

5. Geology

5.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
LSGR-ARTGR	LANDSCAPED GROUND (UNDIVIDED)	ARTIFICIALLY MODIFIED GROUND
WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.3 Bedrock and Solid Geology

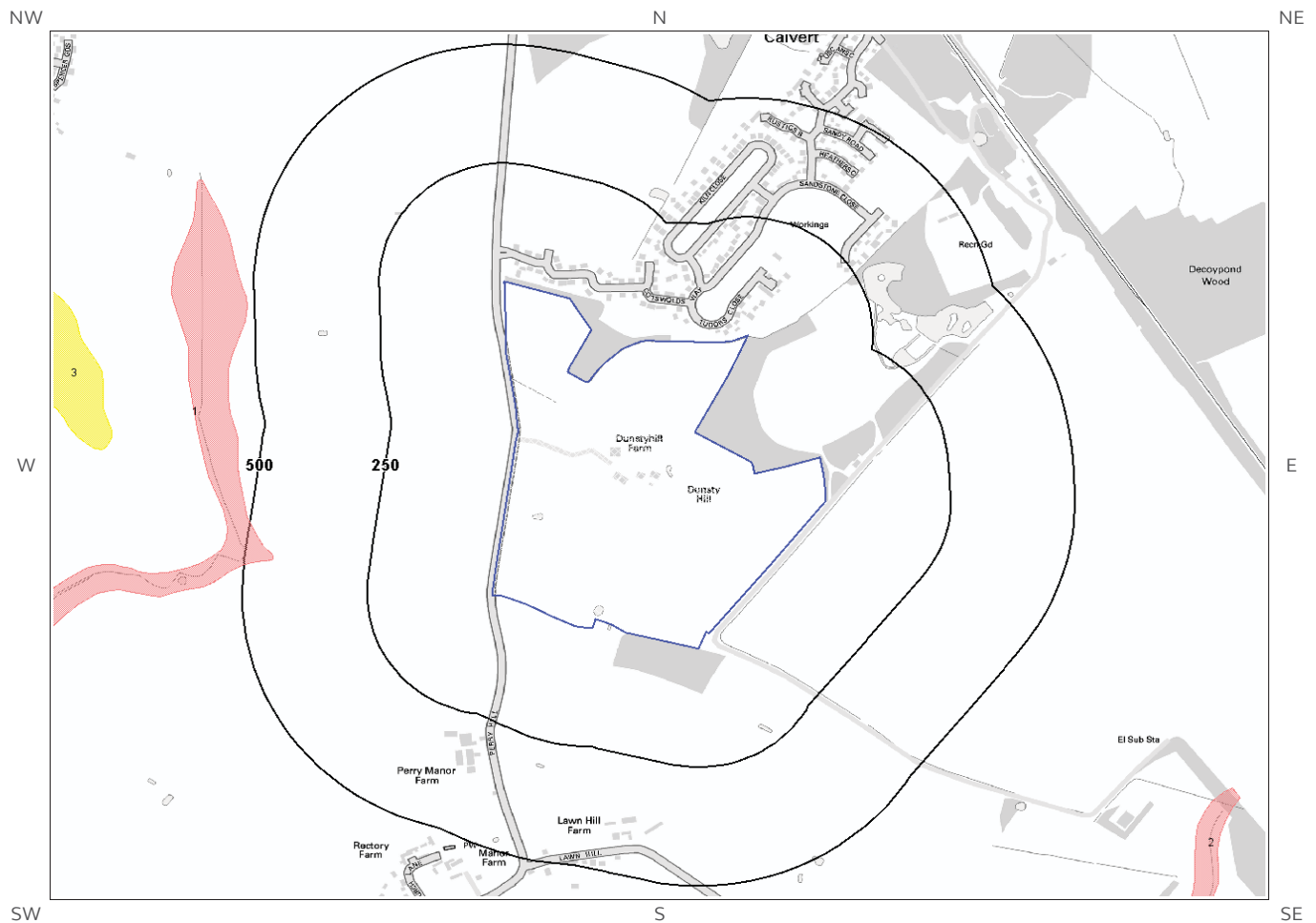
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
SBY-MDST	STEWARTBY MEMBER	MUDSTONE
WEY-MDST	WEYMOUTH MEMBER	MUDSTONE
PET-MDST	PETERBOROUGH MEMBER	MUDSTONE

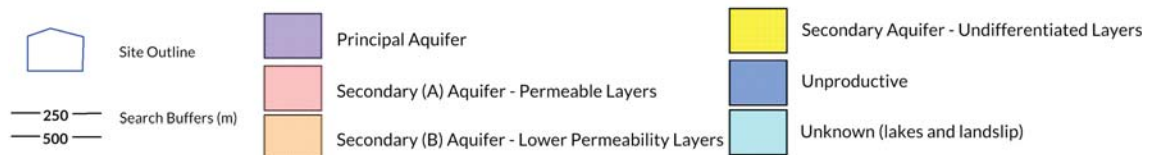
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

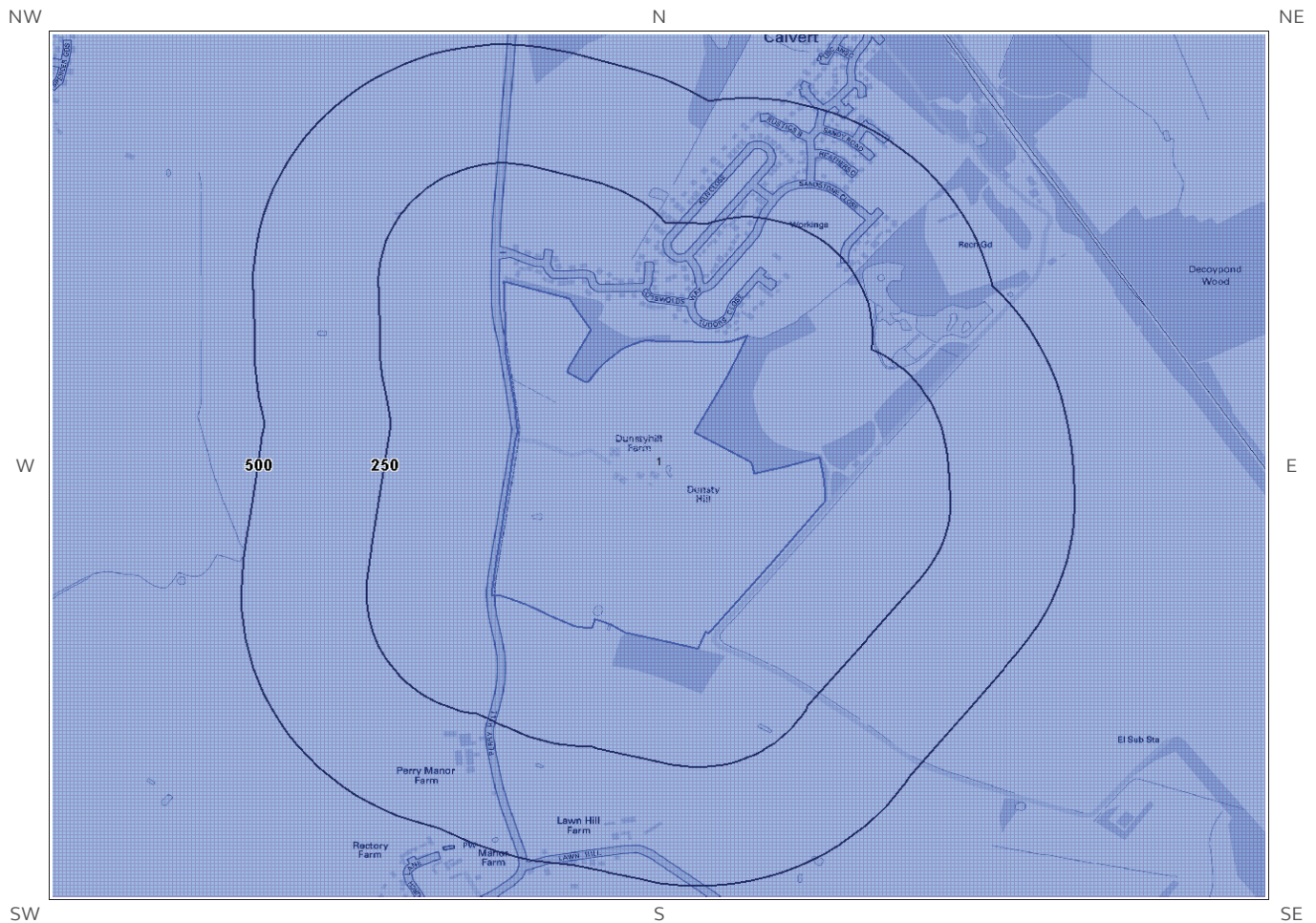
6a. Aquifer Within Superficial Geology



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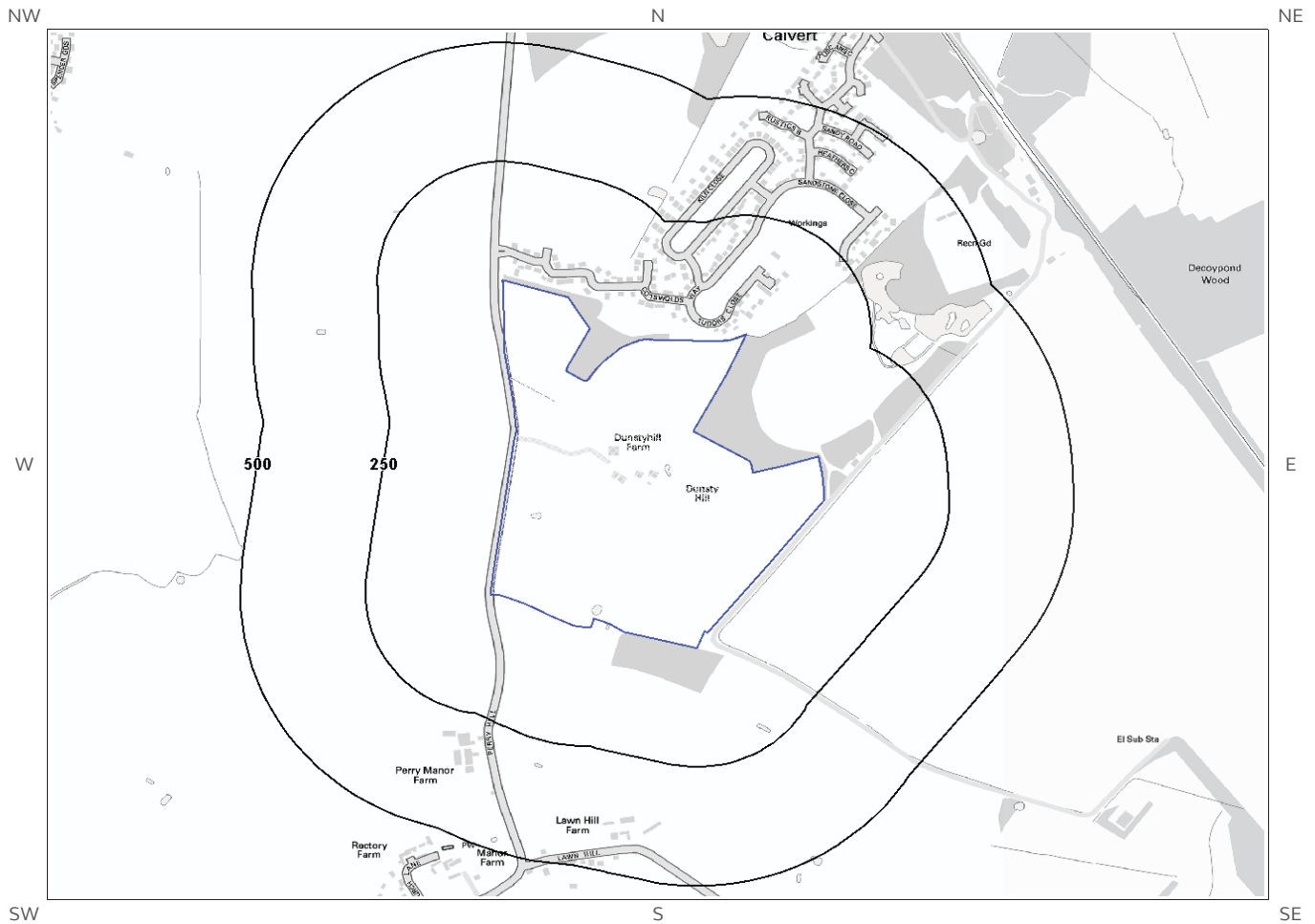
6b. Aquifer Within Bedrock Geology and Abstraction Licences



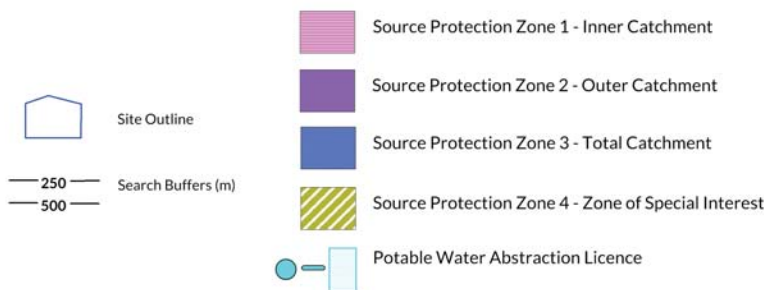
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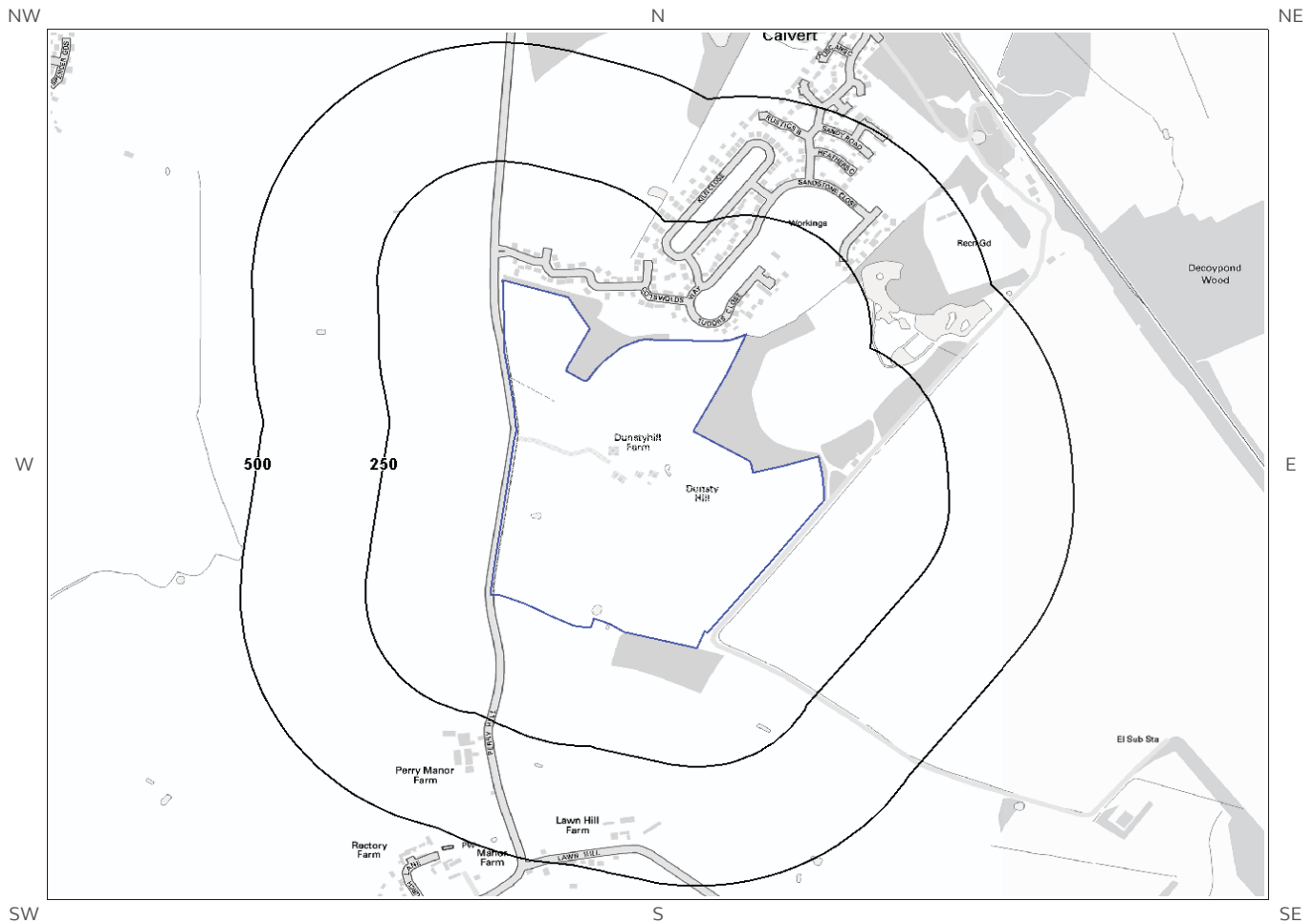
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences



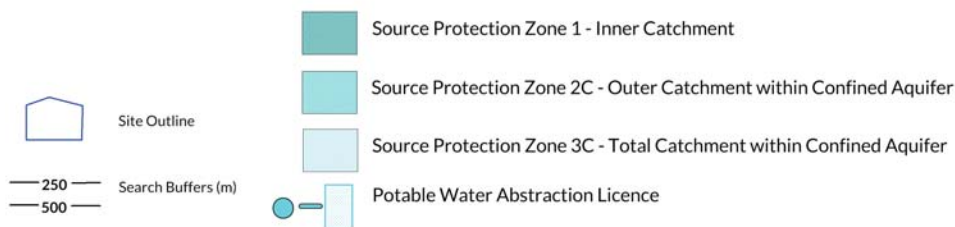
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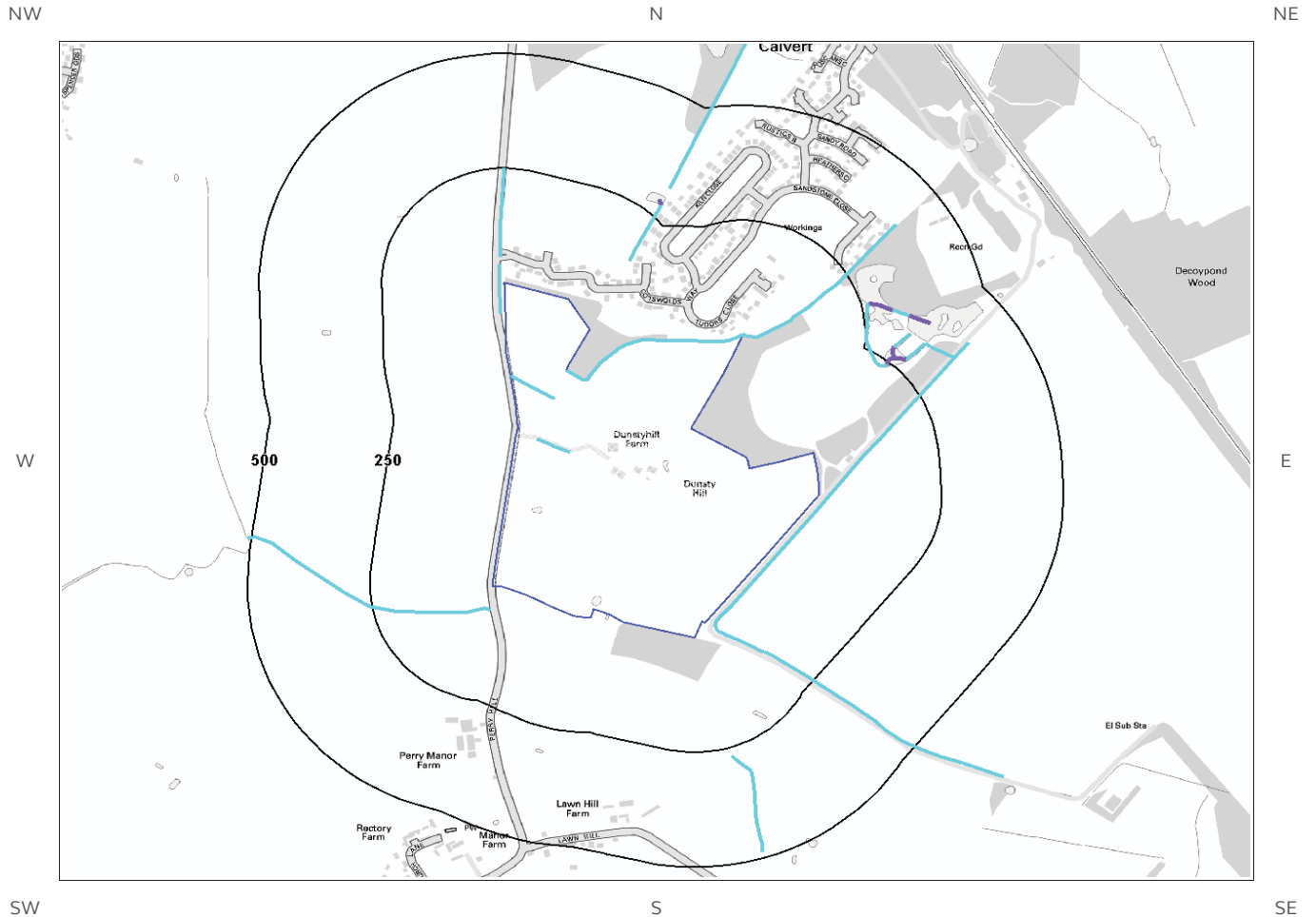
6d. Hydrogeology – Source Protection Zones within confined aquifer



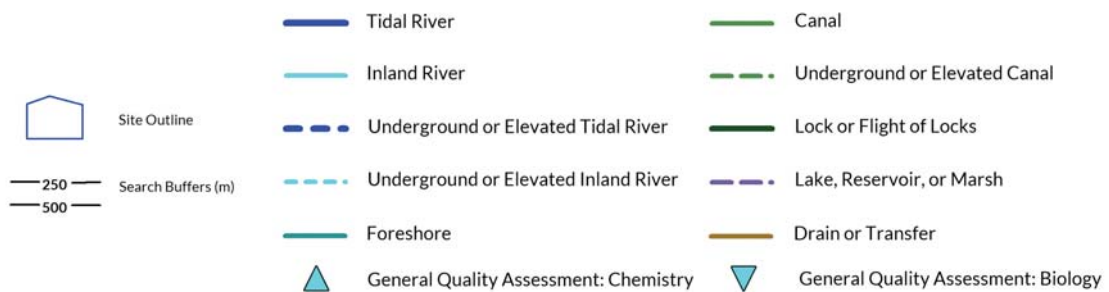
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6e. Hydrology – Watercourse Network and River Quality



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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Records of strata classification within the superficial geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	443	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Records of strata classification within the bedrock geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site None identified

Database searched and no data found.

6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site None identified

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site None identified

Database searched and no data found.

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site None identified

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Source Protection Zones within the Confined Aquifer within 500m of the study site None identified

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site None identified

Database searched and no data found.

6.9 River Quality

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site None identified

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Ordnance Survey MasterMap Water Network

Ordnance Survey MasterMap Water Network entries within 500m of the study site

This watercourse information is provided by Ordnance Survey MasterMap Water Network. The data provides a detailed centre line following the curve of the waterway precisely, so all distances provided in the report should be understood as measurements to the centreline rather than a measurement to the nearest point of the watercourse. Underground watercourses are inferred from entry and exit points so caution is advised in using these to indicate precise locations of underground watercourses when planning site investigation and development.

The following Ordnance Survey MasterMap Water Network records are represented on the Hydrology Map (6e):

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
2	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
4	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
5	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				conditions) Average Width in Watercourse Section (m): Not Provided
1	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
2	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
4	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
5	0 On Site	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
6	9 W	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
6	9 W	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
7	12 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
7	12 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
8	15 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
9	15 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
8	15 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
9	15 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
10	38 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
10	38 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	49 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	49 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
12	86 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
12	86 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
13	101 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
13	101 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	110 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	110 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
15	115 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
15	115	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	N			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
16	120 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
16	120 N	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	123 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	123 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
18	129 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
18	129 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
19	133 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
19	133 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
20	134 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
20	134 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
21	150 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
21	150 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): Not Provided
22	233 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.6
22	233 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.6
23	244 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
23	244 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
24	264 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
25	264 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
24	264 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
25	264 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
26	265 E	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 27.4
26	265 E	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 27.4
27	268 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
27	268 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
28	278 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
28	278 NE	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
29	280 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 12.2
29	280 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 12.2
30	283 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 12.8
30	283 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 12.8
31	310 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
31	310 E	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
32	313 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	313 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
33	318 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
33	318 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
34	324	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	S			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	324 S	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
35	330 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
35	330 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
36	332 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
36	332 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
37	342 E	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
37	342 E	Not specified	Lake, loch or reservoir.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
38	345 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
38	345 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
39	349 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
39	349 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
40	351 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): Not Provided
40	351 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
41	354 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
41	354 NE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
42	364 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
42	364 SE	Not specified	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

6.11 Surface Water Features

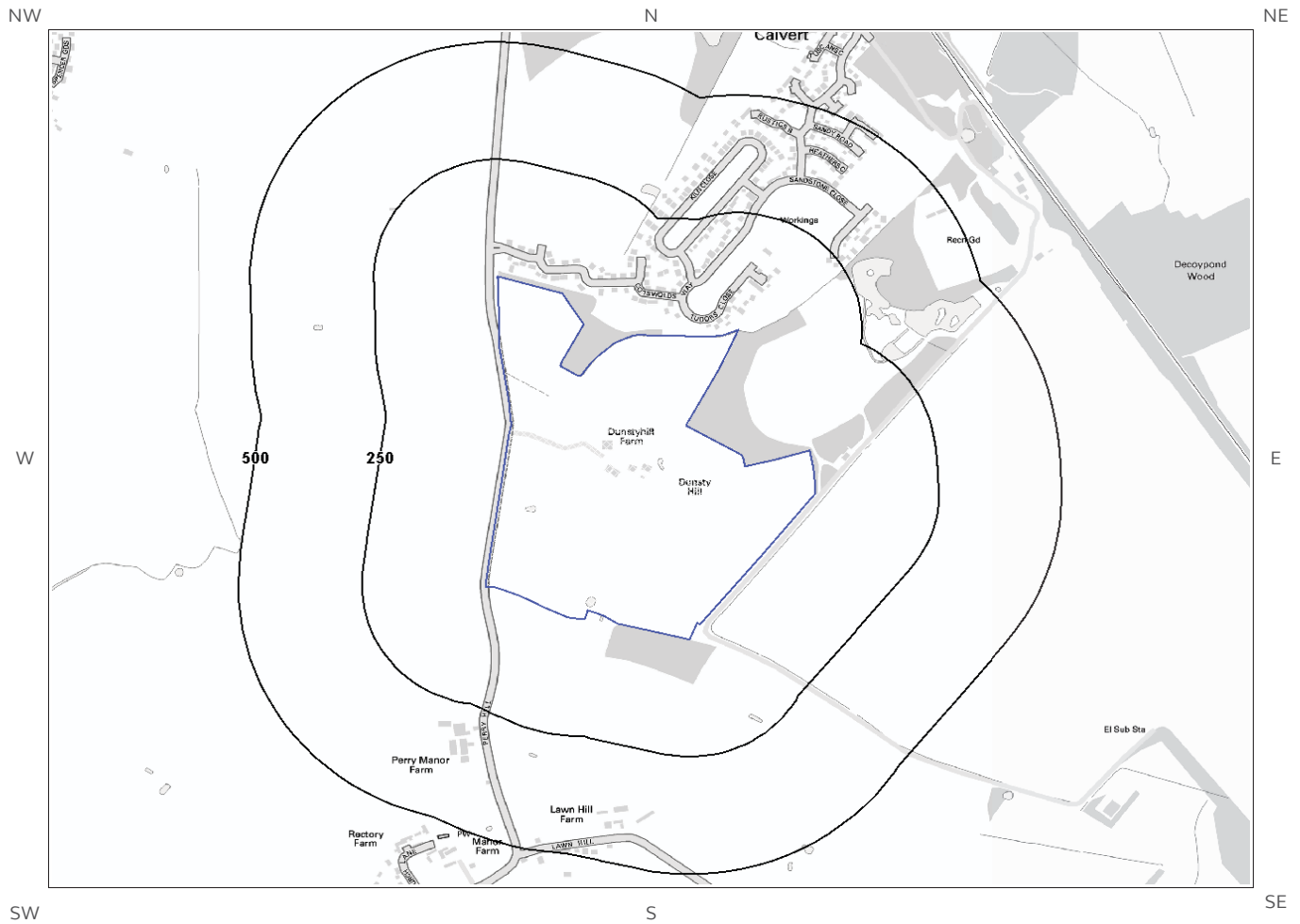
Surface water features within 250m of the study site

Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
9	W
15	SE
86	N
110	E
120	N
133	SE
134	E
150	NE
231	NE

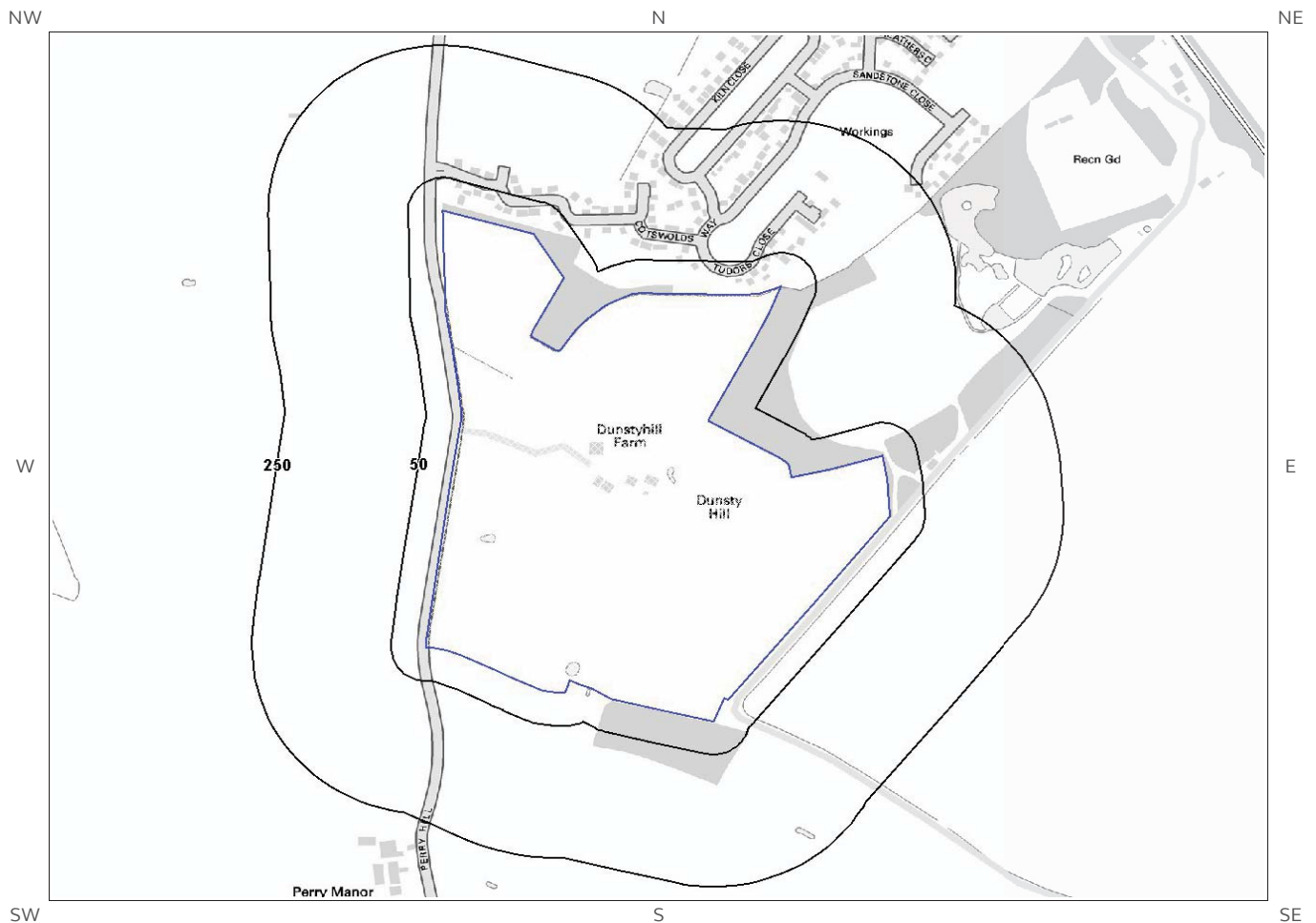
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



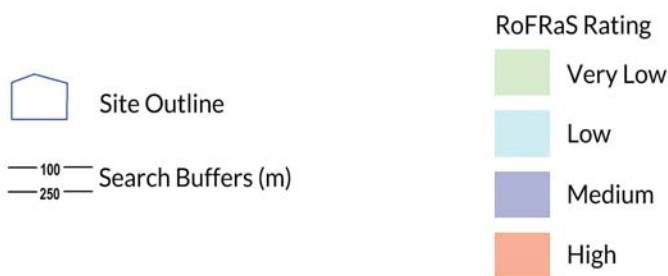
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency/Natural Resources Wales Zone 2 floodplain within 250m None identified

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Environment Agency/Natural Resources Wales Zone 3 floodplain within 250m None identified

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Database searched and no data found.

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

Highest risk of flooding onsite Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Flood Defences within 250m of the study site None identified
Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site None identified

7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site

None identified

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site

Identified

Clearwater Flooding or Superficial Deposits Flooding

Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 Highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

7.8 Groundwater Flooding Confidence Areas

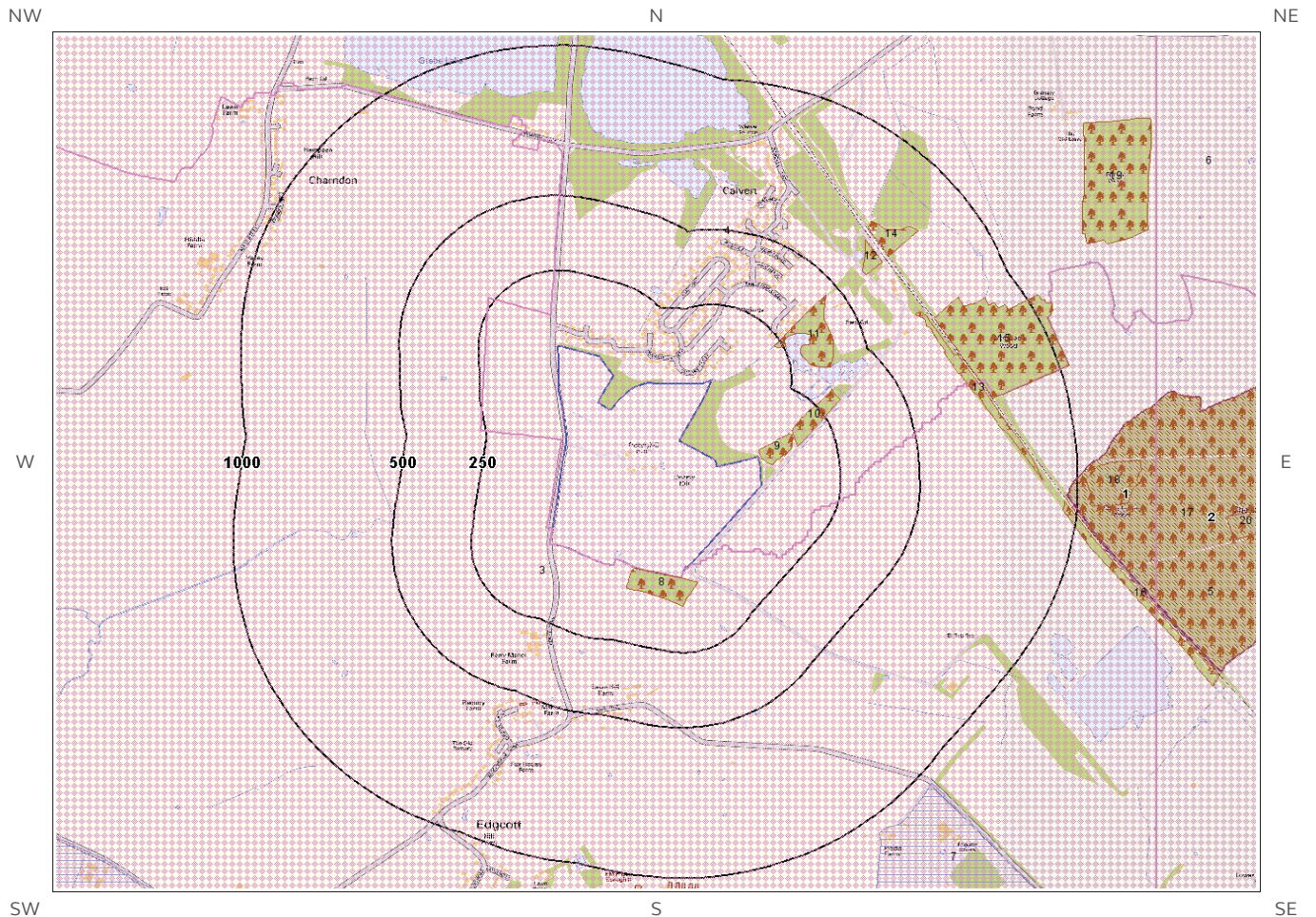
British Geological Survey confidence rating in this result

High

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site

Identified

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

2

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
1	967	E	Sheephouse Wood	Natural England
2	1247	E	Sheephouse Wood	Natural England

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

13

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
8	0	On Site	UNKNOWN	Ancient and Semi-Natural Woodland
9	10	NE	UNKNOWN	Ancient and Semi-Natural Woodland
10	130	E	UNKNOWN	Ancient and Semi-Natural Woodland
11	224	NE	UNKNOWN	Ancient and Semi-Natural Woodland
12	596	NE	UNKNOWN	Ancient and Semi-Natural Woodland
13	674	E	UNKNOWN	Ancient and Semi-Natural Woodland
14	692	NE	UNKNOWN	Ancient and Semi-Natural Woodland
15	720	NE	UNKNOWN	Ancient and Semi-Natural Woodland
16	956	E	UNKNOWN	Ancient and Semi-Natural Woodland
17	963	E	UNKNOWN	Ancient and Semi-Natural Woodland
18	1027	E	UNKNOWN	Ancient Replanted Woodland
19	1259	NE	UNKNOWN	Ancient and Semi-Natural Woodland
20	1469	E	UNKNOWN	Ancient Replanted Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

1

The following Environmentally Sensitive Area records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	ESA Name	Data Source
7	1044	SE	Upper Thames Tributaries	Natural England

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
3	0	On Site	Existing	DEFRA

ID	Distance (m)	Direction	NVZ Name	Data Source
4	0	On Site	Existing	DEFRA
5	1247	E	Existing	DEFRA
6	1335	E	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

Database searched and no data found.

0

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

Maximum Shrink-Swell** hazard rating identified on the study site Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

Maximum Landslide* hazard rating identified on the study site Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property no significant increase in insurance risk due to natural slope instability problems.

9.1.3 Soluble Rocks

Maximum Soluble Rocks* hazard rating identified on the study site Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

Maximum Compressible Ground* hazard rating identified on the study site

Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

Maximum Collapsible Rocks* hazard rating identified on the study site

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

Maximum Running Sand** hazard rating identified on the study site

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Coal mining areas within 75m of the study site

None identified

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary

None identified

Database searched and no data found.

10.3 Brine Affected Areas

Brine affected areas within 75m of the study site

None identified

Guidance: No Guidance Required.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries

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Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:

Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency

National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506

Web: www.environment-agency.gov.uk

Email: enquiries@environment-agency.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe

Email: enquiries@phe.gov.uk
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www.coal.gov.uk

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority

Authority: Aylesbury Vale District Council
Phone: 01296 585 858
Web: <http://www.aylesburyvaledc.gov.uk/>
Address: Customer Service Centre, 66 High Street, Aylesbury,

Gemapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444



Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England/Natural Resources Wales who retain the Copyright and Intellectual Property Rights for the data.

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Groundsure's Terms and Conditions can be viewed online at this link:

<https://www.groundsure.com/terms-and-conditions-may25-2018>

Hydrock
22, LONG ACRE,
LONDON, WC2E 9LY

Groundsure Reference: GS-5511441
Your Reference: C-09015-C__POP024478
Report Date: 8 Oct 2018
Report Delivery Method: Email - pdf

Geo Insight

Address: DUNSTY HILL FARM, EDGCOTT ROAD, CALVERT GREEN, OX27 0BJ

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

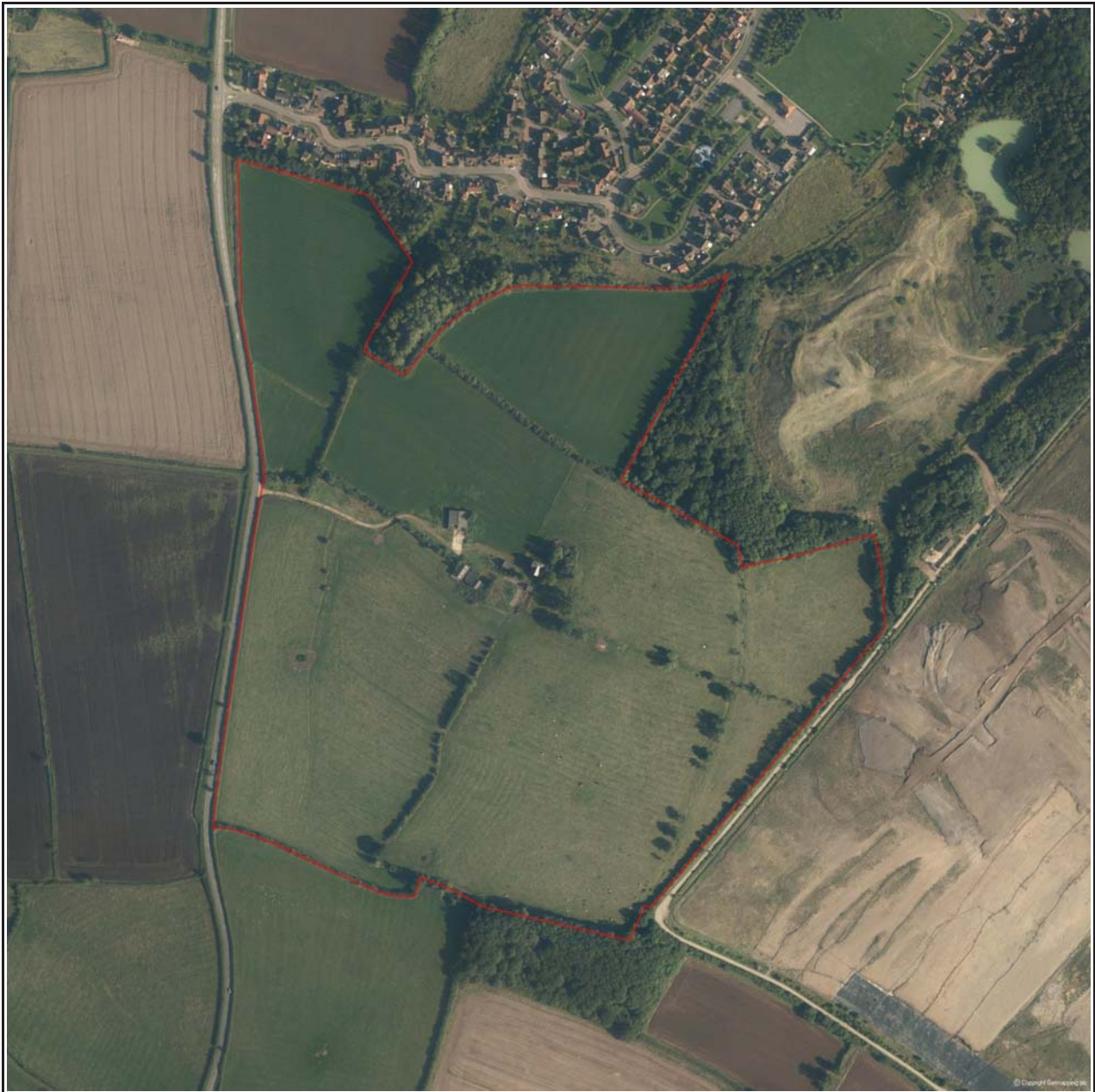


Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Address: DUNSTY HILL FARM, EDGCOTT ROAD, CALVERT GREEN, OX27 0BJ
Date: 8 Oct 2018
Reference: GS-5511441
Client: Hydrock

NW N NE



SW S SE

Aerial Photograph Capture date: 06-Sep-2015
Grid Reference: 468197,223345
Site Size: 30.99ha

Contents Page

Contents Page.....	3
Overview of Findings.....	5
1:10,000 Scale Availability.....	8
Availability of 1:10,000 Scale Geology Mapping.....	9
1 Geology (1:10,000 scale).....	10
1.1 Artificial Ground map (1:10,000 scale).....	10
1. Geology 1:10,000 scale.....	11
1.1 Artificial Ground.....	11
1.2 Superficial Deposits and Landslips map (1:10,000 scale).....	12
1.2 Superficial Deposits and Landslips.....	13
1.2.1 Superficial Deposits/ Drift Geology.....	13
1.2.2 Landslip.....	13
1.3 Bedrock and linear features map (1:10,000 scale).....	14
1.3 Bedrock and linear features.....	15
1.3.1 Bedrock/ Solid Geology.....	15
1.3.2 Linear features.....	15
2 Geology 1:50,000 Scale.....	16
2.1 Artificial Ground map.....	16
2. Geology 1:50,000 scale.....	17
2.1 Artificial Ground.....	17
2.1.1 Artificial/ Made Ground	17
2.1.2 Permeability of Artificial Ground.....	17
2.2 Superficial Deposits and Landslips map (1:50,000 scale).....	18
2.2 Superficial Deposits and Landslips.....	19
2.2.1 Superficial Deposits/ Drift Geology.....	19
2.2.2 Permeability of Superficial Ground	19
2.2.3 Landslip.....	19
2.2.4 Landslip Permeability.....	19
2.3 Bedrock and linear features map (1:50,000 scale).....	20
2.3 Bedrock, Solid Geology & linear features.....	21
2.3.1 Bedrock/Solid Geology.....	21
2.3.2 Permeability of Bedrock Ground.....	21
2.3.3 Linear features.....	21
3 Radon Data.....	22
3.1 Radon Affected Areas.....	22
3.2 Radon Protection.....	22
4 Ground Workings map.....	23
4 Ground Workings.....	24
4.1 Historical Surface Ground Working Features derived from Historical Mapping.....	24
4.2 Historical Underground Working Features derived from Historical Mapping.....	24
4.3 Current Ground Workings.....	25
5 Mining, Extraction & Natural Cavities.....	27
5.1 Historical Mining.....	27
5.2 Coal Mining.....	27
5.3 Johnson Poole and Bloomer.....	27
5.4 Non-Coal Mining.....	27
5.5 Non-Coal Mining Cavities.....	28
5.6 Natural Cavities.....	28
5.7 Brine Extraction.....	28
5.8 Gypsum Extraction.....	28
5.9 Tin Mining.....	28
5.10 Clay Mining.....	29
6 Natural Ground Subsidence.....	30
6.1 Shrink-Swell Clay map.....	30
6.2 Landslides map.....	31
6.3 Ground Dissolution of Soluble Rocks map.....	32
6.4 Compressible Deposits map.....	33
6.5 Collapsible Deposits map.....	34
6.6 Running Sand map.....	35

6 Natural Ground Subsidence.....	36
6.1 Shrink-Swell Clays.....	36
6.2 Landslides.....	36
6.3 Ground Dissolution of Soluble Rocks.....	37
6.4 Compressible Deposits.....	37
6.5 Collapsible Deposits.....	37
6.6 Running Sands.....	38
7 Borehole Records.....	40
8 Estimated Background Soil Chemistry.....	41
9 Railways and Tunnels map.....	42
9 Railways and Tunnels.....	43
9.1 Tunnels	43
9.2 Historical Railway and Tunnel Features	43
9.3 Historical Railways.....	44
9.4 Active Railways.....	44
9.5 Railway Projects.....	44

Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	Yes
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No
Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	Yes
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	Yes
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?

Yes

2.3.3 Are there any records of linear features within 500m of the study site boundary?

No

Section 3: Radon

3. Radon

3.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 Radon Protection

No radon protective measures are necessary.

Section 4: Ground Workings

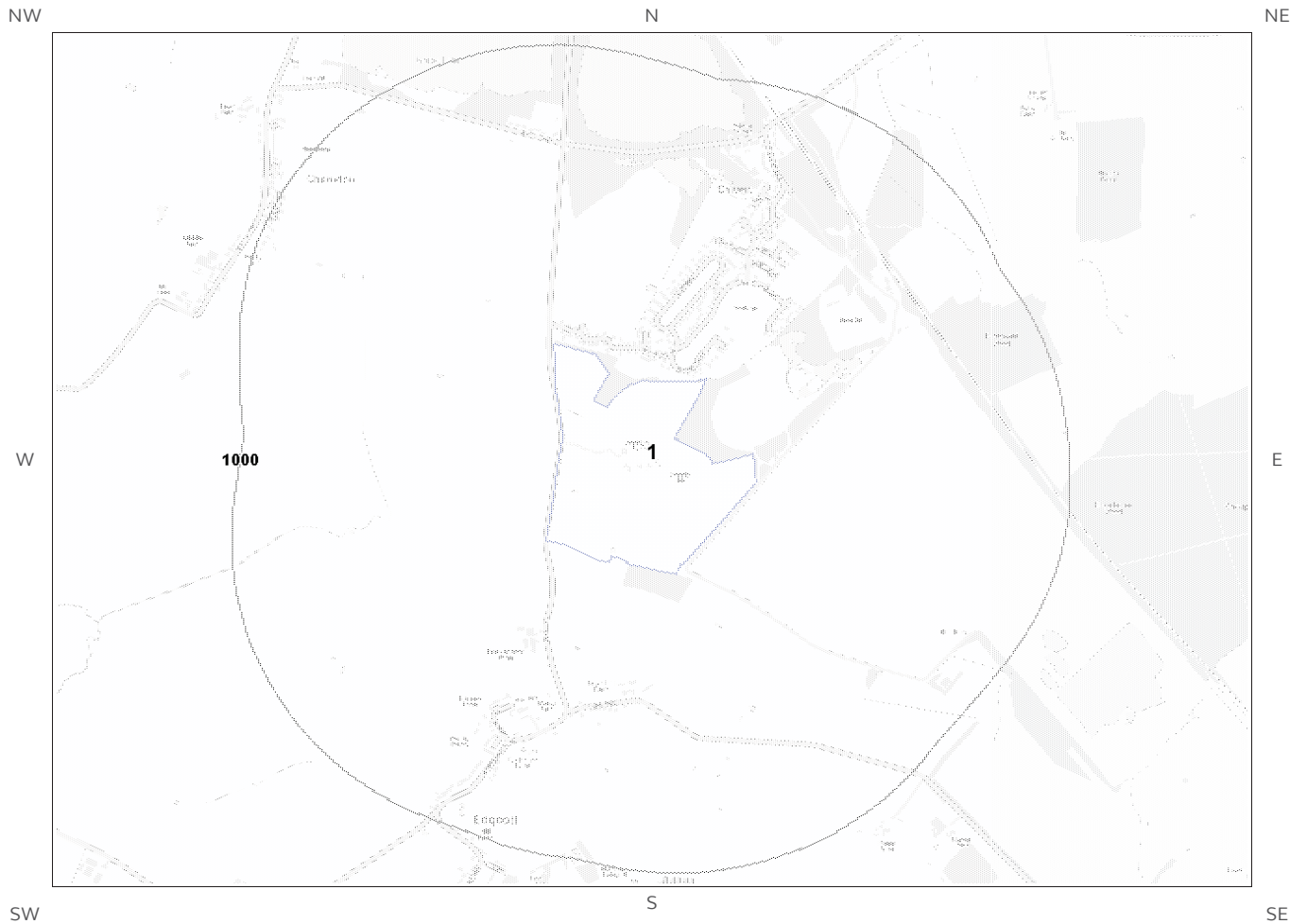
	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	2	3	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	2
4.3 Current Ground Workings	0	0	0	1	2

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	0	0	0	0	0
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

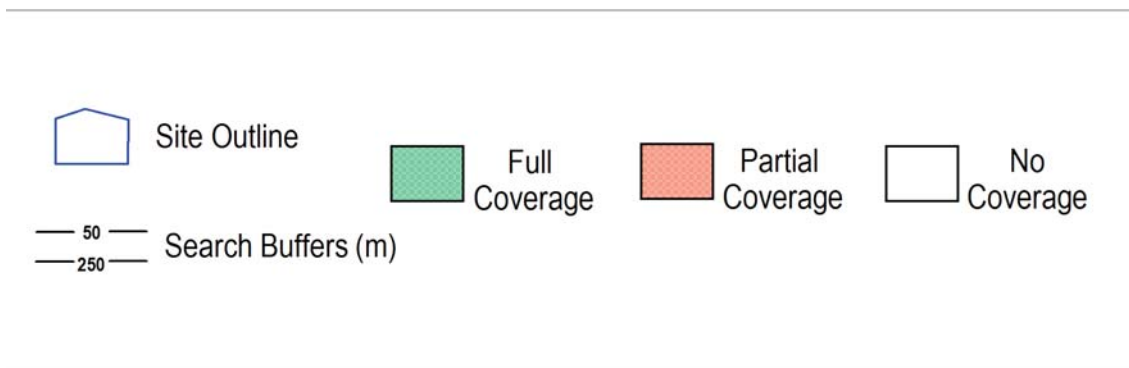
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Moderate				
6.2 Landslides	Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Moderate				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Very Low				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	1	2	0		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	8	4	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	3	2	Not Searched	
9.3 Historical Railways	0	0	0	Not Searched	
9.4 Active Railways	0	0	0	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage

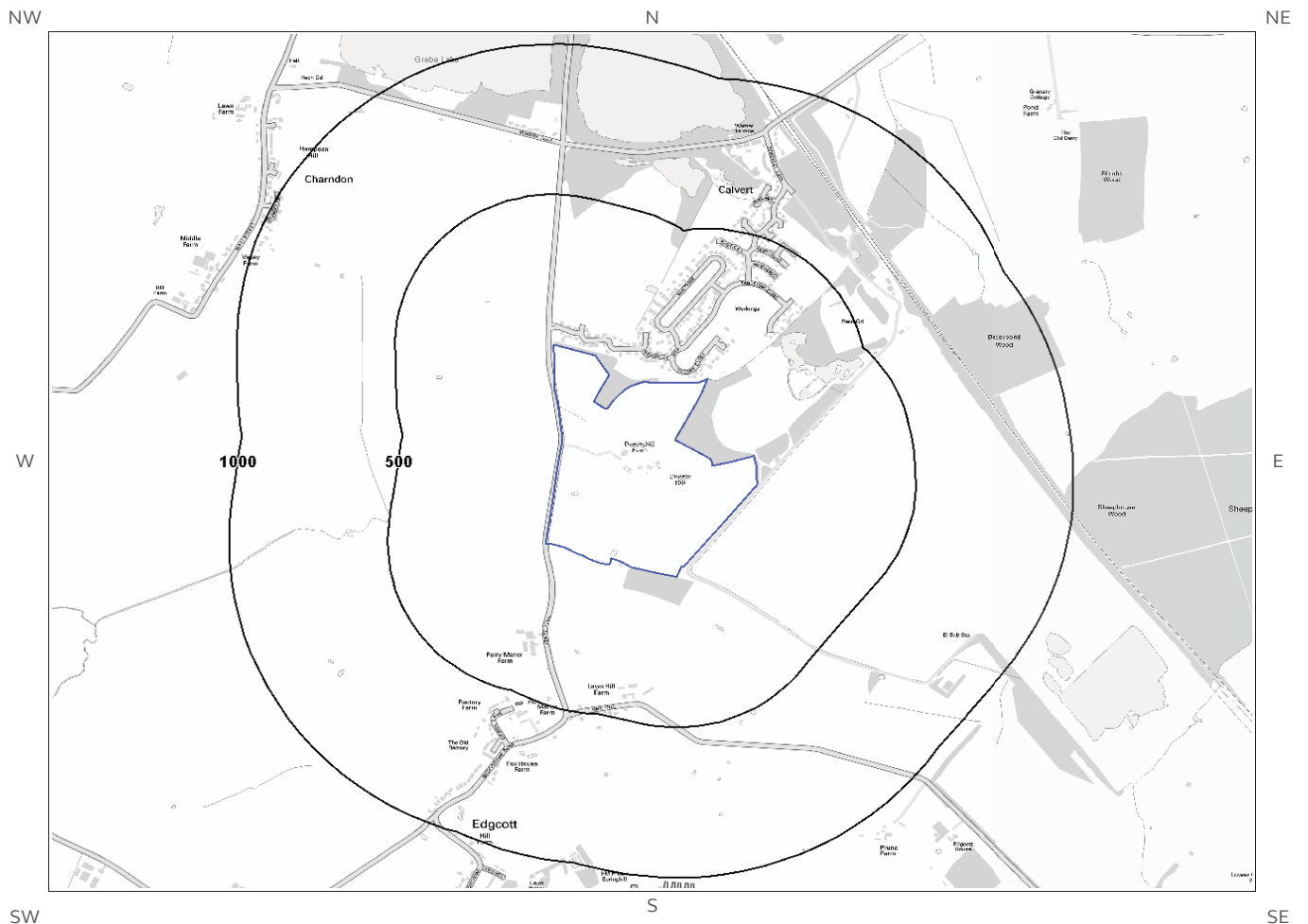
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

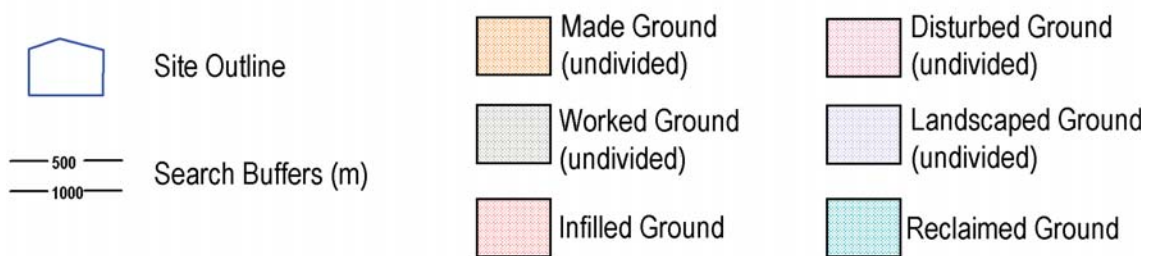
1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)



Artificial Ground Legend

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1. Geology 1:10,000 scale

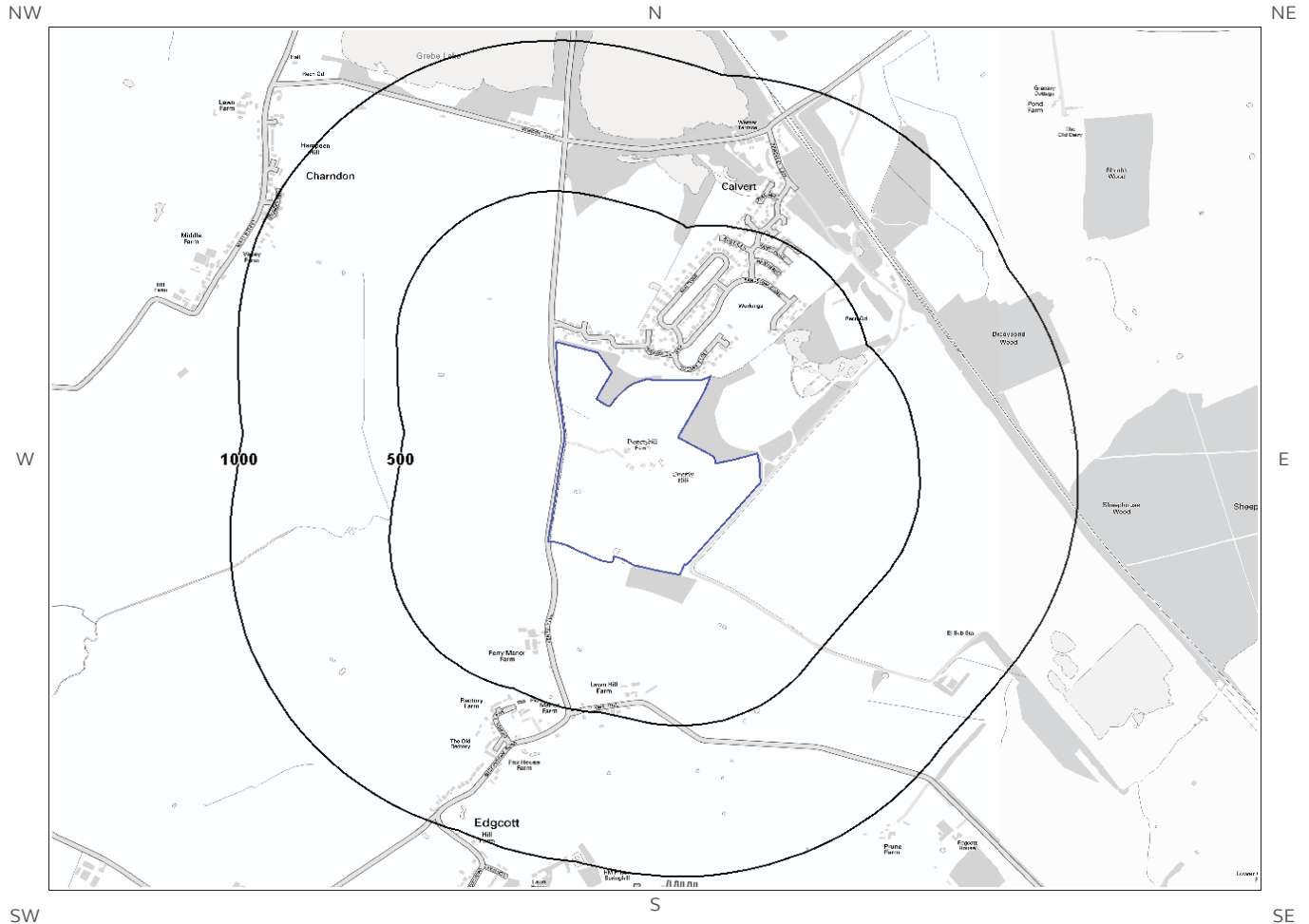
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

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1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

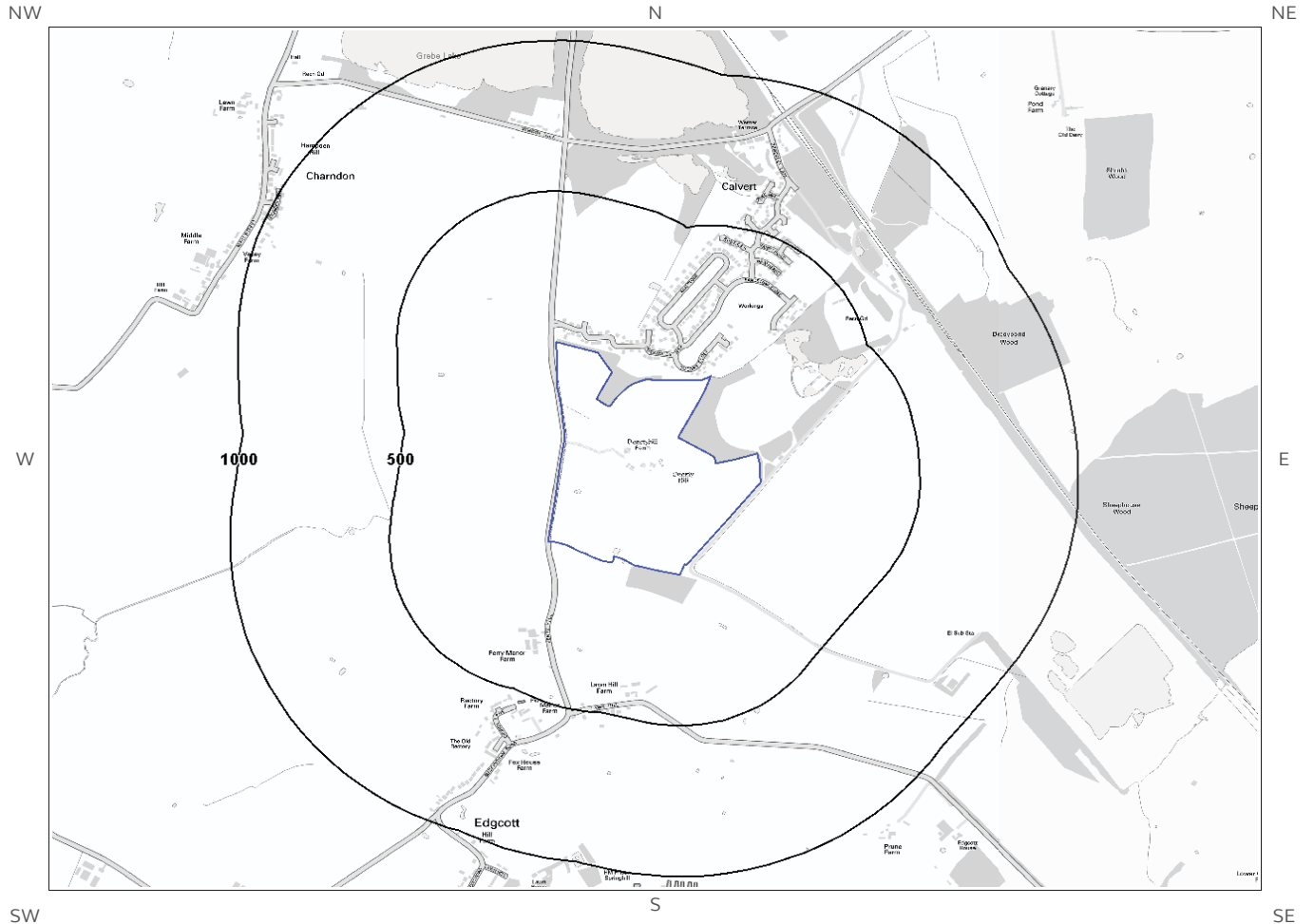
Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

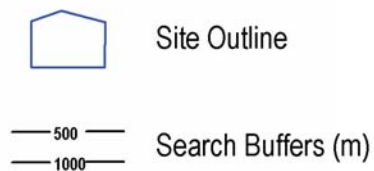
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)



Bedrock and linear features Legend

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1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

Database searched and no data found at this scale.

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

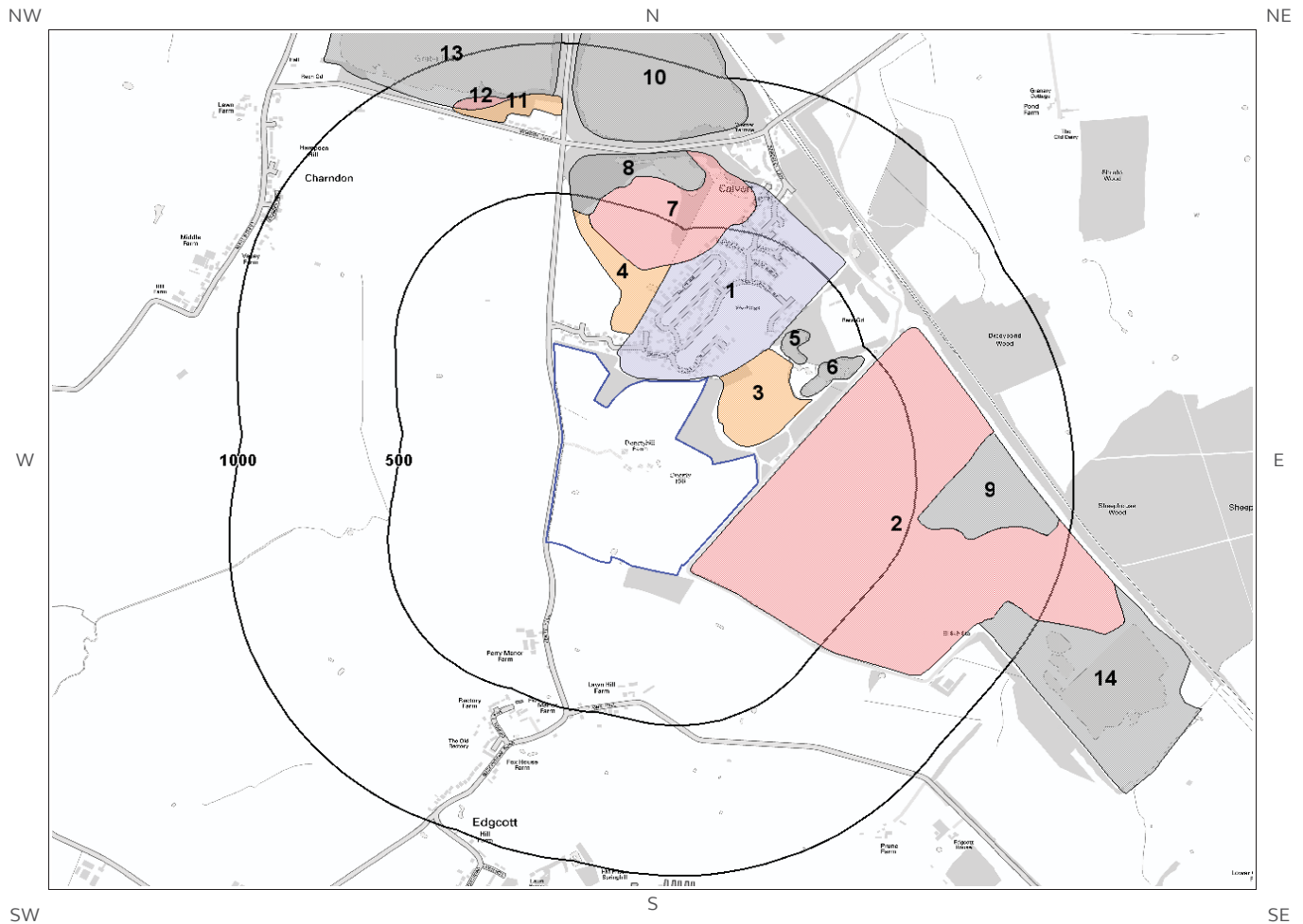
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

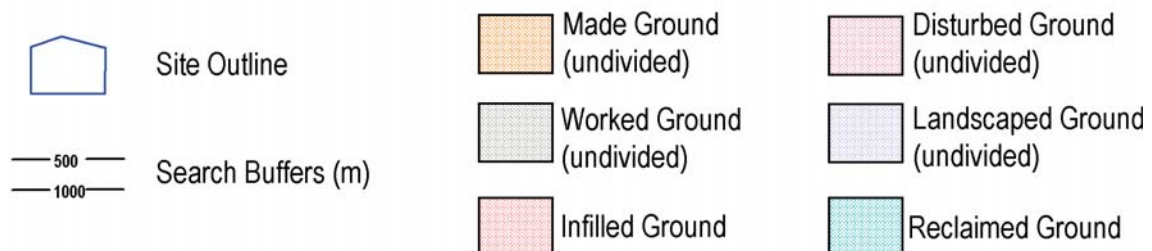
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



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2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 219

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

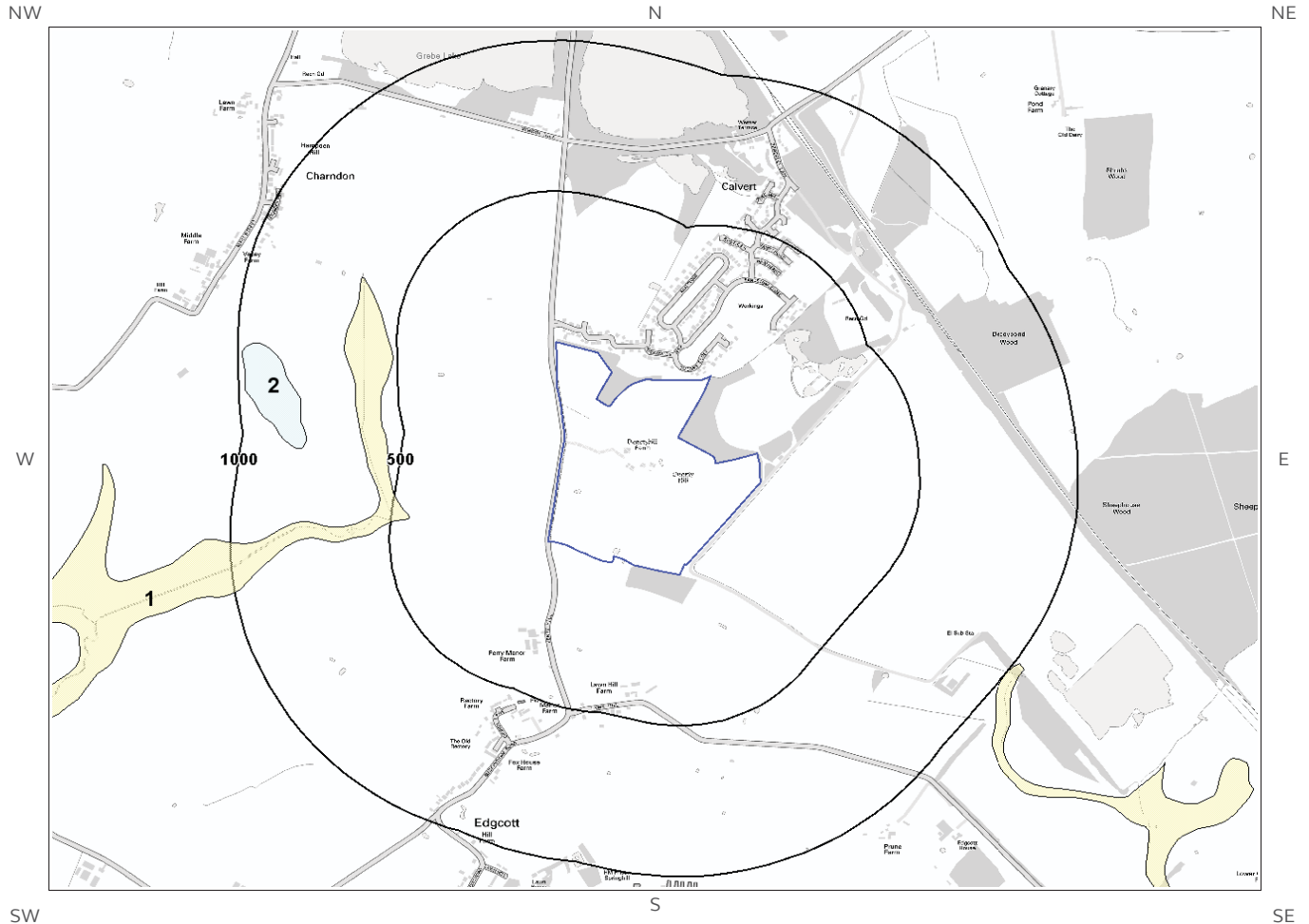
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	3.0	N	LSGR-ARTGR	LANDSCAPED GROUND (UNDIVIDED)	ARTIFICIALLY MODIFIED GROUND
2	16.0	SE	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
3	32.0	N	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
4	95.0	NE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
5	248.0	NE	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
6	249.0	NE	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID
7	315.0	NE	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
8	441.0	N	WGR-VOID	WORKED GROUND (UNDIVIDED)	VOID

2.1.2 Permeability of Artificial Ground

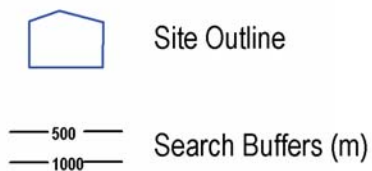
Are there any records relating to permeability of artificial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
3.0	N	Mixed	Very High	Low
16.0	SE	Mixed	Very High	Low
32.0	N	Mixed	Very High	Low

2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	443.0	W	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? No

Database searched and no data found.

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

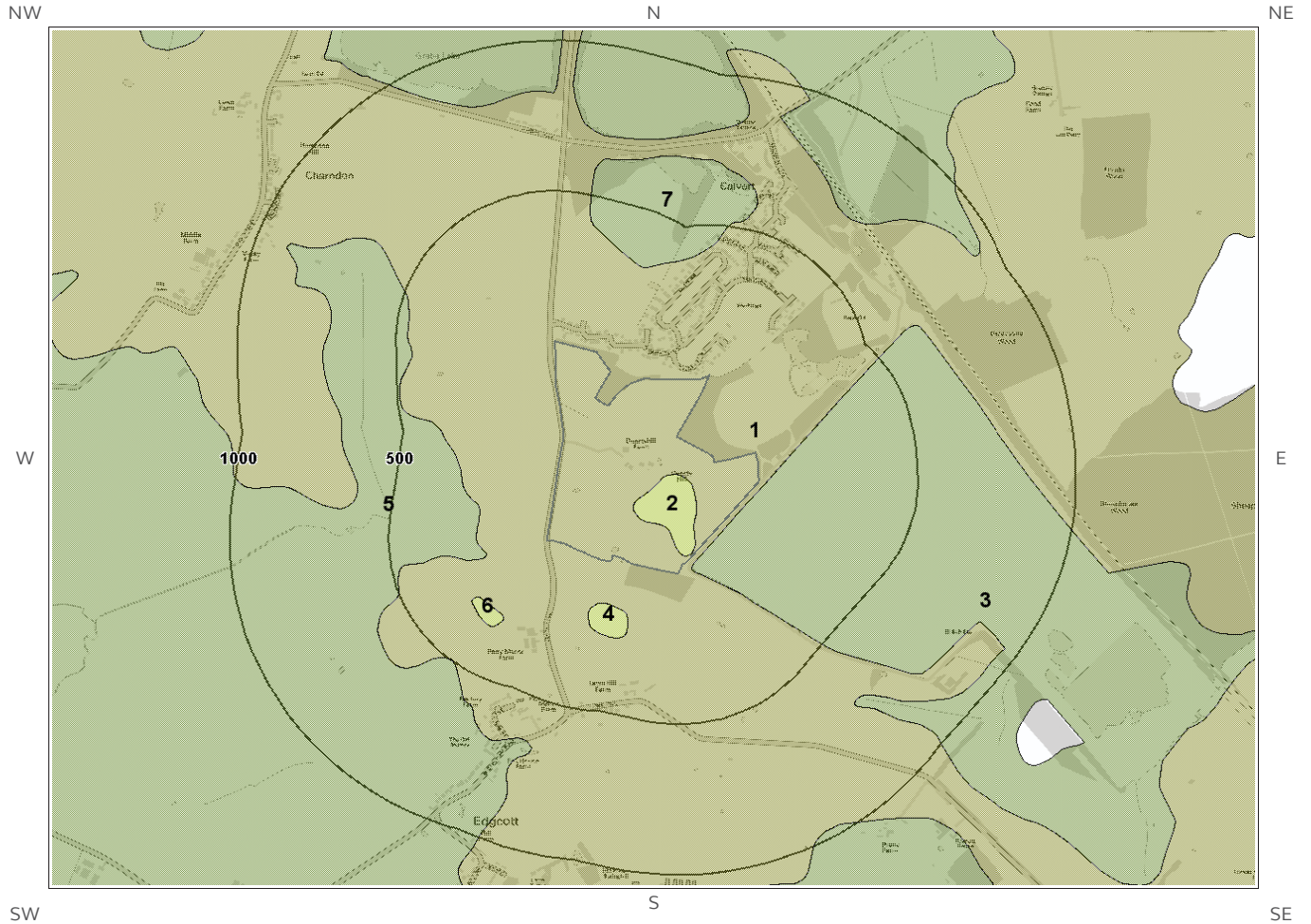
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

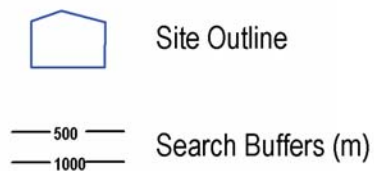
Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and linear features map (1:50,000 scale)



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2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 219

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	SBY-MDST	STEWARTBY MEMBER - MUDSTONE	CALLOVIAN
2	0.0	On Site	WEY-MDST	WEYMOUTH MEMBER - MUDSTONE	OXFORDIAN
3	16.0	SE	PET-MDST	PETERBOROUGH MEMBER - MUDSTONE	CALLOVIAN
4	141.0	S	WEY-MDST	WEYMOUTH MEMBER - MUDSTONE	OXFORDIAN
5	199.0	W	PET-MDST	PETERBOROUGH MEMBER - MUDSTONE	CALLOVIAN
6	281.0	SW	WEY-MDST	WEYMOUTH MEMBER - MUDSTONE	OXFORDIAN
7	315.0	NE	PET-MDST	PETERBOROUGH MEMBER - MUDSTONE	CALLOVIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Low	Very Low
0.0	On Site	Fracture	Low	Very Low
16.0	SE	Fracture	Low	Very Low

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

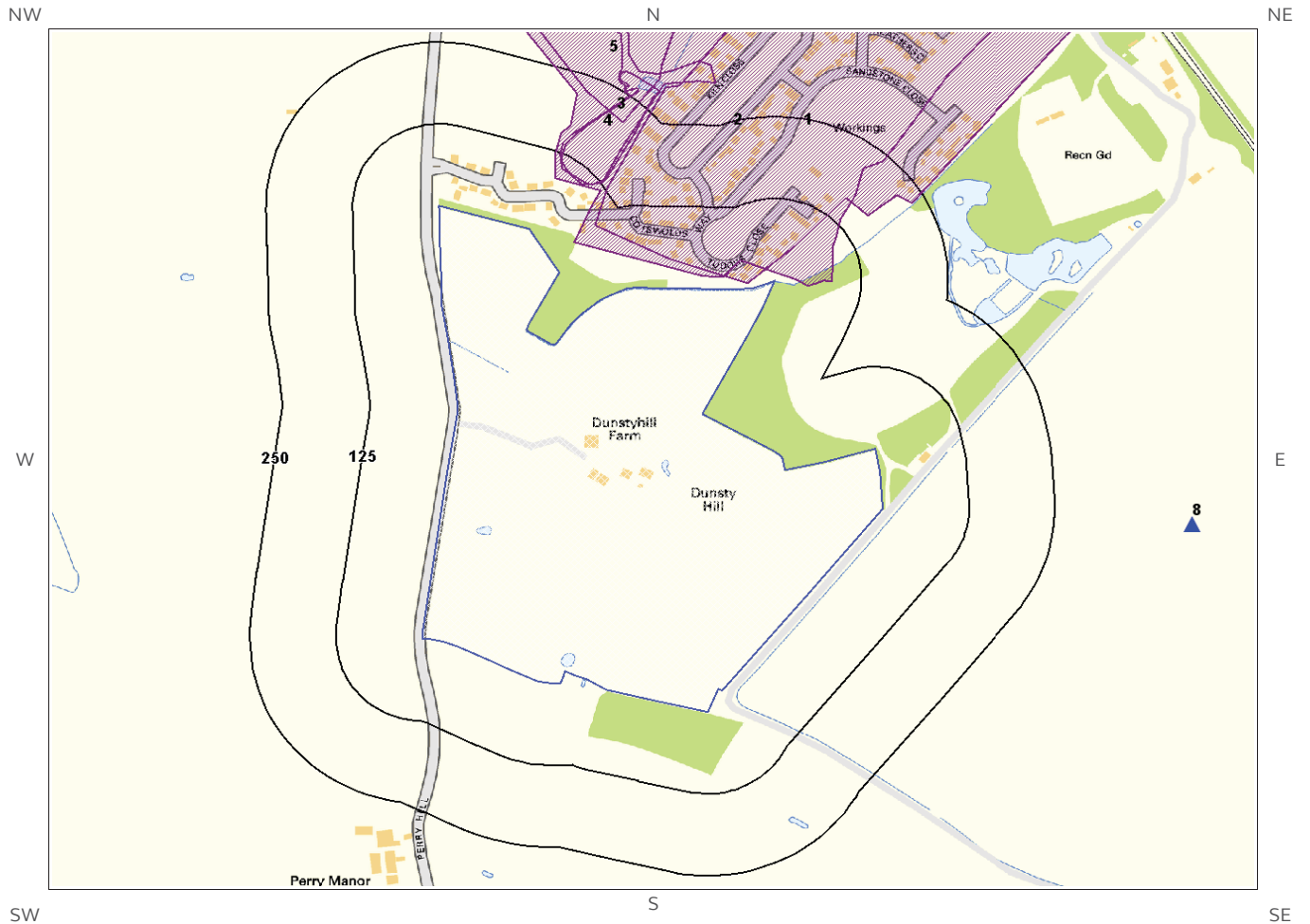
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection


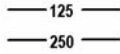



Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings map



Ground Workings Legend

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-  Site Outline
-  Search Buffers (m)
-  Historic Surface Ground Workings
-  Historic Underground Workings
-  Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	9.0	N	468678 224212	Brick Works	1982
2	12.0	N	468522 224262	Brick Works	1879
3	101.0	NE	468390 224169	Unspecified Ground Workings	1879
4	104.0	NE	468360 224106	Unspecified Heap	1950
5	211.0	NE	468308 224370	Refuse Heap	1982

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? Yes

The following Historical Underground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
Not shown	892.0	N	468183 224881	Tunnel	1879
Not shown	893.0	N	468146 224881	Tunnel	1950

4.3 Current Ground Workings

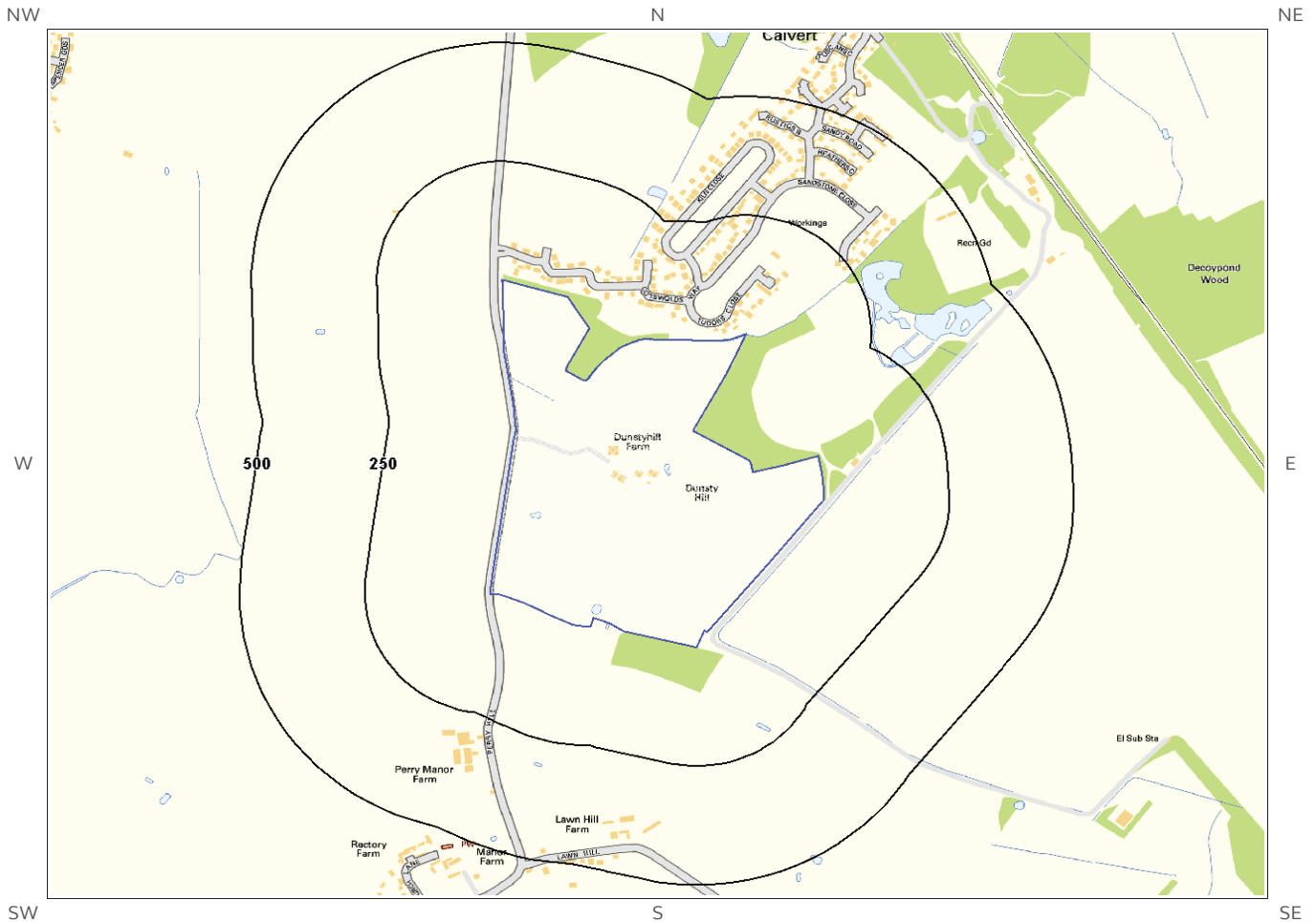
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

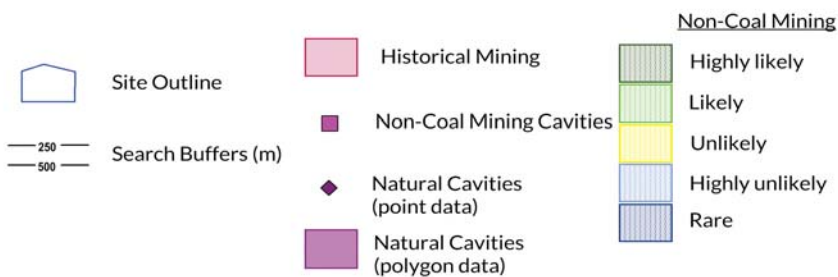
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
8	448.0	E	469200 223500	Clay & Shale	Calvert Brickworks	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Inactive
Not shown	508.0	NE	468460 224410	Clay & Shale	Calvert Brickworks No 1 Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	712.0	SE	469370 223170	Clay & Shale	Calvert Brickworks No 5 Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

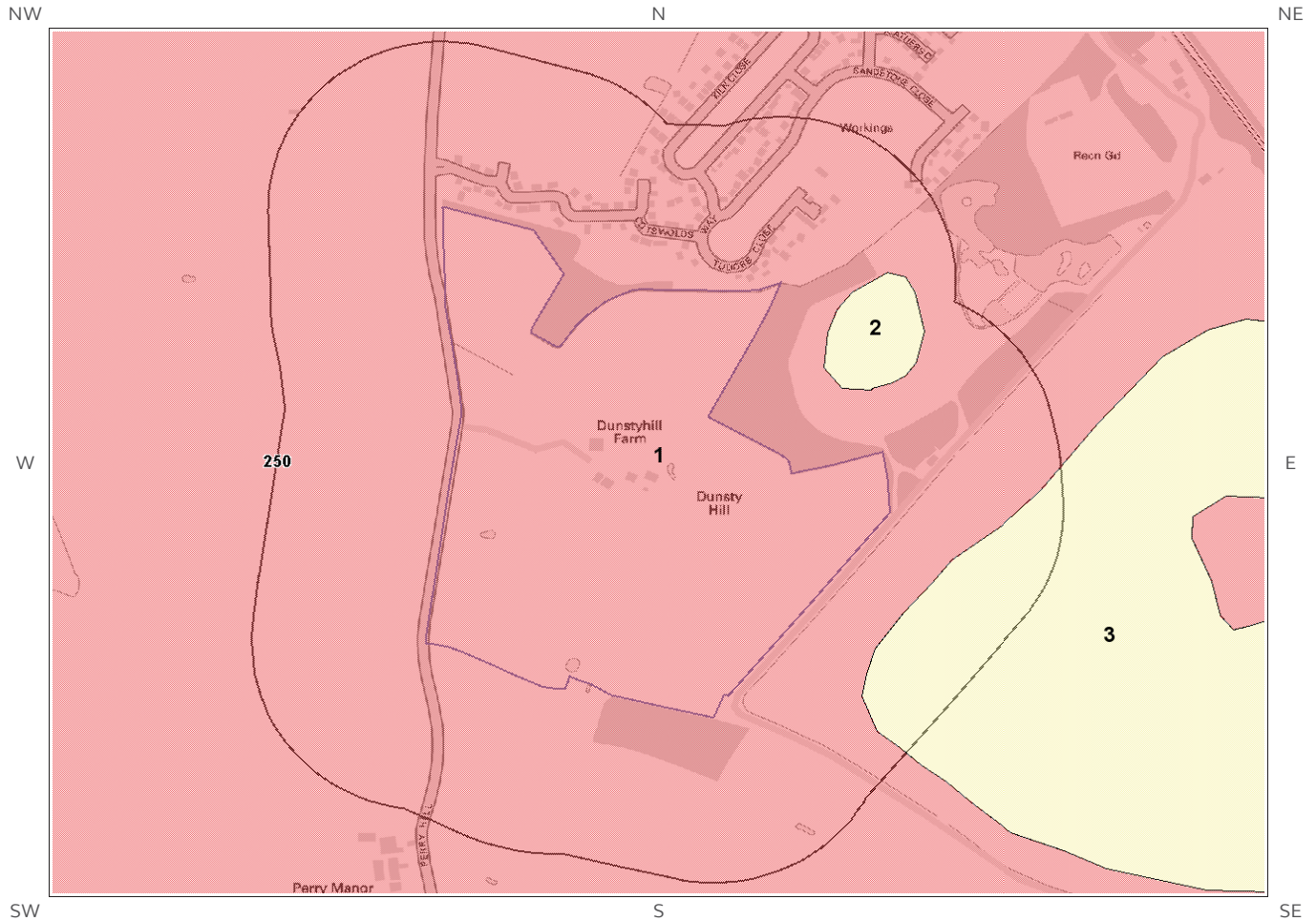
Are there any Clay Mining areas within 1000m of the study site boundary?

No

Database searched and no data found.

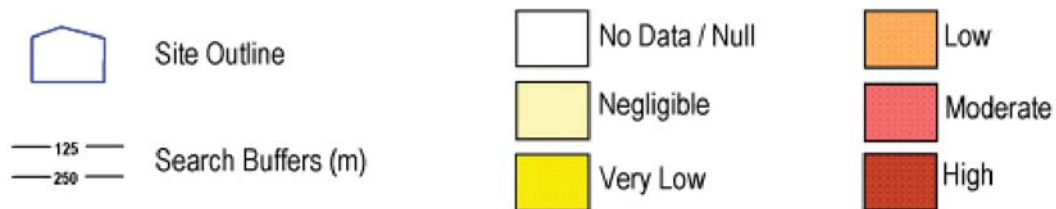
6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map



Shrink Swell Clay Legend

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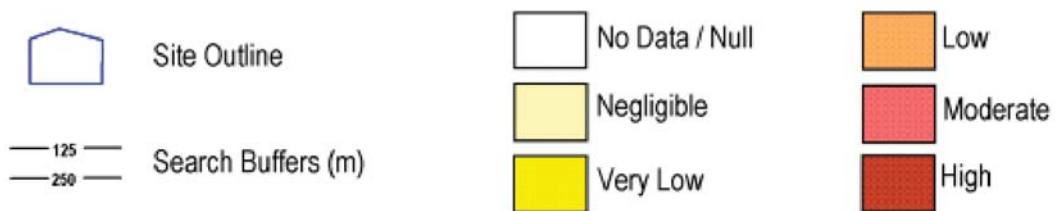


6.2 Landslides map



Landslides Legend

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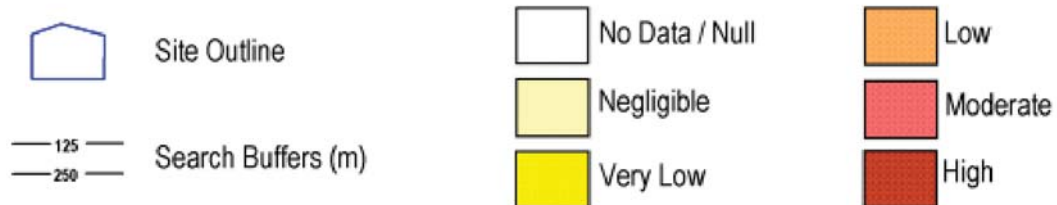


6.3 Ground Dissolution of Soluble Rocks map

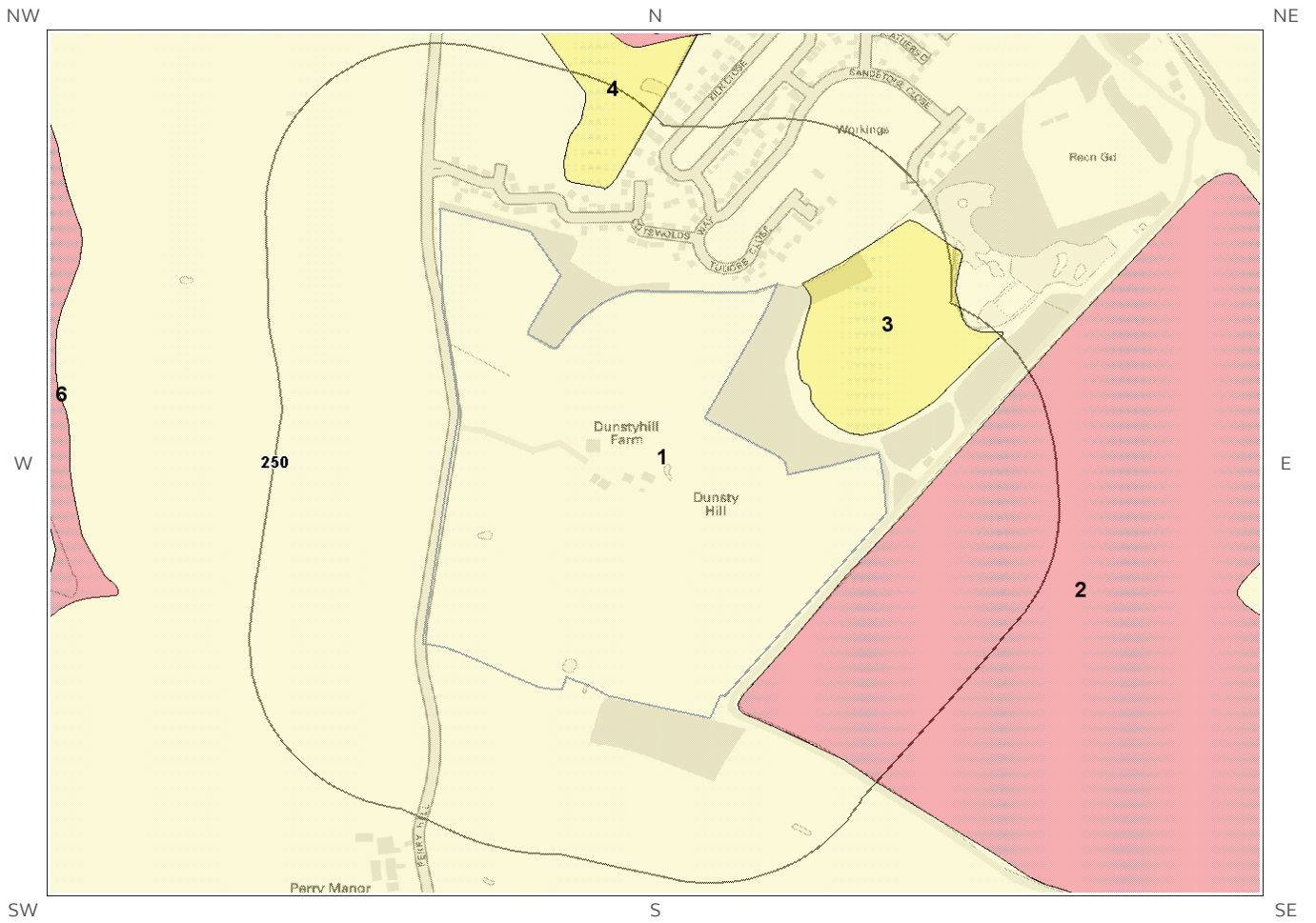


Ground Dissolution Soluble Rocks Legend

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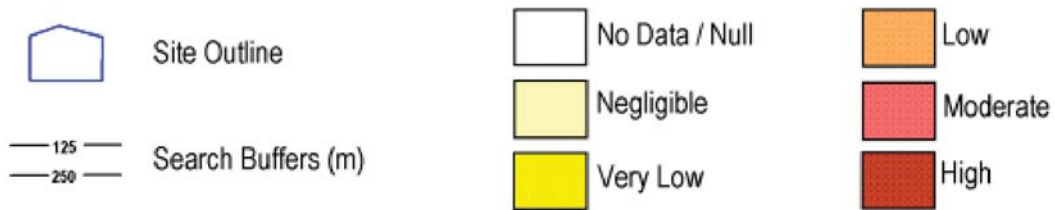


6.4 Compressible Deposits map

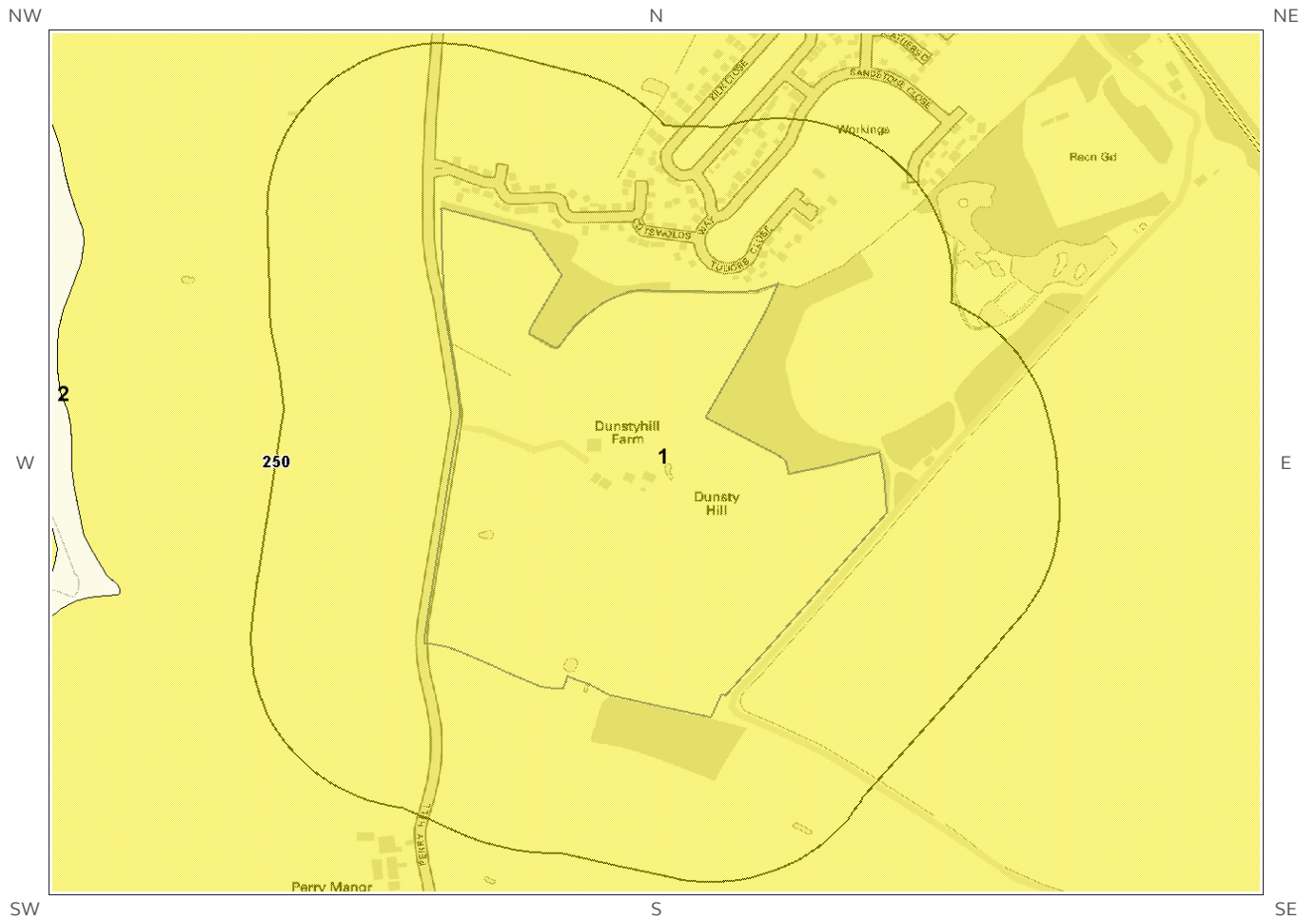


Compressible Deposits Legend

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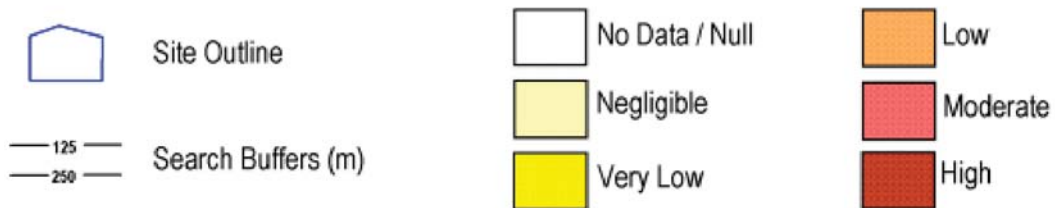


6.5 Collapsible Deposits map

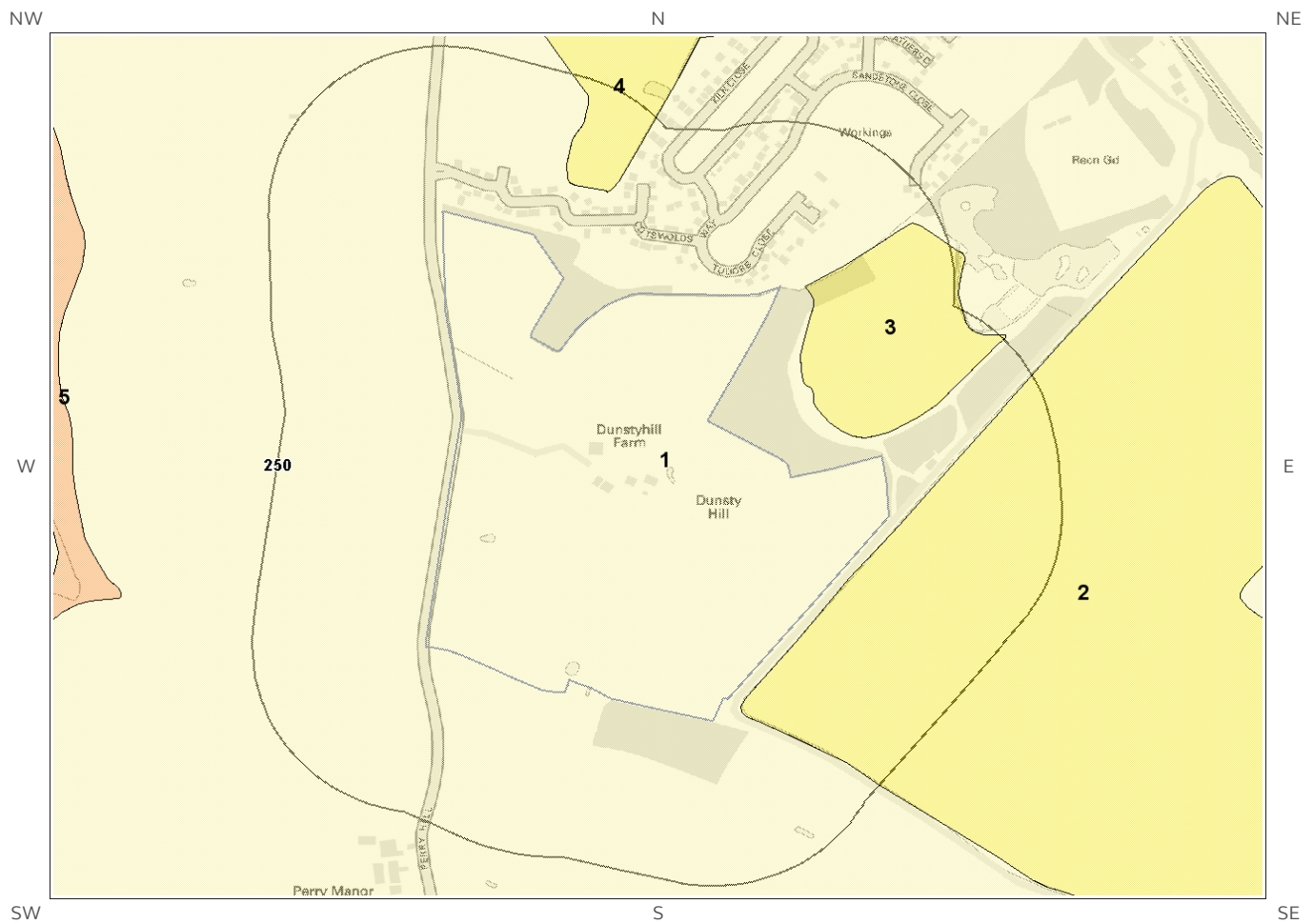


Collapsible Deposits Legend

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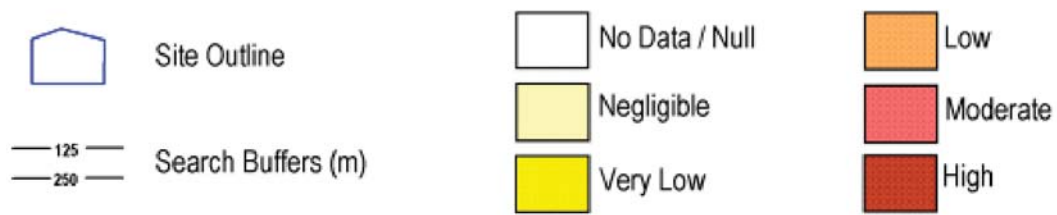


6.6 Running Sand map



Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site** boundary? Moderate

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.
2	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.

* This includes an automatically generated 50m buffer zone around the site

ID	Distance (m)	Direction	Hazard Rating	Details
3	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	16.0	SE	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.
3	32.0	N	Very Low	Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

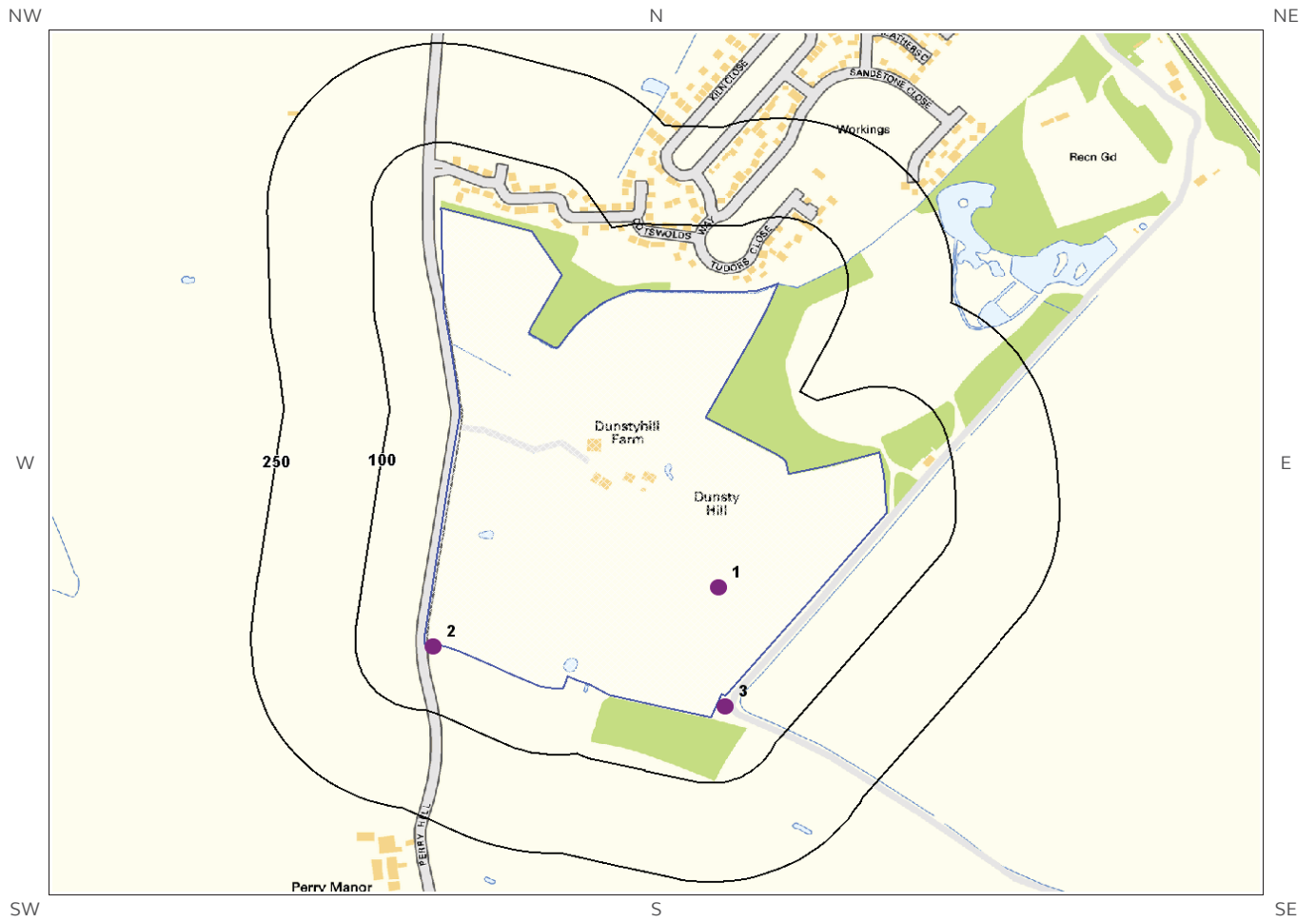
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

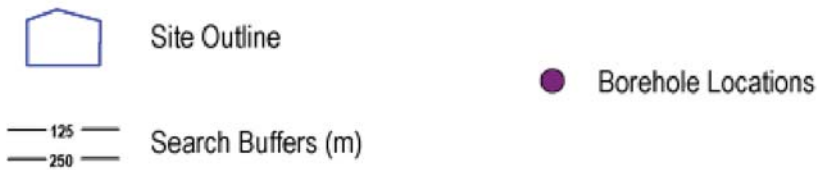
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	16.0	SE	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
3	32.0	N	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records map



Borehole Records Legend

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7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	468510 223410	SP62SE3	70.1	LONDON BRICK CO DUNSTY HILL CHARNDON
2	5.0	S	468100 223320	SP62SE4	-1.0	DUNSTY HILL CALVERT 1/73
3	12.0	SE	468520 223230	SP62SE25	-1.0	CALVERT LANDFILL 2

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/340719

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary:

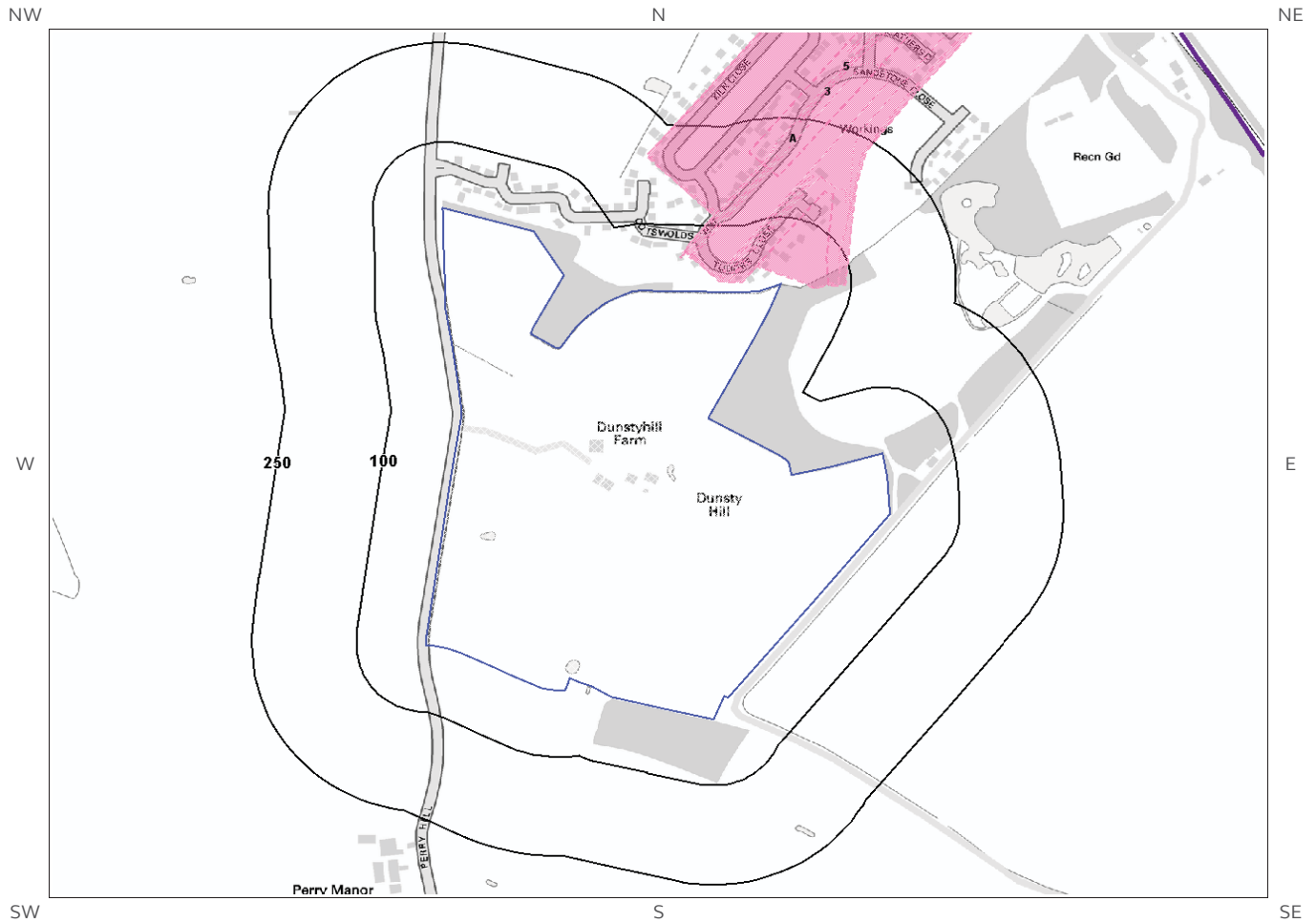
12

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
13.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
13.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
16.0	SE	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
19.0	SE	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg


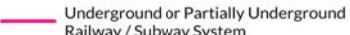



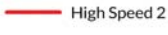





*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels map



Railways and Tunnels Legend

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- | | | | | | |
|---|--------------------|---|--|--|---|
|  | Site Outline |  | Underground or Partially Underground Railway / Subway System |  | Railway Track (OpenStreetMap) |
|  | Search Buffers (m) |  | Railway Tunnel (OS Mapping) |  | High Speed 2 |
| | |  | Abandoned or Dismantled Railway (OpenStreetMap) |  | High Speed 2 Revised Proposed Route |
| | |  | Railway Track (OS Mapping) |  | Crossrail 1 |
| | | | |  | Railway and/or Tunnel Feature from Historical Mapping |

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1A	12	N	468753 224307	Railway Sidings	1951
2A	14	N	468754 224307	Railway Sidings	1957
4	27	N	468736 224451	Railway Sidings	1938
3	161	N	468766 224278	Railway Sidings	1982
5	244	N	468829 224426	Railway Sidings	1978

Any records that have been identified are represented on the Railways and Tunnels map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? Yes

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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<https://www.groundsure.com/terms-and-conditions-may25-2018>

Appendix E

Hydrock Methodology



1.0 HYDROCK DESK STUDY REPORT APPENDIX ON HYDROCK METHODOLOGY

This appendix provides additional background information on certain approaches and methods used by Hydrock Consultants Ltd in the preparation of this report.

Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. The geo-environmental sections are written in broad agreement with BS 10175:2011+A1:2013.

The report is a Preliminary Investigation (BS 10175:2011+A1:2013), often referred to as the Phase 1 Study¹, comprising desk study and walk-over survey, which culminates in the Preliminary Risk Assessment. A preliminary conceptual site model (CSM) is developed. From this are identified any geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. From the geo-environmental perspective, the Hazard Identification process uses professional judgement to evaluate all the hazards in terms of **possible contaminant linkages** (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment.

¹ Please note that it does not refer to a site development phase.



2.0 DESK STUDY INFORMATION

2.1 Unexploded ordnance

Clients have a legal duty under the CDM 2007 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA report C681 (Stone *et al* 2009).

A non-UXO specialist screening exercise has been carried out for the site by considering (a) any evidence of UK defence activities on or near the site evident from the gathered desk study information and (b) the unexploded aerial delivered bomb (UXB) regional risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experience in the desk study, field investigation and clearance of UXO/UXB.

2.2 Hydrogeology

Under the Water Framework Directive the designations of principal and secondary aquifers is based on the Environment Agency interactive aquifer designation map. Where aquifers have been mapped, and they are capable of sustaining a yield of 10 m³/day or supplying 50 people on a continuous basis, the Environment Agency has designated a number of Groundwater Bodies to help manage water quality under the River Basin Management Plans. Groundwater bodies are defined based on their support for ecosystems as well as their capacity to supply drinking water. Note that some localised small aquifers capable of supporting the above supply may be too small to map and can be identified only by investigation.

Where an aquifer exists and it contains groundwater but is incapable of sustaining the above supply, the groundwater is not part of a Groundwater Body and is not considered a strategic resource. In which case the groundwater is not a receptor, but can be a pathway to other receptors by virtue of its ability to transport contaminants.

2.3 Radon

Advice on radon protection in England is provided by Public Health England (www.ukradon.org), formerly the Health Protection Agency (*The Indicative Atlas of Radon in England and Wales*, HPA-RPD-033 (Miles *et al* 2007) and RCE-15 (2010)), and by the BRE (BRE Report BR211 (Scivyer 2007)). An area of the country can be categorised according to the percentage of existing homes where radon is present above the Action Level: 0-1% lower probability, 1-3% intermediate probability and >10% higher probability. It is important to understand that the database on which these numbers are based is incomplete and contains more data points in areas of the country that have traditionally been known for high radon concentrations. As more properties are monitored, the categorisation may change.

The areas where >1% of homes exceed the Action Level are known as Radon Affected Areas.



The Building Regulations cite BR211 and require basic radon protection measures in new buildings in areas of England and Wales where 3-10% of properties exceed the Action Level and full radon protection measures where >10% exceed the Action Level.

Landlords and employers have a legal duty to keep radon levels as low as practicable and to install remedial measures if levels are too high. Commercial new build includes protection measures similar to those for new homes, but once occupied they are subject to the HSW Act and IRR99 regulations.

Private residents are advised to have a radon test where their property is in a Radon Affected Area, and to fit remedial measures if levels are too high.

The Law Society's advice to conveyancing solicitors is to ask the vendor standard questions concerning whether the property is in a radon affected area, whether it was constructed with radon protection measures and whether a radon test has been carried out by the vendor. Hydrock understands that PHE is discussing with the Law Society the adoption of stronger wording to these questions.

In 2009 the then Health Protection Agency recommended that Building Regulations and supporting documents should be amended to ensure that *all* new buildings, extensions, conversions and refurbished buildings in the UK include basic radon protective measures as a minimum. This recommendation was rejected by the Government. Consequently, the current situation is that a developer is *required* only to install protective measures in buildings where >3% of existing properties are above the Action Level, but is not required to install them in Radon Affected Areas where 1-3% of existing properties exceed the Action Level (even though there may be future implications for occupiers of these buildings).



3.0 RISK ASSESSMENT RATIONALE

The work presented in this report has been carried out in accordance with recognised best practice as detailed in guidance documents such as in the CLR 11 Model Procedures (Environment Agency 2004a), GP3 (Environment Agency August 2013), BS 5930:2015 and BS 10175:2011+A1:2013. Important aspects of the risk assessment process are transparency and justification. The particular rationale behind the risk assessments presented is given in this appendix.

A preliminary risk assessment is made of both geotechnical and geo-environmental hazards identified at the desk study stage and confirmed (or amended) at the ground investigation stage. In the case of geo-environmental hazards this is based on a simple matrix of probability of occurrence versus the consequence, as explained below, and is referred to as the **exposure model**. In the case of the geotechnical hazard identification, this is referred to as the **ground model**.

The geo-environmental risk assessment process proceeds to the next level, the generic risk assessment, in which actual contaminant concentrations are considered.

3.1 Preliminary risk assessment

In line with the CLR 11 Model Procedures (Environment Agency 2004a), the Preliminary Risk Assessment includes a geo-environmental Hazard Identification, which seeks to list all the suspected contaminant **sources**, the **receptors** that might be harmed by those sources and the **pathways** via which the sources might reach the receptors to cause the harm. The source-pathway-receptor concept is known as a contaminant linkage (formerly a pollutant linkage) and only when a linkage is complete is there any possibility of risk of harm arising.

The Hazard Identification process uses professional judgement to evaluate all the hazards in terms of **possible contaminant linkages**. Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and the chemical analysis of soil and water samples.

Where no ground investigation has been carried out (i.e. in a desk study only report) there is greater uncertainty in the information available and so a geoenvironmental consequences and probability assessment is undertaken.

Some linkages may be identified which constitute a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled 'no linkage' in the summary table and no further action is required. If a linkage is possible, a comparison is made of consequence against probability in general accordance with the guidance given in CIRIA Report C552 (Rudland *et al* 2001).



Classification of consequences and probability are given in CIRIA C552 Tables 6.3 and 6.4, respectively, but there are a number of inconsistencies in the original Table 6.3, in particular relating to ‘significant harm or significant possibility of significant harm’ (SH/SPOSH). Consequently, the table has been updated by Hydrock in line with current practice and the revision presented in R&D Publication 66, Annex 4 (NHBC and Environment Agency. 2008, and is given in Table 3.1 below.

The basis of the classification is that ‘severe’ and ‘medium’ are likely to result in SH/SPOSH as defined by the EPA 1990, Part 2A, with ‘severe’ resulting in acute harm. ‘Mild’ lies below the level of SH/SPOSH but above the level of ‘no harm’ as implied by the relevant Generic assessment criterion (GAC, see below). Minor lies below the ‘no harm’ level.

Table 3.1: Classification of consequences of geo-environmental risks

Classification of Consequences for Geo-environmental Risks		
Classification	Definition	Examples
Severe	<p>Concentration of contaminants is likely to (or is known from previous data to) exceed that indicative of unacceptable intake or contact. Highly elevated concentrations likely to result in “significant harm” to human health as defined by the EPA 1990, Part 2A, if exposure occurs.</p> <p>I.e. >>SH/SPOSH, concentrations are high enough to cause acute (short-term) effects.</p> <p>Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.</p> <p>Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.</p> <p>Catastrophic damage to crops, buildings or property.</p>	<p>Human health: short-term (acute) effects likely to result in significant harm. E.g. high conc. of cyanide on the surface of an informal recreational area. Significant harm to humans is defined as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.</p> <p>Planting: complete and rapid die-back of landscaped areas.</p> <p>Controlled waters: short-term pollution, e.g. major spillage into controlled water. Major fish kill in surface water from large spillage of contaminants from site.</p> <p>Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity).</p> <p>Buildings etc.: catastrophic damage, e.g. explosion causing collapse. (can also equate to immediate human health risk if buildings are occupied).</p> <p>Ecosystems: acute risk to a particular ecosystem or organism forming part of that ecosystem in a designated protected area, e.g. by contamination spillage. Damage to a protected area of international significance (e.g. Ramsar site).</p> <p>Site workers: risk assessment required to determine PPE and this may involve USEPA Level A, B or C protection.</p>



Classification of Consequences for Geo-environmental Risks		
Classification	Definition	Examples
Medium	<p>Concentration of contaminants is likely to (or is known from previous data to) exceed that indicative of unacceptable intake or contact. Elevated concentrations which could result in “significant harm” to human health as defined by the EPA 1990, Part 2A if exposure occurs.</p> <p>I.e. >SH/SPOSH.</p> <p>Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce.</p> <p>Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population.</p> <p>Significant damage to crops, buildings or property.</p>	<p>Human health: long-term (chronic) effects likely to result in significant harm. E.g. high conc. of contaminants close to the surface of a development site. Significant harm to humans is defined as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.</p> <p>Planting: stressed or dead plants in landscaped areas.</p> <p>Controlled waters: pollution of sensitive water resources, e.g. leaching into principal or secondary aquifers or rivers.</p> <p>Buildings etc.: damage renders unsafe to occupy e.g. foundation damage resulting in instability.</p> <p>Ingress of contaminants through plastic potable water pipes.</p> <p>Ecosystems: chronic death of species in a particular ecosystem in a designated protected area, e.g. by contamination spillage. Damage to a protected area of national significance (e.g. Site of Special Scientific Interest).</p> <p>Site workers: risk assessment required to determine PPE and this may involve USEPA Level B, C or D protection.</p>
Mild	<p>Concentration of contaminants is likely to (or is known from previous data to) exceed that indicative of no harm but not unacceptable intake or contact. Exposure to human health unlikely to lead to “significant harm”.</p> <p>I.e. >SVG/GAC but <SH/SPOSH.</p> <p>Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce.</p> <p>Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.</p> <p>Minor damage to crops, buildings or property.</p>	<p>Human health: harm but probably not significant harm unless particularly sensitive individual within the receptor group. May be aesthetic/olfactory impacts. Exposure could lead to slight short-term effects (e.g. mild skin rash).</p> <p>Planting: damage to plants in landscaped areas, e.g. stunted growth, discoloration.</p> <p>Controlled waters: pollution of non-sensitive water bodies e.g. leaching into non-classified groundwater or minor ditches.</p> <p>Buildings etc.: damage to sensitive buildings etc. Surface spalling of concrete.</p> <p>Ecosystems: minor change in a particular ecosystem in a designated protected area, but not significant harm. Damage to a locally important area.</p> <p>Site workers: risk assessment required to determine PPE and this may involve USEPA Level C or D protection.</p>



Classification of Consequences for Geo-environmental Risks		
Classification	Definition	Examples
Minor	<p>Concentration of contaminants is likely to (or is known from previous data to) be less than that indicative of no harm. No measurable effects on humans.</p> <p>I.e. <SGV/GAC.</p> <p>Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.</p> <p>Repairable effects of damage to buildings, structures and services.</p>	<p>No measurable effects, but simple PPE required (USEPA Level D protection, i.e. overalls, boots, goggles, hard hat).</p> <p>The loss of plants in a landscaping scheme.</p> <p>Discoloration of concrete.</p>

CIRIA Report C552 Table 6.4 is reproduced as Table 3.2 below. This provides an estimate of the probability that the event described by the contaminant linkage will occur. For example, the likelihood that pollution of groundwater will occur by leaching of metals into the aquifer.

Table 3.2: Classification of Probability of Geo-environmental Risks

Classification of Probability of Geo-environmental Risks	
Classification	Definition
High Likelihood	There is a contaminant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	<p>There is a contaminant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur.</p> <p>Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.</p>
Low Likelihood	<p>There is a contaminant linkage and circumstances are possible under which an event could occur.</p> <p>However, it is no means certain that even over a longer period such event could take place, and is less likely in the shorter term.</p>
Unlikely	There is a contaminant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

The perceived level of risk for each pathway is then derived from the probability versus consequences matrix, modified after CIRIA C552 Table 6.5, given in Table 3.3 below. Note that by definition, no contaminant linkage equates to no risk.

Table 3.3: Qualitative Risk Level from Consequence and Probability

		Consequence			
		<i>product</i> Severe	Medium	Mild	Minor
Probability	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			



This approach assumes an equivalence between probability and consequences and ignores the difficulty that can arise where to probability of occurrence appears to be almost negligible but the consequences are very severe. In such conditions there is a degree of subjectivity in assessing the level of risk and it could be low, moderate or high. Such risks may require specialist consideration beyond the scope of this standard report.

Finally, a description of the classified risks and the likely action required can be determined from Table 3.4 below.

Table 3.4: Description of the Classified Risks and Likely Action Required

Description of Classified Risks and Likely Action Required	
Very High Risk	A significant contaminant linkage, including actual evidence of significant harm or significant possibility and significant harm, is clearly identifiable at the site (e.g. from visual or documentary evidence) under current conditions, with potential for legal and/or financial consequences for the site owner or other Responsible Person. Remediation advisable based on acute impacts being likely. Immediate action should be considered.
High Risk	A contaminant linkage is identifiable at the site under current and future use conditions. Although likely, there is no obvious actual evidence of significant harm or significant possibility and significant harm under current conditions. Extent of risk is therefore subject to confirmation by investigation and risk assessment and most likely to be deemed significant. Realisation of the risk is likely to present a substantial liability to the site owner or other Responsible Person. Remediation required for redevelopment and may also be required under Part 2A for existing receptors.
Moderate Risk	A contaminant linkage is identifiable at the site under current and future use conditions. However, it is not likely to be a significant linkage under current conditions. It is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Actual extent of risk subject to confirmation by additional investigation and risk assessment and most likely to lie between no possibility of harm (under current conditions) and significant possibility of significant harm (under conditions created by new use). Remediation may be required for redevelopment.
Low risk	Potential pathways and receptors exist but history of contaminative use or site conditions indicates that contamination is likely to be of limited extent and below the level of no possibility of harm. It is unlikely that the site owner or other Responsible Person would face substantial liabilities from such a risk. Precautionary investigations and risk assessment advisable on change of use. Any subsequent remedial works are likely to be relatively limited.
Very Low Risk	No contaminant linkage likely to exist under current or future conditions, but this cannot be completely discounted. If harm is realised, it is likely at worst to be mild or minor. Site not capable of being determined under Part 2A where the local authority inspects the site. No further action recommended.
No Risk	No contaminant linkage exists.



4.0 FLOOD RISK

The following additional information concerns the background to flood risk mentioned in the report. Guidance is given in the document *Technical Guidance to the National Planning Policy Framework* (DCLG March 2012) which retains key elements from the withdrawn Planning Policy Statement 25.

The Environment Agency flood maps are divided into Flood Zones, as follows.

- Flood Zone 1 is land outside the extent of extreme flooding and the annual risk is less than 1:1000, low probability (depicted as white on the web-based map).
- Flood Zone 2 is land unlikely to flood except in extreme conditions if no defences are present and the annual risk is between 1:100 and 1:1000 (for rivers) or 1:200 and 1:1000 (for the sea), medium probability (depicted as light blue on the web-based map).
- Flood Zone 3 is land within the floodplain at risk of flooding if no defences are present and the annual risk is greater than or equal to 1:100 (for rivers) or 1:200 (for the sea), high probability (depicted as dark blue on the web-based map).

The Agency flood maps also define the risk of flooding: as 'low' ($\leq 1:200$), 'moderate' ($> 1:200$ to $\leq 1:75$) or 'significant' ($> 1:75$), which are not the same divisions as those in the guidance mentioned above. Note that the published flood map only relates to flooding from rivers, estuaries and the sea and does not include other potential sources such as surface water, groundwater, sewers, canals and reservoirs. Note also that the presence on the map of flood defences, or areas benefiting from flood defences, should not be taken to imply that a proposed development in these areas is acceptable.

The **Environment Agency in England** has issued Flood Risk Standing Advice. However, this is to be reviewed following the publication of the NPPF (see <http://www.environment-agency.gov.uk/research/planning/33098.aspx> for updates and details).

The flood map mentioned above can be accessed at the Agency's website.

The Technical Guidance states:

- Within Flood Zone 1 all uses of land are appropriate. For development proposals on sites comprising one hectare or above, the vulnerability to flooding from other sources as well as from river and sea flooding; and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment (FRA) to accompany the planning application. This need only be brief unless the factors above or other local considerations require particular attention. For development proposals less than one hectare no flood risk assessment (FRA) is required.



- Within Flood Zone 2, water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure (as defined in Technical Guidance, Table 2) are appropriate in this zone. The Sequential Test is required and must be passed and for highly vulnerable uses in Table 2 the Exception Test must be applied and passed also. All development proposals in this zone should be accompanied by a flood risk assessment (FRA).
- Flood Zone 3 is sub-divided into 3a and 3b, but these are not distinguished on the published maps. Flood Zone 3a is land having an annual probability of flooding of >1:100 (from rivers) or >1:200 (from the sea). The water-compatible and less vulnerable uses of land (as defined in Technical Guidance, Table 2) are appropriate in this zone. The highly vulnerable uses in Table 2 should not be permitted in this zone. The Sequential Test is required and must be passed and for the more vulnerable and essential infrastructure uses in Table 2 the Exception Test must be applied and passed also. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood. All development proposals in this zone should be accompanied by a flood risk assessment (FRA).

Flood Zone 3b is known as the 'functional floodplain' and comprises land where water has to flow or be stored in times of flood and should be identified on Strategic Flood Risk Assessments (SFRA) undertaken by the Local Planning Authority. Such land is defined as land which would flood with an annual probability of 1:20 or greater, or is *designed* to flood in an extreme (1:1000) flood, or at another probability to be agreed between the Local Planning Authority and the Environment Agency, including water conveyance routes). Only the water-compatible uses and the essential infrastructure (as defined in Technical Guidance, Table 2) that has to be there should be permitted in this zone. It should be designed and constructed to: remain operational and safe for users in times of flood; result in no net loss of floodplain storage; not impede water flows; and not increase flood risk elsewhere. The Sequential Test is required and must be passed and for essential infrastructure the Exception Test must be applied and passed also. All development proposals in this zone should be accompanied by a FRA.

Natural Resources Wales points users to the Environment Agency flood map, but this is not used for planning purposes (only to provide information on flood risk and to raise awareness). Development advice with respect to flooding is provided by the Welsh Assembly Government (July 2004) Technical Advice Note 15 (TAN15) and the accompanying development advice maps. An interactive map is available from the WAG web site.

The development advice map containing three zones (A, B and C with subdivision into C1 and C2) should be used to trigger the appropriate planning tests.

- Zone A is considered to be at little or no risk of fluvial or tidal/coastal flooding. The justification test (TAN15, Section 6) is not applicable and there is no need to consider flood risk further. This equates to Flood Zone 1 on the Agency maps.



- Zone B is land known to have been flooded in the past evidenced by sedimentary deposits. As part of a precautionary approach site levels should be checked against the extreme (1:1000) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further. This land within Flood Zone 1 of the Agency maps but close to Flood Zone 2 or 3.
- Zone C is based on the Environment Agency extreme flood outline, equal to or greater than 1:1000 (river, tidal or coastal) and equates to Flood Zones 2 and 3 on the Agency map. Flooding issues should be considered as an integral part of decision making by the application of the justification test (TAN15, Section 6) including assessment of consequences (TAN15, Section 7) is required. Sub-division C1 is land in the floodplain which are developed and served by significant infrastructure, including flood defences. Development can take place subject to application of the justification test, including acceptability of consequences. Sub-division C2 is land in the floodplain without significant flood defence infrastructure. Only less vulnerable development should be considered subject to application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered. The categories of land use are defined in TAN15, Figure 2.



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Appendix 11.1: Visual Receptors to be Included within LVIA

Public rights of way (PR):

- PR01 BCC ref: CAG/5/1
- PR02 BCC ref: CAG/4/1 (south) and CAG/4/2
- PR03 BCC ref: CAG/4/1 (centre and north)
- PR04 BCC ref: EDG/6/1
- PR05 BCC ref: CAG/4/3, EDG/10/1, EDG/11/2, EDG/12/1 and GUN/23/1
- PR06 BCC ref: CHA/5/7, CHA/6(BW)/4, CHA/11/1 and EDG/5/1
- PR07 BCC ref: CHA/12/1
- PR08 BCC ref: SCL/12/2, SCL/13/1 and SCL/13/2
- PR09 BCC ref: GUN/13/3, GUN/13/4 and GUN/14/1
- PR10 BCC ref: MGI/1/2, EDG/1/1 and GUN/20/2
- PR11 BCC ref: MGI/9A/1, MGI/9/2, EDG/3/1 and EDG/3/2
- PR12 PRoWs to the west of Chardon and south of the railway line
- PR13 BCC ref: TWY/2/1, TWY/2/2 and TWY/3/1

Public open space (POS):

- POS01 Calvert Green open space (framed by Cotswold Way and Sandstone Close)

Residential properties or farmsteads (RE)

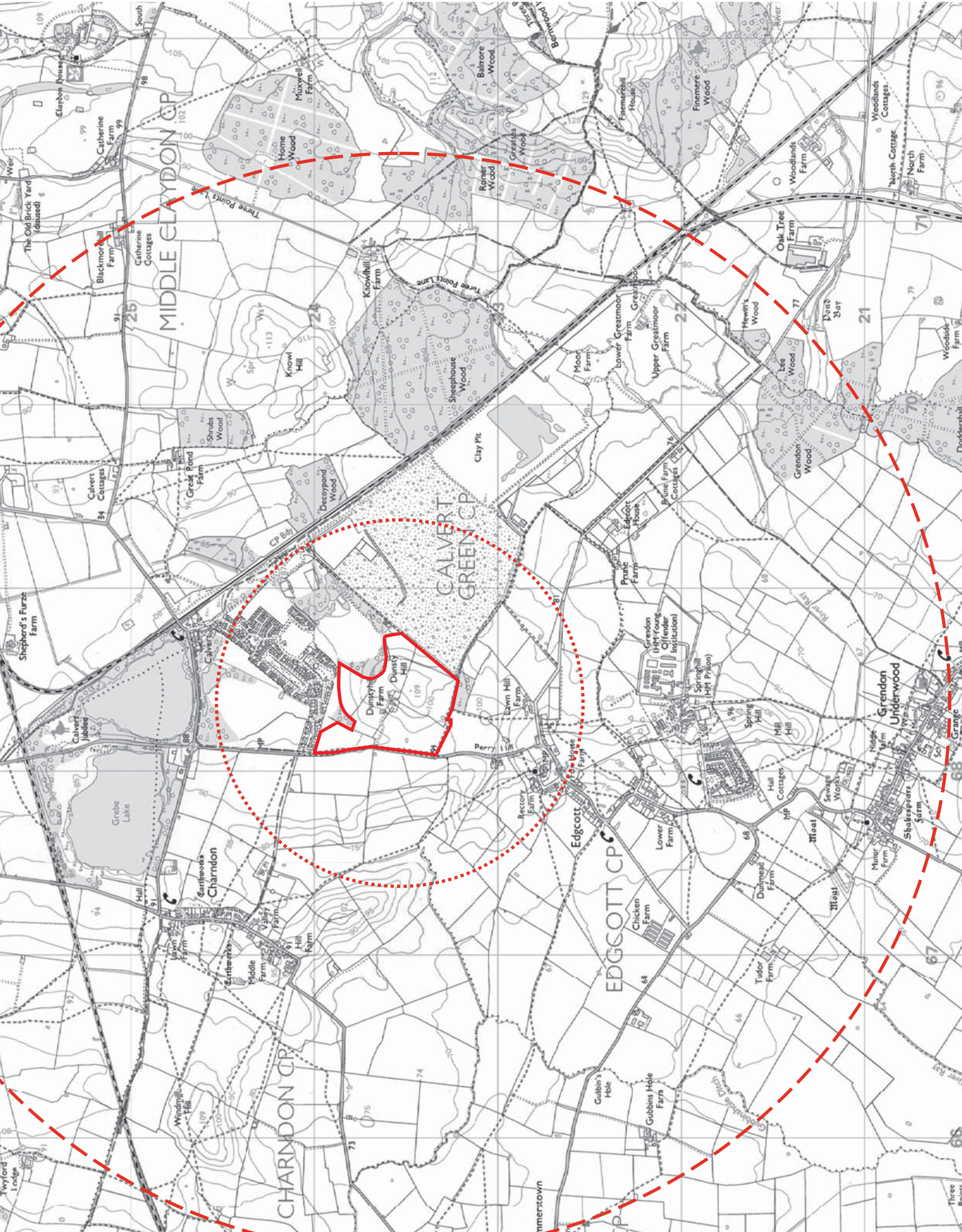
- RE01 Calvert Green residential properties along the south end of Cotswold Way and Tudor Close
- RE02 Remaining Calvert Green residential properties
- RE03 Perry Manor Farmstead
- RE04 Calvert Cottages, Rose Hill Farmstead and Pond Farmstead (including Granary Cottage and the Old Dairy)
- RE05 Properties to the east of School Hill
- RE06 Charndon
- RE07 Prune Farmstead and Edgcott House
- RE08 Grendon Underwood
- RE09 Dunmead Farm, Tudor Farm and Gubbins Hole Farm
- RE10 Springhill (HM Prison)

Roads (RD):

- RD01 Perry Hill
- RD02 Marsh Gibbon Road
- RD03 Cotswold Way and Tudor Close
- RD04 School Hill
- RD05 Unnamed road between Calvert and Botolph Claydon.

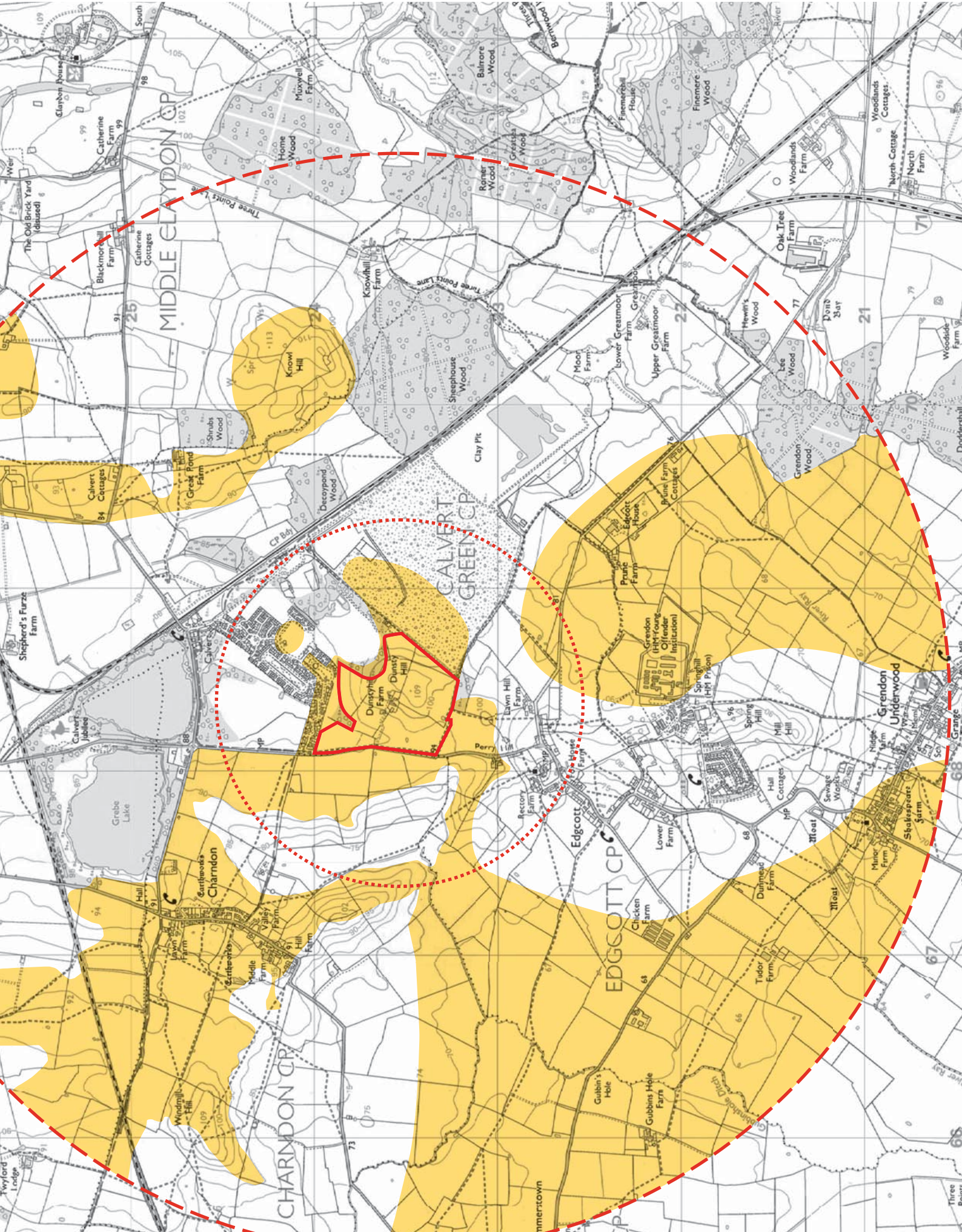
Appendix 11.2: LVIA Figures

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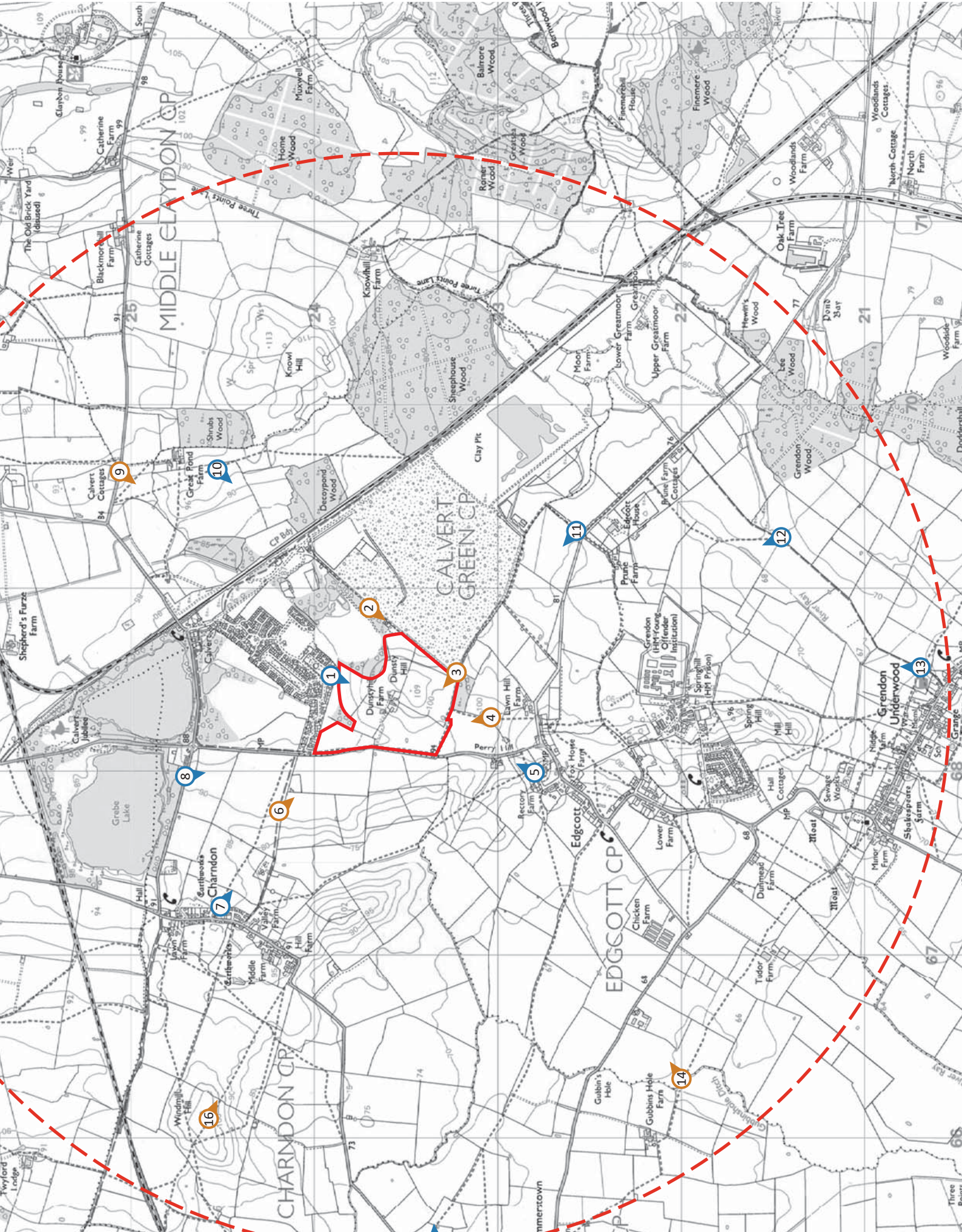


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Note: The figure shows the development ridge height surrounding a built form level field vertical

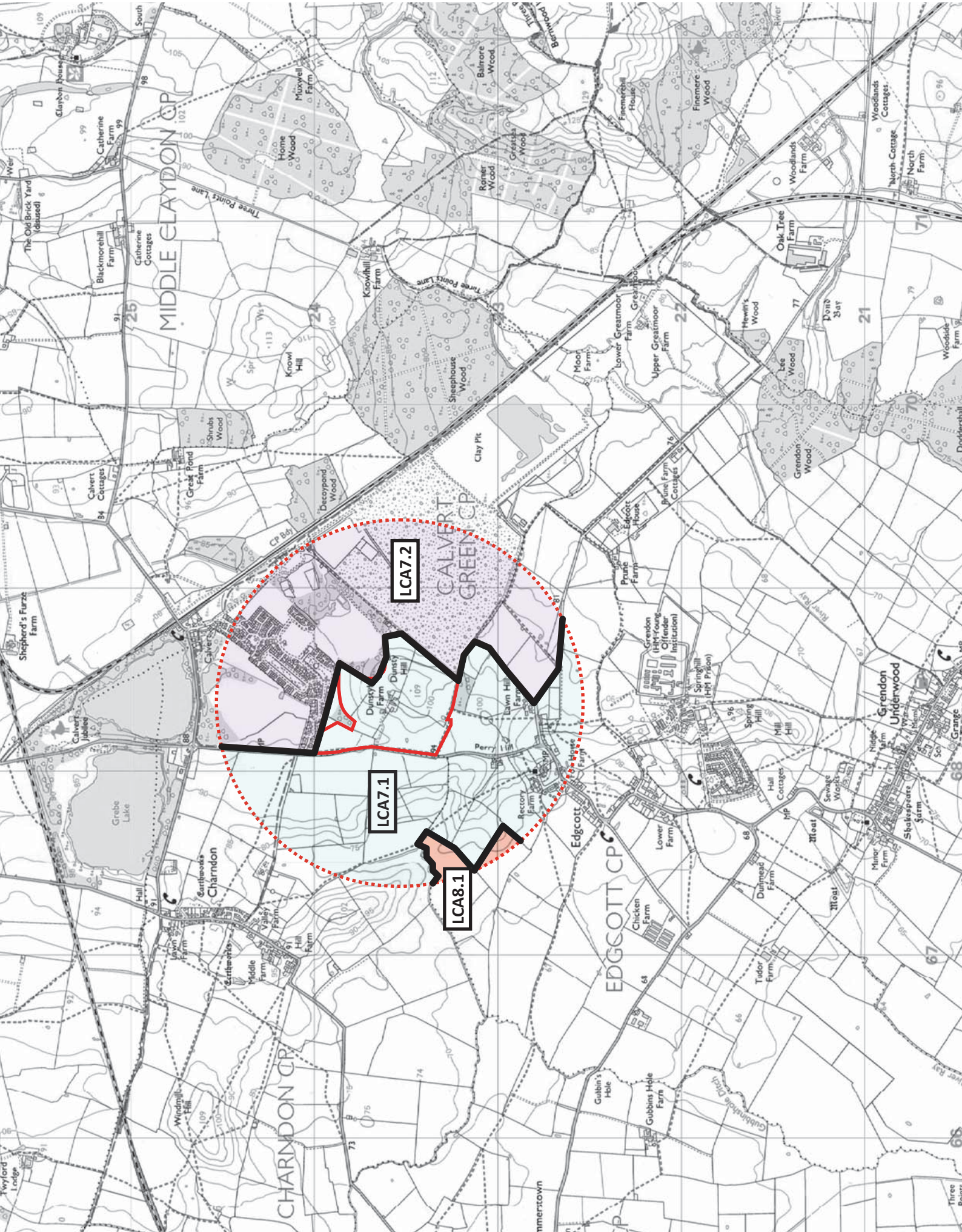


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Appendix 13.1: Archaeology Desk-Based Assessment



**ARCHAEOLOGICAL
DESK BASED
ASSESSMENT**

**Land at
Dunsty Hill Farm
Calvert Green
Buckinghamshire**

October 2018

**Local Planning Authority:
Aylesbury Vale District
Council**

**Site centred at:
SP68386 23589**

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**Report Status:
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CONTENTS

Executive Summary

- 1.0 Introduction and Scope of Study
- 2.0 Development Plan Framework
- 3.0 Geology and Topography
- 4.0 Archaeological and Historical Background, with Assessment of Significance
(Including Historic Map Regression Exercise)
- 5.0 Site Conditions and the Proposed Development
(Likely Impact upon Heritage Assets)
- 6.0 Summary and Conclusions

Sources Consulted

LIST OF ILLUSTRATIONS

- Fig. 1 Site Location
- Fig. 2a Summary of cultural heritage designations (data from Buckinghamshire HER)
- Fig. 2b Ridge and Furrow data (from Buckinghamshire HER)
- Fig. 3 1770 Jeffrey's Map of Buckinghamshire
- Fig. 4 1813-14 Ordnance Survey Drawing
- Fig. 5 1824 Bryant's Map of Buckinghamshire
- Fig. 6 1885 Ordnance Survey
- Fig. 7 1900 Ordnance Survey
- Fig. 8 1938 Ordnance Survey
- Fig. 9 1947 Ordnance Survey
- Fig. 10 1952 Ordnance Survey
- Fig. 11 1958 Ordnance Survey
- Fig. 12 1984 Ordnance Survey
- Fig. 13 1999 Ordnance Survey
- Fig. 14 2003 aerial photograph
- Fig. 15 2006 Ordnance Survey Aerial photograph
- Fig. 16 2017 Ordnance Survey
- Fig. 17 2017 aerial photograph
- Fig. 18 LiDAR data
- Fig. 19 Redevelopment masterplan proposals (October 2018)

LIST OF PLATES

- Plate 1 2017 evidence of ridge and furrow southeast of Dunstyhill Farm
- Plate 2 2017 evidence of ridge and furrow northeast of Dunstyhill Farm
- Plate 3 2017 view west along the southern boundary of the study site
- Plate 4 2017 view from southwestern corner towards Dunstyhill Farm
- Plate 5 2017 view across fields northwest of Dunstyhill Farm

EXECUTIVE SUMMARY

Land at Dunstyhill Farm, Calvert Green, Buckinghamshire, has been considered for its below ground archaeological potential.

In terms of relevant nationally significant designated heritage assets, no World Heritage sites, Scheduled Monuments, Historic Battlefield or Historic Wreck sites are identified within the site or its immediate vicinity.

In terms of relevant local designations the site does not lie within a defined Archaeological Notification Area.

The site can be considered likely to have a generally low/unknown archaeological potential for most past periods of human activity, for remains deemed likely to be of local/regional significance. Evidence of ridge and furrow is visible in two areas within the site, firstly on the slope south of the treeline running east from the farm, and secondly at the crest of the hill north of the treeline running east from the farm.

The site has remained undeveloped farmland throughout its documented history, with the Dunstyhill Farm buildings within the centre.

Proposals include the mixed use redevelopment of the site, primarily residential, together with educational facilities and sheltered accommodation, access, parking and associated areas of landscaping.

Appropriate, additional archaeological mitigation measures are anticipated to be required in advance of relevant construction impacts.

1.0 INTRODUCTION AND SCOPE OF STUDY

- 1.1 This below ground archaeological desk-based assessment has been prepared by CgMs Consulting on behalf of Plan 9 Designs Limited.
- 1.2 The assessment considers the site, also referred to as the study site, of land at Dunstyhill Farm, Calvert Green, Buckinghamshire. The study site totals approximately 31.27 hectares in extent, and comprises open land with the buildings of Dunstyhill Farm within the centre. The study site is centred at National Grid Reference SP68386 23589 within Aylesbury Vale District (see Figures 1, 16-18 and Plates 1-5).
- 1.3 Figures 2a and 2b summarise relevant cultural heritage designations and archaeological findspot references relevant to the study site.
- 1.4 In terms of relevant nationally significant designated heritage assets, no World Heritage sites, Scheduled Monuments, Historic Battlefield or Historic Wreck sites are identified within the study site or its immediate vicinity.
- 1.5 In terms of relevant local designations, the study site does not lie within an Archaeological Notification Area as defined by the local planning authority.
- 1.6 In accordance with relevant government policy and guidance on archaeology and planning, and in accordance with the 'Standard and Guidance for historic environment desk based assessments' (Chartered Institute for Archaeologists January 2017), this assessment draws together the available archaeological, topographic and land-use information in order to clarify the archaeological potential of the study site.
- 1.7 The assessment comprises an examination of available, relevant evidence in the Buckinghamshire Historic Environment Record (HER), the Portable Antiquities Database, and the Buckinghamshire Record Office. The assessment considers the results of nearby archaeological investigations, incorporates published and unpublished material and charts historic land-use through a map regression exercise. A walk over site visit was undertaken during the late morning and early afternoon of 28th November 2017.
- 1.8 As a result, this assessment enables relevant parties to review the archaeological potential of the study site and to consider the need for design, civil engineering, and/or archaeological solutions to the potential identified.

2.0 DEVELOPMENT PLAN FRAMEWORK

- 2.1 National legislation regarding archaeology, including scheduled monuments, is contained in the Ancient Monuments and Archaeological Areas Act 1979, amended by the National Heritage Act 1983 and 2002, updated in April 2014.
- 2.2 In March 2012, the government published the National Planning Policy Framework (NPPF), which was later revised in July 2018. The NPPF is supported by the National Planning Practice Guidance (NPPG), which was published online 6th March 2014 and is periodically updated (<http://planning.guidance.planningportal.gov.uk>).
- 2.3 The NPPF and NPPG are additionally supported by three Good Practice Advice (GPA) documents published by Historic England: GPA 1: The Historic Environment in Local Plans; GPA 2: Managing Significance in Decision-Taking in the Historic Environment (both published March 2015). The second edition of GPA3: The Setting of Heritage Assets was published in December 2017.

National Planning Policy

- 2.4 Section 16 of the NPPF, entitled Conserving and enhancing the historic environment provides guidance for planning authorities, property owners, developers and others on the conservation and investigation of heritage assets. Overall, the objectives of Section 16 of the NPPF can be summarised as seeking the:
- Delivery of sustainable development;
 - Understanding the wider social, cultural, economic and environmental benefits brought by the conservation of the historic environment;
 - Conservation of England's heritage assets in a manner appropriate to their significance; and
 - Recognition that heritage makes to our knowledge and understanding of the past.
- 2.5 Section 16 of the NPPF recognises that intelligently managed change may sometimes be necessary if heritage assets are to be maintained for the long term. Paragraph 189 states that planning decisions should be based on the significance of the heritage asset and that level of detail supplied by an applicant should be proportionate to the importance of the asset and should be *no more than sufficient* to review the potential impact of the proposal upon the significance of that asset.

- 2.6 *Heritage Assets* are defined in Annex 2 of the NPPF as: a building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. They include designated heritage assets (as defined in the NPPF) and assets identified by the local planning authority during the process of decision-making or through the plan-making process.
- 2.7 Annex 2 also defines *Archaeological Interest* as a heritage asset which holds or potentially could hold evidence of past human activity worthy of expert investigation at some point.
- 2.8 A *Nationally Important Designated Heritage Asset* comprises a: World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area.
- 2.9 *Significance* is defined as: The value of a heritage asset to this and future generations because of its heritage interest. This interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.
- 2.10 *Setting* is defined as: The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
- 2.11 In short, government policy provides a framework which:
- Protects nationally important designated Heritage Assets;
 - Protects the settings of such designations;
 - In appropriate circumstances seeks adequate information (from desk based assessment and field evaluation where necessary) to enable informed decisions;
 - Provides for the excavation and investigation of sites not significant enough to merit *in-situ* preservation.
- 2.12 The NPPG reiterates that the conservation of heritage assets in a manner appropriate to their significance is a core planning principle, requiring a flexible and thoughtful approach. Furthermore, it highlights that neglect and decay of heritage assets is best addressed through ensuring they remain in active use that is consistent with their conservation. Importantly, the guidance states that if complete, or partial loss of a heritage asset is justified, the aim should then be to capture and record the evidence of

the asset's significance, and make the interpretation publically available. Key elements of the guidance relate to assessing harm. An important consideration should be whether the proposed works adversely affect a key element of the heritage asset's special architectural or historic interest. Additionally, it is the degree of harm, rather than the scale of development, that is to be assessed. The level of 'substantial harm' is considered to be a high bar that may not arise in many cases. Essentially, whether a proposal causes substantial harm will be a judgment for the decision taker, having regard to the circumstances of the case and the NPPF. Importantly, harm may arise from works to the asset or from development within its setting. Setting is defined as the surroundings in which an asset is experienced, and may be more extensive than the curtilage. A thorough assessment of the impact of proposals upon setting needs to take into account, and be proportionate to, the significance of the heritage asset and the degree to which proposed changes enhance or detract from that significance and the ability to appreciate it.

2.13 In considering any planning application for development, the planning authority will be mindful of the framework set by government policy, in this instance the NPPF, by current Development Plan Policy and by other material considerations.

2.14 The relevant Development Plan framework is provided by the Aylesbury Vale District Local Plan (adopted January 2004). This expired on 27 September 2007 but policies relating to archaeology were 'saved'. It includes the following:

POLICY GP59

IN DEALING WITH DEVELOPMENT PROPOSALS AFFECTING A SITE OF ARCHAEOLOGICAL IMPORTANCE THE COUNCIL WILL PROTECT, ENHANCE AND PRESERVE THE HISTORIC INTEREST AND ITS SETTING.

WHERE RESEARCH SUGGESTS THAT HISTORIC REMAINS MAY BE PRESENT ON A DEVELOPMENT SITE PLANNING APPLICATIONS SHOULD BE SUPPORTED BY DETAILS OF AN ARCHAEOLOGICAL FIELD EVALUATION. IN SUCH CASES THE COUNCIL WILL EXPECT PROPOSALS TO PRESERVE THE HISTORIC INTEREST WITHOUT SUBSTANTIAL CHANGE.

WHERE PERMISSION IS GRANTED FOR DEVELOPMENT INVOLVING SITES CONTAINING ARCHAEOLOGICAL REMAINS THE COUNCIL WILL IMPOSE CONDITIONS OR SEEK PLANNING OBLIGATIONS TO SECURE EXCAVATION AND RECORDING OF THE REMAINS AND PUBLICATIONS OF THE RESULTS.

2.15 The Vale of Aylesbury Local Plan (VALP) 2013-2033, November 2017 proposed submission document, has been submitted to the government, with adoption intended before the end of 2018. Policy relevant to archaeology at the study site is as follows:

BE1 Heritage assets

The historic environment, unique in its character, quality and diversity across the Vale is important and will be preserved or enhanced. All development, including new buildings, alterations, extensions, changes of use and demolitions, should seek to

conserve heritage assets in a manner appropriate to their significance, including their setting, and seek enhancement wherever possible.

Proposals for development shall contribute to heritage values and local distinctiveness. Where a development proposal is likely to affect a designated heritage asset and or its setting, the significance of the heritage asset and the impact of the proposal must be fully assessed and supported in the submission of an application. Heritage statements and/or archaeological evaluations will be required for any proposals related to or impacting on a heritage asset and/or known possible archaeological site.

Proposals which affect the significance of a non-designated heritage asset should be properly considered, weighing the direct and indirect impacts upon the asset and its setting. There will be a presumption in favour of retaining heritage assets wherever practical, including archaeological remains in situ, unless it can be demonstrated that the harm will be outweighed by the benefits of the development.

The Council will:

a. Support development proposals that do not cause harm to, or which better reveal the significance of heritage assets

b. Require development proposals that cause substantial harm to, or loss of a designated heritage asset and its significance, including its setting, to provide a thorough heritage assessment setting out a clear and convincing justification as to why that harm is considered acceptable. Where that case cannot be demonstrated proposals will not be supported unless the harm or loss is necessary to achieve substantial public benefits that outweigh the harm or loss and accord with the requirements of national guidance, and

c. Require development proposals that cause less than substantial harm to a designated heritage asset to weigh the level of harm against the public benefits that may be gained by the proposal, including securing its optimum viable use.

Developments affecting a heritage asset should achieve a high quality design in accordance with adopted SPD and the Council will encourage modern, innovative design which respects and complements the heritage context in terms of scale, massing, design, detailing and use.

- 2.16 Figures 2a and 2b summarise relevant cultural heritage designations and archaeological findspot references relevant to the study site.
- 2.17 In terms of relevant nationally significant designated heritage assets, no World Heritage sites, Scheduled Monuments, Historic Battlefield or Historic Wreck sites are identified within a two kilometre radius of the study site.
- 2.18 In terms of relevant local designations, the study site does not lie within an Archaeological Notification Area as defined by the local planning authority.
- 2.19 In line with relevant planning policy and guidance, this desk based assessment seeks to clarify the study sites archaeological potential and the need or otherwise for additional mitigation measures.

3.0 GEOLOGY AND TOPOGRAPHY

Geology

- 3.1 The underlying geology of the study site is understood to comprise deposits of mudstone, primarily the Stewartby Member, with a small area of the Weymouth Member in the immediate vicinity of the Dunstyhill Farm buildings within the centre of the study site. No superficial geological deposits are recorded. A borehole derived from the British Geological Survey from the vicinity of Dunstyhill Farm buildings, within the centre of the study site dated c.1935-6 revealed deposits of yellow and blue clay. (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>).

Topography

- 3.2 Access to the farm buildings comes into the study site from the centre of the western boundary, and the road rises from c.90-91m AOD to the farm buildings which are level at c.95-101m AOD. The field within the northwestern corner of the study site is generally level at c.88-91m AOD; the land southwest of the farm rises from north to south, from c.92-94.5m AOD; the land southeast of the farm rises to a maximum of 109.6m AOD, southeast of the farm buildings, before dropping again towards the southern and eastern boundaries. The land northwest of the farm rises towards the east, from c.87-89m AOD, to c.102m AOD. The land northeast of the farm drops to the east, from c.102-c.90-91m AOD (see also Figures 16-17, and Plates 1-5).
- 3.3 Ponds are present within the southwestern part of the study site, together with a field drain alongside field boundaries west of Dunstyhill Farm (see Figure 16).

4.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND, WITH ASSESSMENT OF SIGNIFICANCE

(Including Historic Map Regression Exercise)

Timescales used in this report:

Prehistoric

Palaeolithic	450,000 -	12,000 BC
Mesolithic	12,000 -	4,000 BC
Neolithic	4,000 -	1,800 BC
Bronze Age	1,800 -	600 BC
Iron Age	600 -	AD 43

Historic

Roman	AD 43 -	410
Anglo Saxon/Early Medieval	AD 410 -	1066
Medieval	AD 1066 -	1485
Post Medieval	AD 1486 -	1749
Modern	AD 1750 -	Present

Introduction

- 4.1 This chapter reviews existing archaeological evidence for the site and the archaeological/historical background of the general area and, in accordance with NPPF, considers the potential for as yet undiscovered archaeological evidence on the site.
- 4.2 What follows is a consideration of findspots within a two kilometre radius, also referred to as the study area, held on the Buckinghamshire Historic Environment Record (HER), and the Portable Antiquities Database (PAS) together with a map regression exercise charting the history of the site from the eighteenth century until the present day.
- 4.3 Figures 2a and 2b summarise relevant cultural heritage designations and archaeological findspot references relevant to the study site.
- 4.4 In terms of relevant designated heritage assets, no World Heritage sites, Scheduled Monuments, Historic Battlefield or Historic Wreck sites are identified within the study site or its immediate vicinity. In terms of relevant local designations, the study site does not lie within an Archaeological Notification Area as defined by the local planning

authority. Figure 2b reproduces data from the HER showing the extent of ridge and furrow features, across the southwestern part of the study site, recorded in 1995.

- 4.5 In general there are very few HER and PAS entries within the study area; those present deal primarily with metal artefactual discoveries dating to the Roman and Medieval periods, identified through metal detecting, together with documentary evidence for settlement at Edgcott to the southwest, and Charndon to the northwest. Recent geophysical survey, followed by archaeological evaluation and strip, map and record excavation, to the southeast of the study site at Calvert in Charndon and Greatmoor in Grendon Underwood revealed a sequence of natural, undated, Post Medieval and Modern remains (APS 2011; MBC3315, SP69533 22749).
- 4.6 Historic Landscape Characterisation (HLC) data for the study site shows the bulk of the study site (HBC3489, TQ6841 2354) to comprise 'Enclosure (pre 18th Century irregular)' with an area of 'Parliamentary Enclosure (Divided Allotments)' within the northwestern corner (HBC3519, SP 6756 2396).
- 4.7 The walkover site visit, undertaken during the late morning and early afternoon of 28th November 2017, indicated that the ridge and furrow recorded as present around Dunstyhill Farm in 1995 (see Fig 2b) remained largely extant, although varying in quality. It was most visibly present in two areas, firstly on the slope south of the treeline running east from the farm, and secondly at the crest of the hill north of the treeline running east from the farm. The length of each of the plough lines in these areas varies as does the apparent furrow depth, and the areas have clearly been impacted by vehicular access and cattle grazing (see Fig 2b and Figures 1-5).
- 4.8 Unfortunately only the very southern edge of the study site has been subject to LiDAR survey, however it shows the presence of ridge and furrow in this area, supporting the HER data and the 2017 site visit (see Fig 18).
- 4.9 The historic map sequence demonstrates that the study site has remained open farmland throughout its documented history.
- 4.10 Chapter 5 subsequently considers the site conditions and whether the theoretical potential identified in this chapter is likely to survive.

Prehistoric: Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age

- 4.11 From around 4000 BC the mobile hunter-gathering economy of the Mesolithic gradually gave way to a more settled agriculture-based subsistence. The pace of woodland clearance to create arable and pasture-based agricultural land varied regionally and locally, depending on a wide variety of climatic, topographic, social and other factors. The trend was one of a slow, but gradually increasing pace of forest clearance.
- 4.12 By the 1st millennium, i.e. 1000 BC, the landscape was probably a mix of extensive tracts of open farmland, punctuated by earthwork burial and ceremonial monuments from distant generations, with settlements, ritual areas and defended locations reflecting an increasingly hierarchical society.
- 4.13 The sole find of prehistoric date identified within the two kilometre search radius comprises the chance find of a Neolithic or Bronze Age flint tool, in the grounds of Springhill Prison to the south of the study site (MBC14712, SP 68250 21800).
- 4.14 As such, the study site's archaeological potential for the prehistoric periods can be identified as low/unknown, with evidence of agricultural activity and land division most likely to be represented within the archaeological record.

Roman

- 4.15 The line of the A41 to the south of the study site is understood to follow the line of the Roman road from St Albans to Alchester (Margary 1955). Associated settlement evidence has been identified at Grendon Underwood and Quanton to the south and southeast of the study site (APS 2011).
- 4.16 Typical archaeological features associated with Roman roads can include evidence for settlement and occupation, roadside ditches and associated land division, together with quarry pits, burials and chance losses.
- 4.17 A find of late third/early fourth century coins in an earthen pot was found in Chaloner's Wood to the north of the study site (MBC1075, SU69300 24850; IARCH-8C294A, SP6930 2485). PAS data for the study area search radius includes two coins from the Edgcott area (MBC30204, SP6722; MBC29632, SP6622), an incomplete second century silver coin to the west (BERK-727275, SP67564 24166), and an incomplete second/third century silver coin to the southwest (BUC-929C56, SP676 227) and a mid-first century coin also to the west (SUR-98C4F2, SP67736 23747). An incomplete

brooch of first-second century date was also identified from the general area of the study site (NMGW-C9D4E0, SP6823).

- 4.18 The available evidence indicates that during the Roman period, the area of the study site lay away from known Roman activity and settlement areas. The potential of the study site itself for this period can therefore be identified as generally low/unknown.

Anglo Saxon & Medieval

- 4.19 Charndon village to the northwest of the study site is referenced in Domesday (MBC2381, SP671 244). Evidence of shrunken settlement, principally through the identification of earthworks, has been identified here (MBC7147-50, SP6709 2437).
- 4.20 The manor of Edgcott is referenced in Domesday (MBC1272, SP6800 2273; MBC2384, SP679 226). The church of St Michaels, Edgcott, southwest of the study site, has twelfth century origins (MBC7235, SP68000 22796; MBC7236, SP67999 22790).
- 4.21 The sole find of Anglo Saxon date recorded on the HER within the two kilometre study area search radius comprises a stirrup mount identified through metal detecting in the general Edgcott area to the south of the study site (MBC29633, SP67 22).
- 4.22 Evidence of Medieval activity in the form of pottery and a stone yard or path surface was identified at Hampden Row Cottages, Main Street, Charndon, northwest of the study site (MBC2500, SP67030 24194).
- 4.23 PAS data within the study area search radius comprises a Medieval coin found at Edgcott to the southwest (MBC29572, SU6722; BUC-3C3C33, SP675 225), another at Charndon to the northwest (HAMP-A64B27, SP674 247), another in fields to the west of the study site (SUR-ABD8D0, SP67622 23852), and another in the general Edgcott area (MBC29571, SP67 22).
- 4.24 During the Anglo-Saxon and Medieval periods the study site is thought to have lain away from known areas of activity and settlement. Consequently a generally low archaeological potential can be envisaged for these periods at the study site, with evidence of agricultural activity and land division, such as the extant ridge and furrow, most likely to be represented within the archaeological record.

Post Medieval and Modern (including map regression exercise)

- 4.25 Early maps show the study site to lie in open land with the farm at Dunsty Hill named within the central area (Fig 3: 1770 Jeffrey's Map of Buckinghamshire). The 1813-14 Ordnance Survey Drawing (Fig 4) shows the study site unchanged but in more detail than the previous map; Bryant's Map of 1824 (Fig 5) shows no significant changes within the study site.
- 4.26 The First Edition Ordnance Survey (Fig 6: 1885) shows the study site remaining as open farmland, with the buildings of Dunstyhill Farm on Dunsty Hill towards the centre. The Second Edition Ordnance Survey (Fig 7: 1900) shows minor alterations to the buildings of Dunstyhill Farm, but otherwise no significant changes. The 1938 Revised Ordnance Survey (Fig 8) shows no significant changes within the study site itself.
- 4.27 The 1947 aerial photograph (Fig 9), together with Ordnance Surveys dated 1952 and 1958 (Figs 10-11) again shows no significant change within the study site.
- 4.28 The 1984 Ordnance Survey (Fig 12) shows that further buildings have been added to the Dunstyhill Farm complex towards the centre of the study site.
- 4.29 The 1999 Ordnance Survey (Fig 13) shows further minor alterations to the Dunsty Hill farm buildings; no significant changes are shown within the study site on the 2003 aerial photograph (Fig 14).
- 4.30 No significant changes are shown within the study site either on the 2006 Ordnance Survey (Fig 15), the 2017 Ordnance Survey or the 2017 aerial photograph (Figures 16-17).
- 4.31 The archaeological potential of the study site for the Post Medieval and Modern periods is considered likely to be concentrated around Dunstyhill Farm, together with the areas of extant ridge and furrow.

Negative & Neutral Evidence

- 4.32 To the northwest, evaluation at the Gables, Charndon, revealed negative results save for demolition rubble associated with a former building (EBC16085, SP6725 2480; MBC2248, SP6723 2480). To the southwest, monitoring at the Church of St Michael and All Angels revealed negative results (EBC16084, SP6800 2280).

Assessment of Significance (Designated Heritage Assets)

- 4.33 Existing national policy guidance for archaeology (the NPPF as referenced above in section 2) enshrines the concept of the ‘significance’ of heritage assets. Significance as defined in the NPPF centres on the value of an archaeological or historic asset for its ‘heritage interest’ to this or future generations.
- 4.34 No relevant nationally significant designated heritage assets as defined in the NPPF are recorded within the 2km study area search radius around the study site.

Assessment of Significance (Non-Designated Assets)

- 4.36 In terms of relevant local designations, the study site does not lie within an Archaeological Notification Area as defined by the local planning authority.
- 4.37 As identified by desk based work, archaeological potential by period and the likely significance of any archaeological remains which may be present is summarised in table form below:

Period:	Identified Archaeological Potential and Significance:
Palaeolithic	Low/unknown archaeological potential, low/moderate (local/regional) significance
Mesolithic	Low/unknown archaeological potential, low/moderate (local/regional) significance
Neolithic	Low/unknown archaeological potential, low/moderate (local/regional) significance
Bronze Age	Low/unknown archaeological potential, low/moderate (local/regional) significance
Iron Age	Low/unknown archaeological potential, low/moderate (local/regional) significance
Roman	Low/unknown archaeological potential, low/moderate (local/regional) significance
Anglo-Saxon	Low/moderate archaeological potential, low/moderate (local/regional) significance
Medieval	Low/moderate archaeological potential, low/moderate (local/regional) significance
Post Medieval	Low/moderate archaeological potential, low/moderate (local/regional) significance
Modern	Low archaeological potential, low (local) significance

5.0 SITE CONDITIONS AND THE PROPOSED DEVELOPMENT

(Likely Impact upon Heritage Assets)

Site Conditions

- 5.1 The study site currently comprises open farmland with the buildings of Dunstyhill Farm towards the centre (see Figures 16-18 and Plates 1-5).
- 5.2 The evolution of the Dunstyhill Farm complex can be considered likely to have had a negative archaeological impact through the construction and demolition of phases of buildings, focussed primarily within building footprints.
- 5.3 Relevant agricultural/horticultural use of the study site can be considered likely to have had a moderate, widespread negative archaeological impact.

The Proposed Development

- 5.4 Proposals include the mixed use redevelopment of the study site, primarily residential, educational facilities and sheltered accommodation, with associated areas of landscaping.
- 5.5 The current masterplan proposal is reproduced in plan form at Figure 19.

Review of potential development upon Heritage Assets

- 5.6 Within the study site, the extent and nature of archaeological survival will necessarily depend upon the extent and nature of past post-depositional impacts as a result of development since deposition.
- 5.7 In terms of relevant nationally significant designated heritage assets, no World Heritage sites, Scheduled Monuments, Historic Battlefield or Historic Wreck sites are identified within the study site or its immediate vicinity.
- 5.8 In view of the study site's perceived low/unknown archaeological potential, and the perceived local/regional significance of that potential, the redevelopment proposals are considered unlikely to have a significant or widespread negative archaeological impact.
- 5.9 However, as the bulk of the study site has remained largely unaffected by previous development throughout its documented history, it is envisaged that the

Buckinghamshire County Council Archaeological Service will require further archaeological mitigation measures in advance of any construction impacts within this area.

6.0 SUMMARY AND CONCLUSIONS

- 6.1 Land at Dunstyhill Farm, Calvert Green, Buckinghamshire has been reviewed for its below ground archaeological potential.
- 6.2 In accordance with relevant government planning policy and guidance, a desk based assessment has been undertaken to clarify the archaeological potential of the study area.
- 6.3 In terms of relevant nationally significant designated heritage assets, no World Heritage sites, Scheduled Monuments, Historic Battlefield or Historic Wreck sites are identified within the study site or its immediate vicinity.
- 6.4 The study site does not lie within an area of designated, identified archaeological potential.
- 6.5 The study site can be considered likely to have a low/unknown archaeological potential for most past periods of human activity. Evidence of ridge and furrow is visible in two areas within the study site, firstly on the slope south of the treeline running east from the farm, and secondly at the crest of the hill north of the treeline running east from the farm.
- 6.6 The bulk of the study site has remained undeveloped farmland throughout its documented history.
- 6.7 Proposals include the mixed use development of the study site.
- 6.8 The following archaeological mitigation requirements are anticipated to be required prior to construction impacts:
1. Further review of ridge and furrow and historic field boundaries;
 2. Non-intrusive geophysical survey;
 3. Archaeological trial trench evaluation, guided by the results of items 1 and 2;
 4. Further archaeological mitigation (likely to include strip, map and sample excavation, and/or monitoring) guided by the results of items 1-3.

SOURCES CONSULTED

1. **General**

British Library
Buckinghamshire Historic Environment Record
Buckinghamshire Record Office
Portable Antiquities Database

2. **Internet**

<http://archaeologydataservice.ac.uk>
<http://www.britainfromabove.org.uk/>
<http://www.british-history.ac.uk/>
<https://finds.org.uk/database/>
<https://www.historicengland.org.uk/listing/the-list>
<https://opendomesday.org.uk>
<http://www.pastscape.org.uk>
<http://planningguidance.planningportal.gov.uk>

3. **Bibliographic**

Archaeological Project Services *Archaeological Evaluation of Land at Calvert in Clandon and Greatmoor in Grendon Underwood, Buckinghamshire* October 2011 unpublished document

Buckinghamshire County Archaeological Service *Generic Brief for an Historic Environment Assessment and Walk over Survey* n/d unpublished document

Buckinghamshire County Museums *Gazetteer of Buckinghamshire Brickyards* 1980

Chartered Institute for Archaeologists *Standard and Guidance for historic environment desk-based assessment* September 2017 unpublished document

Department of Communities and Local Government *National Planning Policy Framework* 2012 (updated July 2018)

Harley *Ordnance Survey Maps a Descriptive Manual* 1975

Hillier *Clay that Burns A History of the Fletton Brick Industry* 1981

Historic England (formerly English Heritage) *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* 2008

Historic England *Historic Environment Good Practice Advice in Planning: 1 The Historic Environment in Local Plans* July 2015 unpublished document

Historic England *Historic Environment Good Practice Advice in Planning: 2 Managing Significance in Decision-Taking in the Historic Environment* July 2015 unpublished document

Historic England *Historic Environment Good Practice Advice in Planning: 3 The Setting of Heritage Assets* December 2017 unpublished document

Margary *Roman Roads in Britain* 1955

Mills *A Dictionary of British Place Names* 2011

Pevsner & Williamson *Buildings of England Buckinghamshire* 1994

Sheahan *History and Topography of Buckinghamshire* 1862/1971

4. **Cartographic**

1770 Jeffrey's Map of Buckinghamshire

1813-14 Ordnance Survey Drawing

1824 Bryant's Map of Buckinghamshire

1880 Ordnance Survey 25inch

1885 Ordnance Survey 6inch

1899 Ordnance Survey 25inch

1900 Ordnance Survey 1:10560

1938 Ordnance Survey 6inch

1952 Ordnance Survey 1:10560

1958 Ordnance Survey 1:10000

1980 Ordnance Survey 1:2500

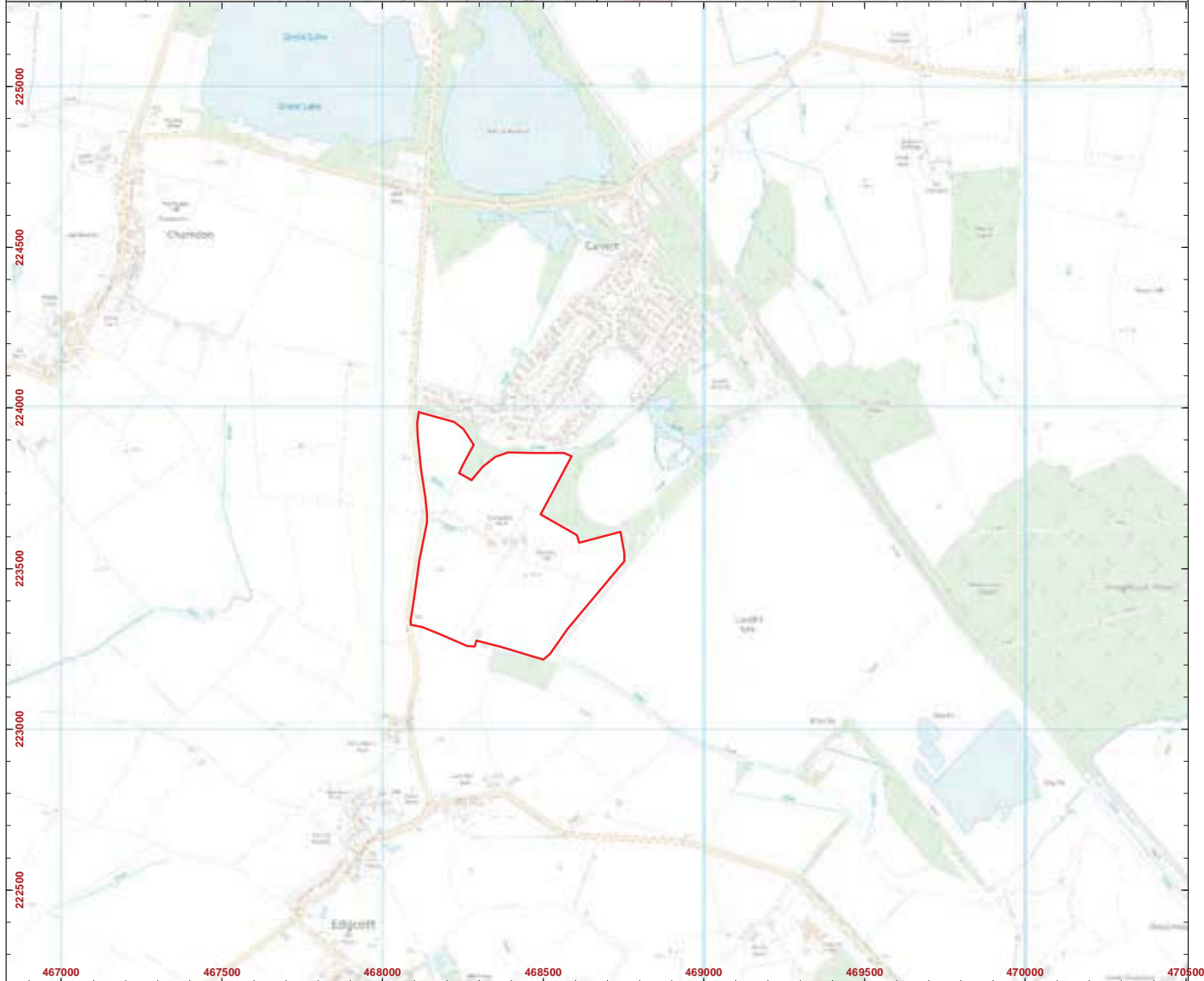
1984 Ordnance Survey 1:10000

1993 Ordnance Survey 1:2500

1999 Ordnance Survey 1:10000

2006 Ordnance Survey 1:10000

2017 Ordnance Survey 1:10000

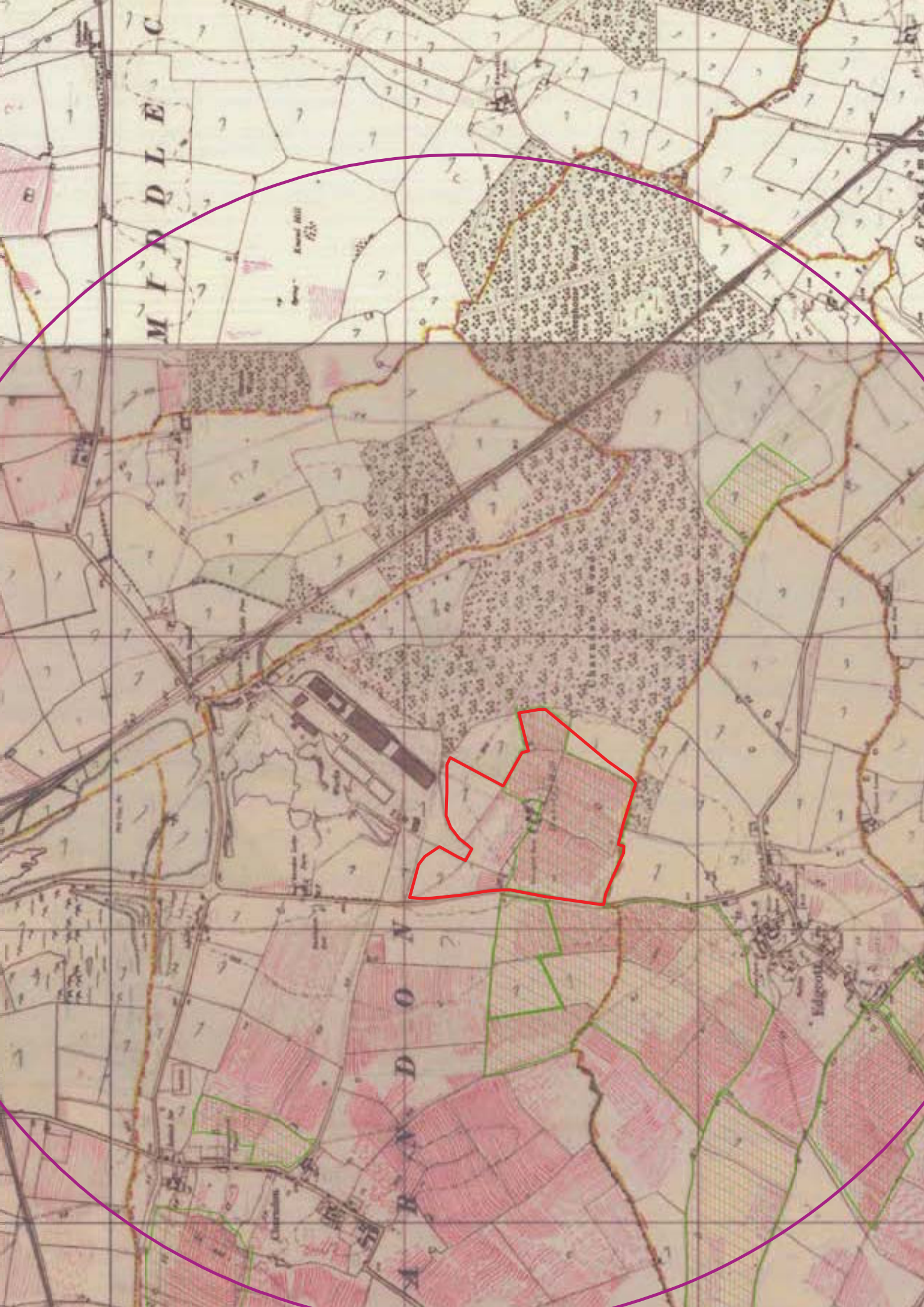


Site Boundary



Scale at A4: 1:20,000
0 500m

Figure 1:
Site Location



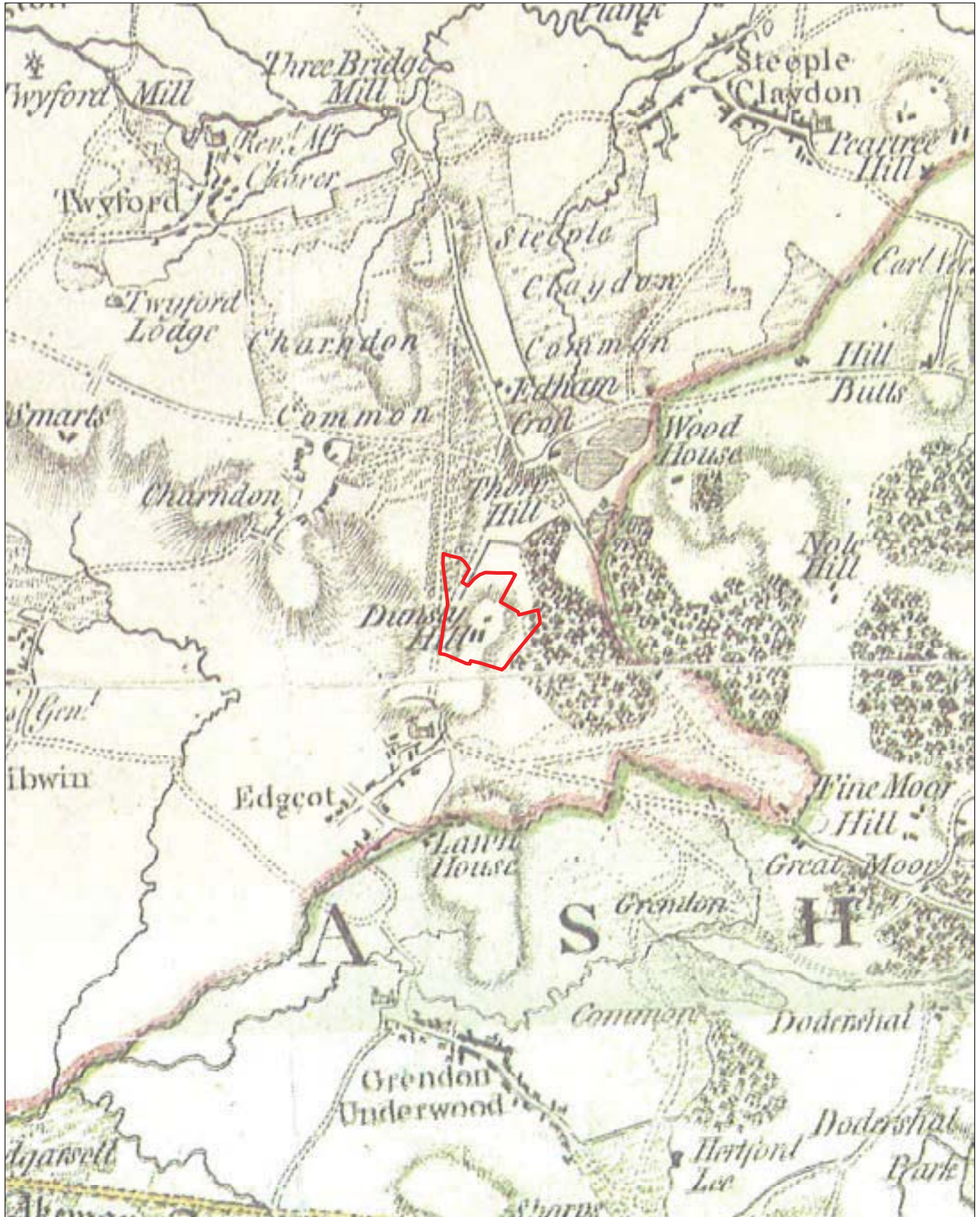
MIDDLEBURY

BRANDON

Small Mill

Charter Oak Wood

Edgcomb



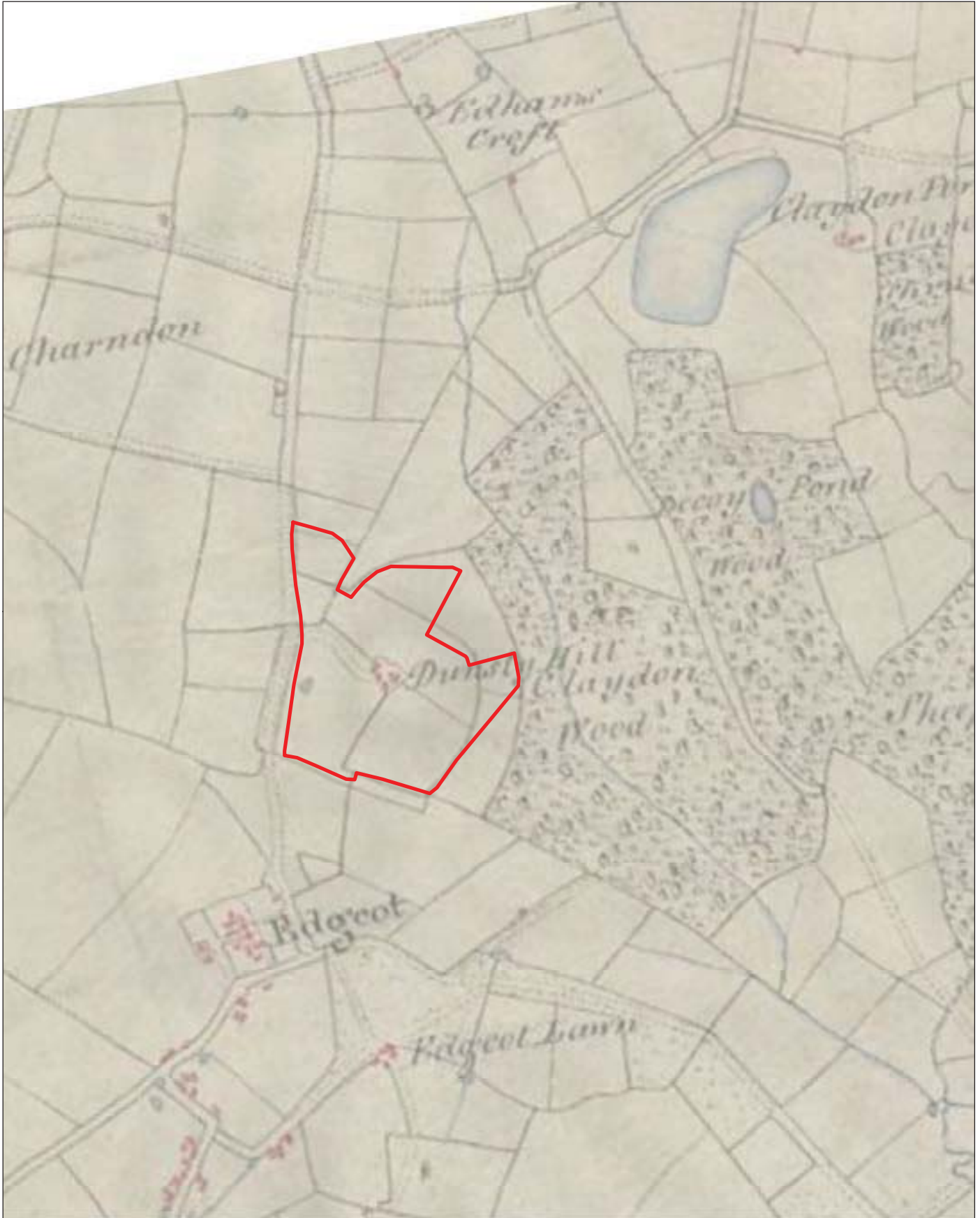
 Approximate Site Location



Scale at A4: 1:35,000



Figure 3:
1770 Jeffrey's Map of
Buckinghamshire



 Approximate Site Location




Scale at A4: 1:15,000



Figure 4:
1813-14 Ordnance
Survey Drawing



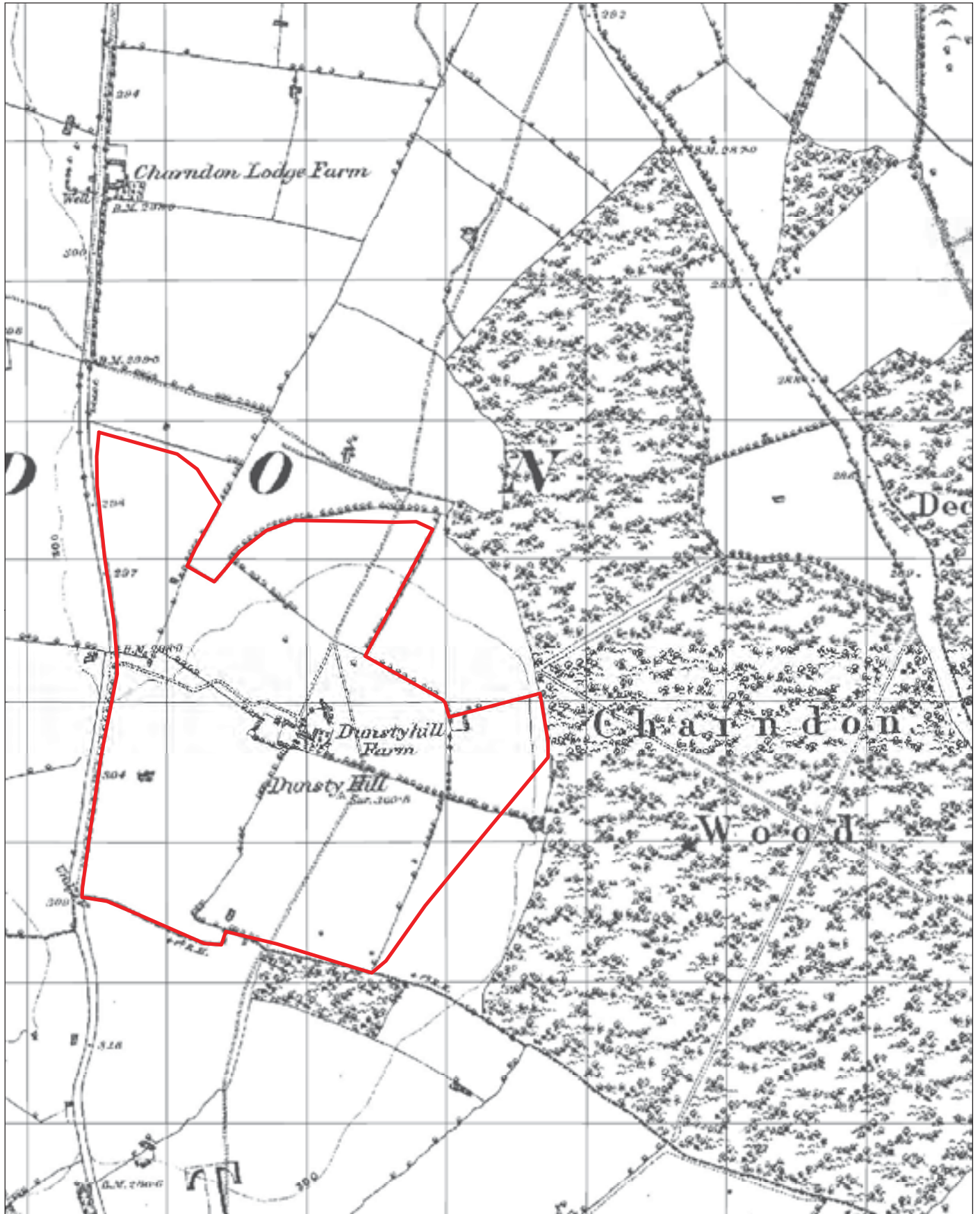
 Approximate Site Location



Scale at A4: 1:25,000



Figure 5:
1824 Bryant's Map of
Buckinghamshire



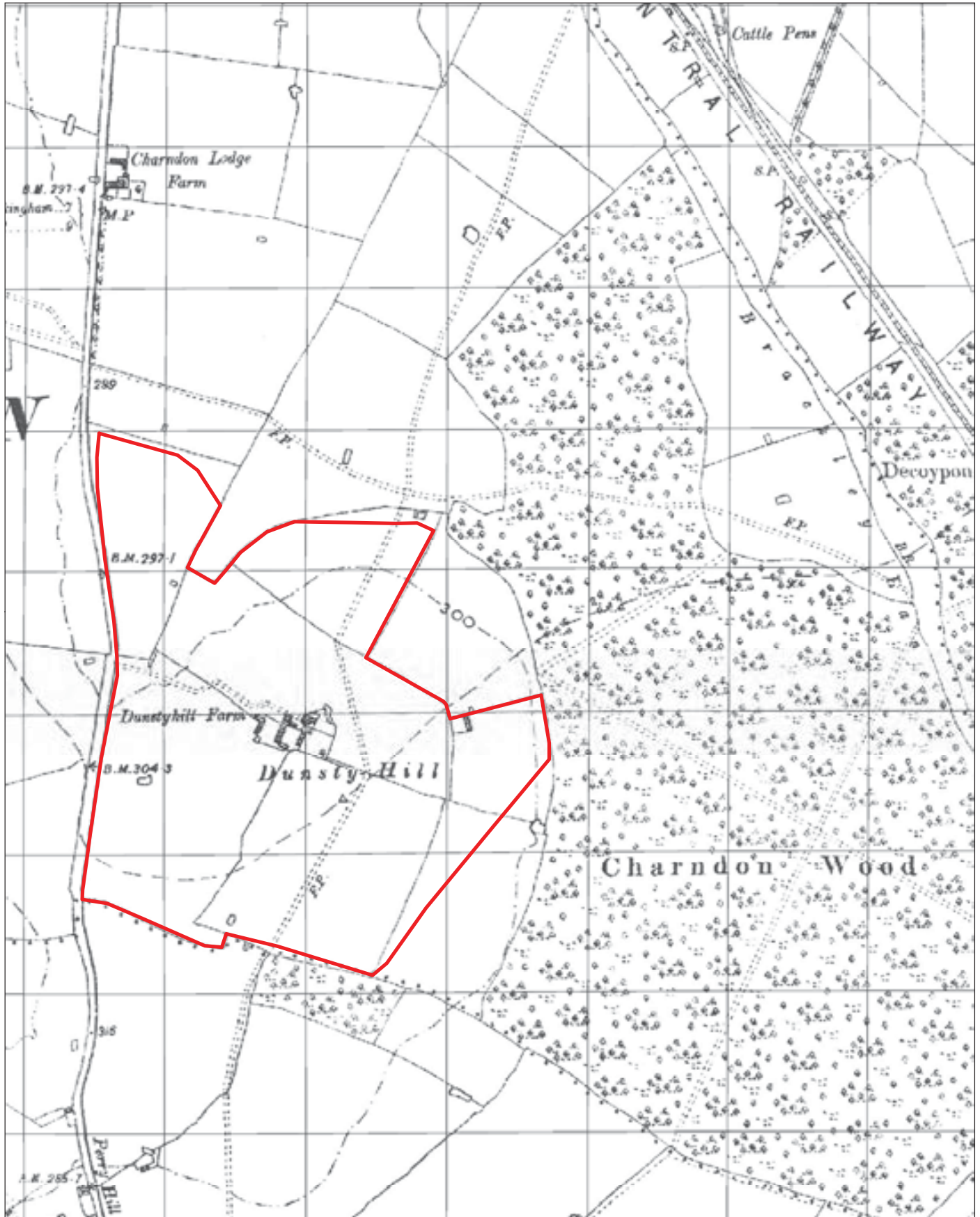
 Site Boundary



Scale at A4: 1:7,500



Figure 6:
1885 Ordnance Survey



 Site Boundary



Scale at A4: 1:7,500



Figure 7:
1900 Ordnance Survey



Site Boundary




Scale at A4: 1:7,500



Figure 8:
1938 Ordnance Survey



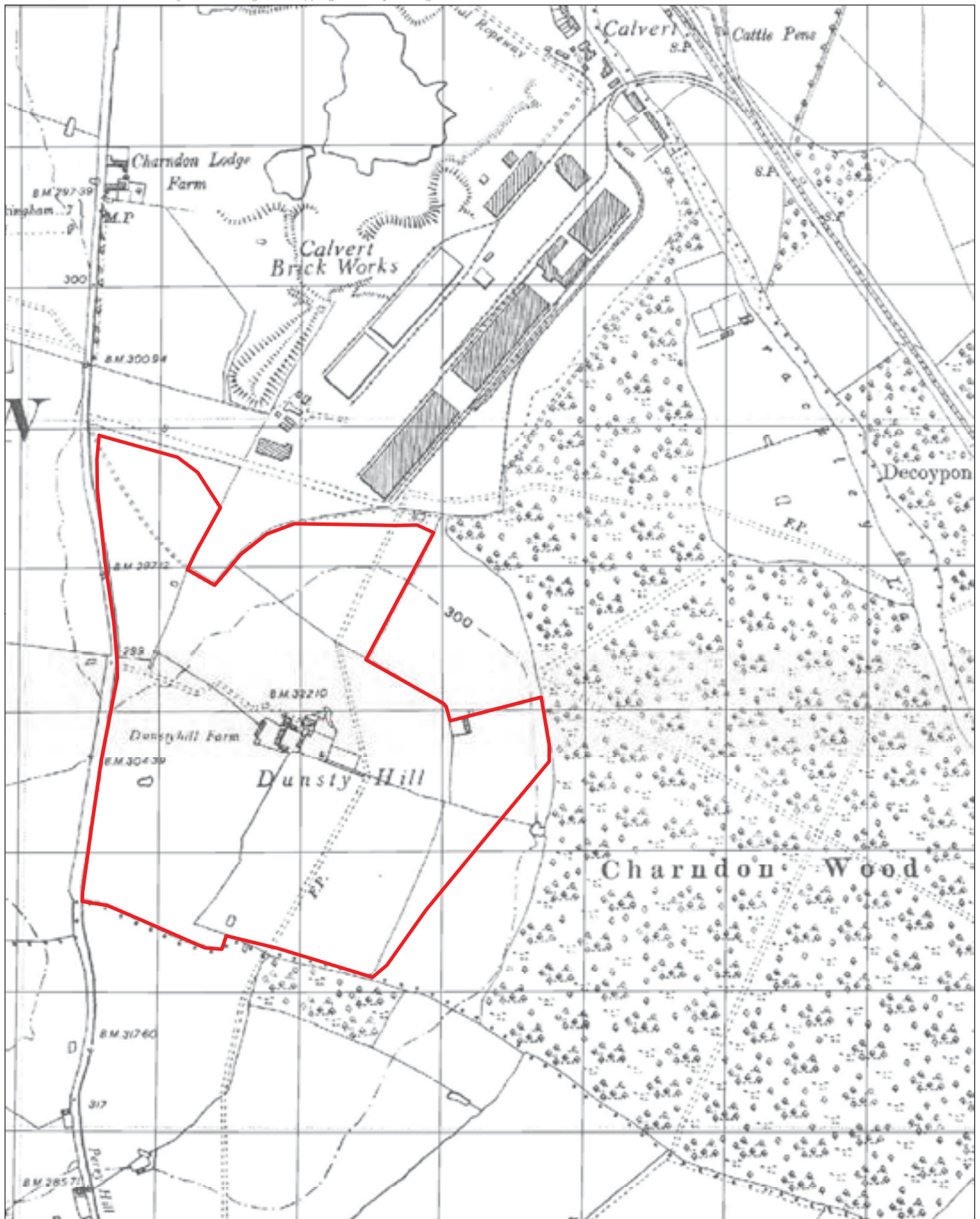
 Site Boundary



Scale at A4: 1:7,500



Figure 9:
1947 aerial photograph



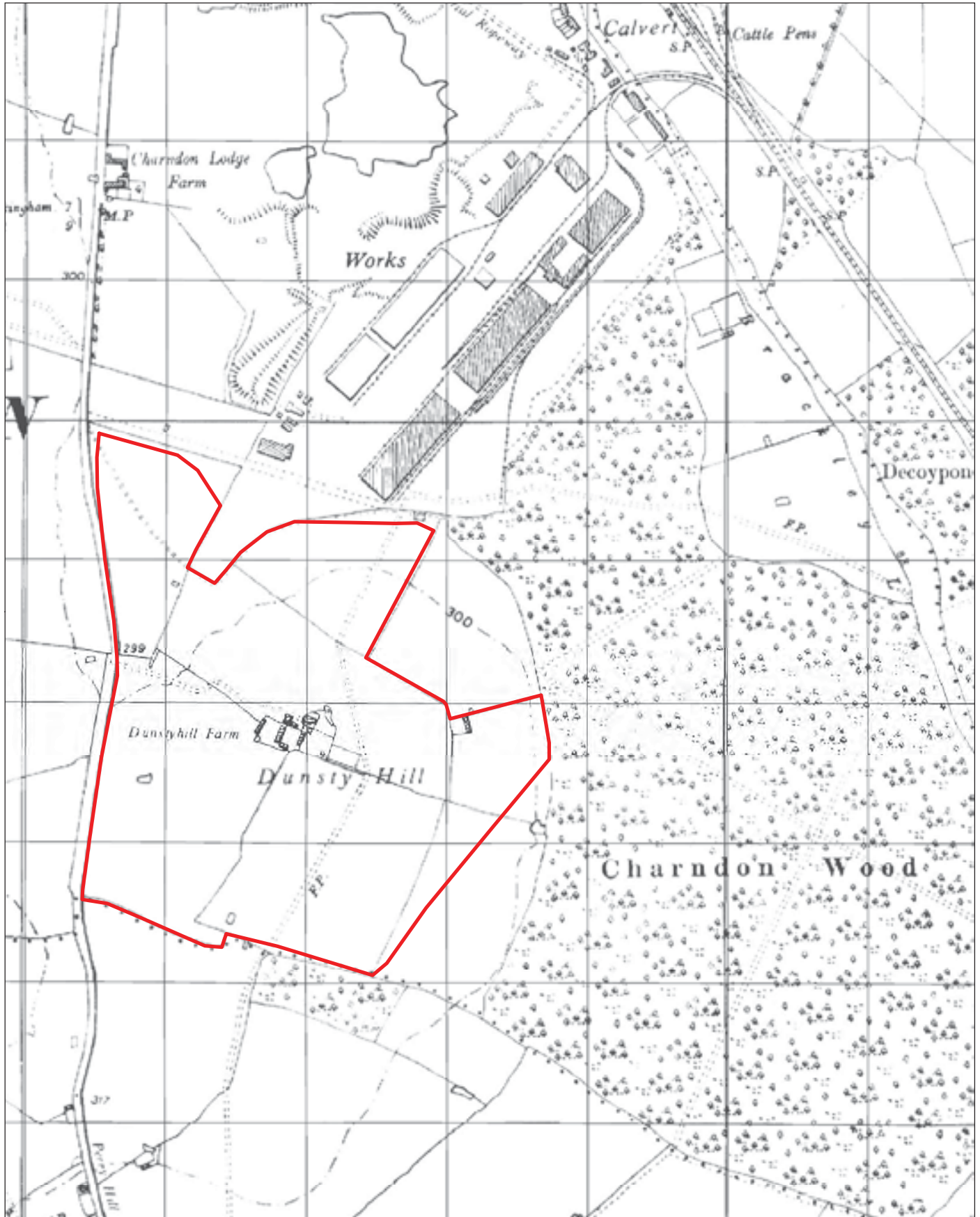
 Site Boundary



Scale at A4: 1:7,500



Figure 10:
1952 Ordnance Survey



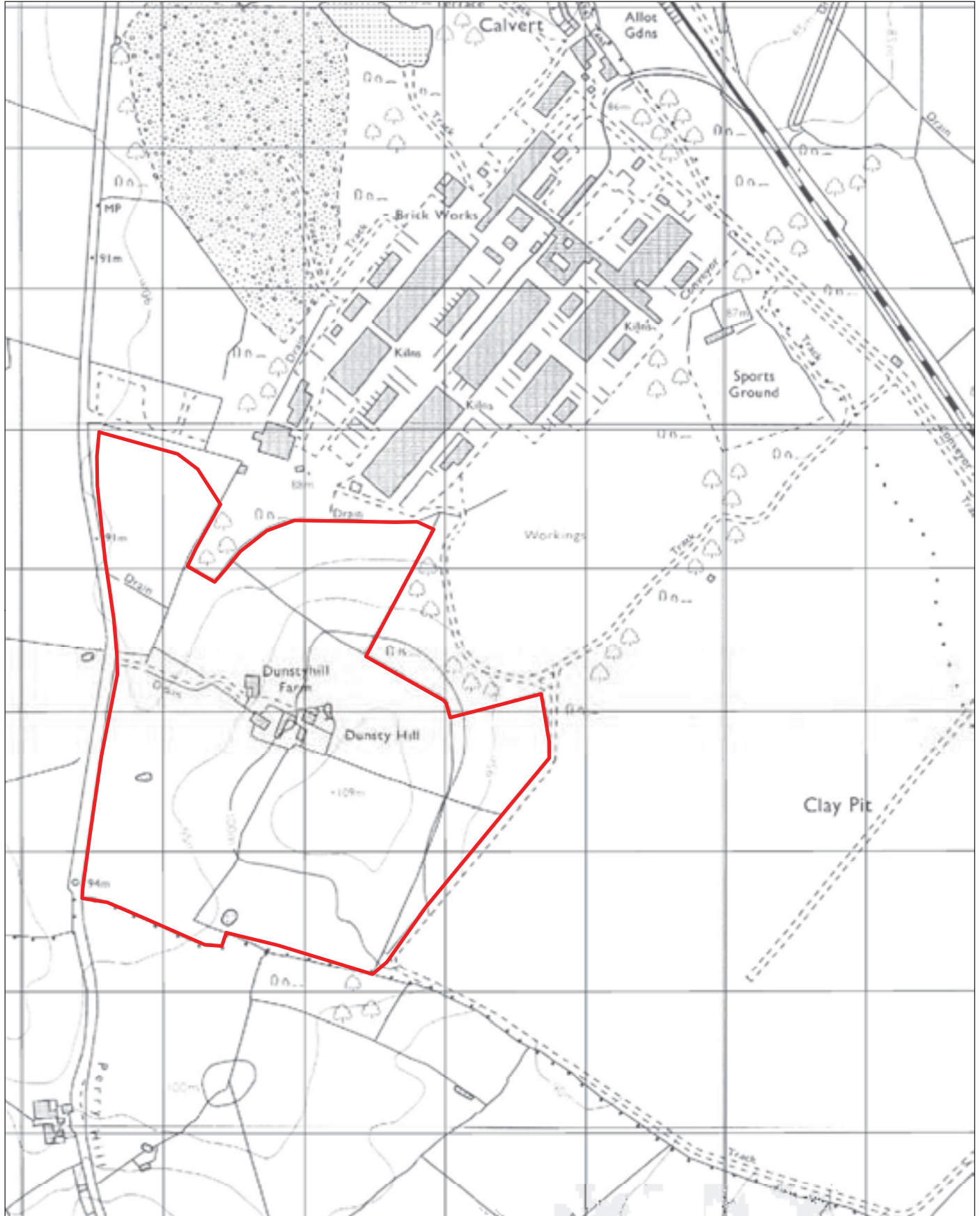
 Site Boundary



Scale at A4: 1:7,500



Figure 11:
1958 Ordnance Survey



 Site Boundary



Scale at A4: 1:7,500



Figure 12:
1984 Ordnance Survey



Site Boundary



Scale at A4: 1:7,500



Figure 13:
1999 Ordnance Survey



 Site Boundary



Scale at A4: 1:7,500



Figure 14:
2003 aerial photograph



 Site Boundary



Scale at A4: 1:7,500



Figure 15:
2006 Ordnance Survey



Site Boundary



Scale at A4: 1:7,500



Figure 16:
2017 Ordnance Survey



 Site Boundary



Scale at A4: 1:7,500



Figure 17:
2018 aerial photograph



De

Track

Sports Ground

Pav

Drain

Track

SA KOSTONIE CLOSE

GOYSWOLD WAY

TURDOON CLOSE

NEW CLOSE

Drain

Dunsty Hill

Dunstyhill Farm

100m

Drain

Drain

90m

90m



Site Boundary



0 100 m

1:5,000 at A4

Figure 19: Development Proposals

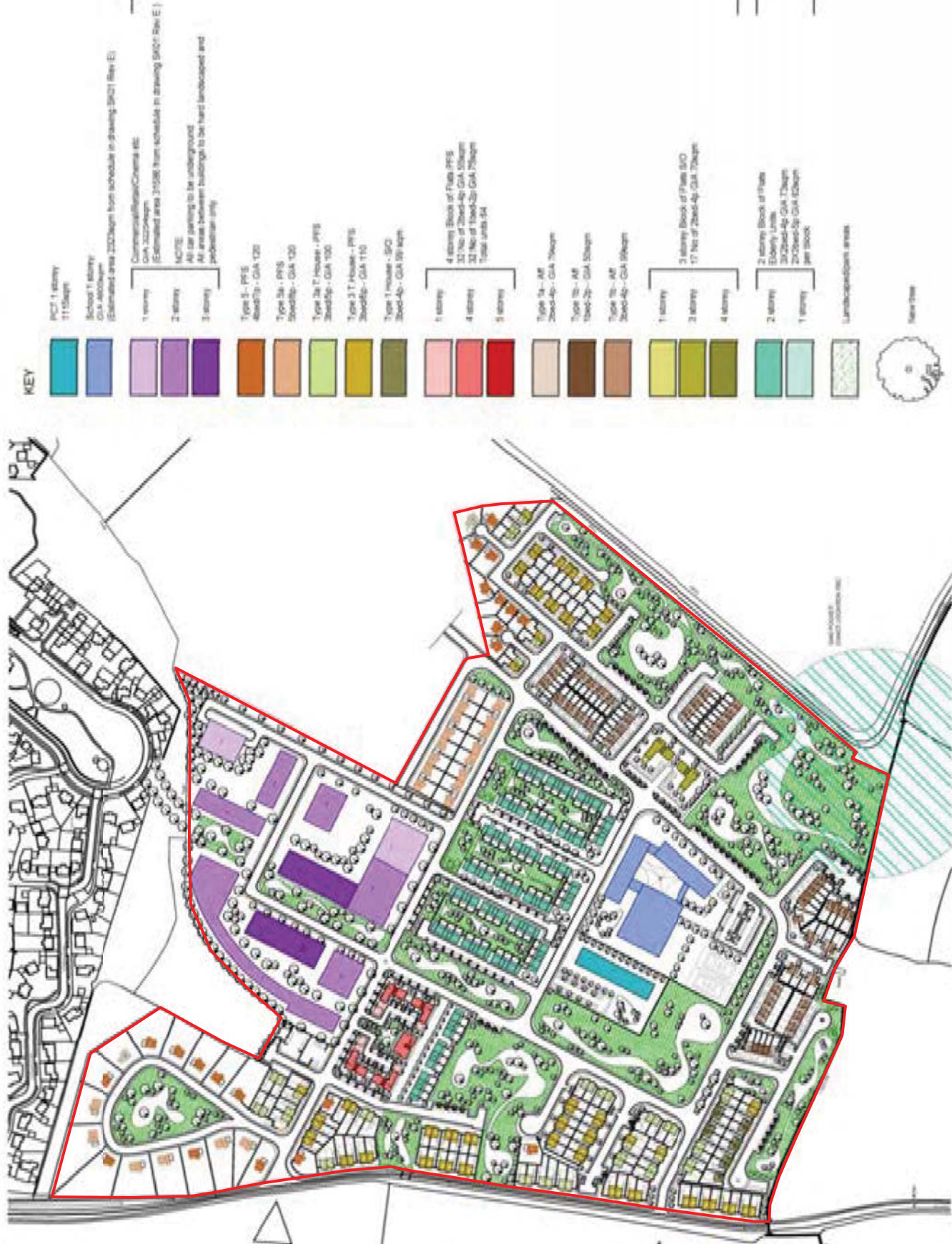




Plate 1: 2017 evidence of ridge and furrow southeast of Dunstyhill Farm



Plate 2: 2017 evidence of ridge and furrow northeast of Dunstyhill Farm



Plate 3: 2017 view west along the southern boundary of the study site



Plate 4: 2017 view from southwestern corner towards Dunstyhill Farm



Plate 5: 2017 view across fields northwest of Dunstyhill Farm

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