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Urban & Renewables

Glint and Glare Receptor Scoping Assessment

JBM Solar Developments Limited

Peartree Hill

April 2024

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ADMINISTRATION PAGE

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Issue	Date	Detail of Changes
1	5th April 2024	Initial issue

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1 INTRODUCTION

1.1 Overview

This receptor scoping report presents all the identified receptors such as aerodromes, dwellings, and roads, which will be taken forward for the full technical glint and glare assessment, for the proposed 'Peartree Hill' solar development. A report has therefore been produced that contains the following:

- Presentation of indicative Solar Photovoltaic (PV) module areas;
- Explanation of glint and glare;
- Overview of relevant guidance;
- Overview of relevant studies;
- Identification of receptors:
    - Licensed and unlicensed aerodromes (Air Traffic Control Towers and approach paths);
    - Road receptors;
    - Dwelling receptors.

1.2 Pager Power's Experience

Pager Power has undertaken over 1,300 Glint and Glare assessments internationally. The studies have included assessment of civil and military aerodromes, railway infrastructure and other ground-based receptors including roads and dwellings.

1.3 Glint and Glare Definition

The definition of glint and glare is as follows[1]:

- Glint – a momentary flash of bright light typically received by moving receptors or from moving reflectors.
- Glare – a continuous source of bright light typically received by static receptors or from large reflective surfaces.

The term 'solar reflection' is used in this report to refer to both reflection types.

[1] These definitions are aligned with those presented within the National Policy Statement for Renewable Energy Infrastructure (EN-3) – published by the Department for Business, Energy & Industrial Strategy in November 2023, and with the Federal Aviation Administration in the USA.

2 PROPOSED DEVELOPMENT LOCATION AND DETAILS

2.1 Site Area Layout Plan

The illustrative masterplan for the Proposed Development is shown in Figure 2[2] on the following page. The green coloured hatched areas represent the areas where solar PV modules will be located. These have been extrapolated and overlaid onto aerial imagery in Figure 1 below.

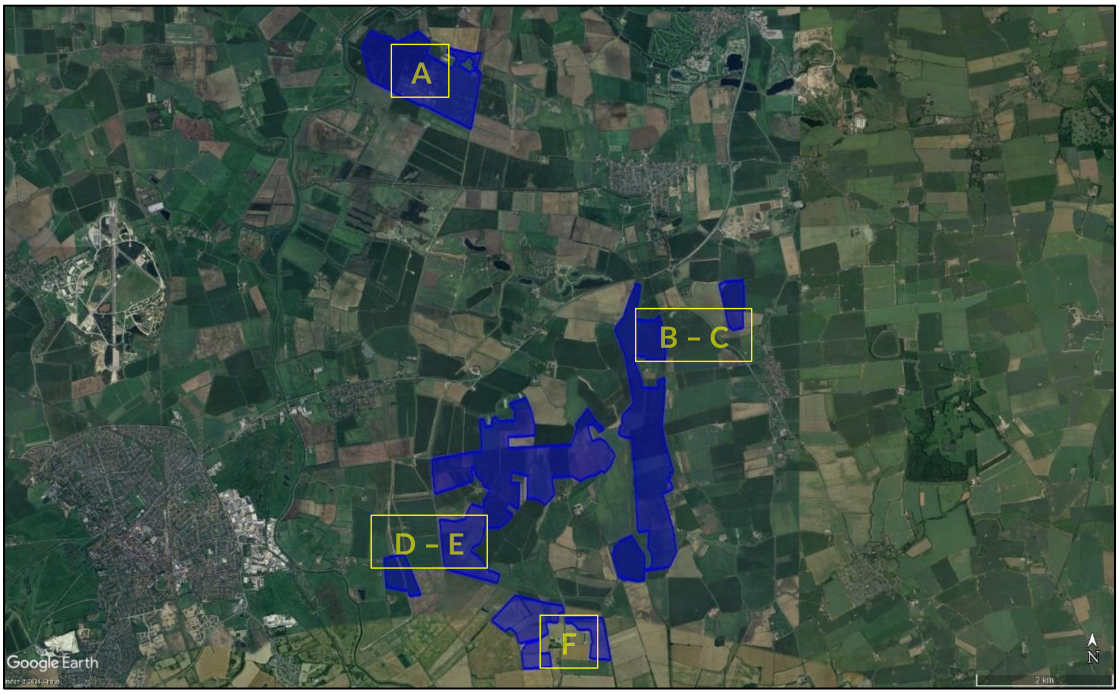

Figure 1 *Panel Areas – aerial image*

[2] Source: Peartree Stage 2 Illustrative Masterplan 2024-02-27

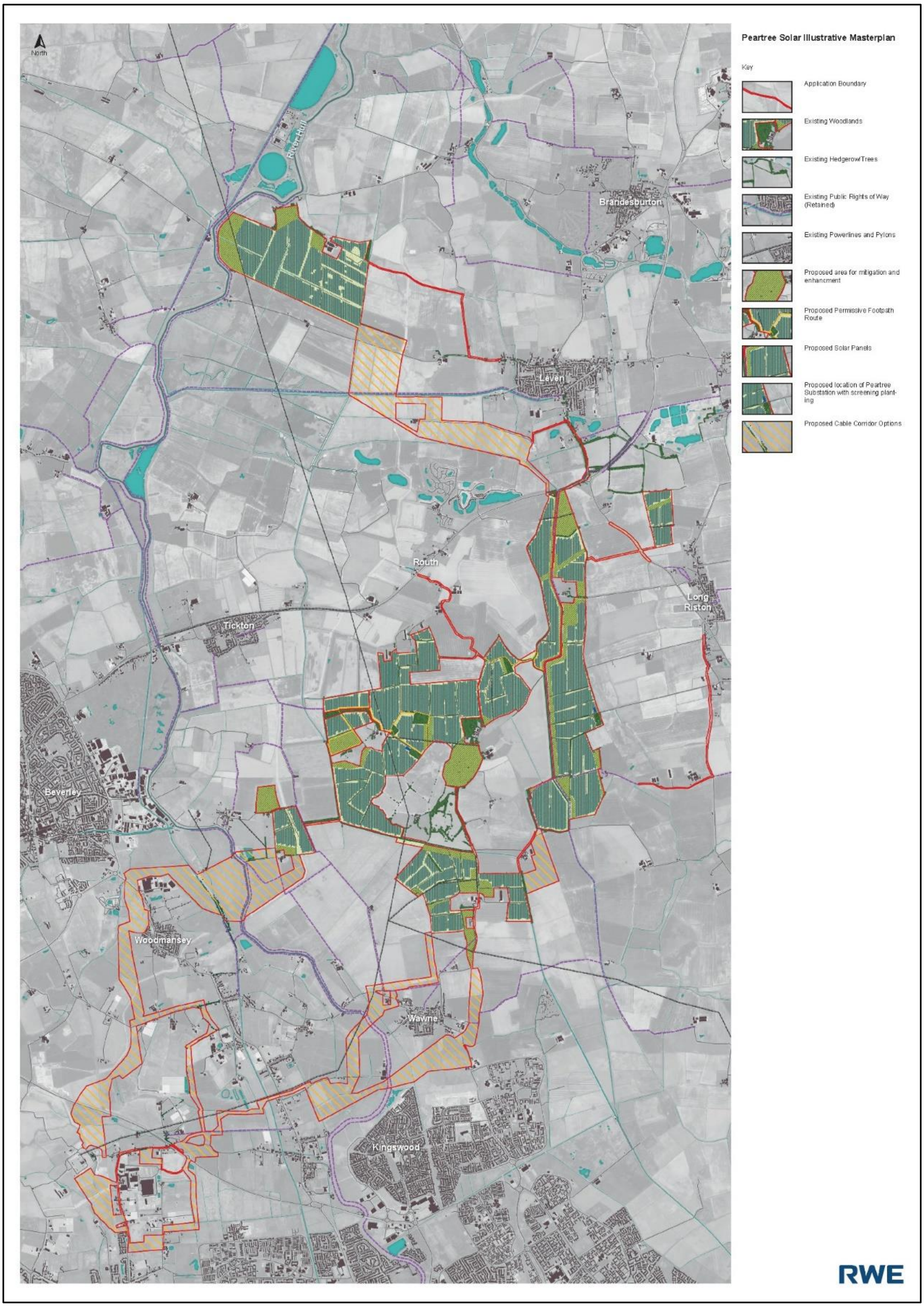

Figure 2 *Peartree Solar Illustrative Masterplan*

3 IDENTIFICATION OF AVIATION RECEPTORS

3.1 Overview of Aviation Receptors

Three active airfields have been identified for the assessment; these are Beverley Airfield, Hill Farm Airfield, and Burton-Constable Airfield. The locations of these airfields relative to the proposed development are shown in Figure 4 on page 11.

Terrain data has been interpolated based on Ordnance Survey 50 Digital Terrain Model (DTM) data. Receptor details can be found in Appendix A.

3.2 Airfield Information

3.2.1 Beverley Airfield

Beverley Airfield is an unlicensed general aviation aerodrome operated by Hull Aero Club, and understood not to have an Air Traffic Control (ATC) Tower. It has one operational runway, the details[3] of which are presented below:

- 12/30 measuring 710 metres by 30 metres (grass).

Beverley Airfield is located immediately south of panel cluster A within the proposed development.

3.2.2 Hill Farm Airfield

Hill Farm Airfield is an unlicensed general aviation aerodrome and understood not to have an ATC Tower. It has one operational runway, the details[4] of which are presented below:

- 18/36 measuring 500 metres by 45 metres (grass).

Hill Farm Airfield is located approximately 6.5km east of panel cluster C within the proposed development.

3.2.3 Burton-Constable Airfield

Burton-Constable Airfield is an unlicensed general aviation aerodrome and understood not to have an ATC Tower. It has one operational runway, the details[4] of which are presented below:

- 16/34 measuring 940 metres by 50 metres (grass).

Burton-Constable Airfield is located approximately 8.5km south-east of panel cluster C within the proposed development.

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[3] Source: Pooley's Flight Guide 2024

[4] Approximated from aerial imagery

3.3 Aviation Receptors – Runway Approach Path and Visual Circuits

The three airfields identified for assessment are general aviation (GA) airfields where aviation activity is dynamic and does not necessarily follow the typical approaches / flight paths of a larger licensed aerodrome or airport. It is not possible to assess every single location of airspace that an aircraft travels in flight around an aerodrome; however, it is possible to assess the most frequently flown flight paths and the most critical stages of flight, which would cover most, or all, of the relevant locations.

As such, Pager Power's methodology is to assess whether a solar reflection can be experienced on the following characteristics:

- 1-mile approach path with a splay angle of 5 degrees, considering 2.5 degrees either side of the extended runway centreline;
- A descent angle of 5 degrees;
- Circuit width of 1 nautical mile from runway centreline;
- Maximum altitude of 500 feet above the average threshold altitude.

Figure 3 below illustrates the typical splayed approach and final sections of the visual circuits.

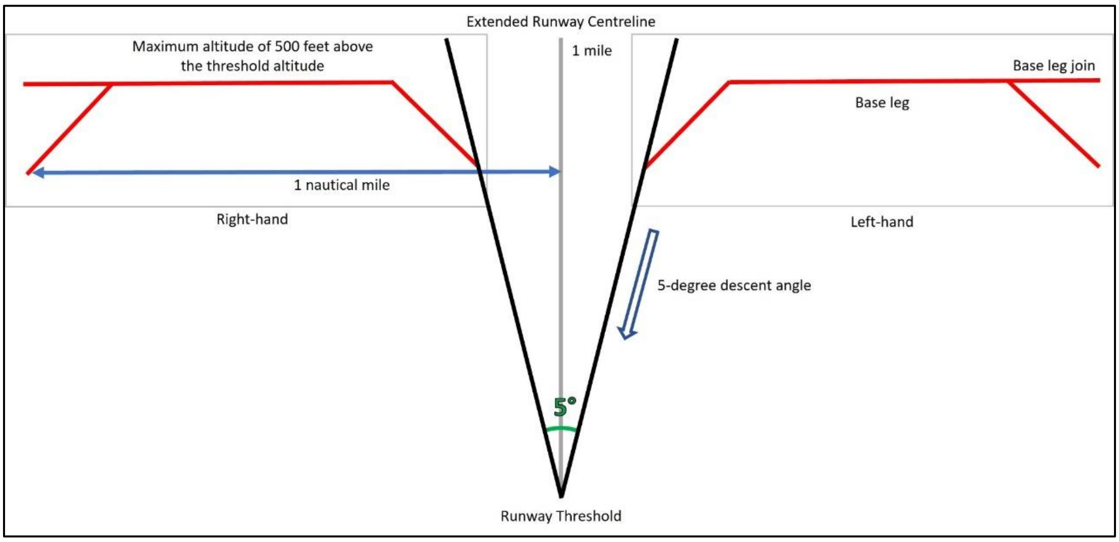

Figure 3 *Splayed approach and final sections of visual circuits*

Figure 4 on the following page shows the proposed aircraft receptor points of the splayed approach and final sections of the visual circuits.

Full technical modelling of aviation receptors associated with these three airfields will be required for all Solar PV modules.

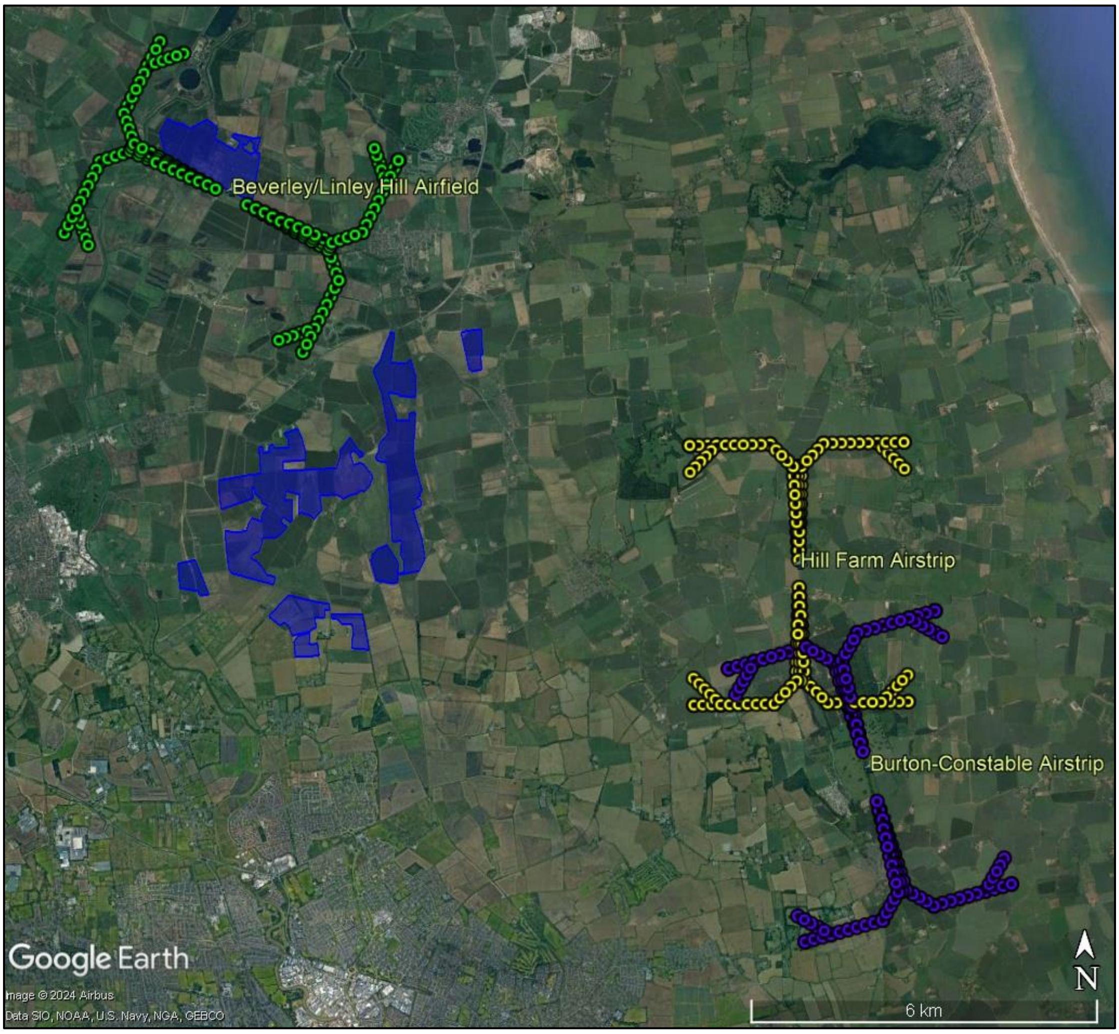

Figure 4 *Identified aerodromes and associated receptors – aerial image*

4 IDENTIFICATION OF GROUND-BASED RECEPTORS

4.1 Overview

There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. From a technical perspective, there is no maximum distance for potential reflections. The significance of a reflection, however, decreases with distance because the proportion of an observer's field of vision that is taken up by the reflecting area diminishes as the separation distance increases. Terrain and shielding by vegetation are also more likely to obstruct an observer's view at longer distances.

The above parameters and extensive experience over a significant number of glint and glare assessments undertaken show that consideration of receptors within 1km of solar PV module areas is appropriate for glint and glare effects on roads and dwellings. Therefore, the study area has been designed accordingly (red outlined areas on the proceeding figures).

Potential receptors are identified based on mapping and aerial photography of the region. The initial judgement is made based on a high-level consideration of aerial photography and mapping i.e. receptors are excluded if it is clear from the outset that no visibility would be possible. A more detailed assessment is made if the modelling reveals a reflection would be geometrically possible.

4.2 Road Receptors

4.2.1 Overview

Road types can generally be categorised as:

- Major National – Typically a road with a minimum of two carriageways with a maximum speed limit of up to 70mph. These roads typically have fast-moving vehicles with busy traffic.
- National – Typically a road with a one or more carriageways with a maximum speed limit of up to 60mph or 70mph. These roads typically have fast-moving vehicles with moderate to busy traffic density.
- Regional – Typically a single carriageway with a maximum speed limit of up to 60mph. The speed of vehicles will vary with a typical traffic density of low to moderate.
- Local - Typically roads and lanes with the lowest traffic densities. Speed limits vary.

Technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the proposed development that are experienced by a road user along a local road would be considered low impact in the worst case in accordance with the guidance presented in Appendix D. The analysis has considered any major national, national, and regional roads that:

- Are within the one-kilometre study area; and
- Have a potential view of the panels.

4.2.2 Identification

86 receptors have been identified distanced circa 100m apart across three road sections:

- A1035 (road receptors 1 to 20);
- A1035 (road receptors 21 to 53);
- Beverley Road/A165 (road receptors 54 to 86).

These are shown in Figure 5 below and in more detail in Figures 6 to 8 on the following pages.

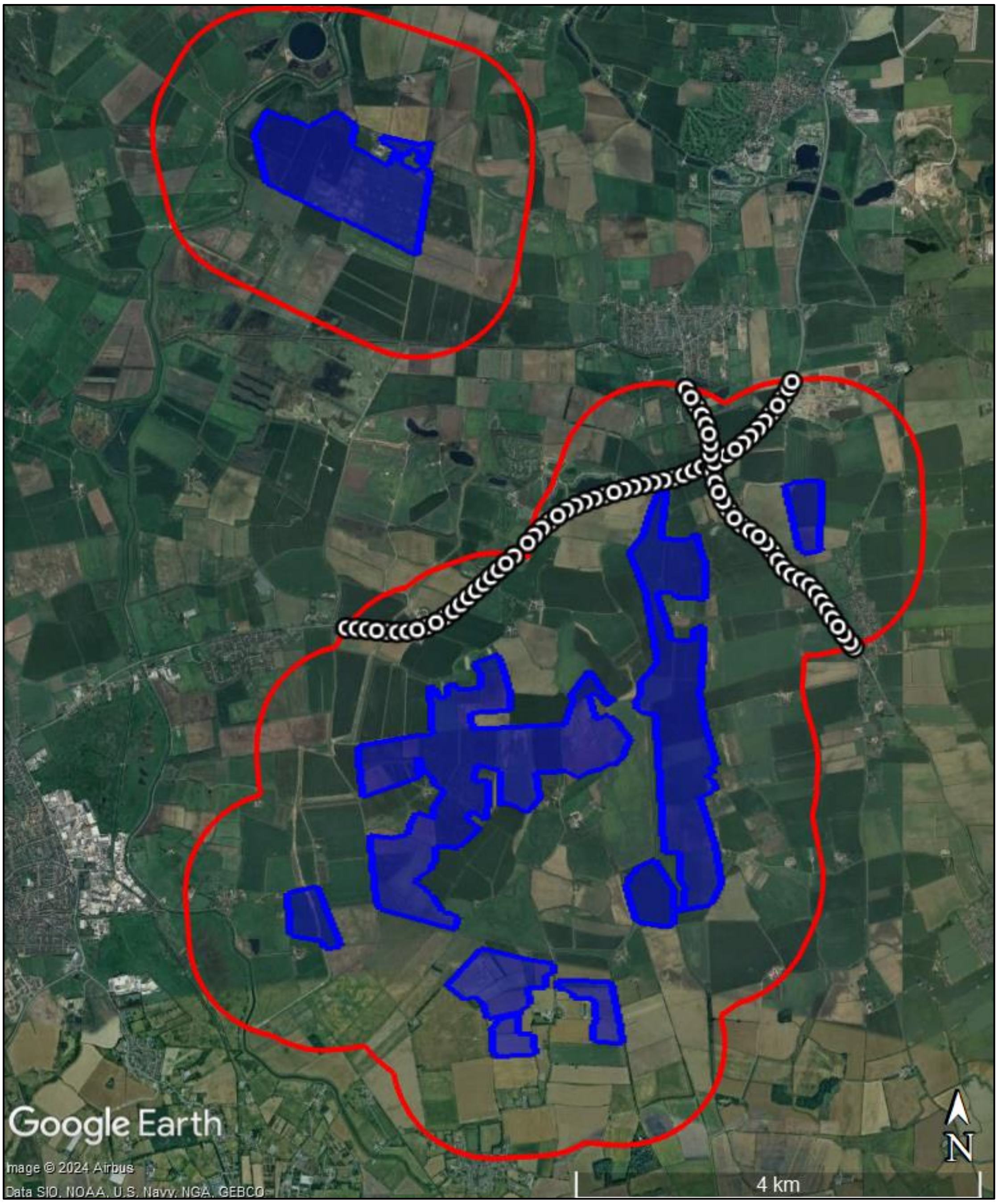

Figure 5 *Overview of road receptors – aerial image*

Figure 6 *A1035: road receptors 1 to 20 – aerial image*

Figure 7 *A1035: road receptors 21 to 53 – aerial image*

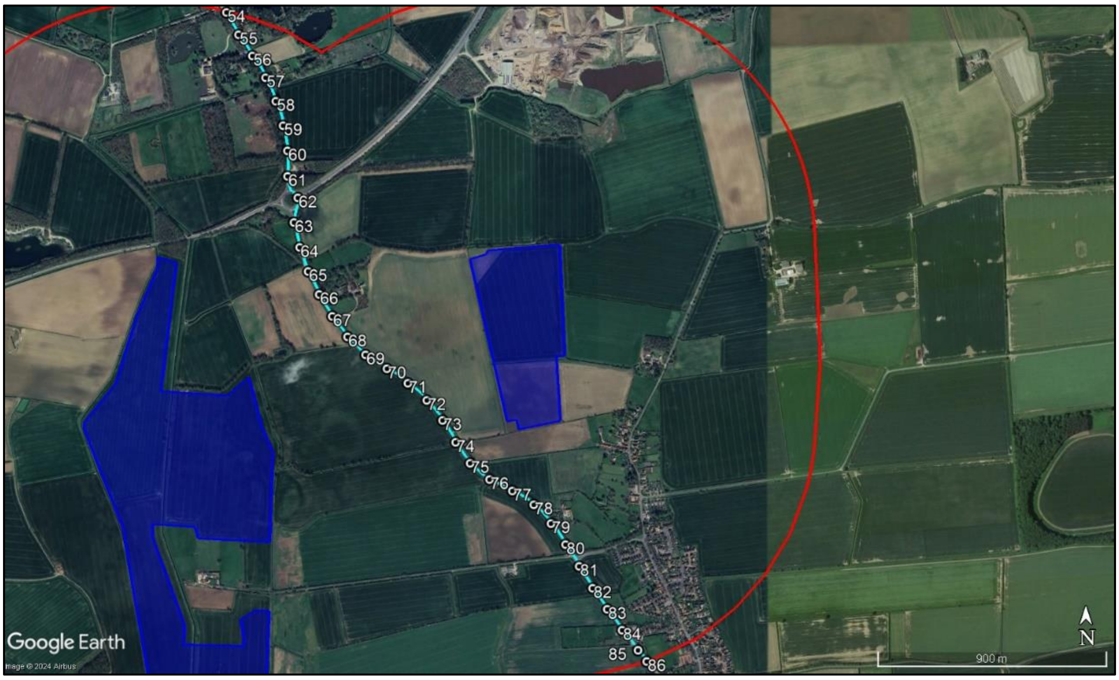

Figure 8 *Beverley Road/A165: road receptors 54 to 86 – aerial image*

4.3 Dwelling Receptors

4.3.1 Overview

The analysis has considered dwellings that:

- Are within the one-kilometre study area; and
- Have a potential view of the panels.

In residential areas with multiple layers of dwellings, only the outer dwellings have been considered for assessment. This is because they will mostly obscure views of the solar panels to the dwellings behind them, which will therefore not be impacted by the Proposed Development because line of sight will be removed, or they will experience comparable effects to the closest assessed dwelling.

In some cases, one physical structure is split into multiple separate addresses. In such cases, the results for the assessed location will be applicable to all associated addresses. The sampling resolution is sufficiently high to capture the level of effect for all potentially affected dwellings.

4.3.2 Identification

In total, 225 dwellings were identified for assessment, these are shown in Figure 9 on the following page, and these are shown in more detail in Figures 10 to 41 on the following pages.

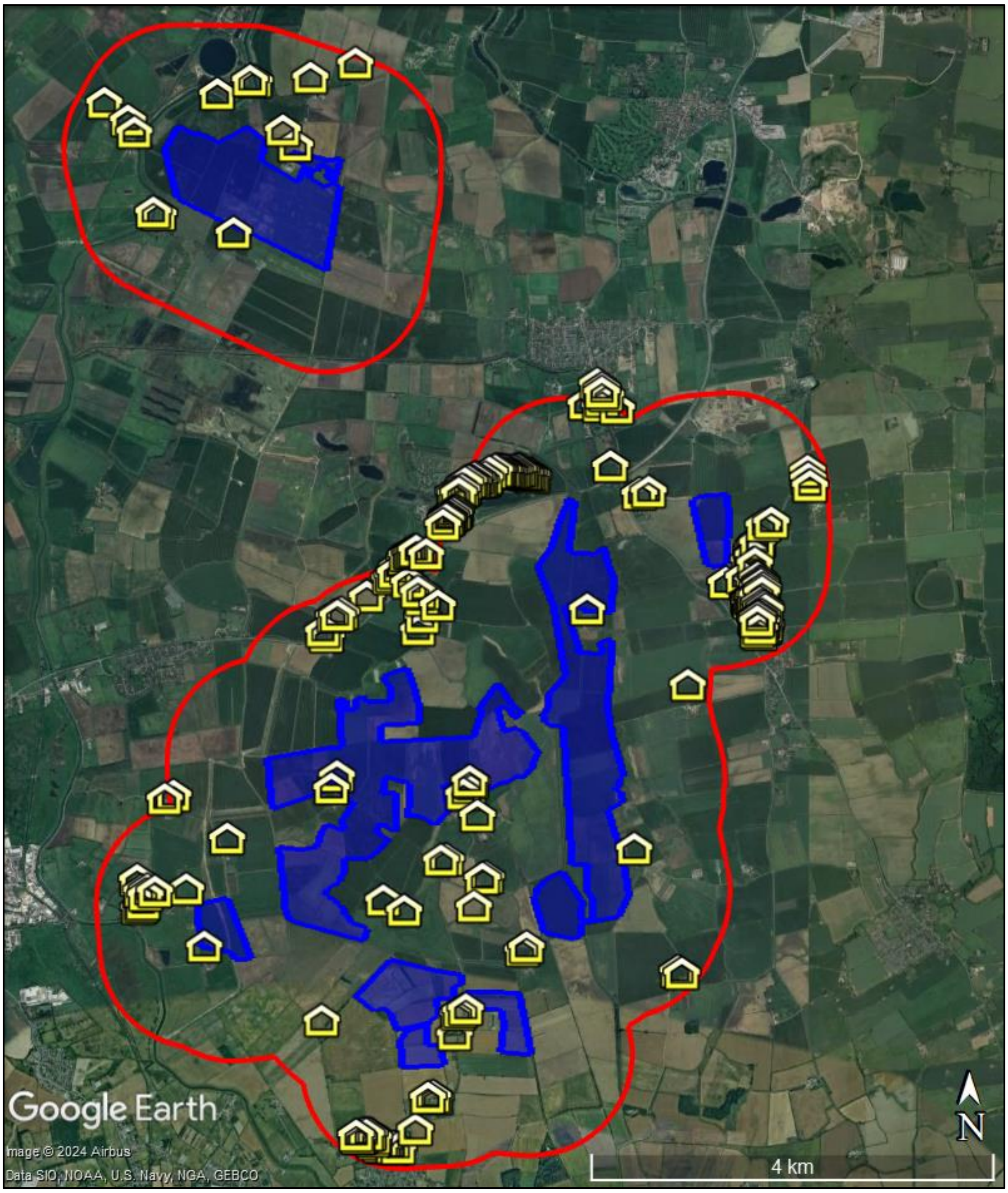

Figure 9 *Overview of dwelling receptors – aerial image*

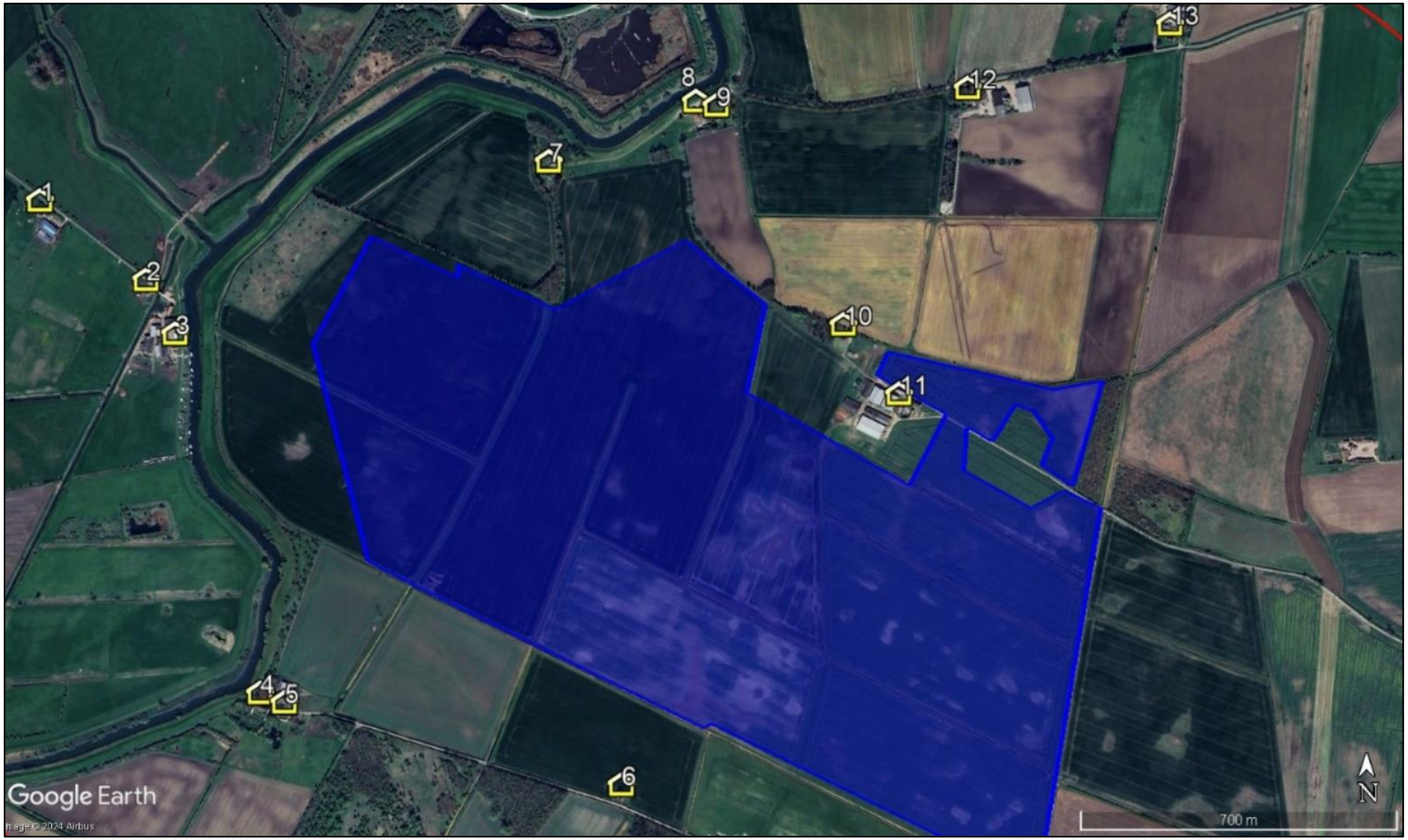

Figure 10 *Dwelling receptors 1 to 13 – aerial image*

Figure 11 *Dwelling receptors 14 to 21 – aerial image*

Figure 12 *Dwelling receptors 22 to 42 – aerial image*

Figure 13 *Dwelling receptors 43 to 63 – aerial image*

Figure 14 *Dwelling receptors 64 to 66 – aerial image*

Figure 15 *Dwelling receptors 67 to 69 – aerial image*

Figure 16 *Dwelling receptors 70 and 71 – aerial image*

Figure 17 *Dwelling receptors 72 to 82 – aerial image*

Figure 18 *Dwelling receptors 83 to 91 – aerial image*

Figure 19 *Dwelling receptors 92 to 105 – aerial image*

Figure 20 *Dwelling receptors 106 to 120 – aerial image*

Figure 21 *Dwelling receptors 121 and 122 – aerial image*

Figure 22 *Dwelling receptor 123 – aerial image*

Figure 23 *Dwelling receptors 124 and 125 – aerial image*

Figure 24 *Dwelling receptors 126 to 138 – aerial image*

Figure 25 *Dwelling receptors 139 to 150 – aerial image*

Figure 26 *Dwelling receptors 151 to 157 – aerial image*

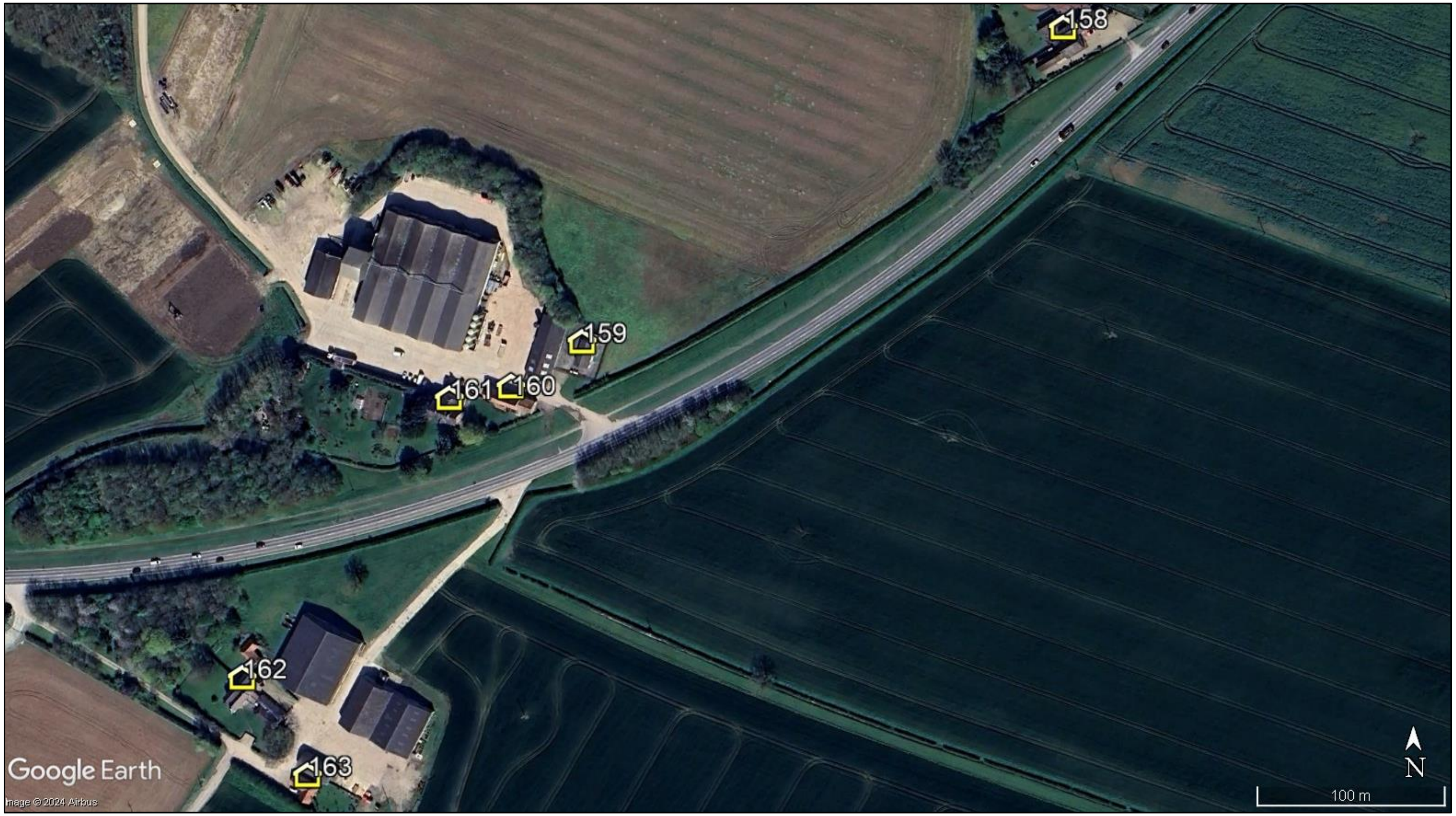

Figure 27 *Dwelling receptors 158 to 163 – aerial image*

Figure 28 *Dwelling receptors 164 and 165 – aerial image*

Figure 29 *Dwelling receptors 166 to 168 – aerial image*

Figure 30 *Dwelling receptors 169 to 177 – aerial image*

Figure 31 *Dwelling receptor 178 – aerial image*

Figure 32 *Dwelling receptor 179 – aerial image*

Figure 33 *Dwelling receptors 180 to 183 – aerial image*

Figure 34 *Dwelling receptors 184 to 188 – aerial image*

Figure 35 *Dwelling receptors 189 to 191 – aerial image*

Figure 36 *Dwelling receptors 192 and 193 – aerial image*

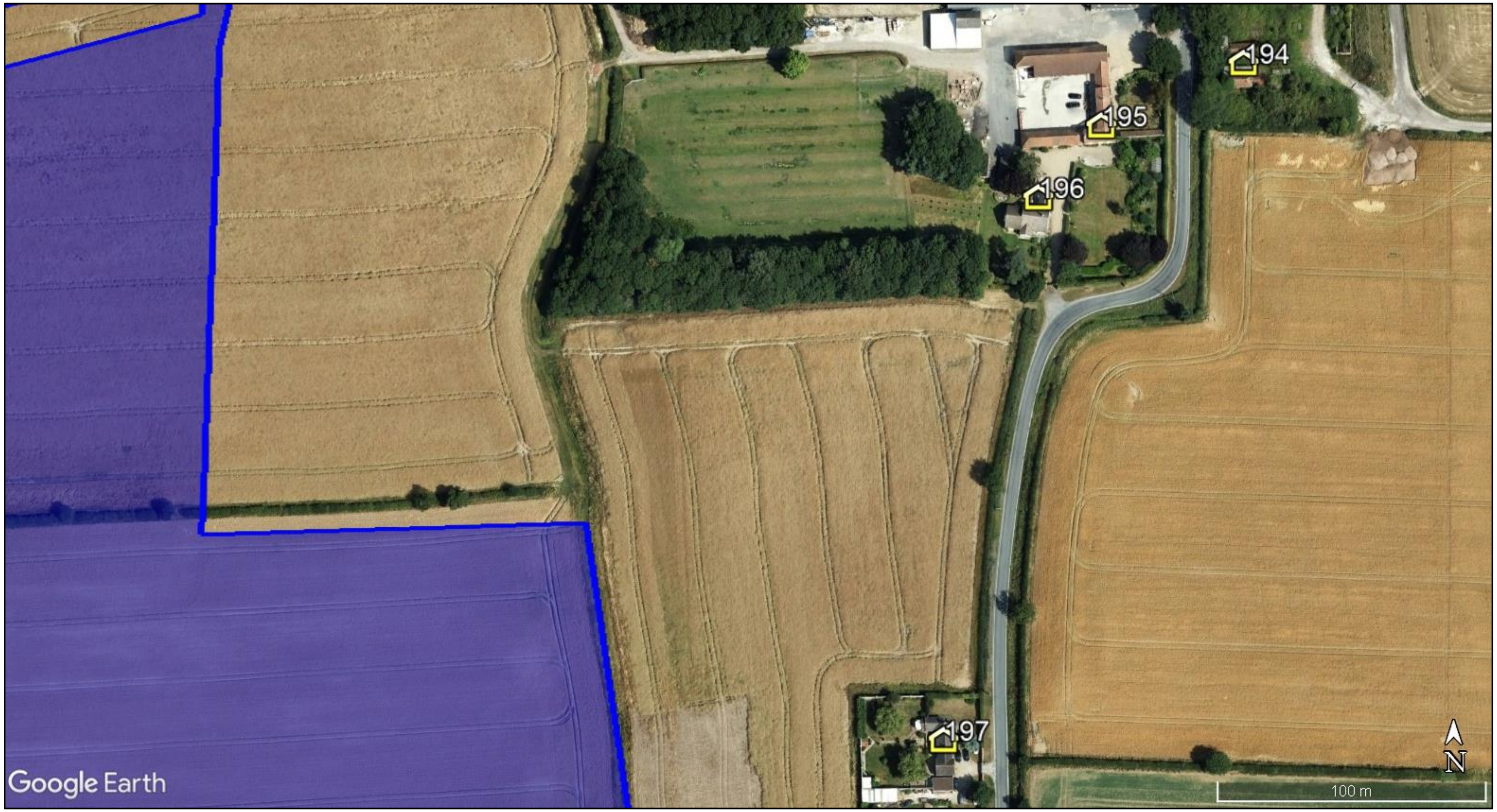

Figure 37 *Dwelling receptors 194 to 197 – aerial image*

Figure 38 *Dwelling receptors 198 to 200 – aerial image*

Figure 39 *Dwelling receptors 201 to 208 – aerial image*

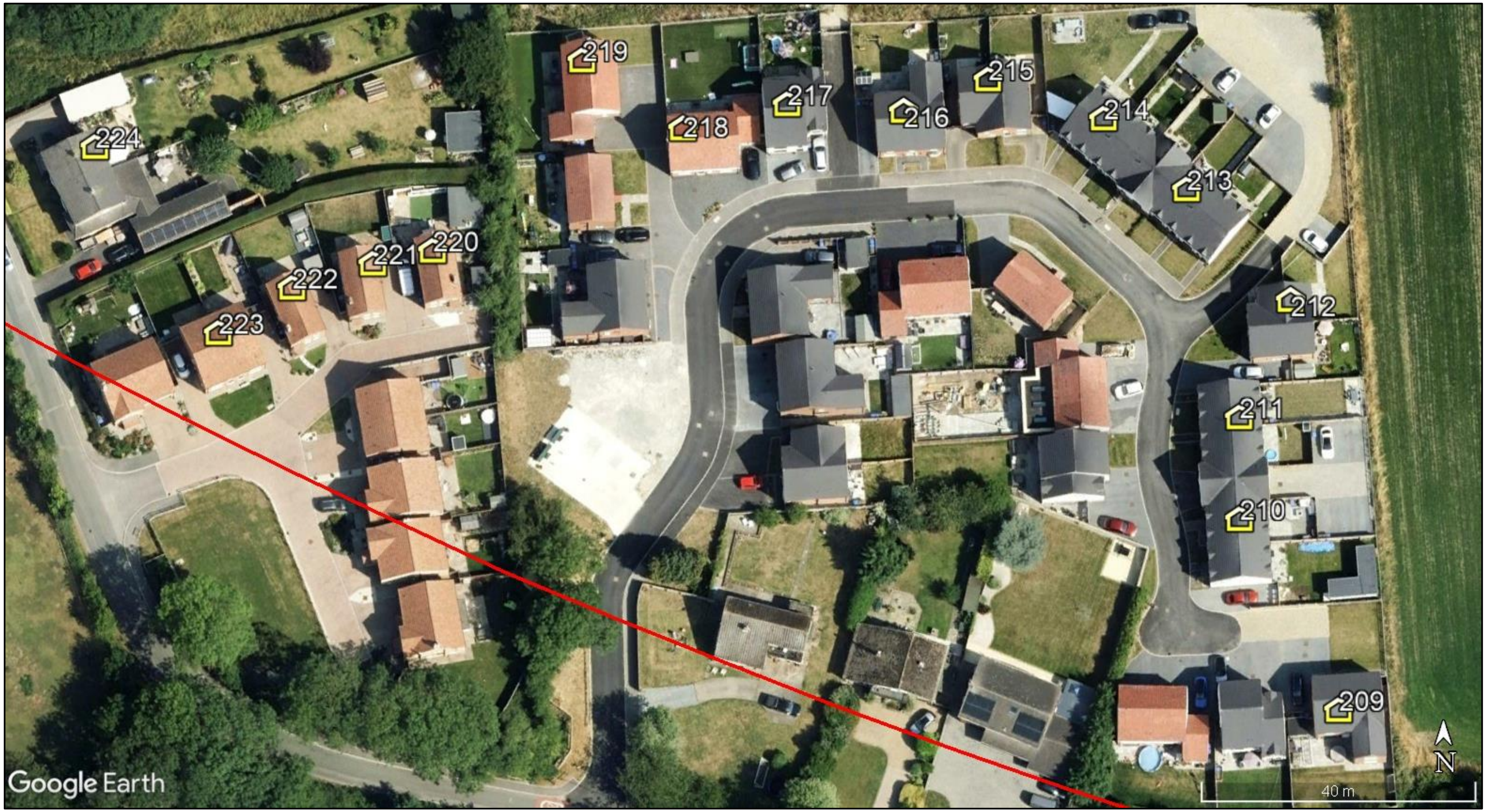

Figure 40 *Dwelling receptors 209 to 224 – aerial image*

Figure 41 *Dwelling receptor 225 – aerial image*

APPENDIX A – RECEPTOR DETAILS

Overview

Coordinate data and terrain heights are ascertained from OSGB 50 DTM data.

Aviation Receptor Data

Full receptor details are available upon request.

Beverley Airfield

Runway Threshold	Latitude (°)	Longitude (°)	Elevation (m amsl)
12	53.899592	-0.365430	3
30	53.897154	-0.357103	1.08

Beverley Airfield

Hill Farm Airfield

Receptor	Latitude (°)	Longitude (°)	Elevation (m amsl)
18	53.842047	-0.212002	10.03
36	53.837759	-0.211894	15

Hill Farm Airfield

Burton-Constable Airfield

Receptor	Latitude (°)	Longitude (°)	Elevation (m amsl)
16	53.812302	-0.195171	15
34	53.80458	-0.191526	16

Burton-Constable Airfield

Road Receptor Details

The road receptors details are presented in the table below.

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
1	53.864734	-0.366414	44	53.880505	-0.308111
2	53.864686	-0.36489	45	53.881064	-0.306915
3	53.864607	-0.36337	46	53.881672	-0.30579

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
4	53.864504	-0.361854	47	53.882303	-0.304702
5	53.864416	-0.360335	48	53.882966	-0.303671
6	53.864367	-0.358812	49	53.883657	-0.302692
7	53.864426	-0.357291	50	53.884372	-0.301766
8	53.864575	-0.355787	51	53.885119	-0.300915
9	53.864835	-0.354328	52	53.885885	-0.300114
10	53.865211	-0.352942	53	53.886466	-0.299605
11	53.865677	-0.351639	54	53.885855	-0.315487
12	53.866219	-0.350422	55	53.885064	-0.31476
13	53.866814	-0.349278	56	53.884312	-0.313922
14	53.867424	-0.348156	57	53.883544	-0.313132
15	53.868021	-0.347014	58	53.882718	-0.312526
16	53.868621	-0.345876	59	53.881858	-0.312093
17	53.869229	-0.34475	60	53.880972	-0.311831
18	53.869836	-0.343625	61	53.880072	-0.311824
19	53.870436	-0.342487	62	53.879316	-0.311211
20	53.871085	-0.341235	63	53.87845	-0.31145
21	53.872245	-0.339211	64	53.877573	-0.311113
22	53.872901	-0.338167	65	53.876725	-0.310606
23	53.873524	-0.337066	66	53.875914	-0.309946
24	53.874099	-0.335892	67	53.875142	-0.309167
25	53.874654	-0.334693	68	53.874421	-0.308253
26	53.875138	-0.333405	69	53.873787	-0.307176
27	53.875534	-0.332036	70	53.873297	-0.305897
28	53.875867	-0.330619	71	53.872786	-0.304643

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
29	53.876163	-0.329177	72	53.872181	-0.303516
30	53.876449	-0.32773	73	53.871474	-0.302572
31	53.876717	-0.326273	74	53.870702	-0.301793
32	53.876974	-0.32481	75	53.869963	-0.300925
33	53.877197	-0.323331	76	53.869391	-0.299766
34	53.8774	-0.321844	77	53.868989	-0.298402
35	53.877581	-0.320349	78	53.868503	-0.29712
36	53.877757	-0.318852	79	53.86784	-0.296093
37	53.877951	-0.317361	80	53.867103	-0.295224
38	53.87823	-0.315912	81	53.86634	-0.294413
39	53.878606	-0.314526	82	53.865574	-0.293613
40	53.878967	-0.313128	83	53.864835	-0.292742
41	53.878889	-0.311676	84	53.864103	-0.291855
42	53.879472	-0.310611	85	53.863398	-0.290906
43	53.879978	-0.309349	86	53.863004	-0.290388

Road receptor locations

Dwelling Receptor Details

The dwelling receptors details are presented in the table below.

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
1	53.910787	-0.389607	114	53.864325	-0.289818
2	53.909217	-0.386038	115	53.864133	-0.289926
3	53.908151	-0.385065	116	53.864099	-0.290112
4	53.901043	-0.382194	117	53.864068	-0.290424
5	53.900857	-0.381377	118	53.864039	-0.290654
6	53.899225	-0.370075	119	53.863749	-0.291046
7	53.911561	-0.372522	120	53.863563	-0.290674

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
8	53.912758	-0.367589	121	53.865773	-0.316715
9	53.912674	-0.366901	122	53.859066	-0.301537
10	53.908339	-0.362632	123	53.844499	-0.309649
11	53.906966	-0.360765	124	53.833608	-0.303072
12	53.91302	-0.358464	125	53.833427	-0.302477
13	53.914286	-0.351675	126	53.873279	-0.338436
14	53.884021	-0.316946	127	53.873741	-0.337971
15	53.883795	-0.314788	128	53.873745	-0.3378
16	53.884293	-0.314426	129	53.873829	-0.33767
17	53.885779	-0.31519	130	53.873926	-0.337615
18	53.885356	-0.314449	131	53.874021	-0.337656
19	53.885025	-0.314477	132	53.874101	-0.337714
20	53.884768	-0.313849	133	53.874113	-0.337295
21	53.883618	-0.312215	134	53.874211	-0.33707
22	53.876122	-0.336762	135	53.874277	-0.33683
23	53.876015	-0.336493	136	53.874335	-0.336709
24	53.876094	-0.336061	137	53.874463	-0.336582
25	53.876242	-0.335801	138	53.874561	-0.336477
26	53.876348	-0.33558	139	53.870671	-0.340958
27	53.876427	-0.335325	140	53.870991	-0.342461
28	53.876616	-0.335265	141	53.870904	-0.342763
29	53.876816	-0.335218	142	53.870811	-0.343101
30	53.876981	-0.335113	143	53.870747	-0.343344
31	53.877081	-0.334845	144	53.870678	-0.343694
32	53.877125	-0.334576	145	53.87056	-0.343905

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
33	53.877136	-0.334315	146	53.870243	-0.34416
34	53.877067	-0.333947	147	53.86951	-0.34533
35	53.877405	-0.333755	148	53.869041	-0.345647
36	53.877425	-0.3334	149	53.868727	-0.346013
37	53.877184	-0.333102	150	53.868512	-0.346473
38	53.877172	-0.332808	151	53.868153	-0.343565
39	53.877184	-0.332506	152	53.8673	-0.342196
40	53.877252	-0.332279	153	53.867195	-0.341442
41	53.877422	-0.332111	154	53.866612	-0.341589
42	53.877576	-0.331894	155	53.866126	-0.339209
43	53.877926	-0.33144	156	53.865056	-0.341508
44	53.878096	-0.330599	157	53.863948	-0.34217
45	53.878099	-0.330378	158	53.866916	-0.349907
46	53.878096	-0.330123	159	53.865422	-0.353788
47	53.878096	-0.329912	160	53.865209	-0.354362
48	53.878066	-0.329674	161	53.865154	-0.354857
49	53.878071	-0.329441	162	53.863823	-0.356531
50	53.878033	-0.329152	163	53.863358	-0.356003
51	53.878015	-0.328888	164	53.850964	-0.354433
52	53.877944	-0.328611	165	53.849861	-0.355262
53	53.877949	-0.328313	166	53.849225	-0.379086
54	53.877998	-0.3279	167	53.848917	-0.380404
55	53.878062	-0.327568	168	53.845415	-0.370976
56	53.878133	-0.327127	169	53.840908	-0.377149
57	53.878108	-0.326776	170	53.840703	-0.381851

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
58	53.877893	-0.326592	171	53.840825	-0.382994
59	53.877806	-0.326182	172	53.841719	-0.384547
60	53.877821	-0.325871	173	53.840724	-0.383905
61	53.877788	-0.325538	174	53.840372	-0.383246
62	53.877706	-0.325148	175	53.839619	-0.38364
63	53.877545	-0.324921	176	53.839397	-0.383865
64	53.87849	-0.313205	177	53.839217	-0.384285
65	53.876029	-0.308821	178	53.83581	-0.374436
66	53.876216	-0.307432	179	53.829232	-0.356732
67	53.878059	-0.283461	180	53.839928	-0.347453
68	53.877377	-0.28337	181	53.839005	-0.344303
69	53.876714	-0.283101	182	53.843478	-0.338753
70	53.873202	-0.29011	183	53.843516	-0.337956
71	53.873487	-0.28893	184	53.849361	-0.335392
72	53.871849	-0.290907	185	53.849726	-0.33457
73	53.871646	-0.291045	186	53.85039	-0.334172
74	53.871528	-0.291296	187	53.850524	-0.334435
75	53.871346	-0.291582	188	53.84743	-0.333268
76	53.87115	-0.291789	189	53.841947	-0.331927
77	53.870879	-0.291879	190	53.841863	-0.332502
78	53.870687	-0.291638	191	53.839372	-0.333779
79	53.870548	-0.291701	192	53.835765	-0.325871
80	53.870404	-0.291826	193	53.835462	-0.326468
81	53.870087	-0.29232	194	53.830263	-0.335005
82	53.869849	-0.291405	195	53.830057	-0.3358

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
83	53.868554	-0.290989	196	53.829818	-0.336155
84	53.868585	-0.293162	197	53.828009	-0.336682
85	53.868121	-0.295815	198	53.822355	-0.339644
86	53.868199	-0.290582	199	53.822503	-0.339944
87	53.8681	-0.290441	200	53.822401	-0.340706
88	53.867936	-0.290491	201	53.819574	-0.342583
89	53.867723	-0.290951	202	53.817894	-0.345177
90	53.867564	-0.290188	203	53.817945	-0.3457
91	53.86729	-0.290342	204	53.817975	-0.345903
92	53.866978	-0.291064	205	53.818003	-0.346802
93	53.866995	-0.291426	206	53.818019	-0.34719
94	53.866804	-0.291627	207	53.818012	-0.347512
95	53.866772	-0.291767	208	53.818068	-0.347919
96	53.866722	-0.291978	209	53.818309	-0.348784
97	53.866759	-0.292399	210	53.81856	-0.349006
98	53.866672	-0.292319	211	53.818693	-0.349006
99	53.866582	-0.292251	212	53.818847	-0.348893
100	53.866482	-0.292202	213	53.818992	-0.349124
101	53.866386	-0.292162	214	53.819084	-0.349309
102	53.866316	-0.290633	215	53.819135	-0.349565
103	53.866043	-0.290364	216	53.819094	-0.349753
104	53.865949	-0.28999	217	53.819102	-0.35001
105	53.865705	-0.289806	218	53.81907	-0.350241
106	53.865218	-0.290424	219	53.819159	-0.350464
107	53.865122	-0.290821	220	53.81891	-0.350791

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
108	53.865039	-0.291004	221	53.818894	-0.350926
109	53.864919	-0.291304	222	53.818862	-0.351106
110	53.864844	-0.291222	223	53.818803	-0.351269
111	53.864722	-0.291041	224	53.819045	-0.351535
112	53.86468	-0.290416	225	53.825639	-0.355683
113	53.864589	-0.290275			

Dwelling receptor locations

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