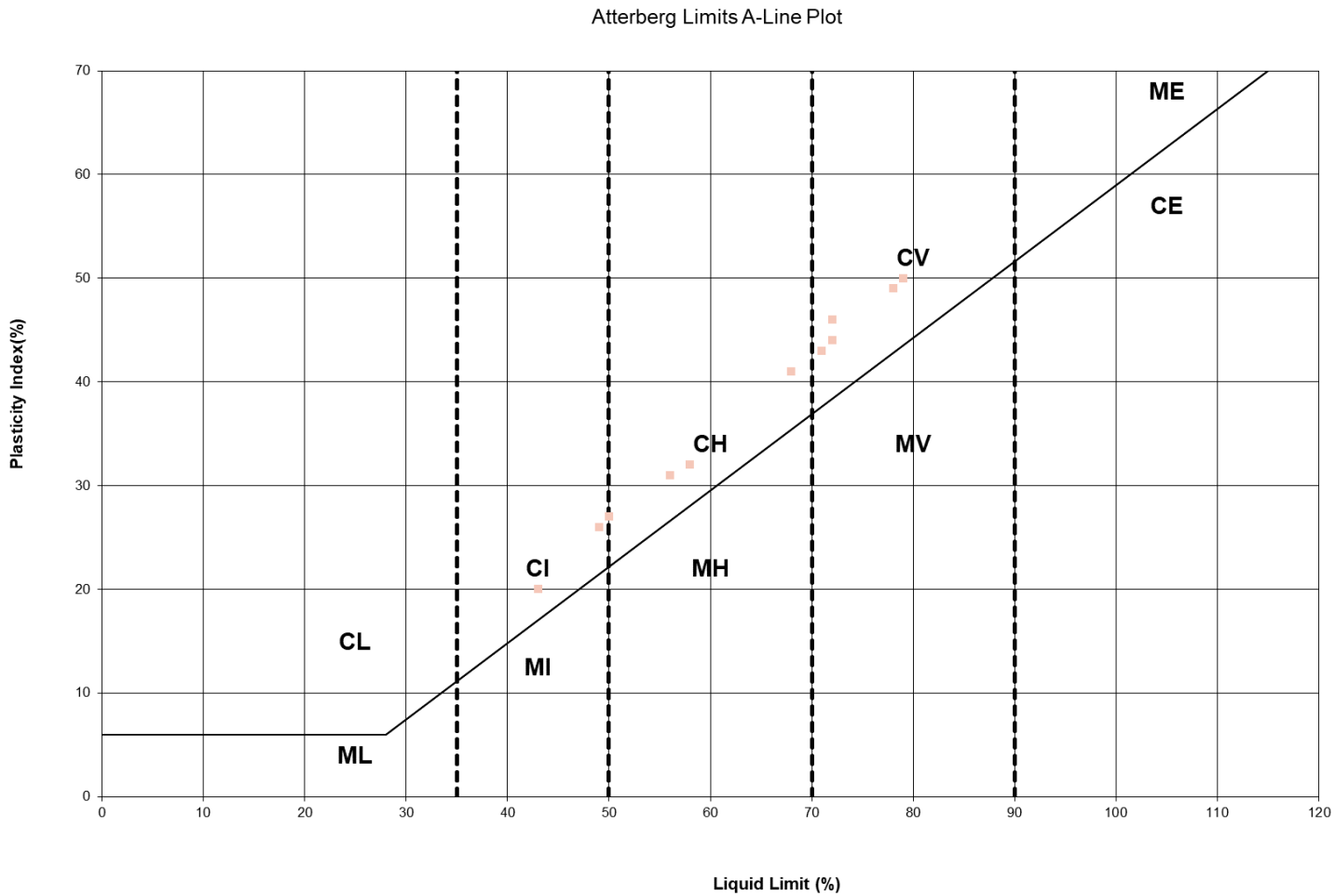


Basemap: Supplied by the client

leap environmental	Client:	Reside Developments	Title:	Site restraints	Project ID:	LP2826
	Project:	Shipley Lane, South Water	Date:	08/03/22	Figure No.	3

Basemap: Supplied by the client
Note 1: Exploratory holes have been positioned by 3rd party surveyors and should therefore only be taken as approximate
Note 2: Exploratory holes shown are not to scale
Note 3: Elevations not shown

leap environmental	Client:	Reside Developments	Title:	Site Investigation Locations	Project ID:	LP2826
	Project:	Woodfords, Shipley Road, Southwater	Date:	23/02/22	Figure No.	4



Client supplied image, ©ECE Architecture

leap environmental	Client:	Reside Developments	Date:	23/02/22	Project ID:	LP2826
	Project:	Woodfords, Shipley Road, Southwater	Title:	A line plot	Fig. No.	5

APPENDIX C – Photographic Record

Photographic Record

Plate 1 – View from the TP1 location across the area of the hors riding school.

Plate 2 – View from TP2 looking south east.

Plate 3 -Arisings from TP9 with overhead lines visible beyond.

Plate 4 – Ground conditions encountered in TP1

Plate 5 – Ground conditions encountered in TP10.

APPENDIX D – Exploratory Logs

Exploratory Logs

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Dorking, Surrey RH4 1XA
Tel: 01306 646510
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Trial Pit Log

Trialpit No **TP1**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515632 - 125044 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m): Depth 3.00	Scale 1:25
Client: Reside Developments			Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Grass over greyish brown silty clayey TOPSOIL with rootlets.
	0.35	ES		0.25			Firm light orangish mottled grey slightly silty CLAY.
	0.70	D					*Hand Pen at 0.7m = 130kPa*
	1.00	D	HVP=112	0.85			Firm light orangish brown and light grey occasionally finely laminated slightly gravelly silty CLAY. Gravel is fine to medium tabular laminated siltstone. *Relic shear surfaces noted at 1.2m bgl.*
	1.60	D	HVP=205	1.50			Very stiff brown mottled dark brown thinly laminated CLAY.
	2.30	D		2.20			Interbedded very weak brown thinly laminated SILTSTONE and MUDSTONE recovered as tabular gravel.
	2.70	D		2.60			Extremely weak to very weak blue grey thinly laminated silty MUDSTONE.
				3.00			End of pit at 3.00 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP2**

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515622 - 125087 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m):	Scale 1:25
Client: Reside Developments		Depth 2.70	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.15	ES		0.20			Grass over dark brown silty clayey TOPSOIL with occasional wood fragments.
	0.40	ES					Stiff light orange brown mottled grey silty CLAY with occasional roots.
							Hand Pen at 0.6m = 190kPa
	0.80	D	HVP=105				
							Hand Pen at 1m = 170kPa
				1.20			Stiff to very stiff light grey mottled orange thinly laminated silty CLAY with rare fine angular gravel of extremely weak mudstone and occasional roots.
			HVP=205				*Hand Pen at 1.4m = 260kPa*
							Relic shear surfaces noted at 1.4m bgl.
				1.60			Friable brown laminated desiccated silty CLAY with rootlets.
	1.80	D					
				2.00			Very weak thickly laminated brown to dark brown occasionally light grey silty MUDSTONE with frequent bivalve fossils. Recovered as fine to coarse tabular gravel.
	2.10	D		2.20			Very weak brown to orangish brown occasionally ironstained thinly laminated clayey SILTSTONE.
	2.60	D		2.70			End of pit at 2.70 m

1 2 3 4 5

Remarks: Trial pit was terminated at 2.7m due t slow progress through weak siltstone. The excavation remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP3**

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515654 - 125101 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m):	Scale 1:25
Client: Reside Developments		Depth 3.00	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Grass over brown locally mottled orange and grey clayey TOPSOIL with rootlets.
				0.20			Firm becoming stiff mottled orange and grey silty CLAY with roots.
	0.30	ES					
							Hand Pen at 0.9m = 200kPa
	1.00	D	HVP=168				
				1.20			Extremely weak thinly laminated dark grey and dark orange silty MUDSTONE.
	1.30	D		1.35			Stiff friable laminated orange brown and light grey silty CLAY.
	1.50	D	HVP=195				
							Off white to grey shelly mudstone bed noted at 1.75m
							Too friable for hand pen
				2.10			Very weak thinly laminated grey and dark reddish brown silty MUDSTONE recovered as tabular gravel.
	2.30	D					
				2.60			Extremely weak light bluish grey thinly laminated silty MUDSTONE.
	2.90	D					
				3.00			End of pit at 3.00 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP4**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515725 - 125082 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m):	Scale 1:25
Client: Reside Developments		Depth 2.90	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.15	ES		0.20			Grass over grey brown mottled orange clayey TOPSOIL with rootlets.
	0.25	ES					Firm to stiff light orange brown and grey silty CLAY.
	0.80	D					*Hand Pen at 0.7m = 190kPa*
			HVP=184	0.95			Stiff dark grey and orange brown silty CLAY. *Hand Pen at 1m = 220kPa*
				1.20			Stiff friable brown mottled grey laminated silty CLAY.
			HVP=166				*Hand Pen at 1.7m exceeds 400kPa*
	1.90	D					
	2.40	D		2.30			Very weak brown and grey ironstained dark brown thinly laminated silty MUDSTONE with occasional bands of bluish grey mudstone.
				2.90			End of pit at 2.90 m

1 2 3 4 5

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP5**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515687 - 125064 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m):	Scale 1:25
Client: Reside Developments		Depth 3.20	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.15	ES		0.20			Grass over brown to greyish brown silty clayey TOPSOIL with rootlets.
	0.60	D					Firm mottled light grey, light orange and dark orange silty CLAY. *Relic shear surface at 0.5m bgl.* *Hand Pen at 0.6m = 220kPa*
	1.00	D	HVP=100	0.85			Stiff dark grey and dark orange silty CLAY. *Hand Pen at 0.9m = 210kPa*
	1.50	D	HVP=205	1.10			Firm to stiff light orange brown and light grey silty CLAY with frequent dark ironstaining in places. *Hand Pen at 1.4m = 190kPa*
	2.00	D		1.80			Friable brown mottled dark brown and orange brown gravelly thinly laminated silty CLAY. Gravel is medium to coarse sub-angular ironstone.
	2.90	D		2.60			Extremely weak to very weak thinly laminated blue grey and light brown silty MUDSTONE.
				3.20			End of pit at 3.20 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP6**

Sheet 1 of 1

Project Name:	Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515771 - 125074 Level:
Date	28/01/2022		
Location:	Woodfords, Shipley Road,, Southwater, West Sussex	Dimensions (m): Depth 2.80	Scale 1:25
Client:	Reside Developments		Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Grass over brown silty clayey TOPSOIL with rootlets.
	0.25	ES		0.20			Stiff light orange and grey silty CLAY.
	0.60	D					*Hand Pen at 0.5m = 210kPa*
			HVP=157				
	1.40	D		1.40			Very stiff dark brown and dark grey silty CLAY with occasional medium to coarse tabular siltstone gravel and frequent roots.
				1.80			Very weak to weak orange to orange brown thinly laminated SILTSTONE with occasional roots recovered as medium to coarse tabular gravel.
	2.40	B					
				2.80			End of pit at 2.80 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP7**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515734 - 125041 Level:	Date 28/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m): Depth 3.00	Scale 1:25
Client: Reside Developments			Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Grass over brown to greyish brown slightly silty clayey TOPSOIL with rootlets.
	0.20	ES		0.25			Firm to stiff orange brown and grey slightly silty CLAY with occasional roots.
	0.35	ES					*Hand Pen at 0.6m = 180kPa*
	0.90	D	HVP=189				
				1.40			Stiff friable brown to orange brown mottled grey brown thinly laminated silty CLAY.
			HVP=190				*Hand Pen at 1.5m = 160kPa*
	1.90	D					
				2.20			Interbedded extremely weak to very weak bluish grey MUDSTONE and dark orange brown silty MUDSTONE.
	2.50	D					
							Becomes very weak to weak below 2.8m
				3.00			End of pit at 3.00 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP8**

Sheet 1 of 1

Project Name:	Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515684 - 125014 Level:
Date	28/01/2022		
Location:	Woodfords, Shipley Road,, Southwater, West Sussex	Dimensions (m):	Scale 1:25
Client:	Reside Developments	Depth 3.00	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30			Grass over greyish brown occasionally mottled orange silty clayey TOPSOIL with abundant rootlets.
	0.35	ES					Stiff orange and light grey silty CLAY. *Hand Pen at 0.7m = 200kPa* *Relic shear surface at 0.8m bgl*
	1.10	D	HVP=167				*Hand Pen at 1.1m = 220kPa*
				1.40			Extremely weak dark brown and light grey thinly laminated MUDSTONE.
	1.60	D	HVP=166				
				2.10			Very stiff blue grey silty CLAY with bands of extremely weak laminated blue grey mudstone. *Hand Pen at 2.2m exceeds 400kPa*
	2.20	D					
				2.70			Very weak to weak thinly laminated blue grey and orange brown silty MUDSTONE recovered as tabular gravel.
	2.80	D					
				3.00			End of pit at 3.00 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP9**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515644 - 124950 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m): Depth 2.90	Scale 1:25
Client: Reside Developments			Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.25			Grass over brown mottled brick red and black silty clayey TOPSOIL with rare fine brick and charcoal fragments.
	0.40	ES					Stiff light orange brown and grey silty CLAY with rare fine ironstone gravel.
	0.80	D					*Hand Pen at 0.8m = 200kPa*
			HVP=143				
							Becomes thinly laminated below 1.25m
				1.40			Stiff friable brown mottled grey gravelly silty CLAY. Gravel is fine to medium sub-angular mudstone and ironstone.
	1.50	D	HVP=193				*Hand Pen at 1.65m = 240kPa*
				1.70			Extremely weak to very weak grey and orange thinly laminated MUDSTONE.
	2.00	D					
	2.20	D					*Frequent light grey silt partings and bivalve fossils at 2.2m bgl.*
				2.50			Weak brown to orange brown silty MUDSTONE recovered as coarse tabular gravel.
	2.80	D					
				2.90			End of pit at 2.90 m

1 2 3 4 5

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP10**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515615 - 124926 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m): Depth 2.70	Scale 1:25
Client: Reside Developments			Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.20			Grass over brown silty clayey TOPSOIL with rootlets and rare fine brick.
	0.30	ES					Stiff grey mottled orange silty CLAY with roots.
	0.90	D	HVP=170				*Hand Pen at 0.8m = 240kPa*
				1.30			Stiff friable brown silty slightly gravelly CLAY. Gravel is fine to medium sub-angular and tabular mudstone and ironstone.
			HVP=196				*Hand Pen at 1.5m = 330kPa*
	1.90	D		1.70			Extremely weak to very weak blue grey mottled orange brown thinly laminated slightly silty MUDSTONE.
	2.60	D		2.50 2.70			Very weak mottled brown, dark brown and grey thinly laminated SILTSTONE recovered as coarse tabular gravel.

End of pit at 2.70 m

Remarks: Trial pit was terminated at 2.7m bgl due to no further progress through weak mudstone. The excavation remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP11**

Sheet 1 of 1

Project Name:	Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515574 - 124939 Level:
Date	28/01/2022		
Location:	Woodfords, Shipley Road,, Southwater, West Sussex	Dimensions (m):	Scale 1:25
Client:	Reside Developments	Depth 2.90	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.15	ES		0.20			Grass over brown silty clayey TOPSOIL with occasional fine brick gravel and abundant rootlets.
							Stiff brown to orange brown and brownish grey slightly silty CLAY with occasional rootlets.
							Hand Pen at 0.8m = 250kPa
	1.00	D	HVP=190	1.10			
							Very stiff friable brown to dark brown mottled grey thinly laminated silty CLAY with occasional fine to medium siltstone gravel.
	1.50	D	HVP=248	1.50			Extremely weak to very weak grey mottled orange brown thinly laminated silty MUDSTONE recovered as tabular gravel.
	1.80	D					*Hand Pen at 1.5m exceeds 400kPa*
							interbedded with bands of siltstone below 2.1m bgl.
	2.80	D		2.90			End of pit at 2.90 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP12**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515542 - 124937 Level:	Date 28/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m):	Scale 1:25
Client: Reside Developments		Depth 2.80	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.20			Grass over greyish brown mottled orange silty clayey TOPSOIL with abundant rootlets and rare fine brick.
	0.30	ES					Stiff mottled orange brown and grey slightly silty CLAY with roots and rootlets.
	0.90	D	HVP=170	1.05			*Hand Pen at 0.9m = 190kPa*
				1.20			Weak grey brown to grey thinly bedded SILTSTONE recovered as tabular gravel.
	1.50	D	HVP=186				Stiff friable orange brown and light grey thinly laminated silty CLAY with thin extremely weak mudstone bands.
							Becomes blue grey below 2.0m bgl.
	2.10	D		2.10			Extremely weak to very weak orange and blue grey thinly laminated silty MUDSTONE.
	2.70	D		2.80			End of pit at 2.80 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP13**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515538 - 124906 Level:	Date 28/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m): Depth 3.00	Scale 1:25
Client: Reside Developments			Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.15	ES		0.20			Grass over brown mottled orange silty clayey TOPSOIL with abundant rootlets.
	0.25	ES					Stiff light orangish brown, brown and grey mottled silty CLAY with rare fine subangular to subrounded ironstone gravel.
	0.70	D					
				0.90			*Hand Pen at 0.85m = 280kPa*
	1.00	D	HVP=168				Stiff mottled dark grey and dark orange silty CLAY with occasional roots. *Relic shear surface at 0.95m bgl.* *Hand Pen at 1m = 210kPa*
				1.30			Stiff friable brown mottled dark grey desiccated silty CLAY with rootlets. *Hand Pen at 1.4m exceeds 400kPa*
	1.40	D					
				2.00			Very weak brown mottled dark brown and light grey thinly laminated MUDSTONE.
	2.10	D					
				2.40			Interbedded very weak to weak brown to light brown mottled dark brown thinly laminated silty MUDSTONE and SILTSTONE.
	2.70	B					
				3.00			End of pit at 3.00 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

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Trial Pit Log

Trialpit No **TP14**

Sheet 1 of 1

Project Name: Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: 515578 - 124896 Level:	Date 27/01/2022
Location: Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m):	Scale 1:25
Client: Reside Developments		Depth 2.90	Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.20			Grass over brown silty clayey TOPSOIL with rootlets and rare fine brick.
	0.40	ES					Firm to stiff light brown, orange brown and grey mottled slightly silty CLAY.
							Hand Pen at 0.8m = 140kPa
	1.10	D	HVP=160				
							Hand Pen at 1.4m = 220kPa
			HVP=132	1.80			Very weak to weak grey and brown laminated SILTSTONE recovered as tabular gravel.
	2.00	D					
	2.80	D		2.90			End of pit at 2.90 m

Remarks: Trial pit remained dry and stable and was backfilled with arisings on completion.

Stability: Stable

AGS

Leap Environmental Ltd
The Atrium, Curtis Road
Dorking, Surrey RH4 1XA
Tel: 01306 646510
www.leapenvironmental.com

Trial Pit Log

Trialpit No
Bund1
Sheet 1 of 1

Project Name:	Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: - Level:
Date	28/01/2022		
Location:	Woodfords, Shipley Road,, Southwater, West Sussex	Dimensions (m): Depth 0.45	Scale 1:25
Client:	Reside Developments		Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.15			Grass over dark brown silty clayey TOPSOIL with rootlets and occasional wood fragments.
				0.45			Light orange brown and grey silty CLAY with rare wood fragments.
							End of pit at 0.45 m

Remarks: Excavation was backfilled on completion.

Stability: Stable

AGS

Leap Environmental Ltd
The Atrium, Curtis Road
Dorking, Surrey RH4 1XA
Tel: 01306 646510
www.leapenvironmental.com

Trial Pit Log

Trialpit No
Bund2
Sheet 1 of 1

Project Name:	Woodfords, Shipley Road,, Southwater	Project No. LP2826	Co-ords: - Level:	Date 08/01/2022
Location:	Woodfords, Shipley Road,, Southwater, West Sussex		Dimensions (m): Depth 0.35	Scale 1:25
Client:	Reside Developments			Logged ADC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Grass over brown silty clayey TOPSOIL with rootlets.
				0.35			Light orange brown and grey silty CLAY.
							End of pit at 0.35 m

1
2
3
4
5

Remarks: Excavation was backfilled on completion.

Stability: Stable

AGS

APPENDIX E – Geotechnical Field Test Results

Geotechnical Field Test Results

Dynamic Cone CBR Test

Nr Blows	S Blows	Penetration mm	S Pen. mm
0	0	50	50
1	1	50	100
1	2	50	150
1	3	50	200
2	5	50	250
1	6	50	300
1	7	50	350
1	8	50	400
1	9	50	450
1	10	50	500
1	11	50	550
1	12	50	600
1	13	50	650
2	15	50	700
1	16	50	750
2	18	50	800
2	20	50	850
2	22	50	900

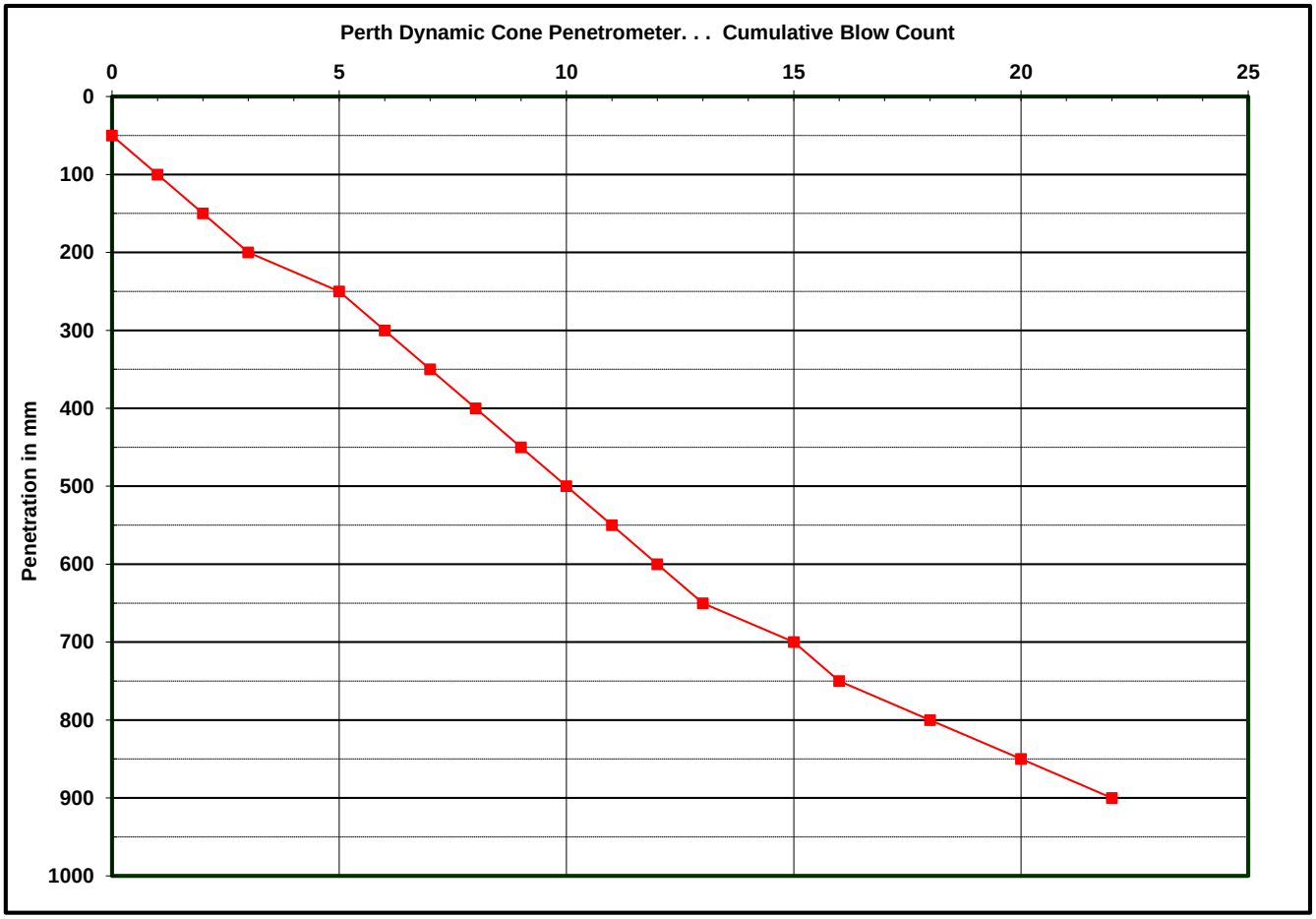
Woodfords, Shipley Road, Southwater Test Reference: - DCP1

Job Nr LP2826 Date 28-Jan-22

0

CBR VALUE CALCULATIONS

Initial S Pen mm	Final S Pen mm	Initial S Blows	Final S Blows	Pen/Blow mm	CBR TRRL	CBR KVH	CBR Value (%)
100	650	1	13	45.8	5.3	3.2	**3.2**
650	900	13	22	27.8	9.0	6.1	**6.1**
			0				
			0				
			0				
			0				
			0				



Tested by	ADC	Checked		Approved	

Site: Woodfords, Shipley Road, Southwate	**Client:** Reside Developments	**Date:** 28/01/2022
	Job No: LP2826	**Test No:** DCP1

Dynamic Cone CBR Test

Nr Blows	S Blows	Penetration mm	S Pen. mm
0	0	50	50
1	1	50	100
1	2	50	150
1	3	50	200
0	3	50	250
1	4	50	300
2	6	50	350
1	7	50	400
1	8	50	450
1	9	50	500
1	10	50	550
1	11	50	600
1	12	50	650
2	14	50	700
1	15	50	750
2	17	50	800
2	19	50	850
3	22	50	900

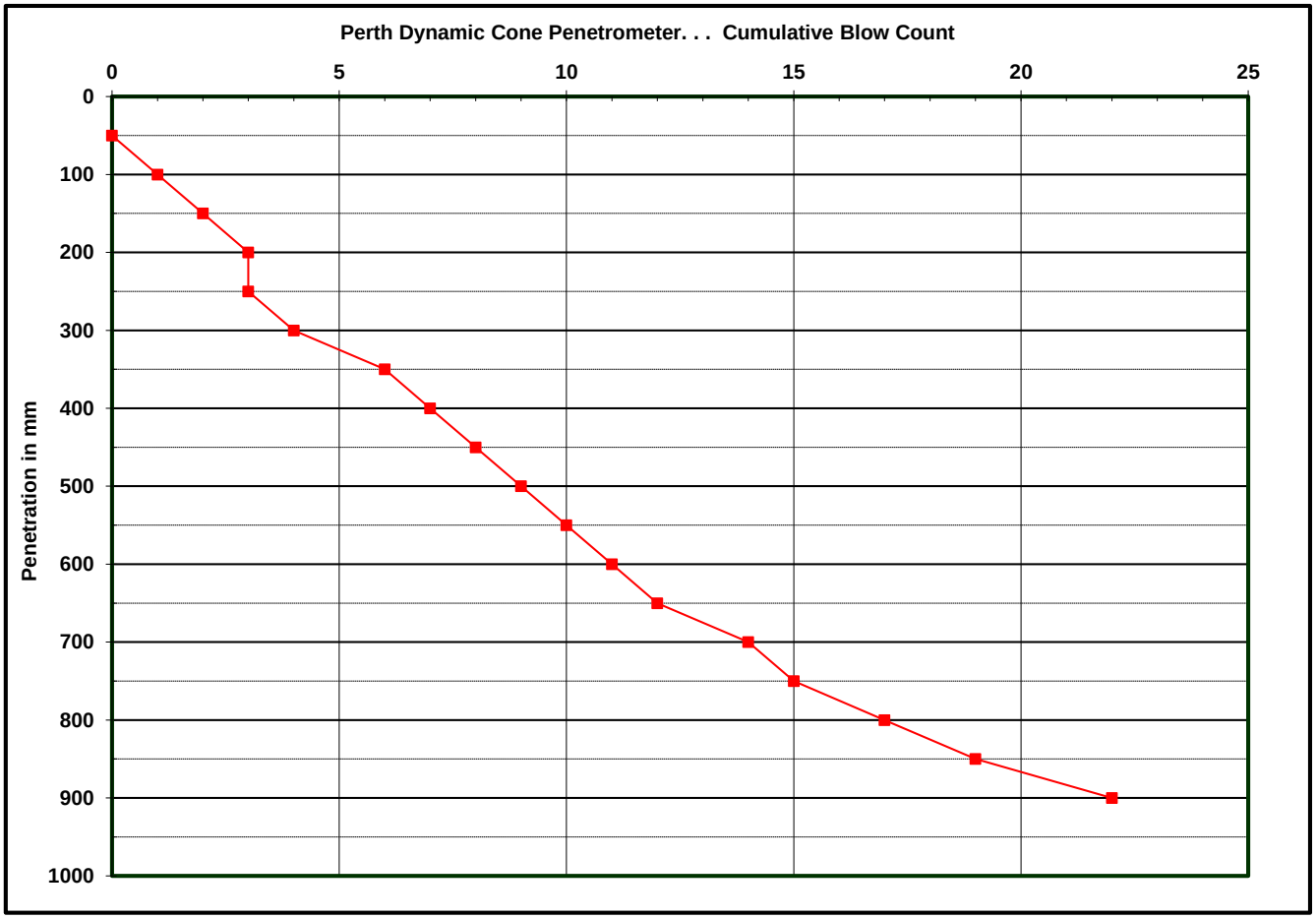
Woodfords, Shipley Road, Southwater Test Reference: - DCP2

Job Nr LP2826 Date 28-Jan-22

0

CBR VALUE CALCULATIONS

Initial S Pen mm	Final S Pen mm	Initial S Blows	Final S Blows	Pen/Blow mm	CBR TRRL	CBR KVH	CBR Value (%)
100	200	1	3	50.0	4.8	2.9	**2.9**
200	350	3	6	50.0	4.8	2.9	**2.9**
350	650	6	12	50.0	4.8	2.9	**2.9**
650	900	12	22	25.0	10.1	7.0	**7.0**
			0				
			0				
			0				



Tested by	ADC	Checked		Approved	

Site: Woodfords, Shipley Road, Southwate	**Client:** Reside Developments	**Date:** 28/01/2022
	Job No: LP2826	**Test No:** DCP2

Dynamic Cone CBR Test

Nr Blows	S Blows	Penetration mm	S Pen. mm
0	0	50	50
0	0	50	100
0	0	50	150
0	0	50	200
1	1	50	250
0	1	50	300
1	2	50	350
1	3	50	400
1	4	50	450
1	5	50	500
1	6	50	550
1	7	50	600
1	8	50	650
1	9	50	700
1	10	50	750
2	12	50	800
1	13	50	850
1	14	50	900

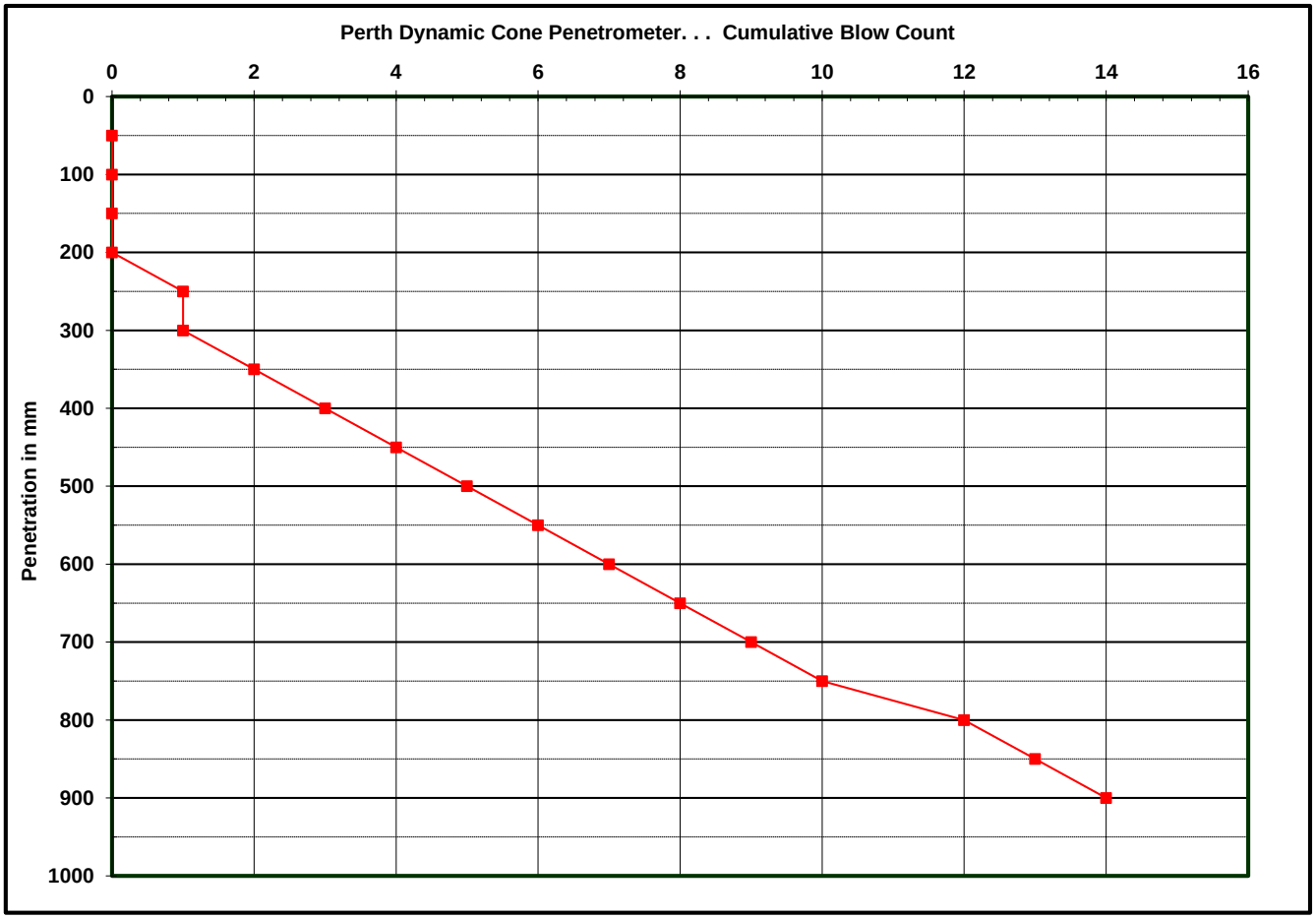
Woodfords, Shipley Road, Southwater Test Reference: - DCP3

Job Nr LP2826 Date 28-Jan-22

0

CBR VALUE CALCULATIONS

Initial S Pen mm	Final S Pen mm	Initial S Blows	Final S Blows	Pen/Blow mm	CBR TRRL	CBR KVH	CBR Value (%)
300	750	1	10	50.0	4.8	2.9	**2.9**
750	900	10	14	37.5	6.6	4.1	**4.1**
			0				
			0				
			0				
			0				
			0				



Tested by	ADC	Checked		Approved	

Site: Woodfords, Shipley Road, Southwate	**Client:** Reside Developments	**Date:** 28/01/2022
	Job No: LP2826	**Test No:** DCP3

Dynamic Cone CBR Test

Nr Blows	S Blows	Penetration mm	S Pen. mm
0	0	50	50
1	1	50	100
1	2	50	150
1	3	50	200
1	4	50	250
1	5	50	300
2	7	50	350
1	8	50	400
2	10	50	450
2	12	50	500
1	13	50	550
2	15	50	600
2	17	50	650
2	19	50	700
2	21	50	750
2	23	50	800
3	26	50	850
2	28	50	900

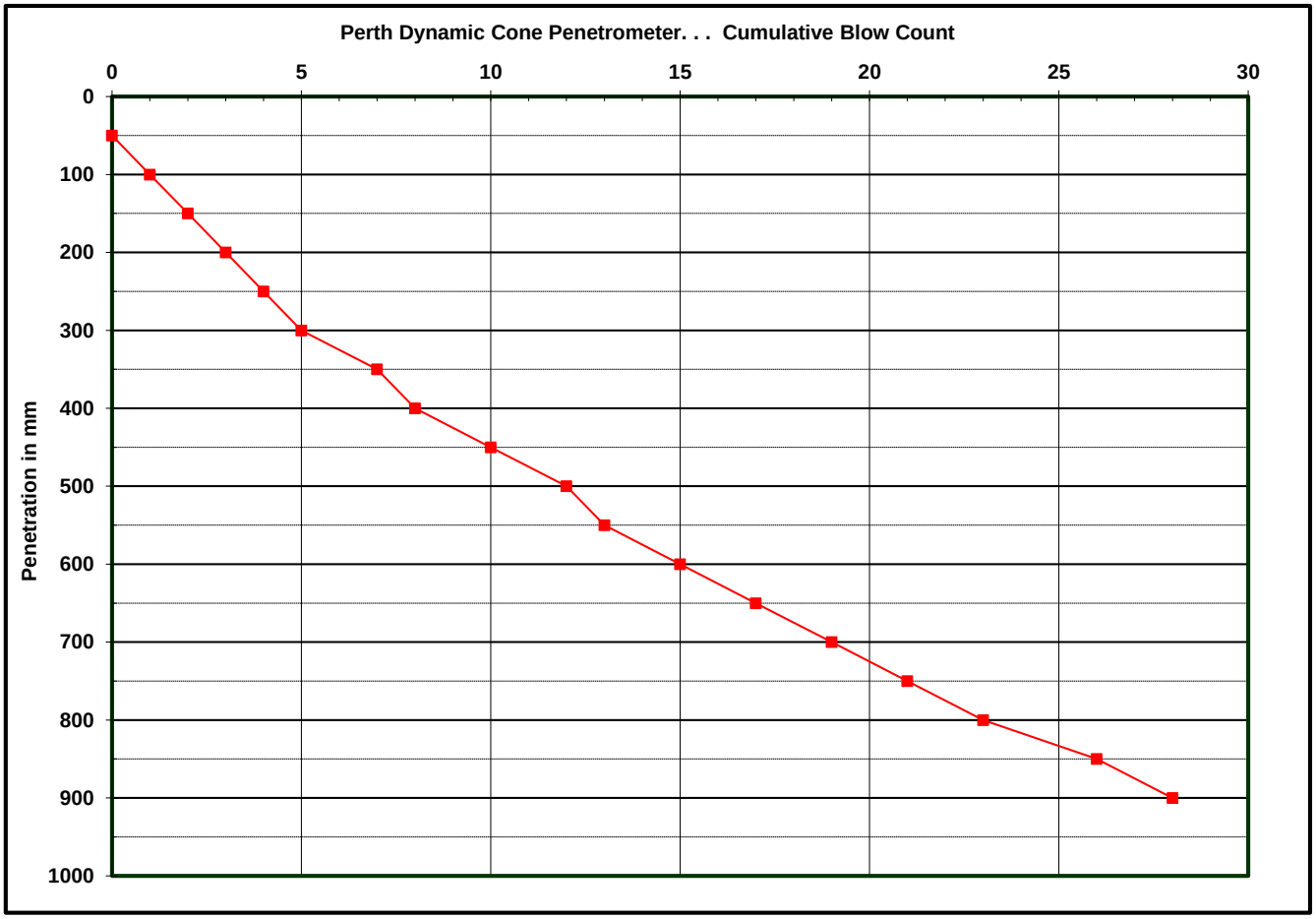
Woodfords, Shipley Road, Southwater Test Reference: - DCP4

Job Nr LP2826 Date 28-Jan-22

0

CBR VALUE CALCULATIONS

Initial S Pen mm	Final S Pen mm	Initial S Blows	Final S Blows	Pen/Blow mm	CBR TRRL	CBR KVH	CBR Value (%)
100	300	1	5	50.0	4.8	2.9	**2.9**
300	550	5	13	31.3	7.9	5.2	**5.2**
550	900	13	28	23.3	10.8	7.6	**7.6**
			0				
			0				
			0				
			0				



Tested by	ADC	Checked		Approved	

Site: Woodfords, Shipley Road, Southwate	**Client:** Reside Developments	**Date:** 28/01/2022
	Job No: LP2826	**Test No:** DCP4

Appendix D

reside.

RESIDE DEVELOPMENTS

Flood Risk Assessment and Drainage Strategy

13TH SEPTEMBER 2021

Document Control Sheet

Flood Risk Assessment and Drainage Strategy

Woodfords, Shipley Road, Southwater

Reside Developments Limited

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
13/09/21	Draft	MH	NJ

Contents

Appendices

1.0 Introduction

1.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared on behalf of Reside Developments in relation to development proposals at Woodfords, Shipley Road, Southwater, West Sussex.

1.2 The aim of this report is to satisfy the requirements of the Local Planning Authority, Lead Local Flood Authority (LLFA) and Environment Agency (EA) in relation to development and flood risk. Specific objectives of this FRA are to:

- Assess the proposed development against the requirements of the National Planning Policy Framework (NPPF).
- Assess whether the proposed development has taken appropriate consideration of the risk of flooding from all potential flood sources.
- Detail how the proposed development will be safe with respect to flooding during its lifetime and will not increase the risk of flooding to other sites.
- Produce a Drainage Strategy that will detail how the proposed development will not result in an increase in surface water that could cause flood risk to both the development and the neighbouring sites.

1.3 This report considers the requirements for carrying out an FRA as set out in the NPPF and has been prepared to comply with current EA and Flood Risk policy.

2.0 Site Description

Site Location and Description

2.1 The proposed 3.83-hectare (ha) development site is currently a combination of open field and an existing residential property. The site is bordered to the north by residential development and to the west, east and south by open fields. The centre of the site is at grid reference TQ 15625 25002. A site location plan can be found in **Appendix A**. A site masterplan can be found in **Appendix B**.

Topography

2.2 A topographical survey of the existing site was undertaken by Hook Survey Partnership in July 2019, which is provided in **Appendix C** of this report.

2.3 The topography demonstrates that the site has two catchments known as Catchment A and Catchment B as illustrated in Figure 2.1 below. Catchment A falls towards the ordinary watercourse which runs along the eastern site boundary with ground levels ranging from 50.56 metres Above Ordinance Datum (mAOD) to 43.62 mAOD. Catchment B fall towards the ordinary watercourse which runs along the southern site boundary with ground levels ranging from 50.12 mAOD to 43.26 mAOD.

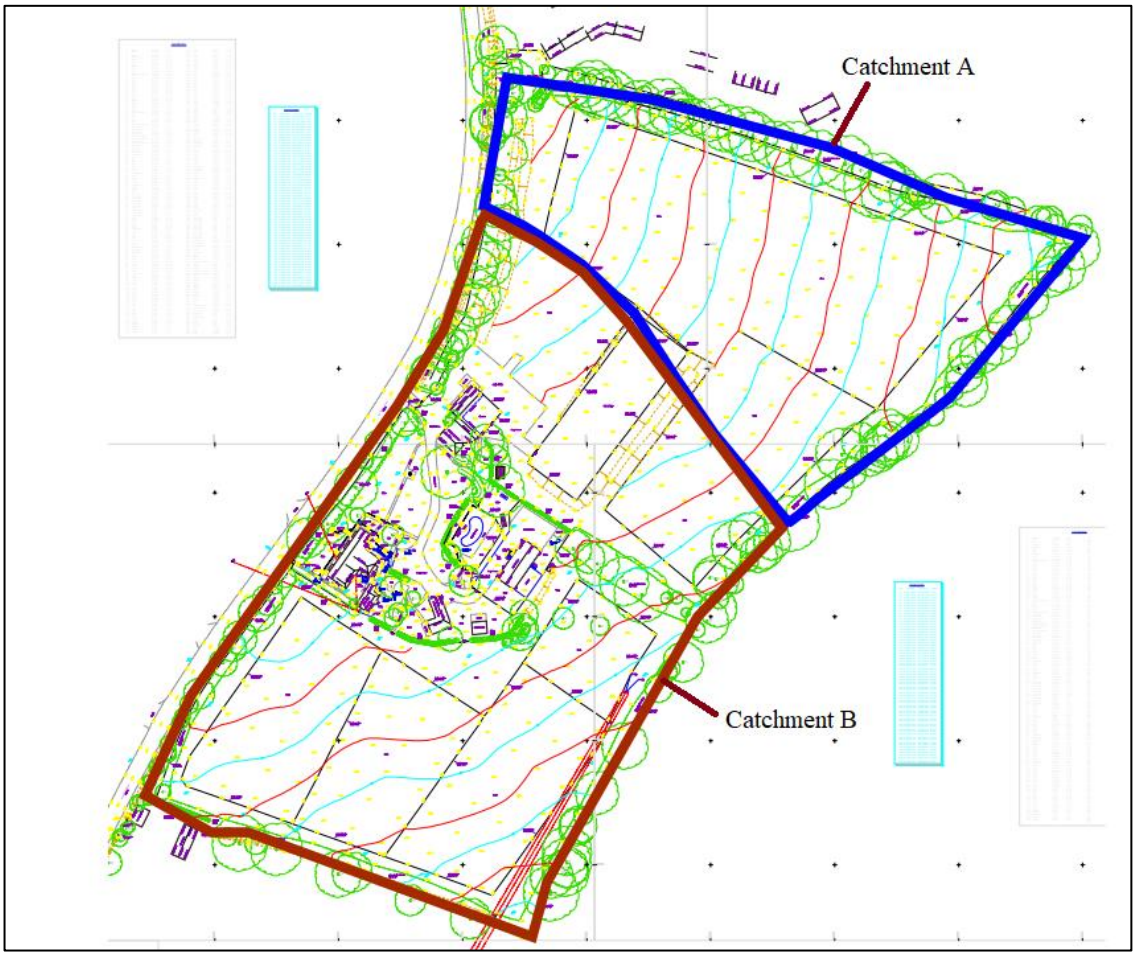


Figure 2.1 Catchment boundaries

Geology

2.4 The British Geological Survey (BGS) online Geoindex Mapping indicates that the site is underlain by the Weald Clay Formation with no superficial deposits. Borehole records from the surrounding area have been obtained from the BGS online index, these can be found in **Appendix D.** These Borehole records support the findings of the BGS mapping. As the site is underlain by clay it is anticipated that infiltration techniques will not be viable on site. However, infiltration testing is recommended to confirm this at the detailed design stage

Existing Drainage Regime

2.5 Southern Water records can be found in **Appendix E** and show a 225mm surface water sewer running along Rascals Close, within the development to the north of the site. There is also a 150mm foul water sewer within Rascals Close to the north of the site.

2.6 The nearest main river is the River Adur located approximately 3km north of the site. However, there are a number of ordinary watercourses which run along the sites northern, eastern, and southern boundaries. The site currently drains into these existing watercourses.

3.0 Legislative and Policy Framework

Flood and Water Management Act

3.1 The Flood and Water Management Act 2010 (FWMA) received Royal Assent on 8th April 2010. The Act was introduced to enforce some of the key proposals set out within UK Government flood and water strategies along with UK Government's response to the Sir Michael Pitt's Review of the summer 2007 floods.

3.2 LLFA's including West Sussex County Council (WSCC) have a responsibility under the FWMA to develop, maintain, apply, and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from surface run-off, groundwater, and ordinary watercourses (i.e. non main rivers). The EA plays a role in managing the watercourses designated as 'main rivers.

3.3 Relevant to the site, the FWMA will encourage the uptake of SuDS by removing the automatic right to connect to sewers and providing for LLFA to adopt SuDS for new developments.

3.4 The development proposals will adhere to the Act through the provision of SuDS as a fundamental element of the surface water drainage system. Furthermore, the client is committed to work with the relevant stakeholders, such as the EA, WSCC (the lead local flood authority), in implementing the requirements of the FWMA where necessary.

National Planning Policy Framework

3.5 The NPPF and the PPG set out the Government's planning policies for England and how these are expected to be applied. This includes ensuring that flood risk is considered at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest.

3.6 A site-specific FRA is required for proposals of 1ha or greater in Flood Zone 1, all proposals for development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the EA). The FRA should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

Local Planning Policy Requirements

3.7 Horsham District Planning Framework was produced in 2015. Policy 38 relates to Flood Risk and states;

- Development proposals will follow a sequential approach to flood risk management, giving priority to development sites with the lowest risk of flooding and making required development safe without increasing flood risk elsewhere. Development proposals will:

  a.) Take a sequential approach to ensure most vulnerable uses are placed in the lowest risk areas.

  b.) Avoid the functional floodplain (Flood zone 3b) except for water-compatible uses and essential infrastructure.

  c.) Only be acceptable in Flood Zone 2 and 3, following completion of a sequential test and exceptions test if necessary.

  d.) Require a site-specific Flood Risk Assessments for all developments over 1 hectare in Flood Zone 1 and all proposals in Flood Zone 2 and 3.

- Development proposals will comply with the tests and recommendations set out in the Horsham District Strategic Flood Risk Assessment (SFRA).

- Where there is the potential to increase flood risk, proposals must incorporate the use of sustainable drainage systems (SuDS) where technically feasible or incorporate water management measures which reduce the risk of flooding and ensure flood risk is not increased elsewhere.
- Consider the vulnerability and importance of local ecological resources such as water quality and biodiversity when determining the suitability of SuDS. New development should undertake more detailed assessments to consider the most appropriate SuDS methods for each site. Consideration should also be given to amenity value and green infrastructure.
- Utilise drainage techniques that mimic natural drainage patterns and manage surface water as close to its source as possible will be required where technically feasible.
- Be in accordance with the objective of the Water Framework Directive and accord with the findings of the Gatwick Sub Region Water Cycle Study in order to maintain water quality and water availability in rivers and wetlands and wastewater treatment requirements.

The Sequential and Exception Tests

3.8 The NPPF Sequential Test classifies proposed development into one of four Flood Zones, detailed in Table 3.1.

Flood Zone	Annual Probability of Flooding (%)	Corresponding Annual Chance of Flooding (1 in x)
✓ Low Probability	Fluvial <0.1% Tidal <0.1%	>1,000 >1,000
✓ Medium Probability	Fluvial 0.1 – 1.0% Tidal 0.1 – 0.5%	1,000 – 100 1,000 – 200
✓ a) High Probability	Fluvial >1.0% Tidal >0.5%	<100 <200
✓ b) The Functional Floodplain	Fluvial >5.0%* Tidal >5.0%* *Starting point for consideration. LPAs should identify Functional Floodplain, which should not be defined solely by rigid probability parameters.	<20 <20

Table 3.1 Flood Zones

3.9 The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The NPPF provides guidance on the compatibility of each land use classification in relation to each of the Flood Zones as summarised in Table 3.2.

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b	Exception test required	✓	✓	✓	✓
Key: ✓ Development is appropriate × Development should not be permitted					

Table 3.2 Flood Risk Vulnerability Classification

3.10 The proposed development site is located within an area designated as Flood Zone 1, having a less than 1 in 1000 chance per annum of flooding from rivers or seas. More vulnerable development (residential developments as per the proposals) is shown to be acceptable within this flood zone negating the need for a sequential or exception test.

Lead Local Flood Authority

3.11 As of April 2015, the LLFA became a statutory consultee on all major planning applications. The LLFA is required to assess planning applications in respect of surface water drainage and sustainable drainage systems. WSCC is the LLFA for Southwater and wider West Sussex areas.

Horsham District Council Strategic Flood Risk Assessment

3.12 The Horsham District Council Strategic Flood Risk Assessment (SFRA) has been prepared by Scott Wilson in 2010. The SFRA provides a useful source of information and evidence for a variety of stakeholders as part of the planning application process and when making decisions regarding the allocation of sites. The information within the SFRA should be used when putting together Flood Risk Assessments (FRAs) as part of planning applications.

Environment Agency Flood Map

3.13 As part of this FRA a 'Flood Product 4' data request was submitted to the EA. The 'Flood Product 4' provided confirmation of the sites flood zone classification, a detailed flood map, information about historical flooding incidents and EA model output data such as predicted fluvial flood water levels in the vicinity of the site. The response to this Flood Product data request is provided in **Appendix F**.

3.14 The EA Flood Map shows that the entirety of the site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

4.0 Flood Risk

4.1 In this section a number of potential sources of flooding have been considered and the probability of any likely impacts assessed.

Flooding from Rivers and the Sea

4.2 The EA Flood Map shows that the whole of the site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

4.3 The nearest watercourse to the site is the River Adur located approximately 3km north of the site. However there a number of ordinary watercourses in close vicinity to the site running the northern, eastern, and southern boundaries.

It is therefore concluded that the site is at very low risk of flooding from rivers and the sea.

Groundwater Flooding

4.4 Groundwater flooding occurs when water originating in aquifers reaches the surface, typically as a result of high groundwater levels caused by prolonged rainfall. It has been identified using public data provided by the BGS that the site is underlain by the Weald Clay Formation with no superficial deposits. The SFRA states that the study area is not at risk of groundwater flooding and the SFRA has no record of the site or any area close to the site having flooded due to groundwater.

It is therefore concluded that the site is at very low risk of flooding from Groundwater.

Surface Water Flooding

4.5 Flooding from overland flow occurs when intense rainfall is unable to infiltrate into the ground or enter drainage systems resulting in localised flooding in low spots that provide no means of outfall.

4.6 The EA surface water flood map in **Appendix G** provides information concerning the risk of surface water flooding to the site. The Surface Water Flood Map shows the majority of the site is located in an area defined as 'very low' risk (outside of the modelled 1 in 1000 rainfall event) of surface water flooding. However, there is an area of the site is defined as 'low' risk (between 1 in 1000 and 1 in 100 chance) and 'medium' risk (between 1 in 100 and 1 in 30 chance) of surface water flooding. The EA surface water flood maps show that surface water flood depths in these areas are between 0 to 300mm.

4.7 The mapping appears to show surface water entering the site from the field opposite to the east and Shipley Road. However, as the surface water modelling is quite coarse it does not appear to take account of the existing highway drainage ditch adjacent to the Shipley Road, which would intercept this overland flow and prevent it entering the site. In the unlikely event that water did enter the site, the water will be routed overland through the development using the existing road. Houses adjacent to the road will be set a minimum of 300mm above the external ground levels to prevent the properties from flooding.

It is therefore concluded that the site is between low to medium risk of flooding from surface water.

Flooding from Infrastructure Failure

In order to control and convey surface water runoff from impermeable surfaces in urban areas, underground surface water sewers or combined sewers (foul and surface water) are often utilised in urban areas. Pipes, culverts etc. have a finite capacity and therefore pose a risk of flooding due to the risk of siltation, blockage, or collapse.

4.8 Southern Water records show a 225mm surface water sewer running along Rascals Close to the north of the site. There is also a 150mm foul water sewer running along Rascals Close. The SFRA has no records of the site flooding due to infrastructure failure.

It is therefore concluded that the site is at low risk of flooding from infrastructure failure.

Flooding from Artificial sources

4.9 The EA provides a map showing the maximum potential flood extent, in the event that all reservoirs with a capacity of greater than 25,000 cubic metres were to fail and release the water they hold. The map shows that the site would not experience flooding in this scenario. There are no other significant artificial waterbodies in proximity of the site.

It is therefore concluded that the site is at low risk of flooding from artificial sources.

5.0 Drainage Strategy

Sustainable Drainage Overview & Hierarchy

5.1 Current planning policy and EA guidance requires developments to employ SuDS (Sustainable Drainage Systems) techniques wherever feasible. Careful design of SuDS features can ensure that the site surface water drainage closely reflects the natural hydrology and hydrogeology of the site.

5.2 SuDS will attenuate and treat surface water run-off quantities at the source (source control) in line with National Planning Policy Framework and EA policies.

5.3 This use of SuDS is needed to replicate the pre-developed Greenfield conditions so as not to increase flood risk to the site or surrounding sites by managing excess run-off at the source.

5.4 Source control systems treat water close to the point of collection, in features such as soakaways, permeable paving and dry swales.

5.5 The key benefits of SuDS are as follows:

- Improving water quality over a conventional piped system by removing pollutants from diffuse pollutant sources (e.g. roads);
- Improving amenity through the provision of open green space and wildlife habitat; and
- Enabling a natural drainage regime which recharges groundwater (where possible).

5.6 SuDS provide a flexible approach to drainage, with a wide range of components from house soakaways to large-scale basins or ponds. The individual techniques should be used where possible in a management train which mimics the natural pre-development pattern of drainage. The Interim Code of Practice for SuDS sets out the hierarchy of techniques. These are:

- Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution;
- Source control – control of runoff at or very near its source (such as permeable paving or soakaways for individual houses);
- Site control – management of water from several sub-catchments (including routeing water from roofs and car parks to one large soakaway or infiltration basin for the whole site); and
- Regional control – management of runoff from several sites, typically in a detention pond or wetland.

Greenfield Runoff Rates

5.7 The total area of the site is 3.83 ha. UKSUDS was used to calculate the QBar Greenfield runoff rate for the entire site showing a result of 20.87 l/s or 5.45 l/s/ha. UKSUDS QBar outputs can be found in **Appendix H**. Catchment A has a total area of 1.43ha and Catchment B has a total area of 2.40ha. Therefore, Catchment A has a Greenfield runoff rate of 7.79 l/s and Catchment B has a Greenfield runoff rate of 13.08 l/s.

Proposed Sustainable Drainage Strategy

5.8 The proposed development will have an increase in the amount of hardstanding areas on site from the new development and associated access roads. Therefore, without mitigation there will be an increase in surface water runoff from the site as a result of the development. A drainage strategy has been put in place so that the proposed development does not result in an increase in surface water run-off that could cause potential flood risk to both the development and the neighbouring sites.

5.9 The site is currently defined as Greenfield and drains into the existing ordinary watercourses which run along the sites northern, eastern, and southern boundaries. There is also an existing land drain which crosses the centre of the site and runs from east to west and the land drain will remain in place. Any works to the existing ordinary watercourses will be subject to land drainage consents which will be submitted as part of the detailed design stage following planning permission.

5.10 The proposed impermeable area of the site has been calculated from Catchment A has an impermeable area of 7,000m^2 and Catchment B has an impermeable area of 7,461m^2.

5.11 Urban Creep can be described as future urban expansion within a development such as extensions to buildings and increased paved areas. These activities increase the impermeable area of a site and often sit outside of the development control process. Therefore, we have included a 10% increase in impermeable area on the development site to allow for urban creep. The proposed impermeable area of catchment A has been calculated as 0.70ha and therefore the estimated impermeable area due to urban creep = 0.70 x 1.1 = 0.77ha. The proposed impermeable area of catchment B has been calculated as 0.75ha and therefore the estimated impermeable area due to urban creep = 0.75 x 1.1 = 0.83ha.

5.12 Based on MicroDrainage source control calculations the approximate amount of attenuation storage required on Catchment A is between 471m^3 and 659m^3 based on a restriction of 3.82l/s (Qbar for 0.70ha of impermeable area) and for storm events up to 1 in 100-year plus 40% climate change. The model results can be found in full in **Appendix I**. Based on MicroDrainage source control calculations the approximate amount of attenuation storage required on Catchment B is between 503m^3 and 704m^3 based on a restriction of 4.09l/s (Qbar for 0.75ha of impermeable area) and for storm events up to 1 in 100year plus 40% climate change. The model results can be found in full in **Appendix J**.

5.13 In order to attenuate the additional surface water from the development in Catchment A it is proposed to have permeable paving with Permavoid beneath on some of the side roads and parking areas, cellular storage, and a wetland which will the discharge into the watercourse along the north-eastern site boundary at a restricted rate of 3.22l/s. In order to attenuate the additional surface water from the development in Catchment B it is proposed to have permeable paving on side roads and parking areas, swales, cellular storage, and a pond in the south-eastern corner of the site. Surface water will the discharge into the watercourse along the southern site boundary at a restricted rate of 3.8l/s. A drainage strategy can be found in full in **Appendix K** and a summary of the proposed SuDS features are shown in Table 5.1

SuDS feature	Storage Volume (m^3)
Catchment A – Permavoid permeable paving	403
Catchment A – Attenuation tank	52
Catchment A – Pond	169
Catchment A total storage volume 624m^3	
Catchment B – Permeable paving	203
Catchment B – Attenuation tanks	99
Catchment B – Swale	144
Catchment B - Pond	198
Catchment B total storage volume 644m^3	

Table 5.1 SuDS features

5.14 The proposed ditches that the surface water runoff will discharge into are located on the development site and not within third party land.

Exceedance Events

5.15 Exceedance events are those greater than the design rainfall event, i.e. greater than the 1-in-100-year rainfall event plus a 40% increase in climate change.

5.16 MicroDrainage Source Control Calculations have been used to identify the range of acceptable storage volumes to prevent flooding for the design rainfall event. For the purposes of this report, it is assumed that a low-level exceedance event may still be able to be discharged within the capacity of the system before significant flooding occurs.

5.17 It is imperative to check whether flooding would occur and, if so, whether it needs to be contained onsite. Exceedance flows should not ingress into any properties onsite and should not cause nuisance to any neighbouring sites or buildings.

5.18 As the site is divided into two catchment areas, any exceedance flows onsite would flow along the proposed road network within the proposed development, towards the wetland and pond areas within the northeastern and southeastern corner of the development site. It would be recommended to bound the proposed access roads and parking areas with precast concrete HB2 kerbs with a 125mm upstand where required to contain the exceedance flows below the top of kerbline.

5.19 An Exceedance Routing Plan for surface water deiling the proposed exceedance flows and storage areas within the development is found in **Appendix** L.

Surface Water Quality

5.20 The NPPF (Section 110) states that the development should not have a detrimental impact on the environment, including the water environment. The technical guidance to the NPPF provides further advise on the benefits of ensuring runoff quality is to an appropriate standard.

5.21 The CIRIA SuDS Manual C753 provides guidance on the treatment of surface water runoff. With regards to the proposed development site, Table 26.2 of the CIRIA SuDS Manual rates the pollution hazard from roof water runoff as 'very low'. The only requirement for roof water runoff is the removal of gross solids and sediments, which would be achieved using catchpits and silt traps upstream of any attenuation media, such as the cellular storage tanks.

5.22 With regards to the property driveways and access road, Table 26.2 of the CIRIA SuDS Manual C753 rates the pollution hazard from residential car parking and low traffic roads as 'low'. To mitigate a 'low' pollution hazard, the CIRIA SuDS Manual recommends using a Simple Index Approach, in line with Section 26.7.1. The Pollution Hazard Indices for the different land use classifications relating to the parking areas on the site is defined in further detail in Table 5.2 below:

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual Property Driveways, Residential Car Parks, Low Traffic Roads (e.g. Cul-de-sacs, Homezones and General Access Roads) and Non-Residential Car Parking with Infrequent Change (e.g. Schools, Offices) i.e. <300 Traffic Movements /Day	Low	0.5	0.4	0.4

Table 5.2 Excerpt from Table 26.2 of the CIRIA SuDS Manual

5.23 To deliver adequate pollution treatment and mitigation, the CIRIA SuDS Manual recommends using a SuDS component that has a total Pollution Mitigation Index (for each contaminant type) that equals or exceeds the Pollution Hazard Index (for each contaminant type).

5.24 Table 26.3 of the CIRIA SuDS Manual provides indicative SuDS Mitigation Indices for each SuDS type when discharging to surface water. Table 5.3 below, which is an excerpt from Table 26.3 of the CIRIA SuDS Manual, shows the Mitigation Indices for the SuDS features:

Type of Pollution Removal Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Concrete Block Permeable Paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Detention Basin	0.5	0.5	0.5

Table 5.3 Pollution Mitigation Index

5.25 As Illustrated above, the Mitigation Indices for the proposed SuDS features exceed those of the Pollution Hazard Index figures for the identified site Pollution Hazard Level. This means that no further measures for pollution removal of SuDS elements are required to manage the pollution hazards onsite.

6.0 SuDS Maintenance Regime

6.1 This section describes the proposed management and schedules for the maintenance to reduce the risk of the proposed network flooding due to poor maintenance.

Piped Network Maintenance

6.2 The piped network shall be maintained by either Southern Water or an approved maintenance company in accordance with Sewers for Adoption (7th Ed.) and the manufacturers guidance.

6.3 This maintenance schedule should include clearing gullies, removing any large obstructions within the pipes and cleaning catchpits at regular intervals to ensure the correct operation of the sewer network.

Attenuation Storage Tanks and Pond Maintenance

6.4 The proposed SuDS features are to have a routine maintenance schedule that conforms to CIRIA SuDS Manual (C753) 2015 guidance. An approved maintenance company is to adhere to the maintenance schedule provided in Tables 6.1, 6.2 and 6.3 permeable paving, ponds, and swales of the CIRIA guidance in order to ensure the correct operation of the drainage.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required - once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised within 50mm of the level of the paving.	As requires
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for 3 months after installation.
	inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three-monthly, 48h after large storms in first 6 months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers	Annually

Table 6.1 Operation and maintenance requirements for permeable paving

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the treatment area
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table 6.2 Operation and maintenance requirements for swales and ponds

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the treatment area
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table 6.3 Operation and maintenance requirements for Swales

7.0 Foul Water Drainage

Existing Foul Water

7.1 As detailed in section 2.2, the site is currently greenfield and does not have an existing foul water drainage system.

Proposed Foul Water

7.2 Southern Water records can be found in **Appendix E** and show a 150mm foul water sewer running along Rascals Close along the northern site boundary. It is not thought that a site will be able to drain by gravity, so a pumping station is proposed to the north-eastern of the site. A foul water drainage strategy can be found in full in **Appendix K**.

7.3 The peak foul flow rate from the proposed development has been based on the following assumptions as dictated by Sewers for Adoption 7th Edition:

4000 Litres per dwelling per day
4000 x 73= 292, 000
312000/86400 = 3.38 l/s.

7.4 The calculated peak foul flow rate from the site is therefore 3.38 l/s.

7.5 The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN: 752 drainage and sewer systems outside buildings, the local authority building control specifications and requirements, Sewers for Adoption 7th Edition and the Civil Engineering Specification for the Water Industry 7th Edition.

8.0 Summary and Conclusions

8.1 This FRA has been produced by Motion on behalf of Reside Developments to support a planning application for approximately 78 new residential developments with associated roads and parking at Woodfords, Shipley Road, Southwater, West Sussex. The nearest postcode is RH13 9GB.

8.2 The proposed 3.83-hectare (ha) development site is currently a combination of open field and an existing residential property.

8.3 The EA Flood Maps shows that the entirety of the site is located within Flood Zone 1, having a very low risk of flooding from the rivers or seas.

8.4 The EA Surface Water Flood Map shows the majority of the site is located in an area defined as 'very low' (outside of the modelled 1 in 1000 rainfall event) risk of surface water flooding. However, there is an area of site where the lower ground levels are located which are defined as 'low' (between 1 in 1000 and 1 in 100 chance), risk and 'medium' (between 1 in 100 and 1 in 30 chance) risk of surface water. The EA surface water flood maps show that surface water flood depths in these areas are between 0 to 300mm. It is understood that the finished floor levels of the buildings will be raised 300mm above existing ground levels so will not be affected by surface water flooding. In addition, the existing surface water flow path across the site will be diverted across the site and won't be affected.

8.5 The development site is also considered to be at very low risk of sewers, groundwater, and artificial sources.

8.6 The proposed development will increase the amount of hardstanding areas on site due to the new residential development and associated hardstanding areas. Therefore, without mitigation there would be an increase in surface water runoff as a result of the development of the site.

8.7 The total area of the site is 3.83 ha. UKSUDS was used to calculate the QBar Greenfield runoff rate for the entire site showing a result of 20.87 l/s or 5.45 l/s/ha. Catchment A has a total area of 1.43ha and Catchment B has a total area of 2.40ha. Therefore, Catchment A has a Greenfield runoff rate of 7.79 l/s and Catchment B has a Greenfield runoff rate of 13.08 l/s.

8.8 In order to attenuate the additional surface water from the development in Catchment A it is proposed to have permeable paving throughout the roads and parking areas which will the discharge into the watercourse along the eastern site boundary at a restricted rate of 3.82l/s. In order to attenuate the additional surface water from the development in Catchment B it is proposed to have permeable paving throughout the roads and parking areas, swales, and a pond in the south-eastern corner of the site. Surface water will the discharge into the watercourse along the southern site boundary at a restricted rate of 4.09l/s.

8.9 There is also an existing land drain which crosses the site. This land drain will remain as is and any additional surface water runoff from the development will be mitigated.

8.10 The proposed ditches the surface water runoff will discharge into are located on the development site. If any third-party permission is required, then this will be covered at detailed design phase.

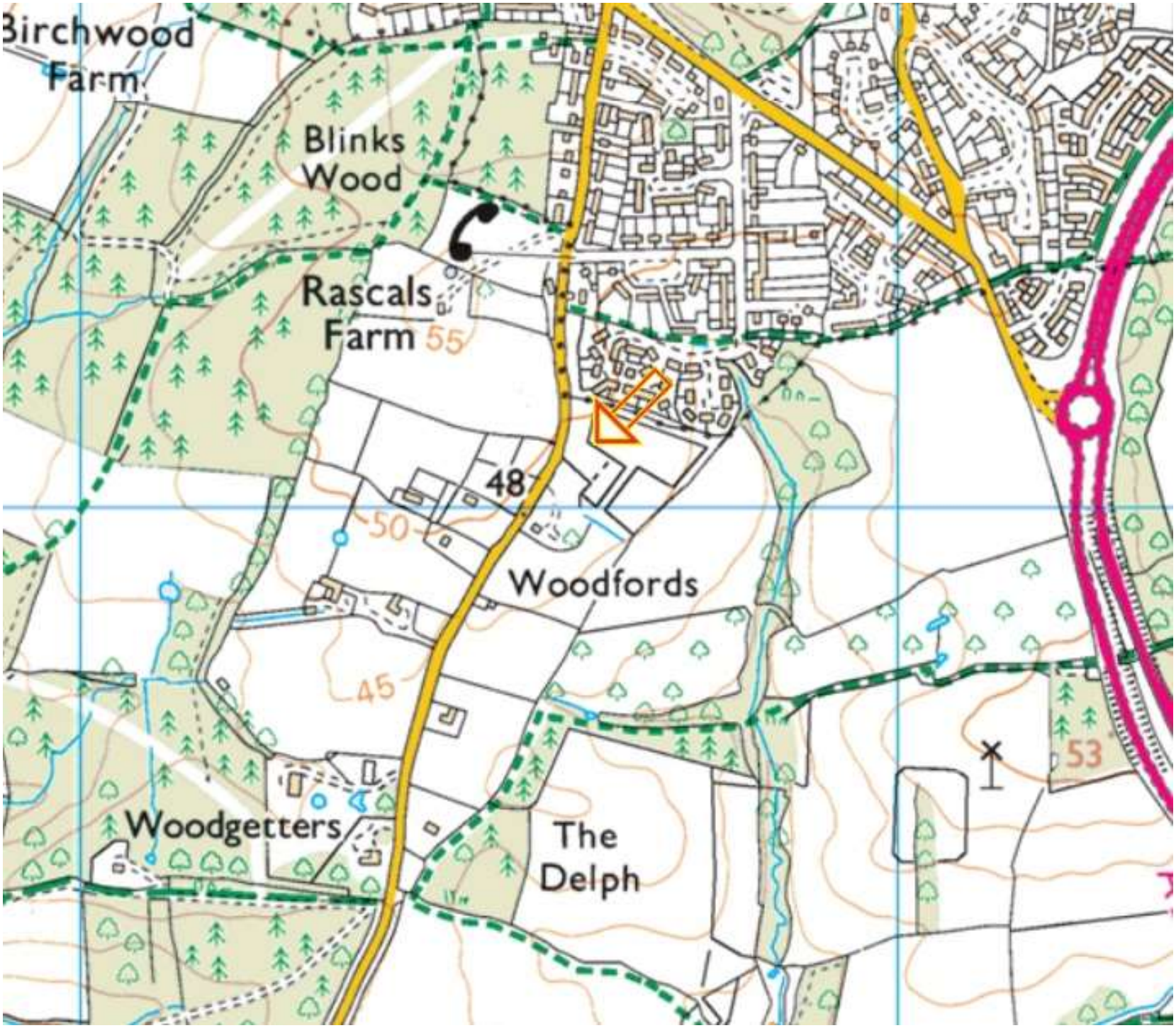
8.11 The SuDS features will also improve water quality on site as contaminated run-off passing through the permeable paving will be treated to remove silts, sediment, and hydrocarbon through the process of filtration.

8.12 The proposed drainage strategy has been designed to cater for the 1 in 100 + 40% CC event in accordance with the requirements of the LLFA, the EA as well as the NPPF.

This FRA demonstrates that the flood risk for the proposed development can be managed on site without creating a risk to the proposed development or increasing the risk to any neighbouring developments or downstream areas, and therefore fulfils the requirements of the PPG and NPPF.

Appendix A

Site Location Plan


Birchwood
Farm
Blinks
Wood
Rascals
Farm
55
48
50
Woodfords
45
53
Woodgetters
The
Delph

Appendix B

Masterplan

CDM 2015 Health & Safety Information

This information relates only to 'Significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Hazard Register.

Indicative Accommodation Schedule

Market	
13no.	2-Bedroom Dwellings
19no.	3-Bedroom Dwellings
12no.	4-Bedroom Dwellings
Affordable:	
9no.	1-Bedroom Dwellings
7no.	2-Bedroom Dwellings
11no.	3-Bedroom Dwellings
2no.	4-Bedroom Dwellings
Total;	**73 Dwellings**

Rev	Date	Revision Details	Dr	Ch

London: 76 Great Suffolk Street, London, SE1 0BL
T 0207 928 2773 E london@ecearchitecture.com
Sussex: Brooklyn Chambers, 11 Goring Road, Worthing, West Sussex, BN12 4AP
T 01903 248777 E sussex@ecearchitecture.com
Bristol: Westworks, Colston Tower, Colston Street, Bristol, BS1 4XE
T 0117 214 1101 E bristol@ecewestworks.com
ECE Architecture
www.ecearchitecture.com

Client's Name: Reside Developments

Job Title: Shipley Road, Southwater

Drawing Title: Alternative Illustrative Layout

Scale: 1:500 @ A0 / 1:1000 @ A2

metres 10 20 30 40 50

Drawn	Checked	Date
KE	AK	12/04/21

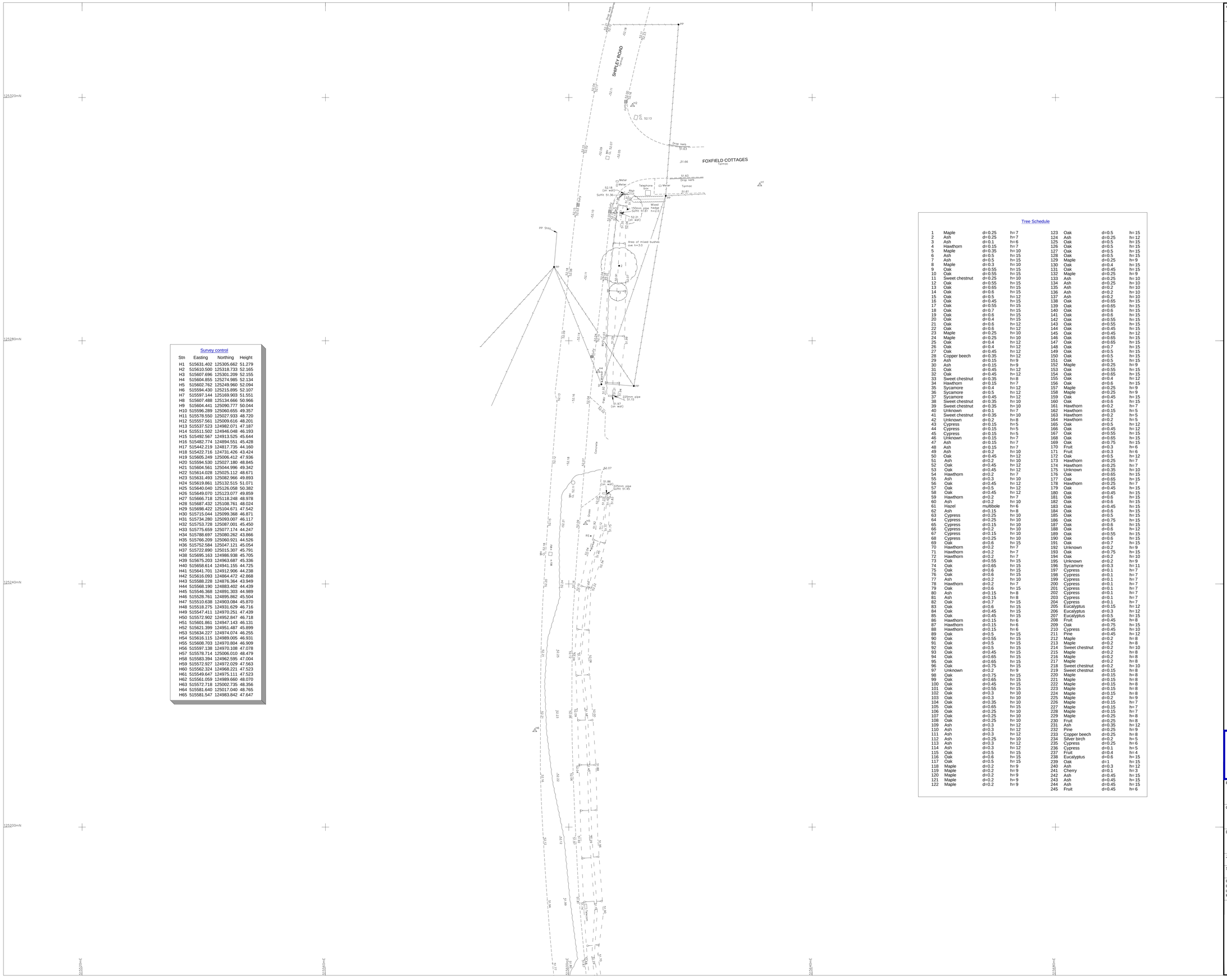
Job No	Drawing No	Rev
6769	PL-12	

Status: INFORMATION

CAD Plot date: 13/09/2021 - 15:17:14 6769-site3.dwg

Appendix C

Topographic Survey



Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.616	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.048	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.804	46.909
H56	515597.138	124970.108	47.078
H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647

Tree Schedule

1	Maple	d=0.25	h= 7	123	Oak	d=0.5	h= 15
2	Ash	d=0.25	h= 7	124	Ash	d=0.25	h= 12
3	Ash	d=0.1	h= 6	125	Oak	d=0.5	h= 15
4	Hawthorn	d=0.15	h= 7	126	Oak	d=0.5	h= 15
5	Maple	d=0.35	h= 10	127	Oak	d=0.5	h= 15
6	Ash	d=0.5	h= 15	128	Oak	d=0.5	h= 15
7	Ash	d=0.5	h= 15	129	Maple	d=0.25	h= 9
8	Maple	d=0.3	h= 10	130	Oak	d=0.4	h= 15
9	Oak	d=0.55	h= 15	131	Oak	d=0.45	h= 15
10	Oak	d=0.55	h= 15	132	Maple	d=0.25	h= 9
11	Sweet chestnut	d=0.25	h= 10	133	Ash	d=0.25	h= 10
12	Oak	d=0.55	h= 15	134	Ash	d=0.25	h= 10
13	Oak	d=0.65	h= 15	135	Ash	d=0.2	h= 10
14	Oak	d=0.6	h= 15	136	Ash	d=0.2	h= 10
15	Oak	d=0.5	h= 12	137	Ash	d=0.2	h= 10
16	Oak	d=0.45	h= 15	138	Oak	d=0.65	h= 15
17	Oak	d=0.55	h= 15	139	Oak	d=0.65	h= 15
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22	Oak	d=0.6	h= 12	144	Oak	d=0.45	h= 15
23	Maple	d=0.25	h= 10	145	Oak	d=0.45	h= 12
24	Maple	d=0.25	h= 10	146	Oak	d=0.65	h= 15
25	Oak	d=0.4	h= 12	147	Oak	d=0.65	h= 15
26	Oak	d=0.4	h= 12	148	Oak	d=0.7	h= 15
27	Oak	d=0.45	h= 12	149	Oak	d=0.5	h= 15
28	Copper beech	d=0.35	h= 12	150	Oak	d=0.5	h= 15
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31	Oak	d=0.45	h= 12	153	Oak	d=0.55	h= 15
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33	Sweet chestnut	d=0.35	h= 8	155	Oak	d=0.4	h= 12
34	Hawthorn	d=0.15	h= 7	156	Oak	d=0.6	h= 15
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36	Sycamore	d=0.5	h= 12	158	Maple	d=0.25	h= 9
37	Sycamore	d=0.45	h= 12	159	Oak	d=0.45	h= 15
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41	Sweet chestnut	d=0.35	h= 10	163	Hawthorn	d=0.2	h= 5
42	Unknown	d=0.2	h= 8	164	Hawthorn	d=0.2	h= 5
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44	Cypress	d=0.15	h= 5	166	Oak	d=0.45	h= 12
45	Cypress	d=0.15	h= 5	167	Oak	d=0.55	h= 15
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47	Ash	d=0.15	h= 7	169	Oak	d=0.75	h= 15
48	Ash	d=0.15	h= 7	170	Fruit	d=0.3	h= 6
49	Ash	d=0.2	h= 10	171	Fruit	d=0.3	h= 6
50	Oak	d=0.45	h= 12	172	Oak	d=0.5	h= 12
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54	Hawthorn	d=0.2	h= 7	176	Oak	d=0.65	h= 15
55	Ash	d=0.3	h= 10	177	Oak	d=0.65	h= 15
56	Oak	d=0.45	h= 12	178	Hawthorn	d=0.25	h= 7
57	Oak	d=0.5	h= 12	179	Oak	d=0.45	h= 15
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60	Ash	d=0.2	h= 10	182	Oak	d=0.6	h= 15
61	Hazel	multibole	h= 6	183	Oak	d=0.45	h= 15
62	Ash	d=0.15	h= 8	184	Oak	d=0.6	h= 15
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67	Cypress	d=0.15	h= 10	189	Oak	d=0.55	h= 15
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69	Oak	d=0.6	h= 15	191	Oak	d=0.7	h= 15
70	Hawthorn	d=0.2	h= 7	192	Unknown	d=0.2	h= 9
71	Hawthorn	d=0.2	h= 7	193	Oak	d=0.75	h= 15
72	Hawthorn	d=0.2	h= 7	194	Oak	d=0.2	h= 10
73	Oak	d=0.55	h= 15	195	Unknown	d=0.2	h= 9
74	Oak	d=0.65	h= 15	196	Sycamore	d=0.3	h= 11
75	Oak	d=0.6	h= 15	197	Cypress	d=0.1	h= 7
76	Oak	d=0.6	h= 15	198	Cypress	d=0.1	h= 7
77	Ash	d=0.2	h= 10	199	Cypress	d=0.1	h= 7
78	Hawthorn	d=0.2	h= 7	200	Cypress	d=0.1	h= 7
79	Oak	d=0.6	h= 15	201	Cypress	d=0.1	h= 7
80	Ash	d=0.15	h= 8	202	Cypress	d=0.1	h= 7
81	Ash	d=0.15	h= 8	203	Cypress	d=0.1	h= 7
82	Oak	d=0.7	h= 15	204	Cypress	d=0.1	h= 7
83	Oak	d=0.6	h= 15	205	Eucalyptus	d=0.15	h= 12
84	Oak	d=0.45	h= 15	206	Eucalyptus	d=0.3	h= 12
85	Oak	d=0.45	h= 15	207	Eucalyptus	d=0.5	h= 15
86	Hawthorn	d=0.15	h= 6	208	Fruit	d=0.45	h= 8
87	Hawthorn	d=0.15	h= 6	209	Oak	d=0.75	h= 15
88	Hawthorn	d=0.15	h= 6	210	Cypress	d=0.45	h= 10
89	Oak	d=0.5	h= 15	211	Pine	d=0.45	h= 12
90	Oak	d=0.55	h= 15	212	Maple	d=0.2	h= 8
91	Oak	d=0.5	h= 15	213	Maple	d=0.2	h= 8
92	Oak	d=0.5	h= 15	214	Sweet chestnut	d=0.2	h= 10
93	Oak	d=0.45	h= 15	215	Maple	d=0.2	h= 8
94	Oak	d=0.65	h= 15	216	Maple	d=0.2	h= 8
95	Oak	d=0.65	h= 15	217	Maple	d=0.2	h= 8
96	Oak	d=0.75	h= 15	218	Sweet chestnut	d=0.2	h= 10
97	Unknown	d=0.2	h= 9	219	Sweet chestnut	d=0.15	h= 8
98	Oak	d=0.75	h= 15	220	Maple	d=0.15	h= 8
99	Oak	d=0.65	h= 15	221	Maple	d=0.15	h= 8
100	Oak	d=0.45	h= 15	222	Maple	d=0.15	h= 8
101	Oak	d=0.55	h= 15	223	Maple	d=0.15	h= 8
102	Oak	d=0.3	h= 10	224	Maple	d=0.15	h= 8
103	Oak	d=0.3	h= 10	225	Maple	d=0.2	h= 9
104	Oak	d=0.35	h= 10	226	Maple	d=0.15	h= 7
105	Oak	d=0.65	h= 15	227	Maple	d=0.15	h= 7
106	Oak	d=0.25	h= 10	228	Maple	d=0.15	h= 7
107	Oak	d=0.25	h= 10	229	Maple	d=0.25	h= 8
108	Oak	d=0.25	h= 10	230	Fruit	d=0.25	h= 8
109	Ash	d=0.3	h= 12	231	Ash	d=0.35	h= 12
110	Ash	d=0.3	h= 12	232	Pine	d=0.25	h= 9
111	Ash	d=0.3	h= 12	233	Copper beech	d=0.25	h= 8
112	Ash	d=0.25	h= 10	234	Silver birch	d=0.2	h= 5
113	Ash	d=0.3	h= 12	235	Cypress	d=0.25	h= 6
114	Ash	d=0.3	h= 12	236	Cypress	d=0.1	h= 5
115	Oak	d=0.5	h= 15	237	Fruit	d=0.4	h= 4
116	Oak	d=0.6	h= 15	238	Eucalyptus	d=0.6	h= 15
117	Oak	d=0.5	h= 15	239	Oak	d=1	h= 15
118	Maple	d=0.2	h= 9	240	Ash	d=0.3	h= 12
119	Maple	d=0.2	h= 9	241	Cherry	d=0.1	h= 3
120	Maple	d=0.2	h= 9	242	Ash	d=0.45	h= 15
121	Maple	d=0.2	h= 9	243	Ash	d=0.45	h= 15
122	Maple	d=0.2	h= 9	244	Ash	d=0.45	h= 15
				245	Fruit	d=0.45	h= 6

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64
Survey Station H5
Gate
Level 115.28
Ordnance Survey Benchmark OSBM
Foul Drainage 100mm FW MH CL 116.10 IL 116.75
Storm Drainage 100mm SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Sheet Layout

1
2 3
4 5
6
7

HOOK SURVEY PARTNERSHIP

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/01	-
Scale :	**Date :**	**Drawn by :**
1:200	July 2019	D.S.

Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email = mail@hooksurvey.com
Tel = 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email = midlands@hooksurvey.com
Tel = 01608 523118

www.hooksurvey.com

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line 64
Survey Station H5
Gate
Level .115.28
Ordnance Survey Benchmark OSBM
Foul Drainage 100mm FW MH CL 117.10 IL 116.75
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Abbreviations

Animal Sett	Sett
Air Valve	AV
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Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

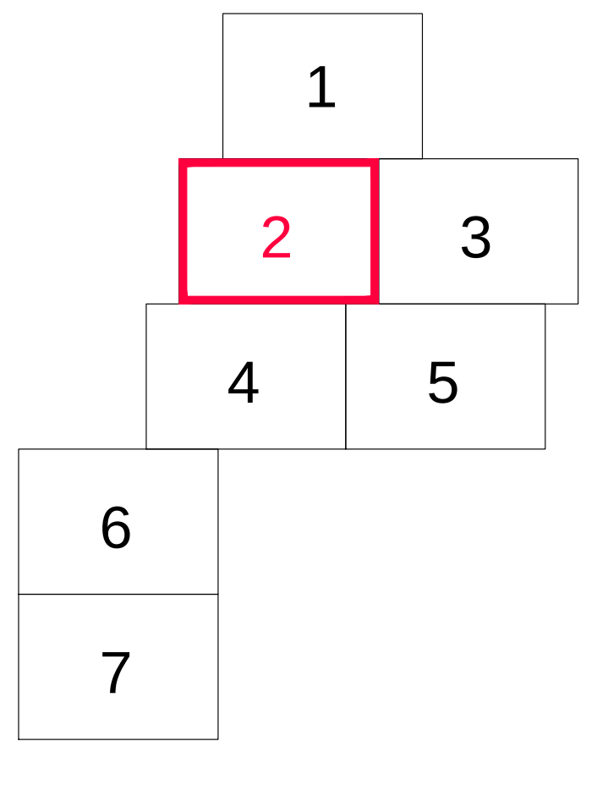
Notes

All trees are identified where possible.
Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Sheet Layout



HOOK SURVEY PARTNERSHIP

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/02	-
Scale :	Date :	Drawn by :
1:200	July 2019	D.S.

Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

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42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118
www.hooksurvey.com

Tree Schedule

1	Maple	d=0.25	h=7
2	Ash	d=0.25	h=7
3	Ash	d=0.1	h=6
4	Hawthorn	d=0.15	h=7
5	Maple	d=0.35	h=10
6	Ash	d=0.5	h=15
7	Ash	d=0.5	h=15
8	Maple	d=0.3	h=10
9	Oak	d=0.55	h=15
10	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h=10
12	Oak	d=0.55	h=15
13	Oak	d=0.65	h=15
14	Oak	d=0.6	h=15
15	Oak	d=0.5	h=12
16	Oak	d=0.45	h=15
17	Oak	d=0.55	h=15
18	Oak	d=0.7	h=15
19	Oak	d=0.6	h=15
20	Oak	d=0.4	h=15
21	Oak	d=0.6	h=12
22	Oak	d=0.6	h=12
23	Maple	d=0.25	h=10
24	Maple	d=0.25	h=10
25	Oak	d=0.4	h=12
26	Oak	d=0.4	h=12
27	Oak	d=0.45	h=12
28	Copper beech	d=0.35	h=12
29	Ash	d=0.15	h=9
30	Ash	d=0.15	h=9
31	Oak	d=0.45	h=12
32	Oak	d=0.45	h=12
33	Sweet chestnut	d=0.35	h=8
34	Hawthorn	d=0.15	h=7
35	Sycamore	d=0.4	h=12
36	Sycamore	d=0.5	h=12
37	Sycamore	d=0.45	h=12
38	Sweet chestnut	d=0.35	h=10
39	Sweet chestnut	d=0.35	h=10
40	Unknown	d=0.1	h=7
41	Sweet chestnut	d=0.35	h=10
42	Unknown	d=0.2	h=8
43	Cypress	d=0.15	h=5
44	Cypress	d=0.15	h=5
45	Cypress	d=0.15	h=5
46	Unknown	d=0.15	h=7
47	Ash	d=0.15	h=7
48	Ash	d=0.15	h=7
49	Ash	d=0.2	h=10
50	Oak	d=0.45	h=12
51	Ash	d=0.2	h=10
52	Oak	d=0.45	h=12
53	Oak	d=0.45	h=12
54	Hawthorn	d=0.2	h=7
55	Ash	d=0.3	h=10
56	Oak	d=0.45	h=12
57	Oak	d=0.5	h=12
58	Oak	d=0.45	h=12
59	Hawthorn	d=0.2	h=7
60	Ash	d=0.2	h=10
61	Hazel	multibole	h=6
62	Ash	d=0.15	h=8
63	Cypress	d=0.25	h=10
64	Cypress	d=0.25	h=10
65	Cypress	d=0.15	h=10
66	Cypress	d=0.2	h=10
67	Cypress	d=0.15	h=10
68	Cypress	d=0.25	h=10
69	Oak	d=0.6	h=15
70	Hawthorn	d=0.2	h=7
71	Hawthorn	d=0.2	h=7
72	Hawthorn	d=0.2	h=7
73	Oak	d=0.55	h=15
74	Oak	d=0.65	h=15
75	Oak	d=0.6	h=15
76	Oak	d=0.6	h=15
77	Ash	d=0.2	h=10
78	Hawthorn	d=0.2	h=7
79	Oak	d=0.6	h=15
80	Ash	d=0.15	h=8
81	Ash	d=0.15	h=8
82	Oak	d=0.7	h=15
83	Oak	d=0.6	h=15
84	Oak	d=0.45	h=15
85	Oak	d=0.45	h=15
86	Hawthorn	d=0.15	h=6
87	Hawthorn	d=0.15	h=6
88	Hawthorn	d=0.15	h=6
89	Oak	d=0.5	h=15
90	Oak	d=0.55	h=15
91	Oak	d=0.5	h=15
92	Oak	d=0.5	h=15
93	Oak	d=0.45	h=15
94	Oak	d=0.65	h=15
95	Oak	d=0.65	h=15
96	Oak	d=0.75	h=15
97	Unknown	d=0.2	h=9
98	Oak	d=0.75	h=15
99	Oak	d=0.65	h=15
100	Oak	d=0.45	h=15
101	Oak	d=0.55	h=15
102	Oak	d=0.3	h=10
103	Oak	d=0.3	h=10
104	Oak	d=0.35	h=10
105	Oak	d=0.65	h=15
106	Oak	d=0.25	h=10
107	Oak	d=0.25	h=10
108	Oak	d=0.25	h=10
109	Ash	d=0.3	h=12
110	Ash	d=0.3	h=12
111	Ash	d=0.3	h=12
112	Ash	d=0.25	h=10
113	Ash	d=0.3	h=12
114	Ash	d=0.3	h=12
115	Oak	d=0.5	h=15
116	Oak	d=0.6	h=15
117	Oak	d=0.5	h=15
118	Maple	d=0.2	h=9
119	Maple	d=0.2	h=9
120	Maple	d=0.2	h=9
121	Maple	d=0.2	h=9
122	Maple	d=0.2	h=9
123	Oak	d=0.5	h=15
124	Ash	d=0.25	h=12
125	Oak	d=0.5	h=15
126	Oak	d=0.5	h=15
127	Oak	d=0.5	h=15
128	Oak	d=0.5	h=15
129	Maple	d=0.25	h=9
130	Oak	d=0.4	h=15
131	Oak	d=0.45	h=15
132	Maple	d=0.25	h=9
133	Ash	d=0.25	h=10
134	Ash	d=0.25	h=10
135	Ash	d=0.2	h=10
136	Ash	d=0.2	h=10
137	Ash	d=0.2	h=10
138	Oak	d=0.65	h=15
139	Oak	d=0.65	h=15
140	Oak	d=0.6	h=15
141	Oak	d=0.6	h=15
142	Oak	d=0.55	h=15
143	Oak	d=0.55	h=15
144	Oak	d=0.45	h=15
145	Oak	d=0.45	h=12
146	Oak	d=0.65	h=15
147	Oak	d=0.65	h=15
148	Oak	d=0.7	h=15
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150	Oak	d=0.5	h=15
151	Oak	d=0.5	h=15
152	Maple	d=0.25	h=9
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155	Oak	d=0.4	h=12
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157	Maple	d=0.25	h=9
158	Maple	d=0.25	h=9
159	Oak	d=0.45	h=15
160	Oak	d=0.6	h=15
161	Hawthorn	d=0.2	h=7
162	Hawthorn	d=0.15	h=5
163	Hawthorn	d=0.2	h=5
164	Hawthorn	d=0.2	h=5
165	Oak	d=0.5	h=12
166	Oak	d=0.45	h=12
167	Oak	d=0.55	h=15
168	Oak	d=0.65	h=15
169	Oak	d=0.75	h=15
170	Fruit	d=0.3	h=6
171	Fruit	d=0.3	h=6
172	Oak	d=0.5	h=12
173	Hawthorn	d=0.25	h=7
174	Hawthorn	d=0.25	h=7
175	Unknown	d=0.35	h=10
176	Oak	d=0.65	h=15
177	Oak	d=0.65	h=15
178	Hawthorn	d=0.25	h=7
179	Oak	d=0.45	h=15
180	Oak	d=0.45	h=15
181	Oak	d=0.6	h=15
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183	Oak	d=0.45	h=15
184	Oak	d=0.6	h=15
185	Oak	d=0.5	h=15
186	Oak	d=0.75	h=15
187	Oak	d=0.6	h=15
188	Oak	d=0.6	h=12
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190	Oak	d=0.6	h=15
191	Oak	d=0.7	h=15
192	Unknown	d=0.2	h=9
193	Oak	d=0.75	h=15
194	Oak	d=0.2	h=10
195	Unknown	d=0.2	h=9
196	Sycamore	d=0.3	h=11
197	Cypress	d=0.1	h=7
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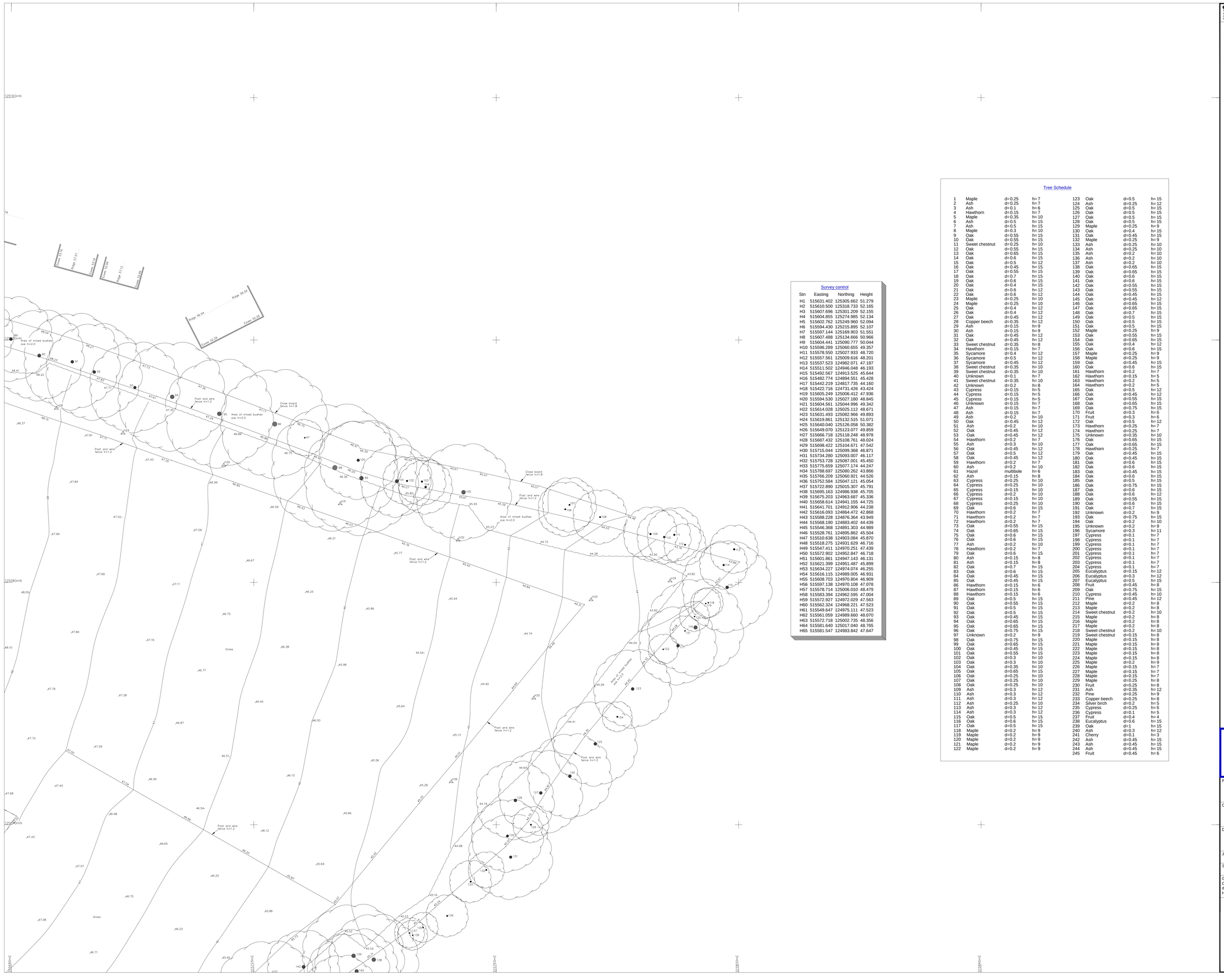
199	Cypress	d=0.1	h=7
200	Cypress	d=0.1	h=7
201	Cypress	d=0.1	h=7
202	Cypress	d=0.1	h=7
203	Cypress	d=0.1	h=7
204	Cypress	d=0.1	h=7
205	Eucalyptus	d=0.15	h=12
206	Eucalyptus	d=0.3	h=12
207	Eucalyptus	d=0.5	h=15
208	Fruit	d=0.45	h=8
209	Oak	d=0.75	h=15
210	Cypress	d=0.45	h=10
211	Pine	d=0.45	h=12
212	Maple	d=0.2	h=8
213	Maple	d=0.2	h=8
214	Sweet chestnut	d=0.2	h=10
215	Maple	d=0.2	h=8
216	Maple	d=0.2	h=8
217	Maple	d=0.2	h=8
218	Sweet chestnut	d=0.2	h=10
219	Sweet chestnut	d=0.15	h=8
220	Maple	d=0.15	h=8
221	Maple	d=0.15	h=8
222	Maple	d=0.15	h=8
223	Maple	d=0.15	h=8
224	Maple	d=0.15	h=8
225	Maple	d=0.2	h=9
226	Maple	d=0.15	h=7
227	Maple	d=0.15	h=7
228	Maple	d=0.15	h=7
229	Maple	d=0.25	h=8
230	Fruit	d=0.25	h=8
231	Ash	d=0.35	h=12
232	Pine	d=0.25	h=9
233	Copper beech	d=0.25	h=8
234	Silver birch	d=0.2	h=5
235	Cypress	d=0.25	h=6
236	Cypress	d=0.1	h=5
237	Fruit	d=0.4	h=4
238	Eucalyptus	d=0.6	h=15
239	Oak	d=1	h=15
240	Ash	d=0.3	h=12
241	Cherry	d=0.1	h=3
242	Ash	d=0.45	h=15
243	Ash	d=0.45	h=15
244	Ash	d=0.45	h=15
245	Fruit	d=0.45	h=6

Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.616	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.048	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.804	46.909
H56	515597.138	124970.108	47.078
H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647



Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.616	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.048	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.904	46.909
H56	515597.138	124970.108	47.078
H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647

Tree Schedule

1	Maple	d=0.25	h=7	123	Oak	d=0.5	h=15
2	Ash	d=0.25	h=7	124	Ash	d=0.25	h=12
3	Ash	d=0.1	h=6	125	Oak	d=0.5	h=15
4	Hawthorn	d=0.15	h=7	126	Oak	d=0.5	h=15
5	Maple	d=0.35	h=10	127	Oak	d=0.5	h=15
6	Ash	d=0.5	h=15	128	Oak	d=0.5	h=15
7	Ash	d=0.5	h=15	129	Maple	d=0.25	h=9
8	Maple	d=0.3	h=10	130	Oak	d=0.4	h=15
9	Oak	d=0.55	h=15	131	Oak	d=0.45	h=15
10	Oak	d=0.55	h=15	132	Maple	d=0.25	h=9
11	Sweet chestnut	d=0.25	h=10	133	Ash	d=0.25	h=10
12	Oak	d=0.55	h=15	134	Ash	d=0.25	h=10
13	Oak	d=0.65	h=15	135	Ash	d=0.2	h=10
14	Oak	d=0.6	h=15	136	Ash	d=0.2	h=10
15	Oak	d=0.5	h=12	137	Ash	d=0.2	h=10
16	Oak	d=0.45	h=15	138	Oak	d=0.65	h=15
17	Oak	d=0.55	h=15	139	Oak	d=0.65	h=15
18	Oak	d=0.7	h=15	140	Oak	d=0.6	h=15
19	Oak	d=0.6	h=15	141	Oak	d=0.6	h=15
20	Oak	d=0.4	h=15	142	Oak	d=0.55	h=15
21	Oak	d=0.6	h=12	143	Oak	d=0.55	h=15
22	Oak	d=0.6	h=12	144	Oak	d=0.45	h=15
23	Maple	d=0.25	h=10	145	Oak	d=0.45	h=12
24	Maple	d=0.25	h=10	146	Oak	d=0.65	h=15
25	Oak	d=0.4	h=12	147	Oak	d=0.65	h=15
26	Oak	d=0.4	h=12	148	Oak	d=0.7	h=15
27	Oak	d=0.45	h=12	149	Oak	d=0.5	h=15
28	Copper beech	d=0.35	h=12	150	Oak	d=0.5	h=15
29	Ash	d=0.15	h=9	151	Oak	d=0.5	h=15
30	Ash	d=0.15	h=9	152	Maple	d=0.25	h=9
31	Oak	d=0.45	h=12	153	Oak	d=0.55	h=15
32	Oak	d=0.45	h=12	154	Oak	d=0.65	h=15
33	Sweet chestnut	d=0.35	h=8	155	Oak	d=0.4	h=12
34	Hawthorn	d=0.15	h=7	156	Oak	d=0.6	h=15
35	Sycamore	d=0.4	h=12	157	Maple	d=0.25	h=9
36	Sycamore	d=0.5	h=12	158	Maple	d=0.25	h=9
37	Sycamore	d=0.45	h=12	159	Oak	d=0.45	h=15
38	Sweet chestnut	d=0.35	h=10	160	Oak	d=0.6	h=15
39	Sweet chestnut	d=0.35	h=10	161	Hawthorn	d=0.2	h=7
40	Unknown	d=0.1	h=7	162	Hawthorn	d=0.15	h=5
41	Sweet chestnut	d=0.35	h=10	163	Hawthorn	d=0.2	h=5
42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=5
43	Cypress	d=0.15	h=5	165	Oak	d=0.5	h=12
44	Cypress	d=0.15	h=5	166	Oak	d=0.45	h=12
45	Cypress	d=0.15	h=5	167	Oak	d=0.55	h=15
46	Unknown	d=0.15	h=7	168	Oak	d=0.65	h=15
47	Ash	d=0.15	h=7	169	Oak	d=0.75	h=15
48	Ash	d=0.15	h=7	170	Fruit	d=0.3	h=6
49	Ash	d=0.2	h=10	171	Fruit	d=0.3	h=6
50	Oak	d=0.45	h=12	172	Oak	d=0.5	h=12
51	Ash	d=0.2	h=10	173	Hawthorn	d=0.25	h=7
52	Oak	d=0.45	h=12	174	Hawthorn	d=0.25	h=7
53	Oak	d=0.45	h=12	175	Unknown	d=0.35	h=10
54	Hawthorn	d=0.2	h=7	176	Oak	d=0.65	h=15
55	Ash	d=0.3	h=10	177	Oak	d=0.65	h=15
56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7
57	Oak	d=0.5	h=12	179	Oak	d=0.45	h=15
58	Oak	d=0.45	h=12	180	Oak	d=0.45	h=15
59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15
60	Ash	d=0.2	h=10	182	Oak	d=0.6	h=15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h=15
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h=15
63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15
64	Cypress	d=0.25	h=10	186	Oak	d=0.75	h=15
65	Cypress	d=0.15	h=10	187	Oak	d=0.6	h=15
66	Cypress	d=0.2	h=10	188	Oak	d=0.6	h=12
67	Cypress	d=0.15	h=10	189	Oak	d=0.55	h=15
68	Cypress	d=0.25	h=10	190	Oak	d=0.6	h=15
69	Oak	d=0.6	h=15	191	Oak	d=0.7	h=15
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=9
71	Hawthorn	d=0.2	h=7	193	Oak	d=0.75	h=15
72	Hawthorn	d=0.2	h=7	194	Oak	d=0.2	h=10
73	Oak	d=0.55	h=15	195	Unknown	d=0.2	h=9
74	Oak	d=0.65	h=15	196	Sycamore	d=0.3	h=11
75	Oak	d=0.6	h=15	197	Cypress	d=0.1	h=7
76	Oak	d=0.6	h=15	198	Cypress	d=0.1	h=7
77	Ash	d=0.2	h=10	199	Cypress	d=0.1	h=7
78	Hawthorn	d=0.2	h=7	200	Cypress	d=0.1	h=7
79	Oak	d=0.6	h=15	201	Cypress	d=0.1	h=7
80	Ash	d=0.15	h=8	202	Cypress	d=0.1	h=7
81	Ash	d=0.15	h=8	203	Cypress	d=0.1	h=7
82	Oak	d=0.7	h=15	204	Cypress	d=0.1	h=7
83	Oak	d=0.6	h=15	205	Eucalyptus	d=0.15	h=12
84	Oak	d=0.45	h=15	206	Eucalyptus	d=0.3	h=12
85	Oak	d=0.45	h=15	207	Eucalyptus	d=0.5	h=15
86	Hawthorn	d=0.15	h=6	208	Fruit	d=0.45	h=8
87	Hawthorn	d=0.15	h=6	209	Oak	d=0.75	h=15
88	Hawthorn	d=0.15	h=6	210	Cypress	d=0.45	h=10
89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=12
90	Oak	d=0.55	h=15	212	Maple	d=0.2	h=8
91	Oak	d=0.5	h=15	213	Maple	d=0.2	h=8
92	Oak	d=0.5	h=15	214	Sweet chestnut	d=0.2	h=10
93	Oak	d=0.45	h=15	215	Maple	d=0.2	h=8
94	Oak	d=0.65	h=15	216	Maple	d=0.2	h=8
95	Oak	d=0.65	h=15	217	Maple	d=0.2	h=8
96	Oak	d=0.75	h=15	218	Sweet chestnut	d=0.2	h=10
97	Unknown	d=0.2	h=9	219	Sweet chestnut	d=0.15	h=8
98	Oak	d=0.75	h=15	220	Maple	d=0.15	h=8
99	Oak	d=0.65	h=15	221	Maple	d=0.15	h=8
100	Oak	d=0.45	h=15	222	Maple	d=0.15	h=8
101	Oak	d=0.55	h=15	223	Maple	d=0.15	h=8
102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8
103	Oak	d=0.3	h=10	225	Maple	d=0.2	h=9
104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7
105	Oak	d=0.65	h=15	227	Maple	d=0.15	h=7
106	Oak	d=0.25	h=10	228	Maple	d=0.15	h=7
107	Oak	d=0.25	h=10	229	Maple	d=0.25	h=8
108	Oak	d=0.25	h=10	230	Fruit	d=0.25	h=8
109	Ash	d=0.3	h=12	231	Ash	d=0.35	h=12
110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9
111	Ash	d=0.3	h=12	233	Copper beech	d=0.25	h=8
112	Ash	d=0.25	h=10	234	Silver birch	d=0.2	h=5
113	Ash	d=0.3	h=12	235	Cypress	d=0.25	h=6
114	Ash	d=0.3	h=12	236	Cypress	d=0.1	h=5
115	Oak	d=0.5	h=15	237	Fruit	d=0.4	h=4
116	Oak	d=0.6	h=15	238	Eucalyptus	d=0.6	h=15
117	Oak	d=0.5	h=15	239	Oak	d=1	h=15
118	Maple	d=0.2	h=9	240	Ash	d=0.3	h=12
119	Maple	d=0.2	h=9	241	Cherry	d=0.1	h=3
120	Maple	d=0.2	h=9	242	Ash	d=0.45	h=15
121	Maple	d=0.2	h=9	243	Ash	d=0.45	h=15
122	Maple	d=0.2	h=9	244	Ash	d=0.45	h=15
				245	Fruit	d=0.45	h=6

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64
Survey Station — H5
Gate
Level — 15.28
Ordnance Survey Benchmark — OSBM
Foul Drainage — 100mm — FW MH CL 117.10 IL 116.75
Storm Drainage — 100mm — SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Sheet Layout

1
2 3
4 5
6
7

HOOK SURVEY PARTNERSHIP

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/03	-
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email = mail@hooksurvey.com
Tel = 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email = midlands@hooksurvey.com
Tel = 01608 523118

Registered Member
Chartered Surveyors
RICS Member
THE SURVEY ASSOCIATION

www.hooksurvey.com

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
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Contour line — 64
Survey Station — H5
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Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

124960mN

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

NORTH

124920mN

Sheet Layout

1
2 3
4 5
6
7

Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.616	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.049	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.804	46.909
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H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647

HOOK SURVEY PARTNERSHIP

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

124880mN

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/04	-
Scale :	**Date :**	**Drawn by :**
1:200	July 2019	D.S.

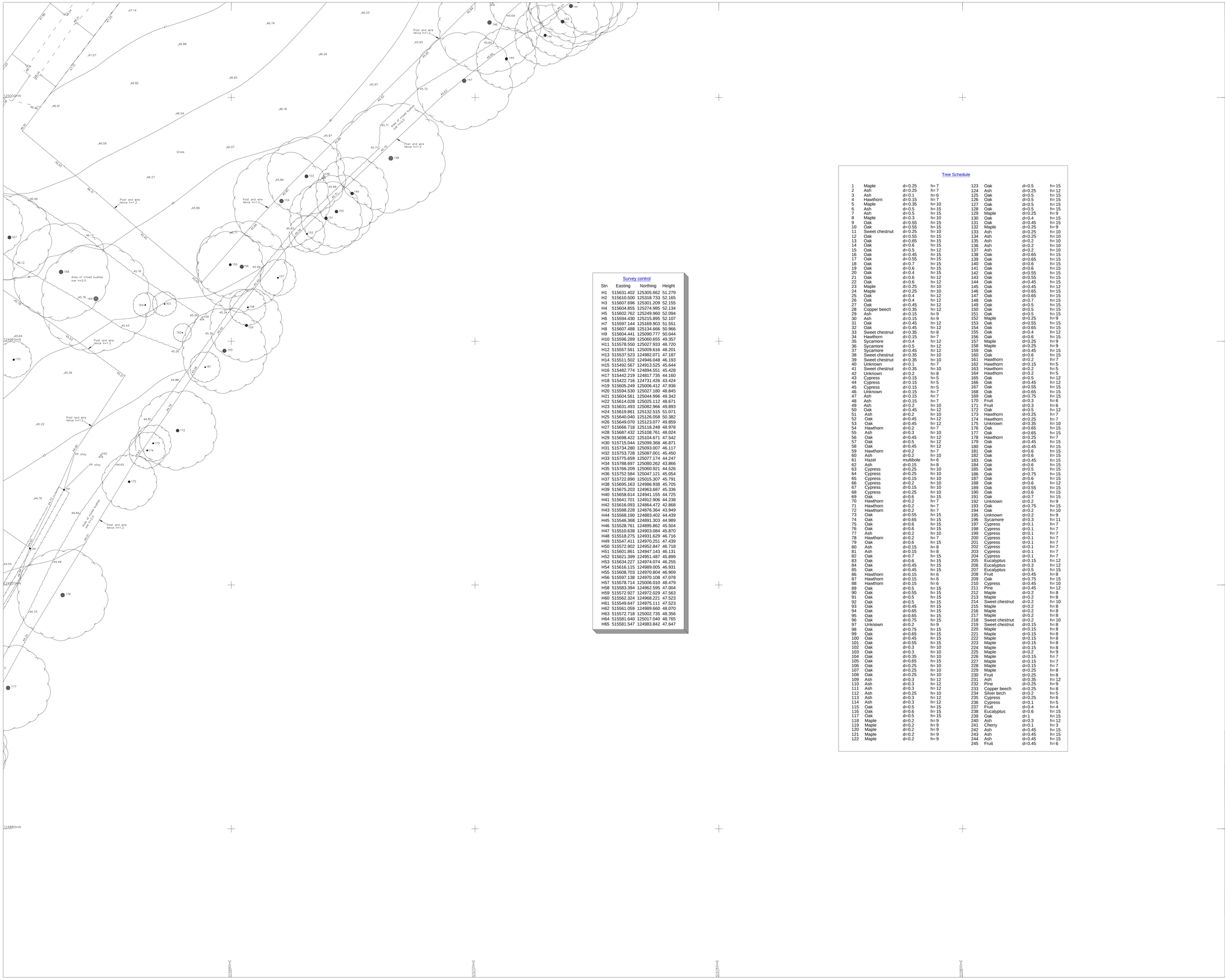
Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Regional Winner
@hooksurveyg
THE SURVEY ASSOCIATION



Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.616	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.048	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.804	46.909
H56	515597.138	124970.108	47.078
H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647

Tree Schedule

1	Maple	d=0.25	h=7	123	Oak	d=0.5	h=15
2	Ash	d=0.25	h=7	124	Ash	d=0.25	h=12
3	Ash	d=0.1	h=6	125	Oak	d=0.5	h=15
4	Hawthorn	d=0.15	h=7	126	Oak	d=0.5	h=15
5	Maple	d=0.35	h=10	127	Oak	d=0.5	h=15
6	Ash	d=0.5	h=15	128	Oak	d=0.5	h=15
7	Ash	d=0.5	h=15	129	Maple	d=0.25	h=9
8	Maple	d=0.3	h=10	130	Oak	d=0.4	h=15
9	Oak	d=0.55	h=15	131	Oak	d=0.45	h=15
10	Oak	d=0.55	h=15	132	Maple	d=0.25	h=9
11	Sweet chestnut	d=0.25	h=10	133	Ash	d=0.25	h=10
12	Oak	d=0.55	h=15	134	Ash	d=0.25	h=10
13	Oak	d=0.65	h=15	135	Ash	d=0.2	h=10
14	Oak	d=0.6	h=15	136	Ash	d=0.2	h=10
15	Oak	d=0.5	h=12	137	Ash	d=0.2	h=10
16	Oak	d=0.45	h=15	138	Oak	d=0.65	h=15
17	Oak	d=0.55	h=15	139	Oak	d=0.65	h=15
18	Oak	d=0.7	h=15	140	Oak	d=0.6	h=15
19	Oak	d=0.6	h=15	141	Oak	d=0.6	h=15
20	Oak	d=0.4	h=15	142	Oak	d=0.55	h=15
21	Oak	d=0.6	h=12	143	Oak	d=0.55	h=15
22	Oak	d=0.6	h=12	144	Oak	d=0.45	h=15
23	Maple	d=0.25	h=10	145	Oak	d=0.45	h=12
24	Maple	d=0.25	h=10	146	Oak	d=0.65	h=15
25	Oak	d=0.4	h=12	147	Oak	d=0.65	h=15
26	Oak	d=0.4	h=12	148	Oak	d=0.7	h=15
27	Oak	d=0.45	h=12	149	Oak	d=0.5	h=15
28	Copper beech	d=0.35	h=12	150	Oak	d=0.5	h=15
29	Ash	d=0.15	h=9	151	Oak	d=0.5	h=15
30	Ash	d=0.15	h=9	152	Maple	d=0.25	h=9
31	Oak	d=0.45	h=12	153	Oak	d=0.55	h=15
32	Oak	d=0.45	h=12	154	Oak	d=0.65	h=15
33	Sweet chestnut	d=0.35	h=8	155	Oak	d=0.4	h=12
34	Hawthorn	d=0.15	h=7	156	Oak	d=0.6	h=15
35	Sycamore	d=0.4	h=12	157	Maple	d=0.25	h=9
36	Sycamore	d=0.5	h=12	158	Maple	d=0.25	h=9
37	Sycamore	d=0.45	h=12	159	Oak	d=0.45	h=15
38	Sweet chestnut	d=0.35	h=10	160	Oak	d=0.6	h=15
39	Sweet chestnut	d=0.35	h=10	161	Hawthorn	d=0.2	h=7
40	Unknown	d=0.1	h=7	162	Hawthorn	d=0.15	h=5
41	Sweet chestnut	d=0.35	h=10	163	Hawthorn	d=0.2	h=5
42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=5
43	Cypress	d=0.15	h=5	165	Oak	d=0.5	h=12
44	Cypress	d=0.15	h=5	166	Oak	d=0.45	h=12
45	Cypress	d=0.15	h=5	167	Oak	d=0.55	h=15
46	Unknown	d=0.15	h=7	168	Oak	d=0.65	h=15
47	Ash	d=0.15	h=7	169	Oak	d=0.75	h=15
48	Ash	d=0.15	h=7	170	Fruit	d=0.3	h=6
49	Ash	d=0.2	h=10	171	Fruit	d=0.3	h=6
50	Oak	d=0.45	h=12	172	Oak	d=0.5	h=12
51	Ash	d=0.2	h=10	173	Hawthorn	d=0.25	h=7
52	Oak	d=0.45	h=12	174	Hawthorn	d=0.25	h=7
53	Oak	d=0.45	h=12	175	Unknown	d=0.35	h=10
54	Hawthorn	d=0.2	h=7	176	Oak	d=0.65	h=15
55	Ash	d=0.3	h=10	177	Oak	d=0.65	h=15
56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7
57	Oak	d=0.5	h=12	179	Oak	d=0.45	h=15
58	Oak	d=0.45	h=12	180	Oak	d=0.45	h=15
59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15
60	Ash	d=0.2	h=10	182	Oak	d=0.6	h=15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h=15
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h=15
63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15
64	Cypress	d=0.25	h=10	186	Oak	d=0.75	h=15
65	Cypress	d=0.15	h=10	187	Oak	d=0.6	h=15
66	Cypress	d=0.2	h=10	188	Oak	d=0.6	h=12
67	Cypress	d=0.15	h=10	189	Oak	d=0.55	h=15
68	Cypress	d=0.25	h=10	190	Oak	d=0.6	h=15
69	Oak	d=0.6	h=15	191	Oak	d=0.7	h=15
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=9
71	Hawthorn	d=0.2	h=7	193	Oak	d=0.75	h=15
72	Hawthorn	d=0.2	h=7	194	Oak	d=0.2	h=10
73	Oak	d=0.55	h=15	195	Unknown	d=0.2	h=9
74	Oak	d=0.65	h=15	196	Sycamore	d=0.3	h=11
75	Oak	d=0.6	h=15	197	Cypress	d=0.1	h=7
76	Oak	d=0.6	h=15	198	Cypress	d=0.1	h=7
77	Ash	d=0.2	h=10	199	Cypress	d=0.1	h=7
78	Hawthorn	d=0.2	h=7	200	Cypress	d=0.1	h=7
79	Oak	d=0.6	h=15	201	Cypress	d=0.1	h=7
80	Ash	d=0.15	h=8	202	Cypress	d=0.1	h=7
81	Ash	d=0.15	h=8	203	Cypress	d=0.1	h=7
82	Oak	d=0.7	h=15	204	Cypress	d=0.1	h=7
83	Oak	d=0.6	h=15	205	Eucalyptus	d=0.15	h=12
84	Oak	d=0.45	h=15	206	Eucalyptus	d=0.3	h=12
85	Oak	d=0.45	h=15	207	Eucalyptus	d=0.5	h=15
86	Hawthorn	d=0.15	h=6	208	Fruit	d=0.45	h=8
87	Hawthorn	d=0.15	h=6	209	Oak	d=0.75	h=15
88	Hawthorn	d=0.15	h=6	210	Cypress	d=0.45	h=10
89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=12
90	Oak	d=0.55	h=15	212	Maple	d=0.2	h=8
91	Oak	d=0.5	h=15	213	Maple	d=0.2	h=8
92	Oak	d=0.5	h=15	214	Sweet chestnut	d=0.2	h=10
93	Oak	d=0.45	h=15	215	Maple	d=0.2	h=8
94	Oak	d=0.65	h=15	216	Maple	d=0.2	h=8
95	Oak	d=0.65	h=15	217	Maple	d=0.2	h=8
96	Oak	d=0.75	h=15	218	Sweet chestnut	d=0.2	h=10
97	Unknown	d=0.2	h=9	219	Sweet chestnut	d=0.15	h=8
98	Oak	d=0.75	h=15	220	Maple	d=0.15	h=8
99	Oak	d=0.65	h=15	221	Maple	d=0.15	h=8
100	Oak	d=0.45	h=15	222	Maple	d=0.15	h=8
101	Oak	d=0.55	h=15	223	Maple	d=0.15	h=8
102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8
103	Oak	d=0.3	h=10	225	Maple	d=0.2	h=9
104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7
105	Oak	d=0.65	h=15	227	Maple	d=0.15	h=7
106	Oak	d=0.25	h=10	228	Maple	d=0.15	h=7
107	Oak	d=0.25	h=10	229	Maple	d=0.25	h=8
108	Oak	d=0.25	h=10	230	Fruit	d=0.25	h=8
109	Ash	d=0.3	h=12	231	Ash	d=0.35	h=12
110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9
111	Ash	d=0.3	h=12	233	Copper beech	d=0.25	h=8
112	Ash	d=0.25	h=10	234	Silver birch	d=0.2	h=5
113	Ash	d=0.3	h=12	235	Cypress	d=0.25	h=6
114	Ash	d=0.3	h=12	236	Cypress	d=0.1	h=5
115	Oak	d=0.5	h=15	237	Fruit	d=0.4	h=4
116	Oak	d=0.6	h=15	238	Eucalyptus	d=0.6	h=15
117	Oak	d=0.5	h=15	239	Oak	d=1	h=15
118	Maple	d=0.2	h=9	240	Ash	d=0.3	h=12
119	Maple	d=0.2	h=9	241	Cherry	d=0.1	h=3
120	Maple	d=0.2	h=9	242	Ash	d=0.45	h=15
121	Maple	d=0.2	h=9	243	Ash	d=0.45	h=15
122	Maple	d=0.2	h=9	244	Ash	d=0.45	h=15
				245	Fruit	d=0.45	h=6

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64
Survey Station — H5
Gate
Level — 15.28
Ordnance Survey Benchmark — OSBM
Foul Drainage — 100mm — FW MH CL 117.10 IL 116.75
Storm Drainage — 100mm — SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Sheet Layout

1
2 3
4 5
6
7

HOOK SURVEY PARTNERSHIP

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/05	-
Scale :	**Date :**	**Drawn by :**
1:200	July 2019	D.S.

Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

Registered Member
@hooksurvey
THE SURVEY ASSOCIATION
www.hooksurvey.com

Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line — 64 —
Survey Station H5
Gate
Level .115.28
Ordnance Survey Benchmark OS5M
Foul Drainage — 100mm — FW MH CL 117.10 IL 116.75
Storm Drainage — 100mm — SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

Notes

All trees are identified where possible. Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Sheet Layout

1
2 3
4 5
6
7

HOOK SURVEY PARTNERSHIP

Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/06	-
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Regional Member
Chartered Surveyors
THE SURVEY ASSOCIATION

Tree Schedule

1	Maple	d=0.25	h=7	123	Oak	d=0.5	h=15
2	Ash	d=0.25	h=7	124	Ash	d=0.25	h=12
3	Ash	d=0.1	h=6	125	Oak	d=0.5	h=15
4	Hawthorn	d=0.15	h=7	126	Oak	d=0.5	h=15
5	Maple	d=0.35	h=10	127	Oak	d=0.5	h=15
6	Ash	d=0.5	h=15	128	Oak	d=0.5	h=15
7	Ash	d=0.5	h=15	129	Maple	d=0.25	h=9
8	Maple	d=0.3	h=10	130	Oak	d=0.4	h=15
9	Oak	d=0.55	h=15	131	Oak	d=0.45	h=15
10	Oak	d=0.55	h=15	132	Maple	d=0.25	h=9
11	Sweet chestnut	d=0.25	h=10	133	Ash	d=0.25	h=10
12	Oak	d=0.55	h=15	134	Ash	d=0.25	h=10
13	Oak	d=0.65	h=15	135	Ash	d=0.2	h=10
14	Oak	d=0.6	h=15	136	Ash	d=0.2	h=10
15	Oak	d=0.5	h=12	137	Ash	d=0.2	h=10
16	Oak	d=0.45	h=15	138	Oak	d=0.65	h=15
17	Oak	d=0.55	h=15	139	Oak	d=0.65	h=15
18	Oak	d=0.7	h=15	140	Oak	d=0.6	h=15
19	Oak	d=0.6	h=15	141	Oak	d=0.6	h=15
20	Oak	d=0.4	h=15	142	Oak	d=0.55	h=15
21	Oak	d=0.6	h=12	143	Oak	d=0.55	h=15
22	Oak	d=0.6	h=12	144	Oak	d=0.45	h=15
23	Maple	d=0.25	h=10	145	Oak	d=0.45	h=12
24	Maple	d=0.25	h=10	146	Oak	d=0.65	h=15
25	Oak	d=0.4	h=12	147	Oak	d=0.65	h=15
26	Oak	d=0.4	h=12	148	Oak	d=0.7	h=15
27	Oak	d=0.45	h=12	149	Oak	d=0.5	h=15
28	Copper beech	d=0.35	h=12	150	Oak	d=0.5	h=15
29	Ash	d=0.15	h=9	151	Oak	d=0.5	h=15
30	Ash	d=0.15	h=9	152	Maple	d=0.25	h=9
31	Oak	d=0.45	h=12	153	Oak	d=0.55	h=15
32	Oak	d=0.45	h=12	154	Oak	d=0.65	h=15
33	Sweet chestnut	d=0.35	h=8	155	Oak	d=0.4	h=12
34	Hawthorn	d=0.15	h=7	156	Oak	d=0.6	h=15
35	Sycamore	d=0.4	h=12	157	Maple	d=0.25	h=9
36	Sycamore	d=0.5	h=12	158	Maple	d=0.25	h=9
37	Sycamore	d=0.45	h=12	159	Oak	d=0.45	h=15
38	Sweet chestnut	d=0.35	h=10	160	Oak	d=0.6	h=15
39	Sweet chestnut	d=0.35	h=10	161	Hawthorn	d=0.2	h=7
40	Unknown	d=0.1	h=7	162	Hawthorn	d=0.15	h=5
41	Sweet chestnut	d=0.35	h=10	163	Hawthorn	d=0.2	h=5
42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=5
43	Cypress	d=0.15	h=5	165	Oak	d=0.5	h=12
44	Cypress	d=0.15	h=5	166	Oak	d=0.45	h=12
45	Cypress	d=0.15	h=5	167	Oak	d=0.55	h=15
46	Unknown	d=0.15	h=7	168	Oak	d=0.65	h=15
47	Ash	d=0.15	h=7	169	Oak	d=0.75	h=15
48	Ash	d=0.15	h=7	170	Fruit	d=0.3	h=6
49	Ash	d=0.2	h=10	171	Fruit	d=0.3	h=6
50	Oak	d=0.45	h=12	172	Oak	d=0.5	h=12
51	Ash	d=0.2	h=10	173	Hawthorn	d=0.25	h=7
52	Oak	d=0.45	h=12	174	Hawthorn	d=0.25	h=7
53	Oak	d=0.45	h=12	175	Unknown	d=0.35	h=10
54	Hawthorn	d=0.2	h=7	176	Oak	d=0.65	h=15
55	Ash	d=0.3	h=10	177	Oak	d=0.65	h=15
56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7
57	Oak	d=0.5	h=12	179	Oak	d=0.45	h=15
58	Oak	d=0.45	h=12	180	Oak	d=0.45	h=15
59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15
60	Ash	d=0.2	h=10	182	Oak	d=0.6	h=15
61	Hazel	multibole	h=6	183	Oak	d=0.45	h=15
62	Ash	d=0.15	h=8	184	Oak	d=0.6	h=15
63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15
64	Cypress	d=0.25	h=10	186	Oak	d=0.75	h=15
65	Cypress	d=0.15	h=10	187	Oak	d=0.6	h=15
66	Cypress	d=0.2	h=10	188	Oak	d=0.6	h=12
67	Cypress	d=0.15	h=10	189	Oak	d=0.55	h=15
68	Cypress	d=0.25	h=10	190	Oak	d=0.6	h=15
69	Oak	d=0.6	h=15	191	Oak	d=0.7	h=15
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=9
71	Hawthorn	d=0.2	h=7	193	Oak	d=0.75	h=15
72	Hawthorn	d=0.2	h=7	194	Oak	d=0.2	h=10
73	Oak	d=0.55	h=15	195	Unknown	d=0.2	h=9
74	Oak	d=0.65	h=15	196	Sycamore	d=0.3	h=11
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79	Oak	d=0.6	h=15	201	Cypress	d=0.1	h=7
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81	Ash	d=0.15	h=8	203	Cypress	d=0.1	h=7
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86	Hawthorn	d=0.15	h=6	208	Fruit	d=0.45	h=8
87	Hawthorn	d=0.15	h=6	209	Oak	d=0.75	h=15
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89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=12
90	Oak	d=0.55	h=15	212	Maple	d=0.2	h=8
91	Oak	d=0.5	h=15	213	Maple	d=0.2	h=8
92	Oak	d=0.5	h=15	214	Sweet chestnut	d=0.2	h=10
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94	Oak	d=0.65	h=15	216	Maple	d=0.2	h=8
95	Oak	d=0.65	h=15	217	Maple	d=0.2	h=8
96	Oak	d=0.75	h=15	218	Sweet chestnut	d=0.2	h=10
97	Unknown	d=0.2	h=9	219	Sweet chestnut	d=0.15	h=8
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100	Oak	d=0.45	h=15	222	Maple	d=0.15	h=8
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102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8
103	Oak	d=0.3	h=10	225	Maple	d=0.2	h=9
104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7
105	Oak	d=0.65	h=15	227	Maple	d=0.15	h=7
106	Oak	d=0.25	h=10	228	Maple	d=0.15	h=7
107	Oak	d=0.25	h=10	229	Maple	d=0.25	h=8
108	Oak	d=0.25	h=10	230	Fruit	d=0.25	h=8
109	Ash	d=0.3	h=12	231	Ash	d=0.35	h=12
110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9
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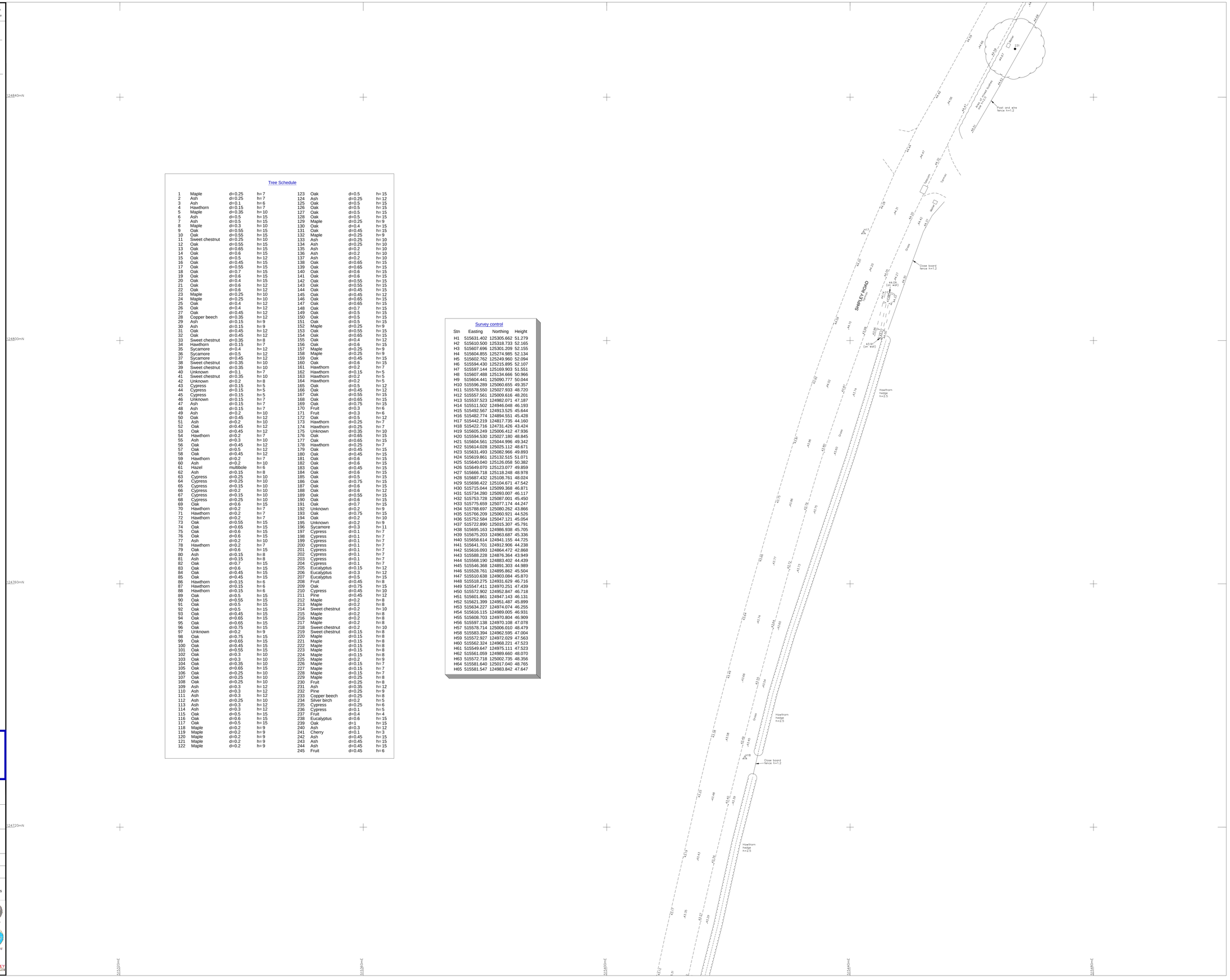
121	Maple	d=0.2	h=9	243	Ash	d=0.45	h=15
122	Maple	d=0.2	h=9	244	Ash	d=0.45	h=15
				245	Fruit	d=0.45	h=6

Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.816	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.048	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.804	46.909
H56	515597.138	124970.108	47.078
H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647



Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
Power line
Banking
Contour line 6·4
Survey Station H5
Gate
Level 115.28
Ordnance Survey Benchmark OSBM
Foul Drainage 100mm FW MH CL 117.10 IL 116.75
Storm Drainage 100mm SW MH CL 117.10 IL 116.75

Abbreviations

Animal Sett	Sett
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trial Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

Metres
0 5 10
Scale

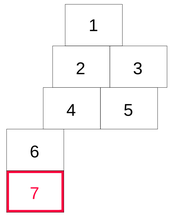
Notes

All trees are identified where possible.
Species, spread, height and girth are indicative only.

Drainage has been surveyed where found, and traced where possible.

Eaves and ridge heights of surrounding buildings have been surveyed where possible.

Sheet Layout



HOOK SURVEY PARTNERSHIP
Land & Building Surveyors
www.hooksurvey.com

Project :
Woodfords, Shipley Road,
Southwater, RH13 9BG

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S19/7188	S19/7188/07	-
Scale : 1:200	Date : July 2019	Drawn by : D.S.

Grid & Levels related to :
Ordnance Survey (OSGB36) coordinate system and level data defined by Geoid model OSTN15, based around 2 survey stations H1 & H2 with a scale factor of 1.00000

Head Office
Unit 1, Bybow Farm
Orchard Way
Dartford, Kent
DA2 7ER
Email > mail@hooksurvey.com
Tel > 01322 277221

Midlands Office
42 Hanson Avenue
Shipston-on-Stour
Warwickshire
CV36 4HS
Email > midlands@hooksurvey.com
Tel > 01608 523118

www.hooksurvey.com

Registered IPI-TRC

Chartered Surveyors

@hooksurvey

THE SURVEY ASSOCIATION

Tree Schedule

1	Maple	d=0.25	h= 7	123	Oak	d=0.5	h= 15
2	Ash	d=0.25	h= 7	124	Ash	d=0.25	h= 12
3	Ash	d=0.1	h= 6	125	Oak	d=0.5	h= 15
4	Hawthorn	d=0.15	h= 7	126	Oak	d=0.5	h= 15
5	Maple	d=0.35	h= 10	127	Oak	d=0.5	h= 15
6	Ash	d=0.5	h= 15	128	Oak	d=0.5	h= 15
7	Ash	d=0.5	h= 15	129	Maple	d=0.25	h= 9
8	Maple	d=0.3	h= 10	130	Oak	d=0.4	h= 15
9	Oak	d=0.55	h= 15	131	Oak	d=0.45	h= 15
10	Oak	d=0.55	h= 15	132	Maple	d=0.25	h= 9
11	Sweet chestnut	d=0.25	h= 10	133	Ash	d=0.25	h= 10
12	Oak	d=0.55	h= 15	134	Ash	d=0.25	h= 10
13	Oak	d=0.65	h= 15	135	Ash	d=0.2	h= 10
14	Oak	d=0.6	h= 15	136	Ash	d=0.2	h= 10
15	Oak	d=0.5	h= 12	137	Ash	d=0.2	h= 10
16	Oak	d=0.45	h= 15	138	Oak	d=0.65	h= 15
17	Oak	d=0.55	h= 15	139	Oak	d=0.65	h= 15
18	Oak	d=0.7	h= 15	140	Oak	d=0.6	h= 15
19	Oak	d=0.6	h= 15	141	Oak	d=0.6	h= 15
20	Oak	d=0.4	h= 15	142	Oak	d=0.55	h= 15
21	Oak	d=0.6	h= 12	143	Oak	d=0.55	h= 15
22	Oak	d=0.6	h= 12	144	Oak	d=0.45	h= 15
23	Maple	d=0.25	h= 10	145	Oak	d=0.45	h= 12
24	Maple	d=0.25	h= 10	146	Oak	d=0.65	h= 15
25	Oak	d=0.4	h= 12	147	Oak	d=0.65	h= 15
26	Oak	d=0.4	h= 12	148	Oak	d=0.7	h= 15
27	Oak	d=0.45	h= 12	149	Oak	d=0.5	h= 15
28	Copper beech	d=0.35	h= 12	150	Oak	d=0.5	h= 15
29	Ash	d=0.15	h= 9	151	Oak	d=0.5	h= 15
30	Ash	d=0.15	h= 9	152	Maple	d=0.25	h= 9
31	Oak	d=0.45	h= 12	153	Oak	d=0.55	h= 15
32	Oak	d=0.45	h= 12	154	Oak	d=0.65	h= 15
33	Sweet chestnut	d=0.35	h= 8	155	Oak	d=0.4	h= 12
34	Hawthorn	d=0.15	h= 7	156	Oak	d=0.6	h= 15
35	Sycamore	d=0.4	h= 12	157	Maple	d=0.25	h= 9
36	Sycamore	d=0.5	h= 12	158	Maple	d=0.25	h= 9
37	Sycamore	d=0.45	h= 12	159	Oak	d=0.45	h= 15
38	Sweet chestnut	d=0.35	h= 10	160	Oak	d=0.6	h= 15
39	Sweet chestnut	d=0.35	h= 10	161	Hawthorn	d=0.2	h= 7
40	Unknown	d=0.1	h= 7	162	Hawthorn	d=0.15	h= 5
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42	Unknown	d=0.2	h= 8	164	Hawthorn	d=0.2	h= 5
43	Cypress	d=0.15	h= 5	165	Oak	d=0.5	h= 12
44	Cypress	d=0.15	h= 5	166	Oak	d=0.45	h= 12
45	Cypress	d=0.15	h= 5	167	Oak	d=0.55	h= 15
46	Unknown	d=0.15	h= 7	168	Oak	d=0.65	h= 15
47	Ash	d=0.15	h= 7	169	Oak	d=0.75	h= 15
48	Ash	d=0.15	h= 7	170	Fruit	d=0.3	h= 6
49	Ash	d=0.2	h= 10	171	Fruit	d=0.3	h= 6
50	Oak	d=0.45	h= 12	172	Oak	d=0.5	h= 12
51	Ash	d=0.2	h= 10	173	Hawthorn	d=0.25	h= 7
52	Oak	d=0.45	h= 12	174	Hawthorn	d=0.25	h= 7
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54	Hawthorn	d=0.2	h= 7	176	Oak	d=0.65	h= 15
55	Ash	d=0.3	h= 10	177	Oak	d=0.65	h= 15
56	Oak	d=0.45	h= 12	178	Hawthorn	d=0.25	h= 7
57	Oak	d=0.5	h= 12	179	Oak	d=0.45	h= 15
58	Oak	d=0.45	h= 12	180	Oak	d=0.45	h= 15
59	Hawthorn	d=0.2	h= 7	181	Oak	d=0.6	h= 15
60	Ash	d=0.2	h= 10	182	Oak	d=0.6	h= 15
61	Hazel	multibole	h= 6	183	Oak	d=0.45	h= 15
62	Ash	d=0.15	h= 8	184	Oak	d=0.6	h= 15
63	Cypress	d=0.25	h= 10	185	Oak	d=0.5	h= 15
64	Cypress	d=0.25	h= 10	186	Oak	d=0.75	h= 15
65	Cypress	d=0.15	h= 10	187	Oak	d=0.6	h= 15
66	Cypress	d=0.2	h= 10	188	Oak	d=0.6	h= 12
67	Cypress	d=0.15	h= 10	189	Oak	d=0.55	h= 15
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69	Oak	d=0.6	h= 15	191	Oak	d=0.7	h= 15
70	Hawthorn	d=0.2	h= 7	192	Unknown	d=0.2	h= 9
71	Hawthorn	d=0.2	h= 7	193	Oak	d=0.75	h= 15
72	Hawthorn	d=0.2	h= 7	194	Oak	d=0.2	h= 10
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74	Oak	d=0.65	h= 15	196	Sycamore	d=0.3	h= 11
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77	Ash	d=0.2	h= 10	199	Cypress	d=0.1	h= 7
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79	Oak	d=0.6	h= 15	201	Cypress	d=0.1	h= 7
80	Ash	d=0.15	h= 8	202	Cypress	d=0.1	h= 7
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82	Oak	d=0.7	h= 15	204	Cypress	d=0.1	h= 7
83	Oak	d=0.6	h= 15	205	Eucalyptus	d=0.15	h= 12
84	Oak	d=0.45	h= 15	206	Eucalyptus	d=0.3	h= 12
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86	Hawthorn	d=0.15	h= 6	208	Fruit	d=0.45	h= 8
87	Hawthorn	d=0.15	h= 6	209	Oak	d=0.75	h= 15
88	Hawthorn	d=0.15	h= 6	210	Cypress	d=0.45	h= 10
89	Oak	d=0.5	h= 15	211	Pine	d=0.45	h= 12
90	Oak	d=0.55	h= 15	212	Maple	d=0.2	h= 8
91	Oak	d=0.5	h= 15	213	Maple	d=0.2	h= 8
92	Oak	d=0.5	h= 15	214	Sweet chestnut	d=0.2	h= 10
93	Oak	d=0.45	h= 15	215	Maple	d=0.2	h= 8
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97	Unknown	d=0.2	h= 9	219	Sweet chestnut	d=0.15	h= 8
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117	Oak	d=0.5	h= 15	239	Oak	d=1	h= 15
118	Maple	d=0.2	h= 9	240	Ash	d=0.3	h= 12
119	Maple	d=0.2	h= 9	241	Cherry	d=0.1	h= 3
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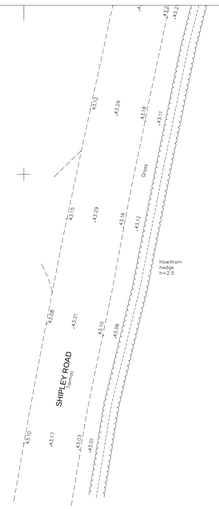
121	Maple	d=0.2	h= 9	243	Ash	d=0.45	h= 15
122	Maple	d=0.2	h= 9	244	Ash	d=0.45	h= 15
				245	Fruit	d=0.45	h= 6

Survey control

Stn	Easting	Northing	Height
H1	515631.402	125305.662	51.279
H2	515610.500	125318.733	52.165
H3	515607.696	125301.209	52.155
H4	515604.855	125274.985	52.134
H5	515602.762	125249.960	52.094
H6	515594.430	125215.895	52.107
H7	515597.144	125169.903	51.551
H8	515607.488	125134.666	50.966
H9	515604.441	125090.777	50.044
H10	515596.289	125060.655	49.357
H11	515578.550	125027.933	48.720
H12	515557.561	125009.616	48.201
H13	515537.523	124982.071	47.187
H14	515511.502	124946.048	46.193
H15	515492.567	124913.525	45.644
H16	515482.774	124894.551	45.428
H17	515442.219	124817.735	44.160
H18	515422.716	124731.426	43.424
H19	515605.249	125006.412	47.936
H20	515594.530	125027.180	48.845
H21	515604.561	125044.996	49.342
H22	515614.028	125025.112	48.671
H23	515631.493	125082.966	49.893
H24	515619.861	125132.515	51.071
H25	515640.040	125126.058	50.382
H26	515649.070	125123.077	49.859
H27	515666.718	125118.248	48.978
H28	515687.432	125108.761	48.024
H29	515698.422	125104.671	47.542
H30	515715.044	125099.368	46.871
H31	515734.280	125093.007	46.117
H32	515753.728	125087.001	45.450
H33	515775.659	125077.174	44.247
H34	515788.697	125080.262	43.866
H35	515766.209	125060.921	44.526
H36	515752.584	125047.121	45.054
H37	515722.890	125015.307	45.791
H38	515695.163	124986.938	45.705
H39	515675.203	124963.687	45.336
H40	515658.614	124941.155	44.725
H41	515641.701	124912.906	44.238
H42	515616.093	124864.472	42.868
H43	515588.228	124876.364	43.949
H44	515568.190	124883.402	44.439
H45	515546.368	124891.303	44.989
H46	515528.761	124895.862	45.504
H47	515510.638	124903.084	45.870
H48	515518.275	124931.629	46.716
H49	515547.411	124970.251	47.439
H50	515572.902	124952.847	46.718
H51	515601.861	124947.143	46.131
H52	515621.399	124951.487	45.899
H53	515634.227	124974.074	46.255
H54	515616.115	124989.005	46.931
H55	515608.703	124970.804	46.909
H56	515597.138	124970.108	47.078
H57	515578.714	125006.010	48.479
H58	515583.394	124962.595	47.004
H59	515572.927	124972.029	47.563
H60	515562.324	124968.221	47.523
H61	515549.647	124975.111	47.523
H62	515561.059	124989.660	48.070
H63	515572.718	125002.735	48.356
H64	515581.640	125017.040	48.765
H65	515581.547	124983.842	47.647



124680mN
124640mN
124600mN
124560mN
515320mE
515360mE
515400mE
515440mE
515480mE

Appendix D

BGS Borehole Records

Borehole Scan Viewer

BGS ID: 578383 : BGS Reference: TQ12NE63 British National Grid (27700) : 516160,125210

<< < **Prev** Page 1 of 1 **Next** > >>

Report an issue with this borehole

GROUND EXPLORATIONS Ltd.
68/75 Alpha Street, Slough, Bucks., SL1 1QX

Contract: Southwater Bypass TQ12NE/63
Location: A24 south of Cripplegate Windmill
Report No: 5949/BW 1616. 2521

Borehole No: 54
Started: 26.3.73.
Completed: 26.3.73.
Diameter: 150 mm
Ground Level: O.D. 48·67 m

Description	Legend	Thickness m	Depth m	Level m	Sample Type	Sample No	Depth m	C'b (N)	Mv/Cv (G/Sa/Si)	Water
Top-soil		0·3	0·3	48·4	D	5103	0·3			
Mottled brown and light grey clay		0·9			D B	5104 9729	0·6 0·8			
			1·2	47·5	U	5105	1·1			
Black, brown and grey shaly clay		0·3	1·5	47·2	D	5106	1·5			
Brown and grey mottled clay		0·9			D U	5107 9281	1·8 2·1			
			2·4	46·3						
Brown and grey mottled friable clay with crystals		0·6			D	5108	2·4			
			3·0	45·7						
Olive clay-shale with crystals		2·2			D	5110	3·4			
					U	5111	4·1			
					U	5115	4·7			
			5·2	43·5						WE Nil/3·0/26.3.

Borehole Scan Viewer

BGS ID: 578387 : BGS Reference: TQ12NE67 British National Grid (27700) : 516250,125010

<< < **Prev** Page 1 of 1 **Next** > >>

Report an issue with this borehole

GROUND EXPLORATIONS Ltd.
68/76 Alpha Street, Slough, Bucks., SL1 1QX

Contract: Southwater bypass TQ12NE/67
Location: A24 north of Vincents Cottages
Report No: 5949/BW 1625, 2501

Borehole No: 60
Started: 28.3.73.
Completed: 28.3.73.
Diameter: 150 mm
Ground Level: O.D. 47·83 m

Description	Legend	Thickness m	Depth m	Level m	Sample Type	Sample No	Depth m	C/O (N)	M_v/C_v (C/Sa/Si)	Water
Topsoil		0·3	0·3	47·5	D	5124	0·3			
Brown and light grey mottled clay with rootlets and plant stems		1·1	1·4	46·4	D U	5125 5126	0·6 1·1			
Brown and blue mottled clay		0·7	2·1	45·7	D	5127	1·8			
Brown-blue mottled friable clay with crystals		0·6	2·7	45·1	D U	5128 5129	2·4 2·6			
Brown friable clay-shale		0·3	3·0	44·8	D	5130	3·0			WE Nil/1·5/28.3.

Useful links

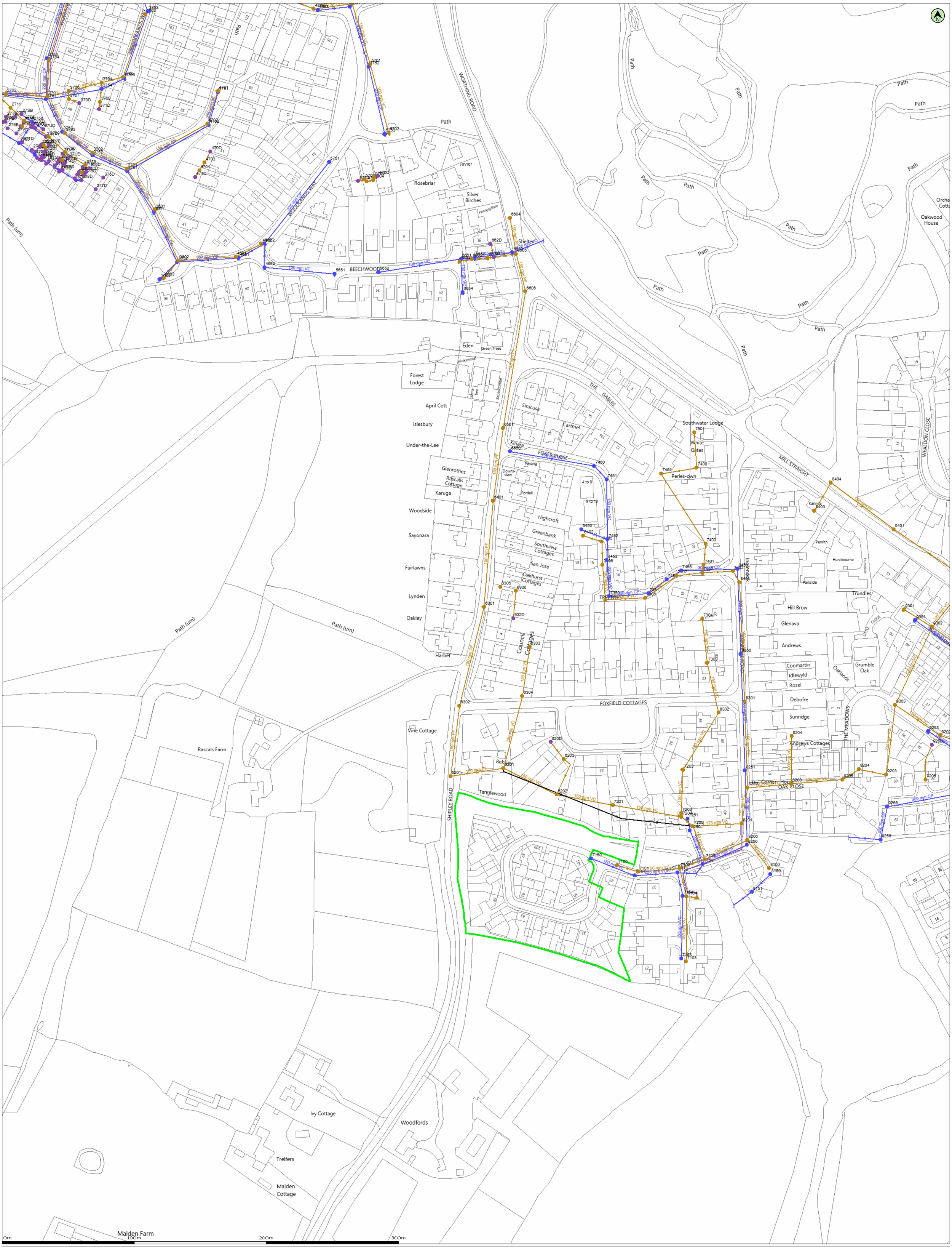
About BGS

Policies & legal

Privacy policy

Appendix E

Southern Water records



Data updated: 21/09/20

Scale: 1:1250
Map Centre: 515619,125372

Date: 02/10/20
Our Ref: 443855 - 1

Wastewater Plan A1
Powered by digdat

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
WWTW Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

vholdo@motion.co.uk

southwater

WATER for LIFE from Southern Water.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2701	F	50.36	48.20	
2702	F	50.88	48.00	
2704	F	51.54	49.36	
2705	F	0.00	0.00	
2707	F	0.00	0.00	
2708	F	0.00	0.00	
2709	F	0.00	0.00	
270D	F	0.00	0.00	
2710	F	0.00	0.00	
2711	F	0.00	0.00	
271D	F	0.00	0.00	
272D	F	0.00	0.00	
273D	F	0.00	0.00	
274D	F	0.00	0.00	
27BD	F	0.00	0.00	
3601	F	52.77	50.58	
3602	F	54.99	52.95	
3603	F	54.77	53.48	
3701	F	51.80	49.77	
3702	F	50.80	49.12	
3703	F	50.21	48.59	
3704	F	0.00	0.00	
3705	F	52.30	50.48	
3706	F	0.00	0.00	
3707	F	0.00	0.00	
3708	F	0.00	0.00	
370D	F	0.00	0.00	
3712	F	0.00	0.00	
3718	F	0.00	0.00	
3719	F	0.00	0.00	
371D	F	0.00	0.00	
3720	F	0.00	0.00	
372D	F	0.00	0.00	
373D	F	0.00	0.00	
374D	F	0.00	0.00	
37AD	F	0.00	0.00	
37BD	F	0.00	0.00	
37CD	F	0.00	0.00	
37DD	F	0.00	0.00	
37ED	F	0.00	0.00	
3802	F	54.38	52.19	
4601	F	56.86	55.04	
4602	F	58.10	56.32	
4701	F	54.50	52.63	
4702	F	53.90	52.09	
4703	F	0.00	0.00	
4704	F	0.00	0.00	
470D	F	0.00	0.00	
471D	F	0.00	0.00	
4803	F	55.06	50.95	
5201	F	52.14	0.00	
5701	F	56.32	53.91	
5702	F	56.91	54.64	
5703	F	0.00	0.00	
5704	F	0.00	0.00	
5705	F	0.00	0.00	
5706	F	0.00	0.00	
570D	F	0.00	0.00	
571D	F	0.00	0.00	
5801	F	54.67	50.72	
6201	F	50.21	49.22	
6202	F	48.09	47.44	
6203	F	0.00	0.00	
620D	F	0.00	0.00	
6301	F	53.12	51.61	
6302	F	52.10	50.35	
6303	F	0.00	0.00	
6304	F	50.94	50.19	
6305	F	0.00	0.00	
6306	F	0.00	0.00	
632D	F	0.00	0.00	
6401	F	56.61	52.05	
6402	F	53.47	52.97	
6501	F	57.15	52.56	
6601	F	56.84	54.69	
6602	F	56.58	54.42	
6603	F	56.38	53.84	
6604	F	54.60	53.28	
6605	F	55.05	53.08	
6606	F	55.15	0.00	
661D	F	0.00	0.00	
662D	F	0.00	0.00	
7100	F	46.50	44.56	
7101	F	45.72	43.81	
7102	F	44.26	41.52	
7103	F	44.84	42.69	
7104	F	44.34	41.41	
7105	F	44.08	41.78	
7201	F	47.27	46.57	
7202	F	46.32	45.60	
7203	F	0.00	0.00	
7204	F	46.29	45.53	
7205	F	46.51	45.35	
7303	F	49.99	48.27	
7304	F	51.27	50.06	
7305	F	52.58	51.40	
7306	F	52.81	51.17	
7401	F	52.84	51.39	
7402	F	52.60	50.79	
7403	F	0.00	0.00	
7404	F	0.00	0.00	
7405	F	53.31	52.45	
7406	F	53.58	51.62	
7407	F	52.87	50.94	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7501	F	0.00	0.00	
8100	F	44.64	43.21	
8201	F	46.35	45.26	
8202	F	46.95	45.16	
8203	F	47.15	0.00	
8204	F	0.00	0.00	
8205	F	0.00	0.00	
8206	F	45.88	42.91	
8301	F	48.98	47.59	
8302	F	0.00	0.00	
8401	F	51.94	50.51	
8402	F	52.18	50.62	
8403	F	51.69	50.00	
8404	F	51.11	49.66	
9202	F	49.19	46.80	
9203	F	48.03	0.00	
9204	F	0.00	0.00	
9205	F	0.00	0.00	
920D	F	0.00	0.00	
9301	F	49.27	47.53	
9302	F	49.42	44.52	
9303	F	49.49	44.74	
9401	F	0.00	0.00	
2751	S	50.38	48.68	
2753	S	51.59	50.03	
2754	S	0.00	0.00	
2755	S	0.00	0.00	
2756	S	0.00	0.00	
275B	S	0.00	0.00	
275D	S	0.00	0.00	
276B	S	0.00	0.00	
276D	S	0.00	0.00	
277B	S	0.00	0.00	
277D	S	0.00	0.00	
278D	S	0.00	0.00	
279D	S	0.00	0.00	
27PB	S	0.00	0.00	
27PD	S	0.00	0.00	
27QD	S	0.00	0.00	
27RD	S	0.00	0.00	
27SB	S	0.00	0.00	
27SD	S	0.00	0.00	
27TB	S	0.00	0.00	
27TD	S	0.00	0.00	
27UB	S	0.00	0.00	
27UD	S	0.00	0.00	
27VB	S	0.00	0.00	
27VD	S	0.00	0.00	
27WD	S	0.00	0.00	
27XD	S	0.00	0.00	
27YD	S	0.00	0.00	
27ZD	S	0.00	0.00	
3651	S	52.84	50.98	
3652	S	55.00	53.36	
3653	S	54.71	53.66	
3751	S	51.81	50.23	
3752	S	50.89	49.53	
3753	S	50.21	48.98	
3754	S	51.81	49.99	
3755	S	52.29	50.79	
3756	S	0.00	0.00	
375D	S	0.00	0.00	
376D	S	0.00	0.00	
377D	S	0.00	0.00	
378D	S	0.00	0.00	
379D	S	0.00	0.00	
37PD	S	0.00	0.00	
37QD	S	0.00	0.00	
37RD	S	0.00	0.00	
37SD	S	0.00	0.00	
37TD	S	0.00	0.00	
37UD	S	0.00	0.00	
37VD	S	0.00	0.00	
3853	S	54.46	52.58	
4651	S	56.86	55.52	
4652	S	58.15	56.71	
4653	S	57.61	56.27	
4751	S	54.49	52.93	
4752	S	53.91	52.45	
4853	S	55.04	53.18	
5651	S	59.01	57.75	
5652	S	58.46	56.52	
5751	S	58.28	56.91	
5752	S	56.39	54.28	
5753	S	56.96	55.03	
5851	S	54.72	53.42	
6450	S	53.57	52.76	
6550	S	55.94	54.32	
6651	S	56.81	54.99	
6652	S	56.44	54.51	
6653	S	55.18	53.35	
6654	S	56.97	55.46	
7150	S	47.50	46.01	
7151	S	45.81	44.00	
7152	S	44.28	42.38	
7153	S	44.97	42.73	
7154	S	44.40	42.55	
7155	S	44.02	42.57	
7250	S	45.66	43.53	
7251	S	46.13	44.94	
7350	S	52.65	50.90	
7351	S	52.85	50.66	
7450	S	54.30	53.85	
7451	S	53.88	53.43	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7453	S	52.62	51.42	
7454	S	52.94	50.49	
7455	S	52.86	50.39	
8150	S	42.98	44.41	
8151	S	0.00	0.00	
8250	S	45.67	44.05	
8251	S	45.72	45.65	
8350	S	50.34	48.71	
8450	S	52.22	50.07	
9253	S	49.24	46.81	
9255	S	0.00	0.00	
9256	S	0.00	0.00	
9351	S	49.40	47.92	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

| | | |

Appendix F

EA Product 4

Flood map for planning

Your reference	Location (easting/northing)	Created
product 4	**515721/125177**	**23 Nov 2020 17:39**

Your selected location is in flood zone 1, an area with a low probability of flooding.

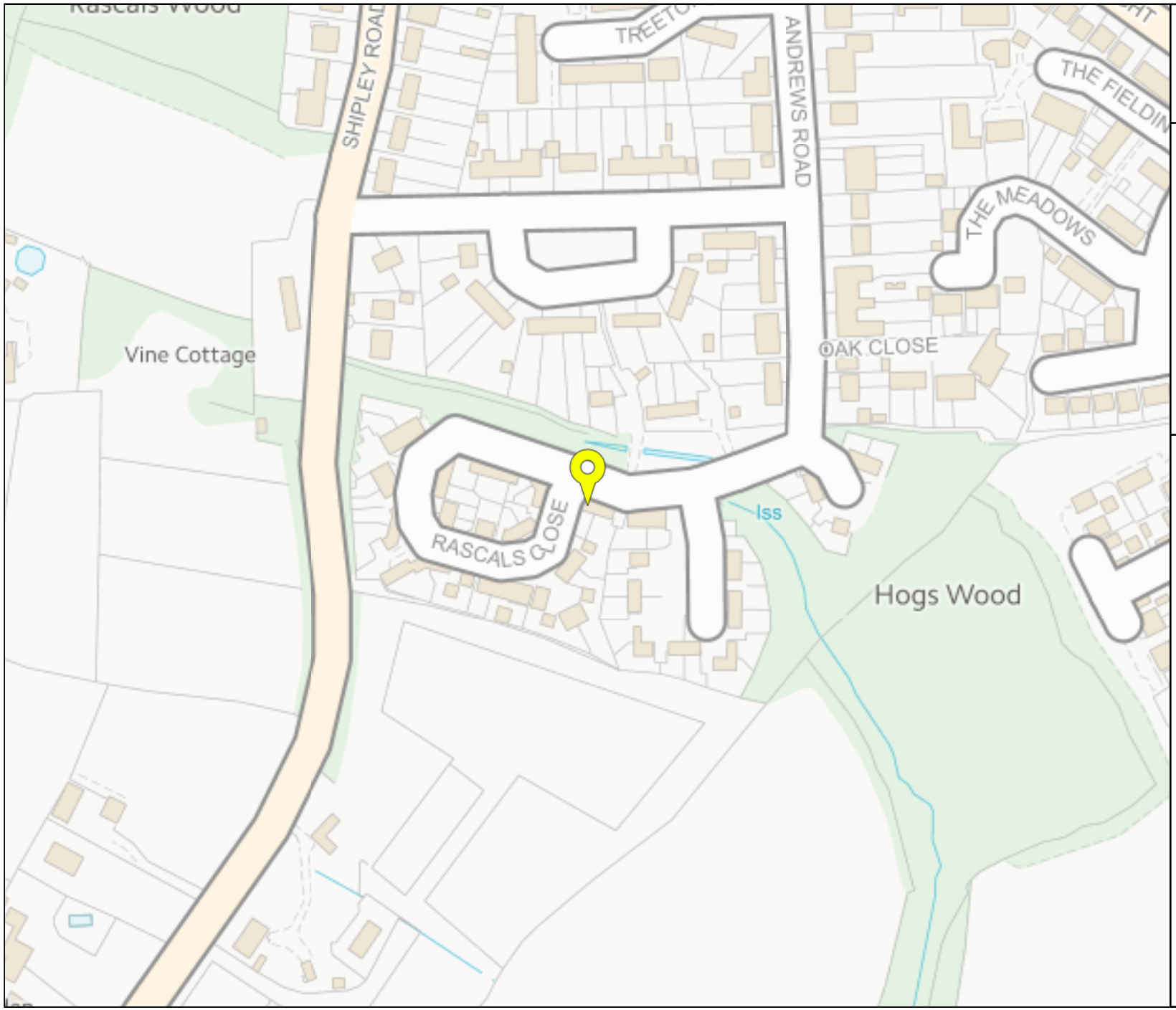
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
product 4

Location (easting/northing)
515721/125177

Scale
1:2500

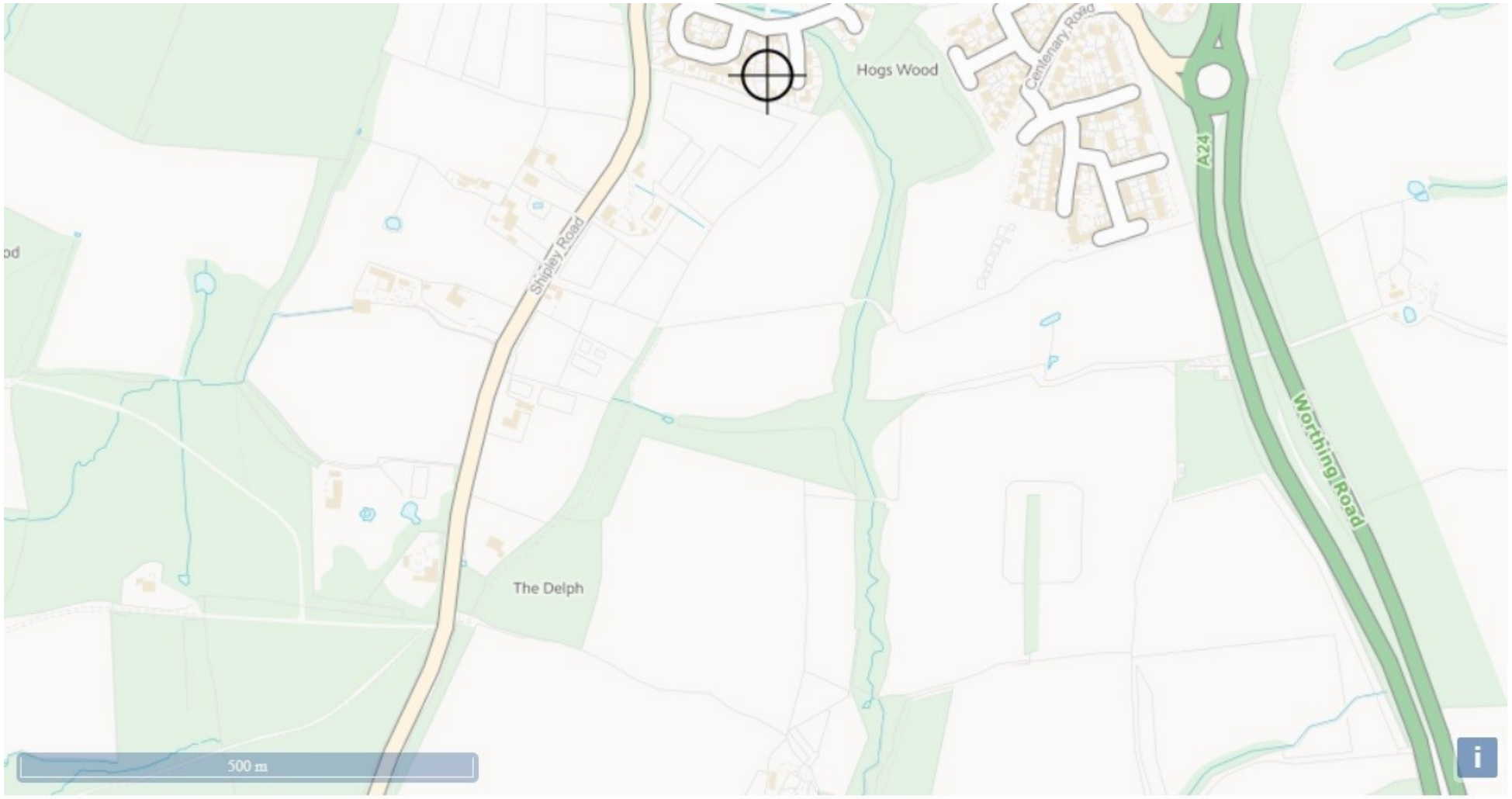
Created
23 Nov 2020 17:39

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix G

Surface Water Flood Maps



Extent of flooding from rivers or the sea

High Medium Low Very low Location you selected

Appendix H

QBar Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	victoria berg-holdo
Site name:	Woodfords
Site location:	Woodfords

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

Site Details

Latitude:	51.01324° N
Longitude:	0.35249° W
Reference:	2902456036
Date:	Oct 02 2020 16:26

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1

Methodology

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

Soil characteristics

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

Hydrological characteristics

	Default	Edited
SAAR (mm):	776	776
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

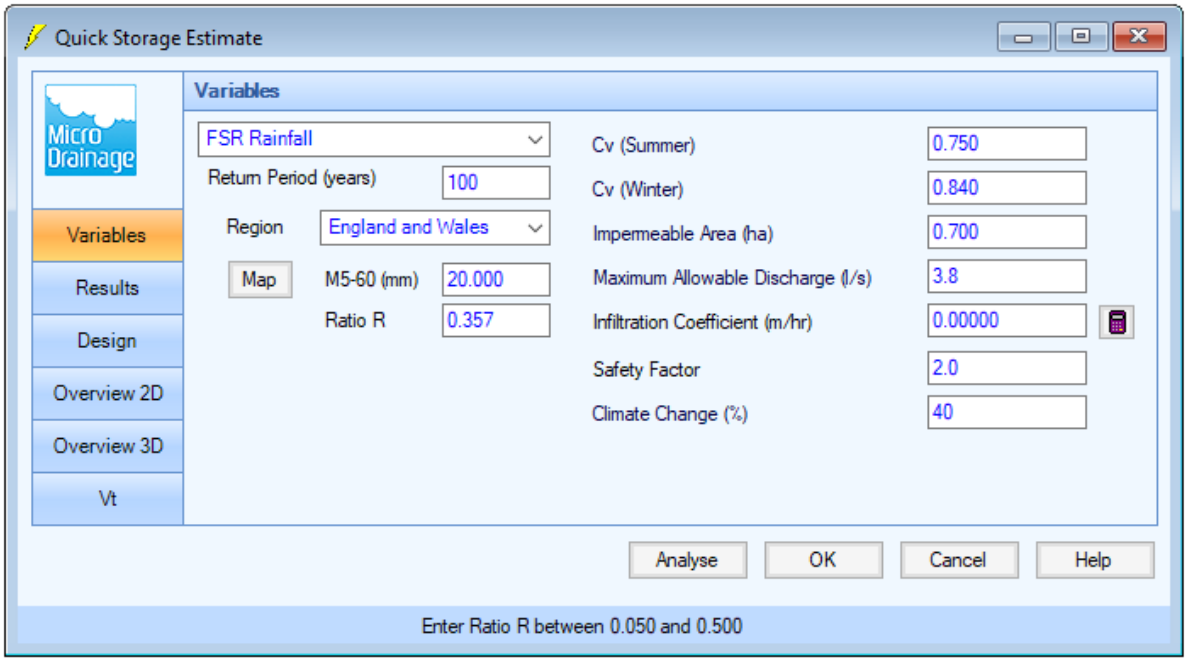
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

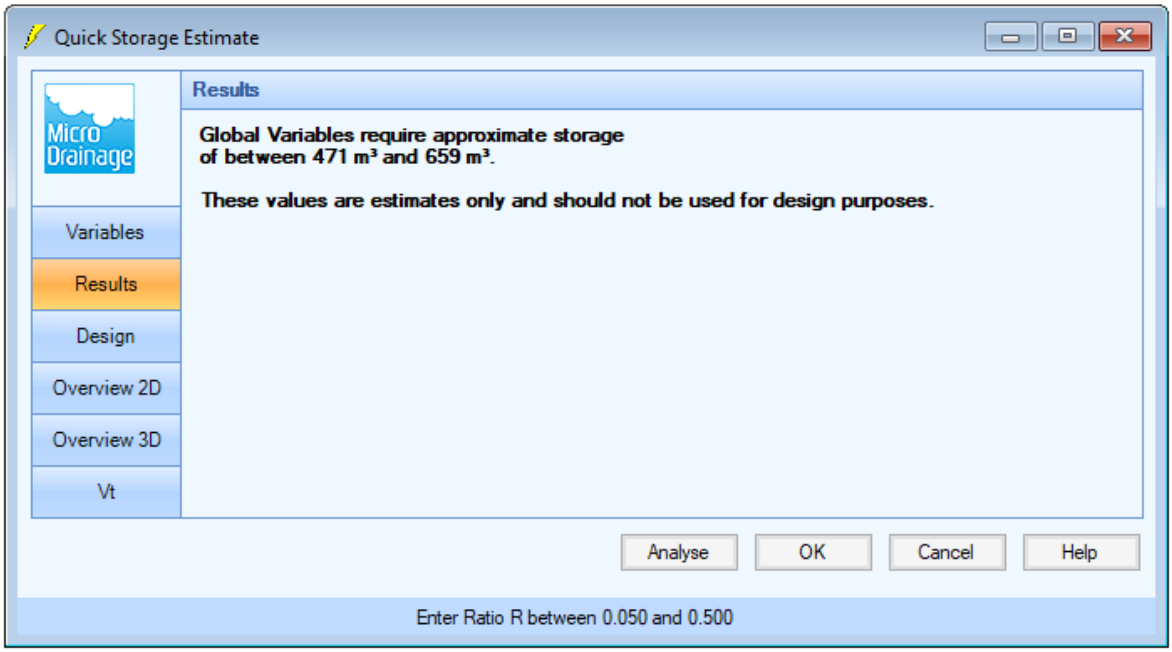
Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	5.45	5.45
1 in 1 year (l/s):	4.63	4.63
1 in 30 years (l/s):	12.53	12.53
1 in 100 year (l/s):	17.37	17.37
1 in 200 years (l/s):	20.37	20.37

Appendix I

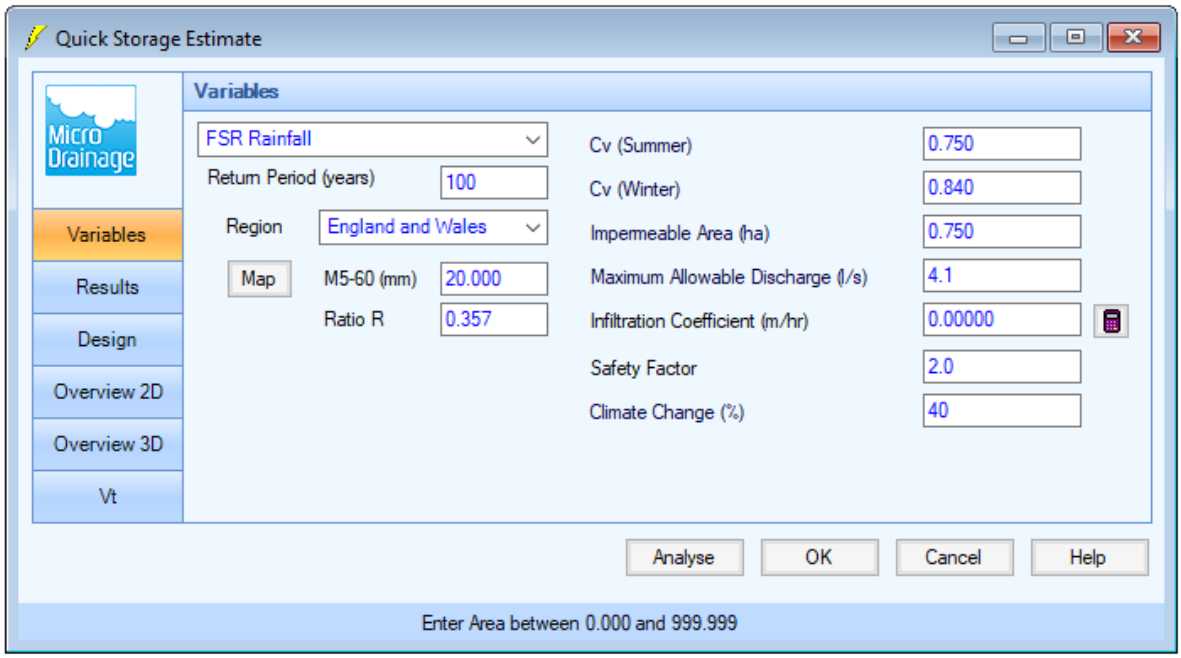
MicroDrainage model results Catchment A

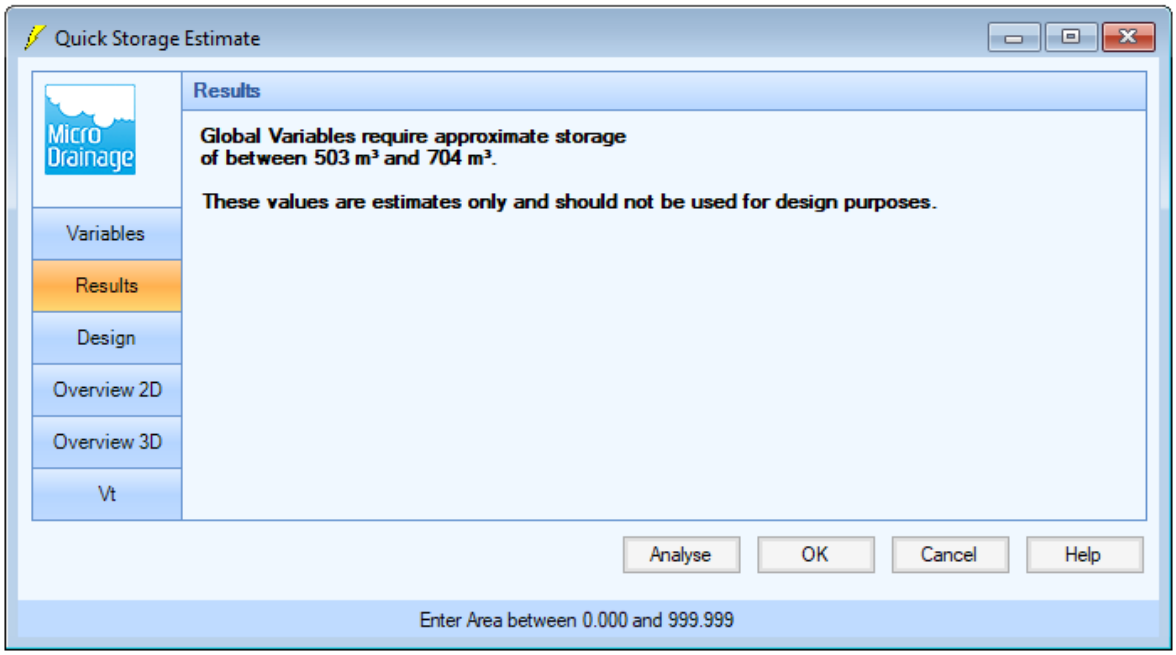

Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years)
100
Region
England and Wales
Map
M5-60 (mm)
20.000
Ratio R
0.357
Cv (Summer)
0.750
Cv (Winter)
0.840
Impermeable Area (ha)
0.700
Maximum Allowable Discharge (l/s)
3.8
Infiltration Coefficient (m/hr)
0.00000
Safety Factor
2.0
Climate Change (%)
40
Analyse
OK
Cancel
Help
Enter Ratio R between 0.050 and 0.500


Quick Storage Estimate
Micro Drainage
Results
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Global Variables require approximate storage
of between 471 m³ and 659 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Ratio R between 0.050 and 0.500

Appendix J

MicroDrainage model results Catchment B


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years)
100
Region
England and Wales
Map
M5-60 (mm)
20.000
Ratio R
0.357
Cv (Summer)
0.750
Cv (Winter)
0.840
Impermeable Area (ha)
0.750
Maximum Allowable Discharge (l/s)
4.1
Infiltration Coefficient (m/hr)
0.00000
Safety Factor
2.0
Climate Change (%)
40
Analyse
OK
Cancel
Help
Enter Area between 0.000 and 999.999


Quick Storage Estimate
Micro Drainage
Results
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Global Variables require approximate storage
of between 503 m³ and 704 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Area between 0.000 and 999.999

Appendix K

Drainage Strategy

Legend

- Proposed Permeable Paving - 450mm deep Type 4 Open Graded Sub-base, 30% Void Ratio [Total Volume: 203m³]
- Proposed Permeable Paving - 450mm Permavoid Storage Crates, 95% Void Ratio [Total Volume: 403m³]
- Proposed Attenuation Storage Tank - 400mm deep [Total Volume: 52m³]
- Proposed Attenuation Storage Tank - 800mm deep [Total Volume: 99m³]
- Proposed Surface Water Sewer
- Proposed Surface Water Manhole / Inspection Chamber
- Proposed Headwall
- Proposed Ponding Area - Refer to Main Drawing for Area Type
- Proposed Swale - 500mm deep [Total Volume: 144m³]

Total Storage Volume:
Catchment A: 624m³
Catchment B: 644m³
Overall Storage Volume: 1268m³

Rev	Revision Notes:	Drn	Chk	App	Date
D	Site Layout Updated	MH	PA	NJ	10/09/2021
C	Site layout updated	MH	VH	NJ	26/11/2020
B	Swale and LEAP area amended following comments	MH	NJ	NJ	24/11/2020
A	First Issue	MH	VH	NJ	20/11/2020

Drawing Status:
DRAFT
NOT FOR CONSTRUCTION

motion

84 North Street
Guildford
Surrey
GU1 4AU
01483 531300

9 Greyfriars Road
Reading
Berkshire
RG1 1NU
0118 206 2930

Golden Cross House
8 Duncannon Street
London
WC2N 4JF
020 7031 8141

www.motion.co.uk

Client:
reside.

Project:
Land East of Shipley Road, Southwater

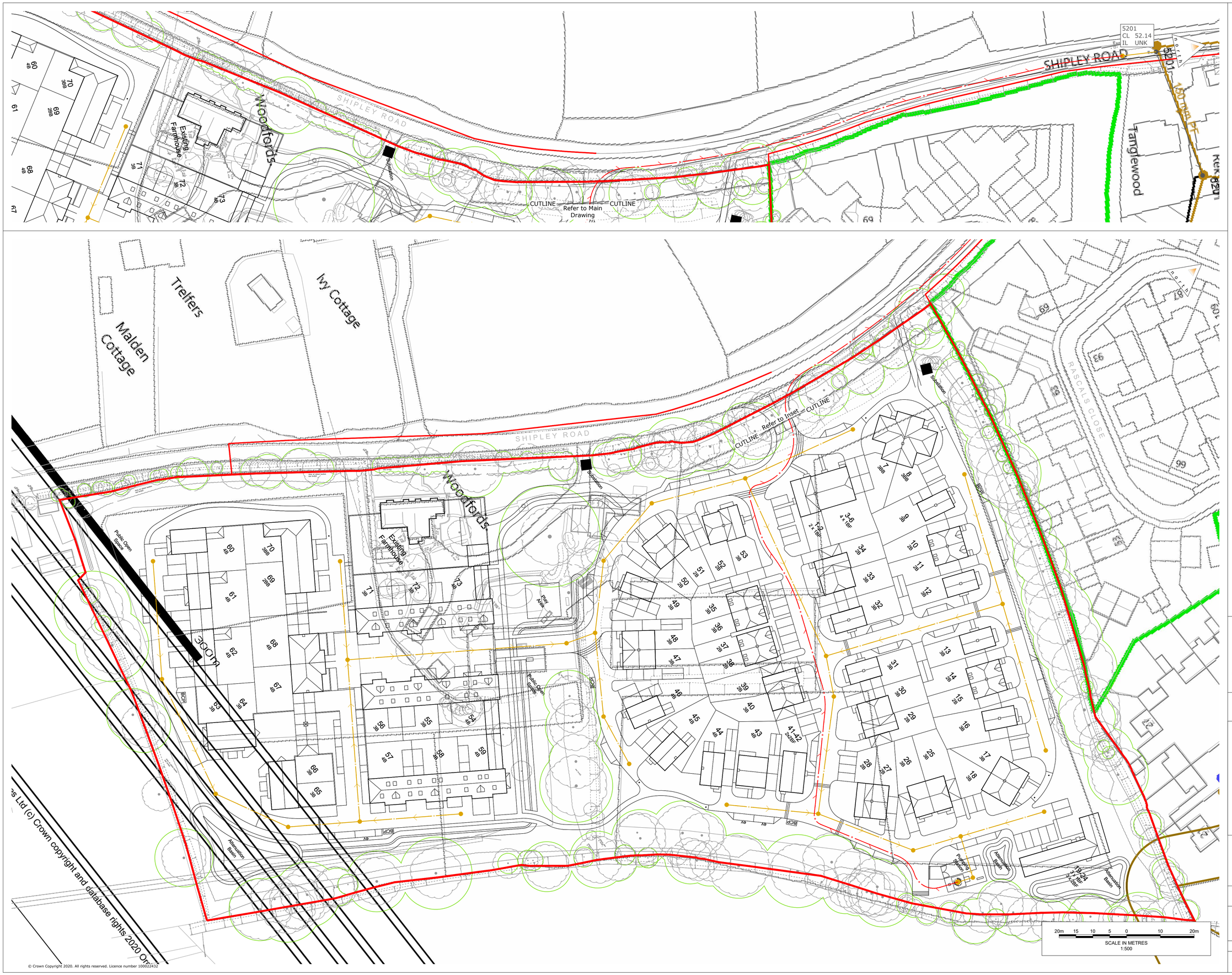
Title:
Outline Drainage Strategy

Scale: 1:500 | Size: A1 | Project No: 2007068

Drawing: 2007068-0500-01 | Revision: D

20m 15 10 5 0 10 20m
SCALE IN METRES
1:500

C:\Users\MatthewHands\Motion\Staffsite - Infrastructure\Indox 2007068\Drawings\2007068-0500-01 [Drainage Strategy].dwg



Legend

- Proposed Foul Sewer
- Proposed Foul Manhole / Inspection Chamber
- Proposed Foul Rising Main
- Existing Southern Water Foul Sewer

Revision Notes:	Drn	Chk	App	Date
B Site layout updated	MH	PA	NJ	13/09/2021
A First Issue	MH	VH	NJ	27/11/2020

Drawing Status:

DRAFT
NOT FOR CONSTRUCTION

motion

84 North Street
Guildford
Surrey
GU1 4AU
01483 531300

9 Greyfriars Road
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Berkshire
RG1 1NU
0118 206 2930

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8 Duncannon Street
London
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020 7031 8141

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Client:

reside.

Project:

Land East of Shipley Road, Southwater

Title:

Outline Foul Drainage Strategy

Scale: 1:500 | Size: A1 | Project No: 2007068

Drawing: 2007068-0500-03

Revision: B

Appendix L

Exceedance Plan

Legend

→ Exceedance Route - Flow Direction

▭ Exceedance Route - Storage Area

Revision Notes:		Drn	Chk	App	Date
C	Site layout updated	MH	PA	NJ	10/09/2021
B	Site layout updated	MH	VH	NJ	27/11/2020
A	First Issue	MH	VH	NJ	20/11/2020

Drawing Status:

DRAFT
NOT FOR CONSTRUCTION

motion

84 North Street
Guildford
Surrey
GU1 4AU

01483 531300

9 Greyfriars Road
Reading
Berkshire
RG1 1NU

0118 206 2930

Golden Cross House
8 Duncannon Street
London
WC2N 4JF

020 7031 8141

www.motion.co.uk

Client:

reside.

Project:
Land East of Shipley Road, Southwater

Title:
Outline Drainage Strategy
Exceedance Plan

Scale: 1:500
Size: A1
Project No: 2007068

Drawing:
2007068-0500-02

Revision:
C

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Appendix E

Eleanor Read
Flood Risk Management Officer
Highways, Transport and Planning,
Place Services

Eleanor.Read@westsussex.gov.uk
www.westsussex.gov.uk

Ground Floor
Northleigh
County Hall
Chichester
PO19 1RH
03302 227048

Dominic Cronin
The Hallmark Building
52-56 Leadenhall Street
London
EC3 5JE

25th April 2025

Dear Dominic,

WSCC-671906145 – Shipley Road, Horsham, RH13 9BQ

WSCC Flood Risk Management Team Level 2 Pre-Application Advice has been sought for a 1.83ha site in Southwater, Horsham District. The application will be reserved matters for 73 dwellings, with associated hard landscaping, access road and SuDS attenuation.

Following a meeting on 4th April 2025, we have the following comments to make:

1. We discussed the history of the site drainage wise, as well as changes to NPPF/PPG Flood risk and coastal change and calculation parameters which will need to be considered as part of this application.

2. In terms of the calculations discussion that occurred during the meeting, for this application, we'd support using a Cv value of 1 with reduced freeboard. Due to the reduced freeboard in the basins as a result of this, the exceedance plan must show flow directions from the basin, to ensure flood risk will not increase elsewhere or affect any vulnerable aspects of the site.

3. We can confirm that if Qbar is not viable when using Cv value 1, restricting to flow matching rates is acceptable. However, it is our preference that is single rate discharge is used. Long term storage should be included in the scenario where flow matching is used.

4. The watercourse within the site and the drain along the northern boundary will need a 3m easement from the top of both banks for maintenance purposes. It would be helpful if the watercourse and it's connection to the wider network is provided.

5. If proposing to connect to the ditch outside the red line boundary, we'll need third party agreement to this.

6. As discussed, construction drawings of the outfall should be provided, so we can let the applicant know whether an ordinary Watercourse Consent will be required.

7. The foul pumping station is in close proximity to the basin. This will need to be considered from both an adoption and surface water quality perspective.

8. When preparing the calculations, the following should be used as guidance (follow the full application type as they layout is being set as part of this reserved matters application): Surface Water Drainage Proforma

Yours sincerely,

Ellie Read and Natalie Biddulph
Flood Risk Management Team

SENT BY EMAIL ONLY

Documents reviewed for this letter and the meeting:

Outline Drainage Strategy by Motion, 10/09/2021, revision D
Presentation Layout by DHA Architecture, 14/03/2025
Proposed Drainage Strategy by Ardent, 09/04/2025, revision F

Appendix F

Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	FEH
Positively Drained Area (ha)	1.000
SAAR (mm)	767
Host	18
BFIHost	0.236
Region	7
QBar/QMed conversion factor	1.136
Betterment (%)	0
QMed (l/s)	6.7
QBar (l/s)	7.7

Load

Calc

Return Period (years)	Growth Factor	Q (l/s)
2	0.88	6.7
30	2.40	18.4
100	3.19	24.4

Appendix G

Surface Water Drainage Proforma

West Sussex County Council (WSCC) as Lead Local Flood Authority recommends this proforma is completed and submitted to support any planning application for a major development. The information contained in this form will be used by WSCC officers in their role as 'statutory consultee' on surface water drainage. The proforma should accompany the site-specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

1. Site Details

No.	Requirement	Answer	Application Type
1.1	Address including postcode	Shipley Road, Southwater, Horsham, RH13 9BQ	Outline & Full
1.2	OS grid reference (easting and northing)	515680, 125027	Outline & Full
1.3	Planning application reference	DC/21/2180	Outline & Full
1.4	Total site area (hectares)	3.7	Outline & Full
1.5	Pre-development use	Assumed for equestrian purposes	Outline & Full
1.6	Proposed design life	Yes	Outline & Full
1.7	Have agreements in principle for discharge been provided (where applicable)? (YES/NO)	Yes	
1.8	Topographic Survey Plan showing existing site layout, site levels and drainage system	YES	Outline & Full

2. Discharge Hierarchy/Methods of Discharge[1]

No.	Requirement	Answer	Application Type
2.1	Store rainwater for later use (reuse) (YES/NO)	NO	Full
2.2	Infiltration techniques such as soakaways, permeable paving, etc (YES/NO)	NO	Outline & Full
2.3	Hybrid (YES/NO)	NO	Outline & Full

[1] Runoff may be discharged via one or multiple methods.

west sussex county council

No.	Requirement	Answer	Application Type
2.4	Attenuation with restricted discharge to watercourse (YES/NO)	YES	Outline & Full
2.5	Attenuation with restricted discharge to surface water sewer (YES/NO)	NO	Outline & Full
2.6	Attenuation with restricted discharge to combined sewer (YES/NO)	NO	Outline & Full

3. Calculation Inputs

No.	Requirement	Answer	Application Type
3.1	Area within site which is drained by SuDS[2] (hectares)	1.67 ha	Outline & Full
3.2	Impermeable area drained pre-development[3] (hectares)	0.16 ha	Outline & Full
3.3	Impermeable area drained post-development[3] (hectares)	1.67 ha	Outline & Full
3.4	Urban Creep (hectares)	0.08 ha	Outline & Full
3.5	Climate change factor applied (1 in 30 and 1 in 100) (percentage)	40% for 1 in 30 and 45% for 1 in 100	Outline & Full

4. Infiltration Feasibility/Ground Investigations

No.	Requirement	Answer	Application Type
4.1	Has winter groundwater monitoring and infiltration been undertaken? (YES/NO)	Groundwater monitoring was encountered but no infiltration tests were taken.	Outline & Full
4.2	Period of winter groundwater monitoring (from/to)	SI states "towards the end of a particularly dry winter"	Outline & Full
4.3	Depth to highest recorded groundwater level (mAOD)	SI states "No groundwater was encountered"	Full
4.4	Infiltration rate	No infiltration tests were taken	Outline & Full

[2] Impermeable area should be measured pre and post development. Impermeable surfaces include roofs, pavements, driveways and paths, where runoff is conveyed to the drainage system.

[3] 10% Urban Creep should be added to the volumes required for storage and not increase discharge rates.

No.	Requirement	Answer	Application Type
4.5	Depth of infiltration structure (mAOD)	N/A	Full
4.6	Safety factor used for sizing infiltration storage	N/A	Outline & Full

5. Calculation Outputs: Greenfield Runoff Rates[4]

No.	Requirement	Answer	Application Type
5.1	Qbar (l/s)	7.70	Outline & Full
5.2	1 in 2 year rainfall (l/s)	6.70	Outline & Full
5.3	1 in 30 year rainfall (l/s)	18.40	Outline & Full
5.4	1 in 100 year rainfall (l/s)	24.40	Outline & Full

6. Calculation Outputs: Brownfield Runoff Rates (including Urban Creep) (if applicable)

No.	Requirement	Answer	Application Type
6.1	1 in 1 year rainfall (l/s)	N/A	Outline & Full
6.2	1 in 30 year rainfall (l/s)	N/A	Outline & Full
6.3	1 in 100 year rainfall (l/s)	N/A	Outline & Full

7. Calculation Outputs: Volume Control/Infiltration Provision

No.	Requirement	Answer	Application Type
7.1	Infiltration (m^3)		Outline & Full
7.2	Attenuation (m^3)	1,613m^3	Outline & Full
7.3	Separate volume designated as long-term storage[5] (m^3)	None, as discharging at QBar	Full
7.4	Total volume control (sum of inputs for 7.1 to 7.3) (m^3)	0m^3	Full

[4] Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 litres per second per hectare (l/s/ha).

[5] In calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable, and CV values must equal 1.

8. Calculation Outputs: Attenuation/Restricted Discharge

No.	Requirement		Answer	Application Type
8.1	Proposed discharge rate (critical storm)	1 in 1 (100%) AEP (m/s)	Catchment A: 13.40 l/s | Catchment B: 8.2 l/s	Outline & Full
		1 in 30 (3.33%) AEP (m/s)	Catchment A: 13.40 l/s | Catchment B: 8.2 l/s	Outline & Full
		1 in 30 (3.33%) AEP plus climate change (m/s)	Catchment A: 13.40 l/s | Catchment B: 8.2 l/s	Outline & Full
		1 in 100 (1%) AEP (m/s)	Catchment A: 13.40 l/s | Catchment B: 8.2 l/s	Outline & Full
		1 in 100 (1%) AEP plus climate change (m/s)	Catchment A: 13.40 l/s | Catchment B: 8.2 l/s	Outline & Full
8.2	Calculations show critical storm durations (both by max height and max discharge) for 1 in 1, 1 in 30, 1 in 30 plus climate change, 1 in 100 and 1 in 100 year plus climate change allowance can be accommodated on site (YES/NO)		Yes	Outline & Full
8.3	Has treatment of potential contaminants been considered? (YES/NO)		Yes	Outline & Full
8.4	Demonstration of source control features with substantive evidence why these cannot be used if not (YES/NO)		Yes	Full
8.5	If discharging into a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? (YES/NO)		No	Full

9. Other Supporting Details

No.	Requirement	Answer	Application Type
9.1	Plan detailing location of groundwater monitoring and infiltration testing	Groundwater monitoring - yes Infiltration testing - no	Outline & Full
9.2	Detailed drainage design layout	Yes	Full
9.3	Maintenance strategy	Yes	Full

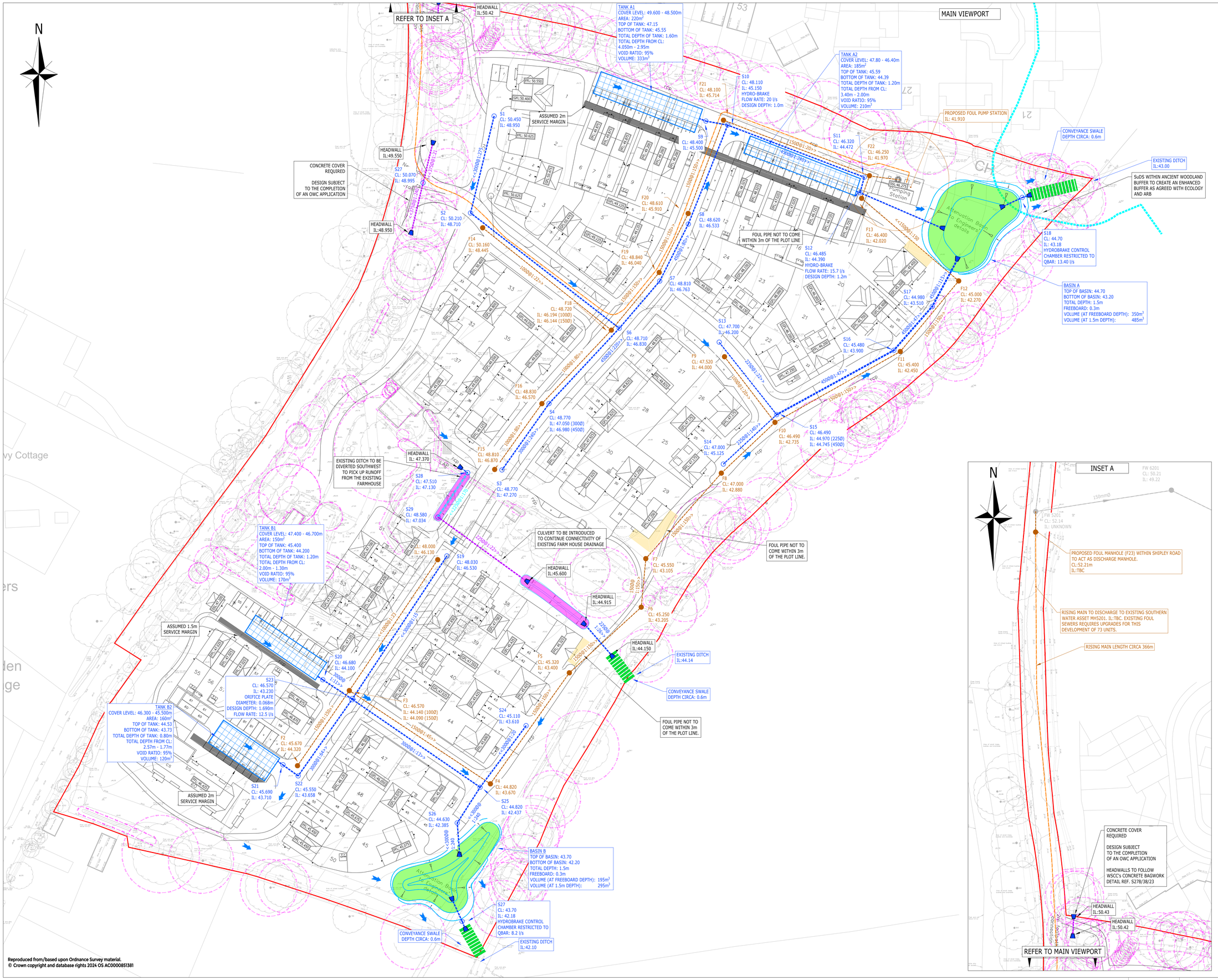
No.	Requirement	Answer	Application Type
9.4	Detailed development layout	Yes	Full
9.5	Impermeable area plan	No	Full
9.6	Phasing plan?	No	Full
9.7	If ground levels are being raised over 300mm above existing levels and is unavoidable, have detailed plans been provided, together with drainage proposals, to address any potential drainage related issues?	Yes	Full

The above form should be completed using evidence from information which should be appended to this form. The information being submitted should be proportionate to the site conditions, flood risks and magnitude of development. It should serve as a summary of the drainage proposals and should clearly show that the proposed discharge rate and volume as a result of development will not be increasing. Where there is an increase in discharge rate or volume, then the relevant section of this form must be completed with clear evidence demonstrating how the requirements will be met.

This form is completed using factual information and can be used as a summary of the surface water drainage strategy on this site.

Form completed by	Dominic Cronin
Qualification of person responsible for signing off this proforma	BEng Civil Engineering
Company	Ardent Consulting
On behalf of (client's details)	Bellway
Date	08/09/25

Appendix H



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION, INC. RISK ASSESSMENTS AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
2. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES UNLESS OTHERWISE STATED.
4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
5. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
6. ANY WORKS OUTSIDE RED SITE BOUNDARY ARE FOR INFORMATION PURPOSES ONLY. UNLESS SPECIFICALLY NOTED, ALL WORKS OUTSIDE THE SITE BOUNDARY WILL BE UNDERTAKEN BY OTHERS UNDER A SEPARATE CONTRACT.
7. PROPOSED TREES WITHIN SITE LAYOUT TO HAVE APPROPRIATE SPACING/SURROUNDING NEAR ATTENTUATION TANKS.

KEY

- SITE BOUNDARY
- PROPOSED FOUL WATER SEWER
- PROPOSED FOUL RISING MAIN SEWER
- PROPOSED SURFACE WATER SEWER
- EXISTING FOUL WATER SEWER
- ROOT PROTECTION AREA
- 15m ANCIENT WOODLAND BUFFER
- PROPOSED ATTENUATION TANK
- PROPOSED BASIN
- PROPOSED HEADWALL
- PROPOSED SLOPING (MAX 1:3)
- PROPOSED SWALE
- PROPOSED DIVERTED DITCH
- 3m DRAINAGE EASEMENT
- PROPOSED SURFACE WATER CULVERT
- PROPOSED UNDER-DRAINED DIVERTED DITCH
- FLOOD EXCEEDANCE ROUTE ARROWS
- FFL:47.850 FINISHED FLOOR LEVEL
- GFL:47.850 GARAGE FLOOR LEVEL
- SSL:47.850 STRUCTURAL SLAB LEVEL

INFORMATION SUMMARY

INFORMATION TYPE	SOURCE	REFERENCE	REVISION & DATE
SITE LAYOUT	DHA	102108-BEL-SL-01	02.10.25
TOPOGRAPHICAL SURVEY	HOOK SURVEY	S19/7188/01-07	July 2019 Rev. C
ROOT PROTECTION AREA	KEEN CONSULTANTS	2463-KC-XX-YTREE-TC	20.06.2025
EXISTING SEWER RECORDS	ARDENT CONSULTING	2108061_B-ACE-XX-XX-RP-C-0001	08.09.25 Rev. A

0m 5m 25m
Scale: 1:500 @ A1

Rev	Description	Drn	Chk	App	Date
B	UPDATED TO SUIT NEW SITE LAYOUT	JTM	TR	BB	06.10.25
A	PRELIMINARY ISSUE	DC	TR	BB	08.09.25

Purpose: DRAFT
Status: NOT YET APPROVED

ARDENT CONSULTING ENGINEERS
AN EMPLOYEE OWNED COMPANY
Third Floor
The Hallmark Building
52-56 Leadenhall Street
London
EC3M 5JE
Tel: 020 7680 4088
Web: www.ardent-ce.co.uk
E-mail: enquiries@ardent-ce.co.uk

Client
BELLWAY HOMES LIMITED

Project Title:
WOODFORDS, SOUTHWATER

Drawing Title:
DRAINAGE STRATEGY

Drawn by	Checked by	Approved by	Revision
DC	TR	BB	B

A1 Scale: 1:500@A1
Date: SEPT 2025

Drawing Number
2108061_B-ACE-XX-XX-DR-C-0501

Appendix I

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.042	5.00	50.511	1350	515627.056	125113.584	1.501
S2	0.028	5.00	50.601	1350	515624.922	125095.170	1.671
S3	0.110	5.00	50.340	1350	515618.522	125077.897	1.500
S4	0.106	5.00	48.678	1350	515627.402	125000.812	1.500
S5	0.045	5.00	48.489	1350	515640.427	125020.501	1.509
S6	0.056	5.00	48.515	1350	515652.370	125033.690	1.615
S7	0.013	5.00	48.687	1200	515662.807	125044.694	1.857
TANK A1	0.078	5.00	49.753	1350	515655.236	125116.897	4.203
S9	0.100	5.00	46.485	1800	515732.271	125088.721	2.145
S10	0.023	5.00	48.052	2100	515695.652	125101.989	2.902
S11	0.058	5.00	48.450	1200	515683.977	125072.127	1.917
S12	0.049	5.00	48.643	1350	515673.593	125054.689	1.880
S13	0.025	5.00	47.413	1350	515692.636	125037.623	1.425
S14	0.107	5.00	46.583	1350	515693.856	125001.792	1.458
S15	0.069	5.00	46.253	1350	515709.334	125017.085	2.514
S16	0.049	5.00	45.480	1350	515744.128	125034.383	1.891
S17			44.965	1350	515755.884	125048.873	1.455
S18			44.700		515764.130	125062.791	1.430
BASIN A			44.700		515776.648	125077.741	1.550
S20			44.700	1500	515784.998	125080.923	1.550
S21			43.812		515791.201	125082.675	0.712
TANK A2		5.00	46.490	1350	515726.061	125072.634	2.100

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	S1	S2	18.537	0.600	49.010	48.930	0.080	231.7	300	5.30	50.0
1.001	S2	S3	18.420	0.600	48.930	48.840	0.090	204.7	300	5.58	50.0
1.002	S3	S7	55.350	0.600	48.840	46.830	2.010	27.5	300	5.89	50.0
2.000	S4	S5	23.608	0.600	47.178	46.980	0.198	119.2	300	5.27	50.0
2.001	S5	S6	17.792	0.600	46.980	46.900	0.080	222.4	450	5.49	50.0
2.002	S6	S7	15.167	0.600	46.900	46.830	0.070	216.7	450	5.68	50.0
1.003	S7	S12	14.705	0.600	46.830	46.763	0.067	220.0	450	6.07	50.0
3.000	TANK A1	S10	43.078	0.600	45.550	45.150	0.400	107.7	450	5.37	50.0
4.000	S10	S9	38.949	0.600	45.150	44.340	0.810	48.1	450	6.58	50.0
3.001	S11	S10	32.063	0.600	46.533	45.300	1.233	26.0	450	6.36	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	S1	S2	1.028	72.7	7.6	65	0.670
1.001	S2	S3	1.095	77.4	12.7	82	0.813
1.002	S3	S7	3.007	212.6	32.5	79	2.195
2.000	S4	S5	1.439	101.7	19.1	88	1.111
2.001	S5	S6	1.359	216.1	27.3	107	0.939
2.002	S6	S7	1.377	219.0	37.3	125	1.039
1.003	S7	S12	1.366	217.3	72.2	178	1.232
3.000	TANK A1	S10	1.958	311.5	14.2	65	1.011
4.000	S10	S9	2.937	467.1	110.0	148	2.422
3.001	S11	S10	3.999	636.0	91.6	115	2.883

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)
3.002	S12	S11	20.295	0.600	46.763	46.533	0.230	88.2	450	6.22	50.0
4.000_A	TANK A2	S9	17.244	0.600	44.390	44.347	0.043	400.0	450	5.28	50.0
1.005	S13	S15	26.470	0.600	45.988	43.964	2.024	13.1	225	5.12	50.0
5.000	S14	S15	21.759	0.600	45.125	43.964	1.161	18.7	225	5.12	50.0
1.006	S15	S16	38.856	0.600	43.739	43.589	0.150	259.0	450	5.64	50.0
1.007	S16	S17	18.659	0.600	43.589	43.514	0.075	250.0	450	5.88	50.0
1.008	S17	S18	16.177	0.600	43.510	43.270	0.240	67.4	450	5.99	50.0
1.009	S18	BASIN A	19.499	0.600	43.270	43.200	0.070	278.6	450	6.26	50.0
1.010	BASIN A	S20	8.936	0.600	43.200	43.150	0.050	178.7	450	6.91	50.0
1.011	S20	S21	6.445	0.600	43.150	43.100	0.050	128.9	225	7.00	50.0
1.007_A	S9	BASIN A	45.715	0.600	44.340	43.150	1.190	38.4	450	6.81	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.002	S12	S11	2.165	344.3	81.1	148	1.785
4.000_A	TANK A2	S9	1.010	160.7	0.0	0	0.000
1.005	S13	S15	3.637	144.6	4.6	28	1.687
5.000	S14	S15	3.036	120.7	19.3	60	2.233
1.006	S15	S16	1.258	200.1	36.3	129	0.963
1.007	S16	S17	1.281	203.7	45.2	143	1.036
1.008	S17	S18	2.479	394.2	45.2	102	1.669
1.009	S18	BASIN A	1.213	192.9	45.2	147	0.996
1.010	BASIN A	S20	1.517	241.3	173.3	283	1.645
1.011	S20	S21	1.150	45.7	173.3	225	1.171
1.007_A	S9	BASIN A	3.288	522.9	128.1	151	2.736

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	18.537	231.7	300	Circular	50.511	49.010	1.201	50.601	48.930	1.371
1.001	18.420	204.7	300	Circular	50.601	48.930	1.371	50.340	48.840	1.200
1.002	55.350	27.5	300	Circular	50.340	48.840	1.200	48.687	46.830	1.557
2.000	23.608	119.2	300	Circular	48.678	47.178	1.200	48.489	46.980	1.209
2.001	17.792	222.4	450	Circular	48.489	46.980	1.059	48.515	46.900	1.165
2.002	15.167	216.7	450	Circular	48.515	46.900	1.165	48.687	46.830	1.407
1.003	14.705	220.0	450	Circular	48.687	46.830	1.407	48.643	46.763	1.430
3.000	43.078	107.7	450	Circular	49.753	45.550	3.753	48.052	45.150	2.452
4.000	38.949	48.1	450	Circular	48.052	45.150	2.452	46.485	44.340	1.695

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1350	Manhole	Adoptable	S2	1350	Manhole	Adoptable
1.001	S2	1350	Manhole	Adoptable	S3	1350	Manhole	Adoptable
1.002	S3	1350	Manhole	Adoptable	S7	1200	Manhole	Adoptable
2.000	S4	1350	Manhole	Adoptable	S5	1350	Manhole	Adoptable
2.001	S5	1350	Manhole	Adoptable	S6	1350	Manhole	Adoptable
2.002	S6	1350	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.003	S7	1200	Manhole	Adoptable	S12	1350	Manhole	Adoptable
3.000	TANK A1	1350	Manhole	Adoptable	S10	2100	Manhole	Adoptable
4.000	S10	2100	Manhole	Adoptable	S9	1800	Manhole	Adoptable

Pipeline Schedule

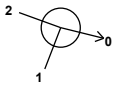
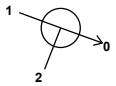
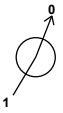
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.001	32.063	26.0	450	Circular	48.450	46.533	1.467	48.052	45.300	2.302
3.002	20.295	88.2	450	Circular	48.643	46.763	1.430	48.450	46.533	1.467
4.000_A	17.244	400.0	450	Circular	46.490	44.390	1.650	46.485	44.347	1.688
1.005	26.470	13.1	225	Circular	47.413	45.988	1.200	46.253	43.964	2.064
5.000	21.759	18.7	225	Circular	46.583	45.125	1.233	46.253	43.964	2.064
1.006	38.856	259.0	450	Circular	46.253	43.739	2.064	45.480	43.589	1.441
1.007	18.659	250.0	450	Circular	45.480	43.589	1.441	44.965	43.514	1.001
1.008	16.177	67.4	450	Circular	44.965	43.510	1.005	44.700	43.270	0.980
1.009	19.499	278.6	450	Circular	44.700	43.270	0.980	44.700	43.200	1.050
1.010	8.936	178.7	450	Circular	44.700	43.200	1.050	44.700	43.150	1.100
1.011	6.445	128.9	225	Circular	44.700	43.150	1.325	43.812	43.100	0.487
1.007_A	45.715	38.4	450	Circular	46.485	44.340	1.695	44.700	43.150	1.100

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.001	S11	1200	Manhole	Adoptable	S10	2100	Manhole	Adoptable
3.002	S12	1350	Manhole	Adoptable	S11	1200	Manhole	Adoptable
4.000_A	TANK A2	1350	Manhole	Adoptable	S9	1800	Manhole	Adoptable
1.005	S13	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
5.000	S14	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
1.006	S15	1350	Manhole	Adoptable	S16	1350	Manhole	Adoptable
1.007	S16	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
1.008	S17	1350	Manhole	Adoptable	S18		Junction	
1.009	S18		Junction		BASIN A		Junction	
1.010	BASIN A		Junction		S20	1500	Manhole	Adoptable
1.011	S20	1500	Manhole	Adoptable	S21		Junction	
1.007_A	S9	1800	Manhole	Adoptable	BASIN A		Junction	

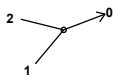
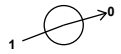
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S1	515627.056	125113.584	50.511	1.501	1350		0	1.000	49.010	300
S2	515624.922	125095.170	50.601	1.671	1350		1	1.000	48.930	300
							0	1.001	48.930	300
S3	515618.522	125077.897	50.340	1.500	1350		1	1.001	48.840	300
							0	1.002	48.840	300
S4	515627.402	125000.812	48.678	1.500	1350		0	2.000	47.178	300
S5	515640.427	125020.501	48.489	1.509	1350		1	2.000	46.980	300
							0	2.001	46.980	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S6	515652.370	125033.690	48.515	1.615	1350		1	2.001	46.900	450
							0	2.002	46.900	450
S7	515662.807	125044.694	48.687	1.857	1200		1	2.002	46.830	450
							2	1.002	46.830	300
							0	1.003	46.830	450
TANK A1	515655.236	125116.897	49.753	4.203	1350		0	3.000	45.550	450
S9	515732.271	125088.721	46.485	2.145	1800		1	4.000_A	44.347	450
							2	4.000	44.340	450
							0	1.007_A	44.340	450
S10	515695.652	125101.989	48.052	2.902	2100		1	3.000	45.150	450
							2	3.001	45.300	450
							0	4.000	45.150	450
S11	515683.977	125072.127	48.450	1.917	1200		1	3.002	46.533	450
							0	3.001	46.533	450
S12	515673.593	125054.689	48.643	1.880	1350		1	1.003	46.763	450
							0	3.002	46.763	450
S13	515692.636	125037.623	47.413	1.425	1350		0	1.005	45.988	225
S14	515693.856	125001.792	46.583	1.458	1350		0	5.000	45.125	225
S15	515709.334	125017.085	46.253	2.514	1350		1	5.000	43.964	225
							2	1.005	43.964	225
							0	1.006	43.739	450
S16	515744.128	125034.383	45.480	1.891	1350		1	1.006	43.589	450
							0	1.007	43.589	450
S17	515755.884	125048.873	44.965	1.455	1350		1	1.007	43.514	450
							0	1.008	43.510	450
S18	515764.130	125062.791	44.700	1.430			1	1.008	43.270	450
							0	1.009	43.270	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
BASIN A	515776.648	125077.741	44.700	1.550			1	1.009	43.200	450
							2	1.007_A	43.150	450
							0	1.010	43.200	450
S20	515784.998	125080.923	44.700	1.550	1500		1	1.010	43.150	450
							0	1.011	43.150	225
S21	515791.201	125082.675	43.812	0.712			1	1.011	43.100	225
TANK A2	515726.061	125072.634	46.490	2.100	1350		0	4.000_A	44.390	450

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

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 %)
1	0	5	0
30	0	5	0
30	40	5	0
100	0	5	0
100	45	5	0

Node S20 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	43.150	Product Number	CTL-SHE-0162-1340-1320-1340
Design Depth (m)	1.320	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	13.4	Min Node Diameter (mm)	1500

Node S10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	45.150	Product Number	CTL-SHE-0199-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.0	Min Node Diameter (mm)	1500

Node S9 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	44.340	Product Number	CTL-SHE-0176-1570-1200-1570
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	15.7	Min Node Diameter (mm)	1500

Node BASIN A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	43.150
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	178.3	0.0	0.400	248.2	0.0	0.800	327.5	0.0	1.200	415.7	0.0
0.100	194.7	0.0	0.500	267.2	0.0	0.900	348.7	0.0	1.300	439.1	0.0
0.200	212.0	0.0	0.600	286.7	0.0	1.000	370.4	0.0	1.400	463.2	0.0
0.300	229.8	0.0	0.700	306.8	0.0	1.100	392.8	0.0	1.500	487.8	0.0

Node TANK A2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	44.390
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	185.0	0.0	1.200	185.0	0.0	1.201	0.0	0.0

Node TANK A1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	45.550
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	126

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	219.5	0.0	1.600	219.5	0.0	1.601	0.0	0.0

Results for 1 year +5% A Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	49.064	0.054	5.4	0.0779	0.0000	OK
15 minute summer	S2	11	49.000	0.070	8.9	0.1003	0.0000	OK
15 minute summer	S3	10	48.905	0.065	22.8	0.0937	0.0000	OK
15 minute summer	S4	10	47.252	0.074	13.6	0.1065	0.0000	OK
15 minute summer	S5	10	47.074	0.094	19.3	0.1341	0.0000	OK
15 minute summer	S6	11	47.013	0.113	26.2	0.1613	0.0000	OK
15 minute summer	S7	11	46.985	0.155	50.2	0.1749	0.0000	OK
120 minute summer	TANK A1	76	45.619	0.069	21.7	14.4239	0.0000	OK
240 minute summer	S9	160	44.617	0.277	25.0	0.7059	0.0000	OK
15 minute summer	S10	12	45.706	0.556	66.2	1.9258	0.0000	SURCHARGED
15 minute summer	S11	11	46.628	0.095	63.5	0.1070	0.0000	OK
15 minute summer	S12	11	46.896	0.133	56.4	0.1905	0.0000	OK
15 minute summer	S13	10	46.012	0.024	3.3	0.0337	0.0000	OK
15 minute summer	S14	10	45.177	0.052	13.7	0.0748	0.0000	OK
15 minute summer	S15	10	43.848	0.109	25.6	0.1561	0.0000	OK
15 minute summer	S16	11	43.714	0.125	31.7	0.1788	0.0000	OK
15 minute summer	S17	11	43.596	0.086	31.6	0.1231	0.0000	OK
360 minute summer	S18	264	43.475	0.205	9.6	0.0000	0.0000	OK
360 minute summer	BASIN A	264	43.475	0.325	22.1	66.9333	0.0000	OK
360 minute summer	S20	264	43.475	0.325	12.9	0.5747	0.0000	SURCHARGED
360 minute summer	S21	264	43.181	0.081	12.8	0.0000	0.0000	OK
240 minute summer	TANK A2	160	44.618	0.228	13.3	40.3457	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	5.3	0.503	0.073	0.1963	
15 minute summer	S2	1.001	S3	8.8	0.741	0.114	0.2193	
15 minute summer	S3	1.002	S7	22.5	0.989	0.106	1.3262	
15 minute summer	S4	2.000	S5	13.5	0.835	0.132	0.3821	
15 minute summer	S5	2.001	S6	19.1	0.701	0.088	0.4860	
15 minute summer	S6	2.002	S7	26.1	0.665	0.119	0.6005	
15 minute summer	S7	1.003	S12	50.4	1.155	0.232	0.6421	
15 minute summer	TANK A1	3.000	S10	-45.5	-0.471	-0.146	3.6899	
15 minute summer	S9	1.007_A	BASIN A	15.3	2.027	0.029	0.9859	
30 minute summer	S10	4.000	S9	20.0	0.652	0.043	1.7919	
15 minute summer	S11	3.001	S10	63.4	1.972	0.100	2.7882	
15 minute summer	S12	3.002	S11	56.4	1.792	0.164	0.6428	
15 minute summer	S13	1.005	S15	3.2	1.490	0.022	0.0576	
15 minute summer	S14	5.000	S15	13.6	1.989	0.113	0.1488	
15 minute summer	S15	1.006	S16	25.4	0.788	0.127	1.2589	
15 minute summer	S16	1.007	S17	31.6	0.920	0.155	0.6419	
15 minute summer	S17	1.008	S18	31.7	1.152	0.080	0.4481	
15 minute summer	S18	1.009	BASIN A	31.3	0.922	0.162	0.6667	
360 minute winter	BASIN A	1.010	S20	13.3	0.171	0.055	0.9499	
360 minute summer	S20	1.011	S21	12.8	0.967	0.281	0.0856	194.4
15 minute summer	TANK A2	4.000_A	S9	-21.6	-0.651	-0.135	0.8257	

Results for 30 year +5% A Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	49.127	0.117	21.3	0.1672	0.0000	OK
15 minute summer	S2	10	49.080	0.150	35.6	0.2146	0.0000	OK
15 minute summer	S3	10	48.976	0.136	91.2	0.1941	0.0000	OK
15 minute summer	S4	10	47.340	0.162	53.9	0.2325	0.0000	OK
15 minute summer	S5	11	47.232	0.252	76.9	0.3601	0.0000	OK
15 minute summer	S6	11	47.215	0.315	102.1	0.4503	0.0000	OK
15 minute summer	S7	11	47.190	0.360	198.1	0.4068	0.0000	OK
60 minute winter	TANK A1	60	46.237	0.687	131.7	144.3037	0.0000	SURCHARGED
480 minute winter	S9	416	45.111	0.771	25.1	1.9629	0.0000	SURCHARGED
60 minute winter	S10	60	46.236	1.086	133.3	3.7620	0.0000	SURCHARGED
15 minute summer	S11	11	46.754	0.221	251.8	0.2498	0.0000	OK
15 minute summer	S12	11	47.059	0.296	223.1	0.4240	0.0000	OK
15 minute summer	S13	10	46.034	0.046	13.0	0.0661	0.0000	OK
15 minute summer	S14	10	45.237	0.112	54.4	0.1607	0.0000	OK
15 minute summer	S15	10	43.982	0.243	102.0	0.3471	0.0000	OK
600 minute winter	S16	630	43.978	0.389	11.2	0.5573	0.0000	OK
600 minute winter	S17	630	43.978	0.468	11.2	0.6703	0.0000	SURCHARGED
600 minute winter	S18	630	43.978	0.708	22.2	0.0000	0.0000	SURCHARGED
600 minute winter	BASIN A	630	43.978	0.828	26.0	209.2200	0.0000	SURCHARGED
600 minute winter	S20	630	43.978	0.828	13.5	1.4634	0.0000	SURCHARGED
60 minute summer	S21	117	43.183	0.083	13.4	0.0000	0.0000	OK
480 minute winter	TANK A2	416	45.112	0.722	8.8	127.8556	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	21.1	0.697	0.290	0.5615	
15 minute summer	S2	1.001	S3	35.2	1.073	0.455	0.6090	
15 minute summer	S3	1.002	S7	90.6	1.545	0.426	2.8046	
15 minute summer	S4	2.000	S5	53.9	1.095	0.530	1.1838	
15 minute summer	S5	2.001	S6	74.8	0.802	0.346	1.8642	
15 minute summer	S6	2.002	S7	102.6	0.819	0.469	1.9281	
15 minute summer	S7	1.003	S12	199.2	1.614	0.917	1.8126	
15 minute summer	TANK A1	3.000	S10	-253.5	-1.972	-0.814	6.8254	
15 minute winter	S9	1.007_A	BASIN A	16.2	2.094	0.031	3.0679	
60 minute winter	S10	4.000	S9	20.2	0.580	0.043	3.3454	
15 minute summer	S11	3.001	S10	252.8	2.129	0.397	3.7807	
15 minute summer	S12	3.002	S11	223.5	2.419	0.649	1.9085	
15 minute summer	S13	1.005	S15	12.9	2.237	0.089	0.1526	
15 minute summer	S14	5.000	S15	54.2	2.855	0.449	0.4129	
15 minute summer	S15	1.006	S16	101.0	1.069	0.505	3.6698	
15 minute summer	S16	1.007	S17	125.6	1.309	0.617	1.7897	
15 minute summer	S17	1.008	S18	126.0	1.603	0.320	1.2712	
15 minute summer	S18	1.009	BASIN A	126.5	1.387	0.656	1.7776	
15 minute winter	BASIN A	1.010	S20	36.9	0.606	0.153	1.0781	
60 minute summer	S20	1.011	S21	13.4	0.978	0.293	0.0882	218.2
15 minute summer	TANK A2	4.000_A	S9	-77.6	-1.272	-0.483	1.8345	

Results for 30 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	49.157	0.147	29.9	0.2107	0.0000	OK
15 minute summer	S2	10	49.115	0.185	49.7	0.2652	0.0000	OK
15 minute summer	S3	10	49.005	0.165	127.7	0.2366	0.0000	OK
15 minute summer	S4	11	47.569	0.391	75.5	0.5596	0.0000	SURCHARGED
15 minute summer	S5	11	47.437	0.457	103.8	0.6538	0.0000	SURCHARGED
15 minute summer	S6	11	47.408	0.508	142.0	0.7265	0.0000	SURCHARGED
15 minute summer	S7	11	47.358	0.528	276.0	0.5969	0.0000	SURCHARGED
120 minute winter	TANK A1	110	46.628	1.078	110.1	226.2472	0.0000	SURCHARGED
480 minute summer	S9	528	45.493	1.153	29.3	2.9349	0.0000	SURCHARGED
120 minute winter	S10	112	46.628	1.478	115.7	5.1185	0.0000	SURCHARGED
15 minute summer	S11	11	46.879	0.346	351.5	0.3911	0.0000	OK
15 minute summer	S12	11	47.164	0.401	311.3	0.5733	0.0000	OK
15 minute summer	S13	10	46.042	0.054	18.2	0.0767	0.0000	OK
15 minute summer	S14	10	45.265	0.140	76.2	0.2004	0.0000	OK
960 minute winter	S15	990	44.279	0.540	8.7	0.7726	0.0000	SURCHARGED
960 minute winter	S16	990	44.279	0.690	10.8	0.9872	0.0000	SURCHARGED
960 minute winter	S17	990	44.279	0.769	9.9	1.1003	0.0000	SURCHARGED
960 minute winter	S18	990	44.279	1.009	41.9	0.0000	0.0000	SURCHARGED
960 minute winter	BASIN A	990	44.279	1.129	28.5	319.1925	0.0000	SURCHARGED
960 minute winter	S20	990	44.279	1.129	13.5	1.9944	0.0000	SURCHARGED
120 minute winter	S21	70	43.183	0.083	13.4	0.0000	0.0000	OK
480 minute summer	TANK A2	528	45.493	1.103	13.1	195.4835	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	29.5	0.737	0.406	0.7423	
15 minute summer	S2	1.001	S3	49.2	1.162	0.635	0.7873	
15 minute summer	S3	1.002	S7	126.9	2.040	0.597	3.0503	
15 minute summer	S4	2.000	S5	72.9	1.137	0.717	1.6625	
15 minute summer	S5	2.001	S6	104.3	0.805	0.482	2.8190	
15 minute summer	S6	2.002	S7	142.5	0.899	0.651	2.4031	
15 minute summer	S7	1.003	S12	278.0	1.756	1.279	2.2608	
15 minute summer	TANK A1	3.000	S10	-339.3	-2.325	-1.089	6.8254	
15 minute winter	S9	1.007_A	BASIN A	16.1	2.127	0.031	3.8314	
120 minute winter	S10	4.000	S9	23.5	0.621	0.050	4.2842	
15 minute summer	S11	3.001	S10	351.7	2.283	0.553	4.6360	
15 minute summer	S12	3.002	S11	311.9	2.349	0.906	2.8391	
15 minute summer	S13	1.005	S15	18.1	2.285	0.125	0.2781	
15 minute summer	S14	5.000	S15	75.8	3.071	0.628	0.5371	
15 minute summer	S15	1.006	S16	140.8	1.141	0.704	4.7904	
15 minute summer	S16	1.007	S17	175.4	1.452	0.861	2.2489	
15 minute summer	S17	1.008	S18	175.8	1.725	0.446	1.6445	
15 minute summer	S18	1.009	BASIN A	176.5	1.553	0.915	2.6080	
15 minute winter	BASIN A	1.010	S20	38.2	0.573	0.158	1.3620	
120 minute winter	S20	1.011	S21	13.4	0.978	0.293	0.0882	249.8
15 minute summer	TANK A2	4.000_A	S9	-89.8	-1.403	-0.559	2.3289	

Results for 100 year +5% A Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	49.147	0.137	26.9	0.1954	0.0000	OK
15 minute summer	S2	10	49.103	0.173	44.8	0.2473	0.0000	OK
15 minute summer	S3	10	48.995	0.155	114.9	0.2219	0.0000	OK
15 minute summer	S4	11	47.413	0.235	67.9	0.3361	0.0000	OK
15 minute summer	S5	11	47.338	0.358	94.5	0.5128	0.0000	OK
15 minute summer	S6	11	47.321	0.421	125.5	0.6018	0.0000	OK
15 minute summer	S7	11	47.286	0.456	245.5	0.5160	0.0000	SURCHARGED
60 minute winter	TANK A1	61	46.506	0.956	172.4	200.6133	0.0000	SURCHARGED
360 minute summer	S9	440	45.356	1.016	30.7	2.5853	0.0000	SURCHARGED
60 minute winter	S10	61	46.503	1.353	170.8	4.6884	0.0000	SURCHARGED
15 minute summer	S11	11	46.824	0.291	311.6	0.3292	0.0000	OK
15 minute summer	S12	11	47.114	0.351	275.8	0.5024	0.0000	OK
15 minute summer	S13	10	46.039	0.051	16.4	0.0728	0.0000	OK
15 minute summer	S14	10	45.255	0.130	68.5	0.1863	0.0000	OK
960 minute winter	S15	930	44.173	0.434	7.8	0.6216	0.0000	OK
960 minute winter	S16	930	44.173	0.584	9.7	0.8363	0.0000	SURCHARGED
960 minute winter	S17	930	44.173	0.663	15.5	0.9493	0.0000	SURCHARGED
960 minute winter	S18	930	44.173	0.903	26.7	0.0000	0.0000	SURCHARGED
960 minute winter	BASIN A	930	44.173	1.023	37.2	278.3167	0.0000	SURCHARGED
960 minute winter	S20	930	44.173	1.023	13.6	1.8080	0.0000	SURCHARGED
30 minute winter	S21	133	43.183	0.083	13.4	0.0000	0.0000	OK
360 minute summer	TANK A2	440	45.356	0.966	14.0	171.1503	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	26.6	0.726	0.366	0.6785	
15 minute summer	S2	1.001	S3	44.3	1.136	0.572	0.7252	
15 minute summer	S3	1.002	S7	114.2	1.871	0.537	2.9655	
15 minute summer	S4	2.000	S5	65.4	1.116	0.643	1.5297	
15 minute summer	S5	2.001	S6	91.5	0.809	0.423	2.5749	
15 minute summer	S6	2.002	S7	125.4	0.843	0.573	2.3700	
15 minute summer	S7	1.003	S12	245.7	1.655	1.131	2.1407	
15 minute summer	TANK A1	3.000	S10	-308.8	-2.207	-0.992	6.8254	
15 minute summer	S9	1.007_A	BASIN A	16.1	2.117	0.031	3.6384	
60 minute winter	S10	4.000	S9	22.5	0.572	0.048	3.3572	
15 minute summer	S11	3.001	S10	312.3	2.127	0.491	4.2784	
15 minute summer	S12	3.002	S11	276.0	2.343	0.802	2.4469	
15 minute summer	S13	1.005	S15	16.3	2.337	0.113	0.2024	
15 minute summer	S14	5.000	S15	68.2	3.005	0.565	0.4937	
15 minute summer	S15	1.006	S16	126.7	1.117	0.633	4.4028	
15 minute summer	S16	1.007	S17	158.0	1.405	0.776	2.0962	
15 minute summer	S17	1.008	S18	158.4	1.687	0.402	1.5163	
15 minute summer	S18	1.009	BASIN A	158.9	1.498	0.824	2.3172	
15 minute winter	BASIN A	1.010	S20	37.3	0.614	0.155	1.2860	
30 minute winter	S20	1.011	S21	13.4	0.978	0.293	0.0882	203.6
15 minute summer	TANK A2	4.000_A	S9	-85.7	-1.379	-0.533	2.1356	

Results for 100 year +45% CC +5% A Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	12	49.234	0.224	39.0	0.3204	0.0000	OK
15 minute summer	S2	12	49.199	0.269	64.6	0.3855	0.0000	OK
15 minute summer	S3	12	49.132	0.292	165.1	0.4180	0.0000	OK
15 minute summer	S4	11	48.461	1.283	98.5	1.8366	0.0000	FLOOD RISK
15 minute summer	S5	11	48.258	1.278	130.3	1.8284	0.0000	FLOOD RISK
15 minute summer	S6	11	48.213	1.313	175.7	1.8783	0.0000	SURCHARGED
15 minute summer	S7	11	48.138	1.308	330.3	1.4789	0.0000	SURCHARGED
120 minute winter	TANK A1	116	47.060	1.510	146.7	316.9588	0.0000	SURCHARGED
360 minute summer	S9	384	46.279	1.939	39.4	4.9352	0.0000	FLOOD RISK
120 minute winter	S10	116	47.059	1.909	151.0	6.6127	0.0000	SURCHARGED
15 minute summer	S11	12	47.526	0.993	418.0	1.1234	0.0000	SURCHARGED
15 minute summer	S12	12	47.895	1.132	371.2	1.6202	0.0000	SURCHARGED
15 minute summer	S13	10	46.049	0.061	23.7	0.0877	0.0000	OK
15 minute summer	S14	10	45.294	0.169	99.4	0.2414	0.0000	OK
1440 minute winter	S15	1380	44.514	0.775	8.1	1.1090	0.0000	SURCHARGED
1440 minute winter	S16	1380	44.514	0.925	9.8	1.3236	0.0000	SURCHARGED
1440 minute winter	S17	1380	44.514	1.004	9.2	1.4367	0.0000	SURCHARGED
1440 minute winter	S18	1380	44.514	1.244	12.8	0.0000	0.0000	FLOOD RISK
1440 minute winter	BASIN A	1380	44.514	1.364	24.2	419.4919	0.0000	FLOOD RISK
1440 minute winter	S20	1380	44.514	1.364	13.4	2.4097	0.0000	FLOOD RISK
15 minute winter	S21	90	43.183	0.083	13.4	0.0000	0.0000	OK
360 minute summer	TANK A2	384	46.279	1.889	23.0	213.6913	0.0000	FLOOD RISK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	38.2	0.751	0.526	1.1405	
15 minute summer	S2	1.001	S3	62.7	1.189	0.810	1.2577	
15 minute summer	S3	1.002	S7	157.1	2.297	0.739	3.8826	
15 minute summer	S4	2.000	S5	90.0	1.279	0.885	1.6625	
15 minute summer	S5	2.001	S6	126.4	0.802	0.585	2.8190	
15 minute summer	S6	2.002	S7	172.1	1.086	0.786	2.4031	
15 minute summer	S7	1.003	S12	327.6	2.068	1.508	2.3299	
15 minute summer	TANK A1	3.000	S10	-394.0	-2.591	-1.265	6.8254	
480 minute winter	S9	1.007_A	BASIN A	19.4	1.385	0.037	4.2415	
120 minute winter	S10	4.000	S9	26.7	0.614	0.057	6.1712	
15 minute summer	S11	3.001	S10	413.2	2.608	0.650	5.0802	
15 minute summer	S12	3.002	S11	366.3	2.316	1.064	3.2156	
15 minute summer	S13	1.005	S15	23.6	2.217	0.163	0.5703	
15 minute summer	S14	5.000	S15	99.4	3.169	0.823	0.7106	
15 minute summer	S15	1.006	S16	181.5	1.188	0.907	5.9593	
15 minute summer	S16	1.007	S17	226.7	1.580	1.113	2.6372	
15 minute summer	S17	1.008	S18	227.1	1.820	0.576	2.0069	
15 minute summer	S18	1.009	BASIN A	227.5	1.711	1.180	3.0689	
5760 minute winter	BASIN A	1.010	S20	37.7	0.361	0.156	1.0179	
15 minute winter	S20	1.011	S21	13.4	0.978	0.293	0.0882	196.5
15 minute summer	TANK A2	4.000_A	S9	-112.4	-1.491	-0.700	2.7322	

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S22	0.178	5.00	48.185	1350	515613.130	124974.827	1.620
TANK B2	0.097	5.00	45.449	1200	515561.078	124915.344	1.729
S26	0.084	5.00	45.715	1200	515568.836	124909.910	2.365
TANK B1	0.078	5.00	47.254	1200	515561.104	124949.261	3.134
S23	0.033	5.00	46.572	2100	515584.629	124932.458	3.342
S29	0.079	5.00	45.325	1350	515647.141	124938.449	1.505
S28	0.006	5.00	44.774	1350	515622.895	124905.347	1.854
S30	0.038	5.00	44.648	1350	515616.886	124897.939	1.768
S31			43.700		515615.639	124883.489	1.460
Basin B	0.041	5.00	43.700		515613.893	124874.357	1.500
S33			43.700	1500	515616.892	124866.481	1.530
S34			42.797		515618.767	124862.882	0.647

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	S22	S23	51.063	0.600	46.565	43.230	3.335	15.3	300	5.21	50.0
3.000	TANK B2	S26	9.473	0.600	43.720	43.425	0.295	32.1	225	5.07	50.0
2.001	S26	S23	27.529	0.600	43.350	43.230	0.120	229.4	300	5.51	50.0
4.000	TANK B1	S23	28.910	0.600	44.120	43.230	0.890	32.5	300	5.17	50.0
1.001	S23	S28	46.896	0.600	43.230	42.920	0.310	151.3	300	6.12	50.0
5.000	S29	S28	41.032	0.600	43.820	43.070	0.750	54.7	300	5.32	50.0
1.002	S28	S30	9.538	0.600	42.920	42.880	0.040	238.5	300	6.28	50.0
1.003	S30	S31	14.504	0.600	42.880	42.240	0.640	22.7	300	6.35	50.0
1.004	S31	Basin B	9.384	0.600	42.240	42.200	0.040	234.6	300	6.51	50.0
1.005	Basin B	S33	8.345	0.600	42.200	42.170	0.030	278.2	300	6.66	50.0
1.006	S33	S34	4.058	0.600	42.170	42.150	0.020	202.9	150	6.75	50.0

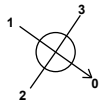
Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	S22	S23	4.037	285.4	32.1	68	2.708
3.000	TANK B2	S26	2.316	92.1	17.5	66	1.796
2.001	S26	S23	1.034	73.1	32.7	140	1.005
4.000	TANK B1	S23	2.768	195.6	14.1	54	1.631
1.001	S23	S28	1.276	90.2	84.8	232	1.443
5.000	S29	S28	2.130	150.5	14.3	62	1.354
1.002	S28	S30	1.014	71.6	100.1	300	1.027
1.003	S30	S31	3.316	234.4	107.1	142	3.243
1.004	S31	Basin B	1.022	72.2	107.1	300	1.035
1.005	Basin B	S33	0.938	66.3	114.4	300	0.950
1.006	S33	S34	0.702	12.4	114.4	150	0.715

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	51.063	15.3	300	Circular	48.185	46.565	1.320	46.572	43.230	3.042
3.000	9.473	32.1	225	Circular	45.449	43.720	1.504	45.715	43.425	2.065
2.001	27.529	229.4	300	Circular	45.715	43.350	2.065	46.572	43.230	3.042
4.000	28.910	32.5	300	Circular	47.254	44.120	2.834	46.572	43.230	3.042
1.001	46.896	151.3	300	Circular	46.572	43.230	3.042	44.774	42.920	1.554
5.000	41.032	54.7	300	Circular	45.325	43.820	1.205	44.774	43.070	1.404
1.002	9.538	238.5	300	Circular	44.774	42.920	1.554	44.648	42.880	1.468
1.003	14.504	22.7	300	Circular	44.648	42.880	1.468	43.700	42.240	1.160
1.004	9.384	234.6	300	Circular	43.700	42.240	1.160	43.700	42.200	1.200
1.005	8.345	278.2	300	Circular	43.700	42.200	1.200	43.700	42.170	1.230
1.006	4.058	202.9	150	Circular	43.700	42.170	1.380	42.797	42.150	0.497

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S22	1350	Manhole	Adoptable	S23	2100	Manhole	Adoptable
3.000	TANK B2	1200	Manhole	Adoptable	S26	1200	Manhole	Adoptable
2.001	S26	1200	Manhole	Adoptable	S23	2100	Manhole	Adoptable
4.000	TANK B1	1200	Manhole	Adoptable	S23	2100	Manhole	Adoptable
1.001	S23	2100	Manhole	Adoptable	S28	1350	Manhole	Adoptable
5.000	S29	1350	Manhole	Adoptable	S28	1350	Manhole	Adoptable
1.002	S28	1350	Manhole	Adoptable	S30	1350	Manhole	Adoptable
1.003	S30	1350	Manhole	Adoptable	S31		Junction	
1.004	S31		Junction		Basin B		Junction	
1.005	Basin B		Junction		S33	1500	Manhole	Adoptable
1.006	S33	1500	Manhole	Adoptable	S34		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S22	515613.130	124974.827	48.185	1.620	1350		0	1.000	46.565	300
TANK B2	515561.078	124915.344	45.449	1.729	1200		0	3.000	43.720	225
S26	515568.836	124909.910	45.715	2.365	1200		1	3.000	43.425	225
							0	2.001	43.350	300
TANK B1	515561.104	124949.261	47.254	3.134	1200		0	4.000	44.120	300
S23	515584.629	124932.458	46.572	3.342	2100		1	4.000	43.230	300
							2	2.001	43.230	300
							3	1.000	43.230	300
							0	1.001	43.230	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S29	515647.141	124938.449	45.325	1.505	1350				
						0	5.000	43.820	300
S28	515622.895	124905.347	44.774	1.854	1350	1	5.000	43.070	300
						2	1.001	42.920	300
						0	1.002	42.920	300
S30	515616.886	124897.939	44.648	1.768	1350	1	1.002	42.880	300
						0	1.003	42.880	300
S31	515615.639	124883.489	43.700	1.460		1	1.003	42.240	300
						0	1.004	42.240	300
Basin B	515613.893	124874.357	43.700	1.500		1	1.004	42.200	300
						0	1.005	42.200	300
S33	515616.892	124866.481	43.700	1.530	1500	1	1.005	42.170	300
						0	1.006	42.170	150
S34	515618.767	124862.882	42.797	0.647		1	1.006	42.150	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

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 %)
1	0	5	0
30	0	5	0
30	40	5	0
100	0	5	0
100	45	5	0

Node S33 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	42.170	Product Number	CTL-SHE-0128-8200-1340-8200
Design Depth (m)	1.340	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.2	Min Node Diameter (mm)	1500

Node S23 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.690	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	12.5		
Invert Level (m)	43.230	Diameter (m)	0.068		

Node Basin B Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	42.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	43.7	0.0	0.400	106.2	0.0	0.800	204.6	0.0	1.200	302.0	0.0
0.100	58.3	0.0	0.500	123.4	0.0	0.900	228.1	0.0	1.300	327.7	0.0
0.200	73.7	0.0	0.600	159.3	0.0	1.000	252.2	0.0	1.400	354.0	0.0
0.300	89.6	0.0	0.700	181.7	0.0	1.100	276.8	0.0	1.500	380.9	0.0

Node TANK B2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	43.720
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	160.0	0.0	0.800	160.0	0.0	0.801	0.0	0.0

Node TANK B1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	44.120
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	136

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	150.0	0.0	1.200	150.0	0.0	1.201	0.0	0.0

Results for 1 year +5% A Critical Storm Duration. Lowest mass balance: 98.19%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S22	10	46.622	0.057	22.8	0.0813	0.0000	OK
240 minute summer	TANK B2	156	43.881	0.161	14.2	24.6398	0.0000	OK
30 minute summer	S26	20	43.885	0.535	21.4	0.6055	0.0000	SURCHARGED
120 minute summer	TANK B1	70	44.149	0.029	5.4	4.1231	0.0000	OK
30 minute summer	S23	20	43.893	0.663	28.4	2.2954	0.0000	SURCHARGED
15 minute summer	S29	10	43.873	0.053	10.2	0.0755	0.0000	OK
15 minute summer	S28	12	43.018	0.098	16.7	0.1407	0.0000	OK
15 minute summer	S30	11	42.940	0.060	20.9	0.0860	0.0000	OK
360 minute summer	S31	264	42.549	0.309	11.6	0.0000	0.0000	SURCHARGED
360 minute summer	Basin B	264	42.549	0.349	12.9	24.4398	0.0000	SURCHARGED
360 minute summer	S33	264	42.548	0.378	8.1	0.6684	0.0000	SURCHARGED
360 minute summer	S34	264	42.233	0.083	8.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S22	1.000	S23	22.6	1.352	0.079	2.0342	
30 minute summer	TANK B2	3.000	S26	-21.7	-0.798	-0.236	0.2498	
30 minute summer	S26	2.001	S23	-14.4	0.312	-0.198	1.9386	
120 minute summer	TANK B1	4.000	S23	3.7	0.085	0.019	1.0672	
30 minute summer	S23	1.001	S28	7.5	0.690	0.083	0.6809	
15 minute summer	S29	5.000	S28	9.9	1.211	0.066	0.3365	
15 minute summer	S28	1.002	S30	16.7	1.128	0.233	0.1432	
15 minute summer	S30	1.003	S31	20.8	1.288	0.089	0.2541	
15 minute summer	S31	1.004	Basin B	20.8	1.201	0.287	0.3443	
360 minute summer	Basin B	1.005	S33	8.1	0.216	0.122	0.5876	
360 minute summer	S33	1.006	S34	8.0	0.769	0.649	0.0425	135.9

Results for 30 year +5% A Critical Storm Duration. Lowest mass balance: 98.19%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S22	10	46.680	0.115	90.6	0.1645	0.0000	OK
120 minute winter	TANK B2	116	44.388	0.668	55.1	102.2840	0.0000	SURCHARGED
120 minute winter	S26	116	44.388	1.038	40.6	1.1736	0.0000	SURCHARGED
120 minute winter	TANK B1	116	44.387	0.267	22.9	38.4194	0.0000	OK
15 minute summer	S23	10	44.397	1.167	106.9	4.0410	0.0000	SURCHARGED
15 minute summer	S29	10	43.928	0.108	40.4	0.1549	0.0000	OK
480 minute summer	S28	624	43.168	0.248	15.9	0.3553	0.0000	OK
480 minute summer	S30	624	43.168	0.288	19.0	0.4119	0.0000	OK
480 minute summer	S31	624	43.167	0.927	19.0	0.0000	0.0000	SURCHARGED
480 minute summer	Basin B	624	43.167	0.967	22.1	129.0567	0.0000	SURCHARGED
480 minute summer	S33	624	43.166	0.996	8.4	1.7606	0.0000	SURCHARGED
15 minute winter	S34	121	42.233	0.083	8.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S22	1.000	S23	90.2	1.751	0.316	2.4318	
15 minute summer	TANK B2	3.000	S26	-92.1	-2.561	-1.000	0.3768	
15 minute summer	S26	2.001	S23	-50.0	-0.710	-0.684	1.9386	
15 minute summer	TANK B1	4.000	S23	-50.9	-0.985	-0.260	1.6280	
120 minute winter	S23	1.001	S28	10.1	0.769	0.112	0.8346	
15 minute summer	S29	5.000	S28	39.8	1.782	0.264	0.9161	
15 minute summer	S28	1.002	S30	52.7	1.537	0.735	0.3271	
15 minute summer	S30	1.003	S31	71.5	1.760	0.305	0.6733	
15 minute summer	S31	1.004	Basin B	68.7	1.376	0.952	0.6608	
15 minute winter	Basin B	1.005	S33	11.9	0.487	0.179	0.5876	
15 minute winter	S33	1.006	S34	8.2	0.773	0.661	0.0430	120.6

Results for 30 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 98.19%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S22	10	46.704	0.139	126.8	0.1983	0.0000	OK
180 minute winter	TANK B2	172	44.776	1.056	45.9	122.8705	0.0000	SURCHARGED
180 minute winter	S26	172	44.776	1.426	33.2	1.6126	0.0000	SURCHARGED
180 minute winter	TANK B1	172	44.776	0.656	37.3	94.1526	0.0000	SURCHARGED
180 minute winter	S23	172	44.775	1.545	37.9	5.3530	0.0000	SURCHARGED
15 minute summer	S29	10	43.951	0.131	56.5	0.1874	0.0000	OK
600 minute winter	S28	765	43.409	0.489	15.0	0.7001	0.0000	SURCHARGED
600 minute winter	S30	765	43.408	0.528	17.3	0.7562	0.0000	SURCHARGED
600 minute winter	S31	765	43.408	1.168	17.3	0.0000	0.0000	FLOOD RISK
600 minute winter	Basin B	765	43.407	1.207	19.8	194.8407	0.0000	FLOOD RISK
600 minute winter	S33	765	43.407	1.237	8.3	2.1850	0.0000	FLOOD RISK
2160 minute summer	S34	2100	42.233	0.083	8.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S22	1.000	S23	126.4	2.141	0.443	2.6097	
15 minute summer	TANK B2	3.000	S26	-107.7	-2.883	-1.169	0.3768	
15 minute summer	S26	2.001	S23	-49.4	-0.701	-0.676	1.9386	
15 minute summer	TANK B1	4.000	S23	-89.1	-1.496	-0.456	2.0358	
180 minute winter	S23	1.001	S28	11.7	0.603	0.130	2.1470	
15 minute summer	S29	5.000	S28	55.7	1.944	0.370	1.1764	
15 minute summer	S28	1.002	S30	70.1	1.630	0.978	0.4176	
15 minute summer	S30	1.003	S31	96.4	1.890	0.411	0.7500	
15 minute summer	S31	1.004	Basin B	94.1	1.411	1.303	0.6608	
15 minute winter	Basin B	1.005	S33	11.8	0.504	0.178	0.5876	
2160 minute summer	S33	1.006	S34	8.2	0.773	0.661	0.0430	722.7

Results for 100 year +5% A Critical Storm Duration. Lowest mass balance: 98.19%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S22	10	46.696	0.130	114.1	0.1867	0.0000	OK
120 minute winter	TANK B2	118	44.582	0.862	58.3	122.6504	0.0000	SURCHARGED
120 minute winter	S26	118	44.581	1.231	43.2	1.3927	0.0000	SURCHARGED
120 minute winter	TANK B1	118	44.582	0.462	35.7	66.3202	0.0000	SURCHARGED
120 minute winter	S23	118	44.581	1.351	43.7	4.6804	0.0000	SURCHARGED
15 minute summer	S29	10	43.943	0.123	50.8	0.1763	0.0000	OK
720 minute summer	S28	810	43.335	0.415	15.4	0.5941	0.0000	SURCHARGED
720 minute summer	S30	810	43.334	0.454	18.2	0.6504	0.0000	SURCHARGED
720 minute summer	S31	810	43.334	1.094	18.2	0.0000	0.0000	SURCHARGED
720 minute summer	Basin B	810	43.333	1.133	20.9	173.0758	0.0000	SURCHARGED
720 minute summer	S33	810	43.333	1.163	8.3	2.0545	0.0000	SURCHARGED
600 minute summer	S34	285	42.233	0.083	8.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S22	1.000	S23	113.6	1.959	0.398	2.5485	
15 minute summer	TANK B2	3.000	S26	-104.0	-2.773	-1.129	0.3768	
15 minute winter	S26	2.001	S23	-50.3	-0.714	-0.688	1.9386	
15 minute summer	TANK B1	4.000	S23	-75.2	-1.327	-0.384	1.9517	
120 minute winter	S23	1.001	S28	10.9	0.665	0.121	1.8764	
15 minute summer	S29	5.000	S28	50.1	1.892	0.333	1.0865	
15 minute summer	S28	1.002	S30	64.0	1.605	0.893	0.3803	
15 minute summer	S30	1.003	S31	88.0	1.909	0.375	0.7200	
15 minute summer	S31	1.004	Basin B	85.3	1.373	1.181	0.6608	
15 minute summer	Basin B	1.005	S33	12.9	0.492	0.195	0.5876	
600 minute summer	S33	1.006	S34	8.2	0.773	0.661	0.0430	325.8

Results for 100 year +45% CC +5% A Critical Storm Duration. Lowest mass balance: 98.19%

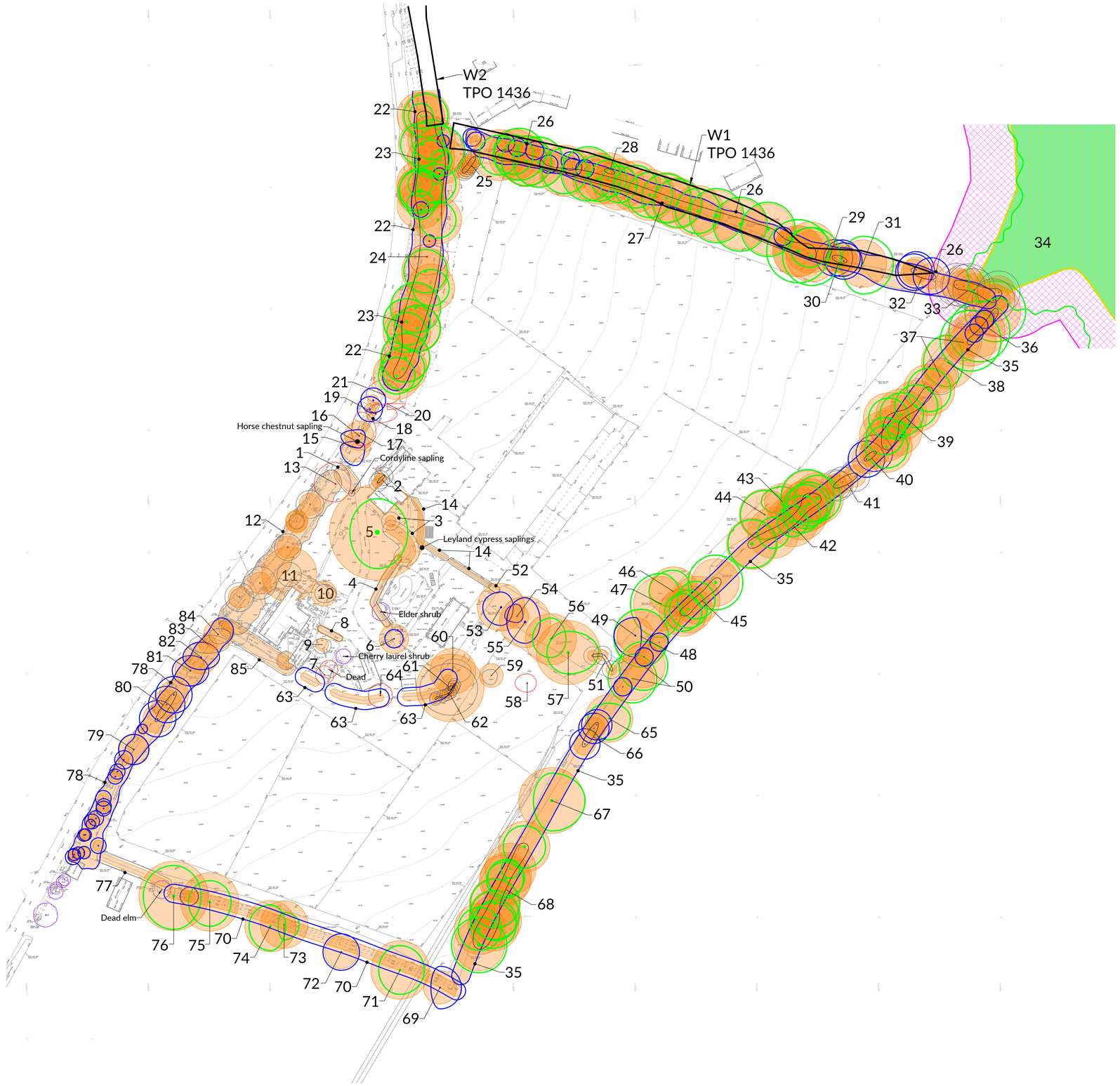
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S22	10	46.744	0.179	165.4	0.2563	0.0000	OK
180 minute winter	TANK B2	172	45.325	1.605	47.4	123.4908	0.0000	FLOOD RISK
180 minute winter	S26	172	45.328	1.978	38.0	2.2371	0.0000	SURCHARGED
180 minute winter	TANK B1	172	45.321	1.201	81.0	172.4256	0.0000	SURCHARGED
180 minute winter	S23	172	45.336	2.106	80.1	7.2963	0.0000	SURCHARGED
15 minute summer	S29	10	43.974	0.154	73.6	0.2198	0.0000	OK
720 minute winter	S28	840	43.607	0.687	16.3	0.9837	0.0000	SURCHARGED
720 minute winter	S30	840	43.607	0.727	18.4	1.0397	0.0000	SURCHARGED
720 minute winter	S31	840	43.606	1.366	18.1	0.0000	0.0000	FLOOD RISK
720 minute winter	Basin B	840	43.605	1.405	20.9	260.0242	0.0000	FLOOD RISK
720 minute winter	S33	840	43.604	1.434	8.3	2.5345	0.0000	FLOOD RISK
720 minute winter	S34	840	42.233	0.083	8.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S22	1.000	S23	164.1	2.575	0.575	2.9180	
15 minute summer	TANK B2	3.000	S26	-121.9	-3.122	-1.324	0.3768	
60 minute summer	S26	2.001	S23	66.9	0.950	0.916	1.9386	
15 minute summer	TANK B1	4.000	S23	-129.7	-1.960	-0.663	2.0358	
180 minute winter	S23	1.001	S28	13.6	0.595	0.151	3.1705	
15 minute summer	S29	5.000	S28	72.7	2.074	0.483	1.4390	
15 minute summer	S28	1.002	S30	88.7	1.636	1.238	0.5420	
15 minute summer	S30	1.003	S31	122.0	1.953	0.521	0.8562	
15 minute summer	S31	1.004	Basin B	120.1	1.705	1.662	0.6608	
30 minute summer	Basin B	1.005	S33	10.3	0.479	0.156	0.5876	
720 minute winter	S33	1.006	S34	8.2	0.773	0.662	0.0431	411.0

Appendix J

Schedule of trees on land at Woodfords, Shipley Road, Southwater, Horsham, West Sussex RH13 9BQ

Tree No.	Species	Ht (m)	Branch Spread (m) N	E	S	W	Stem diameters (cm) Single-Stem	2-5 stems Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	More than 5 stems Mean dia	No. stems	Height of crown clearance (m)	Height of first branch (m) & aspect (compass point)	Age class	Category grading	Root protection radius (m)	Condition Physiological / Structural	Preliminary management recommendations	Root protection radius (m)	Root protection area sq.m
1	Row of Leyland cypress	13av	3av				20av								2	2N	S	C2	>10	Row of outgrown conifers adjoining entrance.		2.40	18
2	Row of Leyland cypress	12av	3av				15av								0	-	S	C2	>10	Row of outgrown conifers adjoining entrance.		1.80	10
3	Leyland cypress hedge	12av	3av				15av								0	-	S	C2	>10	Outgrown hedgerow adjoining lawn.		1.80	10
4	Western red cedar and Leyland cypress hedgerow	3av	1av				10av								0	-	S	C2	>10	Maintains section of hedgerow adjoining lawn.		1.20	5
5	English oak	16	11	10	12	9	154								3	3SE	E	A1	>40	Visually significant broad spreading tree growing adjoining driveway. Previously drastically reduced in size but subsequently regrown. Some decay at those points. Some minor decay between buttress roots.		15.00	707
6	Noble fir	12	3	3	3	3	41								2	2S	Y	B1	>20	Reasonably well formed young tree		4.92	76
7	Norway spruce	13	3	3	3	3	36								0	-	S	U	<10	Distinct lack of vitality.		4.32	59
8	Leyland cypress hedge	2av	1av				10av								0	-	S	C2	>10	Short section of hedgerow adjoining driveway.		1.20	5
9	Weeping birch	4	2	3	3	3	17								2	2S	S	C1	<10	Small tree growing within garden.		2.04	13
10	Apple	5	3	4	3	3	36								2	2E	S	C1	>10	Established fruit tree growing in shrub bed adjoining dwelling.		4.32	59
11	Mulberry	8	4	4	4	4	72								2	2N	S	C1	>10	Established tree growing near dwelling. Drastically reduced in the past.		8.76	241
12	Row of Leyland cypress	14av	4av				30av								0	-	S	C2	>10	Row of mostly outgrown conifers alongside Shipley Road. Some stems have failed and others have died. Includes occasional ash, sycamore and English oak.		3.60	41
13	Ash	15	7	5	6	7	45e								3	3S	E	U	<10	Advanced Ash Dieback. Unsuited to long-term retention. Base of tree smothered in bramble and ivy.		5.40	92
14	Mixed broadleaf hedgerow	2av	1av				5av								0	-	Y	C2	>10	Short section of internal hedgerow. Includes hawthorn, field maple and blackthorn.		0.60	1
15	English oak	14	2	3	6	5	41								2	25W	S	B2	>20	Contributes to row of trees alongside Shipley Road. Some large sections of dead wood in crown.	Remove dead wood in excess of 25mm in diameter.	4.92	76
16	English oak	14	2	2	4	6	39								3	3W	S	B2	>20	Contributes to row of trees alongside Shipley Road. Some large sections of dead wood in crown.	Remove dead wood in excess of 25mm in diameter.	4.68	69
17	Field maple	14	7	5	4	3	40e								2	2N	S	U	<10	Dead. Lower stems smothered in ivy.	Remove.	4.80	72
18	Row of Leyland cypress	3av	1av				5av								0	-	Y	C2	<10	Collection of conifers alongside Shipley Road.		0.60	1
19	English oak	14	3	7	3	3	55e								2	2N	S	U	<10	Dead.	Remove.	6.60	137
20	Ash	13	0	6	2	0	27								2	2S	S	U	<10	Primary failure of main stem. Showing early signs of Ash Dieback.	Remove.	3.24	33
21	English oak	14	5	5	3	6	55e								4	4SW	S	U	<10	Dead. Main stem and crown smothered in ivy.	Remove.	6.60	137
22	Mixed broadleaf hedgerow	6av	2av				15av								0	-	S	B2	>20	Established but outgrown hedgerow along tree line adjoining Shipley Road. Includes hawthorn, hazel, blackthorn, field maple and holly.		1.80	10
23	Row of English oak & ash	18av	11av				65av								3	3E	E	A2	>40	Prominent row of trees alongside Shipley Road. All stems smothered in ivy. Most trees contain some large sections of dead wood.	Remove dead wood in excess of 25mm in diameter.	7.80	191
24	English oak	14	4	7	6	6	55e								7	7S	S	U	<10	Dead.	Remove.	6.60	137
25	Row of Leyland cypress	13av	3av				20av								0	-	S	C2	>10	Row of outgrown conifers in north-western corner of site.		2.40	18
26	Mixed broadleaf hedgerow	6av	3av				15av								0	-	S	B2	>20	Established and sprawling hedgerow of mixed native species including hazel, hawthorn, blackthorn, field maple as well as a small horse chestnut.		1.80	10
27	Row of English oak	18av	11av				70av								2	3S	E	A2	>40	Prominent row of trees along northern boundary of site. All stems smothered in ivy. Some large sections of dead wood within crown.	Remove dead wood in excess of 25mm in diameter.	8.40	222
28	Group of ash	13av	3av				30av								0	-	S	U	<10	Advanced Ash Dieback. Some trees are dead.	Remove.	3.60	41
29	English oak	14	5	4	4	2	55e								7	7S	S	U	<10	Dead. Main stem smothered in ivy.	Remove.	6.60	137
30	Group of English oak	15av	6av				40av								2	2S	S	B2	>20	Small components of tree-belt.		4.80	72
31	English oak	18	9	10	10	7	65e								2	2SE	S	A2	>40	Contributes to linear belt of trees along northern boundary.		7.80	191
32	Group of English oak	12av	6av				35av								2	2S	S	B2	>20	A group of smaller trees contributing to tree-belt on northern boundary.		4.20	55
33	Group of ash	15av	7av				45av								2	2S	S	C2	>10	Group of trees contributing to tree-belt on northern boundary. Showing signs of Ash Dieback.		5.40	92
34	Mixed broadleaf woodland	<19	<10				<60								0	-	E	A2	>40	Small block of woodland outside north-eastern corner of site. Upper canopy consists primarily of English oak and ash. The latter exhibits signs of Ash Dieback. Mixed understorey of hazel, holly, field maple, hawthorn and blackthorn. Delineated at southern edge by ditch.		7.20	163
35	Mixed broadleaf hedgerow	9av	3av				25av								0	-	E	B2	>20	Established but outgrown hedgerow on bank alongside ditch. Mixed species including hawthorn, blackthorn, hazel, holly and field maple.		3.00	28
36	Group of English oak	18av	10av				70av								3	3W	E	A2	>40	Larger components of a tree-belt along the south-eastern boundary of the site. All stems covered in ivy.		8.40	222
37	Pair of ash	17av	6av				45av								3	3E	S	C2	>10	A pair of slender stems growing within tree-belt. Both showing signs of Ash Dieback.		5.40	92
38	English oak	16	9	5	8	8	72								4	4W	E	A2	>40	Contributes to line of trees along south-eastern boundary of site.		8.64	235
39	Row of English oak	17av	10av				70av								2	2W	E	A2	>40	Closely spaced group of trees along south-east boundary of site. All stems smothered in ivy. Group includes occasional field maple.		8.40	222
40	Group of field maple	14av	6av				40av								2	25W	E	B2	>20	Contribute to linear tree-belt along south-east boundary of site.		4.80	72
41	Group of ash	15av	5av				30av								4	4SE	S	C2	>10	Contribute to linear tree-belt along south-east boundary of site. All showing signs of Ash Dieback and unsuited to long-term retention.		3.60	41
42	Group of English oak	18av	11av				70av								3	3NW	E	A2	>40	Closely spaced group of trees growing along south-east boundary of site. Most contains some dead wood within the crown.		8.40	222
43	English oak	15	5	5	4	7	49								3	3W	E	A2	>40	Contributes to tree group at south-eastern boundary of site.		5.88	109
44	English oak	16	8	7	8	8	69								2	2W	E	A2	>40	Stands at edge of group of trees along south-east boundary of site.		8.28	215
45	Row of English oak	17av	9av				65av								4	4SE	E	A2	>40	Closely spaced group of trees along south-east boundary of site.		7.80	191
46	English oak	17	7	6	5	8	67								2	2N	E	A2	>40	Contributing to group of trees along south-east boundary but set slightly remote.		8.04	203
47	English oak	18	10	7	11	10	74								2	2W	E	A2	>40	Contributing to group of trees along south-east boundary but set slightly remote.		8.88	248
48	English oak	17	9	9	10	9	74e								5	5E	E	A2	>40	Contributing to group of trees along south-east boundary but set slightly remote. Ivy covered main stem.		8.88	248
49	English oak	12	6	2	7	7	49								2	2SW	S	B2	>20	Suppressed by adjoining larger tree.		5.88	109
50	Pair of English oak	15av	8av				60av								2	2E	E	A2	>40	Contributing to linear tree group along south-east boundary of site. Most stems covered in ivy.		7.20	163
51	Group of hawthorn	5av	3av				15av								0	-	Y	C2	>10	Possibly remnants of hedgerow.		1.80	10
52	Row of Leyland cypress	3av	1av				10av								0	-	Y	C2	>10	Group of small trees contributing to hedge.		1.20	5
53	English oak	13	5	4	6	6	66								2	2NE	E	B2	>20	Contributes to line of oak trees bisecting fields. Lack of vitality. Some damage to bark on lower stem.		7.92	197
54	English oak	11	4	2	2	4	33								2	2N	S	B2	>20	Contributing to row of trees bisecting fields.		3.96	49
55	English oak	15	8	5	7	6	71								2	2S	E	B2	>20	Contributing to row of trees bisecting fields. Extensive damage to bark on lower stem and some decay.		8.52	228
56	English oak	17	7	5	6	6	71								2	2S	E	A2	>40	Larger and better specimen forming row of trees bisecting fields.		8.52	228
57	English oak	17	7	10	7	7	87								2	2SW	E	A2	>40	Larger and better specimen forming row of trees bisecting fields. Some broken branches and dead wood within crown.		10.44	342
58	Pear	7	3	3	3	4		34	2a						2	2S	E	U	<10	Extensive browsing damage at base. Distinct lack of vitality.		5.14	83
59	Pear	7	2	2	3	3					13	6	2	2S	S	C1	<10	Established tree growing in field. Extensive browsing damage.		3.82	46
60	Pear	9	4	6	4	4		45e	45e				2	2E	E	C1	<10	Growing amidst dense bramble. Ivy smothered main stems.		7.64	183
61	Eucalyptus	17	8	9	9	10		65e	65e				3	3E	E	C1	<10	Established tree growing amidst dense vegetation.		11.03	382
62	Row of Western red cedar	7av	2av				10av						0	-	Y	C2	<10	Group of conifers growing amidst bramble. Lacking vitality.		1.20	5
63	Mixed broadleaf hedgerow	5av	3av				10av						0	-	S	B2	>20	Established but outgrown hedgerow at edge of field. Predominantly blacthorn with some hawthorn, sycamore and field maple.		1.20	5
64	Sycamore															U				Dead.	Remove.	0.00	0
65	English oak	12	5	7	7	7	64								2	2W	E	A2	>40	Contributes to row of trees along south-east boundary of site.		7.68	185
66	Group of mixed broadleaves	10av	5av				30av								0	-	Y	B2	>20	Contributes to row of trees along south-east boundary of site. Slightly larger than the understorey that runs beneath.		3.60	41
67	English oak	16	9	11	10	6	90e								2	2NE	E	A1	>40	Larger tree growing within tree-belt along south east boundary of site. Lower stem partially smothered in ivy. North-westerly crown trimmed to provide clearance from overhead wires.		10.80	366
68	Row of English oak	17av	9av				70av								0	-	E	A2	>40	Closely spaced group of trees on south-east boundary of site. All stems covered in ivy. Crowns trimmed on north-western side to provide clearance from overhead wires.		8.40	222
69	Field maple	13	7	7	7	3	45e								2	2N	S	B2	>20	Contributes to hedge line. Lower stem partially covered in ivy. Grown beyond fence line.		5.40	92
70	Mixed broadleaf hedgerow	6av	3av				15av								0	-	E	B2	>20	Established but outgrown hedgerow. Core of hedge seems to be south of the ditch but some stems lie to the north. Some stems have been reduced in height where the overhead wires pass over.		1.80	10
71	English oak	15	8	8	8	7	80e								3	3NW	E	A1	>40	Larger component of hedge line. Standing within dense vegetation so unable to inspect base.		9.60	290
72	Field maple	12	6	6	6	6	45e								0	-	S	B2	>20	Larger component of hedgerow. Standing amidst dense vegetations hence unable to inspect base.		5.40	92
73	English oak	14	4	5	5	2	65e								2	2N	S	A2	>40	Larger component of hedgerow.		7.80	191
74	English oak	16	7	5	8	7	70e								4	4N	S	A2	>40	Larger component of hedgerow.		8.40	222
75	English oak	14	7	7	8	7	80e								2	2NE	E	A1	>40	Larger component of hedgerow. Main stem covered in ivy.		9.60	290
76	English oak	15	10	9	11	10	95e								2	3N	E	A1	>40	Larger tree growing within hedgerow. Partial loss of vitality. Some large sections of dead wood within crown. Lower stems smothered in ivy.		11.40	408
77	Mixed hedgerow	3av	2av				10av								0	-	Y	C2	>10	Mixed hedgerow along boundary of site. Predominantly Leyland cypress with some blackthorn, hawthorn and elm.		1.20	5
78	Mixed broadleaf hedgerow	9av	3av				15av								0	-	E	B2	>20	Established but outgrown hedgerow alongside Shipley Road. Southern end contains mini elms most of which are dead and need to be removed. Hedge has spread predominantly with blackthorn and would benefit from being brought back under management. Other species include sycamore, field maple, horse chestnut and hawthorn.	Remove dead elms	1.80	10
79	Red horse chestnut	11	5	5	5	5	40e								2	2E	S	B2	>20	Contributes to tree cover alongside Shipley Road. Ivy smothered stem.		4.80	72
80	Group of horse chestnut	14av	6av				40av								2	2E	E	B2	>20	Row of trees contributing to tree cover alongside Shipley Road. All stems covered in Ivy.		4.80	72
81	Horse chestnut	12	5	6	5	6		35e	25e						2	2E	S	B2	>20	Contributes to tree cover alongside Shipley Road. Ivy smothered stems.		5.16	84
82	Red horse chestnut	13	5	6	4	6	45e								0	-	S	B2	>20	Contributes to tree cover alongside Shipley Road. Ivy smothered stems.		5.40	92
83	Gleditsia	14	3	7	3	6		20e	17e						2	2E	S	C1	>10	Contributing to tree cover along Shipley Road. Lower stems covered in ivy.		3.15	31
84	Horse chestnut	9	2	4	3	3	40e								2	2E	S	C2	>10	Contributes to tree cover along Shipley Road but of low vitality. Main stem covered in ivy.		4.80	72
85	Row of Leyland cypress	13av	3av				20av								0	-	S	C2	>10	Row of outgrown conifers at edge of garden.		2.40	18



NORTH

0 5m 10m 25m 50m

NOTES

1. **This tree survey information has been prepared for planning purposes only. Additional detail will be needed for foundation design.**
2. The original of this drawing was produced in colour – a monochrome copy should not be relied upon.
3. Scale for planning purposes only.
4. All dimensions to be checked on site.
5. The copyright of this document resides with Keen Consultants unless assigned in writing by the company.
6. Details shown on this drawing are devised with reference to BS5837:2012:*Trees in relation to design, demolition and construction - Recommendations.*
7. Tree Preservation Order based on Horsham District Council Tree Preservation Order number TPO1436.
8. Ancient Woodland (England) & Priority Habitat Inventory - Deciduous Woodland (England) based on information from MAGIC website.
9. Topographical survey based on Hook Survey Partnership job number S19/7188.
10. Where trees were not identified on the topographical survey they have been plotted by eye.
11. Canopy lines for groups are indicative only and should be confirmed by a topographical survey.

KEY

1. Trees to be considered for retention:
   (Coloured tie indicates extent of canopy)
   - Tree Category A 1,2 or 3 - Trees of high quality
   - Tree Category B 1,2 or 3 - Trees of moderate quality
   - Tree Category C 1,2 or 3 - Trees of low quality
2. Trees unsuitable for retention:
   (Coloured tie indicates extent of canopy)
   - Tree Category U - Trees that cannot realistically be retained due to their condition
3. Protection Areas:
   - Root Protection Area (RPA) (where RPAs overlap the shading will appear darker)
   - W1 Tree Preservation Order (TPO) woodland
   - Minimum 15m buffer to Ancient Woodland
4. Tree/Hedge numbering:
   - 5 Tree number - refer to schedule for information
5. Designations:
   - Ancient and Semi-Natural Woodland
   - Priority Habitat Inventory - Deciduous Woodland (England)

KEY TO TREE SCHEDULE

Column Heading	Explanation
Tree No.	Unique number corresponding with number on plan
Species	English names
Ht (m)	Height in metres
Branch Spread	Crown radius in metres to cardinal points of the compass
Stem Dia	All measurements conform to Annex C of BS 5837:2012 Single stem - Stem diameter in centimetres measured at 1.5m above ground level. Multi-stemmed tree with 2 to 5 stems - Diameter of each stem Multi-stemmed tree with more than 5 stems - Average stem diameter and number of stems
Height of crown clearance	Height in metres between the ground and underside of canopy
Height of first major branch and direction of growth	Height from ground level to base of first major branch and the approximate direction of growth
Abbreviations as suffix to a dimension	Suffix 'e' denotes an estimated dimension Suffix 'av' denotes an average dimension
Age Class	Age Class definitions: Y = Young S = Semi-mature E = Early mature M = Mature O = Over mature
Category grading	Summary of BS 5837: 2012 categorisation: 1. Trees unsuitable for retention: U = those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer that 10 years 2. Trees to be considered for retention: A1, 2 or 3 = trees of high quality (substantial contribution >40 yrs) B1, 2 or 3 = trees of moderate quality (significant contribution >20 yrs) C1, 2 or 3 = trees of low quality (but adequate, ie >10 yrs or young trees - until new planting can be established)
Estimated remaining contribution (yrs)	Note: Useful estimated remaining contribution of the tree or tree group based on figures stated in BS5837:2012
Condition	Brief description including physiological and structural defects
Preliminary management recommendations	Describes current arboricultural requirement for the tree in its current context
Root Protection Radius	Radius of minimum root protection area in metres calculated from section 4.6 and Annex D of BS5837:2012
Root Protection Area	Total area of minimum root protection area extrapolated from root protection radius

Rev	Description	Date
0	Preliminary issue	20.06.25

KEEN CONSULTANTS
The Studio, Timbers,
Gables Road, Church Crookham
Fleet, Hampshire
GU52 6QY
T 01252 850096
mail@keenconsultants.co.uk
keenconsultants.co.uk
Keen Consultants is a trading name of Keen (Europe) Limited. Registered No.: 13945594
Registered office: The Stables, Moneys Farm, Bottle Lane, Mattingley, Hampshire RG27 8LJ

Client
BELLWAY HOMES LIMITED

Project
LAND AT WOODFORDS,
SHIPLEY ROAD, SOUTHWATER

Title
TREE CONSTRAINTS PLAN

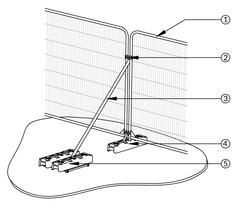
Date	Scale
JUNE 2025	1:500@A0
Drawn by	**Checked by**
ML	JTK

Drawing Number
2463-KC-XX-YTREE-TCP01Rev0

Schedule of trees on land at Woodfords, Shipley Road, Southwater, Horsham, West Sussex RH13 9BQ

Tree No.	Species	Ht (m)	Branch Spread (m) N	E	S	W	Stem diameters (cm) Single Stem	2-5 stems Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	More than 5 stems Mean dia	No. stems	Height of crown clearance (m)	Height of first branch (compass point)	Age class	Category grading	Remaining contribution (yrs)	Condition Physiological / Structural	Tree Works to BS3998	Root protection radius m	Root protection area sq.m
1	Row of Leyland cypress	13av		3av			20av								2	2N	S	C2	>10	Row of outgrown conifers adjoining entrance.	Remove.	2.40	18
2	Row of Leyland cypress	12av		3av			15av								0	-	S	C2	>10	Row of outgrown conifers adjoining entrance.		1.80	10
3	Leyland cypress hedge	12av		3av			15av								0	-	S	C2	>10	Outgrown hedgerow adjoining lawn.	Remove.	1.80	10
4	Western red cedar and Leyland cypress hedgerow	3av		1av			10av								0	-	S	C2	>10	Maintains section of hedgerow adjoining lawn.	Remove.	1.20	5
5	English oak	16	11	10	12	9	154								3	3SE	E	A1	>40	Visually significant broad spreading tree growing adjoining driveway. Previously drastically reduced in size but subsequently regrown. Some decay at those points. Some minor decay between buttress roots.		15.00	707
6	Noble fir	12	3	3	3	3	41								2	2S	Y	B1	>20	Reasonably well formed young tree	Remove.	4.92	76
7	Norway spruce	13	3	3	3	3	36								0	-	S	U	<10	Distinct lack of vitality.	Remove.	4.32	59
8	Leyland cypress hedge	2av		5av			10av								0	-	S	C2	>10	Short section of hedgerow adjoining driveway.	Remove.	1.20	5
9	Weeping birch	4	2	3	3	3	17								2	2S	S	C1	>10	Small tree growing within garden.	Remove.	2.04	13
10	Apple	5	3	4	3	3	36								2	2E	S	C1	>10	Established fruit tree growing in shrub bed adjoining dwelling.		4.32	59
11	Mulberry	8	4	4	4	4	73								2	2N	S	C1	>10	Established tree growing near dwelling. Drastically reduced in the past.		8.76	241
12	Row of Leyland cypress	14av		4av			30av								0	-	S	C2	>10	Row of mostly outgrown conifers alongside Shipley Road. Some stems have failed and others have died. Includes occasional ash, sycamore and English oak.		3.60	41
13	Ash	15	7	5	6	7	45e								3	3S	E	U	<10	Advanced Ash Dieback. Unsuited to long-term retention. Base of tree smothered in bramble and ivy.	Remove.	5.40	92
14	Mixed broadleaf hedgerow	2av		1av			5av								0	-	Y	C2	>10	Short section of internal hedgerow. Includes hawthorn, field maple and blackthorn.	Remove.	0.60	1
15	English oak	14	2	3	6	5	41								2	2SW	S	B2	>20	Contributes to row of trees alongside Shipley Road. Some large sections of dead wood in crown.	Remove dead wood in excess of 25mm in diameter.	4.92	76
16	English oak	14	2	2	4	6	39								3	3W	S	B2	>20	Contributes to row of trees alongside Shipley Road. Some large sections of dead wood in crown.	Remove dead wood in excess of 25mm in diameter.	4.68	69
17	Field maple	14	7	5	4	3	40e								2	2N	S	U	<10	Dead. Lower stems smothered in ivy.		4.80	72
18	Row of Leyland cypress	3av		1av			5av								0	-	Y	C2	>10	Collection of conifers alongside Shipley Road.		0.60	1
19	English oak	14	3	7	3	3	55e								2	2N	S	U	<10	Dead.		6.60	137
20	Ash	13	0	6	2	0	27								2	2S	S	U	<10	Primary failure of main stem. Showing early signs of Ash Dieback.		3.24	33
21	English oak	14	5	5	3	6	55e								4	4SW	S	U	<10	Dead. Main stem and crown smothered in ivy.		6.60	137
22	Mixed broadleaf hedgerow	6av		2av			15av								0	-	S	B2	>20	Established but outgrown hedgerow along tree line adjoining Shipley Road. Includes hawthorn, hazel, blackthorn, field maple and holly.	Remove section as shown.	1.80	10
23	Row of English oak & ash	18av		11av			65av								3	3E	E	A2	>40	Prominent row of trees alongside Shipley Road. All stems smothered in ivy. Most trees contain some large sections of dead wood.	Remove dead wood in excess of 25mm in diameter. Remove 4 stems as shown.	7.80	191
24	English oak	14	4	7	6	6	55e								7	7S	S	U	<10	Dead.		6.60	137
25	Row of Leyland cypress	13av		3av			20av								0	-	S	C2	>10	Row of outgrown conifers in north-western corner of site.		2.40	18
26	Mixed broadleaf hedgerow	6av		3av			15av								0	-	S	B2	>20	Established and sprawling hedgerow of mixed native species including hazel, hawthorn, blackthorn, field maple as well as a small horse chestnut.		1.80	10
27	Row of English oak	18av		11av			70av								2	3S	E	A2	>40	Prominent row of trees along northern boundary of site. All stems smothered in ivy. Some large sections of dead wood within crown.	Remove dead wood in excess of 25mm in diameter.	8.40	222
28	Group of ash	13av		3av			30av								0	-	S	U	<10	Advanced Ash Dieback. Some trees are dead.		3.60	41
29	English oak	14	5	4	4	2	55e								7	7S	S	U	<10	Dead. Main stem smothered in ivy.		6.60	137
30	Group of English oak	15av		6av			40av								2	2S	S	B2	>20	Small components of tree-belt.		4.80	72
31	English oak	18	9	10	10	7	65e								2	2SE	S	A2	>40	Contributes to linear belt of trees along northern boundary.		7.80	191
32	Group of English oak	12av		6av			35av								2	2S	S	B2	>20	A group of smaller trees contributing to tree-belt on northern boundary.		4.20	55
33	Group of ash	15av		7av			45av								2	2S	S	C2	>10	Group of trees contributing to tree-belt on northern boundary. Showing signs of Ash Dieback.		5.40	92
34	Mixed broadleaf woodland	<19		<10			<60								0	-	E	A2	>40	Small block of woodland outside north-eastern corner of site. Upper canopy consists primarily of English oak and ash. The latter exhibits signs of Ash Dieback. Mixed understorey of hazel, holly, field maple, hawthorn and blackthorn. Delineated at southern edge by ditch.		7.20	163
35	Mixed broadleaf hedgerow	9av		3av			25av								0	-	E	B2	>20	Established but outgrown hedgerow on bank alongside ditch. Mixed species including hawthorn, blackthorn, hazel, holly and field maple.		3.00	28
36	Group of English oak	18av		10av			70av								3	3W	E	A2	>40	Larger components of a tree-belt along the south-eastern boundary of the site. All stems covered in Ivy.		8.40	222
37	Pair of ash	17av		6av			45av								3	3E	S	C2	>10	A pair of slender stems growing within tree-belt. Both showing signs of Ash Dieback.		5.40	92
38	English oak	16	9	5	8	8	72								4	4W	E	A2	>40	Contributes to line of trees along south-eastern boundary of site.		8.64	235
39	Row of English oak	17av		10av			70av								2	2W	E	A2	>40	Closely spaced group of trees along south-east boundary of site. All stems smothered in Ivy. Group includes occasional field maple.		8.40	222
40	Group of field maple	14av		6av			40av								2	2SW	E	B2	>20	Contribute to linear tree-belt along south-east boundary of site.		4.80	72
41	Group of ash	15av		5av			30av								4	4SE	S	C2	>10	Contribute to linear tree-belt along south-east boundary of site. All showing signs of Ash Dieback and unsuited to long-term retention.		3.60	41
42	Group of English oak	18av		11av			70av								3	3NW	E	A2	>40	Closely spaced group of trees growing along south-east boundary of site. Most contains some dead wood within the crown.		8.40	222
43	English oak	15	5	5	4	7	49								3	3W	E	A2	>40	Contributes to tree group at south-eastern boundary of site.		5.88	109
44	English oak	16	8	7	8	8	69								2	2W	E	A2	>40	Stands at edge of group of trees along south-east boundary of site.		8.28	215
45	Row of English oak	17av		9av			65av								4	4SE	E	A2	>40	Closely spaced group of trees along south-east boundary of site.		7.80	191
46	English oak	17	7	6	5	8	67								2	2N	E	A2	>40	Contributing to group of trees along south-east boundary but set slightly remote.		8.04	203
47	English oak	18	10	7	11	10	74								2	2W	E	A2	>40	Contributing to group of trees along south-east boundary but set slightly remote.		8.88	248
48	English oak	17	9	9	10	9	74e								5	5E	E	A2	>40	Contributing to group of trees along south-east boundary but set slightly remote. Ivy covered main stem.		8.88	248
49	English oak	12	6	2	7	7	49								2	2SW	S	B2	>20	Suppressed by adjoining larger tree.		5.88	109
50	Pair of English oak	15av		8av			60av								2	2E	E	A2	>40	Contributing to linear tree group along south-east boundary of site. Most stems covered in Ivy.		7.20	163
51	Group of hawthorn	5av		3av			15av								0	-	Y	C2	>10	Possibly remnants of hedgerow.	Remove 1 stem as shown.	1.80	10
52	Row of Leyland cypress	3av		1av			10av								0	-	Y	C2	>10	Group of small trees contributing to hedge.	Remove.	1.20	5
53	English oak	13	5	4	6	6	66								2	2NE	E	B2	>20	Contributes to line of oak trees bisecting fields. Lack of vitality. Some damage to bark on lower stem.		7.92	197
54	English oak	11	4	2	2	4	33								2	2N	S	B2	>20	Contributing to row of trees bisecting fields.		3.96	49
55	English oak	15	8	5	7	6	71								2	2S	E	B2	>20	Contributing to row of trees bisecting fields. Extensive damage to bark on lower stem and some decay.		8.52	228
56	English oak	17	7	5	6	6	71								2	2S	E	A2	>40	Larger and better specimen forming row of trees bisecting fields.		8.52	228
57	English oak	17	7	10	7	7	87								2	2SW	E	A2	>40	Larger and better specimen forming row of trees bisecting fields. Some broken branches and dead wood within crown.		10.44	342
58	Pear	7	3	3	3	4		34	26						2	2S	E	U	<10	Extensive browsing damage at base. Distinct lack of vitality.	Remove.	5.14	83
59	Pear	7	2	2	3	3							13	6	2	2S	S	C1	>10	Established tree growing in field. Extensive browsing damage.	Remove.	3.82	46
60	Pear	9	4	6	4	4		45e	45e						2	2E	E	C1	>10	Growing amidst dense bramble. Ivy smothered main stems.	Remove.	7.64	183
61	Eucalyptus	17	8	9	9	10		65e	65e						3	3E	E	C1	>10	Established tree growing amidst dense vegetation.	Remove.	11.03	382
62	Row of Western red cedar	7av		2av			10av								0	-	Y	C2	>10	Group of conifers growing amidst bramble. Lacking vitality.	Remove.	1.20	5
63	Mixed broadleaf hedgerow	5av		3av			10av								0		S	B2	>20	Established but outgrown hedgerow at edge of field. Predominantly blackthorn with some hawthorn, sycamore and field maple.	Remove.	1.20	5
64	Sycamore																U			Dead.	Remove.	0.00	0
65	English oak	12	5	7	7	7	64								2	2SW	E	A2	>40	Contributes to row of trees along south-east boundary of site.		7.68	185
66	Group of mixed broadleaves	10av		5av			30av								0	-	Y	B2	>20	Contributes to row of trees along south-east boundary of site. Slightly larger than the understorey that runs beneath.		3.60	41
67	English oak	16	9	11	10	6	90e								2	2NE	E	A1	>40	Larger tree growing within tree-belt along south east boundary of site. Lower stem partially smothered in Ivy. North-westerly crown thinned to provide clearance from overhead wires.		10.80	366
68	Row of English oak	17av		9av			70av								0	-	E	A2	>40	Closely spaced group of trees on south-east boundary of site. All stems covered in Ivy. Crowns trimmed on north-western side to provide clearance from overhead wires.		8.40	222
69	Field maple	13	7	7	7	3	45e								2	2N	S	B2	>20	Contributes to hedge line. Lower stem partially covered in Ivy. Grown beyond fence line.		5.40	92
70	Mixed broadleaf hedgerow	6av		3av			15av								0	-	E	B2	>20	Established but outgrown hedgerow. Core of hedge seems to be south of the ditch but some stems lie to the north. Some stems have been reduced in height where the overhead wires pass over.		1.80	10
71	English oak	15	8	8	8	7	80e								3	3NW	E	A1	>40	Larger component of hedge line. Standing within dense vegetation so unable to inspect base.		9.60	290
72	Field maple	12	6	6	6	6	45e								0	-	S	B2	>20	Larger component of hedgerow. Standing amidst dense vegetations hence unable to inspect base.		5.40	92
73	English oak	14	4	5	5	2	65e								2	2N	S	A2	>40	Larger component of hedgerow.		7.80	191
74	English oak	16	7	5	8	7	70e								4	4N	S	A2	>40	Larger component of hedgerow.		8.40	222
75	English oak	14	7	7	8	7	80e								2	2NE	E	A1	>40	Larger component of hedgerow. Main stem covered in Ivy.		9.60	290
76	English oak	15	10	9	11	10	95e								2	3N	E	A1	>40	Larger tree growing within hedgerow. Partial loss of vitality. Some large sections of dead wood within crown. Lower stems smothered in Ivy.		11.40	408
77	Mixed hedgerow	3av		2av			10av								0	-	Y	C2	>10	Mixed hedgerow along boundary of site. Predominantly Leyland cypress with some blackthorn, hawthorn and elm.		1.20	5
78	Mixed broadleaf hedgerow	9av		3av			15av								0	-	E	B2	>20	Established but outgrown hedgerow alongside Shipley Road. Southern end contains mini elms most of which are dead and need to be removed. Hedge has spread predominantly with blackthorn and would benefit from being brought back under management. Other species include sycamore, field maple, horse chestnut and hawthorn.	Remove dead elms.	1.80	10
79	Red horse chestnut	11	5	5	5	5	40e								2	2E	S	B2	>20	Contributes to tree cover alongside Shipley Road. Ivy smothered stem.		4.80	72
80	Group of horse chestnut	14av		6av			40av								2	2E	E	B2	>20	Row of trees contributing to tree cover alongside Shipley Road. All stems covered in Ivy.		4.80	72
81	Horse chestnut	12	5	6	5	6		35e	25e						2	2E	S	B2	>20	Contributes to tree cover alongside Shipley Road. Ivy smothered stems.		5.16	84
82	Red horse chestnut	13	5	6	4	6	45e								0	-	S	B2	>20	Contributes to tree cover alongside Shipley Road. Ivy smothered stems.		5.40	92
83	Gleditsia	14	3	7	3	6		20e	17e						2	2E	S	C1	>10	Contributing to tree cover along Shipley Road. Lower stems covered in Ivy.		3.15	31
84	Horse chestnut	9	2	4	3	3	40e								2	2E	S	C2	>10	Contributes to tree cover along Shipley Road but of low vitality. Main stem covered in Ivy.		4.80	72
85	Row of Leyland cypress	13av		3av			20av								0	-	S	C2	>10	Row of outgrown conifers at edge of garden.		2.40	18

Figure 1: Example of a protective barrier



1. Steel mesh panel
2. Connectors fitted to secure panels
3. Diagonal strut
4. Block feet to avoid driven scaffold poles
5. Block tray weighted with blocks

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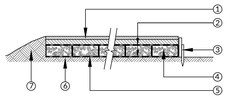
Figure 3: Typical detail of 'no-dig' surfacing



1. Surface material to engineer's specifications
2. Geotextile separation fabric as specified by engineers
3. Treated timber edging supported on timber posts or concrete gravel boards supported on concrete spur posts if required
4. 40/20mm clean angular stone
5. Cellular confinement system to engineer's specification and depth
6. Existing ground levels retained (no excavation)
7. Soil fillet can be used as edges

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NOTES

1. **This tree survey information has been prepared for planning purposes only. Additional detail will be needed for foundation design.**
2. The original of this drawing was produced in colour – a monochrome copy should not be relied upon.
3. Scale for planning purposes only.
4. All dimensions to be checked on site.
5. The copyright of this document resides with Keen Consultants unless assigned in writing by the company.
6. Details shown on this drawing are devised with reference to BS5837:2012:*Trees in relation to design, demolition and construction - Recommendations.*
7. Tree Preservation Order based on Horsham District Council Tree Preservation Order number TPO1436.
8. Ancient Woodland (England) & Priority Habitat Inventory – Deciduous Woodland (England) based on information from MAGIC website.
9. Topographical survey based on Hook Survey Partnership job number S19/718B.
10. Where trees were not identified on the topographical survey they have been plotted by eye.
11. Canopy lines for groups are indicative only and should be confirmed by a topographical survey.
12. Proposed layout based on dha architecture ltd Presentation Planning Layout drawing number 102108-BEL-SL-01.
13. Proposed drainage layout based on Ardent Concept Drainage Strategy drawing 2108061_B-ACE-XX-XX-DR-C-0501_Drainage Strategy.
14. Proposed levels based on Ardent Concept Levels Strategy drawing number 2108061_B-ACE-XX-XX-DR-C-0101-A.

KEY

- Existing site features
- Proposed layout
- Proposed drainage
- Proposed levels
- Trees retained (Green-coloured line indicates extent of canopy)
- Trees for removal (Red-coloured dash line indicates extent of canopy)
- 2.0m high barrier as detail in Figure 1 (Temporary, for the duration of works)
- Minimum extent of no-dig construction. Actual deployment may be greater. As detail in Figure 3
- W1 Tree Preservation Order (TPO) woodland

KEY TO TREE SCHEDULE

Column Heading	Explanation
Tree No.	Unique number corresponding with number on plan
Species	English names
Ht (m)	Height in metres
Branch Spread	Crown radius in metres to cardinal points of the compass
Stem Dia	All measurements conform to Annex C of BS 5837:2012 Single stem - Stem diameter in centimetres measured at 1.5m above ground level. Multi-stemmed tree with 2 to 5 stems - Diameter of each stem Multi-stemmed tree with more than 5 stems - Average stem diameter and number of stems
Height of crown clearance	Height in metres between the ground and underside of canopy
Height of first major branch and direction of growth	Height from ground level to base of first major branch and the approximate direction of growth
Abbreviations as suffix to a dimension	Suffix 'e' denotes an estimated dimension Suffix 'av' denotes an average dimension
Age Class	Age Class definitions: Y = Young S = Semi-mature E = Early mature M = Mature O = Over mature
Category grading	Summary of BS 5837: 2012 categorisation: 1. Trees unsuitable for retention: U = those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer that 10 years 2. Trees to be considered for retention: A1, 2 or 3 = trees of high quality (substantial contribution >40 yrs) B1, 2 or 3 = trees of moderate quality (significant contribution >20 yrs) C1, 2 or 3 = trees of low quality (but adequate, ie >10 yrs or young trees – until new planting can be established)
Estimated remaining contribution (yrs)	Note: Useful estimated remaining contribution of the tree or tree group based on figures stated in BS5837:2012
Condition	Brief description including physiological and structural defects
Tree Works	Works required to be undertaken to the trees to facilitate the construction or remediate a defect encountered during the survey
Root Protection Radius	Radius of minimum root protection area in metres calculated from section 4.6 and Annex D of BS5837:2012
Root Protection Area	Total area of minimum root protection area extrapolated from root protection radius

Rev	Description	Date
A	Latest levels overlay	05.09.25
0	Preliminary issue	21.08.25

KEEN CONSULTANTS
Keen Consultants is a trading name of Keen (Europe) Limited. Registered No.: 12641584
Registered office: The Stables, Moneys Farm, Battle Lane, Mattingley, Hampshire RG27 8LJ

The Studio, Timbers,
Gables Road, Church Crookham
Fleet, Hampshire
GU52 6QY
T 01252 850096
mail@keenconsultants.co.uk
keenconsultants.co.uk

Client
BELLWAY HOMES LIMITED (SOUTH LONDON)

Project
WOODFORDS, SHIPLEY ROAD, SOUTHWATER, HORSHAM

Title
TREE PROTECTION PLAN

Date	Scale
AUG 2025	1:500@A0
Drawn by ML	Checked by JTK

Drawing Number
2463-KC-XX-YTREE-TPP01RevA

Appendix K

Pollution hazard indices for different land use classifications (land use shaded grey applicable for the development)

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
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, home zones 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 (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. 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	High	0.8	0.8	0.9

Indicative SuDS mitigation indices for discharges to surface waters (SuDS components shaded grey applicable to this development)

	Mitigation indices		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bio retention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	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.		

Indicative SuDS mitigation indices for discharges to groundwater

(SuDS components shaded grey applicable to this development)

	Mitigation indices		
Characteristic of the material overlying the proposed infiltration surface, through which the runoff percolates	**TSS**	**Metals**	**Hydro-carbons**
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.6	0.5	0.6
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
Infiltration trench underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.4	0.4
Constructed permeable paving underlain by a soil with a good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7
Bio retention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Indicative SuDS mitigation indices for discharges to surface waters – Catchment A

For surface water discharge from Residential Parking Areas and Low Traffic Roads <300 traffic movements/day			
	Required mitigation indices		
Source	**TSS**	**Metals**	**Hydrocarbons**
Low	0.5	0.4	0.4
Proposed Drainage			
Detention Basin	0.5	0.5	0.6
Swale	0.5	0.6	0.6
Total	0.5 + (0.5 x 0.5) =0.75	0.5 + (0.6 x 0.5) =0.8	0.6 + (0.6 x 0.5) =0.9
Check	+0.25	+0.40	+0.50

Total SuDS mitigation index = mitigation index$_1$ + (0.5 x mitigation index$_2$) + (0.5 x mitigation index$_3$)….

Indicative SuDS mitigation indices for discharges to surface waters – Catchment B

For surface water discharge from Residential Parking Areas and Low Traffic Roads <300 traffic movements/day			
	Required mitigation indices		
Source	**TSS**	**Metals**	**Hydrocarbons**
Low	0.5	0.4	0.4
Proposed Drainage			
Detention Basin	0.5	0.5	0.6
Swale	0.5	0.6	0.6
Total	0.5 + (0.5 x 0.5) =0.75	0.5 + (0.6 x 0.5) =0.8	0.6 + (0.6 x 0.5) =0.9
Check	+0.25	+0.40	+0.50

Total SuDS mitigation index = mitigation index$_1$ + (0.5 x mitigation index$_2$) + (0.5 x mitigation index$_3$)….

Appendix L

Maintenance and Management

The Sustainable Drainage Systems (SuDS) within individual plots will be privately maintained by the respective homeowners, while the connecting pipework is intended to be adopted and maintained by the water authority. As construction has not yet commenced, there is currently no formal mechanism in place to confirm or enforce homeowner maintenance responsibilities. The developer will ensure that the necessary maintenance obligations for the SuDS are clearly set out in the property deeds or relevant homeowner guidance to support long-term functionality. Coordination with the water authority will also be undertaken to ensure that responsibilities between private and adoptable infrastructure are clearly delineated and do not result in gaps in maintenance.

The indicative maintenance requirements for each proposed SuDS component is given below. Taken from CIRIA report C753 "The SuDS Manual".

Drainage Pipes

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove sediment and debris from inspection chambers and hydrobrake chambers	Annually
	Cleaning of gutters and any filters on downpipes	Annually
	Remove any root ingress	As required
Occasional Maintenance	CCTV survey of drains to check alignment, cracking and joint displacement	10 year intervals

Basins

Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut the grass – to retain grass height within specified design range	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions, if required	As required or if bare soil is exposed over > 10% of the filter strip area
Remedial Actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Attenuation Tank

Maintenance Period	Maintenance Task	Frequency
Maintenance Work	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial Work	Repair/rehabilitate inlets, outlets, overflows and vents	As required.
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually.
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.