ARDENT
CONSULTING ENGINEERS
AN EMPLOYEE OWNED COMPANY

ESQUIRE DEVELOPMENTS

BLACKTHORN FARM, CULVERSTONE GREEN

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

REPORT REF.
2500770-ACE-XX-XX-RP-C-0301

July 2025

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Distribution

1. Introduction

Preface

1.1 Ardent Consulting Engineers (hereafter referred to as Ardent) has been commissioned by Esquire Developments to prepare a Flood Risk Assessment and Drainage Strategy for a proposed residential development at Blackthorn Farm, Culverstone Green (hereafter referred to as the "Site").

1.2 The contents of this FRA assess the implications of flood risk on the proposed development. This FRA has been prepared with specific reference to the requirements of National Planning Policy Framework (NPPF – December 2024) and the Planning Practice Guidance, which superseded the Technical Guidance to the NPPF (PPG - March 2014 – flood risk section updated in July 2022).

1.3 A Sustainable Drainage Strategy has also been included within this document to demonstrate how surface water flows from the development will be managed appropriately.

2. Baseline Parameters

Existing Site

2.1 The site is located to the north-west of Culverston Green immediately adjacent to the A227, covering an area of roughly 5.4 hectares. Refer to **Figure 2-1**.

Figure 2-1: ***Location Plan***

2.2 The site is both bounded and accessed from the west by the A227. To the north of the site are commercial units, with other units situated to the east and south west. The south of the development is bounded by a wooded area.

2.3 The site is currently utilised as paddocks, with the exception of a single dwelling in the southern part of the site and its access road.

Development Proposals

2.4 The proposed development will comprise 100 residential units situated in the main field with the southern and eastern field being retained for landscaping and SuDS management.

2.5 The proposed site area will be 5.4ha with 3.78ha in soft landscaping and 1.63ha of hardstanding.

2.6 Development proposals can be found in **Appendix A.**

Topography

2.7 The site currently falls from South-west (166.3mAOD) to North-east (148.0mAOD).

2.8 A topographical surveys are included in **Appendix B**.

Hydrology

2.9 There are no existing water features within the site or it's vicinity.

Ground Conditions

2.10 According to the British Geological Survey 1:50,000 scale geological mapping available online, the bedrock geology comprises the Lewes Nodular Chalk Formation. Superficial geology is recorded as clay-with-flints Formation - clay, silt, sand and gravel, for the majority of the site with the eastern field indicating no superficial geology.

2.11 According to Department for the Environment, Food and Rural Affairs (DEFRA) 'Magic Maps', the site is shown to be underlain by an aquifer. DEFRA's 'Magic Maps' indicates the Site is located within Zone III (Total Catchment) as shown in **Figure 2-2**.

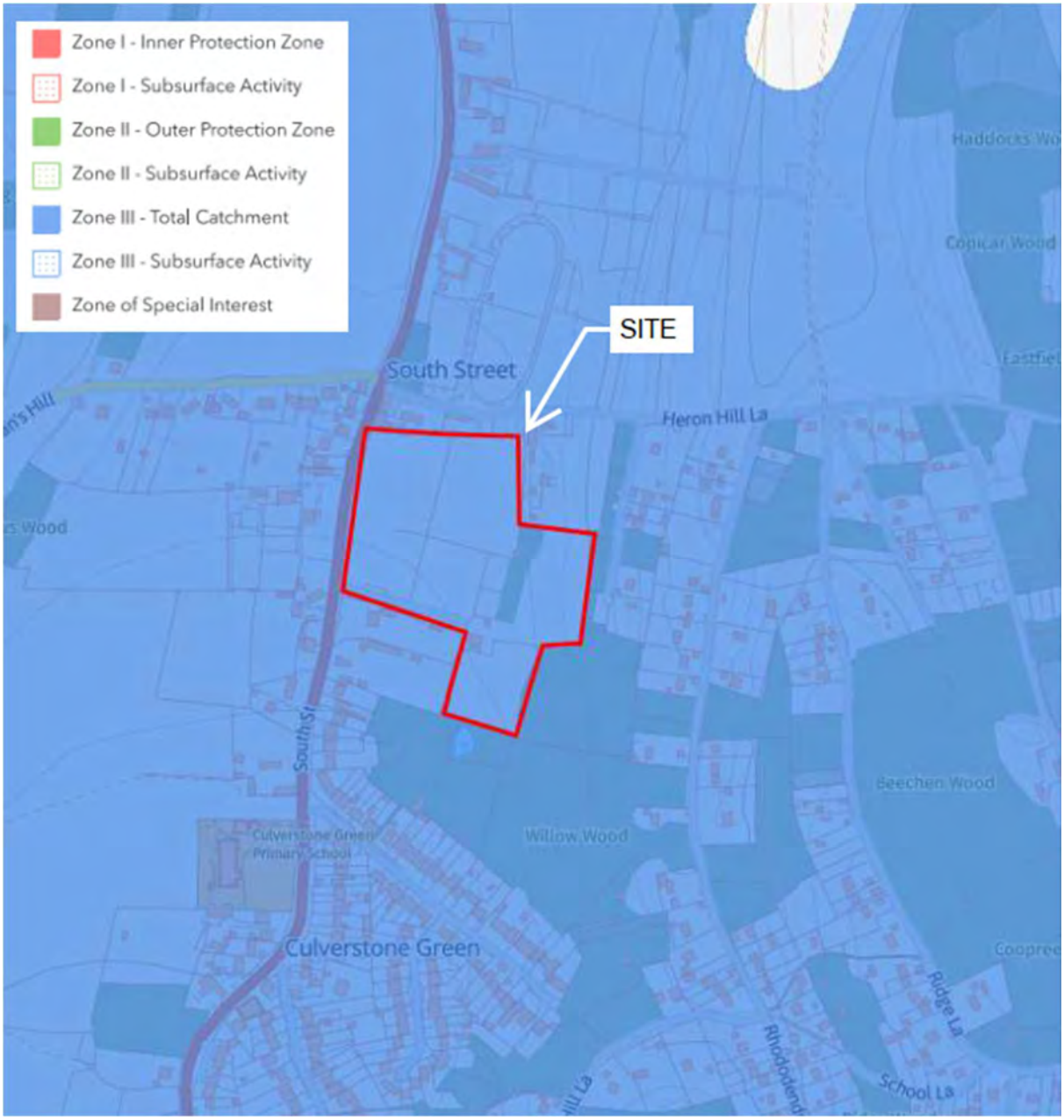

Figure 2-2: *Magic Maps* Source Protection Zone *Map*

Existing Sewer Infrastructure

2.12 Referring to the topographical survey, this indicates that the hardstanding and dwelling has no formal surface water drainage features and therefore is assumed to fall with the existing surface levels from South-west to North-east.

2.13 There is a Southern Water foul sewer located in the A227 to the west of the site running south to north. However there are no surface water sewers in the vicinity of the development. Refer to **Appendix C** for the Southern Water Asset Plans.

Policy Context

National Planning policy Framework

2.14 The National Planning Policy Framework (NPPF) was introduced on 27 March 2012. This document was revised most recently in December 2024; where paragraphs 170 to 182 inclusive establish the Planning Policy relating to flood risk management.

2.15 It states all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – to avoid where possible, flood risk to people and property. They should do this and manage residual risk, by:

a) applying the sequential test, and if necessary, the exception test;

b) safeguarding land from development that is required for current and future flood management;

c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and

d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development including housing, to more sustainable locations.

2.16 The NPPF states that a Flood Risk Assessment is required "*A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use*."

2.17 The Planning Practice Guidance (PPG) provides the methodology required to undertake the Sequential and Exception Tests.

Flood and Water Management Act (2010)

2.18 The Flood and Water Management Act places a duty on all flood risk management authorities to co-operate with each other. The act also provides

lead local flood authorities and the Environment Agency with a power to request information required in connection with their flood risk management functions.

Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems (March 2015)

2.19 The Non-statutory technical standards for sustainable drainage systems were published in March 2015. They should be used in conjunction with the Planning Practice Guidance. In addition, the Best Practice Guidance for the Non-statutory technical standards were published in July 2015 by LASOO.

2.20 The Local Planning Authority (LPA) may set local requirements for planning permission that have the effect of more stringent requirements than these non-statutory technical standards.

2.21 In addition, SuDS should be designed in accordance with CIRIA 753 SuDS Manual, which represents current best practice.

Kent – Making it Happen - Sustainability

2.22 Kent's guidance on the form of drainage sets out the Drainage principles which should be applied to each development.

(a) impermeable areas are kept to a minimum;

(b) surface runoff is managed at its source, where practicable;

(c) surface runoff is managed on the surface, where practicable;

(d) public space is used and integrated with the drainage system, where it serves more than one property;

(e) design is cost-effective to operate and maintain over the design life of the development,

(f) design of the drainage system accounts for the likely impacts of: climate change and changes in impermeable area, over the design life of the development;

(g) the system is designed to have minimal on/offsite impact if the system's capacity is exceeded during extreme weather events; and,

(h) there is proper access for the maintenance of all elements of the system. We also require that the surface water strategy for a new development should mimic, wherever possible, the natural existing runoff conditions and utilise,

wherever feasible, the existing drainage channels and surface water pathways. Drainage measures should be at the surface where possible.

Gravesham Local Plan Core Strategy (2014)

Flood Risk

2.23 The Gravesham Local Plan Core Strategy includes Policy CS 18 relating to climate change which specifies:

2.24 *With the exception of the previously developed sites along the Thames Riverside (see Policies CS03, CS04 and CS05) and those other regeneration sites which have already been evaluated in accordance with the sequential and exception tests at the application stage, development will be directed sequentially to those areas at least risk of flooding.*

2.25 *Proposals in areas at risk of flooding must be accompanied by a Flood Risk Assessment (in accordance with national policy and Environment Agency standing guidance as appropriate) and a Flood Risk Management Plan (if required) to demonstrate that they are adequately defended and safe over their lifetime. Planning permission will be refused for schemes which do not pass the sequential and exception tests.*

2.26 *The Council will prioritise the maintenance, improvement or replacement of flood defence infrastructure over other land uses where relevant. In addition to meeting their 20 own flood defence and management needs, the Council will expect new development to take advantage of opportunities to reduce the causes and impacts of flooding from all sources where it is technically and financially feasible.*

Water Quality

2.27 *As part of its approach to climate change and environmental improvement, the Council will have regard to the delivery of the Water Framework Directive and associated Thames River Basin Management Plan objectives to support water bodies being progressively improved to "good" status over the plan period.*

Sustainable Drainage and Surface Water Run-Off

2.28 *The Council will seek to minimise the impact of drainage from new development on waste water systems. In particular, the Council will:*

- *Require that surface water run-off from all new development has, as a minimum, no greater adverse impact than the existing use; and*

• Require the use of Sustainable Drainage Systems on all developments where technically and financially feasible.

Climate Change Allowances

2.29 The Planning Practice Guidance states that to allow for the predicted impacts of climate change on surface water runoff within the Medway Management Catchment, the following increases detailed in **Table 2-2** below to rainfall intensity should be allowed for. For development with a lifetime of between 2061 and 2100, the central allowances should be used.

Table 2-1: Adur and Ouse Management Catchment peak rainfall allowances

London Management Catchment	Central Allowance	Upper End Allowance
3.3% annual exceedance rainfall event		
Total potential change 2050s	20%	35%
Total potential change 2070s	20%	35%
1% annual exceedance rainfall event		
Total potential change 2050s	20%	45%
Total potential change 2070s	20%	40%

2.30 Therefore, in line with guidance from the NPPG, an allowance of 40% for the effects of climate change for the 1% annual exceedance rainfall event would achieve the policy requirements in designing the drainage elements the proposed redevelopment.

3. Sources of Flooding

3.1. The NPPF requires flood risk from the following sources to be assessed, each of which are assessed separately below:

- Fluvial sources (river flooding);
- Tidal sources (flooding from the sea);
- Groundwater sources;
- Pluvial sources (flooding resulting from overland flows);
- Sewer Flooding;
- Artificial sources, canals, reservoirs etc.; and,
- It also requires the risk from increases in surface water discharge to be assessed (surface water management).

Fluvial - Flood Zone Designation

3.2. Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. The NPPF Planning Practice Guidance defines Flood Zones as follows:

- **Flood Zone 1: Low Probability**. Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
- **Flood Zone 2: Medium Probability**. Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map).
- **Flood Zone 3a: High Probability.** Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
- **Flood Zone 3b: The functional Floodplain**. This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:

- land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
- land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

3.3. According to the Environment Agency's Flood map for planning, as illustrated in **Figure 3-1** below, the site is entirely situated within Flood Zone 1 associated with a **low** probability of flooding.

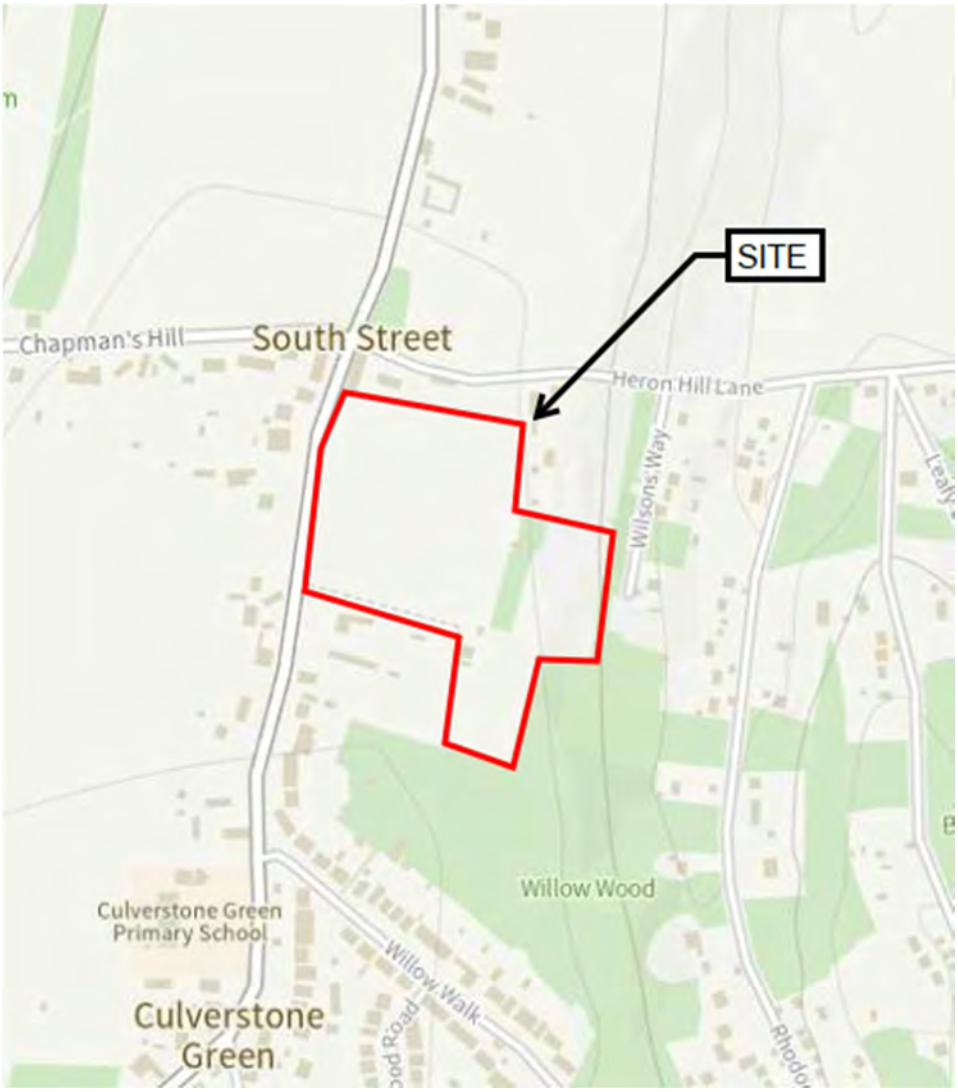

Figure 3-1: EA Flood Map for Planning

Pluvial Flood Risk

3.4. Referring to flood maps for planning, most of the site falls under the category, 'low risk' with no surface water flooding shown within the proposed site extents.

3.5. For the 1 in 100 year surface water mapping, there is an area within the tree line near the northern central boundary of incidental surface water flooding, which remains unchanged when climate change is applied as per **Figure 3-2** .

3.6. The extent of this surface water flooding is within the tree line through the site which will not be developed and therefore will not impact any of the development within the site.

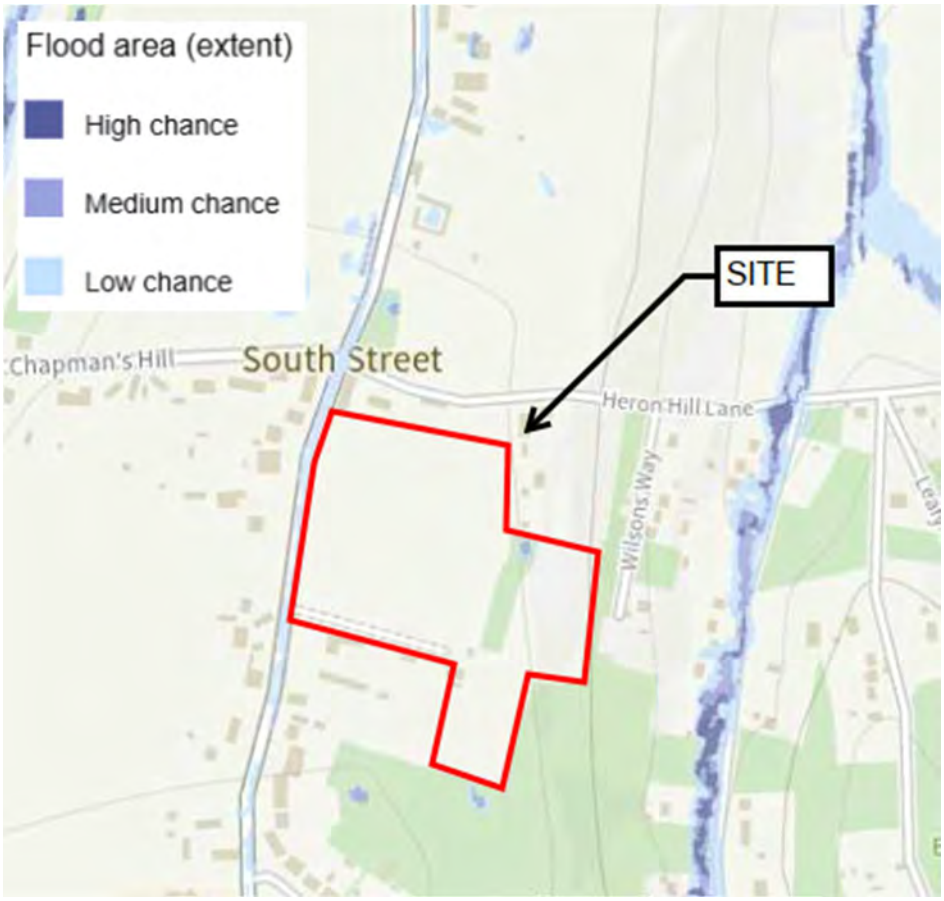

Figure 3-2: Surface Water Flow Map

3.7. The Kent County Council Flood Investigation Report relating to Vigo Village and Culverstone incident of 10th June 2019 indicates the location of flood events in the vicinity of the site.

3.8. From the figures within the report it can be seen that there was 1 flood event in the vicinity of the site, as shown in **Figure 3-3** below, which was below the level of the existing site, and as such would not pose a risk to the proposed development

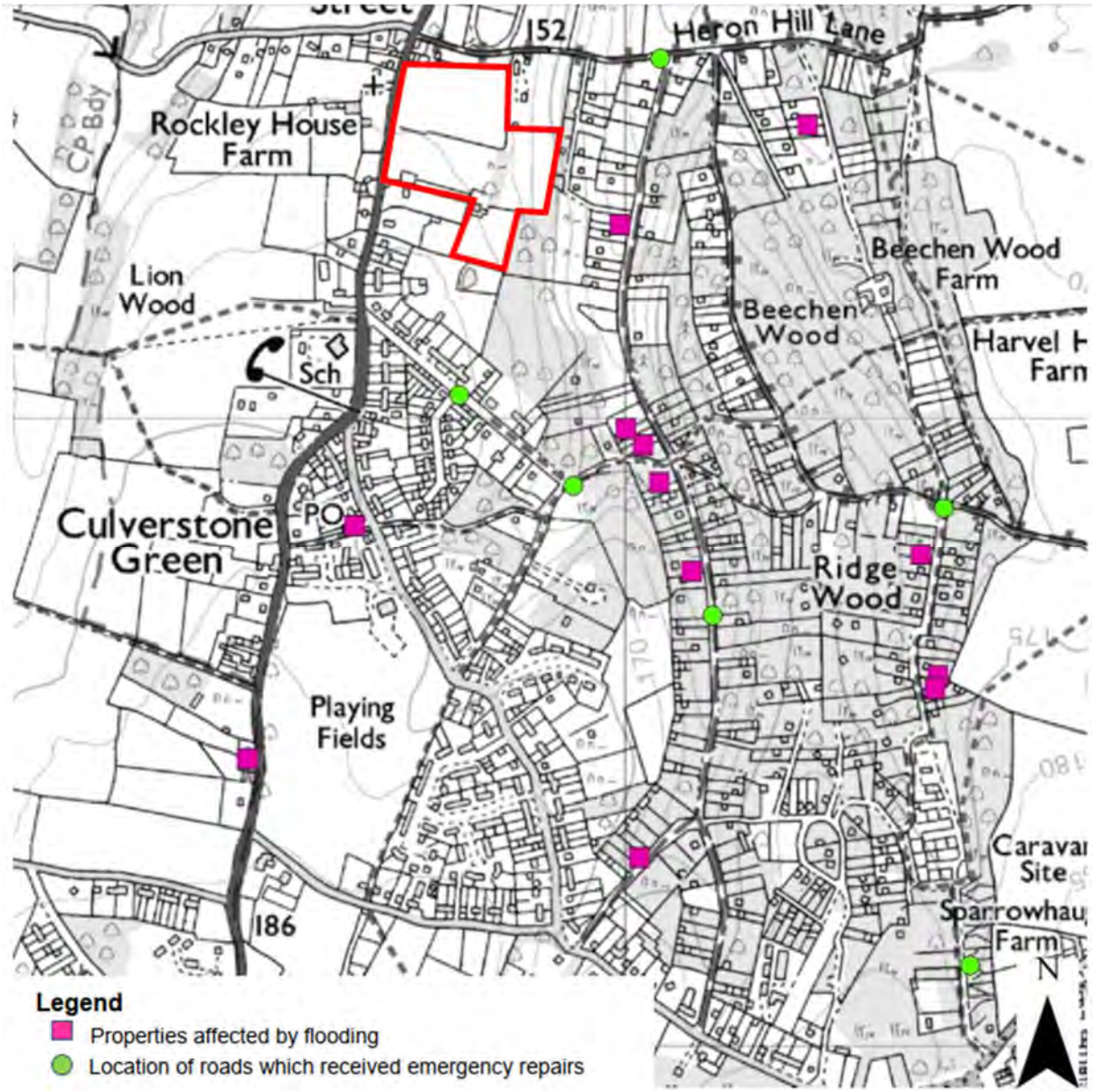

Figure 3-3: Kent County Council Flood Investigation Report Extract

3.9. Therefore, the risk of pluvial flooding to the Site is assessed as **Low**.

Sewer Flood Risk

3.10. Given there are no surface water sewers in the vicinity of the site the risk of Flood Risk from Sewers is **Very Low**.

Flood Risk from Artificial Sources

3.11. The EA flood maps for reservoirs shows that the site is not at risk from reservoirs Therefore the risk of flooding from reservoirs is assessed to be **Very Low**.

4. Surface & Foul Water Drainage Strategy

4.1. DEFRA's Non-statutory technical guidance for Sustainable Drainage Systems and CIRIA Guidance C753 "The SuDS Manual" have been used to determine the appropriate SuDS Strategy, which considers the spatial and environmental constraints of the Site.

4.2. In accordance with the NPPF, an allowance of 40% for the effects of climate change will achieve the policy requirements for the proposed development.

Proposed Sustainable Drainage Systems (SuDS)

4.3. With regards to Sustainable Drainage, surface water runoff should be disposed of according to the following hierarchy:

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

5.4. As discussed in **Section 2**, BGS data indicates that the Site is underlain by bedrock geology of Lewes Nodular Chalk Formation. Superficial geology is recorded as Alluvium comprised of clay, silt, sand and peat.

5.5. DEFRA's 'Magic Maps' indicates the Site is located within Source Protection Zone 2 (Outer Protection zone).

5.6. Geotechnical investigations undertaken onsite have indicated that the site is capped with a layer of clay and underlain by chalk.

5.7. Preliminary site investigation shows the chalk strata near the surface level is structured and therefore unsuitable for infiltration; therefore it is currently proposed the site is to drain to deep bore soakaways. Further testing is required to confirm infiltration rates at deeper levels, however at this time the current value is to be used in accordance with Ciria 753 Guidelines.

5.8. The constraints and opportunities for the use of SuDS techniques are appraised using the Management Train approach outlined in CIRIA C753 'The SuDS Manual' in **Table 5-1** below.

Table 4-1: SuDS Opportunities & Constraints

Type:	**Infiltration Devices** (Source Control)
Constraints:	Due to ground conditions being chalk and being capped by Clay infiltration would need to be suitably spaced from structures.
Opportunities:	Possible in larger open spaces.
Type:	**Permeable Paving** (Source Control)
Constraints:	It is not possible to provide infiltrating permeable paving due to Site characteristics (due to the clay capping layer on the site).
Opportunities:	None
Type:	**Rainwater Harvesting** (Source Control)
Constraints:	The benefits of rainwater harvesting on a specific design storm event cannot be quantified, due to the seasonal availability of storage within the structure.
Opportunities:	Water butts could be provided to individual properties
Type:	**Swales, etc.** (Permeable Conveyance)
Constraints:	In order to provide practicable attenuation benefits 1:3 side-slope swales tend to require a significant land requirement.
Opportunities:	None due to insufficient space.
Type:	**Tree Pits/Rain gardens**
Constraints:	Subject to Landscape Architect's design.
Opportunities:	Unlikely to be suitable in terms of adoption requirements
Type:	**Green Roofs**
Constraints:	Subject to Architect's design.
Opportunities:	None due to sloped roofs being proposed
Type:	**Attenuation Tanks**
Constraints:	Does not provide treatment to surface water.
Opportunities:	We propose to utilise other forms of SuDS treatment first and maximise their use, after which the remaining volume can be stored via attenuation tanks.

5.9. After consideration of the CIRIA C753 SuDS Management Train approach, the most viable SuDS options for the Site is site wide infiltration basins with other SuDS such as water butts provided where suitable, however will not be incorporated within the wider calculations as a conservative approach. Refer to Drawing **2405840-ACE-**

XX-XX-DR-C-0001 Drainage Strategy in **Appendix D** for the proposed surface water drainage strategy along with supporting calculations.

Proposed Surface Water Discharge Rates

5.10. As set out above it is intended that flows from the site will discharge via infiltration and therefore there will be no positive discharge from the site with all water discharged to the ground.

Proposed Development

5.11. It is proposed to discharge to deep bore soakaways via a detention basin to the east of the main site.

5.12. The maximum attenuation requirement will be governed by the infiltration rate and the rainfall with a climate change allowance of 45%. In order to maintain the surface water runoff within the site the infiltration basin is proposed with a depth of 1.65m, with a freeboard of 400mm

Surface Water Quality

5.13. The recommended stage of treatment in terms of water quality would be provided through a detention basin prior to discharging into the deep bore soakaways.

5.14. In line with the SuDS Manual C753, Tables 5.1-5.3 below demonstrate the compliance of the system.

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	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

Table 5.1: Pollution hazard indices for different land use classifications

(land use in bold applicable for the 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.		

Table 5.2: Indicative SuDS mitigation indices for discharges to surface waters

(bold text is applicable to this development).

For surface water discharge from Residential Parking Areas and Low Traffic Roads <300 traffic movements/day			
	Required mitigation indices		
Source	**TSS**	**Metals**	**Hydrocarbons**
Medium	**0.5**	**0.4**	**0.4**
Type of SuDS component provided			
Detention basin	0.5	0.5	0.6
Total	**0.5**	**0.5**	**0.6**
Check	**+0.0**	**+0.1**	**+0.2**

Table 5.3: SuDS mitigation indices provided

Urban Creep

5.15. A 10% allowance has been made to the impermeable areas with an additional 0.16Ha allowed for .

Exceedance Flows

5.16. In times of heavy or extreme storm events the capacity of sewers and other drainage systems can become exceeded. This will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or piped system becomes overloaded, blocked or when the outfall becomes restricted due to flood levels in the receiving outfall.

5.17. Overland exceedance flows from the site will fall generally from west to east away from the proposed buildings with the highways acting as overland flow paths toward the public open space and infiltration basin in the east. An exceedance flow routing plan is provided in **Appendix D**.

Future Maintenance

5.18. A management company will be appointed, on behalf of the building owners, to maintain communal areas, landscaping, and shared SuDS throughout the development.

5.19. All maintenance will be in accordance with the best practices and the CIRIA Manual C753. Please refer to **Appendix E** for an overview of the maintenance tasks required.

Proposed Foul Water Drainage Strategy

5.20. The proposed development will comprise of 100 residential units. It is proposed that foul flows from the development will discharge to a private packaged pumping station, prior to discharging into the existing Southern Water public sewer in the main highway.

5. Summary & Conclusions

5.1. Ardent Consulting Engineers has been commissioned by Esquire Developments to prepare a Flood Risk Assessment and Drainage Strategy for a proposed residential development at Blackthorn Farm, Culverston Green.

5.2. This Flood Risk Assessment considers the current policy relating to flood risk, including the National Planning Policy Framework and local policy.

5.3. The site is located entirely within Flood Zone 1.

5.4. It is concluded that the Site is at low risk of flooding from all other sources.

5.5. Geotechnical investigations undertaken have indicated that the site is underlain by chalk; an infiltration rate of $3x10^{-5}$ has been used inline with Ciria Guidance.

5.6. The proposed surface water drainage strategy for the site demonstrates a system of Sustainable Drainage and attenuation features to provide sufficient attenuation storage within the site during the 1 in 100-year storm event +45% allowance for climate change.

5.7. The local drainage network is provided by Southern Water. The proposed drainage strategy will connect into this network for the foul water drainage

5.8. In conclusion, this document demonstrates that the proposals are consistent with the aims of the NPPF, the Planning Practice Guidance to the NPPF and local planning guidance. The Site will not be at significant risk of flooding or increase the flood risk potential to others.

Appendix A

Esquire Developments

N

NOTES:

Report all discrepancies, errors and omissions.

Verify all dimensions on site before commencing any work on site or preparing shop drawings.

All materials, components and workmanship are to comply with the relevant British Standards, Codes of Practice, and appropriate manufacturers recommendations that from time to time shall apply.

For all specialist work, see relevant drawings.

Rev	Date	Description

Affordable	Area (approx sqft)
17no. 1B2P	550sqft
21no. 2B4P	868sqft
41no. 3B4P A	1006sqft
13no. 3B4P B	1006sqft
8no. 4B5P	1166sqft
Total: 100no.	91230sqft

Project Title

Proposed Residential Development
Blackthorne Farm
Culverstone

Drawing Description

Proposed Site Layout Plan
100% Affordable Mix
100 Units

Scale	Drawn by
1:500@A0	JS
Date	Checked by
April 2025	TWM

CLAGUE ARCHITECTS

62 Burgate, Canterbury
Kent CT1 2BH 01227 762060

2 Kinsbourne Court, Luton Road,
Harpenden, Hertfordshire AL5 3BL 01582 765102

8, Disney Street
London SE1 1JF 0203 597 6112

CANTERBURY LONDON HARPENDEN

Drawing Number	Revision
23357B	

0 5 10 15 20 25 50m

Scale 1:500

Proposed Residential Development, Blackthorne Farm, Culverstone

Appendix B

Tree Schedule

1	Hawthorn	d=0.25	h=5
2	Hawthorn	d=0.4	h=8
3	Hawthorn	d=0.1	h=4
4	Hawthorn	d=0.1	h=4
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14	Hawthorn	d=0.25	h=7
15	Hawthorn	d=0.2	h=6
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22	Elder	d=0.15	h=4
23	Holly	d=0.15	h=5
24	Holly	d=0.2	h=7
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57	Hawthorn	d=0.15	h=5
58	Hawthorn	d=0.15	h=5
59	Hawthorn	d=0.2	h=5
60	Hawthorn	d=0.35	h=5
61	Hawthorn	d=0.2	h=5
62	Hawthorn	d=0.2	h=5
63	Hawthorn	d=0.2	h=5
64	Hawthorn	d=0.2	h=5
65	Hawthorn	d=0.2	h=5
66	Hawthorn	d=0.2	h=5
67	Hawthorn	d=2x0.25	h=6
68	Hawthorn	d=0.2	h=5
69	Hawthorn	d=0.2	h=5
70	Hawthorn	d=0.2	h=5
71	Hawthorn	multibole	h=6
72	Hawthorn	d=0.15	h=4
73	Hawthorn	d=0.25	h=5
74	Hazel	multibole	h=8
75	Hazel	multibole	h=8
76	Hazel	multibole	h=8
77	Hawthorn	d=0.25	h=5
78	Hawthorn	d=0.15	h=4
79	Yew	d=0.1	h=3
80	Elder	d=0.1	h=3
81	Hawthorn	d=0.25	h=5
82	Hawthorn	d=0.25	h=5
83	Ash	d=0.35	h=12
84	Yew	d=0.1	h=3
85	Hawthorn	d=0.2	h=5
86	Hawthorn	d=0.2	h=5
87	Hawthorn	d=0.2	h=5
88	Hawthorn	d=0.2	h=5
89	Hawthorn	d=0.15	h=4
90	Hawthorn	d=0.2	h=5
91	Hawthorn	d=0.2	h=5
92	Hawthorn	d=0.2	h=5
93	Unknown	d=0.5	h=10
94	Unknown	d=0.5	h=10
95	Unknown	d=0.45	h=10
96	Hawthorn	d=0.15	h=5
97	Unknown	d=0.15	h=7
98	Unknown	d=0.25	h=7
99	Unknown	d=0.25	h=7
100	Hawthorn	d=0.15	h=5

Tree Schedule

101	Hawthorn	d=0.15	h=5
102	Beech	d=0.3	h=10
103	Beech	d=0.3	h=10
104	Beech	d=0.1	h=6
105	Beech	d=0.25	h=10
106	Beech	d=0.35	h=10
107	Beech	d=0.35	h=10
108	Ash	d=2x0.2	h=12
109	Hawthorn	d=0.15	h=5
110	Hawthorn	d=0.15	h=5
111	Ash	d=0.15	h=6
112	Hawthorn	d=0.15	h=5
113	Hawthorn	d=0.15	h=5
114	Hawthorn	d=0.15	h=5
115	Hawthorn	d=0.25	h=6
116	Hawthorn	d=0.1	h=4
117	Hawthorn	d=0.1	h=4
118	Hawthorn	d=0.1	h=4
119	Ash	d=0.15	h=7
120	Unknown	d=0.1	h=4
121	Hawthorn	d=0.2	h=6
122	Unknown	d=0.35	h=8
123	Ash	d=0.35	h=12
124	Hawthorn	d=0.2	h=5
125	Hazel	multibole	h=6
126	Hazel	multibole	h=6
127	Hazel	multibole	h=6
128	Unknown	d=0.15	h=6
129	Fruit	d=0.35	h=8
130	Hazel	multibole	h=7
131	Hazel	multibole	h=7
132	Hazel	multibole	h=7
133	Unknown	multibole	h=3
134	Elder	d=0.1	h=3
135	Unknown	multibole	h=3
136	Unknown	multibole	h=8
137	Oak	d=0.5	h=15
138	Oak	d=0.5	h=15
139	Unknown	d=0.35	h=10
140	Hawthorn	d=0.2	h=5
141	Hawthorn	d=0.2	h=5
142	Hawthorn	d=0.1	h=4
143	Hawthorn	d=0.1	h=4
144	Hawthorn	d=0.2	h=5
145	Oak	d=0.7	h=15
146	Elder	d=0.15	h=5
147	Sycamore	d=0.2	h=8
148	Hawthorn	d=0.2	h=5
149	Hawthorn	d=0.35	h=7
150	Unknown	d=0.2	h=8
151	Hawthorn	d=0.2	h=5
152	Hawthorn	d=0.3	h=5
153	Hawthorn	d=0.3	h=5
154	Hawthorn	multibole	h=6
155	Oak	d=0.65	h=15
156	Unknown	d=0.35	h=8
157	Unknown	d=0.25	h=7
158	Hawthorn	d=0.15	h=6
159	Hawthorn	d=0.15	h=6
160	Hawthorn	d=0.15	h=6
161	Hawthorn	d=0.15	h=6
162	Hawthorn	d=0.15	h=6
163	Hawthorn	d=0.15	h=6
164	Sycamore	d=0.25	h=8
165	Hawthorn	d=0.3	h=8
166	Hazel	multibole	h=7
167	Oak	d=0.3	h=12
168	Oak	d=0.3	h=12
169	Unknown	d=0.3	h=8
170	Unknown	d=0.4	h=10
171	Beech	d=0.3	h=12
172	Beech	d=0.45	h=12
173	Ash	d=0.25	h=12
174	Ash	d=0.3	h=12
175	Ash	d=0.3	h=12
176	Ash	d=0.3	h=12
177	Elder	d=0.15	h=3
178	Hawthorn	d=0.3	h=8
179	Beech	d=0.5	h=12
180	Beech	d=0.5	h=12
181	Oak	d=0.85	h=15
182	Ash	d=0.3	h=12
183	Ash	d=0.25	h=10
184	Ash	d=0.35	h=12
185	Ash	d=0.35	h=12
186	Ash	d=0.3	h=10
187	Ash	d=0.3	h=10
188	Ash	d=0.25	h=10
189	Ash	d=0.25	h=10
190	Ash	d=0.3	h=10
191	Hawthorn	d=0.2	h=6
192	Oak	multibole	h=15
193	Oak	d=0.35	h=12
194	Ash	d=0.55	h=15
195	Ash	d=0.7	h=15
196	Hazel	multibole	h=6
197	Hazel	multibole	h=6
198	Ash	d=0.4	h=15
199	Ash	d=0.5	h=15
200	Hawthorn	d=0.25	h=8

Tree Schedule

201	Hazel	multibole	h=6
202	Hawthorn	d=0.2	h=7
203	Hawthorn	d=0.2	h=7
204	Hawthorn	d=0.25	h=8
205	Hawthorn	d=0.15	h=6
206	Beech	d=0.3	h=10
207	Hazel	multibole	h=6
208	Oak	d=0.6	h=15
209	Hazel	multibole	h=6
210	Oak	d=0.65	h=15
211	Ash	d=0.6	h=15
212	Ash	d=0.35	h=12
213	Ash	d=0.35	h=12
214	Beech	multibole	h=15
215	Ash	d=0.35	h=12
216	Ash	d=0.45	h=12
217	Ash	d=0.25	h=10
218	Ash	d=0.2	h=10
219	Hazel	multibole	h=7
220	Hazel	d=0.35	h=7
221	Elder	d=0.1	h=4
222	Elder	d=0.1	h=4
223	Ash	d=0.25	h=12
224	Hazel	multibole	h=7
225	Beech	d=0.35	h=12
226	Beech	d=0.35	h=12
227	Hawthorn	d=0.2	h=7
228	Hawthorn	d=0.15	h=6
229	Ash	d=0.4	h=15
230	Unknown	d=0.25	h=10
231	Unknown	d=0.25	h=8
232	Hazel	multibole	h=7
233	Hazel	multibole	h=9
234	Ash	d=0.25	h=10
235	Beech	d=0.4	h=12
236	Ash	d=1	h=15
237	Hazel	multibole	h=8
238	Hazel	multibole	h=8
239	Ash	d=2x0.25	h=12
240	Hazel	multibole	h=8
241	Ash	d=0.35	h=12
242	Unknown	d=0.3	h=10
243	Ash	d=0.3	h=12
244	Ash	d=0.45	h=12
245	Unknown	d=0.45	h=12
246	Unknown	d=0.45	h=12
247	Unknown	d=0.45	h=12
248	Hazel	multibole	h=6
249	Hawthorn	d=2x0.2	h=8
250	Unknown	d=0.45	h=12
251	Ash	d=2x0.4	h=15
252	Oak	d=0.65	h=15
253	Beech	d=0.2	h=8
254	Beech	d=0.2	h=8
255	Unknown	d=0.25	h=10
256	Ash	d=0.9	h=15
257	Oak	d=0.65	h=15
258	Elder	d=0.25	h=5
259	Elder	d=0.15	h=5
260	Elder	d=0.15	h=5
261	Beech	multibole	h=15
262	Ash	d=0.5	h=15
263	Ash	d=0.45	h=15
264	Ash	d=0.55	h=15
265	Ash	d=0.1	h=5
266	Unknown	d=0.5	h=12
267	Unknown	d=0.35	h=10
268	Ash	d=0.25	h=10
269	Ash	d=0.45	h=12
270	Hawthorn	d=0.3	h=8
271	Unknown	d=0.7	h=12
272	Unknown	d=2x0.25	h=12
273	Unknown	d=3x0.15	h=10
274	Ash	d=3x0.4	h=15
275	Beech	d=0.25	h=10
276	Beech	d=0.3	h=10
277	Beech	d=0.3	h=10
278	Beech	d=0.4	h=12
279	Unknown	d=0.2	h=9
280	Unknown	d=0.2	h=9
281	Ash	d=1	h=15
282	Unknown	d=0.5	h=12
283	Unknown	d=0.2	h=9
284	Ash	d=0.35	h=12
285	Hazel	multibole	h=6
286	Ash	d=0.15	h=8
287	Ash	d=0.15	h=8
288	Ash	d=0.15	h=8
289	Ash	d=0.15	h=8
290	Hazel	multibole	h=6
291	Hazel	multibole	h=6
292	Unknown	d=0.15	h=7
293	Hazel	multibole	h=6
294	Oak	d=0.65	h=15
295	Cherry	d=0.5	h=15
296	Cherry	d=0.15	h=10
297	Hazel	multibole	h=6
298	Hazel	d=0.35	h=6
299	Ash	d=0.2	h=8
300	Hawthorn	d=0.1	h=5

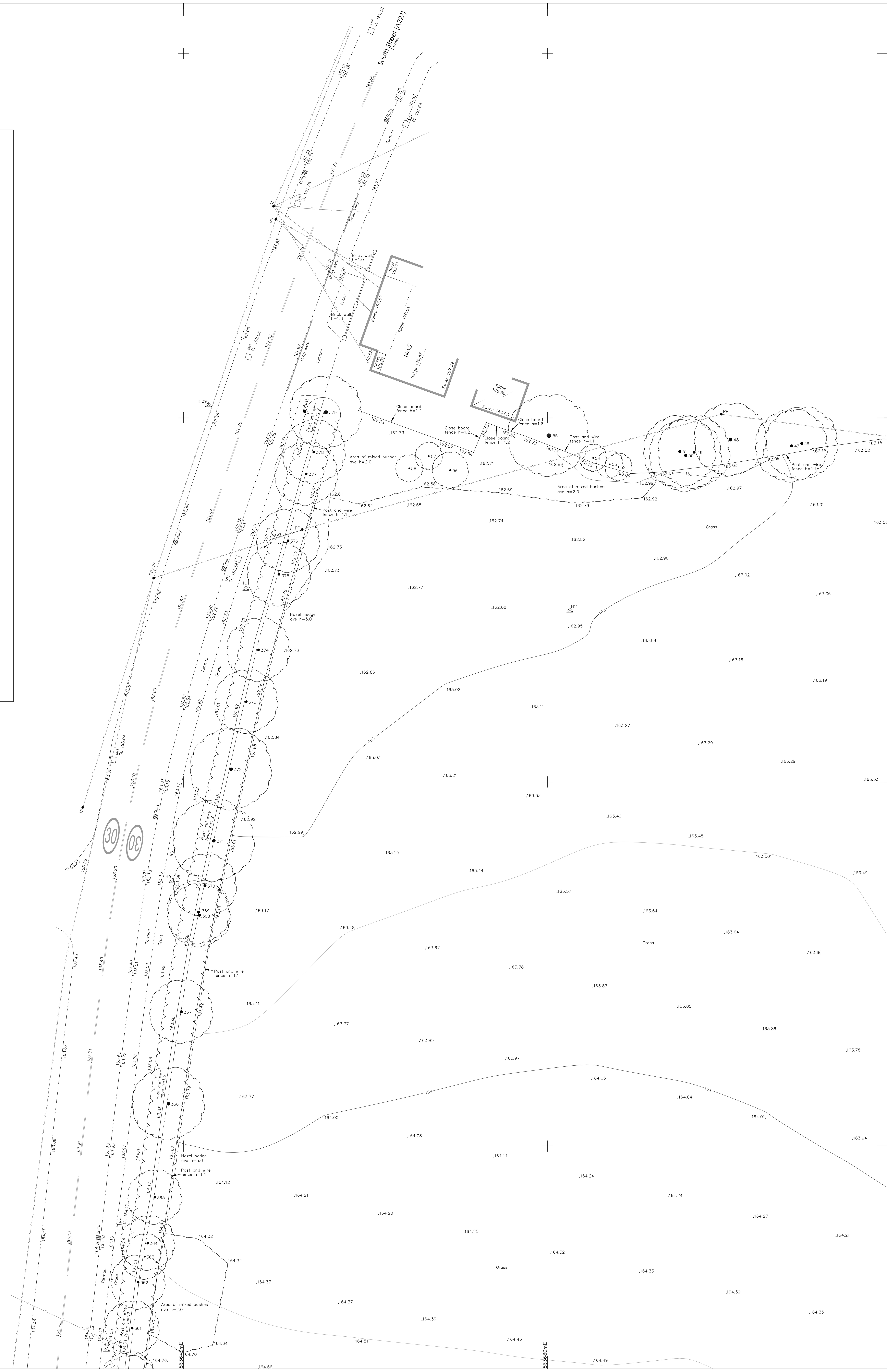
Tree Schedule

301	Ash	multibole	h=10
302	Hawthorn	d=0.4	h=9
303	Unknown	d=0.15	h=7
304	Hazel	multibole	h=6
305	Oak	d=0.5	h=15
306	Hawthorn	d=0.15	h=6
307	Ash	d=0.2	h=8
308	Cherry	d=0.15	h=10
309	Cherry	d=0.15	h=10
310	Cherry	d=0.15	h=10
311	Ash	multibole	h=10
312	Unknown	d=0.45	h=10
313	Ash	multibole	h=10
314	Hazel	multibole	h=6
315	Hazel	multibole	h=6
316	Hazel	multibole	h=6
317	Elder	d=0.15	h=5
318	Ash	d=0.15	h=8
319	Ash	d=0.15	h=8
320	Elder	d=0.15	h=5
321	Hazel	multibole	h=6
322	Hazel	multibole	h=6
323	Oak	d=0.5	h=15
324	Hawthorn	d=0.2	h=7
325	Hawthorn	d=0.2	h=7
326	Ash	d=0.45	h=12
327	Ash	d=0.4	h=12
328	Holly	d=0.4	h=10
329	Ash	d=0.15	h=8
330	Unknown	d=0.2	h=8
331	Ash	d=0.25	h=9
332	Hazel	multibole	h=6
333	Hawthorn	d=0.25	h=8
334	Ash	d=0.4	h=12
335	Hazel	multibole	h=6
336	Hazel	multibole	h=6
337	Holly	d=0.2	h=8
338	Holly	d=0.2	h=8
339	Unknown	d=0.1	h=7
340	Hawthorn	d=0.2	h=7
341	Hawthorn	multibole	h=7
342	Hawthorn	d=0.2	h=7
343	Unknown	d=0.25	h=8
344	Unknown	d=0.25	h=8
345	Unknown	d=0.25	h=8
346	Oak	d=0.25	h=10
347	Unknown	d=0.25	h=8
348	Unknown	d=0.25	h=8
349	Pine	d=0.2	h=8
350	Unknown	d=0.25	h=8
351	Unknown	d=0.15	h=6
352	Unknown	d=0.15	h=6
353	Unknown	d=0.15	h=6
354	Pine	d=0.25	h=10
355	Unknown	d=0.15	h=6
356	Unknown	d=0.25	h=8
357	Unknown	d=0.25	h=8
358	Unknown	d=0.25	h=8
359	Unknown	d=0.25	h=8
360	Unknown	d=0.25	h=8
361	Unknown	d=0.25	h=8
362	Unknown	d=0.25	h=8
363	Unknown	d=0.15	h=8
364	Unknown	d=0.25	h=8
365	Unknown	d=0.25	h=8
366	Pine	d=0.35	h=10
367	Unknown	d=0.3	h=8
368	Unknown	d=0.3	h=8
369	Unknown	d=0.3	h=8
370	Unknown	d=0.3	h=8
371	Unknown	d=0.35	h=10
372	Unknown	d=0.35	h=10
373	Unknown	d=0.25	h=8
374	Unknown	d=0.25	h=8
375	Unknown	d=0.25	h=8
376	Unknown	d=0.25	h=8
377	Unknown	d=0.25	h=8
378	Unknown	d=0.25	h=8
379	Unknown	d=0.4	h=10

Survey control

Stn	Easting	Northing	Height
H1	563672.412	163384.298	166.094
H2	563726.877	163395.300	164.946
H3	563779.972	163450.721	162.779
H4	563808.598	163545.121	160.762
H5	563742.797	163521.188	163.080
H6	563722.091	163463.318	164.207
H7	563621.461	163380.275	166.350
H8	563631.587	163457.658	164.501
H9	563638.766	163509.131	163.366
H10	563646.879	163541.246	162.801
H11	563682.474	163538.841	162.971
H12	563668.459	163448.074	164.962
H13	563633.169	163382.078	166.316
H14	563658.714	163383.534	166.219
H15	563688.323	163367.359	166.163
H16	563726.038	163356.350	165.699
H17	563747.005	163348.270	165.122
H18	563758.321	163344.256	165.110
H19	563756.766	163305.630	165.498
H20	563750.861	163263.278	166.752
H21	563798.520	163252.388	164.976
H22	563802.193	163309.812	163.150
H23	563799.785	163330.972	163.106
H24	563774.127	163341.034	164.786
H24A	563788.483	163340.277	164.352
H25	563787.052	163392.614	163.354
H26	563803.534	163420.586	162.388
H27	563822.252	163424.234	159.395
H28	563859.777	163429.293	154.954
H29	563857.745	163393.841	155.370
H30	563835.967	163344.988	159.070
H31	563821.444	163436.954	159.595
H32	563823.779	163441.840	159.039
H33	563813.375	163408.920	159.151
H34	563810.189	163397.782	160.805
H35	563811.631	163382.593	160.617
H36	563807.401	163370.261	161.300
H37	563798.338	163359.591	162.429
H38	563614.402	163338.933	167.401
H39	563642.766	163561.422	162.377

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



163600mN
163560mN
163520mN
163480mN
563560mE
563600mE
563640mE
563680mE

Topographical Survey Legend

Hedge — Telephone line
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 green, pen colour 117.

Indicative N

Sheet Layout

1	2
3	4
	5

HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project : Blackthorn Farm, South Street, Culverstone, Meopham DA13 0QW

Client : Esquire Developments

Drawing title : Topographical Survey

Job No. :	Dwg No. :	Revision :
S24/10281	S24/10281/01	-
Scale : 1:200	Date : January 2025	Drawn by : W.M.

Grid & Levels related to :
Ordnance Survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 5 survey stations with a scale factor of 1.000, only the fixed survey stations H1, H2, H3, H4 & H5 are true Ordnance Survey positions.

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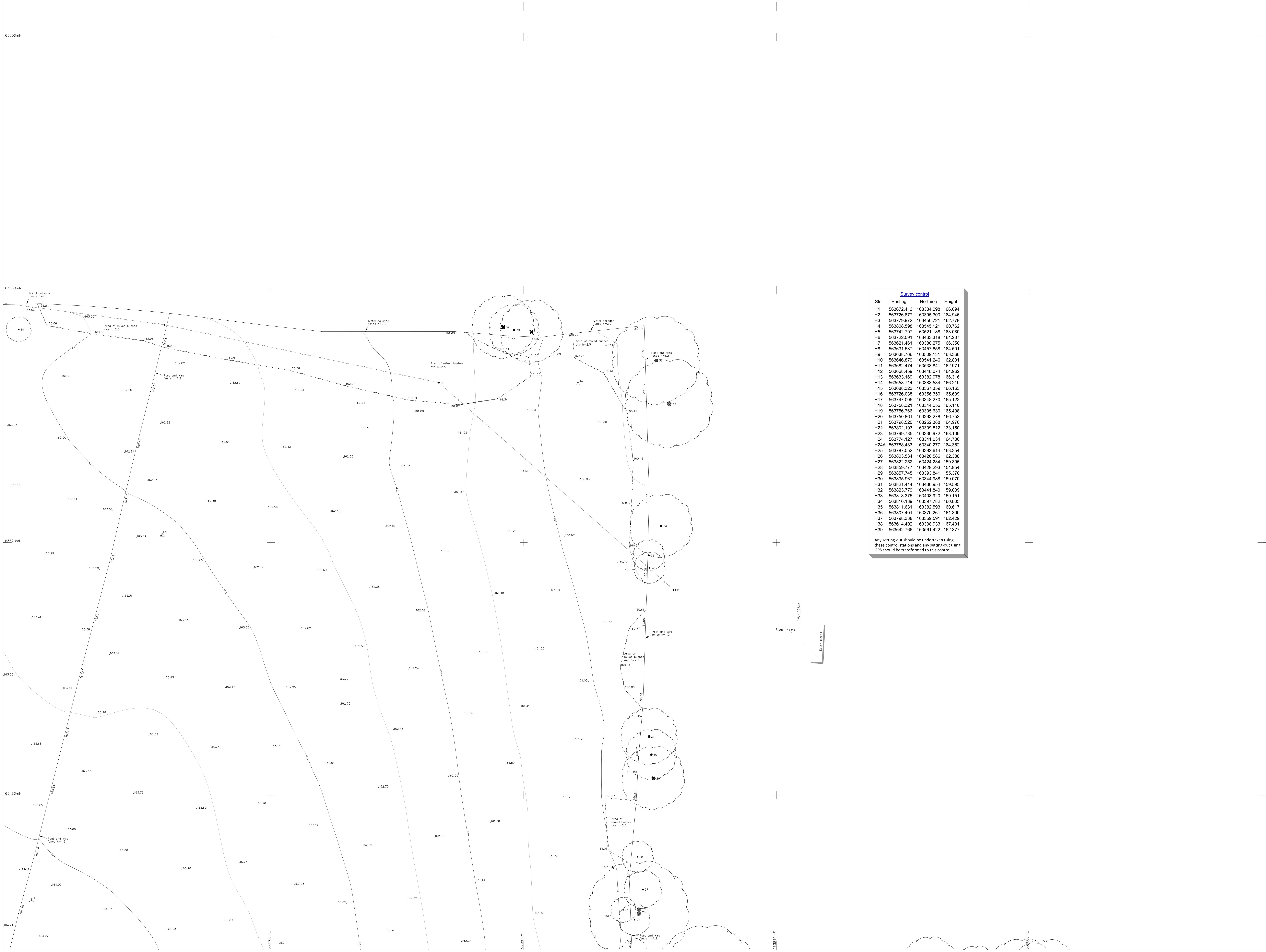

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H14	563658.714	163383.534	166.219
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H20	563750.861	163263.278	166.752
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H24	563774.127	163341.034	164.786
H24A	563788.483	163340.277	164.352
H25	563787.052	163392.614	163.354
H26	563803.534	163420.586	162.388
H27	563822.252	163424.234	159.395
H28	563859.777	163429.293	154.954
H29	563857.745	163393.841	155.370
H30	563835.967	163344.988	159.070
H31	563821.444	163436.954	159.595
H32	563823.779	163441.840	159.039
H33	563813.375	163408.920	159.151
H34	563810.189	163397.782	160.805
H35	563811.631	163382.593	160.617
H36	563807.401	163370.261	161.300
H37	563798.338	163359.591	162.429
H38	563614.402	163338.933	167.401
H39	563642.766	163561.422	162.377

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Tree
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Building
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Open Building
Telephone line
Power line
Banking
Contour line 64
Survey Station H5
Gate
Level .115.28
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Foul Drainage 100mm FW MH CL 117.10 IL 116.75
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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

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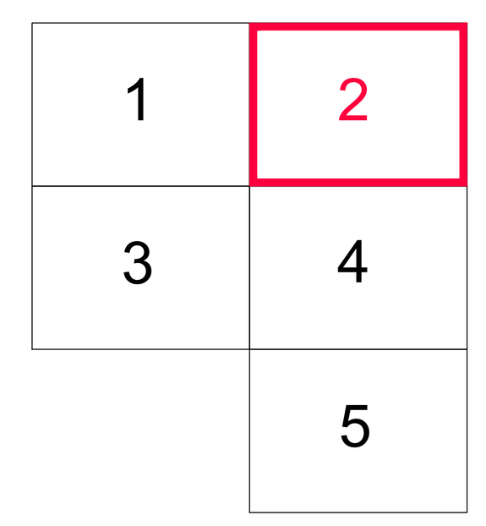
Ordnance Survey Digital Data added and shown in green, pen colour 117.

Sheet Layout



HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Blackthorn Farm, South Street
Culverstone, Meopham DA13 0QW

Client :
Esquire Developments

Drawing title :
Topographical Survey

Job No. : S24/10281	Dwg No. : S24/10281/02	Revision : -
Scale : 1:200	Date : January 2025	Drawn by : W.M.

Grid & Levels related to :
Ordnance Survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 5 survey stations with a scale factor of 1.000, only the fixed survey stations H1, H2, H3, H4 & H5 are true Ordnance Survey positions.

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Tel - 01608 523118

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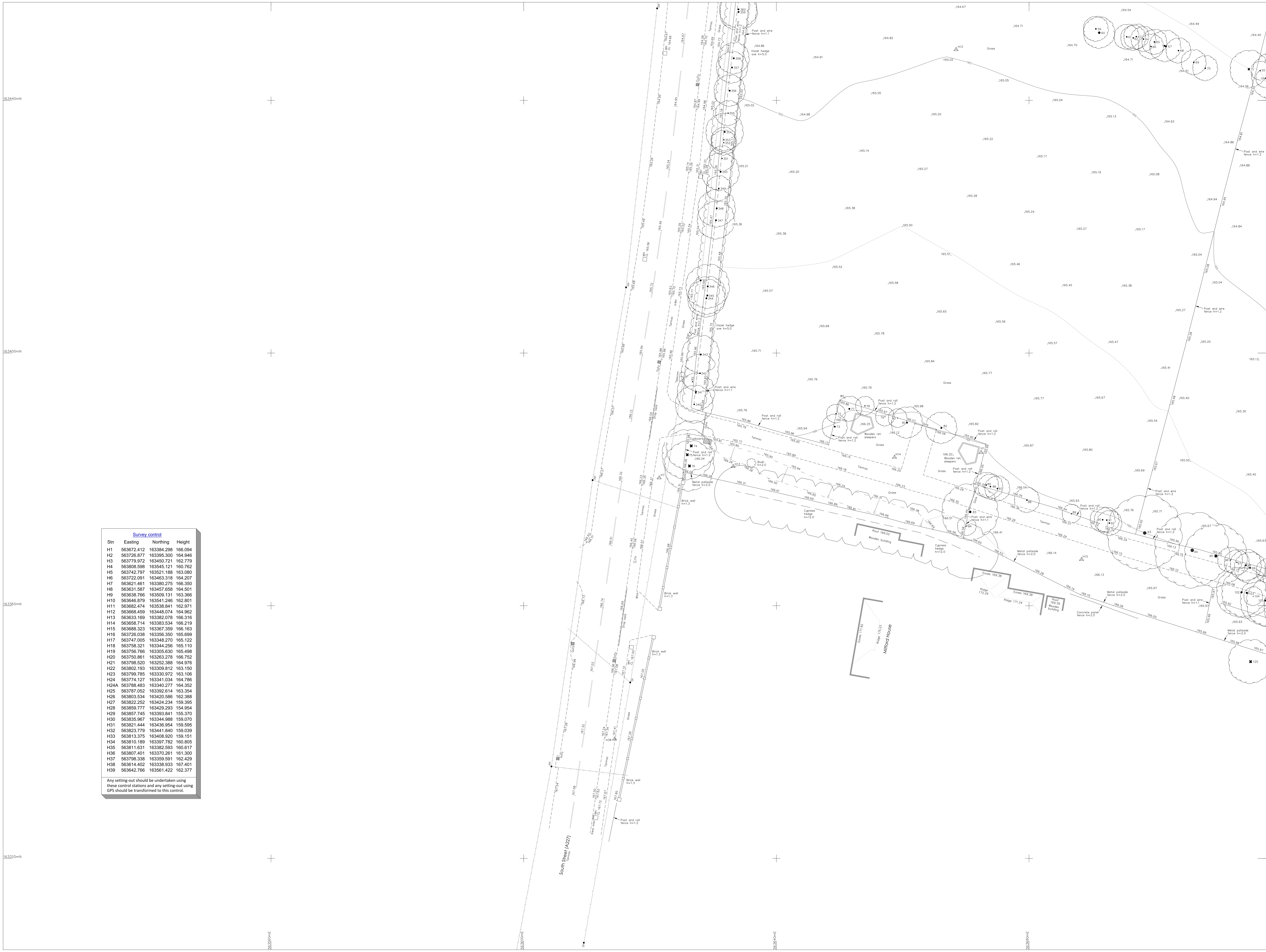

Topographical Survey Legend

Hedge	Telephone line
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 green, pen colour 117.

Survey control

Stn	Easting	Northing	Height
H1	563672.412	163384.298	166.094
H2	563726.877	163395.300	164.946
H3	563779.972	163450.721	162.779
H4	563808.598	163545.121	160.762
H5	563742.797	163521.188	163.080
H6	563722.091	163463.318	164.207
H7	563621.461	163380.275	166.350
H8	563631.587	163457.658	164.501
H9	563638.766	163509.131	163.366
H10	563646.879	163541.246	162.801
H11	563682.474	163538.841	162.971
H12	563668.459	163448.074	164.962
H13	563633.169	163382.078	166.316
H14	563658.714	163383.534	166.219
H15	563688.323	163367.359	166.163
H16	563726.038	163356.350	165.699
H17	563747.005	163348.270	165.122
H18	563758.321	163344.256	165.110
H19	563756.766	163305.630	165.498
H20	563750.861	163263.278	166.752
H21	563798.520	163252.388	164.976
H22	563802.193	163309.812	163.150
H23	563799.785	163330.972	163.106
H24	563774.127	163341.034	164.786
H24A	563788.483	163340.277	164.352
H25	563787.052	163392.614	163.354
H26	563803.534	163420.586	162.388
H27	563822.252	163424.234	159.395
H28	563859.777	163429.293	154.954
H29	563857.745	163393.841	155.370
H30	563835.967	163344.988	159.070
H31	563821.444	163436.954	159.595
H32	563823.779	163441.840	159.039
H33	563813.375	163408.920	159.151
H34	563810.189	163397.782	160.805
H35	563811.631	163382.593	160.617
H36	563807.401	163370.261	161.300
H37	563798.338	163359.591	162.429
H38	563614.402	163338.933	167.401
H39	563642.766	163561.422	162.377

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

HOOK SURVEY
Land & Building Surveyors
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Project :
Blackthorn Farm, South Street
Culverstone, Meopham DA13 0QW

Client :
Esquire Developments

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S24/10281	S24/10281/03	-
Scale : 1:200	Date : January 2025	Drawn by : W.M.

Grid & Levels related to :
Ordnance Survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 5 survey stations with a scale factor of 1.000, only the fixed survey stations H1, H2, H3, H4 & H5 are true Ordnance Survey positions.

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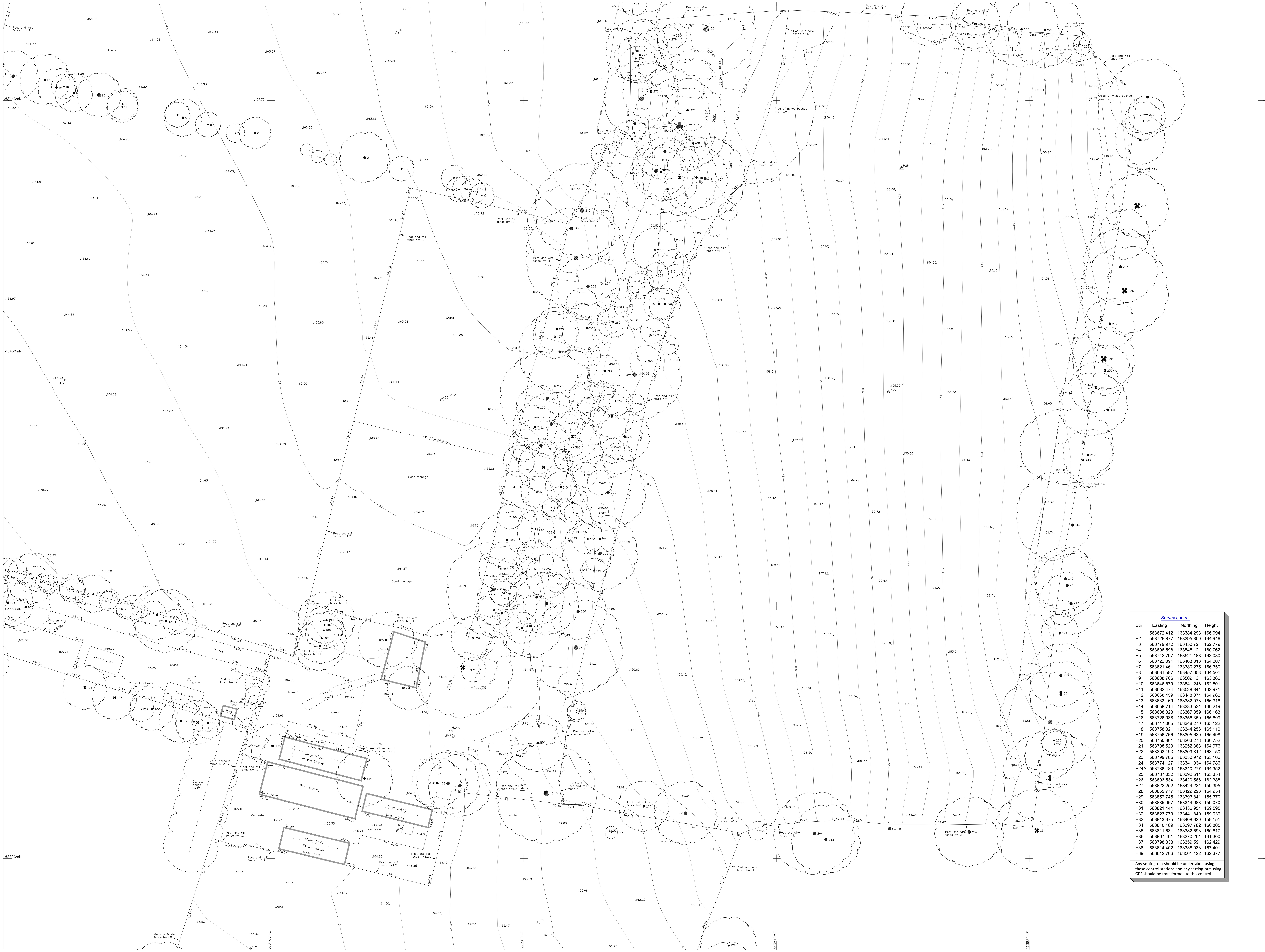

Survey control

Stn	Easting	Northing	Height
H1	563672.412	163384.298	166.094
H2	563726.877	163395.300	164.946
H3	563779.972	163450.721	162.779
H4	563808.598	163545.121	160.762
H5	563742.797	163521.188	163.080
H6	563722.091	163463.318	164.207
H7	563621.461	163380.275	166.350
H8	563631.587	163457.658	164.501
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H10	563646.879	163541.246	162.801
H11	563682.474	163538.841	162.971
H12	563668.459	163448.074	164.962
H13	563633.169	163382.078	166.316
H14	563658.714	163383.534	166.219
H15	563688.323	163367.359	166.163
H16	563726.038	163356.350	165.699
H17	563747.005	163348.270	165.122
H18	563758.321	163344.256	165.110
H19	563756.766	163305.630	165.498
H20	563750.861	163263.278	166.752
H21	563798.520	163252.388	164.976
H22	563802.193	163309.812	163.150
H23	563799.785	163330.972	163.106
H24	563774.127	163341.034	164.786
H24A	563788.483	163340.277	164.352
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H32	563823.779	163441.840	159.039
H33	563813.375	163408.920	159.151
H34	563810.189	163397.782	160.805
H35	563811.631	163382.593	160.617
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Undergrowth
Tree
Bush
Building
Glass Building
Open Building
Telephone line
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Banking
Contour line 64
Survey Station H5
Gate
Level .115.28
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Name Plate	RNP
Power Pole	PP
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Indicative
N

Sheet Layout

1	2
3	4
	5

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Project :
Blackthorn Farm, South Street
Culverstone, Meopham DA13 0QW

Client :
Esquire Developments

Drawing title :
Topographical Survey

Job No. :	Dwg No. :	Revision :
S24/10281	S24/10281/04	-
Scale :	**Date :**	**Drawn by :**
1:200	January 2025	W.M.

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H37	563798.338	163359.591	162.429
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H39	563642.766	163561.422	162.377

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Tree Schedule

1	Hawthorn	d=0.25	h=5
2	Hawthorn	d=0.4	h=8
3	Hawthorn	d=0.1	h=4
4	Hawthorn	d=0.1	h=4
5	Hawthorn	d=0.1	h=4
6	Hawthorn	d=0.35	h=6
7	Hawthorn	d=0.15	h=5
8	Hawthorn	d=0.25	h=6
9	Hawthorn	d=0.35	h=7
10	Hawthorn	d=0.25	h=6
11	Hawthorn	d=0.25	h=6
12	Hawthorn	d=0.25	h=6
13	Hawthorn	d=0.6	h=8
14	Hawthorn	d=0.25	h=7
15	Hawthorn	d=0.2	h=6
16	Hawthorn	d=0.35	h=8
17	Pine	d=0.3	h=10
18	Hawthorn	d=0.5	h=8
19	Hawthorn	d=0.15	h=6
20	Hawthorn	d=0.15	h=6
21	Elder	d=0.15	h=4
22	Elder	d=0.15	h=4
23	Holly	d=0.15	h=5
24	Holly	d=0.2	h=7
25	Hawthorn	d=0.15	h=5
26	Ash	d=2x0.65	h=12
27	Hawthorn	d=0.25	h=6
28	Holly	d=0.2	h=7
29	Unknown	multibole	h=12
30	Ash	d=0.35	h=12
31	Beech	d=0.4	h=12
32	Holly	d=0.2	h=7
33	Holly	d=0.2	h=7
34	Unknown	d=0.35	h=10
35	Ash	d=0.7	h=15
36	Ash	d=0.55	h=15
37	Beech	multibole	h=12
38	Beech	d=0.3	h=12
39	Beech	multibole	h=12
40	Hawthorn	d=0.2	h=5
41	Hawthorn	d=0.2	h=5
42	Hawthorn	d=0.2	h=5
43	Hawthorn	d=0.2	h=5
44	Hawthorn	d=0.2	h=5
45	Hawthorn	d=0.2	h=5
46	Cypress	d=0.3	h=10
47	Cypress	d=0.3	h=10
48	Unknown	d=0.35	h=8
49	Cypress	d=0.3	h=10
50	Cypress	d=0.3	h=10
51	Cypress	d=0.3	h=10
52	Hawthorn	d=0.15	h=4
53	Hawthorn	d=0.15	h=4
54	Hawthorn	d=0.15	h=4
55	Cypress	d=0.45	h=12
56	Hawthorn	d=0.2	h=5
57	Hawthorn	d=0.15	h=5
58	Hawthorn	d=0.15	h=5
59	Hawthorn	d=0.2	h=5
60	Hawthorn	d=0.35	h=5
61	Hawthorn	d=0.2	h=5
62	Hawthorn	d=0.2	h=5
63	Hawthorn	d=0.2	h=5
64	Hawthorn	d=0.2	h=5
65	Hawthorn	d=0.2	h=5
66	Hawthorn	d=0.2	h=5
67	Hawthorn	d=2x0.25	h=6
68	Hawthorn	d=0.2	h=5
69	Hawthorn	d=0.2	h=5
70	Hawthorn	d=0.2	h=5
71	Hawthorn	multibole	h=6
72	Hawthorn	d=0.15	h=4
73	Hawthorn	d=0.25	h=5
74	Hazel	multibole	h=8
75	Hazel	multibole	h=8
76	Hazel	multibole	h=8
77	Hawthorn	d=0.25	h=5
78	Hawthorn	d=0.15	h=4
79	Yew	d=0.1	h=3
80	Elder	d=0.1	h=3
81	Hawthorn	d=0.25	h=5
82	Hawthorn	d=0.25	h=5
83	Ash	d=0.35	h=12
84	Yew	d=0.1	h=3
85	Hawthorn	d=0.2	h=5
86	Hawthorn	d=0.2	h=5
87	Hawthorn	d=0.2	h=5
88	Hawthorn	d=0.2	h=5
89	Hawthorn	d=0.15	h=4
90	Hawthorn	d=0.2	h=5
91	Hawthorn	d=0.2	h=5
92	Hawthorn	d=0.2	h=5
93	Unknown	d=0.5	h=10
94	Unknown	d=0.5	h=10
95	Unknown	d=0.45	h=10
96	Hawthorn	d=0.15	h=5
97	Unknown	d=0.15	h=7
98	Unknown	d=0.25	h=7
99	Unknown	d=0.25	h=7
100	Hawthorn	d=0.15	h=5

Tree Schedule

101	Hawthorn	d=0.15	h=5
102	Beech	d=0.3	h=10
103	Beech	d=0.3	h=10
104	Beech	d=0.1	h=6
105	Beech	d=0.25	h=10
106	Beech	d=0.35	h=10
107	Beech	d=0.35	h=10
108	Ash	d=2x0.2	h=12
109	Hawthorn	d=0.15	h=5
110	Hawthorn	d=0.15	h=5
111	Ash	d=0.15	h=6
112	Hawthorn	d=0.15	h=5
113	Hawthorn	d=0.15	h=5
114	Hawthorn	d=0.15	h=5
115	Hawthorn	d=0.25	h=6
116	Hawthorn	d=0.1	h=4
117	Hawthorn	d=0.1	h=4
118	Hawthorn	d=0.1	h=4
119	Ash	d=0.15	h=7
120	Unknown	d=0.1	h=4
121	Hawthorn	d=0.2	h=6
122	Unknown	d=0.35	h=8
123	Ash	d=0.35	h=12
124	Hawthorn	d=0.2	h=5
125	Hazel	multibole	h=6
126	Hazel	multibole	h=6
127	Hazel	multibole	h=6
128	Unknown	d=0.15	h=6
129	Fruit	d=0.35	h=8
130	Hazel	multibole	h=7
131	Hazel	multibole	h=7
132	Hazel	multibole	h=7
133	Unknown	multibole	h=3
134	Elder	d=0.1	h=3
135	Unknown	multibole	h=3
136	Unknown	multibole	h=8
137	Oak	d=0.5	h=15
138	Oak	d=0.5	h=15
139	Unknown	d=0.35	h=10
140	Hawthorn	d=0.2	h=5
141	Hawthorn	d=0.2	h=5
142	Hawthorn	d=0.1	h=4
143	Hawthorn	d=0.1	h=4
144	Hawthorn	d=0.2	h=5
145	Oak	d=0.7	h=15
146	Elder	d=0.15	h=5
147	Sycamore	d=0.2	h=8
148	Hawthorn	d=0.2	h=5
149	Hawthorn	d=0.35	h=7
150	Unknown	d=0.2	h=8
151	Hawthorn	d=0.2	h=5
152	Hawthorn	d=0.3	h=5
153	Hawthorn	d=0.3	h=5
154	Hawthorn	multibole	h=6
155	Oak	d=0.65	h=15
156	Unknown	d=0.35	h=8
157	Unknown	d=0.25	h=7
158	Hawthorn	d=0.15	h=6
159	Hawthorn	d=0.15	h=6
160	Hawthorn	d=0.15	h=6
161	Hawthorn	d=0.15	h=6
162	Hawthorn	d=0.15	h=6
163	Hawthorn	d=0.15	h=6
164	Sycamore	d=0.25	h=8
165	Hawthorn	d=0.3	h=8
166	Hazel	multibole	h=7
167	Oak	d=0.3	h=12
168	Oak	d=0.3	h=12
169	Unknown	d=0.3	h=8
170	Unknown	d=0.4	h=10
171	Beech	d=0.3	h=12
172	Beech	d=0.45	h=12
173	Ash	d=0.25	h=12
174	Ash	d=0.3	h=12
175	Ash	d=0.3	h=12
176	Ash	d=0.3	h=12
177	Elder	d=0.15	h=3
178	Hawthorn	d=0.3	h=8
179	Beech	d=0.5	h=12
180	Beech	d=0.5	h=12
181	Oak	d=0.85	h=15
182	Ash	d=0.3	h=12
183	Ash	d=0.25	h=10
184	Ash	d=0.35	h=12
185	Ash	d=0.35	h=12
186	Ash	d=0.3	h=10
187	Ash	d=0.3	h=10
188	Ash	d=0.25	h=10
189	Ash	d=0.25	h=10
190	Ash	d=0.3	h=10
191	Hawthorn	d=0.2	h=6
192	Oak	multibole	h=15
193	Oak	d=0.35	h=12
194	Ash	d=0.55	h=15
195	Ash	d=0.7	h=15
196	Hazel	multibole	h=6
197	Hazel	multibole	h=6
198	Ash	d=0.4	h=15
199	Ash	d=0.5	h=15
200	Hawthorn	d=0.25	h=8

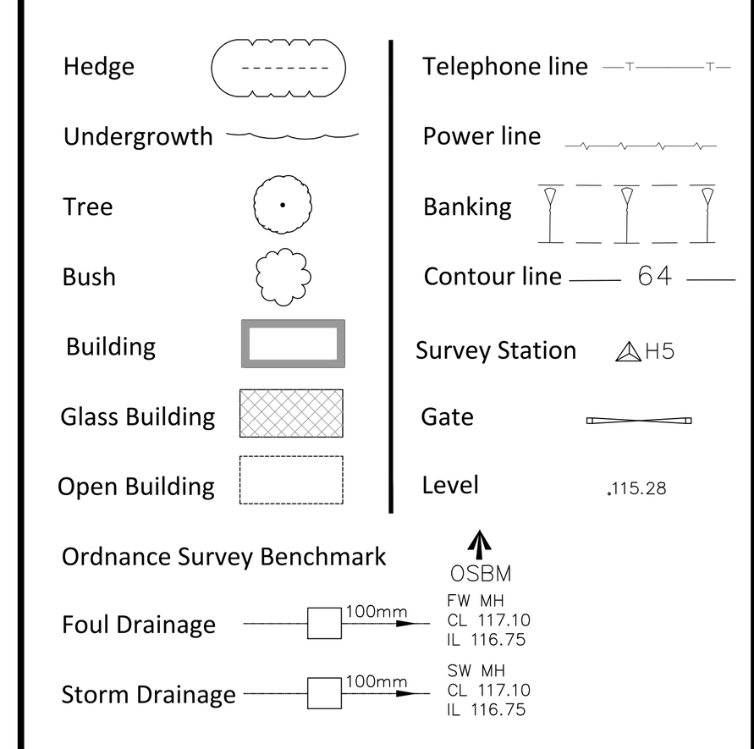
Tree Schedule

201	Hazel	multibole	h=6
202	Hawthorn	d=0.2	h=7
203	Hawthorn	d=0.2	h=7
204	Hawthorn	d=0.25	h=8
205	Hawthorn	d=0.15	h=6
206	Beech	d=0.3	h=10
207	Hazel	multibole	h=6
208	Oak	d=0.6	h=15
209	Hazel	multibole	h=6
210	Oak	d=0.65	h=15
211	Ash	d=0.6	h=15
212	Ash	d=0.35	h=12
213	Ash	d=0.35	h=12
214	Beech	multibole	h=15
215	Ash	d=0.35	h=12
216	Ash	d=0.45	h=12
217	Ash	d=0.25	h=10
218	Ash	d=0.2	h=10
219	Hazel	multibole	h=7
220	Hazel	d=0.35	h=7
221	Elder	d=0.1	h=4
222	Elder	d=0.1	h=4
223	Ash	d=0.25	h=12
224	Hazel	multibole	h=7
225	Beech	d=0.35	h=12
226	Beech	d=0.35	h=12
227	Hawthorn	d=0.2	h=7
228	Hawthorn	d=0.15	h=6
229	Ash	d=0.4	h=15
230	Unknown	d=0.25	h=10
231	Unknown	d=0.25	h=8
232	Hazel	multibole	h=7
233	Hazel	multibole	h=9
234	Ash	d=0.25	h=10
235	Beech	d=0.4	h=12
236	Ash	d=1	h=15
237	Hazel	multibole	h=8
238	Hazel	multibole	h=8
239	Ash	d=2x0.25	h=12
240	Hazel	multibole	h=8
241	Ash	d=0.35	h=12
242	Unknown	d=0.3	h=10
243	Ash	d=0.3	h=12
244	Ash	d=0.45	h=12
245	Unknown	d=0.45	h=12
246	Unknown	d=0.45	h=12
247	Unknown	d=0.45	h=12
248	Hazel	multibole	h=6
249	Hawthorn	d=2x0.2	h=8
250	Unknown	d=0.45	h=12
251	Ash	d=2x0.4	h=15
252	Oak	d=0.65	h=15
253	Beech	d=0.2	h=8
254	Beech	d=0.2	h=8
255	Unknown	d=0.25	h=10
256	Ash	d=0.9	h=15
257	Oak	d=0.65	h=15
258	Elder	d=0.25	h=5
259	Elder	d=0.15	h=5
260	Elder	d=0.15	h=5
261	Beech	multibole	h=15
262	Ash	d=0.5	h=15
263	Ash	d=0.45	h=15
264	Ash	d=0.55	h=15
265	Ash	d=0.1	h=5
266	Unknown	d=0.5	h=12
267	Unknown	d=0.35	h=10
268	Ash	d=0.25	h=10
269	Ash	d=0.45	h=12
270	Hawthorn	d=0.3	h=8
271	Unknown	d=0.7	h=12
272	Unknown	d=2x0.25	h=12
273	Unknown	d=3x0.15	h=10
274	Ash	d=3x0.4	h=15
275	Beech	d=0.25	h=10
276	Beech	d=0.3	h=10
277	Beech	d=0.3	h=10
278	Beech	d=0.4	h=12
279	Unknown	d=0.2	h=9
280	Unknown	d=0.2	h=9
281	Ash	d=1	h=15
282	Unknown	d=0.5	h=12
283	Unknown	d=0.2	h=9
284	Ash	d=0.35	h=12
285	Hazel	multibole	h=6
286	Ash	d=0.15	h=8
287	Ash	d=0.15	h=8
288	Ash	d=0.15	h=8
289	Ash	d=0.15	h=8
290	Hazel	multibole	h=6
291	Hazel	multibole	h=6
292	Unknown	d=0.15	h=7
293	Hazel	multibole	h=6
294	Oak	d=0.65	h=15
295	Cherry	d=0.5	h=15
296	Cherry	d=0.15	h=10
297	Hazel	multibole	h=6
298	Hazel	d=0.35	h=6
299	Ash	d=0.2	h=8
300	Hawthorn	d=0.1	h=5

Tree Schedule

301	Ash	multibole	h=10
302	Hawthorn	d=0.4	h=9
303	Unknown	d=0.15	h=7
304	Hazel	multibole	h=6
305	Oak	d=0.5	h=15
306	Hawthorn	d=0.15	h=6
307	Ash	d=0.2	h=8
308	Cherry	d=0.15	h=10
309	Cherry	d=0.15	h=10
310	Cherry	d=0.15	h=10
311	Ash	multibole	h=10
312	Unknown	d=0.45	h=10
313	Ash	multibole	h=10
314	Hazel	multibole	h=6
315	Hazel	multibole	h=6
316	Hazel	multibole	h=6
317	Elder	d=0.15	h=5
318	Ash	d=0.15	h=8
319	Ash	d=0.15	h=8
320	Elder	d=0.15	h=5
321	Hazel	multibole	h=6
322	Hazel	multibole	h=6
323	Oak	d=0.5	h=15
324	Hawthorn	d=0.2	h=7
325	Hawthorn	d=0.2	h=7
326	Ash	d=0.45	h=12
327	Ash	d=0.4	h=12
328	Holly	d=0.4	h=10
329	Ash	d=0.15	h=8
330	Unknown	d=0.2	h=8
331	Ash	d=0.25	h=9
332	Hazel	multibole	h=6
333	Hawthorn	d=0.25	h=8
334	Ash	d=0.4	h=12
335	Hazel	multibole	h=6
336	Hazel	multibole	h=6
337	Holly	d=0.2	h=8
338	Holly	d=0.2	h=8
339	Unknown	d=0.1	h=7
340	Hawthorn	d=0.2	h=7
341	Hawthorn	multibole	h=7
342	Hawthorn	d=0.2	h=7
343	Unknown	d=0.25	h=8
344	Unknown	d=0.25	h=8
345	Unknown	d=0.25	h=8
346	Oak	d=0.25	h=10
347	Unknown	d=0.25	h=8
348	Unknown	d=0.25	h=8
349	Pine	d=0.2	h=8
350	Unknown	d=0.25	h=8
351	Unknown	d=0.15	h=6
352	Unknown	d=0.15	h=6
353	Unknown	d=0.15	h=6
354	Pine	d=0.25	h=10
355	Unknown	d=0.15	h=6
356	Unknown	d=0.25	h=8
357	Unknown	d=0.25	h=8
358	Unknown	d=0.25	h=8
359	Unknown	d=0.25	h=8
360	Unknown	d=0.25	h=8
361	Unknown	d=0.25	h=8
362	Unknown	d=0.25	h=8
363	Unknown	d=0.15	h=8
364	Unknown	d=0.25	h=8
365	Unknown	d=0.25	h=8
366	Pine	d=0.35	h=10
367	Unknown	d=0.3	h=8
368	Unknown	d=0.3	h=8
369	Unknown	d=0.3	h=8
370	Unknown	d=0.3	h=8
371	Unknown	d=0.35	h=10
372	Unknown	d=0.35	h=10
373	Unknown	d=0.25	h=8
374	Unknown	d=0.25	h=8
375	Unknown	d=0.25	h=8
376	Unknown	d=0.25	h=8
377	Unknown	d=0.25	h=8
378	Unknown	d=0.25	h=8
379	Unknown	d=0.4	h=10

Topographical Survey Legend



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

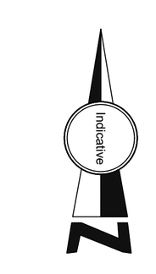
Notes

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

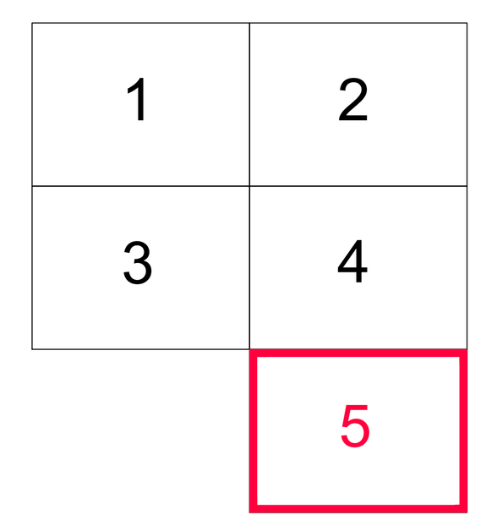
Drainage has been surveyed where found, and traced where possible.

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

Ordnance Survey Digital Data added and shown in green, pen colour 117.



Sheet Layout



HOOK SURVEY
Land & Building Surveyors
www.hooksurvey.com

Project :
Blackthorn Farm, South Street
Culverstone, Meopham DA13 0QW

Client :
Esquire Developments

Drawing title :
Topographical Survey

Job No. : S24/10281	Dwg No. : S24/10281/04	Revision : -
Scale : 1:200	Date : January 2025	Drawn by : W.M.

Grid & Levels related to :
Ordnance Survey coordinate system using GPS related to the Leica Smartnet RTK network. Based around 5 survey stations with a scale factor of 1.000, only the fixed survey stations H1, H2, H3, H4 & H5 are true Ordnance Survey positions.

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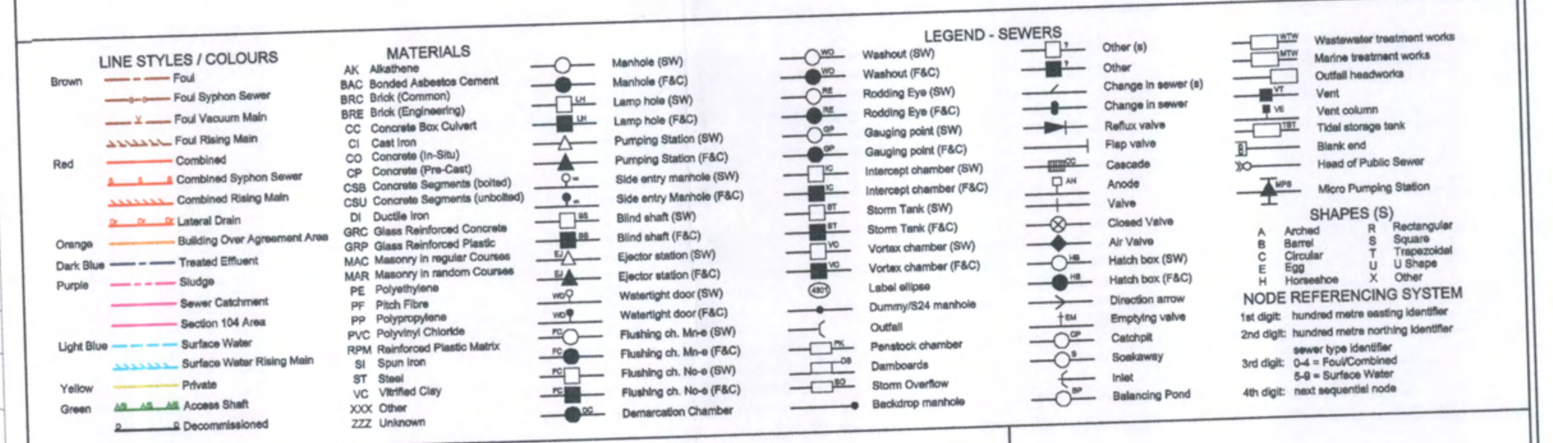
163280mN
163240mN
163200mN
163160mN
563760mE
563800mE
563840mE
563880mE

Appendix C

SEWER RECORDS

Node	Cover	Invert	Size	Material	Shape	
3501X	155.12	151.76	150	VC	CIRC	
3502X			300	VC	CIRC	
3503X			300	VC	CIRC	
350DX			300	VC	CIRC	
351DX			150	VC	CIRC	
360PX	153.16		100	PVC	CIRC	
4601X	162.37	159.89	150	VC	CIRC	
4603X	161.38	159.5	150	VC	CIRC	
4604X			150	VC	CIRC	
460DX			150	VC	CIRC	
4702X	178.77	177.54	150	VC	CIRC	
4703X	178.58	177.07	150	VC	CIRC	
4706X			150	VC	CIRC	
4707X	177.69	176.97	100	VC	CIRC	
4708X	177.68	176.43	150	VC	CIRC	
4709X	177.56	176.26	150	VC	CIRC	
4710X	177.71	176.74	100	VC	CIRC	
4801X	178.51	176.53	150	VC	CIRC	
4802X	177.73	176.11	150	VC	CIRC	
4803X	177.78	176.78	100	VC	CIRC	
4804X	176.82	175.01	150	VC	CIRC	
4805X			UNK	UNK	CIRC	
4901X	176.01	174.44	150	VC	CIRC	
5001X	172.8	170.77	150	VC	CIRC	
5002X	174.1	172.1	150	VC	CIRC	
5003X	174.43	172.75	150	VC	CIRC	
5101X	171.74	169.81	150	VC	CIRC	
5201X	168.89	166.39	225	VC	CIRC	
5202X	170.3	166.97	225	VC	CIRC	
5601X	162.6	161.38	150	VC	CIRC	
5701X			UNK	UNK	CIRC	
5702X			UNK	UNK	CIRC	
5703X			UNK	UNK	CIRC	
5704X			UNK	UNK	CIRC	
5708X	176.25	174.91	150	VC	CIRC	
5709X			150	VC	CIRC	
5710X			150	VC	CIRC	
5711X			150	VC	CIRC	
5712X			UNK	UNK	CIRC	
5713X			UNK	UNK	CIRC	
5714X			UNK	UNK	CIRC	
5715X	175.82		UNK	UNK	CIRC	
5716X			150	VC	CIRC	
5717X	175.43	173.75	150	VC	CIRC	
5718X	175.32		150	VC	CIRC	
5801X	175.07	173.89	150	VC	CIRC	
5802X	174.92	173.12	150	VC	CIRC	
5803X	174.36	172.52	150	VC	CIRC	
5901X	175.02	173.87	150	VC	CIRC	
5902X	174.76	173.37	150	VC	CIRC	
5903X	174.64	173.14	150	VC	CIRC	
5904X	174.68	173.61	150	VC	CIRC	
5905X	174.7	173.06	150	VC	CIRC	
5906X	175.06	173.04	150	VC	CIRC	
5907X	175.01	172.87	150	VC	CIRC	
6001X	172.29	170.03	150	VC	CIRC	
6002X	171.24	169.44	150	VC	CIRC	
6003X	172.64		150	VC	CIRC	
6004X	173.95	171.58	150	VC	CIRC	
6005X	172.98	171.21	150	VC	CIRC	
6006X	174.26	171.67	150	VC	CIRC	
6007X	173.21		150	VC	CIRC	
6008X	173.42	171.74	150	VC	CIRC	
6009X	173.19	171.94	150	VC	CIRC	
6101X	171.24	168.58	225	VC	CIRC	
6102X	171.21	169.05	150	VC	CIRC	
6103X	171.42	168.97	225	VC	CIRC	
6104X	172.67	170.45	225	VC	CIRC	
6105X	172.62	170.62	150	VC	CIRC	
6201X	169.41	167.81	100	VC	CIRC	
6202X	170.25	168.25	225	VC	CIRC	
6301X	168.16	165.97	225	VC	CIRC	
6302X			225	VC	CIRC	
6303X	166.11		225	VC	CIRC	
6304X	167.75	166.62	150	VC	CIRC	
6305X			150	VC	CIRC	
6401X	165.59	163.42	225	VC	CIRC	
6402X	164.68	162.61	225	VC	CIRC	
6501X	163.03	160.55	225	VC	CIRC	
6502X			150	VC	CIRC	
6503X			150	VC	CIRC	
6504X	162.08	159.74	225	VC	CIRC	
6505X	161.81	159.36	225	VC	CIRC	
6506X	162.58	161.28	150	VC	CIRC	
6601X			150	VC	CIRC	
6602X			150	VC	CIRC	
6603X	161.4	158.96	225	VC	CIRC	
6604X			225	VC	CIRC	*
6701X			225	VC	CIRC	*
6701X	174.99		150	VC	CIRC	
6702X	175.03	173.53	150	VC	CIRC	
6703X	175.09	173.21	150	VC	CIRC	
6704X	173.07	171.37	150	VC	CIRC	
6706X	173.16	170.95	150	VC	CIRC	
6707X	170.41	168.59	150	VC	CIRC	
6709Y	175.09		150	VC	CIRC	
6710X	175.02		150	VC	CIRC	
6711X	175.09	173.26	150	VC	CIRC	
6801X	174.35	173.09	150	VC	CIRC	
6802X	173.75	172.3	150	VC	CIRC	
6803X	173	170.58	150	VC	CIRC	
6804X	172.27	170.64	150	VC	CIRC	
6805X	171.03	169.97	150	VC	CIRC	
6806X	174.35	172.2	150	VC	CIRC	
6807X	173.34	171.55	150	VC	CIRC	
6901X	174.47	173.04	150	VC	CIRC	
6902X	174.14	172.37	150	VC	CIRC	
6903X	173.9	172.02	150	VC	CIRC	
6904X	173.69	172	150	VC	CIRC	
6905X	172.99	171.3	150	VC	CIRC	
6906X	172.95	171.4	150	VC	CIRC	
6907X	174.34	172.42	150	VC	CIRC	
690DX			UNK	UNK	CIRC	
7001X	171.96	169.08	150	VC	CIRC	
7101X	170.75	169.75	150	VC	CIRC	
7801X	158.96	156.46	225	VC	CIRC	*
7801X	169.57	168.7	150	VC	CIRC	*
7802X	170.38	168.29	150	VC	CIRC	*
7802X	157.34	155.57	225	VC	CIRC	*
7803X	169.63	167.95	150	VC	CIRC	
7804X	164.58	163.16	150	VC	CIRC	
7805X	165.95	164.37	150	VC	CIRC	
7806X	160.86	159.84	150	VC	CIRC	
7807X	164.87	159.5	150	VC	CIRC	
7901X	155.53	153.24	225	VC	CIRC	*
7901X	171.74	169.81	150	VC	CIRC	*
7902X	170.94	169.22	150	VC	CIRC	
7903X	170.93	169.16	150	VC	CIRC	
7904X	168.72	167.23	150	VC	CIRC	
7905X	169.82	166.79	150	VC	CIRC	
7906X	169.02	165.88	150	VC	CIRC	
8701X	157.1	155.88	225	VC	CIRC	
870PX	157.55		150	PVC	CIRC	



O.S. Ref. TQ6363SE	Drawn by: rohandas
Scale: 1:2500	Date: 30/07/2019

Title: 346311_Blackthorn Farm, Culver

The information contained on this plan is provided as a guide to the approximate position of existing public sewers. The accuracy thereof cannot be guaranteed.

THIS INFORMATION MUST BE TREATED WITH CAUTION AND THE ACTUAL POSITION OF THE PUBLIC SEWERS MUST BE ESTABLISHED ON SITE, IN ALL CASES.

Southern Water must be informed before lifting manhole covers or excavating trial holes.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

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

Southern Water

Appendix D

N

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.

DRAINAGE KEY

- PROPOSED SURFACE WATER SEWER
- PROPOSED FOUL PUMP STATION AND EMERGENCY STORAGE
- PROPOSED FOUL SEWER
- EXISTING FOUL SEWER
- PROPOSED FOUL RISING MAIN
- PROPOSED DETENTION BASIN
- OVERLAND FLOW ROUTES
- PROPOSED MAINTENANCE STRIP

INFORMATION SUMMARY

INFORMATION TYPE	SOURCE	REFERENCE	REVISION & DATE
SITE LAYOUT	Clague	23357B	Nov. 2024 Rev. -
TOPOGRAPHICAL SURVEY	Hook Surveys	S24/10281/01	Jan 2025 Rev. -

Rev	Description	Drn	Chk	App	Date
P2	UPDATED ATTENAUTION FEATURE BASED ON BNG COMMENTS	AMC	AMC	AD	04-07-25
P1	FIRST ISSUE	AD	AMC	AD	30-05-25

Purpose: PRELIMINARY

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: ESQUIRE DEVELOPMENTS

Project Title: BLACKTHORN FARM, ISTEAD RISE

Drawing Title: DRAINAGE STRATEGY LAYOUT

Drawn by	Checked by	Approved by	Revision
AD	AMC	AD	P2

A1 Scale	Date
1:500@A1	23/05/25

Drawing Number: 2500770-ACE-XX-XX-DR-C-0001

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

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
20	0.069	5.00	164.887	1200	563678.600	163446.302	1.500
21	0.069	5.00	165.254	1200	563684.161	163421.067	1.973
30	0.069	5.00	165.738	1200	563655.809	163404.649	1.362
31	0.069	5.00	165.490	1200	563683.000	163408.010	1.504
22	0.069	5.00	165.405	1200	563693.784	163408.450	2.189
23	0.069	5.00	165.046	1350	563719.874	163398.826	2.633
24	0.069	5.00	163.888	1350	563790.019	163379.366	1.700
9			164.674	1350	563779.805	163336.407	2.623
13			163.906	1350	563790.821	163320.796	1.914
14			161.935	1350	563821.290	163316.194	1.575
15			160.676	1350	563824.470	163335.024	1.575
J1			160.800		563825.215	163345.051	1.869
J2			160.800		563831.413	163371.872	2.000
J3			158.000		563838.866	163392.501	2.000
10	0.069	5.00	163.173	1200	563675.179	163524.359	1.500
11	0.069	5.00	163.668	1200	563674.323	163502.974	2.083
12	0.069	5.00	164.074	1200	563679.670	163483.727	2.571
1	0.069	5.00	164.612	1200	563645.923	163458.083	1.421
2	0.069	5.00	164.356	1200	563672.673	163463.197	1.500
3	0.069	5.00	164.273	1350	563689.935	163471.904	2.909
4	0.069	5.00	164.390	1350	563706.585	163459.684	3.090
5	0.069	5.00	164.305	1350	563723.235	163451.893	3.062
6	0.069	5.00	162.309	1350	563789.683	163433.410	1.924
50	0.069	5.00	162.952	1200	563735.486	163532.058	1.500
51	0.069	5.00	161.205	1350	563797.504	163530.561	1.597
52	0.069	5.00	160.968	1350	563804.989	163527.995	1.650
53	0.069	5.00	160.954	1350	563806.913	163521.579	1.653
40	0.069	5.00	163.919	1200	563709.823	163484.155	1.564
41	0.069	5.00	163.426	1200	563725.007	163499.125	1.501
42	0.069	5.00	162.898	1200	563769.703	163485.224	1.893
43	0.069	5.00	161.349	1350	563803.919	163482.444	2.145
44	0.069	5.00	161.135	1350	563809.907	163469.185	1.967
7	0.069	5.00	161.399	1350	563803.736	163430.355	2.515
8			158.620	1350	563831.820	163420.264	1.650
J4			158.000		563840.624	163418.811	2.113
J5			158.000		563841.949	163438.631	2.200
Deep Bore Soakaway 1			157.781		563850.635	163441.218	2.101

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	✓
Winter CV	0.840	Additional Storage (m³/ha)	20.0	100 year 360 minute (m³)	

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	45	0	0
30	0	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.10	Betterment (%)	0
Greenfield Method	IH124	Region	1	QBar	
Positively Drained Area (ha)		Growth Factor 1 year	0.85	Q 1 year (l/s)	
SAAR (mm)		Growth Factor 30 year	1.95	Q 30 year (l/s)	
Soil Index	1	Growth Factor 100 year	2.48	Q 100 year (l/s)	

Pre-development Discharge Volume

Site Makeup	Greenfield	SPR	0.10	Storm Duration (mins)	360
Greenfield Method	FSR/FEH	CWI		Betterment (%)	0
Positively Drained Area (ha)		Return Period (years)	100	PR	
Soil Index	1	Climate Change (%)	0	Runoff Volume (m^3)	

Node J1 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	x	Diameter (m)	0.450
Downstream Link	1.009	Invert Level (m)	158.931	Discharge Coefficient	0.600

Node J2 Online Orifice Control

Flap Valve	x	Invert Level (m)	158.800	Diameter (m)	0.010
Downstream Link	1.010	Design Depth (m)	2.000	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		

Node J3 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	x	Diameter (m)	0.450
Downstream Link	1.011	Invert Level (m)	156.000	Discharge Coefficient	0.600

Node J5 Online Orifice Control

Flap Valve	x	Replaces Downstream Link	x	Diameter (m)	0.450
Downstream Link	1.013	Invert Level (m)	155.800	Discharge Coefficient	0.600

Node Deep Bore Soakaway 1 Deep Bore Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	155.680	Borehole Diameter	0.300
Side Inf Coefficient (m/hr)	0.10800	Time to half empty (mins)	75	Borehole Depth **(m)**	30.000
Safety Factor	2.0	Diameter (m)	1.500	Inf Depth (m)	25.000
Porosity	1.00	Depth (m)		Number Required	4

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	20	10	163.445	0.058	6.2	0.1199	0.0000	OK
15 minute winter	21	11	163.368	0.087	12.2	0.1591	0.0000	OK
15 minute winter	30	10	164.419	0.043	6.2	0.0931	0.0000	OK
15 minute winter	31	11	164.062	0.075	12.3	0.1544	0.0000	OK
15 minute winter	22	11	163.301	0.085	29.8	0.1501	0.0000	OK
15 minute winter	23	11	162.560	0.147	35.8	0.2874	0.0000	OK
15 minute winter	24	12	162.349	0.161	41.8	0.3615	0.0000	OK
15 minute winter	9	12	162.202	0.151	40.5	0.2167	0.0000	OK
15 minute winter	13	12	162.068	0.077	39.9	0.1097	0.0000	OK
15 minute winter	14	13	160.430	0.070	39.8	0.1001	0.0000	OK
15 minute winter	15	13	159.258	0.157	40.0	0.2244	0.0000	OK
8640 minute winter	J1	6360	159.231	0.300	2.7	0.0000	0.0000	OK
8640 minute winter	J2	6300	159.231	0.431	5.6	0.0000	0.0000	SURCHARGED
2880 minute winter	J3	2700	156.213	0.213	0.7	0.0000	0.0000	OK
15 minute winter	10	10	161.732	0.059	6.2	0.1201	0.0000	OK
15 minute winter	11	11	161.669	0.084	12.2	0.1497	0.0000	OK
15 minute winter	12	11	161.611	0.108	18.0	0.1805	0.0000	OK
15 minute winter	1	10	163.236	0.045	6.2	0.0945	0.0000	OK
15 minute winter	2	11	162.941	0.085	12.3	0.1742	0.0000	OK
15 minute winter	3	11	161.521	0.157	35.7	0.2994	0.0000	OK
15 minute winter	4	11	161.458	0.158	41.6	0.2959	0.0000	OK
15 minute winter	5	11	161.364	0.121	47.3	0.2280	0.0000	OK
15 minute winter	6	12	160.483	0.098	52.4	0.2108	0.0000	OK
15 minute winter	50	11	161.489	0.037	6.2	0.0750	0.0000	OK
15 minute winter	51	10	159.659	0.051	12.0	0.1180	0.0000	OK
15 minute winter	52	11	159.433	0.115	18.0	0.2605	0.0000	OK
15 minute winter	53	11	159.416	0.115	23.9	0.2603	0.0000	OK
15 minute winter	40	10	162.395	0.040	6.2	0.0807	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	20	1.000	21	6.0	0.459	0.085	0.3418
15 minute winter	21	1.001	22	12.0	0.719	0.169	0.2647
15 minute winter	30	2.000	31	6.1	0.617	0.046	0.2752
15 minute winter	31	2.001	22	12.0	0.904	0.125	0.1431
15 minute winter	22	1.002	23	30.0	1.871	0.166	0.4461
15 minute winter	23	1.003	24	36.0	0.858	0.325	3.0548
15 minute winter	24	1.004	9	40.5	0.933	0.366	1.9186
15 minute winter	9	1.005	13	39.9	1.413	0.361	0.5522
15 minute winter	13	1.006	14	39.8	2.632	0.086	0.4665
15 minute winter	14	1.007	15	40.0	1.437	0.078	0.5517
15 minute winter	15	1.008	J1	40.2	0.973	0.364	0.4161
8640 minute winter	J1	1.009	J2	5.6	0.006	0.000	172.1682
8640 minute winter	J2	1.010	J3	0.1	0.295	0.008	0.0101
2880 minute winter	J3	1.011	J4	-1.3	0.001	0.000	118.9391
15 minute winter	10	3.000	11	6.0	0.475	0.085	0.2741
15 minute winter	11	3.001	12	12.0	0.620	0.170	0.3883
15 minute winter	12	3.002	3	18.0	0.819	0.254	0.3437
15 minute winter	1	4.000	2	6.1	0.548	0.049	0.3111
15 minute winter	2	4.001	3	12.0	0.752	0.165	0.3077
15 minute winter	3	3.003	4	35.8	0.818	0.324	0.9049
15 minute winter	4	3.004	5	41.5	1.115	0.375	0.6863
15 minute winter	5	3.005	6	46.6	1.745	0.209	1.8483
15 minute winter	6	3.006	7	51.9	2.393	0.131	0.3120
15 minute winter	50	5.000	51	5.9	1.221	0.032	0.3015
15 minute winter	51	5.001	52	11.8	1.375	0.036	0.0683
15 minute winter	52	5.002	53	17.7	0.567	0.109	0.2133
15 minute winter	53	5.003	43	23.7	0.556	0.148	1.6808
15 minute winter	40	6.000	41	6.1	0.842	0.039	0.1561

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	41	10	161.981	0.056	12.3	0.1148	0.0000	OK
15 minute winter	42	11	161.066	0.061	18.2	0.1133	0.0000	OK
15 minute winter	43	11	159.372	0.168	47.4	0.3480	0.0000	OK
15 minute winter	44	11	159.308	0.140	53.2	0.2976	0.0000	OK
15 minute winter	7	11	158.998	0.114	109.9	0.2257	0.0000	OK
15 minute winter	8	12	157.086	0.116	109.4	0.1660	0.0000	OK
2880 minute winter	J4	2700	156.211	0.324	5.7	0.0000	0.0000	OK
2880 minute winter	J5	2700	156.211	0.411	4.3	0.0000	0.0000	OK
2880 minute winter	Deep Bore Soakaway 1	2700	156.211	0.531	2.0	12.3229	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	41	6.001	42	12.0	1.257	0.077	0.4499
15 minute winter	42	6.002	43	18.0	1.784	0.088	0.3460
15 minute winter	43	5.004	44	47.4	0.993	0.297	0.6953
15 minute winter	44	5.005	7	52.8	1.443	0.192	1.4411
15 minute winter	7	3.007	8	109.4	3.435	0.133	0.9507
15 minute winter	8	3.008	J4	110.0	3.591	0.129	0.2734
2880 minute winter	J4	1.012	J5	4.3	0.017	0.000	125.0876
2880 minute winter	J5	1.013	Deep Bore Soakaway 1	2.0	0.401	0.006	2.4012
2880 minute winter	Deep Bore Soakaway 1	Infiltration		1.4			

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	20	10	163.499	0.112	21.8	0.2292	0.0000	OK
15 minute winter	21	10	163.464	0.182	43.2	0.3339	0.0000	OK
15 minute winter	30	10	164.457	0.081	21.8	0.1738	0.0000	OK
15 minute winter	31	10	164.140	0.154	43.3	0.3161	0.0000	OK
15 minute winter	22	11	163.391	0.175	106.4	0.3083	0.0000	OK
15 minute winter	23	11	162.911	0.498	127.2	0.9736	0.0000	SURCHARGED
15 minute winter	24	11	162.596	0.409	141.9	0.9172	0.0000	SURCHARGED
15 minute winter	9	12	162.356	0.305	139.2	0.4370	0.0000	OK
15 minute winter	13	12	162.144	0.152	141.1	0.2178	0.0000	OK
15 minute winter	14	12	160.493	0.133	141.6	0.1898	0.0000	OK
10080 minute winter	15	9420	159.798	0.697	2.1	0.9967	0.0000	SURCHARGED
10080 minute winter	J1	9360	159.799	0.868	7.1	0.0000	0.0000	OK
10080 minute winter	J2	9420	159.796	0.996	14.5	0.0000	0.0000	SURCHARGED
10080 minute winter	J3	9420	156.879	0.879	0.2	0.0000	0.0000	OK
15 minute winter	10	11	161.828	0.155	21.8	0.3176	0.0000	OK
15 minute winter	11	11	161.822	0.237	41.4	0.4248	0.0000	OK
15 minute winter	12	11	161.800	0.297	58.8	0.4948	0.0000	OK
15 minute winter	1	10	163.275	0.084	21.8	0.1768	0.0000	OK
15 minute winter	2	10	163.031	0.175	43.3	0.3587	0.0000	OK
15 minute winter	3	11	161.745	0.381	119.2	0.7253	0.0000	SURCHARGED
15 minute winter	4	11	161.649	0.349	139.7	0.6556	0.0000	OK
15 minute winter	5	11	161.491	0.248	160.3	0.4663	0.0000	OK
15 minute winter	6	11	160.592	0.207	181.1	0.4446	0.0000	OK
15 minute winter	50	10	161.520	0.068	21.8	0.1403	0.0000	OK
15 minute winter	51	10	159.710	0.102	42.8	0.2344	0.0000	OK
15 minute winter	52	11	159.610	0.292	64.9	0.6628	0.0000	OK
15 minute winter	53	11	159.599	0.298	84.3	0.6752	0.0000	OK
15 minute winter	40	10	162.429	0.074	21.8	0.1497	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	20	1.000	21	21.4	0.624	0.302	0.8881
15 minute winter	21	1.001	22	42.2	0.985	0.596	0.6919
15 minute winter	30	2.000	31	21.6	0.841	0.162	0.7102
15 minute winter	31	2.001	22	42.4	1.250	0.441	0.3673
15 minute winter	22	1.002	23	105.4	2.075	0.584	1.5725
15 minute winter	23	1.003	24	121.4	1.101	1.097	8.0290
15 minute winter	24	1.004	9	139.2	1.287	1.255	4.5576
15 minute winter	9	1.005	13	141.1	2.004	1.276	1.3189
15 minute winter	13	1.006	14	141.6	3.693	0.306	1.1825
15 minute winter	14	1.007	15	141.7	1.987	0.275	1.3138
10080 minute winter	15	1.008	J1	4.2	0.393	0.038	1.1090
10080 minute winter	J1	1.009	J2	-17.1	0.006	0.000	481.8417
10080 minute winter	J2	1.010	J3	0.2	0.322	0.012	0.1998
10080 minute winter	J3	1.011	J4	19.7	0.002	0.000	464.1712
15 minute winter	10	3.000	11	19.6	0.593	0.276	1.0309
15 minute winter	11	3.001	12	40.1	0.716	0.565	1.2982
15 minute winter	12	3.002	3	59.5	0.928	0.842	1.1016
15 minute winter	1	4.000	2	21.5	0.741	0.175	0.8004
15 minute winter	2	4.001	3	42.3	1.053	0.584	0.7777
15 minute winter	3	3.003	4	119.2	1.092	1.076	2.2432
15 minute winter	4	3.004	5	139.8	1.506	1.262	1.6928
15 minute winter	5	3.005	6	160.6	2.300	0.719	4.8126
15 minute winter	6	3.006	7	180.4	3.201	0.455	0.8102
15 minute winter	50	5.000	51	21.1	1.771	0.112	0.7394
15 minute winter	51	5.001	52	43.2	1.444	0.131	0.3460
15 minute winter	52	5.002	53	62.5	0.669	0.386	0.7379
15 minute winter	53	5.003	43	82.9	0.670	0.519	4.8645
15 minute winter	40	6.000	41	21.6	1.198	0.137	0.3876

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	41	10	162.033	0.108	43.4	0.2210	0.0000	OK
15 minute winter	42	10	161.124	0.119	64.6	0.2215	0.0000	OK
15 minute winter	43	11	159.566	0.361	167.0	0.7501	0.0000	OK
15 minute winter	44	11	159.458	0.290	187.6	0.6191	0.0000	OK
15 minute winter	7	11	159.119	0.235	388.3	0.4645	0.0000	OK
15 minute winter	8	11	157.213	0.243	387.5	0.3482	0.0000	OK
10080 minute winter	J4	9360	156.879	0.992	25.4	0.0000	0.0000	OK
10080 minute winter	J5	9420	156.879	1.079	18.7	0.0000	0.0000	SURCHARGED
10080 minute winter	Deep Bore Soakaway 1	9420	156.879	1.199	5.9	17.0426	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	41	6.001	42	42.8	1.754	0.274	1.1420
15 minute winter	42	6.002	43	63.6	2.519	0.311	0.8665
15 minute winter	43	5.004	44	167.1	1.359	1.046	1.7789
15 minute winter	44	5.005	7	187.5	1.956	0.683	3.7669
15 minute winter	7	3.007	8	387.5	4.532	0.471	2.5514
15 minute winter	8	3.008	J4	386.4	4.854	0.452	0.7105
10080 minute winter	J4	1.012	J5	18.7	0.017	0.000	393.1045
10080 minute winter	J5	1.013	Deep Bore Soakaway 1	5.9	0.401	0.016	3.2353
10080 minute winter	Deep Bore Soakaway 1	Infiltration		1.4			

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	20	12	164.693	1.306	50.4	2.6777	0.0000	FLOOD RISK
15 minute winter	21	12	164.670	1.389	68.1	2.5410	0.0000	SURCHARGED
15 minute winter	30	12	164.698	0.322	39.9	0.6908	0.0000	SURCHARGED
15 minute winter	31	12	164.665	0.679	79.4	1.3914	0.0000	SURCHARGED
15 minute winter	22	12	164.606	1.390	153.7	2.4475	0.0000	SURCHARGED
15 minute winter	23	12	163.932	1.519	184.9	2.9696	0.0000	SURCHARGED
15 minute winter	24	12	163.222	1.035	219.0	2.3209	0.0000	SURCHARGED
15 minute winter	9	12	162.595	0.544	216.8	0.7789	0.0000	SURCHARGED
15 minute winter	13	12	162.188	0.196	217.2	0.2805	0.0000	OK
15 minute winter	14	12	160.535	0.175	217.5	0.2499	0.0000	OK
10080 minute winter	15	9840	160.309	1.208	4.2	1.7288	0.0000	SURCHARGED
10080 minute winter	J1	9780	160.312	1.381	8.1	0.0000	0.0000	OK
10080 minute winter	J2	9840	160.308	1.508	15.6	0.0000	0.0000	SURCHARGED
10080 minute winter	J3	9840	157.678	1.678	2.2	0.0000	0.0000	OK
15 minute winter	10	12	163.066	1.393	39.9	2.8568	0.0000	FLOOD RISK
15 minute winter	11	12	163.040	1.455	67.2	2.6079	0.0000	SURCHARGED
15 minute winter	12	12	162.943	1.440	97.9	2.4018	0.0000	SURCHARGED
15 minute winter	1	10	163.307	0.116	39.9	0.2430	0.0000	OK
15 minute winter	2	11	163.130	0.274	79.4	0.5628	0.0000	OK
15 minute winter	3	12	162.763	1.399	206.9	2.6670	0.0000	SURCHARGED
15 minute winter	4	12	162.465	1.165	238.5	2.1881	0.0000	SURCHARGED
15 minute winter	5	12	162.093	0.850	270.9	1.6002	0.0000	SURCHARGED
15 minute winter	6	12	160.691	0.306	299.0	0.6581	0.0000	OK
15 minute winter	50	10	161.544	0.092	39.9	0.1896	0.0000	OK
15 minute winter	51	11	160.095	0.487	79.3	1.1174	0.0000	SURCHARGED
15 minute winter	52	11	160.077	0.759	107.5	1.7205	0.0000	SURCHARGED
15 minute winter	53	11	160.059	0.758	142.2	1.7172	0.0000	SURCHARGED
15 minute winter	40	10	162.458	0.103	39.9	0.2067	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	20	1.000	21	36.7	0.632	0.518	1.8196
15 minute winter	21	1.001	22	67.1	1.253	0.948	1.1174
15 minute winter	30	2.000	31	39.5	0.949	0.298	1.9293
15 minute winter	31	2.001	22	69.9	1.391	0.727	0.7600
15 minute winter	22	1.002	23	153.8	2.184	0.853	1.9582
15 minute winter	23	1.003	24	184.8	1.675	1.670	8.0290
15 minute winter	24	1.004	9	216.8	1.966	1.957	4.8704
15 minute winter	9	1.005	13	217.2	2.266	1.965	1.6103
15 minute winter	13	1.006	14	217.5	4.012	0.470	1.6722
15 minute winter	14	1.007	15	217.7	2.350	0.422	1.5331
10080 minute winter	15	1.008	J1	5.8	0.389	0.052	1.1090
10080 minute winter	J1	1.009	J2	15.6	0.006	0.000	807.3520
10080 minute winter	J2	1.010	J3	0.3	0.320	0.014	0.2009
10080 minute winter	J3	1.011	J4	-28.6	-0.001	0.000	968.9492
15 minute winter	10	3.000	11	34.4	0.596	0.485	1.5071
15 minute winter	11	3.001	12	67.3	0.956	0.950	1.4067
15 minute winter	12	3.002	3	99.4	1.412	1.406	1.1026
15 minute winter	1	4.000	2	39.5	0.833	0.321	1.2595
15 minute winter	2	4.001	3	77.4	1.253	1.067	1.1809
15 minute winter	3	3.003	4	201.8	1.830	1.822	2.2780
15 minute winter	4	3.004	5	234.6	2.127	2.117	2.0276
15 minute winter	5	3.005	6	267.8	2.480	1.199	7.1272
15 minute winter	6	3.006	7	300.2	3.494	0.757	1.2275
15 minute winter	50	5.000	51	39.4	1.892	0.209	2.7415
15 minute winter	51	5.001	52	84.6	1.444	0.256	0.8728
15 minute winter	52	5.002	53	114.4	0.722	0.707	1.0613
15 minute winter	53	5.003	43	146.4	0.924	0.917	6.2187
15 minute winter	40	6.000	41	39.6	1.385	0.250	0.6116

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	41	10	162.078	0.153	79.5	0.3134	0.0000	OK
15 minute winter	42	10	161.178	0.173	118.4	0.3210	0.0000	OK
15 minute winter	43	11	159.962	0.758	291.5	1.5726	0.0000	SURCHARGED
15 minute winter	44	11	159.756	0.588	327.0	1.2544	0.0000	SURCHARGED
15 minute winter	7	11	159.230	0.346	654.4	0.6843	0.0000	OK
10080 minute winter	8	9780	157.676	0.706	33.3	1.0107	0.0000	SURCHARGED
10080 minute winter	J4	9780	157.676	1.789	42.0	0.0000	0.0000	OK
10080 minute winter	J5	9840	157.677	1.876	31.2	0.0000	0.0000	SURCHARGED
10080 minute winter	Deep Bore Soakaway 1	9840	157.677	1.997	6.2	22.6841	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	41	6.001	42	78.5	2.012	0.503	1.8258
15 minute winter	42	6.002	43	116.4	2.911	0.569	1.3770
15 minute winter	43	5.004	44	289.4	1.827	1.811	2.3050
15 minute winter	44	5.005	7	323.2	2.099	1.178	5.6833
15 minute winter	7	3.007	8	655.8	4.908	0.798	3.9862
10080 minute winter	8	3.008	J4	42.0	1.676	0.049	1.4138
10080 minute winter	J4	1.012	J5	30.5	0.017	0.000	782.8957
10080 minute winter	J5	1.013	Deep Bore Soakaway 1	6.2	0.401	0.017	3.2353
10080 minute winter	Deep Bore Soakaway 1	Infiltration		1.4			

Appendix E

SuDS MANAGEMENT PLAN

This long-term Management Plan of the Sustainable Drainage System (SuDS) should be implemented at **Blackthorn Farm, Istead Rise** to ensure that the drainage network functions as designed. This plan is intended to cover all on-site drainage structures. The Site Management Team should oversee and implement the SuDS Management Plan and designate a qualified person who will be responsible for the proper operation and maintenance of the foul and stormwater structures.

Financial Responsibility

Financial responsibility of the maintenance will lie with the management company appointed to the site, Rendall and Rittner, whose details can be found below:

F.A.O Nicola Milburn (nicola.milburn@rendallandrittner.co.uk)
Rendall and Rittner
PO Box 154
NE24 9GF

Stormwater Runoff Quality

The stormwater management system protects and enhances the stormwater runoff water quality through the removal of sediment and pollutants, silt trapped gullies and attenuation crates will reduce the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular sweeping and litter removal, prohibitions on the use of pesticides, and maintenance of bin areas.

Drainage System

Maintenance and cleaning of gullies, stormwater manholes, and SuDS components will assure adequate performance. This maintenance program is outlined below;

Maintenance Program

The Site Management Team will conduct the operation and maintenance plan set forth in this document. The Site Management will ensure that inspections and record keeping are timely and accurate. Inspection & Maintenance Log Forms (attached) should include the date and physical conditions of the structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. Records of maintenance will be kept on file at the property and copies of Inspection & Maintenance Log sheets indicating all work and inspections will be available to the Council upon request.

Concurrent with inspection and cleaning, all litter shall be picked up and removed from the parking areas, external bin store, wetland areas, and soft landscaping.

Regular maintenance should include;

1. Inspect channel and gully inlet grates and remove any debris every 6 months or as determined to be reasonable based on experience with the installed systems to ensure that the gullies are working in their intended fashion and that they are free of debris; quarterly, inspect gully sumps and bottom of drain manholes; if depth of sediment in sumps exceeds 50% capacity, sediment must be removed. Excessive sediment shall be removed and properly disposed by a licensed drainage cleaning company.

3. Inspection of external bin store for spillage and scattered litter must be performed on a regular basis to prevent the spread of pollutants into the stormwater management system.

4. Manholes should be checked annually and after large storms to ensure that they are in good condition and operating as designed. Regular maintenance includes inspection and identification of any areas that are not operating correctly monthly for the first 3 months and then every 6 months after.

Winter Maintenance Program

Ensure that drainage structures are not blocked by ice, snow, debris or rubbish during winter months.

Fertiliser Use

Only slow-release organic low-phosphorous fertilisers will be used in any landscaped areas in order to limit the amount of nutrients that could enter the stormwater system.

SUDS Element	Soakaways	
Maintenance Period	**Maintenance Task**	**Frequency**
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and flood of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and flood of inspection tube or chamber and insider concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile(will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

SUDS Element	Detention Basin	
Maintenance Period	**Maintenance Task**	**Frequency**
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring, before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets, and overflows for blockages, and clear is required	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlets and forebays	Annually (or as required)
	Manage wetland plants in outlet pool- where provided	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin	Every 5 years, or as required (likely to be

	when required	minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseeding or returfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven levels and reinstate design levels	As required

SuDS Operation and Maintenance Requirements

Maintenance Task	Description	Frequency
Regular Maintenance		
Litter management	Pick up all litter in suds and landscape areas and remove from site	Monthly
Hard surfaces	Sweep all paving regularly.	Annually
Occasional tasks		
Inspection chambers and Manholes	Annual inspection, remove silt and check free flow.	Annually
Silt management	Inspect Gullies and catchpits for silt accumulation	Annually
	Excavate silt, stack dry and dispose of excess silt.	As required
	Check Vortex Separator sludge trap for silt accumulation	6 Monthly
Remedial work		
	Inspect suds system regularly to check for damage or failure. Undertake remedial work as required.	As required

Drainage Operation and Maintenance Log

Site Maintenance Supervisor:_____ Date:_____

☐ Routine ☐ Response to rainfall event __ in ☐ Other:_____

BMP	Frequency	Date Performed	Comments
Gullies and Manholes	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Pavement Areas (parking, driveways, service areas)	Monthly Sweeping		
	Rubbish & Litter Removal as Necessary		
Landscaped & Vegetated Areas	Maintenance as necessary		