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Large Marsh Grasshopper, purple form, female (photo: Paul Brock)

New Forest Large Marsh Grasshopper (*Stethophyma grossum*) 2017 Survey Report

Higher Level Stewardship Agreement The Verderers of the New Forest AG00300016

October 2017

This project has been funded under the Rural Development Programme for England

This report should be cited as: Harvey, M.C., and Brock, P.D. 2017. New Forest Large Marsh Grasshopper (*Stethophyma grossum*) 2017 Survey Report. Higher Level Stewardship Agreement The Verderers of the New Forest AG00300016.

1. Contents

2. Summary

1. The Large Marsh Grasshopper, *Stethophyma grossum* (Linnaeus, 1758) is the largest of the UK's native grasshoppers (Orthoptera: Acrididae), and one of the rarest, currently known in the UK only from the New Forest and a small area of Dorset.
2. This project aimed to survey known and potential sites for Large Marsh Grasshopper (LMG) on land managed by Forestry Commission under the Higher Level Stewardship Scheme (HLS) in the New Forest. Presence or absence was recorded, and an assessment was made of the status of the populations and habitats found.
3. Sites were targeted based on prior records and previous survey reports. Data was collated from all available sources, in order to prioritise 50 sites that had recent records of LMG and/or that were thought to contain suitable habitat. Of these, 30 were sites that had been surveyed in the previous (1997–98) New Forest surveys.
4. Sites from the previous surveys were digitised within a GIS. Sites visited in 2017 have also been digitised, along with the records from 2017 and all available prior records.
5. The surveys produced 60 individual records of LMG, and 25 further new records of LMG were collated by the authors from records provided by other New Forest naturalists.
6. Of the 50 sites surveyed in 2017 LMG was found at 25 sites; records in 2017 were reported to the authors for a further two sites, and at 23 sites no LMG could be found (although LMG was only judged likely to be absent at 19 of those).
7. Four sites were assessed as supporting a "Strong" population, with another 15 suporting a "Moderate" population. For the 30 sites that had also been surveyed in the 1990s there was little change, with only two sites having apparently gained LMG and two having apparently lost LMG in the 20 years between the two survey periods.
8. An assessment was also made of potential habitat suitability at each site, based on the presence of suitable mire habitat and associated plant species. Eight sites were assessed as having "High" potential for providing suitable LMG habitat, with 25 at "Moderate" potential and 17 at "Low" potential. Of those habitats assessed as being of low potential, the causes were most often that the sites appeared too dry and lacking in *Sphagnum*, and/or in some cases that growth of Bog Myrtle, Purple Moor-grass and/or scrub invasion was becoming too dense.
9. Overall the results present an encouraging picture of LMG populations in the New Forest. There are few signs of change over the last 20 years, and populations remain widespread over much of the Forest area. Some of these populations are small, and there is good reason to regard them as vulnerable to habitat change, e.g. if water levels were to diminish and/or bogs were to become increasingly overgrown with Bog Myrtle, Purple Moor-grass or scrub and trees. But there is no sign at the present time of decline within the New Forest as a whole, and with mire restoration work taking place in the Forest there is the potential for LMG to strengthen its populations in future.

3. Survey aims

The main aims of this survey were to visit known and potential sites for Large Marsh Grasshopper on land managed under the Higher Level Stewardship Scheme (HLS) in the New Forest; to record its presence or absence at these sites, and to provide an assessment of the status of the populations and habitats found.

4. Background

The Large Marsh Grasshopper, *Stethophyma grossum* (Linnaeus, 1758) is the largest of the UK's native grasshoppers (Orthoptera: Acrididae), and one of the rarest. In the rest of this report the species is abbreviated as LMG. See photos in Appendix 3.

In the UK, LMG is now known only from wet, *Sphagnum*-dominated mires on heaths in the New Forest and in Dorset (Poole basin area), having been lost from former sites in Cambridgeshire, Norfolk, Somerset and Surrey (Sutton *et al*. 2017). It is resident in western Ireland. Elsewhere in Europe it is widespread but uncommon, and is found in a wider range of damp habitats including wet grassland (Benton 2012). There is some evidence of a recent range expansion in Germany, for which climate change is seen as the likely driving force (Trautner and Hermann 2008).

LMG is an herbivorous insect, feeding on grasses, rushes and sedges. Eggs are laid in late summer at the bases of grass tufts, where they remain until hatching the following May or June. (Benton 2012.)

Cheesman and Brown 1998 provided a detailed analysis of the habitat associations of LMG at one New Forest site, Upper Crockford Bottom (SZ3499). They noted that LMG is found in sites that typically contain a mosaic of dry heath, wet heath and mire, and that "the highly localised arrangement of [LMG] colonies [within] these habitat mosaics is suggestive of a high degree of fidelity towards a particular set of ecological conditions". Their study looked at numbers of LMG in relation to various habitat features along a transect from wet mire to dry heath, and largely supports the more general habitat associations in the literature. LMG is strongly associated with open areas that are dominated by *Sphagnum* moss (typically described as bogs or quaking bogs), and is negatively associated with higher levels of heathers and other ericoids and small shrubs. Within the *Sphagnum* bogs a positive association with areas of small open water bodies was found.

Edwards (2002, and quoted in Miller 2017) gives descriptions of similar habitat associations in Dorset: "Observations from this and previous surveys suggest it prefers permanently wet sites with *Erica tetralix*, *Narthecium ossifragum*, *Eriophorum angustifolium*, *Rhynchospora alba* and *Molinia caerulea* over a well-developed *Sphagnum* carpet, particularly *S. papillosum* and *S. pulchrum*. Other species forming a significant part of the vegetation at some sites include *Erica ciliaris* and *Schoenus nigricans*."

Dorset surveys by Edwards (2002) and Hunnisett, Allen and Edwards (2006) associated LMG occurrence with the NVC (National Vegetation Classification) community M21a (*Narthecium ossifragum – Sphagnum papillosum* valley mire; *Rynchospora alba – Sphagnum auriculatum* sub-community); community M14 (*Schoenus nigricans – Narthecium ossifragum* mire) was also a common component of the habitat.

Miller (2017) reviewed European literature on LMG and provides a detailed overview of habitat use at different life stages (but this is in part based on research carried out in habitats that differ from those in the New Forest).

LMG was given a conservation status of "Vulnerable" in the insect Red Data Book (Shirt 1987), and has been the subject of a Species Recovery Programme under the auspices of Natural England (formerly English Nature). The conservation statuses of the Orthoptera have been recently reviewed (Sutton 2015), and LMG is now assessed as follows:

- Threat status: "Near Threatened", meaning the species has "been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future" (IUCN 2001).
- Rarity status: "Nationally Rare", a category for "native species recorded from 15 or fewer hectads [10km squares] of the Ordnance Survey national grid in Great Britain since 31st December 1989 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads."

In addition, LMG is listed as a Species of Principal Importance under Section 41 of the Natural Environment and Rural Communities Act 2006, which includes species that are "of principal importance for the purpose of conserving biodiversity" and therefore need to be taken into consideration by a public body when performing any of its functions with a view to conserving biodiversity.

Of the remaining UK populations of LMG most are found in the New Forest, where this large and colourful grasshopper can be considered a flagship species for the conservation of its mire habitats. Most of its New Forest populations are on land managed by the Forestry Commission.

5. Collating existing information

Information on previous sites and records was collated from these sources:

- Orthoptera and Allies Recording Scheme (ORS, the national recording scheme covering grasshoppers) (number of records = 124).
- Records available via the NBN Atlas (https://species.nbnatlas.org/species/NBNSYS0000006834) (excluding those already in the ORS dataset; n = 76).
- Reports from previous New Forest surveys of this species, carried out by Oliver Cheesman and Val Brown (Brown and Cheesman 1997, Cheesman and Brown 1998) (n = 28).
- Records from Hampshire Biodiversity Information Centre, provided by Forestry Commision (n = 17).
- Records for year 2000 provided by Richard Reeves (n = 10).
- Observations on the iSpot website (https://www.ispotnature.org/communities/uk-and-ireland/species-dictionary/NBNSYS0000006834/stethophyma-grossum/observations) (n = 5).

Species records from these sources were combined into an Access database and processed to remove duplicate records, and then analysed using QGIS. Site boundaries from Brown and Cheesman 1997 and Cheesman and Brown 1998 were digitised in QGIS, following the hand-drawn boundaries in the reports as closely as possible.

One record in the ORS dataset requires a correction to its grid reference: this is a record from S. Currie on 26 July 2009 at Acres Down (BRC unique ID 343_17_1197), which in the ORS data is located at SU2608 – the grid reference should be SU27040857 (S. Currie pers. comm. to P. Brock).

5.1 Number of sites and populations

The above records for LMG were plotted at 1km square level. This produced a list of 62 squares (Table 1) within the New Forest that have had at least one LMG record, of which 20 squares have records since 2000 (and 17 squares have no record since 1980). A further 10 squares were listed in the 1990s survey reports as worthy of investigation but with no known LMG records.

Table 1: 1km squares with previous records and/or reports of suitable habitat

1km square	Name	Records	First	Last
SZ2499	Wilverley Bog; Wootton Bog; Wootton Bridge	22	1982	2014
SZ3598	Beaulieu Heath; Crockford Bridge; Lower Crockford Bottom	8	1974	2014
SZ3499	Crockford Bog; Greenmoor; Upper Crockford Bottom	8	1981	2012
SU2502	Duckhole Bog	6	1975	2011
SU2603	Clumber Inclosure Area; Ober Water	6	1998	2011
SU3307	Matley Bog	26	1940	2011
SU1803	Strodgemoor bottom	4	1970	2010

1km square	Name	Records	First	Last
SU2708	Acres Down; Pilmore Gate Heath	7	1976	2010
SU3208	Matley Bog	2	2010	2010
SU4002	Moonhills	3	2010	2010
SZ3498	Crockford stream	2	2010	2010
SU2608	Acres Down	1	2009	2009
SU3604	Pig Bush	5	1982	2004
SU2706	Roman Bridge, Bramble Hill; Warwickslade	3	1983	2002
SU1802	Bagnum Bog area; Kingston Great Common NNR	1	2000	2000
SU2602	Holmhill Bog; Crab Tree Bog	8	1955	2000
SU2700	Hinchelsea Bog	5	1916	2000
SU3308	Fort Bog	1	2000	2000
SU3501	Hawkhill Inclosure	6	1983	2000
SU4102	Stock Water	5	1983	2000
SU1903	Strodgemoor Bottom	4	1975	1999
SZ3699	Peaked Bottom	2	1997	1998
SU1902	Cranesmoor; Burnt Axon	6	1982	1997
SU1904	Vales Moor	4	1975	1997
SU1905	Foulford Bottom; Vereley	4	1989	1997
SU2400	Wilverley Bog West	1	1997	1997
SU3502	Hawkhill Bog	2	1997	1997
SU3602	Furzey Lodge	1	1997	1997
SU3906	Dibden Bottom	3	1983	1997
SU4006	Dibden Inclosure Valley; below Horestone Hill	5	1983	1997
SU4103	Ipers Bridge Road Copse	2	1983	1997
SU4204	Hardley Bridge area; Holbury Mill Pond	7	1970	1997
SU4104	Stonyford Pond Valley	1	1990	1990
SU1800	Lugden Bottom, Bisterne Common	1	1989	1989
SU3505	Beaulieu Road Station; Bishop's Dyke	4	1978	1989
SU2301	Clayhill Bottom, Holmsley	1	1987	1987
SU3407	Matley Bog	1	1987	1987
SU1801	New Forest,Lugden Bottom	3	1983	1983
SU2617	Nomansland	3	1983	1983
SU3306	Shatterford Bottom	4	1983	1983
SU3504	Bishop's Dyke	5	1982	1983
SU3607	Decoy Pond Farm,E of	3	1983	1983
SU3706	Ipley	3	1983	1983
SZ2599	Wilverley Bog	5	1975	1983
SU3405	Beaulieu Road; Denny Lodge; Shatterford	5	1975	1982
SU2702	Aldridge Bog; Crab Tree Bog	5	1940	1979
SU2405	unnamed	1	1975	1975
SU2601	unnamed	1	1975	1975
SU3406	unnamed	2	1940	1975
SZ3599	unnamed	1	1974	1974
SU2005	South of Ridley Wood/Vereley	1	1970	1970
SZ2199	Stony Moors, Holmsley	1	1970	1970
SU1912	Latchmore Bottom	2	1969	1969
SU1807	unnamed	1	1965	1965
SU2401	unnamed	1	1960	1960
SU1810	unnamed	2	1940	1940
SU1910	Linwood	1	1940	1940
SU2503	Duck Hole Stream	1	1940	1940
SU2703	unnamed	2	1940	1940
SU2808	unnamed	1	1940	1940
SU1808	unnamed	1	1929	1929
SU1804	unnamed	1	1923	1923
SU1709	Linwood Bog	0		
SU1805	Foulford Bottom	0		
SU2004	Common Moor, north of Burley Street	0		
SU2006	Valley between Ridley and Backley Plains	0		
SU2106	Harvest Slade Bottom	0		
SU2201	Holmsley Bog	0		

1km square	Name	Records	First	Last
SU2209	Slufters Inclosure South	0		
SU2309	Bratley Arch Bottom	0		
SU2900	Setley Plain	0		
SU3605	Ferny Crofts Bottom	0		

It was not possible to visit all 72 of the 1km-squares listed above within the time available during this contract, so priority was given to sites with recent records and that had been identified as having suitable habitat.

The digitised boundaries from the 1997-98 survey reports were used to help target areas within the 1km squares.

6. Methods

From the prioritised list of 1km squares, 50 sites were visited between 28 July and 15 September 2017, and are listed in Appendix 1 (see also Figure 2 in Section 7.2 below). Of these, 30 were sites that had previously been surveyed in 1997-98 by Brown and Cheesman.

At each site surveys were carried out in favourable weather conditions as far as possible – for the most part surveys were carried out in warm, sunny conditions, but some survey visits had to take place on cloudier days. Weather conditions and temperature measurements were recorded (see Appendix 1).

LMG was surveyed using direct searching in suitable habitats, and listening for calling males (the call is a distinctive 'ticking' sound). Target notes were recorded for each site, and an assessment was made of the strength of the LMG population present, and of the potential for the habitat to support LMG.

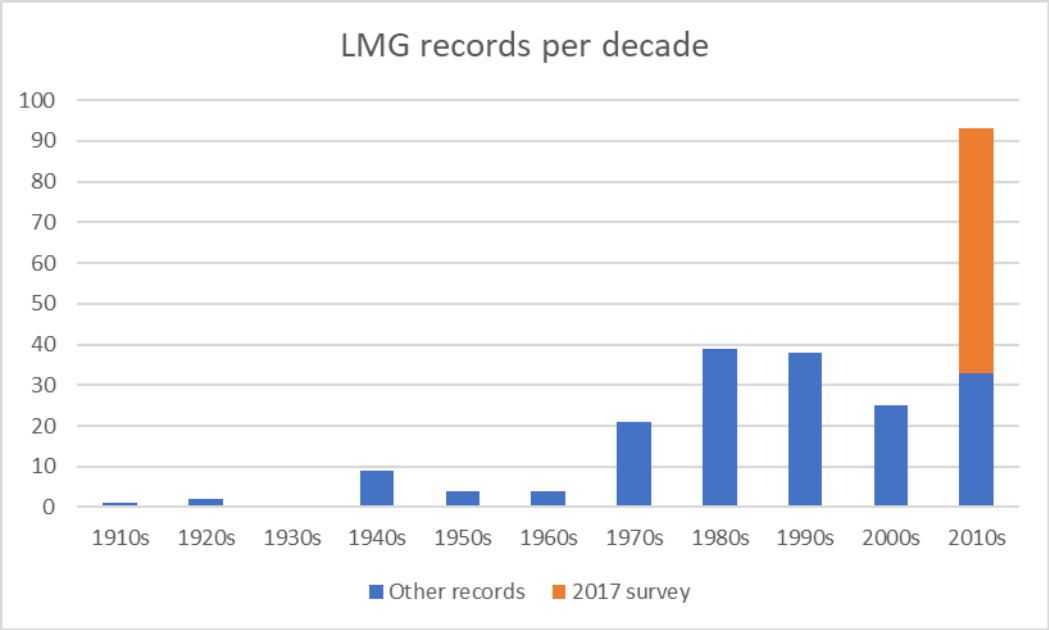
7. Results

7.1 Records of LMG

From the site visits, 60 individual records of LMG were made, and 25 further new records of LMG were collated by the authors from records provided by other New Forest naturalists. In addition, 57 records of ten other species of Orthoptera and allied groups were made during LMG fieldwork. Details of all these have been supplied as a spreadsheet and GIS layer to FC, and as a spreadsheet to the national recording scheme (see also Figure 2 below).

The new records for 2017 add substantially to the total number of records for this species in the New Forest. Figure 1 shows the total number of records of LMG in the New Forest per decade, based on all the data available (see section 5 above). LMG and other Orthoptera species do vary in apparent numbers in the New Forest from year to year, no doubt reflecting variations in weather, but the numbers recorded are heavily influenced by recording effort (number of people seeing them and sending in their records) as well. For instance, much of the apparent peak in the 1980s results from the collation by A.R. & N.I. Welstead of data from many recorders for their privately published *Orthoptera of the New Forest and its environs 1980 to 1988*. Clearly, the number of records on its own does not provide a good measure of population trends for LMG in the Forest.

Figure 1: Number of records of LMG from the New Forest per decade based on all available data



Hornet Robberfly observations

Hornet Robber-fly *Asilus crabronifornis* is a Species of Principle Importance (NERC Act) and is uncommon in the open Forest, but was noted three times during the LMG survey:

- Beaulieu Heath, towards Peaked Bottom, 10 August 2017, SZ35819916
- Hardley Bridge area, 15 August 2017, SU42400451
- Vales Moor, 27 August 2017, SU18960402

It has also been seen near Bagnum Bog in 2014 (PB). Lucas (1920) referred to Hornet Robberfly carrying off a male LMG as prey.

7.2 LMG population assessments in 2017

Where populations are strong and weather conditions are suitable, LMG can be readily found within its preferred habitat. However, there are some difficulties with surveying for this species that need to be born in mind when interpreting the survey results:

- The preferred habitat of wet 'quaking' bog can be difficult and in some cases dangerous to access, and at many sites survey has to be concentrated around the edges of the bogs. This can lead to a degree of under-recording of abundance at sites where it is known to occur, and may contribute to it being missed when present at low density.
- LMG is most active in favourable weather conditions (sheltered, warm and sunny), when males are calling and both sexes will be visible in the vegetation and may fly. As soon as weather conditions become less ideal the grasshopper will shelter deeper in the vegetation, becoming less active and much less apparent to the observer. Surveys in 2017 took place in favourable conditions wherever possible, but the weather was not ideal in all cases (see site visit notes) and may have contributed to under-recording in some sites.

Consequently it is difficult to get objective measures of population size for this species, and it is hard to prove that it is absent from a site. The assessments given below of site suitability and population size are based on the authors' interpretation of the numbers of LMG found, taking into account habitat and weather conditions.

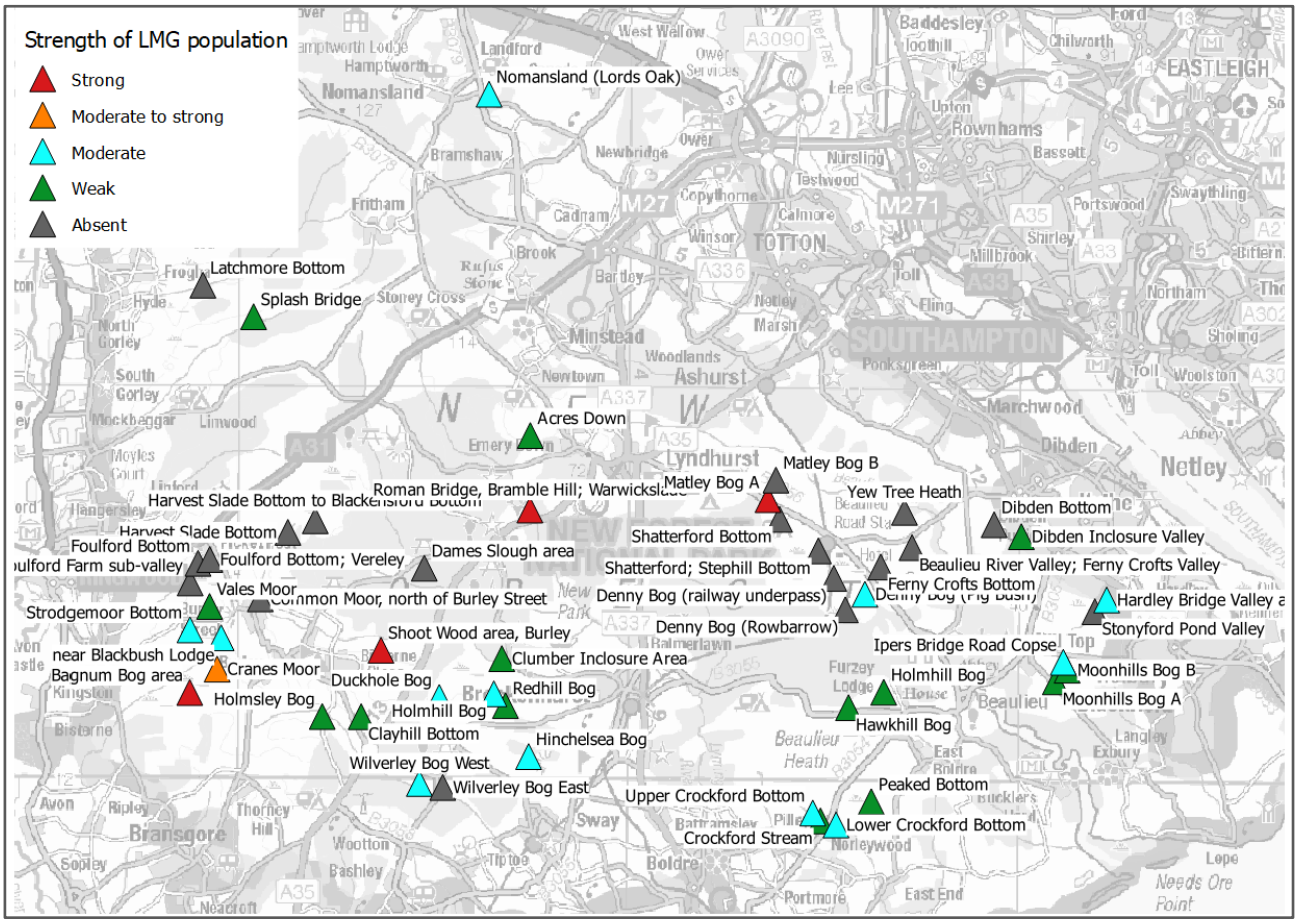
In total, of the 50 sites surveyed in 2017 (see list in Appendix 1 and maps and photos in Appendix 4), the authors found LMG at 25 sites, 2017 sightings were reported to the authors at a further two sites, and for 23 sites no LMG could be found. Estimates were made of the strength of population at each site, based on the numbers seen and with allowance for weather conditions and habitat suitability (Table 2). Although LMG was not found at 23 of the sites, it was only judged likely to be absent at 19 of those: in four cases the apparent absence may have been due to relatively poor weather, and these were judged as potentially supporting weak populations.

Table 2: Estimated population strengths in 2017

Estimated population stength	Number of sites
Absent	19
Weak	14
Moderate	12
Moderate to strong	1
Strong	4

Four sites were assessed as having a "Strong" population: Bagnum Bog area; Shoot Wood area, Burley; Roman Bridge, Bramble Hill/Warwickslade; Matley Bog A. In addition, Cranes Moor was assessed as "Moderate to strong".

Figure 2. Sites surveyed in 2017



There is no obvious geographical pattern to the distribution of populations (Figure 2). The strongest populations are in the centre and west, but other categories are well spread across the Forest. There are two clusters of sites (in the east and in the west) where the populations were apparently absent in 2017,

but we don't believe that significant conclusions can be drawn from this. The difficulty of locating small populations of LMG in less than perfect weather conditions means that it is hard to know with certainty that they are in fact absent. The authors are not aware of any habitat changes in these two cluster areas that might suggest a widespread reduction in populations.

Of the 50 sites visited in 2017, 30 had been surveyed as part of the work by Brown and Cheesman in 1997-98, and there little overall change in occupancy from that time (Table 3). The two sites where LMG had been present but was not recorded in 2017 (Holmhill Bog and Dibden Inclosure Valley) both retain suitable habitat, and it is considered likely that LMG could still be present, especially at Holmhill Bog.

Table 3: Change in occupied sites for the 30 sites surveyed in both 1997-98 and in 2017

Change since 1997-98	Number of sites
Continued absence	14
Gain since 1997-98	2
Apparent loss	2
Still present	12

Of the 20 sites surveyed that were not included in the 1997-98 surveys, 12 sites were supporting LMG, an additional site was reported to have had LMG present in 2017, and there were seven sites where LMG could not be found.

7.3 Habitat assessments in 2017

Cheesman and Brown (1998) referred to a pilot scheme at Upper Crockford Bottom and "confirmed the localisation of the species within *Sphagnum* mire or mire/wet heath transitional habitat, and its apparent exclusion from wet heath *per se* and dry heath habitat. Strong positive correlations were found between [LMG] activity and percentage cover of *Sphagnum*, *Rhyncospora alba*, and areas of exposed surface water. Grasshopper activity negatively correlated with percentage cover of ericoids/sub-shrubs and *Molinia caerulea*." The overall report conclusion was reached (at least in the New Forest) that LMG is confined to open *Sphagnum* dominated areas (i.e. 'bogs' or 'quaking bogs'), and that surface water is important with work undertaken showing "a positive correlation between grasshopper activity and surface water which was stronger than the correlation with *Sphagnum*." The study also suggests that the presence of *Rhyncospora alba* (White-beaked Sedge) is a good indicator of area favourable for LMG.

The 2017 fieldwork found the same type of sites favourable i.e. a mosaic of heathland habitats, with open wet mires supporting LMG (Photo 1). Ideal areas have a range of plants associated with the best bogs, with Purple Moor-grass *Molinia caerulea* (LMG feeds on blades and stems), Bog Myrtle *Myrica gale*, Cross-leaved Heath *Erica tetralix*, *Sphagnum* mosses, Broad-leaved Cotton Grass *Eriophorum latifolium* and White-beaked Sedge *Rhyncospora alba*.

Photo 1: good habitat at Hinchelsea Bog, open with plenty of Sphagnum

At these sites, Bog Bush-cricket *Metrioptera brachyptera* tends to occur as well (sometimes also Long-winged Conehead *Conocephalus fuscus*) – Bog Bush-cricket was recorded at virtually all sites LMG was seen [and others], usually around the edges in tussocks and sometimes extending into drier heath surrounding mires. *Rhyncospora alba* does not occur at all the sites at which LMG occurs, and *Myrica gale* is scarce at some.

Even small bogs may have small populations of LMG but *Sphagnum* carpet is often important. Larger bogs can have good populations of LMG if conditions are suitable, although they may be concentrated in parts of the area. LMG tend to prefer areas with carpets of *Sphagnum*. In some cases these areas are sheltered by small hills and surrounding vegetation, such as woodlands.

For each site visited, the potential of the habitat to support LMG was assessed (Table 4).

Table 4: Estimated potential for habitat to support LMG

Habitat potential	Number of sites
Low	17
Moderate	24
Moderate to high	1
High	8

Of those habitats assessed as being of low potential, the causes were most often that the sites appeared too dry and lacking in *Sphagnum*. Dense growth of Bog Myrtle, Purple Moor-grass and/or scrub invasion were apparent at a few of the Low or Moderate sites. Bog Myrtle is a feature of many of the LMG sites but in a few has become so dense as to limit the more open *Sphagnum* areas that LMG is most strongly associated with. Young pine trees were invading one site (Shatterford/Stephill Bottom). Two of the Moderate sites (Matley Bog B and Shatterford/Stephill Bottom) showed signs of heavy grazing pressure, with short vegetation, trampling of the muddy pools and dung deposition in the bog habitat, but this is not a problem for most of the sites, where grazing animals largely avoid the wettest parts of the mires.

The most important factor in maintaining LMG in the New Forest will be the continued maintenance of open bog habitats, and consequently any loss through drainage or other changes in water level, or through afforestation or succession to scrub, should be avoided. The mire restoration work currently under way in the Forest should provide opportunities to expand the potential habitat for LMG and other bog species. Where areas of mire are close (within c. 500 metres) but are separated by trees or scrub it may be beneficial to create corridors through any trees/scrub to allow dispersal of LMG.

7.4 Habitat management issues

Potential habitat management issues were noted at the sites in Table 5.

Table 5: Sites where habitat management issues were noted

Site name	Survey grid ref	Population assessment	Habitat potential	Notes
Common Moor, north of Burley Street	SU205045	Absent	Low	In part **fairly overgrown with Bog Myrtle**, but all typical bog vegetation present in this small, isolated site
Clayhill Bottom	SU231015	Weak	Moderate	Some sphagnum but **a lot dried up**. All bog vegetation present, some Bog Myrtle. Wet areas by bridge productive, but **fairly overgrown**
Clumber Inclosure Area	SU267030	Weak	Moderate	Assessed as weak population due to the large size of the site, which is **getting overgrown with Bog Myrtle. Little sphagnum**
Shatterford Bottom	SU338066	Absent	Low	**Sphagnum limited, few wet patches**
Matley Bog B	SU337076	Absent	Moderate	Lots of White-beaked Sedge, quite a lot of Sphagnum, some small pools of water; **signs of recent heavy cattle grazing**
Shatterford; Stephill Bottom	SU348058	Absent	Moderate	**Heavy grazing pressure**; some taller vegetation - **pines growing in the area require removal**.
Denny Bog (Rowbarrow)	SU355043	Absent	Low	Potentially **too dry** or unsuitable
Denny Bog (railway underpass)	SU352051	Absent	Low	sites look unsuitable now, **wet but anoxic**.
Wilverley Bog West	SZ246998	Moderate	High	Weather could have been a factor in the low number recorded, although most likely the **site is becoming overgrown with Bog Myrtle** which has spread in the last few years. Ideally **this needs thinning and removing in part**

Photo 2: Bog Myrtle and heathers getting too tall and dense at Clumber Inclosure

Photo 3: Bog Myrtle becoming too dense at Wilverley Bog West

7.5 LMG behavioural observations

Males fly readily when treading in the vicinity, sometimes landing 10 to 20 metres away. The larger females tend to move slightly on the ground or through the vegetation. One needs to look carefully as there can be several in close proximity.

When observing specimens resting on vegetation, they turn away if they realise there might be danger, sometimes walking backwards to the protection of the undergrowth below. Stridulation is often heard on sunny, warm days, caused by males resting on vegetation flicking a hindleg (sometimes both) against a wing tip. This is often several bursts at a rate of two or three a second, a sound quite unlike other British grasshoppers. Both sexes may produce this sound when threatened.

No egg-laying was observed, but it is reported that up to 14 eggs are laid in an elongated pod at the base of grass tufts, where they overwinter until spring. Mating pairs are apparently rarely seen and none noted during the fieldwork. Benton (2012) and Miller (2017) summarise the latest research.

7.6 LMG colour variation

LMG is a variable insect. It is usually olive-green (sometimes brownish), shading to yellow laterally. Females are sometimes greyish brown and various authors refer to an 'uncommon' female purple form. Several of our UK grasshoppers have a pink or purple colour form, usually in both sexes. However, in adults they are only known in female LMG and are thought to be linked to genetics. There is, for example, references to erythrism, a little-understood genetic mutation caused by a recessive gene. This is not a convincing argument and in need of further research.

A simpler explanation is likely. The wide variation in colours of even our British grasshopper species, indicates they are often simply matching their surroundings, presumably for camouflage. Purple colour forms of the LMG are well hidden in areas near flowering heather. The purple forms appear to the human eye to be conspicuous when seen against green backgrounds, but possibly does not stand out to potential predators, and may be well camouflaged against some of the red/brown forms of *Sphagnum*.

In certain Australian pest phasmids (stick insects), when large populations occur, a changed colour phase for some females may help them survive predation (an adaptation known as kentromorphism; Key 1957). Kentromorphism is little known but a change brought about by environmental stimuli (high population density) cannot be ruled out in LMG. The limited data on purple form LMG (see below) certainly links in with some of the better sites, but kentromorphism is considered unlikely, as purple forms do not appear to occur in all the strong populations, being unrecorded at sites such as Matley Bog and surrounds.

Purple form, females noted in 2017:

- Bagnum Bog SU18780213 [Paul Brock, 10 August 2017 – edge of bog between heather and mire]
- Bagnum Bog SU18740210 [Paul Brock, 26 August 2017 – edge of bog between heather and mire, opposite side of bog, clearly a different specimen]
- Bagnum Bog approx. in areas above x 3 [Bjorn Beckmann, Paul Brock & Martin Harvey, 15 September 2017] – one only showing minor purple marks on face and laterally on thorax
- Peaked Bottom SU36019974 [Leanne Sargeant, 8 August 2017 – interface between heather and mire]
- Shoot Wood area SU23490325 [Richard Reeves, 13 August 2017]
- Shoot Wood area SU23420327 x 5 [Richard Reeves, 13 August 2017 – more in wetter area, away from heathers]

Also recorded in the past:

- Bagnum Bog SU18740213 [Dave Browne 6 September 2014, Paul Brock, 15 September 2014]
- Hincheslea Bog [Richard Reeves, date(s) and exact grid references not specified, said to be pinkish/red unlike purple specimens west of Burley]
- Moonhills SU409025 [Tara Dempsey, 11 August 2010]
- Strodgemoor Bottom SU187037 [Tara Dempsey, 12 September 2010]
- New Forest [reported by Lucas, 1920]
- New Forest, locality not disclosed [Collins, 1993 - pink male and female nymph collected and reared. Male and offspring normal colour form, even if pink as nymphs - only the females remained pink in adult stage]

Some areas, including those beyond Lyndhurst, only appear to produce normal colour forms (observations by Brock and Reeves, pers. comm.).

8. Conclusions

Overall the results present an encouraging picture of LMG populations in the New Forest. There are few signs of change over the last 20 years, and populations remain widespread over much of the Forest area. Some of these populations are small, and there is good reason to regard them as vulnerable to habitat change, e.g. if water levels were to diminish and/or bogs were to become increasingly overgrown with Bog Myrtle, Purple Moor-grass or scrub and trees. But there is no sign at the present time of decline within the New Forest as a whole, and with mire restoration work taking place in the Forest there is the potential for LMG to strengthen its populations in future.

Past records show that LMG remains under-recorded unless targeted surveys are promoted. It would be worth investigating the potential for further volunteer involvement with this species, to confirm its presence at the full range of sites and/or to monitor its numbers at particular sites. Miller (2017) outlines a transect methodology that could be applied to individual sites, with the four strongest populations being the highest priorities for longer-term monitoring of this kind. However, the nature of these mire sites makes them hazardous to access and any volunteer programme would need careful planning and support.

9. Acknowledgements

Thanks to: Leanne Sargeant at Forestry Commission for setting up the project, and providing data along with much useful information about the sites; Helen Brock for assistance with fieldwork; Bjorn Beckmann of the national Orthoptera and Allies Recording Scheme for providing data, references and joining a site visit; Jacqui Miller of RSPB for providing additional references and a copy of her very informative report (Miller 2017); Richard Reeves and Colin Easton for providing unpublished records from 2017 and 2000 and for information on sites likely to support good LMG habitat; Martin Noble for discussion over potential habitat changes.

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Appendix 1: Sites surveyed in 2017

These details have also been supplied as a spreadsheet and GIS layer. Strong and Moderate populations are highlighted.

Site name	Survey grid ref	Visit dates	Temp_C	Weather conditions	Abundance in 2017	Change from 1997-98	Population assessment	Habitat potential	Notes
Bagnum Bog area	SU187021	10, 22 & 26.08.2017, & 15.09.2017	20-22	Sunny, moderately windy	30		Strong	High	Checked various areas, concentrating on Bagnum Bog SU18780213 with plenty of singing, found them all along bog edges from SU18840208 to SU18720212. Terrain difficult to access in parts, population restricted by size of boggy areas but at Bagnum alone (a small site) potentially low hundreds with sparser populations elsewhere in the vicinity. At least three purple form females noted.
Strodgemoor Bottom	SU187037	22.08.2017	20	Cloudy, moderately windy	2		Moderate	Moderate	Found at SU18740380, also SU18780302 but weather mixed. A purple form reported in 2010 indicates a reasonable population size
Foulford Farm sub-valley	SU187049	22.08.2017	20	Cloudy, moderately windy	0	Continued absence	Absent	Low	As in 1997/8 survey, not traced, but conditions not ideal. Some sphagnum among drier areas.
Foulford Bottom	SU189054	06.09.2017	18	Cloudy, moderately windy	0	Continued absence	Absent	Low	As in 1997/8 survey, not traced, but conditions not ideal. Potential possibly moderate, but limited amount of sphagnum - could easily be present somewhere in the area
Cranes Moor	SU194027	26-27.08.2017	19	Sunny, fairly still	8	Still present	Moderate to strong	Moderate to high	First find SU19560260 and singing. Bulk around SU194027 [by Colin Easton] once a route was worked out on 27/08. Terrain difficult, likely to be plenty more grasshoppers in the areas of shorter vegetation. Reported population size [1997 report] looks exaggerated - populations can be very localised and numbers vary from year to year
near Blackbush Lodge	SU195035	22.08.2017	20	Cloudy, moderately windy	1		Moderate	Moderate	Found at SU19510350 but weather mixed. Past records indicate a reasonable population size, although it is difficult to access some areas, it is likely there are a number of populations in the area
Vales Moor	SU192043	27.08.2017	23	Sunny, fairly still	2	Still present	Weak	Moderate	First find SU19430397, also SU19000400. Believed to be in low numbers from past experience of the site

Site name	Survey grid ref	Visit dates	Temp_C	Weather conditions	Abundance in 2017	Change from 1997-98	Population assessment	Habitat potential	Notes
Foulford Bottom; Vereley	SU192055	22.08.2017 & 06.09.2017	20	Cloudy, moderately windy	0		Absent	Low	Conditions not ideal. A weak population is likely with a find in 1997, as there is a limited amount of sphagnum - could easily be present in low numbers but absent again on a short second check of the site
Latchmore Bottom	SU190125	27.08.2017	24	Sunny, fairly still	0		Absent	Low	Grid ref given unsuitable heavily grazed habitat, checked possible more likely areas nearby also where Scarce Blue-tailed Damselfly occurs, for example SU19041264, SU19101272, SU19141282
Common Moor, north of Burley Street	SU205045	29.08.2017	22	Mixed, fairly still	0	Continued absence	Absent	Low	In part fairly overgrown with Bog Myrtle, but all typical bog vegetation present in this small, isolated site
Splash Bridge	SU203117	01.08.2017	19	Mixed, moderately windy	1		Weak	Moderate	Reported by Richard Reeves at SU20391175, typical bog vegetation on a sphagnum carpet. 2 recorded at the same site by Colin Easton 28.08.2017 at 22C, indicating just a weak, isolated population
Harvest Slade Bottom	SU212062	06.09.2017	17.5	Mixed, moderately windy	0	Continued absence	Absent	Low	Probably unsuitable, little sphagnum and some drier habitats
Harvest Slade Bottom to Blackensford Bottom	SU219065	06.09.2017	17.5	Mixed, moderately windy	0	Continued absence	Absent	Low	Probably unsuitable, little sphagnum
Holmsley Bog	SU221015	29.08.2017	24	Mixed, fairly still	1	Gain	Weak	Low	Found at SU22220151. Difficult to access centre of bog; likely to be low population
Shoot Wood area, Burley	SU236032	13.08.2017 & 24.08.2017	20-22	Mixed (sunny 24.08), fairly still	50		Strong	High	Grasshoppers well spread at this little known site pointed out by Richard Reeves with all bog vegetation and good sphagnum carpets. Good population concentrated on SU23660325, including purple form females at SU23490325 and SU23420327. Plenty heard singing, particularly SU23420323 to SU23420327
Clayhill Bottom	SU231015	29.08.2017	22	Mixed, fairly still	2		Weak	Moderate	Found at SU23170159. Some sphagnum but a lot dried up. All bog vegetation present, some Bog Myrtle. Wet areas by bridge productive, but fairly overgrown
Dames Slough area	SU247053	29.08.2017	22	Cloudy, fairly still	0		Absent	Low	Woodland clearings look unsuitable, not boggy. Possibly a recording error in 1975 or now unsuitable

Site name	Survey grid ref	Visit dates	Temp_C	Weather conditions	Abundance in 2017	Change from 1997-98	Population assessment	Habitat potential	Notes
Duckhole Bog	SU251020	28.08.2017	23	Sunny, fairly still	8	Still present	Moderate	Moderate	Good patches of sphagnum, particularly around pools SU25160204 and SU25150294; access difficult in parts so mainly concentrated on more straightforward areas. Singing heard. Specimens found at various spots SU25220219 along edges of the bog to SU25150204. Reported at SU25640265 by Richard Reeves on 05.08.2017 in mixed weather
Redhill Bog	SU268018	29.08.2017	25	Mixed, moderately windy	1		Weak	Moderate	Very wet, mixture of bog plants with much sphagnum. Found at SU26840185. Richard Reeves recorded 2 at 'Redhill Bog' on 05.08.200 at SU268020
Holmhill Bog	SU265021	17.08.2017	20	Sunny, moderately windy	0	Not found	Moderate	Moderate	Shorter vegetation than some surrounding bogs. A likely small to modest population, but none found this survey - although present at nearby sites e.g. towards Duck Hole. Richard Reeves found 'lots' at SU267027 and SU265025 on 12.08.2000
Clumber Inclosure Area	SU267030	17.08.2017	20	Sunny, moderately windy	2	Still present	Weak	Moderate	Found at SU26560330 and SU26440315. Assessed as weak population due to the large size of the site, which is getting overgrown with Bog Myrtle. Little sphagnum
Nomansland (Lords Oak)	SU263174	29.08.2017 & 31.08.2017	20-22	Sunny, fairly still to windy	8		Moderate	Moderate	Found at much the same spot as in 1983, site with plenty of sphagnum, shorter grasses and small areas of Bog Myrtle
Hinchelsea Bog	SU274005	25.08.2017	21	Sunny, fairly still	8	Still present	Moderate	High	Found at SU27560053, SU27660050 to SU27770049, with singing in several areas. 1997/8 report suggested 'low density', but this is a large site, part of it in much better condition for Large Marsh than most bogs. With singing insects, easily in double figures in areas sampled c.15, making it one of the better sites
Roman Bridge, Bramble Hill; Warwickslade	SU274068	28.08.2017	25	Sunny, fairly still	17		Strong	High	Typical wet bog including sphagnum. Found at SU27480673 and many others to SU27550679. Across the other side of the track the population was sparse, with some dry sphagnum, but still found at SU27410693 and SU27400693. Access difficult, so actual population likely to be c.100 in a modest size area of habitat - also visited 19.08.2017 at 17.5C and none seen or heard in mixed conditions (forecast was sunny, but showers materialised!).

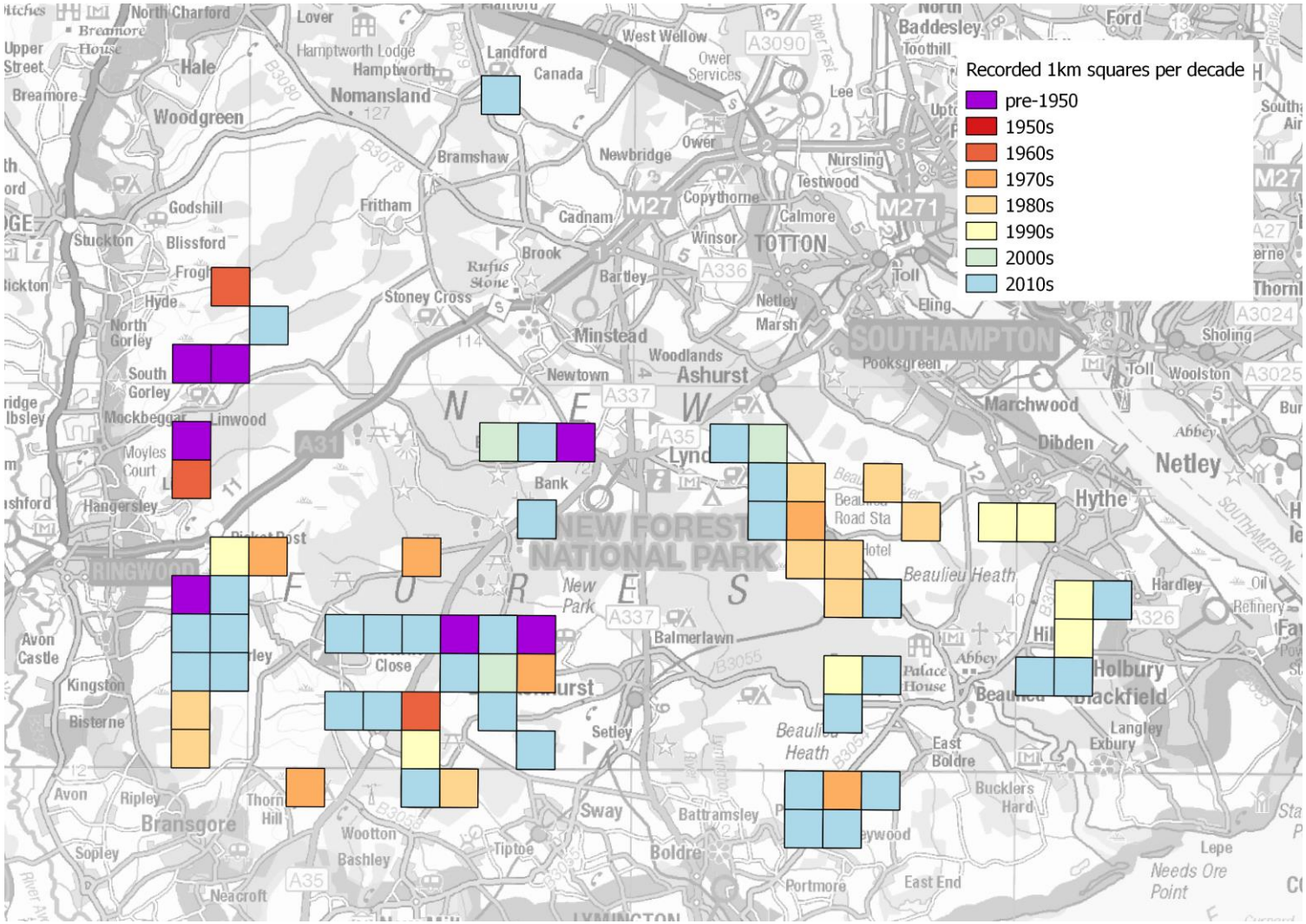
Site name	Survey grid ref	Visit dates	Temp_C	Weather conditions	Abundance in 2017	Change from 1997-98	Population assessment	Habitat potential	Notes
Acres Down	SU274087	19.08.2017	19-20	Mixed, moderately windy	1		Weak	Moderate	Found at SU27700820, close to a report of one by Colin Easton on 13.08.2017. Richard Reeves noted 2 at SU27030858 on tussocks in mire, on 01.08.2017. Mixed weather probably paid a part in lack of further sightings and indications are they are sparsely populated across these bogs. Records received from Dave Browne from August 2015 at SU27520893 and SU27390869
Shatterford Bottom	SU338066	31.07.2017	20	Sunny, moderately windy	0	Continued absence	Absent	Low	Sphagnum limited, few wet patches
Matley Bog A	SU335071	31.07.2017	20	Sunny, moderately windy	20		Strong	High	Typical wet bog habitat for Large Marsh including sphagnum; the terrain is difficult in places. Always well recorded here as this is a popular site with naturalists, most activity from SU33450699 to SU33460708, including singing. The site is known to extend to others nearby such as SU3407 (Phil Budd, 1987), SU3208 (Simon Currie, 2010) & Fort Bog SU334083 ('lots' recorded by Richard Reeves 09.08.2000) - potentially a large population in an area of difficult terrain. The population size varies from year to year
Matley Bog B	SU337076	28.07.2017	17	Cloudy, followed by drizzle	0		Absent	Moderate	Lots of White-beaked Sedge, quite a lot of Sphagnum, some small pools of water; signs of recent heavy cattle grazing. No evidence of LMG but weather was poor.
Shatterford; Stephill Bottom	SU348058	31.07.2017	21	Sunny, moderately windy	0	Continued absence	Absent	Moderate	Heavy grazing pressure; some taller vegetation - pines growing in the area require removal.
Hawkhill Bog	SU356018	13.08.2017	18-19	Sunny, fairly still	2	Still present	Weak	Moderate	Found at SU35720193 and SU35790197. Report by Simon Currie 08.2017: heard singing at SU35880191. Richard Reeves recorded 3 in Little Wood Bog SU357019 on 10.08.2000 (1990s records were allocated to SU3502 but were only metres away from 2017 records
Denny Bog (Rowbarrow)	SU355043	01.09.2017	18	Sunny, moderately windy	0	Continued absence	Absent	Low	Potentially too dry or unsuitable
Denny Bog (railway underpass)	SU352051	31.07.2017	20	Sunny, moderately windy	0	Continued absence	Absent	Low	SU350056 often flooded including track, other sites look unsuitable now, wet but anoxic. Difficult areas to access, possible Large Marsh still exist in a weak population, but not supported by 1997 survey and now 2017

Site name	Survey grid ref	Visit dates	Temp_C	Weather conditions	Abundance in 2017	Change from 1997-98	Population assessment	Habitat potential	Notes
Furzey Lodge	SU365022	06.09.2017	18	Cloudy, moderately windy	1		Weak	Low	Small isolated bog, all typical bog plants present but sphagnum rather limited. Found at SU36670228
Denny Bog (Pig Bush)	SU360047	13.08.2017	20	Mixed, fairly still	3	Gain	Moderate	Moderate	Some dry areas in a moderate size bog. Three females found in a minute at SU3646 0470, SU3665 0474 & SU3645 0469 in indifferent weather indicate that there are at least sparse populations, hence an assessment of a moderate population
Ferny Crofts Bottom	SU364054	13.08.2017	20	Sunny, fairly still	0	Continued absence	Absent	Moderate	Started surveying From SU36490525; habitat could be suitable, but rather limited in size and with good weather conditions, expected to hear/see the species, if present
Beaulieu River Valley; Ferny Crofts Valley	SU372059	01.09.2017	18	Sunny, moderately windy	0	Continued absence	Absent	Moderate	(Covered when checking boggy sites from SU372060)
Yew Tree Heath	SU370068	01.09.2017	18-20	Mixed, moderately windy	0	Continued absence	Absent	Low	If still present at any of these sites, presumably in very low numbers
Dibden Bottom	SU393065	15.08.2017	21	Mixed, fairly still	0	Continued absence	Absent	Moderate	Checked various areas, including bog by bridge SU39740611
Moonhills Bog A	SU409025	15.08.2017	18	Mixed, fairly still	1		Weak	Moderate	Damp bog, plenty of tussocks, much of SU409025 with Bog Myrtle absent. Found at SU41020252
Dibden Inclosure Valley	SU400062	15.08.2017	20	Mixed, fairly still	0	Not found	Weak	Moderate	Very wet bog, but some areas on slope dry; access difficult, could easily be present in pockets in better weather
Moonhills Bog B	SU412028	15.08.2017	19	Mixed, fairly still	0		Weak	Moderate	Small area, rather overgrown with Bog Myrtle and possibly unsuitable now, although Richard Reeves (pers. comm.) reports finding them at SU411029 (5) and SU414025 (2) on 11.08.2000, so there are suitable areas in the grid square
Ipers Bridge Road Copse	SU411030	15.08.2017	19-20	Sunny, fairly still	3	Still present	Moderate	Moderate	Limited size site, singing heard. Found at SU41110278, SU41130278 & SU41150278
Stonyford Pond Valley	SU419043	15.08.2017	19	Mixed, fairly still	0		Absent	Low	Small wet area, with limited sphagnum
Hardley Bridge Valley and Holbury Mill Pond	SU422046	15.08.2017	20	Mixed, fairly still	1	Still present	Moderate	Moderate	Plentiful grasshoppers at Hardley Bridge Valley (fenced off from the Holbury Mill Pond walk, access to some areas difficult), but little sign of Large Marsh except at SU42220469. Mixed weather did not help and there may well be a reasonable population in the vicinity, as in 1997

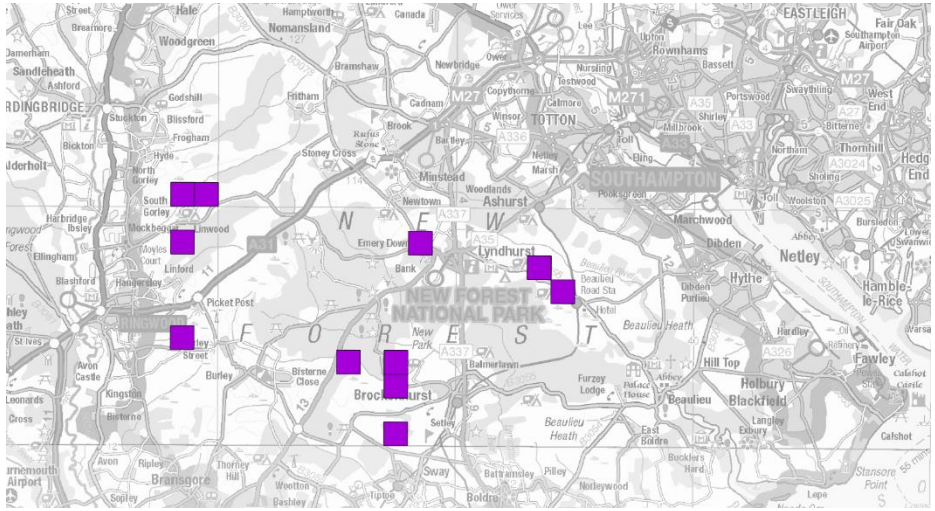
Site name	Survey grid ref	Visit dates	Temp_C	Weather conditions	Abundance in 2017	Change from 1997-98	Population assessment	Habitat potential	Notes
Wilverley Bog West	SZ246998	01.08.2017	21	Mixed, moderately windy	4	Still present	Moderate	High	Rather disappointing total of 4 in an hour at this heavily visited/recorded site. It would normally produce 4 in 15 mins from past experience. Those found were concentrated in SZ24959975 to SZ24949975, but used to be elsewhere. There were some sunny spells, but weather could have been a factor in the low number recorded, although most likely the site is becoming overgrown with Bog Myrtle which has spread in the last few years. Ideally this needs thinning and removing in part
Wilverley Bog East	SZ252997	01.08.2017	21	Mixed, moderately windy	0	Continued absence	Absent	Low	Dry, considered unsuitable
Crockford Stream	SZ349989	10.08.2017	20-21	Mixed, moderately windy	0		Weak	Low	Only time to look for about 15 minutes at the corner of this area; possibility of incorrect grid square, probably relates to Upper Crockford Bottom [worth the recording scheme contacting the recorder for a specific reference]
Upper Crockford Bottom	SZ347991	10.08.2017	20-21	Mixed, moderately windy	3	Still present	Moderate	High	Rather disappointing total of 3 in an hour at this heavily visited/recorded site. The weather is a possible factor, but it might have been a better year for them in 1998 as usually only a few are recorded. Found at SZ34869922, SZ34859924 and SZ34849914
Lower Crockford Bottom	SZ353988	10.08.2017	20	Mixed, moderately windy	1	Still present	Moderate	High	Rather disappointing total of 1 in an hour and singing at this heavily visited/recorded site. The weather is a possible factor. Found at SZ35149875
Peaked Bottom	SZ362994	10.08.2017	21	Mixed, moderately windy	1	Still present	Weak	Moderate	In the knowledge that Leanne Sargeant found a purple form female at SZ36019974 on 08.08.2017 in poor weather, the survey concentrated on other areas in the vicinity, without success - possibly due to unfavourable weather conditions.

Appendix 2: Changes in recorded distribution at 1km square level

These maps show all available records plotted as 1km grid squares. There is clearly variation between the decades, but much of this is due to variation in recording effort, and no overall trend in species distribution is apparent. However, it is reassuring that the total range within the Forest does not appear to be reducing.

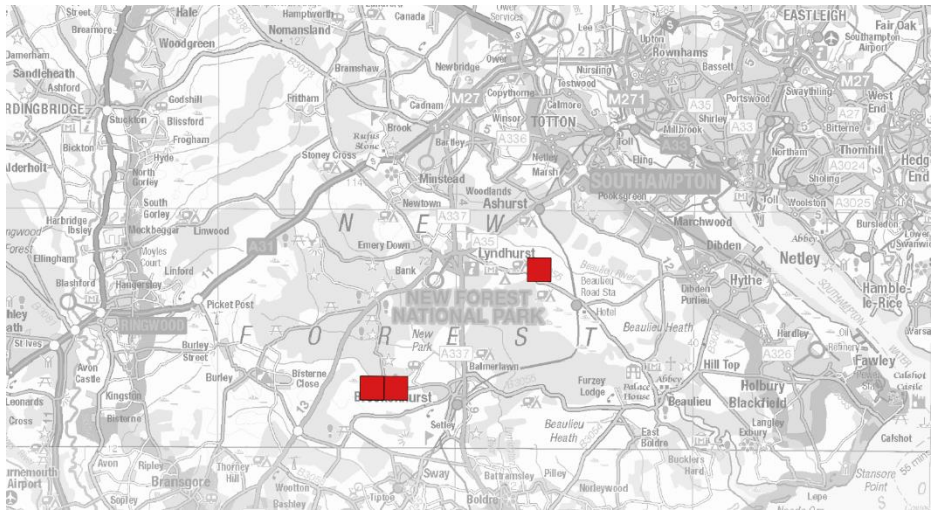


Before 1950:

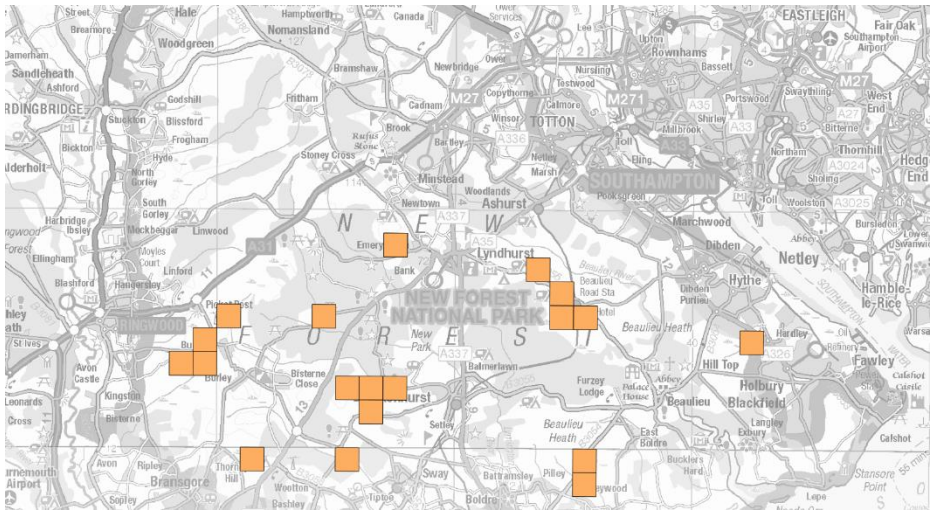


1960s:

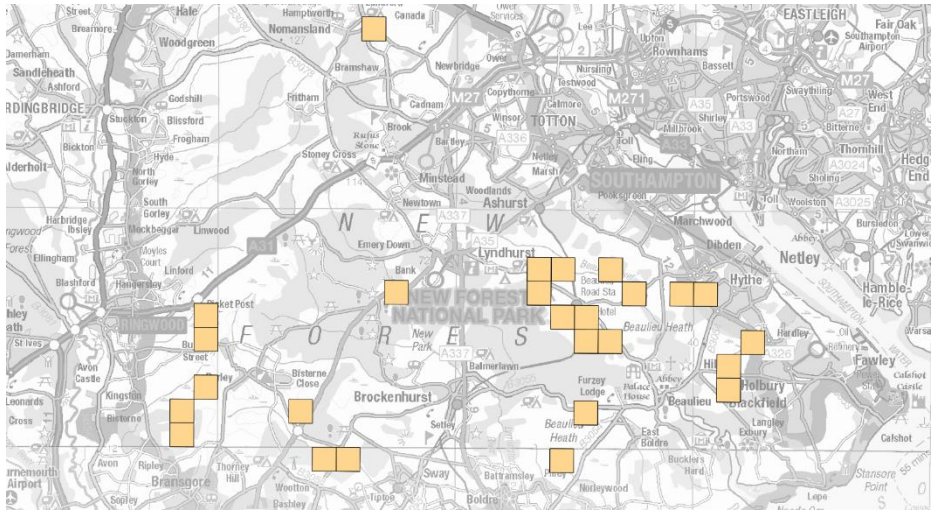
1950s:



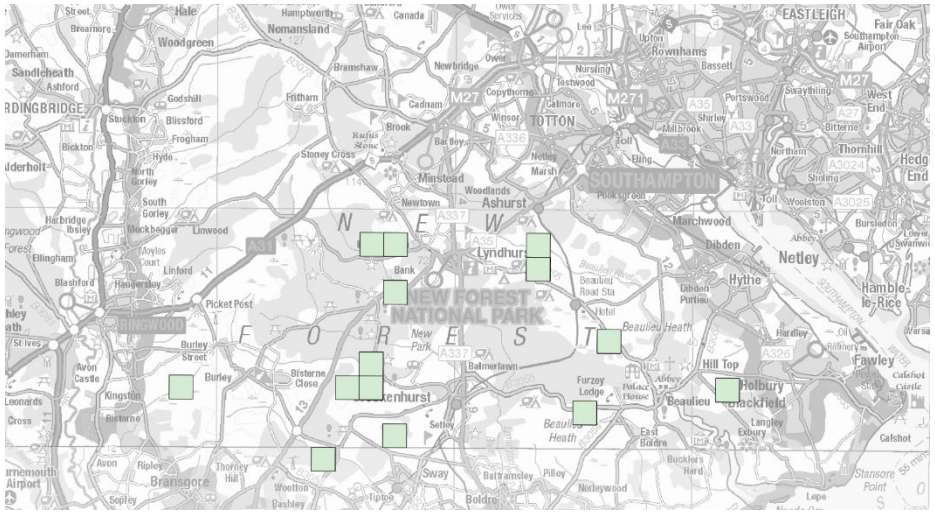
1970s:



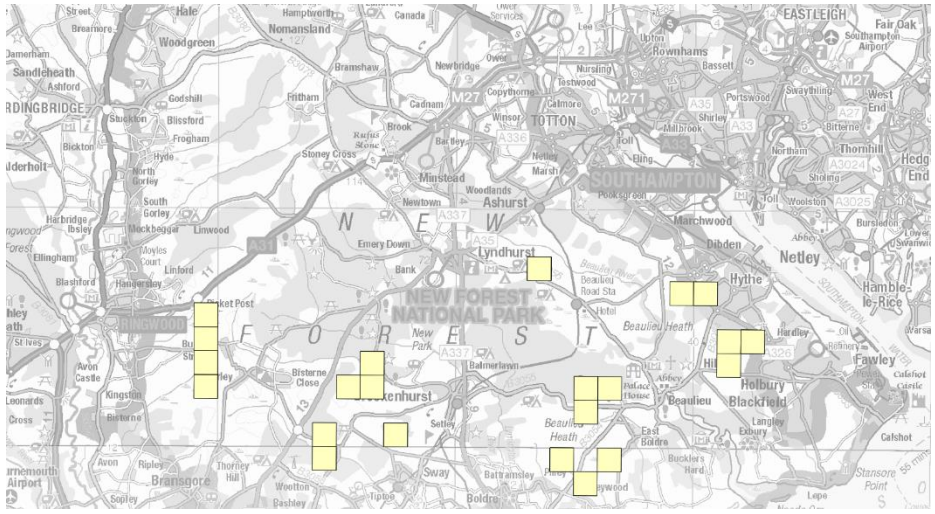
1980s:



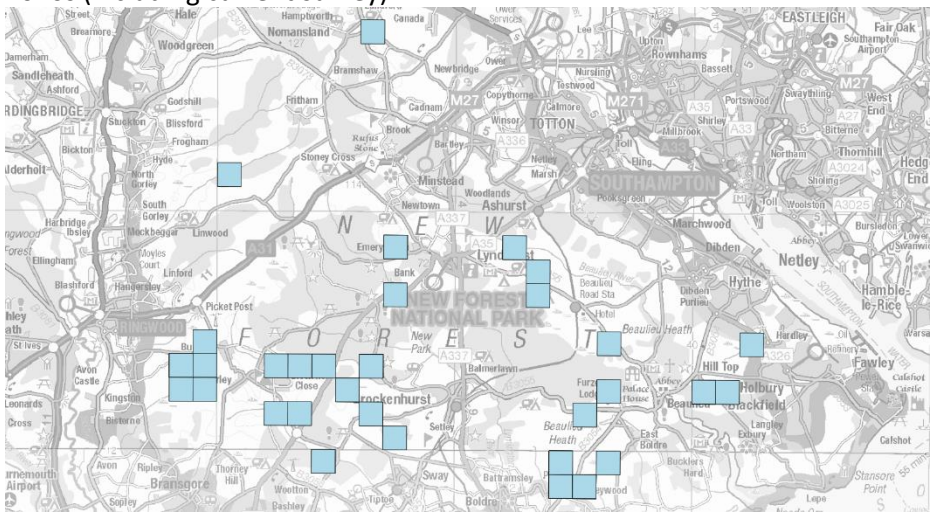
2000s:



1990s:



2010s (including current survey):



Appendix 3: Species photos

All photos by Paul D. Brock.

LMG female, Crockford, 10 Aug 2017

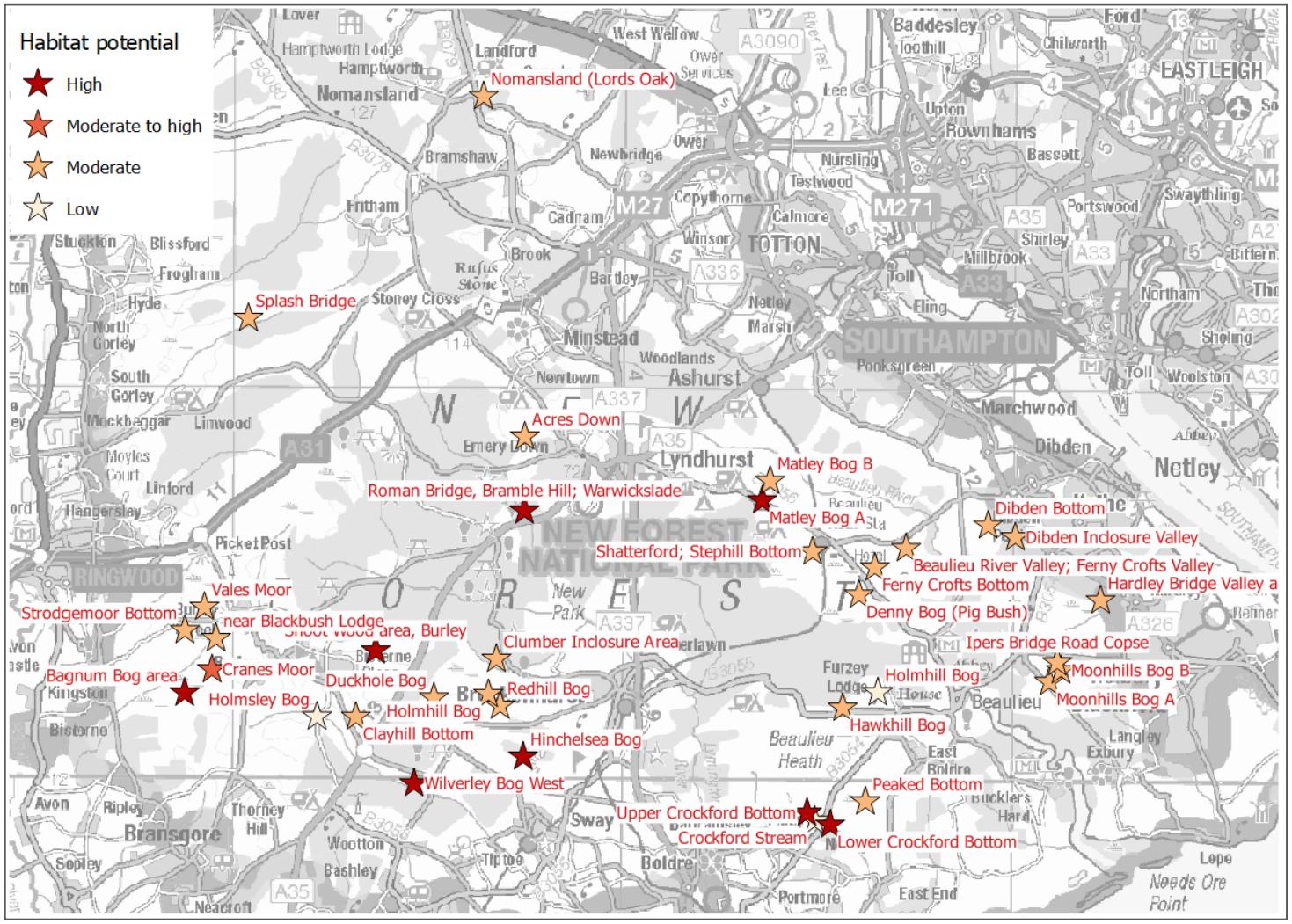
LMG female, purple form, Bagnum 26 Aug 2017

LMG male, Bagnum Bog, 26 Aug 2017

LMG male, Bagnum Bog, 22 Aug 2017

Appendix 4: Site maps and photos

Aerial photo maps are provided below for all sites surveyed in 2017 where LMG was found, or where the habitat was assessed as being of at least 'moderate' potential. The sites mapped are:



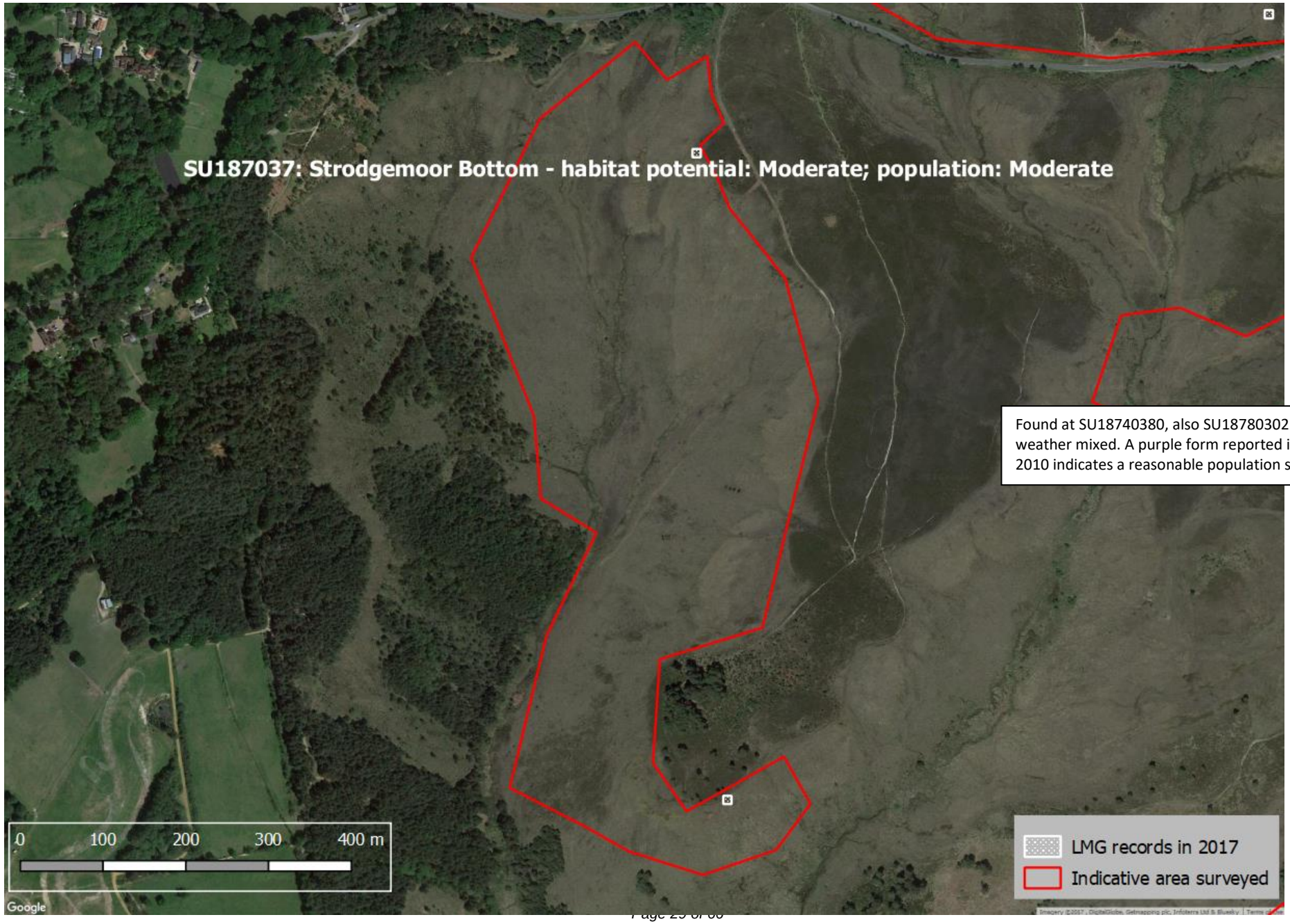
The following sites were also visited in 2017 but are not mapped as LMG was not found and conditions appeared unsuitable. Boundaries for these sites have been provided to FC as GIS data.

1km square	Site name	Survey grid ref
SU1804	Foulford Farm sub-valley	SU187049
SU1805	Foulford Bottom	SU189054
SU1905	Foulford Bottom; Vereley	SU192055
SU1912	Latchmore Bottom	SU190125
SU2004	Common Moor, north of Burley Street	SU205045
SU2106	Harvest Slade Bottom	SU212062
SU2106	Harvest Slade Bottom to Blackensford Bottom	SU219065
SU2405	Dames Slough area	SU247053
SU3306	Shatterford Bottom	SU338066
SU3504	Denny Bog (Rowbarrow)	SU355043
SU3505	Denny Bog (railway underpass)	SU352051
SU3706	Yew Tree Heath	SU370068
SU4104	Stonyford Pond Valley	SU419043
SZ2599	Wilverley Bog East	SZ252997

The red polygons shown on the aerial photos are indicative of the areas surveyed, but do not provide a detailed representation of the extent of the LMG populations, not of the extent of apparently suitable habitat. In view of the LMG's use of the edges of mires, where they start to grade in to drier heath, and also of the difficulty of access to some parts of the mires, it was not possible to provide a hard boundary to the sites assessed. The white squares are locations where LMG was seen and/or heard, based on GPS references.


SU187021: Bagnum Bog area - habitat potential: High; population: Strong
Checked various areas, concentrating on Bagnum Bog SU18780213 with plenty of singing, found them all along bog edges from SU18840208 to SU18720212. Terrain difficult to access in parts, population restricted by size of boggy areas but at Bagnum alone (a small site) potentially low hundreds with sparser populations elsewhere in the vicinity. At least three purple form females noted.
0
100
200
300
400 m
Google
LMG records in 2017
Indicative area surveyed

Bagnum Bog area, showing good habitat with wet mire in the centre, grading to drier heathland, and well-sheltered:


SU187037: Strodgemoor Bottom - habitat potential: Moderate; population: Moderate
Found at SU18740380, also SU18780302 but weather mixed. A purple form reported in 2010 indicates a reasonable population size.
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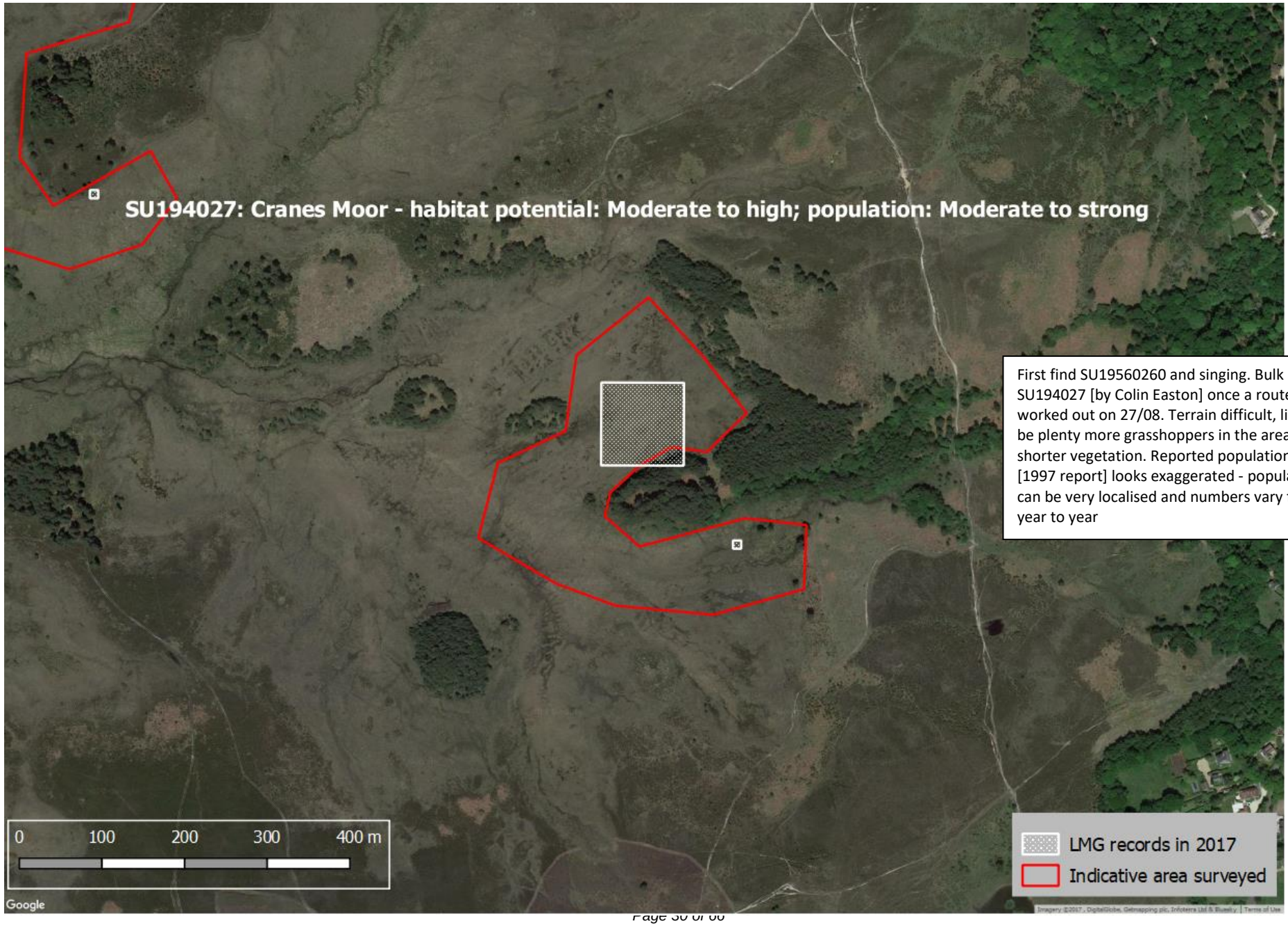
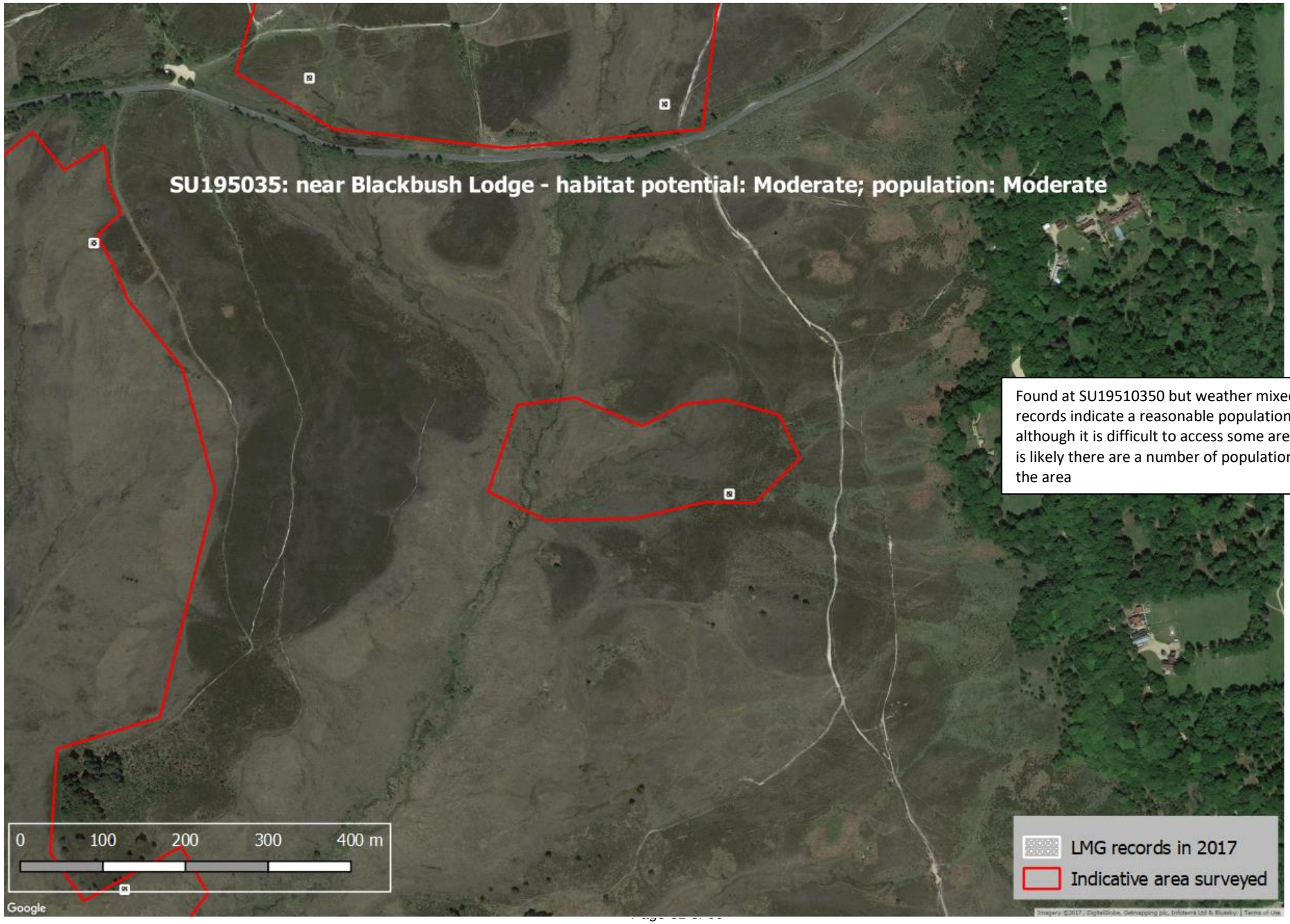
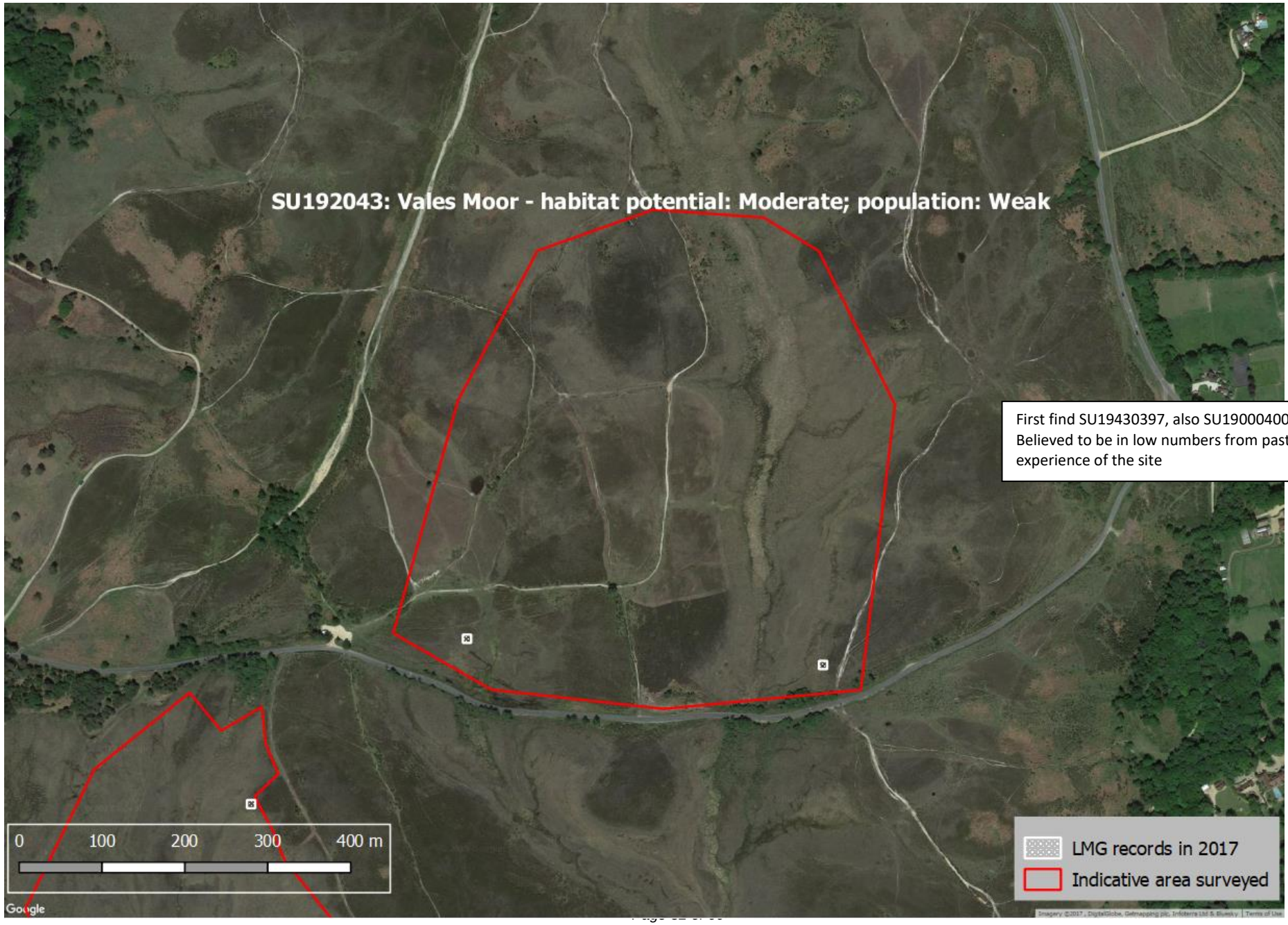
100
200
300
400 m
Google
LMG records in 2017
Indicative area surveyed


SU194027: Cranes Moor - habitat potential: Moderate to high; population: Moderate to strong
First find SU19560260 and singing. Bulk around SU194027 [by Colin Easton] once a route was worked out on 27/08. Terrain difficult, likely to be plenty more grasshoppers in the areas of shorter vegetation. Reported population size [1997 report] looks exaggerated - populations can be very localised and numbers vary from year to year
0
100
200
300
400 m
Google
LMG records in 2017
Indicative area surveyed


SU195035: near Blackbush Lodge - habitat potential: Moderate; population: Moderate
Found at SU19510350 but weather mixed. Past records indicate a reasonable population size, although it is difficult to access some areas, it is likely there are a number of populations in the area
0
100
200
300
400 m
Google
LMG records in 2017
Indicative area surveyed


SU192043: Vales Moor - habitat potential: Moderate; population: Weak
First find SU19430397, also SU19000400. Believed to be in low numbers from past experience of the site
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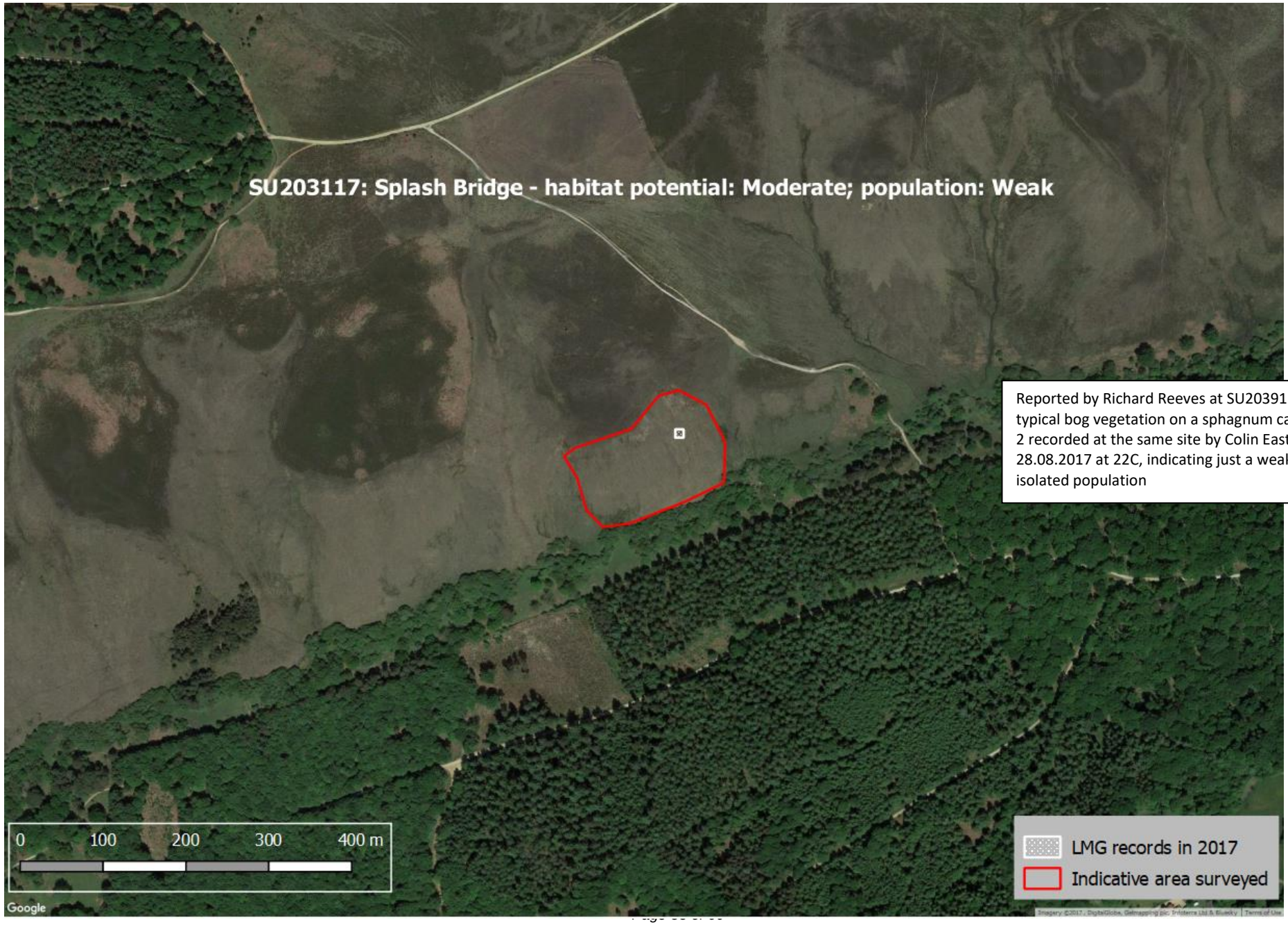
LMG records in 2017
Indicative area surveyed


SU203117: Splash Bridge - habitat potential: Moderate; population: Weak
Reported by Richard Reeves at SU20391175, typical bog vegetation on a sphagnum carpet. 2 recorded at the same site by Colin Easton 28.08.2017 at 22C, indicating just a weak, isolated population
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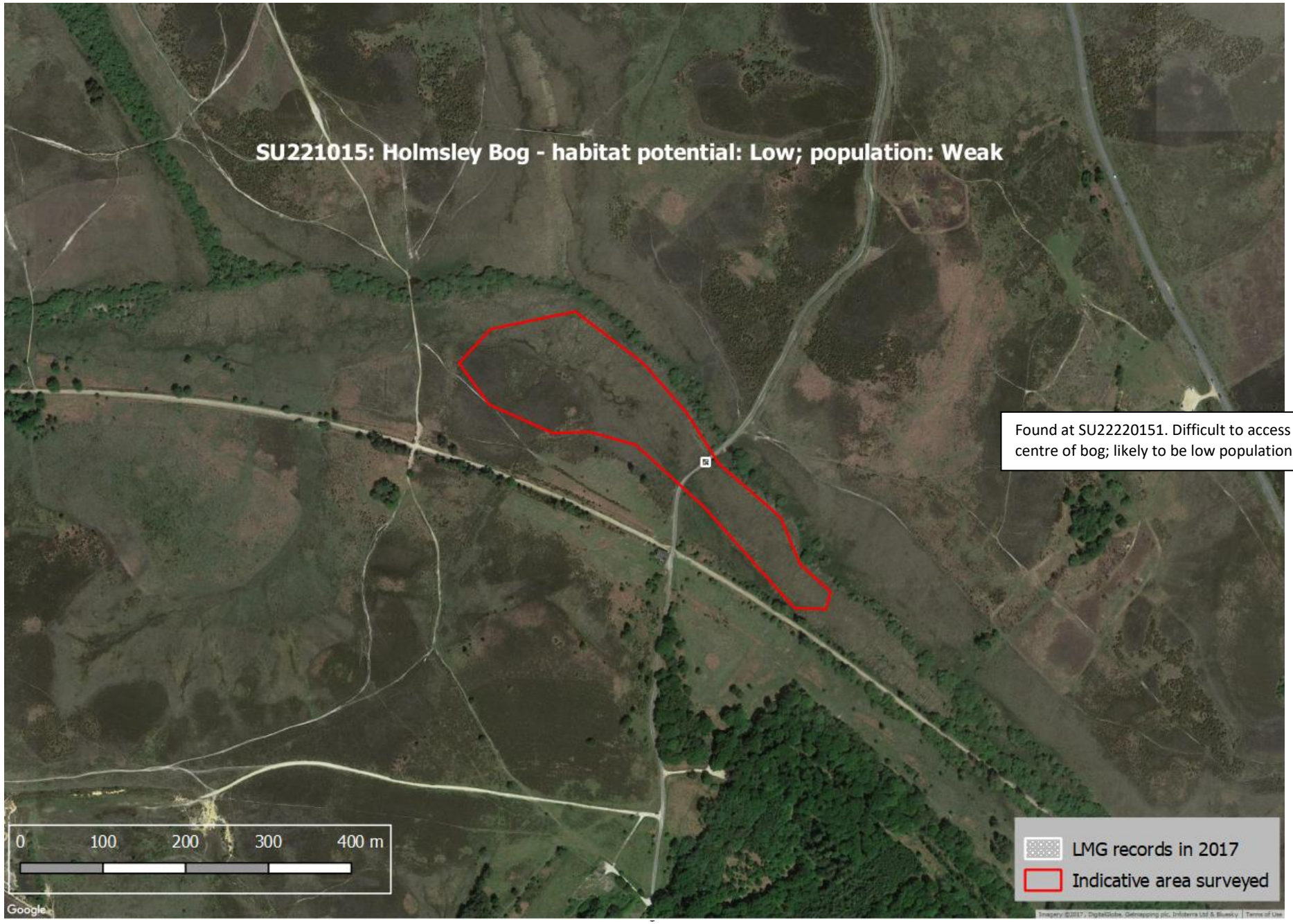
LMG records in 2017
Indicative area surveyed


SU221015: Holmsley Bog - habitat potential: Low; population: Weak
Found at SU22220151. Difficult to access centre of bog; likely to be low population
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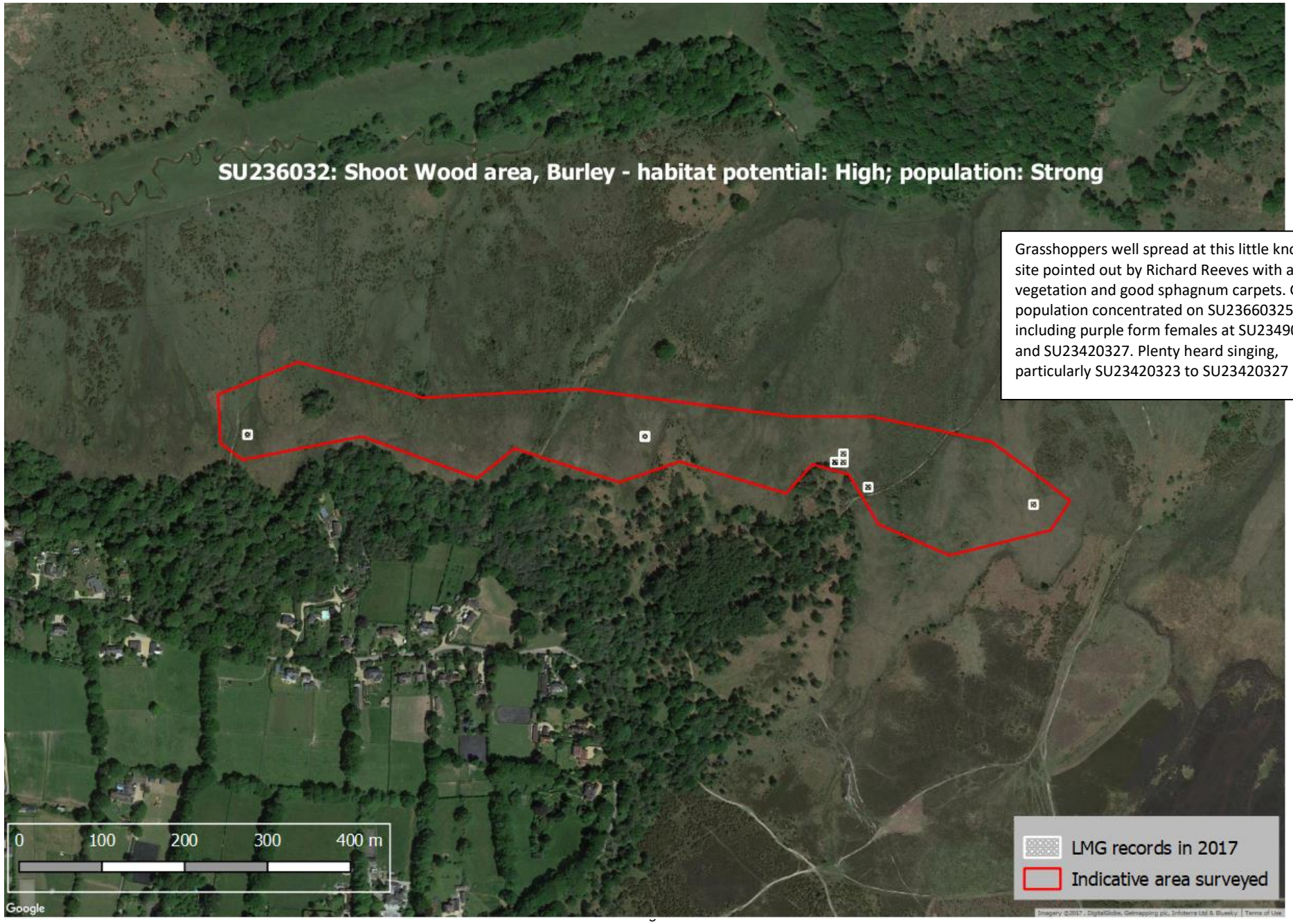
LMG records in 2017
Indicative area surveyed
Google


SU236032: Shoot Wood area, Burley - habitat potential: High; population: Strong
Grasshoppers well spread at this little known site pointed out by Richard Reeves with all bog vegetation and good sphagnum carpets. Good population concentrated on SU23660325, including purple form females at SU23490325 and SU23420327. Plenty heard singing, particularly SU23420323 to SU23420327
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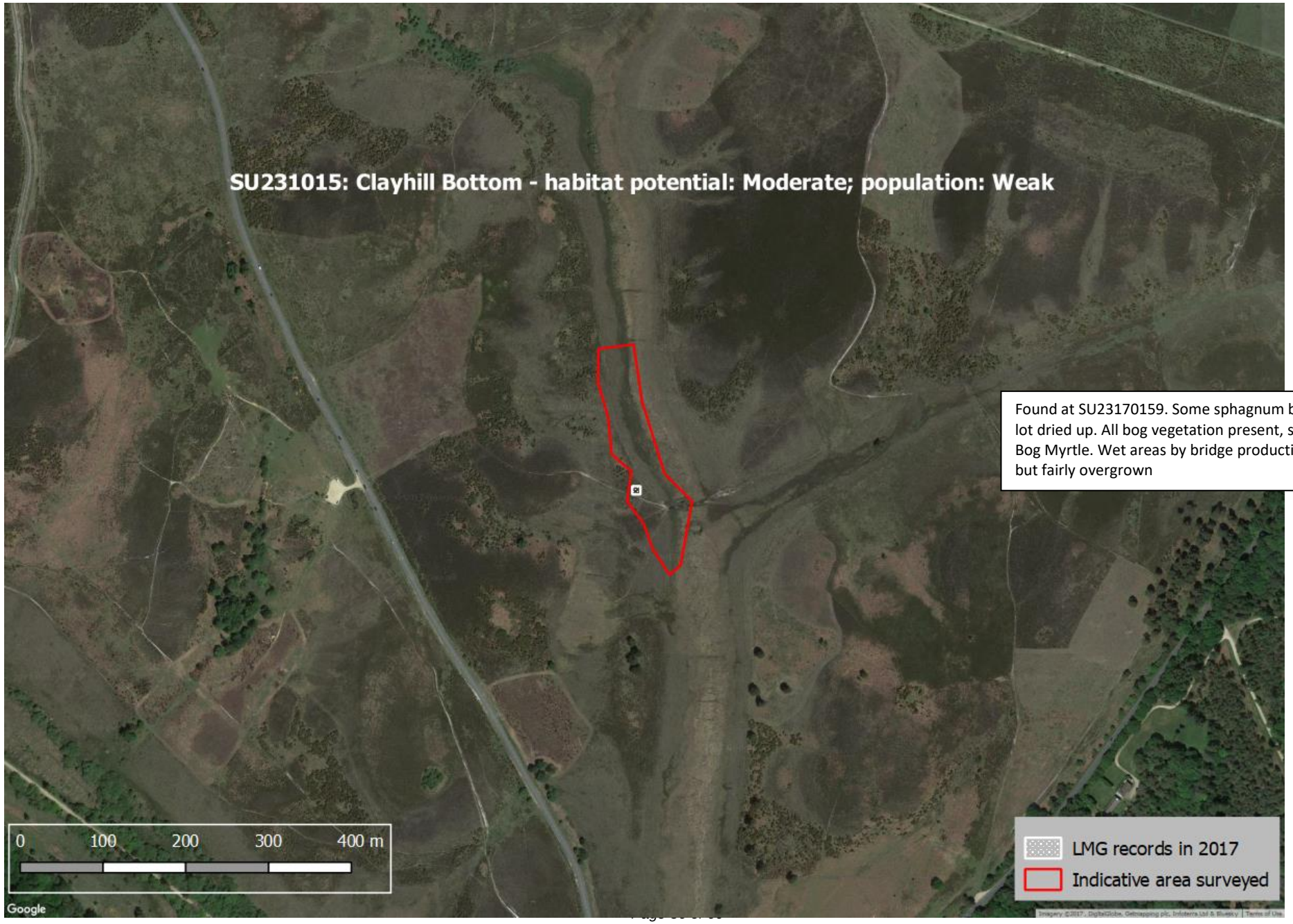
LMG records in 2017
Indicative area surveyed


SU231015: Clayhill Bottom - habitat potential: Moderate; population: Weak
Found at SU23170159. Some sphagnum but a lot dried up. All bog vegetation present, some Bog Myrtle. Wet areas by bridge productive, but fairly overgrown
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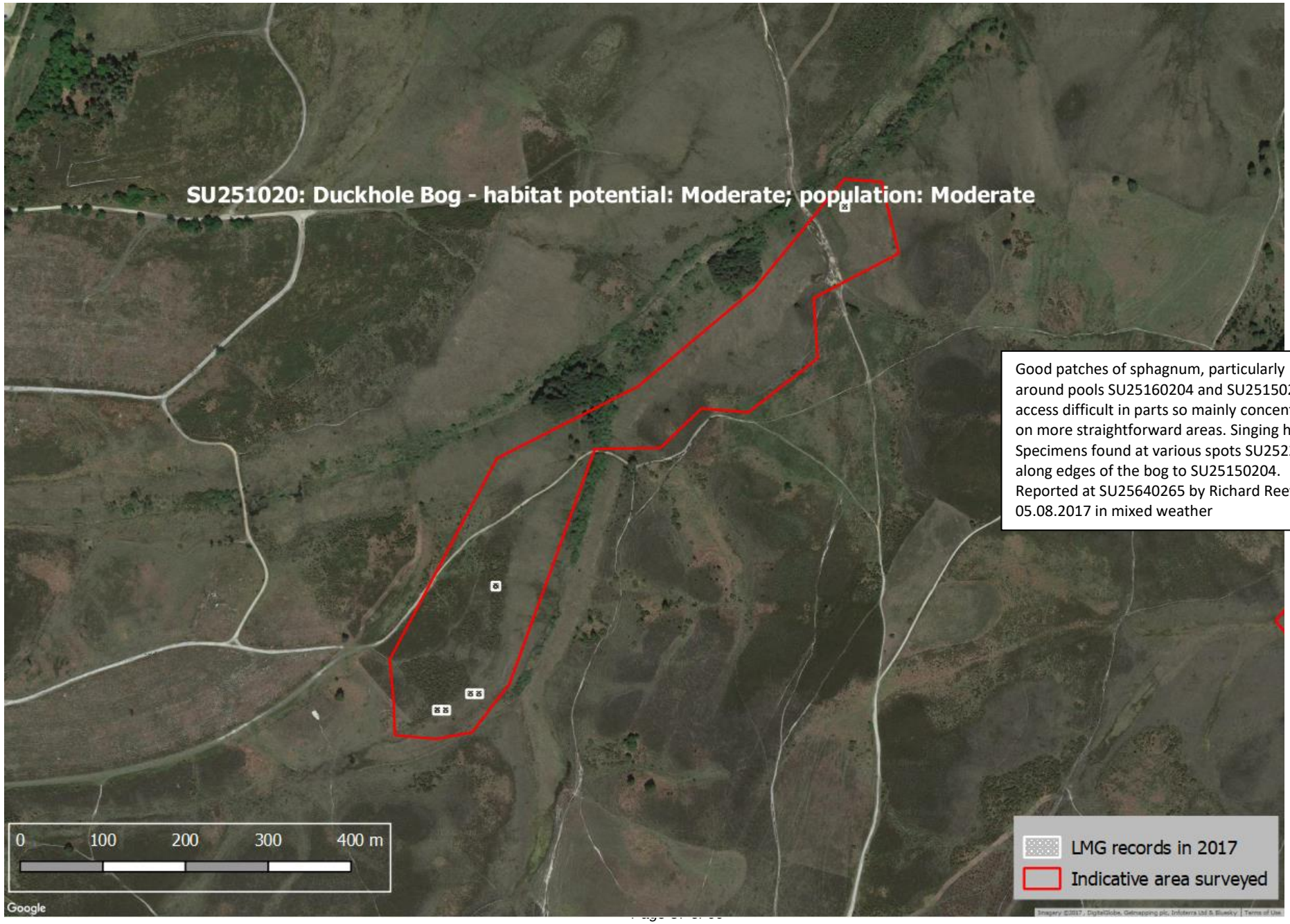
LMG records in 2017
Indicative area surveyed


SU251020: Duckhole Bog - habitat potential: Moderate; population: Moderate
Good patches of sphagnum, particularly around pools SU25160204 and SU25150294; access difficult in parts so mainly concentrated on more straightforward areas. Singing heard. Specimens found at various spots SU25220219 along edges of the bog to SU25150204. Reported at SU25640265 by Richard Reeves on 05.08.2017 in mixed weather
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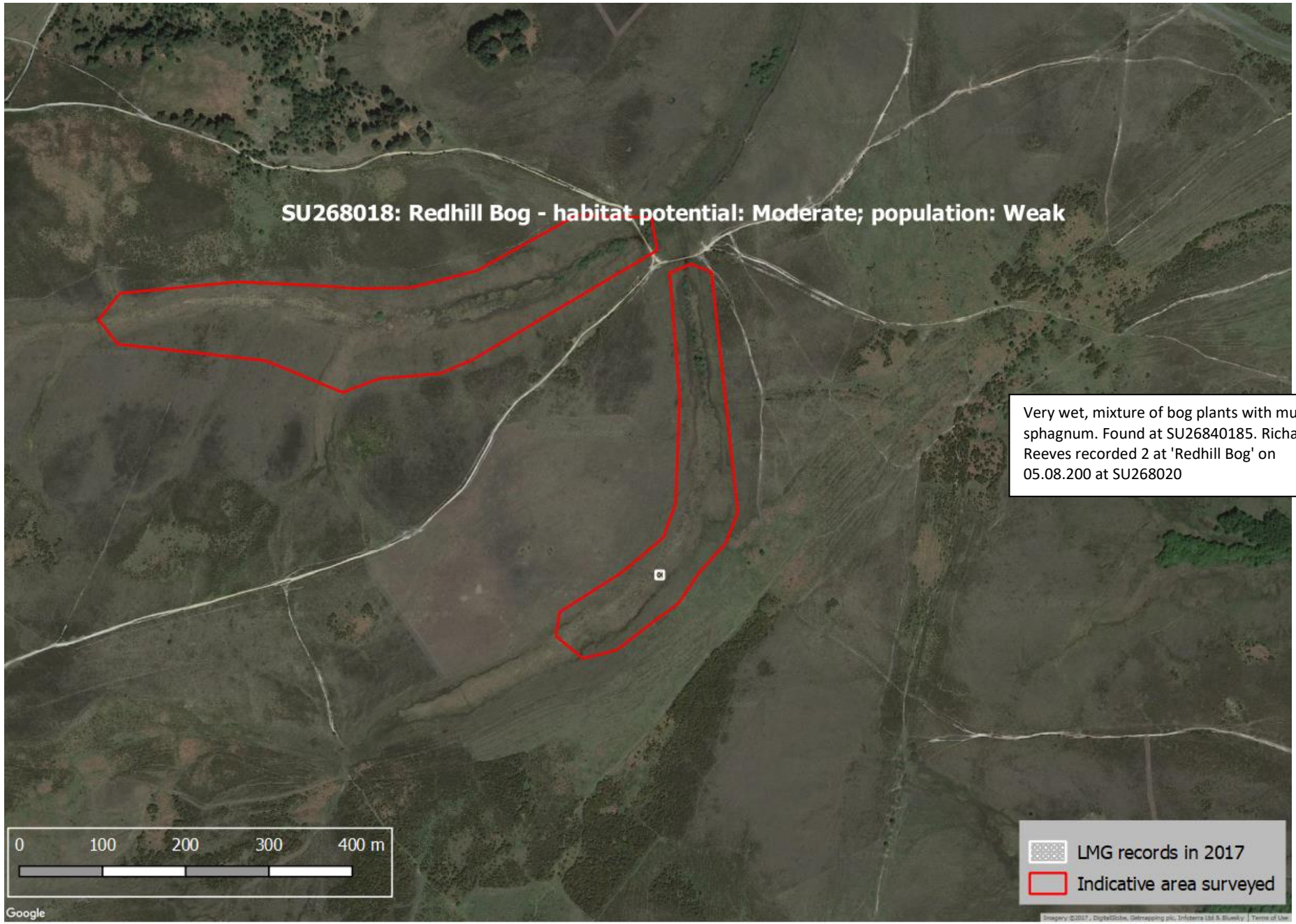
LMG records in 2017
Indicative area surveyed

Duckhole Bog:


SU268018: Redhill Bog - habitat potential: Moderate; population: Weak
Very wet, mixture of bog plants with much sphagnum. Found at SU26840185. Richard Reeves recorded 2 at 'Redhill Bog' on 05.08.200 at SU268020
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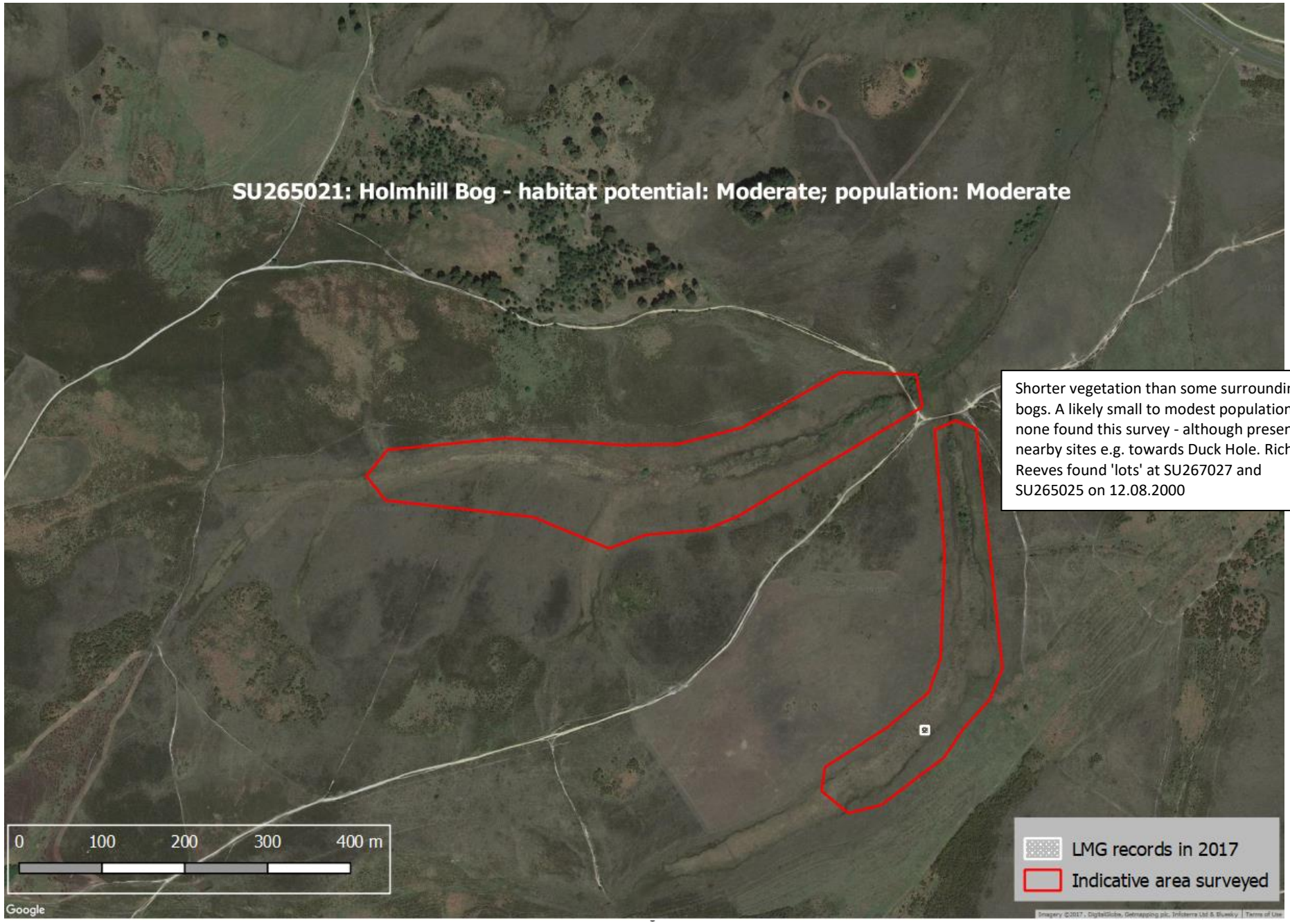
LMG records in 2017
Indicative area surveyed


SU265021: Holmhill Bog - habitat potential: Moderate; population: Moderate
Shorter vegetation than some surrounding bogs. A likely small to modest population, but none found this survey - although present at nearby sites e.g. towards Duck Hole. Richard Reeves found 'lots' at SU267027 and SU265025 on 12.08.2000
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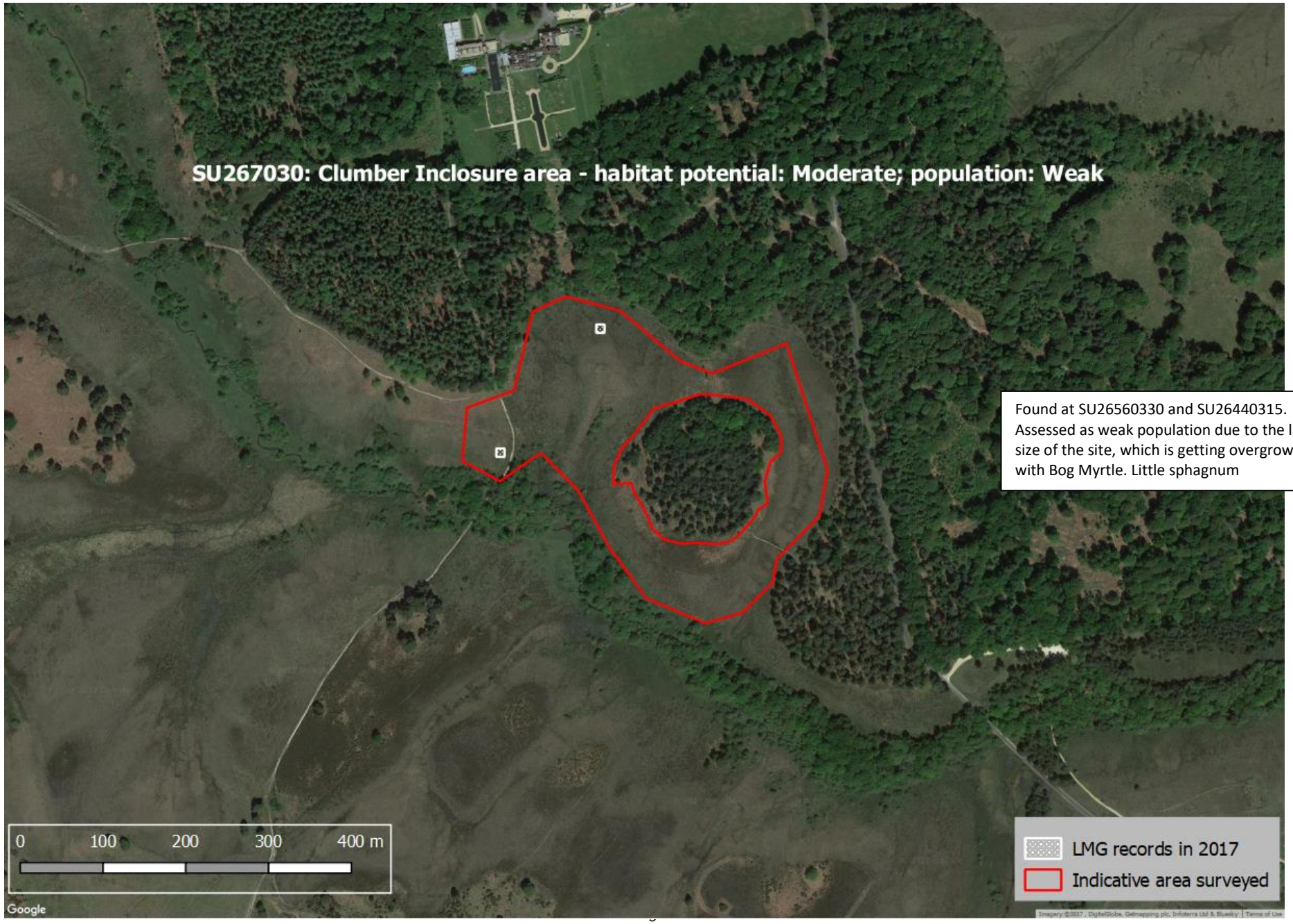
LMG records in 2017
Indicative area surveyed


SU267030: Clumber Inclosure area - habitat potential: Moderate; population: Weak
Found at SU26560330 and SU26440315. Assessed as weak population due to the large size of the site, which is getting overgrown with Bog Myrtle. Little sphagnum
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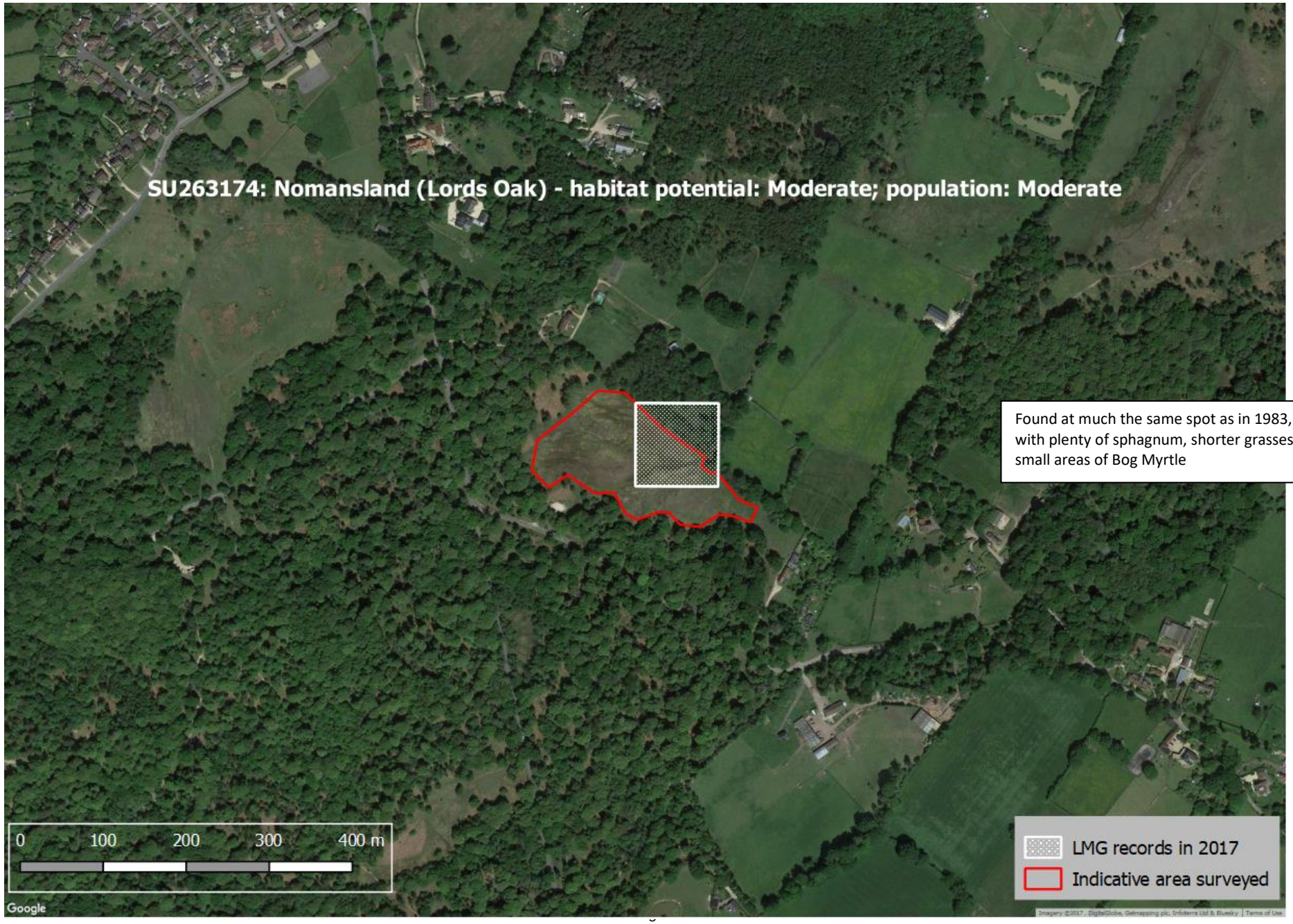
LMG records in 2017
Indicative area surveyed


SU263174: Nomansland (Lords Oak) - habitat potential: Moderate; population: Moderate
Found at much the same spot as in 1983, site with plenty of sphagnum, shorter grasses and small areas of Bog Myrtle
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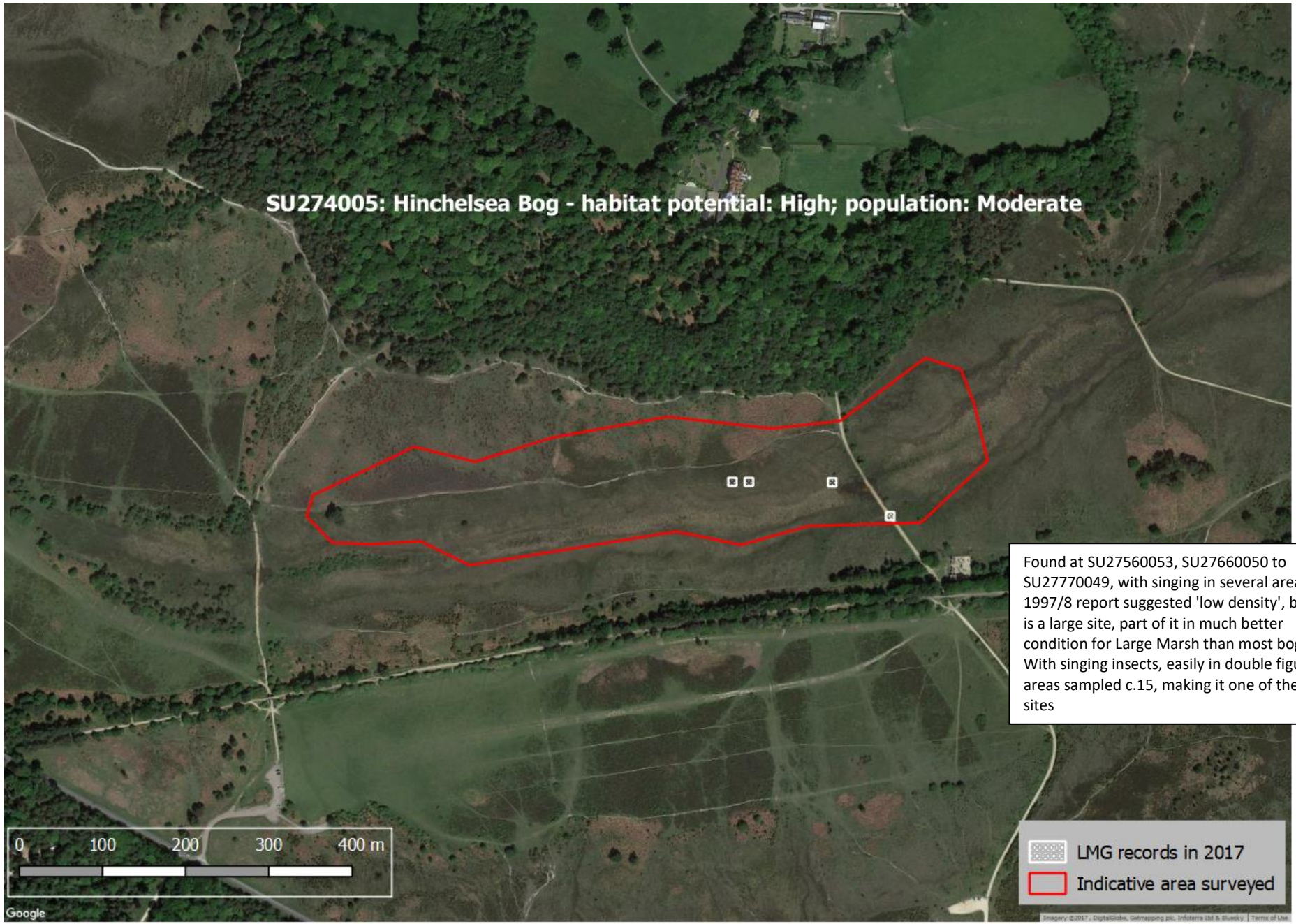
LMG records in 2017
Indicative area surveyed


SU274005: Hinchelsea Bog - habitat potential: High; population: Moderate
Found at SU27560053, SU27660050 to SU27770049, with singing in several areas. 1997/8 report suggested 'low density', but this is a large site, part of it in much better condition for Large Marsh than most bogs. With singing insects, easily in double figures in areas sampled c.15, making it one of the better sites
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Google
LMG records in 2017
Indicative area surveyed

Hinchelsea Bog, good habitat:


SU274068: Roman Bridge, Bramble Hill; Warwickslade - habitat potential: High; population: Strong
Typical wet bog including sphagnum. Found at SU27480673 and many others to SU27550679. Across the other side of the track the population was sparse, with some dry sphagnum, but still found at SU27410693 and SU27400693. Access difficult, so actual population likely to be c.100 in a modest size area of habitat - also visited 19.08.2017 at 17.5C and none seen or heard in mixed conditions.
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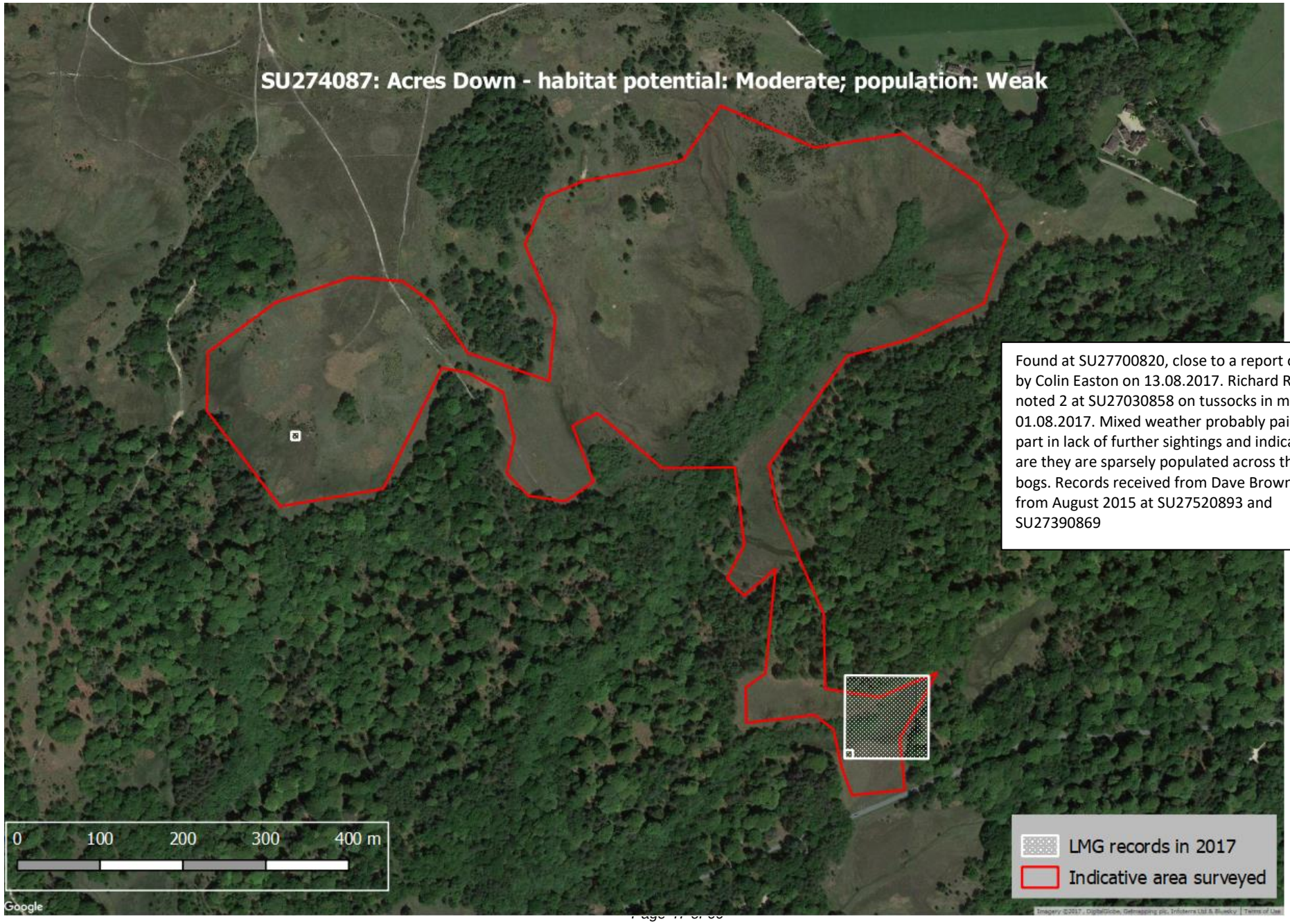
LMG records in 2017
Indicative area surveyed

Warwickslade area, supported a strong population:


SU274087: Acres Down - habitat potential: Moderate; population: Weak
Found at SU27700820, close to a report of one by Colin Easton on 13.08.2017. Richard Reeves noted 2 at SU27030858 on tussocks in mire, on 01.08.2017. Mixed weather probably paid a part in lack of further sightings and indications are they are sparsely populated across these bogs. Records received from Dave Browne from August 2015 at SU27520893 and SU27390869
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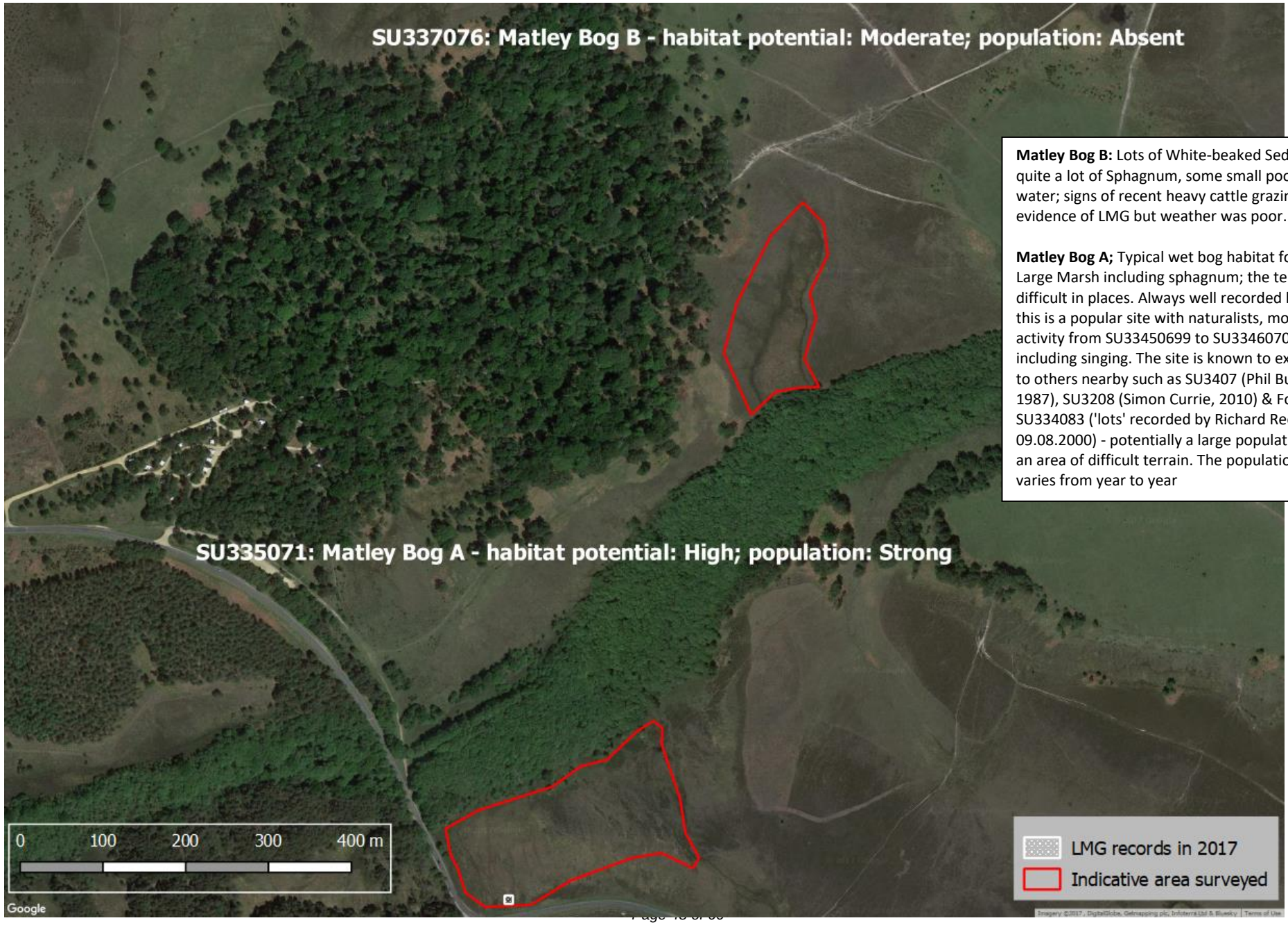
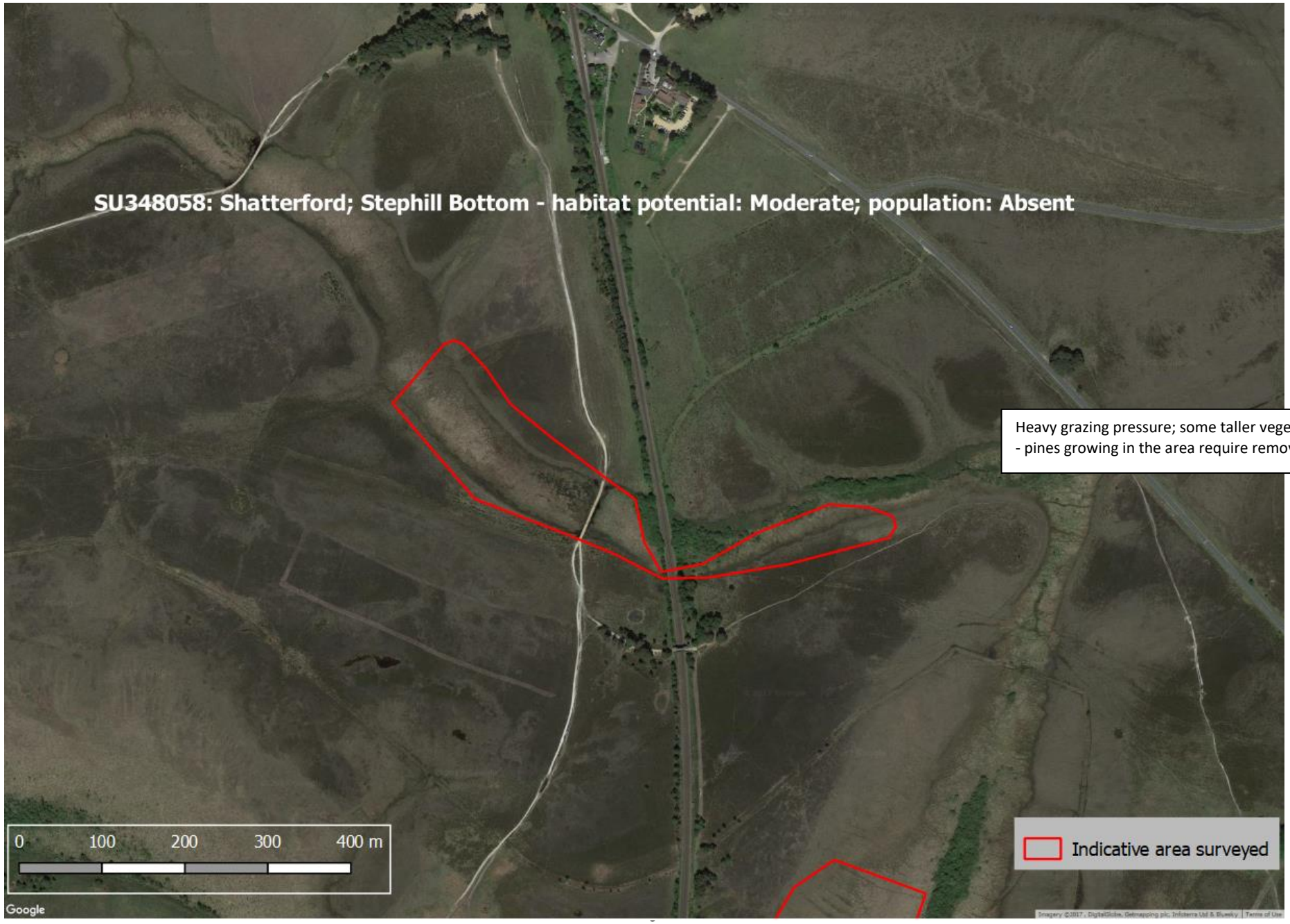
Google
LMG records in 2017
Indicative area surveyed



Matley Bog B: Lots of White-beaked Sedge, quite a lot of Sphagnum, some small pools of water; signs of recent heavy cattle grazing. No evidence of LMG but weather was poor.

Matley Bog A; Typical wet bog habitat for Large Marsh including sphagnum; the terrain is difficult in places. Always well recorded here as this is a popular site with naturalists, most activity from SU33450699 to SU33460708, including singing. The site is known to extend to others nearby such as SU3407 (Phil Budd, 1987), SU3208 (Simon Currie, 2010) & Fort Bog SU334083 ('lots' recorded by Richard Reeves 09.08.2000) - potentially a large population in an area of difficult terrain. The population size varies from year to year

Matley Bog A, good quality habitat:


SU348058: Shatterford; Stephill Bottom - habitat potential: Moderate; population: Absent
Heavy grazing pressure; some taller vegetation - pines growing in the area require removal.
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400 m
Indicative area surveyed
Google


SU356018: Hawkhill Bog - habitat potential: Moderate; population: Weak
Found at SU35720193 and SU35790197. Report by Simon Currie 08.2017: heard singing at SU35880191. Richard Reeves recorded 3 in Little Wood Bog SU357019 on 10.08.2000 (1990s records were allocated to SU3502 but were only metres away from 2017 records
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Google
LMG records in 2017
Indicative area surveyed


SU365022: Holmhill Bog - habitat potential: Low; population: Weak
Small isolated bog, all typical bog plants present but sphagnum rather limited. Found at SU36670228
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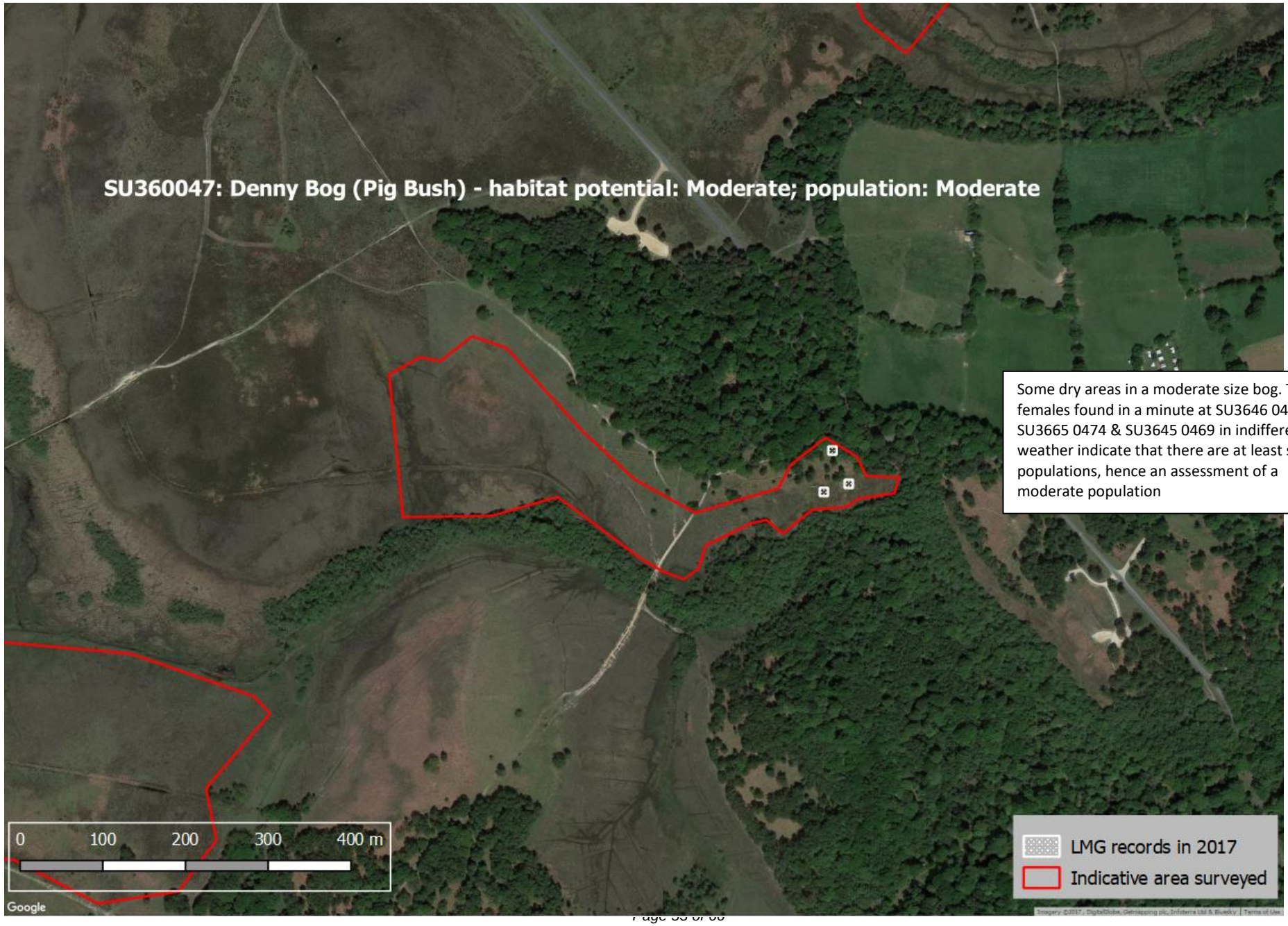
400 m
Google
LMG records in 2017
Indicative area surveyed


SU360047: Denny Bog (Pig Bush) - habitat potential: Moderate; population: Moderate
Some dry areas in a moderate size bog. Three females found in a minute at SU3646 0470, SU3665 0474 & SU3645 0469 in indifferent weather indicate that there are at least sparse populations, hence an assessment of a moderate population
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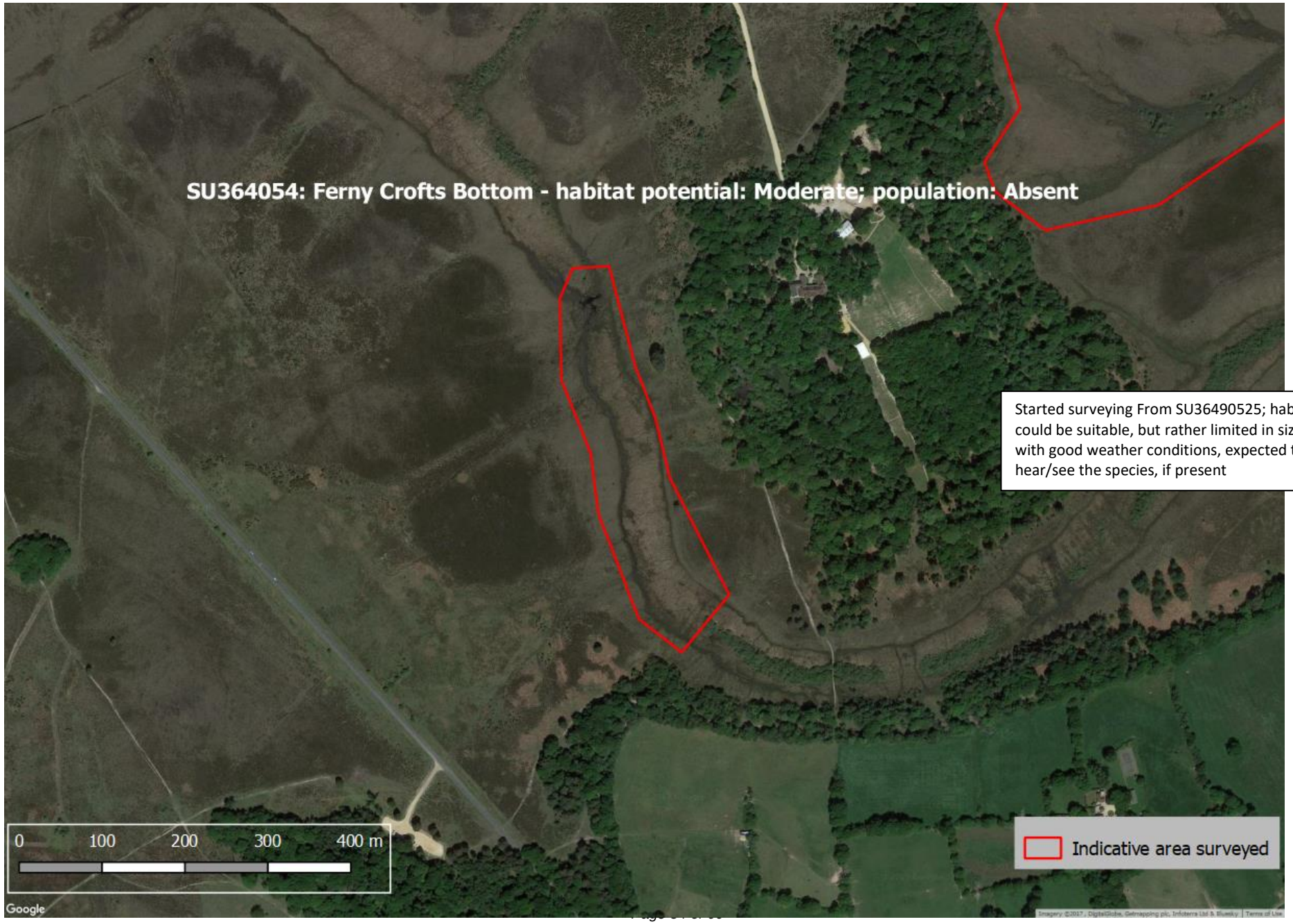
LMG records in 2017
Indicative area surveyed


SU364054: Ferny Crofts Bottom - habitat potential: Moderate; population: Absent
Started surveying From SU36490525; habitat could be suitable, but rather limited in size and with good weather conditions, expected to hear/see the species, if present
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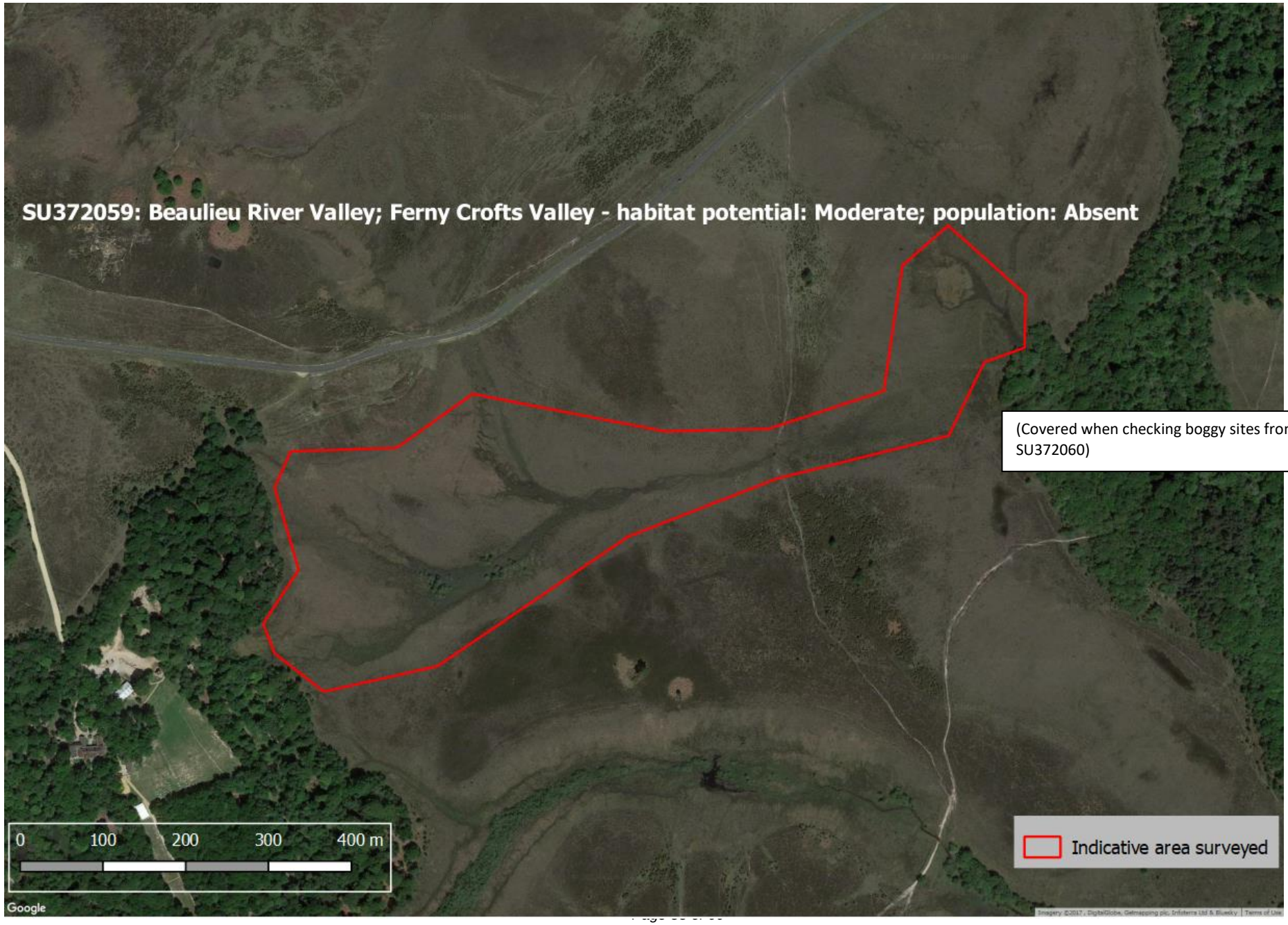
Indicative area surveyed


SU372059: Beaulieu River Valley; Ferny Crofts Valley - habitat potential: Moderate; population: Absent
(Covered when checking boggy sites from SU372060)
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Google
Indicative area surveyed


SU393065: Dibden Bottom - habitat potential: Moderate; population: Absent
Checked various areas, including bog by bridge SU39740611
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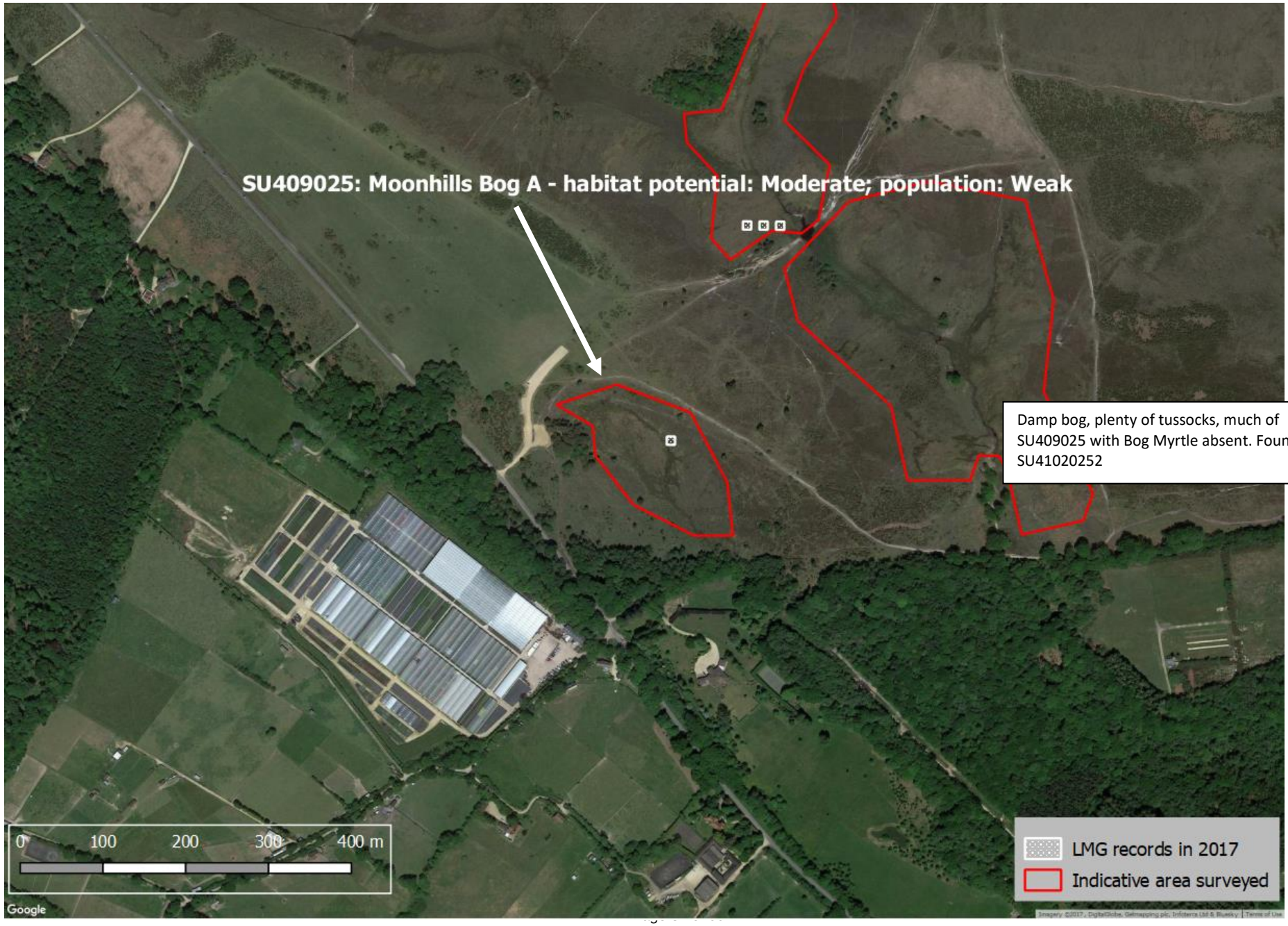
Indicative area surveyed


SU409025: Moonhills Bog A - habitat potential: Moderate; population: Weak
Damp bog, plenty of tussocks, much of SU409025 with Bog Myrtle absent. Found at SU41020252
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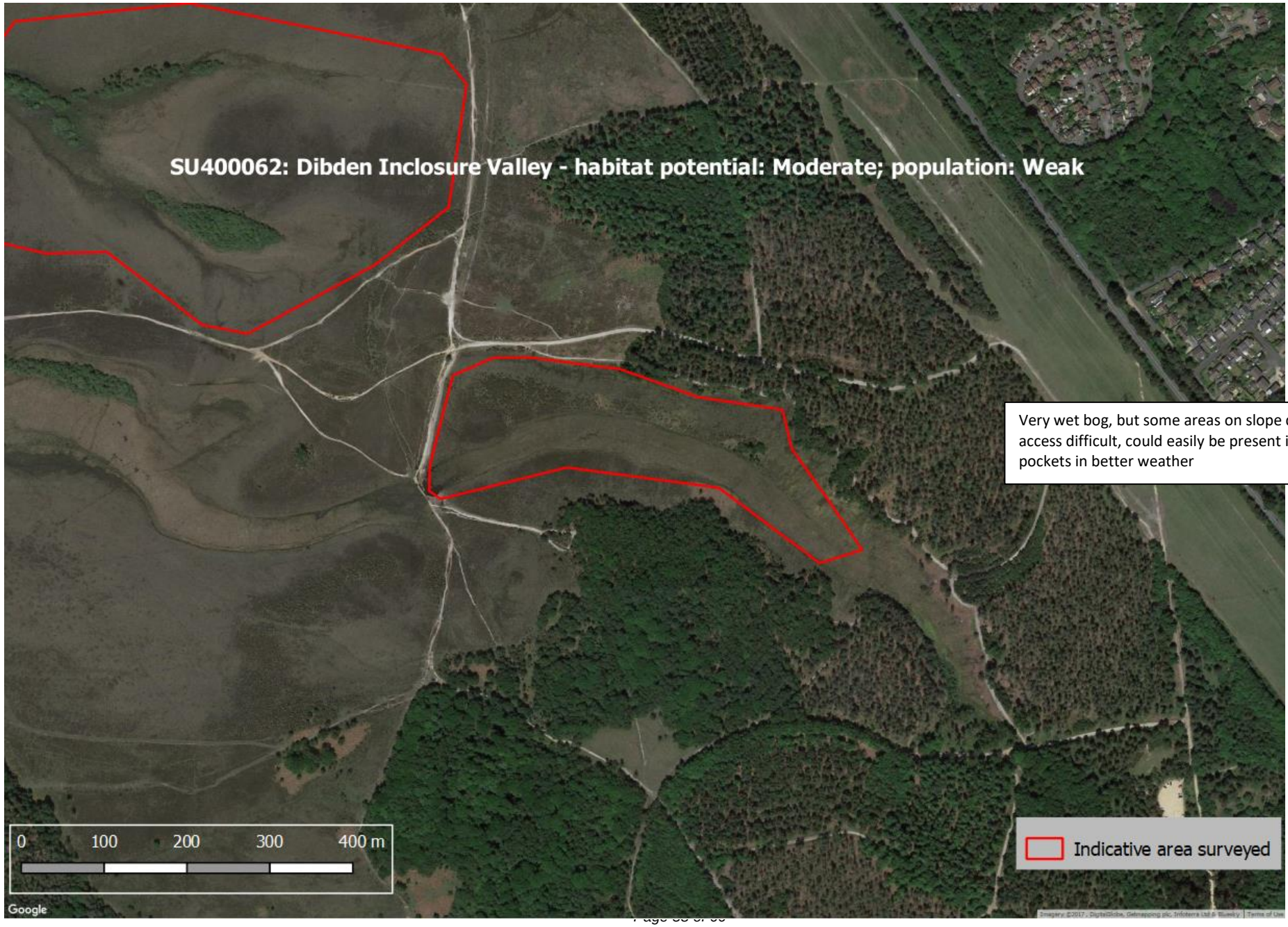
LMG records in 2017
Indicative area surveyed


SU400062: Dibden Inclosure Valley - habitat potential: Moderate; population: Weak
Very wet bog, but some areas on slope dry; access difficult, could easily be present in pockets in better weather
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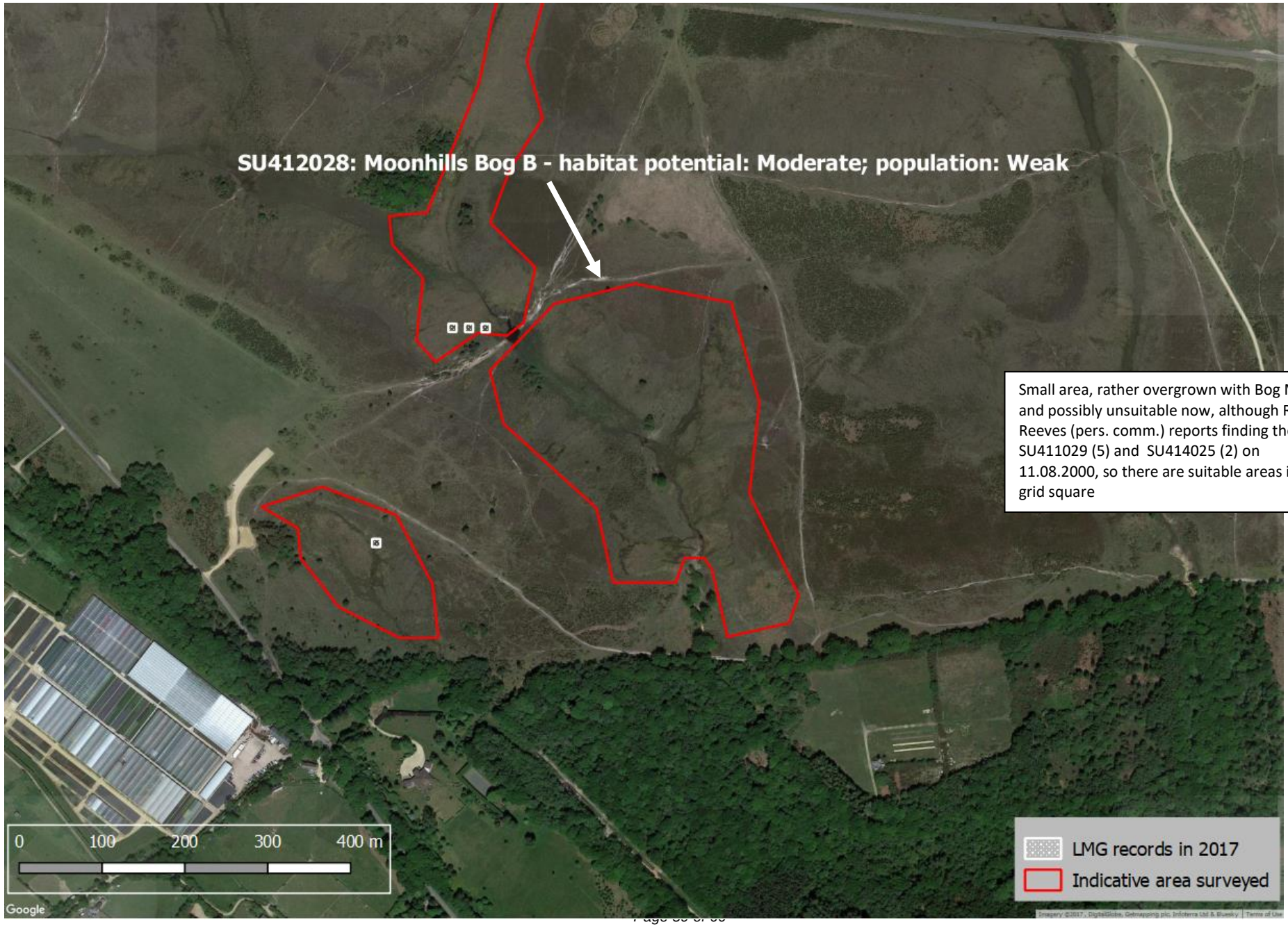
Indicative area surveyed


SU412028: Moonhills Bog B - habitat potential: Moderate; population: Weak
Small area, rather overgrown with Bog Myrtle and possibly unsuitable now, although Richard Reeves (pers. comm.) reports finding them at SU411029 (5) and SU414025 (2) on 11.08.2000, so there are suitable areas in the grid square
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Google
LMG records in 2017
Indicative area surveyed


SU411030: Ipers Bridge Road Copse - habitat potential: Moderate; population: Moderate
Limited size site, singing heard. Found at SU41110278, SU41130278 & SU41150278
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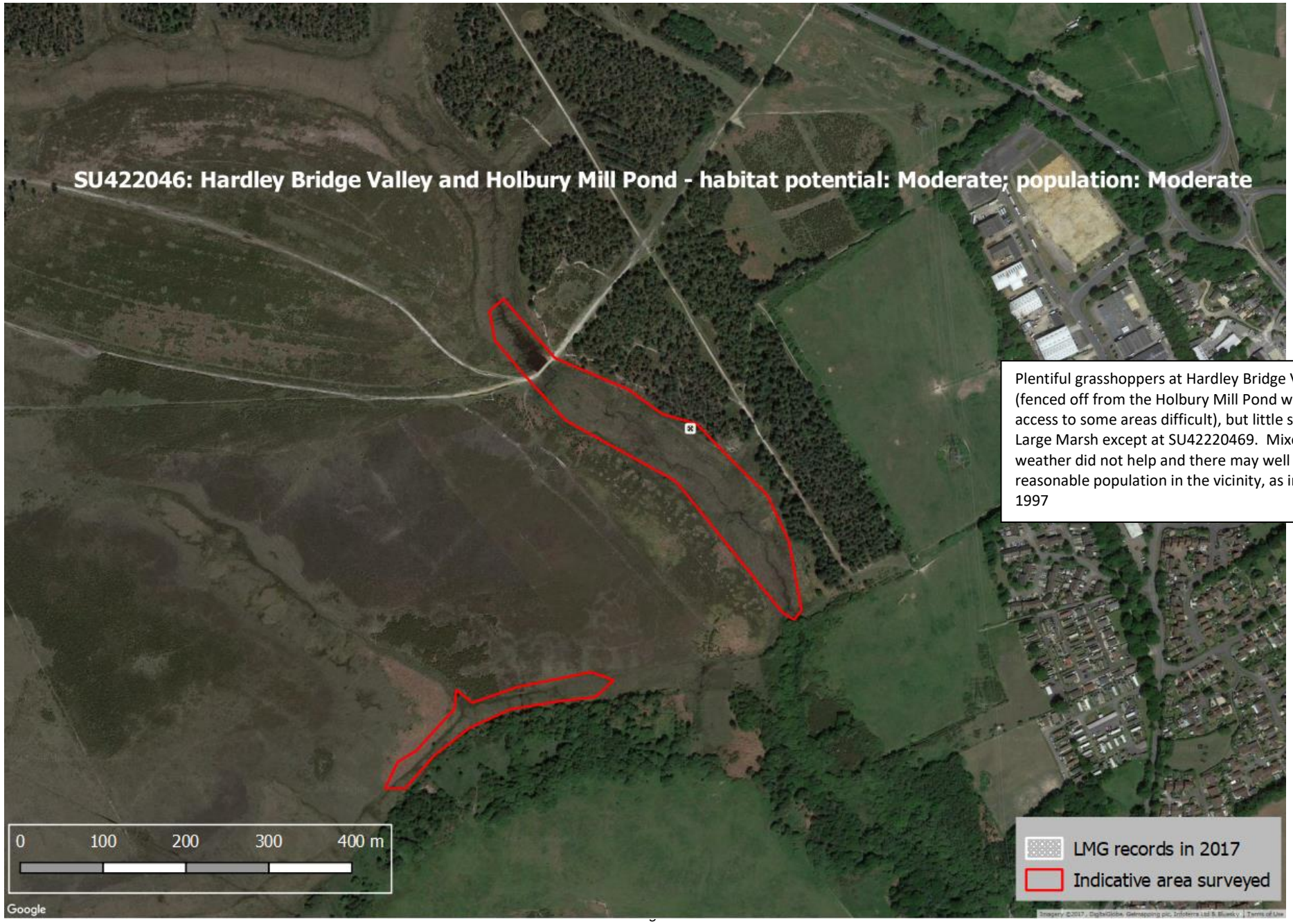
LMG records in 2017
Indicative area surveyed


SU422046: Hardley Bridge Valley and Holbury Mill Pond - habitat potential: Moderate; population: Moderate
Plentiful grasshoppers at Hardley Bridge Valley (fenced off from the Holbury Mill Pond walk, access to some areas difficult), but little sign of Large Marsh except at SU42220469. Mixed weather did not help and there may well be a reasonable population in the vicinity, as in 1997
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LMG records in 2017
Indicative area surveyed


SZ246998: Wilverley Bog West - habitat potential: High; population: Moderate
Rather disappointing total of 4 in an hour at this heavily visited/recorded site. It would normally produce 4 in 15 mins from past experience. Those found were concentrated in SZ24959975 to SZ24949975, but used to be elsewhere. There were some sunny spells, but weather could have been a factor in the low number recorded, although most likely the site is becoming overgrown with Bog Myrtle which has spread in the last few years. Ideally this needs thinning and removing in part
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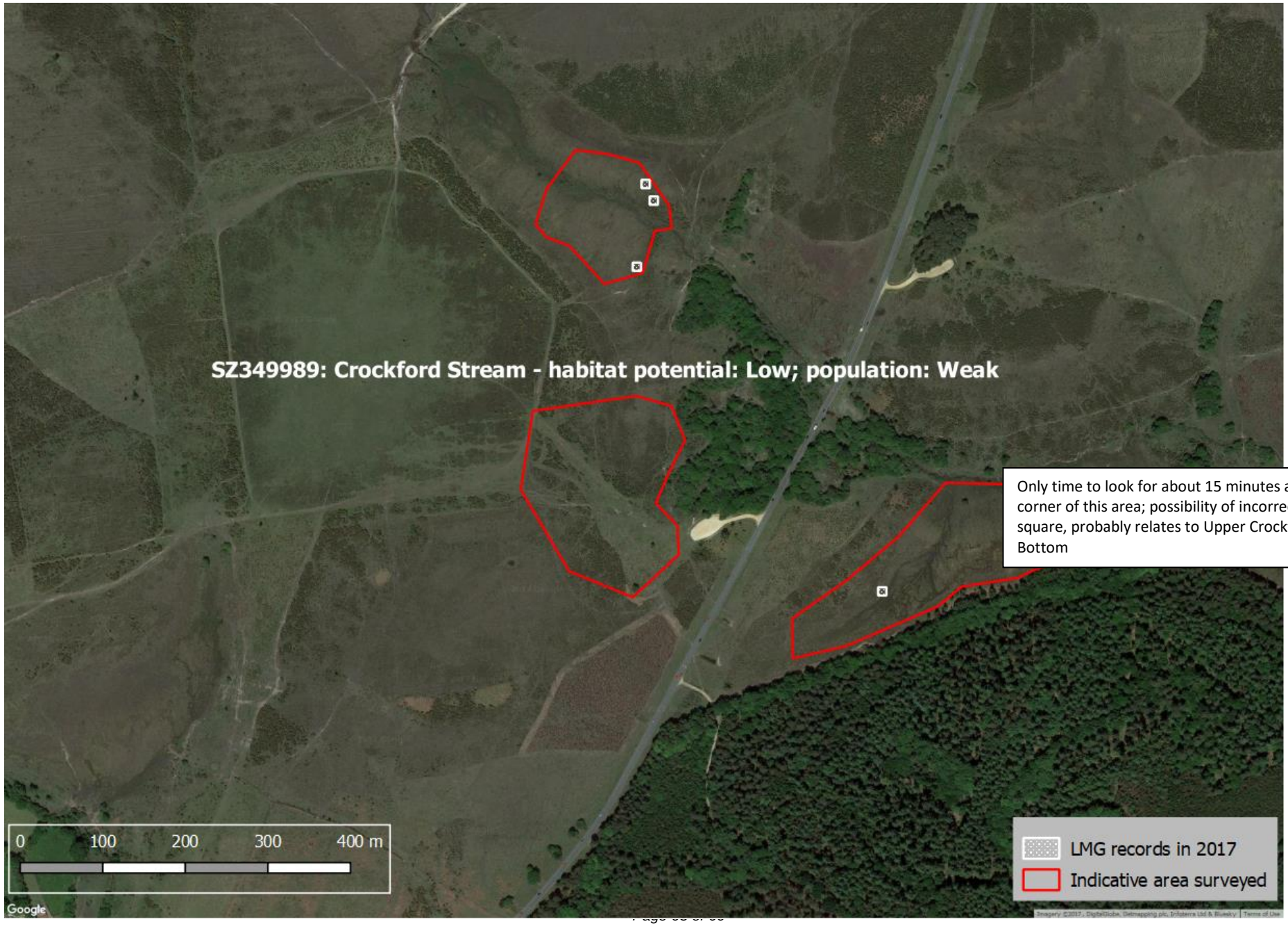
LMG records in 2017
Indicative area surveyed


SZ349989: Crockford Stream - habitat potential: Low; population: Weak
Only time to look for about 15 minutes at the corner of this area; possibility of incorrect grid square, probably relates to Upper Crockford Bottom
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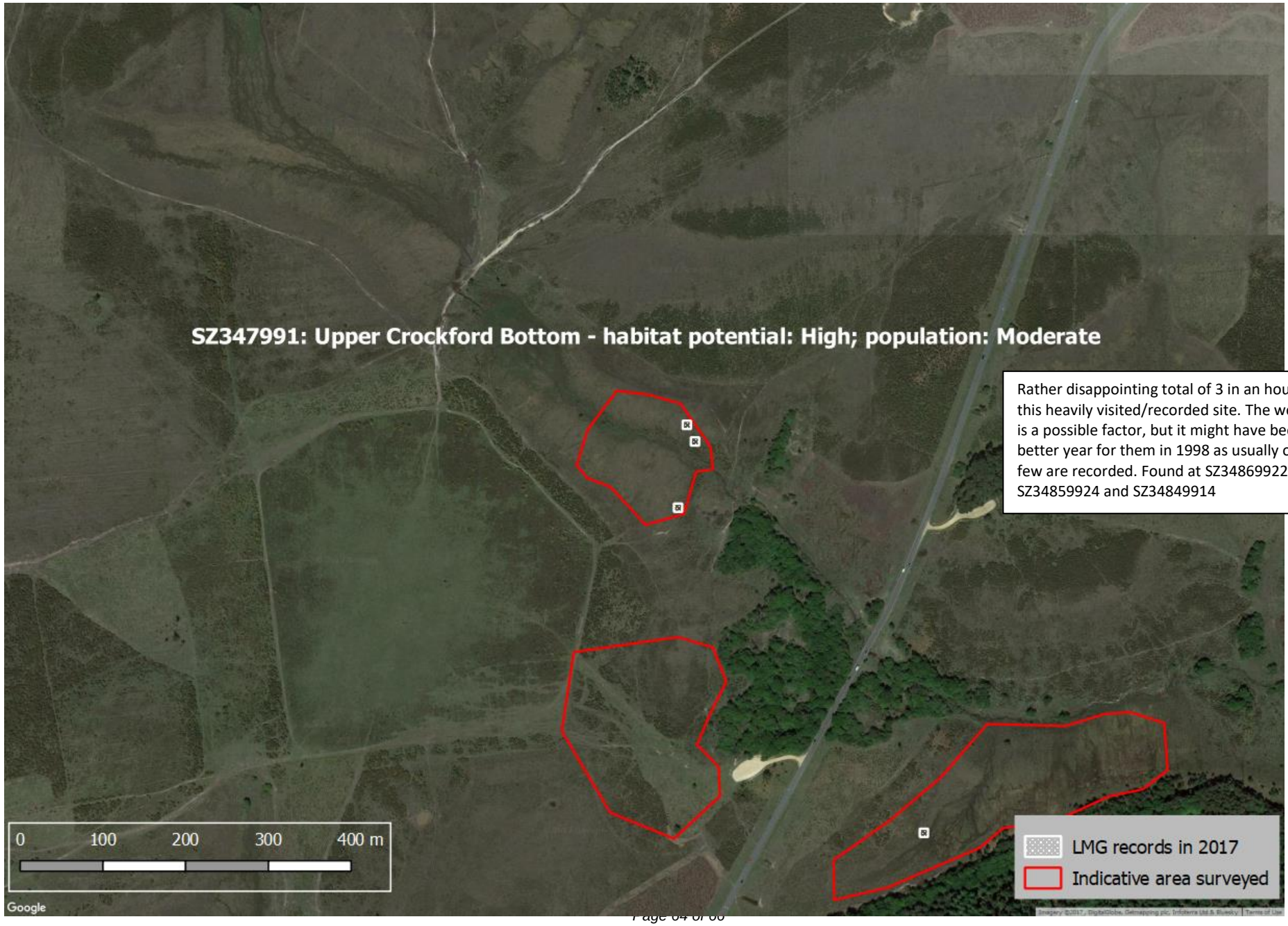
LMG records in 2017
Indicative area surveyed


SZ347991: Upper Crockford Bottom - habitat potential: High; population: Moderate
Rather disappointing total of 3 in an hour at this heavily visited/recorded site. The weather is a possible factor, but it might have been a better year for them in 1998 as usually only a few are recorded. Found at SZ34869922, SZ34859924 and SZ34849914
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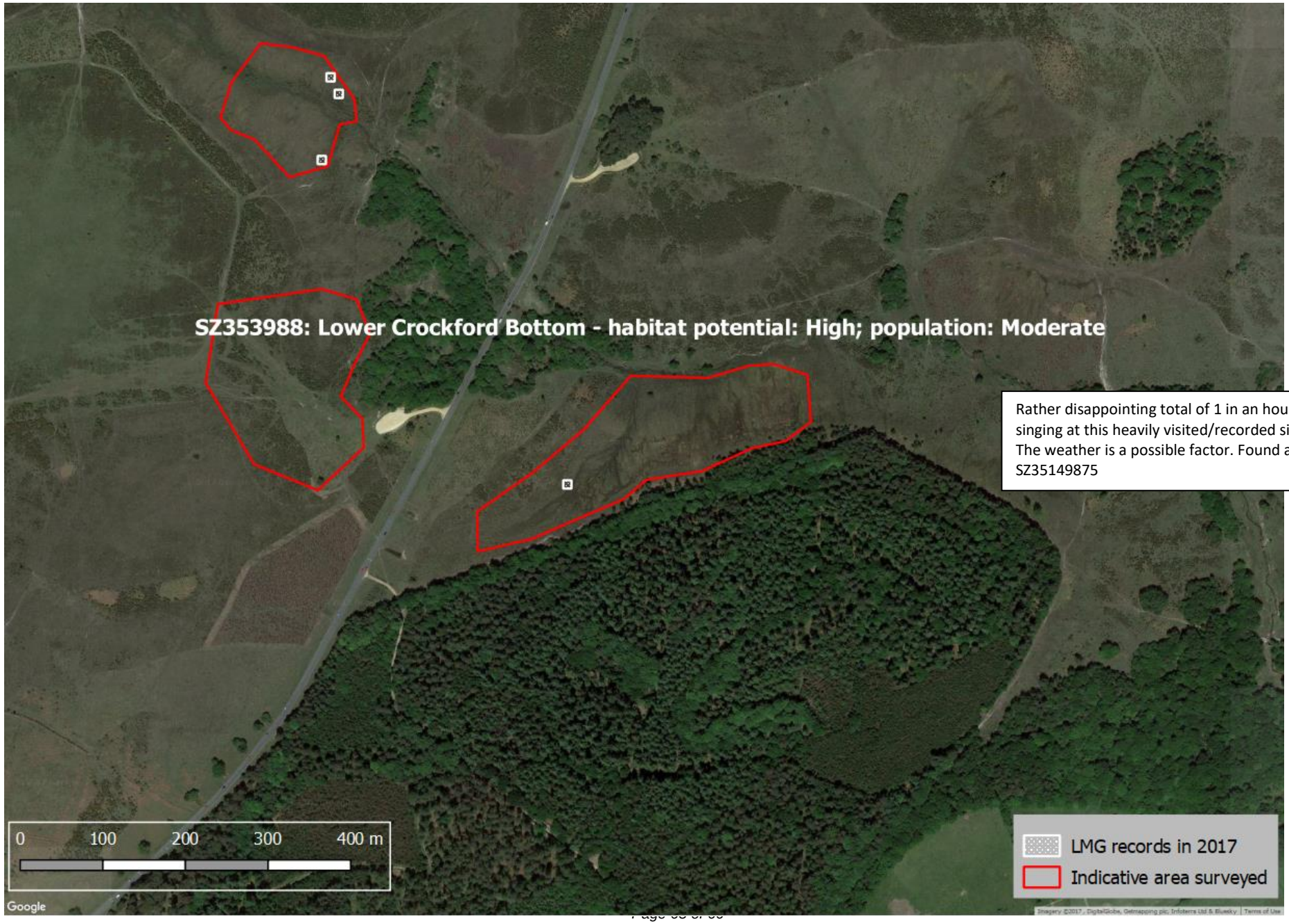
LMG records in 2017
Indicative area surveyed


SZ353988: Lower Crockford Bottom - habitat potential: High; population: Moderate
Rather disappointing total of 1 in an hour and singing at this heavily visited/recorded site. The weather is a possible factor. Found at SZ35149875
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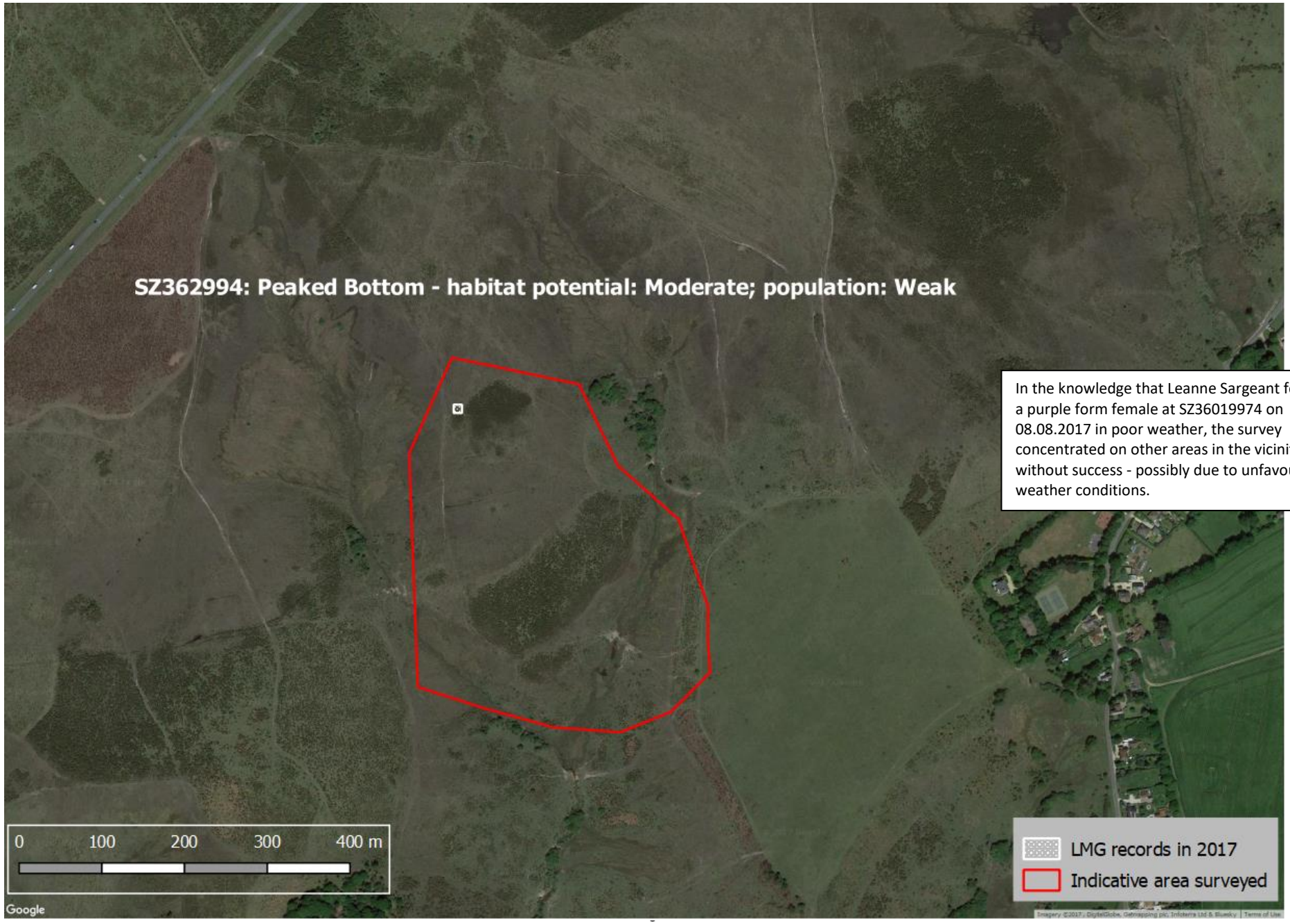
Google
LMG records in 2017
Indicative area surveyed


SZ362994: Peaked Bottom - habitat potential: Moderate; population: Weak
In the knowledge that Leanne Sargeant found a purple form female at SZ36019974 on 08.08.2017 in poor weather, the survey concentrated on other areas in the vicinity, without success - possibly due to unfavourable weather conditions.
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LMG records in 2017
Indicative area surveyed