

BELLWAY HOMES LTD

WOODFORDS, SHIPLEY ROAD

SOUTHWATER, HORSHAM

DRAINAGE TECHNICAL NOTE

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

April 2026

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2108061_B-ACE-XX-XX-RP-C-0001

April 2026

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
A	DRAFT ISSUE	DC	TR	BB	15/09/25
B	FINAL ISSUE	DC	TR	JM	06/10/25
C	UPDATED TO SUIT LLFA COMMENTS	PMA	TR	JM	16/01/26
D	UPDATED TO SUIT LLFA COMMENTS	DC	TR	BB	05/02/26
E	UPDATED TO REVISED LAYOUT	DC	TR	JM	30/02/26
F	UPDATED TO REVISED LAYOUT	PMA	JM	JM	02/04/26

Revision E: Appendix A, Appendix H, Appendix I and Table 3-3 updated to revised layout

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 District Council (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 Environmental'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 West Sussex County Council (WSCC); 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. At the stage of the development the benefits of rainwater harvesting cannot be quantified due to the lack of data on regular daily demand for non-potable water from surface water runoff. Communal systems are not widely accepted due to adoption and maintenance issues and are therefore not relied upon to provide attenuation.

- 3.4. 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.

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

- 3.5. 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

- 3.6. 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.
- 3.7. 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.
- 3.8. 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

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

Table 3-1: C753 SuDS Hierarchy, Site Assessment

Type:	Store Water for Re-use
Constraints:	At the stage of the development the benefits of rainwater harvesting cannot be quantified due to the lack of data on regular daily demand for non-potable water from surface water runoff. Communal systems are not widely accepted due to adoption and maintenance issues and are therefore no relied upon to provide attenuation. Water butts do not guarantee storage will always be available.
Opportunities:	Potential to install water butts to support domestic watering during dry periods.
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.

Proposed Surface Water Drainage Strategy

3.10. 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.

3.11. 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.

3.12. 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.**

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

	1 in 2 YEAR	Q_{Bar}	1 in 30 YEAR	1 in 100 YEAR
GREENFIELD RATE PER HECTARE (l/s/ha)	6.70	7.70	18.40	24.40

3.13. 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.**

3.14. 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.

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

3.16. 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 has been measured as 1.55ha. In line with West Sussex County Council preferences, an allowance of 10% has been provided for urban creep on the

houses and the urban curtilages. This equates to 5% of the total impermeable area, therefore input as 5% within the additional area of the Flow calculations.

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

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

Table 3-3 Drainage Design with Catchments

Catchment	Developable Area (ha)	Impermeable Area (ha)	Impermeable Area (ha) + Urban Creep	Discharge rate based on Q_{Bar} (l/s)	Attenuation Storage Required (m^3)
A	1.74	0.96	1.01	13.40	1,028
B	1.06	0.59	0.62	8.20	555

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

3.20. 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 **1,613m³**, as shown in **Table 3-3**.

3.21. The stormwater networks serving each catchment will be conveyed via pipework to their respective outfalls. A ditch-to-ditch connection is proposed to outfall the surface water runoff to the existing watercourse. A plan indicating this detail is included in **Appendix J**.

Ancient Woodland Buffer and Root Protection Area (RPA)

3.22. An ancient woodland is located north east of the proposed site, in which the ancient woodland buffer overlaps with the SuDS features of the site to create an enhanced buffer from the ancient woodland; refer to **Appendix K**.

3.23. 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.

3.24. 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.

3.25. 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

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

3.27. 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 L**. 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

3.28. 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.

3.29. 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.

3.30. A plan indicating the exceedance flow paths has been provided in **Appendix N**.

Maintenance During Construction

3.31. 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

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

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

3.34. All of the plot drainage will remain private.

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

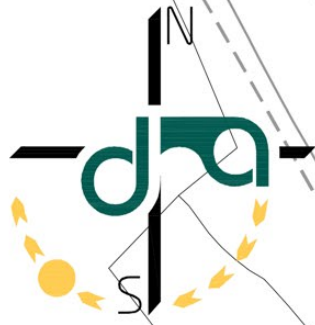
4. Foul Water Drainage

- 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
 - $4000 \times 73 = 292,000$
 - $312000/86400 = 3.38 \text{ l/s}$
- 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 is 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



Landscaping to be updated



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D 27.02.26 SP Footpath between plots 57-28-59 increased. Footpath added in front of plot 58.
C 14.01.26 SP Layout updated to latest drainage strategy.
B 08.01.26 MT Units 55 - 73 repositioned to LA comments.
A 22.09.25 SP Units 22-24 pushed back and road widened.
rev date by details

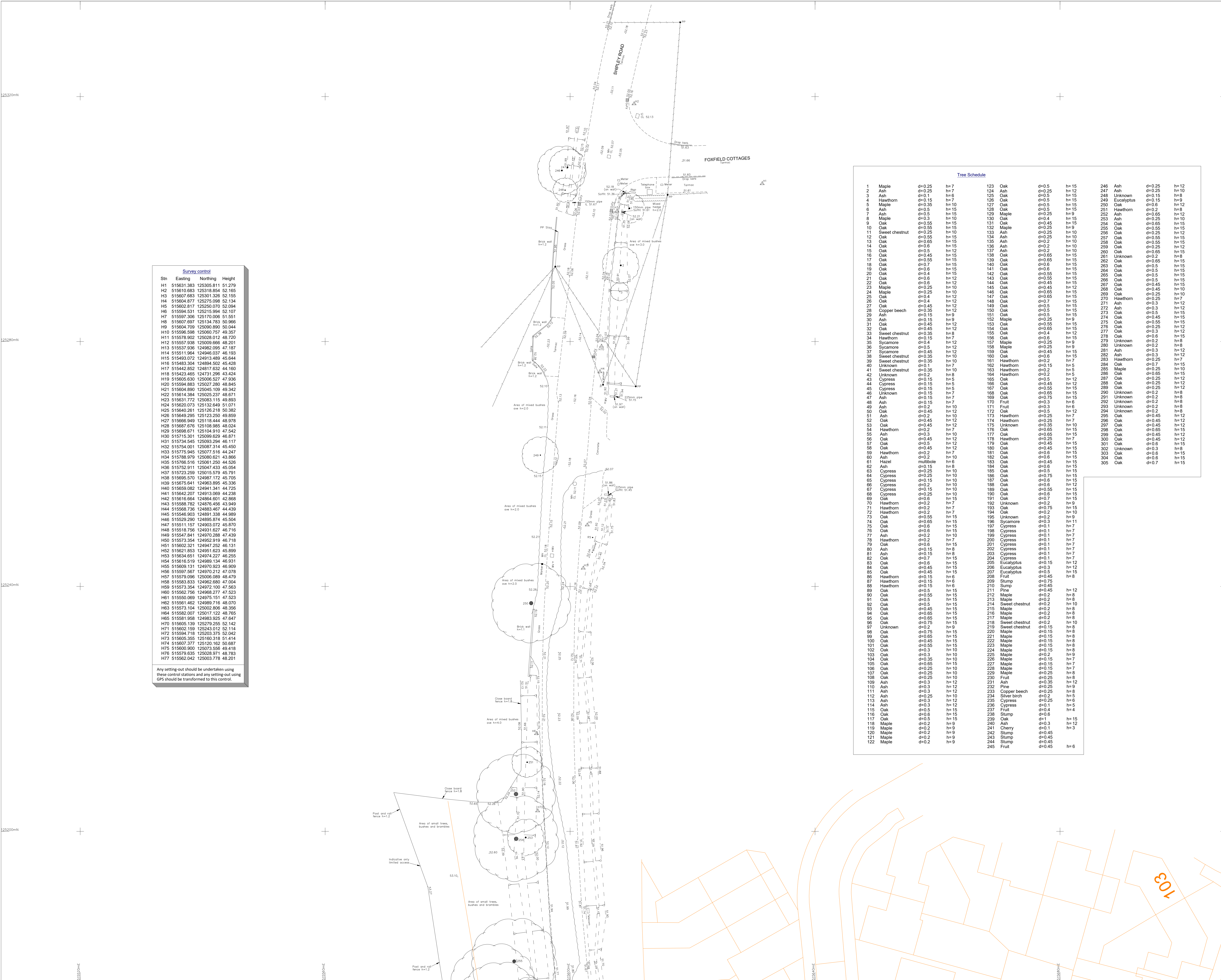
Presentation Planning Layout

reference 102108-BEL-SL-01

09.09.2025 created
1:500 @ A1 scaling
Jeh contact

E revision

Appendix B



Survey control		
Stn	Easting	Northing
H1	515631.383	125305.811
H2	515610.683	125318.854
H3	515607.683	125301.326
H4	515604.877	125275.088
H5	515602.817	125250.070
H6	515594.531	125215.994
H7	515597.306	125170.006
H8	515607.697	125134.763
H9	515604.709	125090.890
H10	515596.288	125060.757
H11	515576.902	125028.012
H12	515557.338	125009.666
H13	515537.936	124982.065
H14	515511.964	124946.037
H15	515493.072	124913.489
H16	515463.304	124884.502
H17	515442.852	124817.632
H18	515423.465	124731.296
H19	515405.630	125006.527
H20	515594.883	125027.280
H21	515604.890	125045.109
H22	515614.384	125025.237
H23	515631.772	125083.115
H24	515620.073	125132.649
H25	515640.251	125120.219
H26	515649.295	125123.250
H27	515666.949	125118.444
H28	515687.076	125108.985
H29	515698.671	125104.910
H30	515715.301	125099.629
H31	515724.545	125093.294
H32	515754.001	125087.314
H33	515775.945	125077.516
H34	515798.979	125080.621
H35	515766.516	125061.250
H36	515732.911	125047.433
H37	515723.259	125015.570
H38	515695.570	124987.172
H39	515675.641	124963.895
H40	515659.082	124941.341
H41	515642.207	124913.069
H42	515616.864	124864.001
H43	515598.782	124876.456
H44	515568.736	124883.467
H45	515546.903	124891.336
H46	515529.290	124896.874
H47	515511.157	124903.072
H48	515518.736	124931.627
H49	515547.941	124970.286
H50	515573.354	124952.919
H51	515602.321	124947.252
H52	515621.853	124951.623
H53	515634.651	124974.227
H54	515616.519	124989.134
H55	515609.131	124970.923
H56	515597.567	124970.212
H57	515579.096	125006.089
H58	515583.533	124962.680
H59	515573.354	124972.100
H60	515562.736	124968.277
H61	515550.969	124976.151
H62	515561.462	124989.716
H63	515573.104	125002.806
H64	515582.207	125017.122
H65	515581.958	124983.925
H70	515605.139	125279.255
H71	515602.159	125243.012
H72	515594.718	125203.375
H73	515605.355	125160.316
H74	515607.377	125120.162
H75	515600.900	125073.556
H76	515579.636	125028.971
H77	515562.042	125003.778

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=0.45	h=12
27	Oak	d=0.45	h=12
28	Copper beech	d=0.35	h=9
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=0.15	h=7
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=0.15	h=7
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	Ash	d=0.2	h=10
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=0.15	h=7
56	Oak	d=0.45	h=12
57	Oak	d=0.45	h=12
58	Oak	d=0.45	h=12
59	Hawthorn	d=0.2	h=7
60	Ash	d=0.15	h=7
61	Hazel	d=0.45	h=10
62	Ash	d=0.15	h=7
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=0.15	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=0.55	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=0.3	h=12
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
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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=0.15	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=15
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=0.12	h=8
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=0.15	h=7
161	Hawthorn	d=0.2	h=7
162	Hawthorn	d=0.15	h=7
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	Unknown	d=0.2	h=12
173	Hawthorn	d=0.25	h=7
174	Hawthorn	d=0.25	h=7
175	Unknown	d=0.3	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	Fruit	d=0.75	h=15
210	Stump	d=0.45	h=6
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=0.3	h=3
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	h=6
243	Stump	d=0.45	h=6
244	Stump	d=0.45	h=6
245	Fruit	d=0.45	h=6

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Hook Survey Legend

Hedge Telephone line

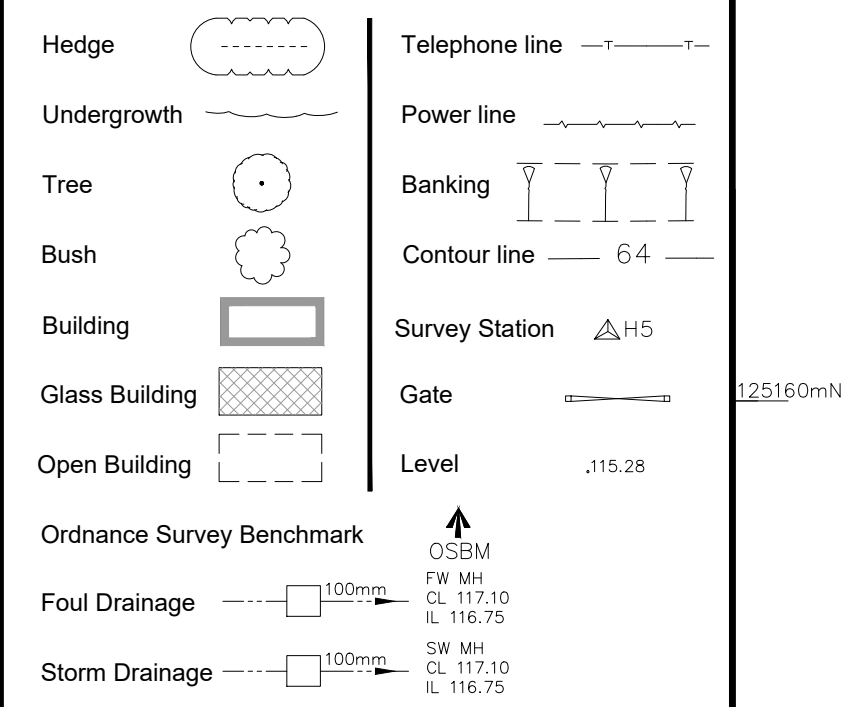
Undergrowth Power line

Tree Banking

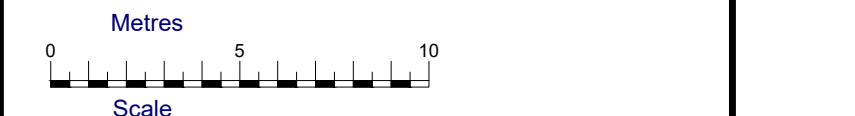
Bush Contour line

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Hook Survey Legend

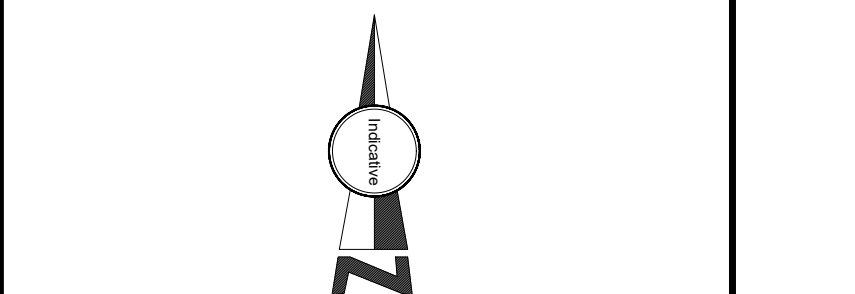


Abbreviations	
Animal Set	Sett
Air Valve	AV
Bowhole	BH
Bus Stop	BS
Cover Level	CL
Earth Road	ER
Electricity Pole	EP
Fire Hydrant	FH
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	RNP
Power Pole	PP
Rain water Pipe	RWP
Road Sign	RS
Rodding Eye	RE
Reinforced Steel Joint	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

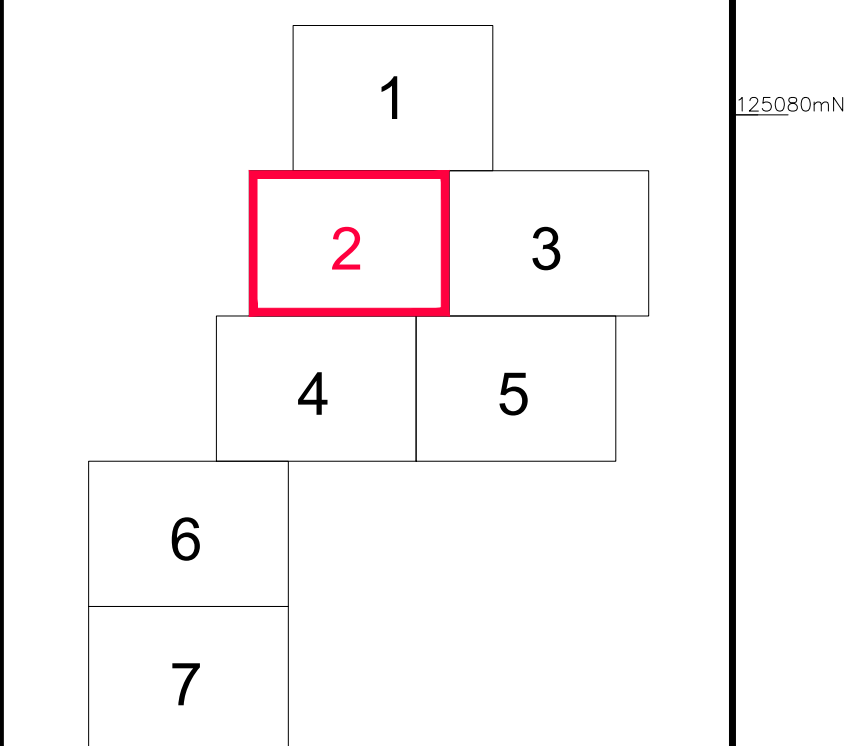


Notes
All trees are identified where possible.
Species, spread, height and girth are indicative only.
Drainage has been surveyed where found, and traced where possible.
Eaves and ridge heights of surrounding buildings have been surveyed where possible.

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.: S197188
Scale: 1:200
Date: July 2019
Revision: C
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, H53 & H60 are true Ordnance Survey positions.

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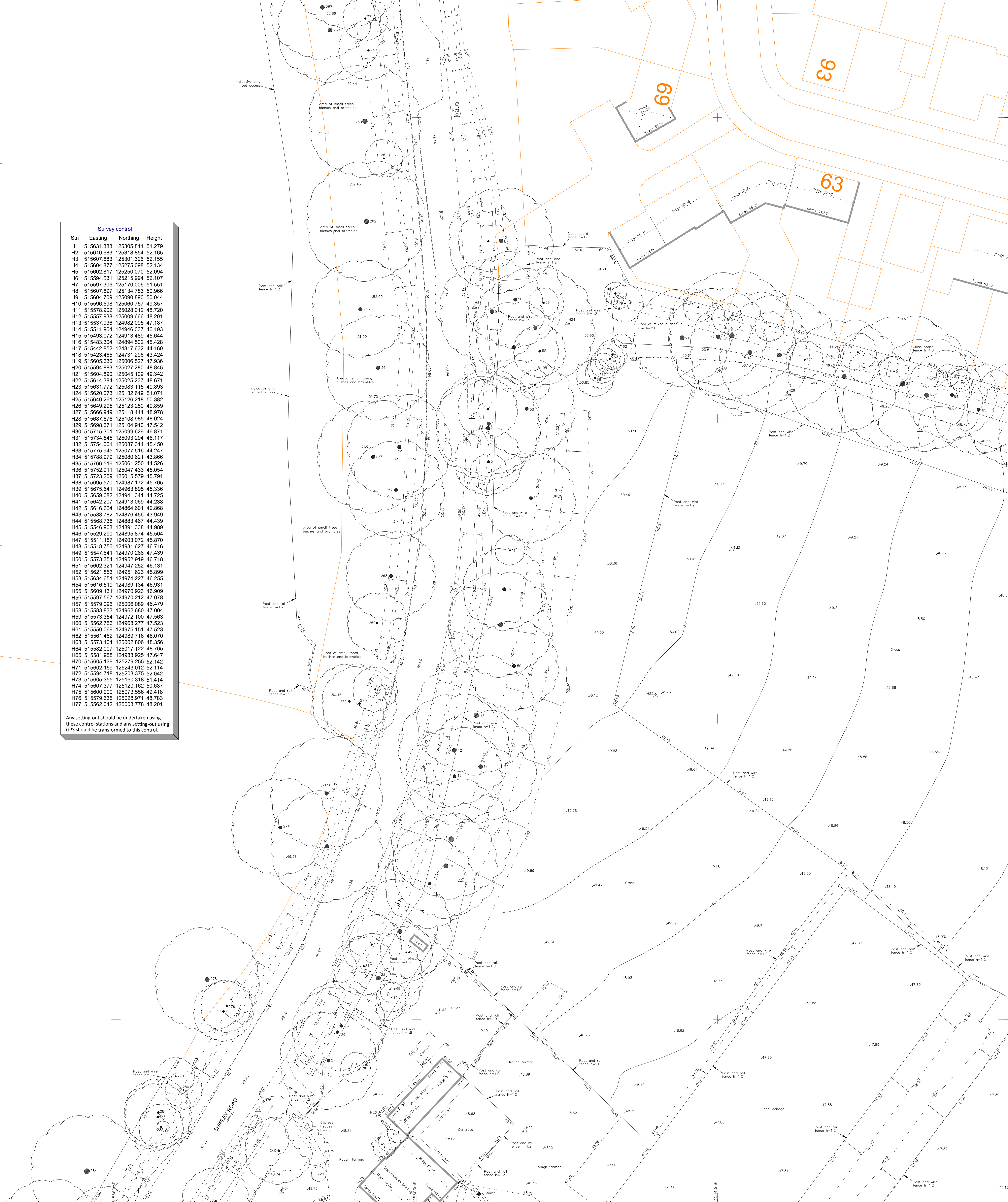


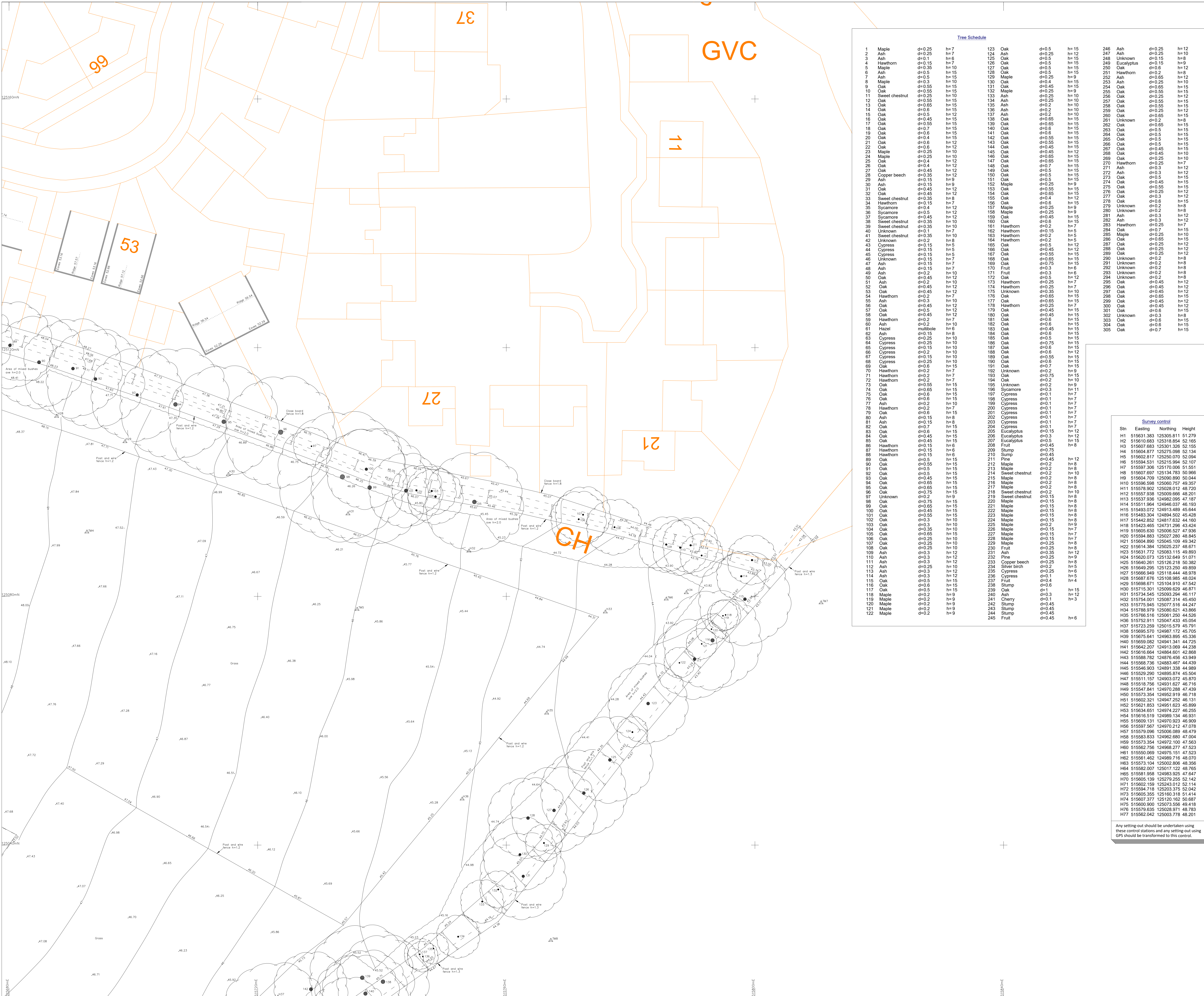
Tree Schedule			
1	Maple	d=0.25	h=7
2	Ash	d=0.25	h=7
3	Ash	d=0.1	h=6
4	Hawthorn	d=0.15	h=7
5	Maple	d=0.35	h=10
6	Ash	d=0.5	h=15
7	Ash	d=0.5	h=15
8	Maple	d=0.3	h=10
9	Oak	d=0.55	h=15
10	Oak	d=0.55	h=15
11	Sweet chestnut	d=0.25	h=10
12	Oak	d=0.55	h=15
13	Oak	d=0.65	h=15
14	Oak	d=0.6	h=15
15	Oak	d=0.5	h=12
16	Oak	d=0.45	h=15
17	Oak	d=0.55	h=15
18	Oak	d=0.7	h=15
19	Oak	d=0.5	h=15
20	Oak	d=0.4	h=15
21	Oak	d=0.6	h=12
22	Maple	d=0.25	h=10
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=0.3	h=7
35	Sycamore	d=0.4	h=12
36	Sycamore	d=0.35	h=10
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	Oak	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	Oak	d=0.45	h=12
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=0.15	h=8
64	Cypress	d=0.25	h=10
65	Cypress	d=0.15	h=8
66	Cypress	d=0.2	h=10
67	Cypress	d=0.15	h=10
68	Cypress	d=0.15	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=0.85	h=15
96	Oak	d=0.75	h=15
97	Unknown	d=0.2	h=8
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=8
119	Maple	d=0.2	h=8
120	Maple	d=0.2	h=8
121	Maple	d=0.2	h=8
122	Maple	d=0.2	h=8

Survey control

Stn	Easting	Northing	Height
H1	515631.383	125305.811	51.279
H2	515610.883	125318.854	52.165
H3	515607.683	125301.328	52.155
H4	515604.877	125275.098	52.134
H5	515602.817	125260.070	52.094
H6	515594.531	125215.994	52.107
H7	515597.306	125170.008	51.551
H8	515607.697	125134.763	50.866
H9	515604.709	125090.890	50.044
H10	515606.588	125060.757	49.357
H11	515578.902	125020.012	48.720
H12	515557.938	125009.666	48.201
H13	515537.936	124982.095	47.187
H14	515511.964	124948.037	46.103
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	49.845
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	125099.626	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	124913.089	44.239
H42	515616.664	124864.601	42.868
H43	515588.782	124876.456	43.949
H44	515568.736	124863.467	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	48.718
H51	515602.321	124947.252	46.131
H52	515621.853	124951.623	45.899
H53	515634.651	124974.227	48.255
H54	515616.519	124889.134	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	124966.277	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	49.416
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=0.45	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=0.65	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=0.55	h=15	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
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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=0.65	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=8	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
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42	Unknown	d=0.2	h=8	164	Hawthorn	d=0.2	h=8	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=5	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
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56	Oak	d=0.45	h=12	178	Hawthorn	d=0.25	h=7	301	Oak	d=0.6	h=15
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59	Hawthorn	d=0.2	h=7	181	Oak	d=0.6	h=15	304	Oak	d=0.6	h=15
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63	Cypress	d=0.25	h=10	185	Oak	d=0.5	h=15				
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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=0.15	h=10	191	Oak	d=0.7	h=15				
70	Hawthorn	d=0.2	h=7	192	Unknown	d=0.2	h=8				
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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				
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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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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=15				
87	Hawthorn	d=0.15	h=6	209	Stump	d=0.75	h=15				
88	Hawthorn	d=0.15	h=6	210	Stump	d=0.45	h=12				
89	Oak	d=0.5	h=15	211	Pine	d=0.45	h=8				
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=0.6	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=8	219	Sweet chestnut	d=0.2	h=10				
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				
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102	Oak	d=0.3	h=10	224	Maple	d=0.15	h=8				
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104	Oak	d=0.35	h=10	226	Maple	d=0.15	h=7				
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110	Ash	d=0.3	h=12	232	Pine	d=0.25	h=9				
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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				
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120	Maple	d=0.2	h=9	242	Stump	d=0.45	h=15				
121	Maple	d=0.2	h=9	243	Stump	d=0.45	h=15				
122	Maple	d=0.2	h=9	244	Stump	d=0.45	h=15				
				245	Fruit	d=0.45	h=6				

Survey control		
Stn	Easting	Height
H1	151631.383	125305.811
H2	151610.683	125318.854
H3	151607.683	125301.326
H4	151604.044	125296.157
H5	151602.817	125250.070
H6	151594.531	125212.954
H7	151597.398	125200.974
H8	151597.694	125173.783
H9	151604.709	125090.890
H10	151596.988	125060.575
H11	151578.902	125028.012
H12	151557.938	125009.666
H13	151557.036	124992.095
H14	151551.964	124946.307
H15	151493.072	124913.489
H16	151463.304	124894.502
H17	151442.852	124871.632
H18	151423.465	124731.296
H19	151005.100	125006.527
H20	151094.883	125027.180
H21	151004.890	125045.109
H22	151614.384	

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Hook Survey Legend

Hedge

Undergrowth

Tree

Bush

Building

Glass Building

Open Building

Ordnance Survey Benchmark

Ford Drainage

Storm Drainage

Telephone line

Power line

Banking

Contour line 6:4

Survey Station

Gate

Level

OSBM

FB 14.75

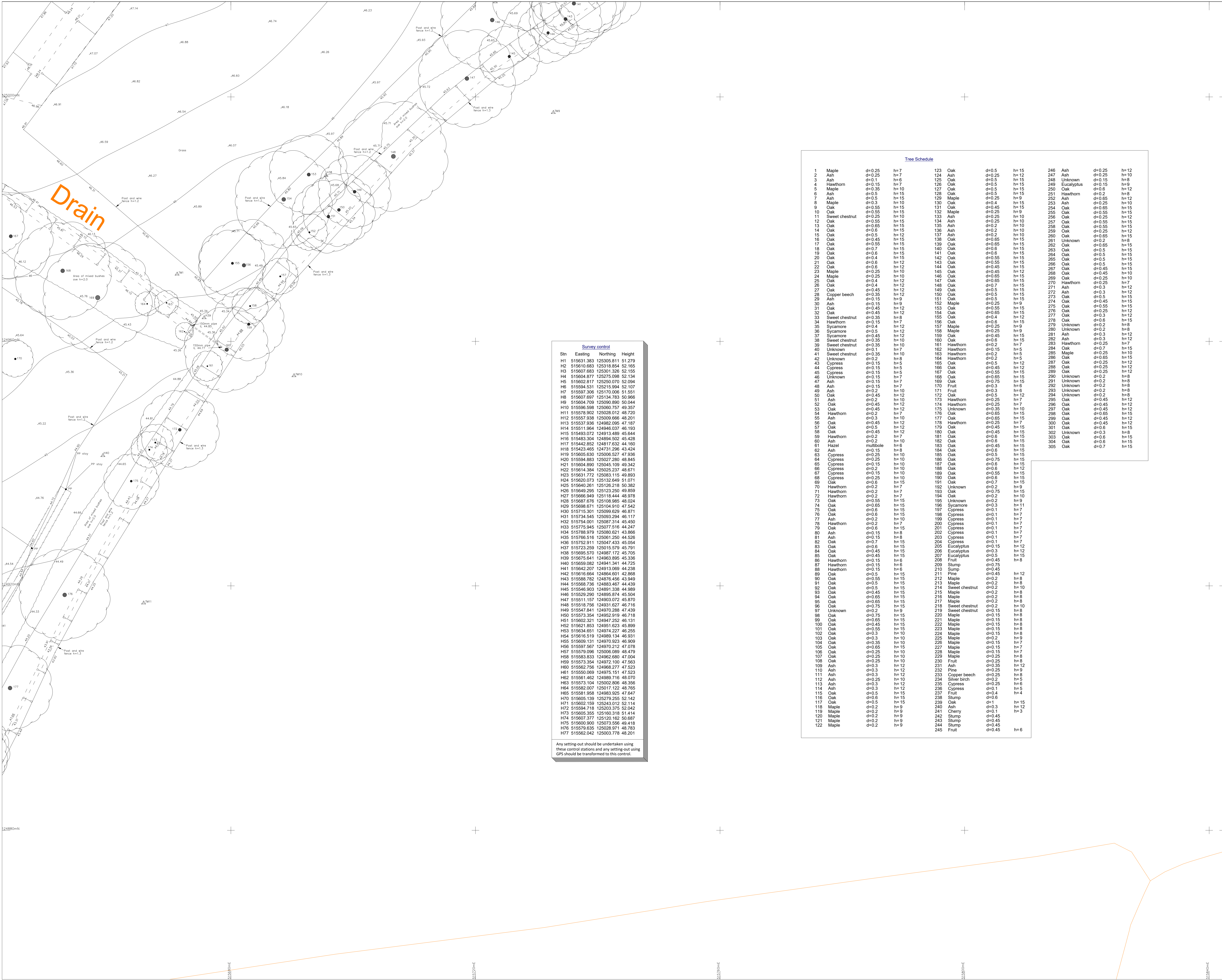
SW 16.75

SW 17.75

SW 18.75

Abbreviations

Animal Set	Set
Air Valve	AV
Borehole	BH
Bus Stop	BS
Cover Level	CL
Earth Rod	ER
Electricity Pole	EP
Fire Hydrant	h=8
Inspection Cover	IC
Invert Level	IL
Lamp Post	LP
Manhole	MH
Marker	MK
Name Plate	NRP
Power Pole	RWP
Road Sign	RS
Roading Eye	RE
Reinforced Steel Joint	RSJ
Soil Vent Pipe	SVP
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	Stump
Trill Hole	TH
Unstable To Lift	UTL
Vent Pipe	VP
Water Valve	WV



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Hook Survey Legend

Hedge
Undergrowth
Tree
Bush
Building
Glass Building
Open Building

Telephone line
Power line
Banking
Contour line 6.4
Survey Station
Gate
Level

Ordnance Survey Benchmark
Foul Drainage
Storm Drainage

Abbreviations

Animal Set
Air Valve
Borehole
Bus Stop
Cover Level
Earth Rod
Electricity Pole
Fire Hydrant
Inspection Cover
Invert Level
Lamp Post
Manhole
Marker
Name Plate
Power Pole
Rain water Pipe
Road Sign
Rodding Eye
Reinforced Steel Joint
Soil Vent Pipe
Stop Valve
Survey Station
Telegraph Pole
Tree Stump
Trial Hole
Unable To Lift
Vent Pipe
Water Valve

Sett
AV
BH
BS
CL
ER
EP
FH
IC
IL
LP
MH
NRP
PP
RWP
RS
RE
RSJ
SV
SV
STN
TP
Stump
TN
UTL
VP
WV

0 5 10 Metres
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, per colour 30.

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Sheet Layout

1
2
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:
Woodforde, 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 H15, H55 & H60 are true Ordnance Survey positions.

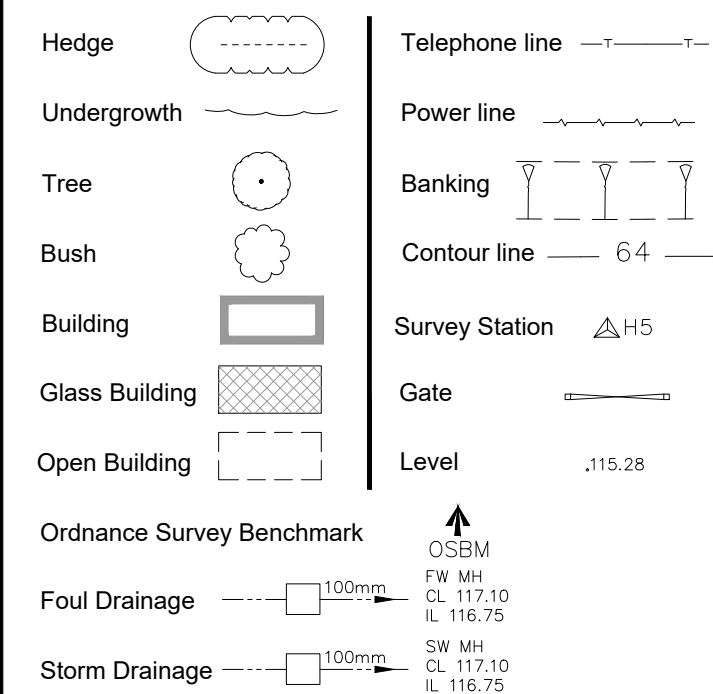
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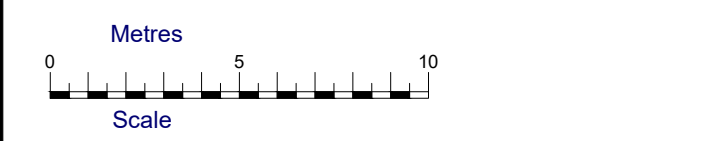
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Hook Survey Legend



Abbreviations

Animal Set	Sett
Air Valve	AV
Bonhole	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	SV
Stop Valve	SV
Survey Station	STN
Telegraph Pole	TP
Tree Stump	ST
Trail Hole	TH
Unable To Lift	UTL
Vent Pipe	VP
Water Valve	WV

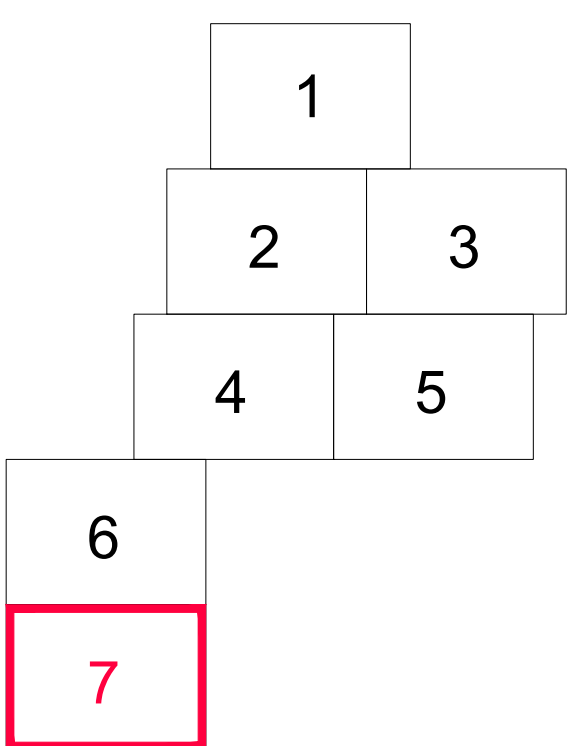


Notes

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

HOO K S U R V E Y

Land & Building Surveyors
www.hooksurvey.com

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

Client :
Reside Developments Ltd

Drawing title :
Topographical Survey

Job No. : S197188
Dwg No. : S197188/07
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
H25, H59 & H60 are true Ordnance Survey positions.

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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=8	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
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				245	Fruit	d=0.45	h=6				

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

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APPENDIX I – Approach to the Selection of Generic Assessment Criteria

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 inaccessible 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 1997¹, as being a Geotechnical Category I 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 I 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 information² 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 Investigation³.

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 LCRM⁴ 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 1997-2:2007⁵.

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.