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6.3 Environmental Statement Appendices
Appendix 8.1 – Botanical and Hedgerow Update Survey Report

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Planning Act 2008

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Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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ENVIRONMENTAL STATEMENT APPENDICES
Appendix 8.1 - Botanical and Hedgerow Update Survey Report

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Highways England

A47 Wansford to Sutton

Botanical and Hedgerow Update Survey Report

MLM.

Group

Part of Sweco

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Appendix C - Quadrat Data for Sutton Heath and Bog SSSI

1 Non-technical Summary

This botanical and hedgerow update survey report has been prepared by MLM and relates to proposed dualling of the A47 from Wansford to Sutton.

The existing A47 single-carriageway is to be upgraded to dual-carriageway standard. It will be constructed slightly to the north of the existing A47 from the A1/A47 junction for approximately 800m, before crossing the existing A47 where it will be constructed to the south of the existing alignment until it ties into the existing dual-carriageway east of Nene Way.

A botanical survey and hedgerow survey of all areas within the development consent order boundary for the scheme and a botanical survey of the Sutton Heath and Bog SSSI was undertaken on four dates between 25 June and 7 July 2020. The survey and report of the findings were carried out by suitably experienced ecological consultants.

The botanical survey identified semi-improved and unimproved neutral grassland, semi-improved calcareous grassland, broadleaved woodland, broadleaved and mixed plantation woodland, hedgerows, bare ground and riparian habitats within the areas surveyed. Species lists were compiled and botanical features of note identified. The hedgerow survey resurveyed hedgerows previously identified as important, and surveyed additional hedgerows not previously surveyed that fell within the development consent order boundary. Four hedgerows identified as important were highlighted by the survey. The survey of Sutton Heath and Bog SSSI identified unimproved neutral and calcareous grassland, flushes, mires, fen-meadow, swamp, woodland and scrub. The mire and calcareous grassland habitats are of national importance. Plant species of conservation significance at both county and national levels were also identified within the SSSI.

There should be no direct effect on Sutton Heath and Bog SSSI. Every effort should be made to avoid any possible indirect effects. Minimal areas within Sutton Meadows North CWS will be affected by the scheme but this will not affect the designation of this site as a CWS.

Grassland, hedgerow and woodland habitats within the DCO boundary will require removal to construct the scheme. This includes some hedgerows identified as important under the wildlife and landscape criteria of the Hedgerows Regulations, and some species-rich grassland on the north side of the A47 between the A1 and the Sacrewell Farm boundary that is of local importance. For areas to be directly affected by the scheme, compensation for the loss of all grassland and woodland habitats should be considered and is likely to be required should the scheme target no net loss of biodiversity. The woodlands to be affected by the scheme are of local importance but are of low quality, so there are opportunities replace these with more diverse and varied habitats should implementation of a long-term management plan following planting be possible. Replacement of hedgerows to be lost should be like-for-like or better if no net loss of biodiversity is targeted for the scheme. More hedgerow should be planted than what is lost. For the grassland habitats of note that are to be lost, consideration of translocation of these habitats should be included when determining mitigation measures.

The possible mitigation and compensation measures discussed in this report are not prescriptive. A full ecological impact assessment and biodiversity net gain assessment will be required to determine the detail of mitigation and compensation measures to be employed.

2 Limitations and Exceptions

This report and its findings should be considered in relation to the terms and conditions proposed and scope of works.

Interpretations contained in the report represent professional opinions, which were arrived at in accordance with currently accepted industry practices at the time of reporting and based on current legislation in force at that time.

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This report is prepared and written in the context of the proposals stated in the introduction to this report and should not be used in a differing context. Furthermore, alterations to the initial proposals or changes in conditions on site over time may necessitate an alteration to the report in whole or in part after its submission. Therefore, in the event of any change in proposals or lapse of one year or more from the date of the report, the content of the report should not be relied upon unless referred to MLM for validation and, if necessary, re-appraisal.

Scientific survey data will be shared with local biological records centre in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) professional code of conduct.

This report was prepared only for our client and is not intended to be relied on by any other party. Third parties should not rely on the facts, matters or opinions set out in this report without the express written permission of MLM.

Please note that MLM does not purport to provide specialist legal advice.

Unless stated specifically, drawings and plans are indicative only. As such, the position of features marked on the plans or drawings should not be taken as 100% accurate.

Survey-specific limitations are included in section 5.6 below.

3 Introduction

3.1 Purpose

This botanical and hedgerow update survey report has been prepared by MLM and relates to proposed widening and re-routing works at the A47 between Wansford and Sutton, which forms part of the wider A47 Corridor Improvement Programme. It is understood the proposed work will include dualling the A47 between Wansford and Sutton. The proposed scheme is shown on the "PCF Stage 3 Main Environmental Constraints Plan" drawing HE551494-GTY-EGN-000-DR-GI-00001.

The aim of the updated survey was to:

- Review all areas within the development consent order (DCO) boundary to see if the phase 1 plan from the previous surveys is accurate and update accordingly.
- Map National Vegetation Classification (NVC) habitats within the Sutton Meadows North County Wildlife Site (CWS) and carry out NVC quadrats to compare condition of the Sutton Heath and Bog Site of Specific Scientific Interest (SSSI) to what was previously recorded.
- Carry out NVC quadrats within the Sutton Meadows North CWS to determine the importance of the grazed grassland in this area.
- Resurvey the two hedgerows noted as important within the zone of influence and survey any other hedgerows not previously surveyed that lie within the DCO boundary.
- Compare findings with previous survey and highlight any changes.
- Identify potential effects on features of botanical importance and possible measures that may be taken to achieve mitigation to reduce ecological impacts and deliver no net loss of biodiversity for the scheme.

3.2 Site Description

The site is located along the A47 between Wansford and Sutton, Cambridgeshire and is located between Ordnance Survey National Grid Reference TL068997 to the west and TL104991 to the east, a distance of approximately 3.6km. Land within the DCO boundary comprises the existing A47 road, a petrol filling station, a pumping station, residential property off Sutton Heath Road, farm buildings, agricultural land, grassland including floodplain meadow between the River Nene and the A47, a stream, woodland and hedgerows. For the purposes of this study, Sutton Heath and Bog SSSI, which is completely outside of the DCO boundary, was also surveyed. Some areas within the DCO boundary could not be accessed at the time of the survey. The DCO boundary, areas surveyed and areas where access could not be granted are shown on drawing 778574-MLM-ZZ-XX-DR-J-0002.

3.3 Background

MLM was commissioned to carry out an update survey on the land within the DCO boundary for the proposed scheme. Previous surveys were completed in 2017 and 2018 which achieve full coverage of the areas within the zone of influence of the proposed scheme, and a detailed survey of the Sutton Heath and Bogs SSSI, which will not incur any direct effects as a result of the proposals.

Detailed botanical surveys and hedgerow surveys were carried out and reported by Amey in 2017 (ref. 1) to provide a discussion of the ecological baseline at Stage 3 to inform potential dualling of the A47 between Wansford and Sutton as part of the wider A47 Corridor Improvement Programme. The Mott MacDonald Sweco Joint Venture prepared a phase 1 habitat survey report for the scheme in 2018 (ref. 2) that included a much wider area than the current DCO boundary. This found that a large proportion of land along the Proposed Scheme is arable fields planted with crop monocultures, with most field margins being of low botanical interest. Grassland habitats are present on road verges and between the River Nene and the A47, mainly lying within the northern extents of Sutton Meadows North CWS. Grassland habitats were recorded as species-poor, except for two small areas, one in the Sutton Meadows North CWS and one at the entrance of Sacrewell Farm. The majority of the woodland areas in the zone of influence are mixed or broadleaved plantation woodlands with mature trees, with a high proportion of non-native species and limited ground flora. There is one small area of mature semi-natural oak woodland, covered by a Tree Preservation Order (TPO) which would be affected by the Proposed Scheme. It is located south of the A47, to the east of the disused railway (also covered by the TPO). The results of the 2017 hedgerow survey identified two species-rich hedgerows classified as 'important' under the wildlife and landscape criteria of the Hedgerows Regulations that are likely to be affected by the scheme (located on The Drift, south of the A47).

In addition to this, a detailed survey of the Sutton Heath and Bog SSSI was carried out by Abrehart Ecology (ref. 3) in June 2018 which involved updating previous surveys carried out in July, August and September 1997 and July 2017. Reports of these previous surveys have not been made available. The survey carried out in 2018 recorded 14 NVC communities, associated with areas of mire and flush, swamp vegetation, open water, unimproved calcareous and neutral grasslands, willow woodland and scattered scrub.

4 Relevant Policy and Legislation

4.1 Current UK Legislation

The main pieces of legislation relating to ecology within England and Wales are:

- The Conservation of Habitats and Species Regulations 2017 (as amended) transposes European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law. These regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' and the adaptation of planning controls for the protection of such sites and species. Under the regulations, public bodies have a duty in exercising their functions to have regard to the EC Habitats Directive.
- The Wildlife and Countryside Act 1981 (as amended) provides detail on a range of protection and offences relating to wild birds, other animals, and plants. The level of protection depends on which Schedule of the Act the species is listed on. Licences are available for specific purposes to permit actions that would otherwise constitute an offence in relation to species. A Site of Special Scientific Interest (SSSI) is a site designated as being of special interest due to the flora or fauna present or the geological make-up or physiography of the area under section 28(1) of the Wildlife and Countryside Act 1981 (WCA 1981) in England and Wales. Schedule 8 of the Wildlife and Countryside Act lists plants which are afforded special protection. Schedule 9 of the Wildlife and Countryside Act lists plants that it is an offence to plant or cause to spread into the wild.
- The Natural Environment and Rural Communities (NERC) Act 2006 imposes an obligation on all public bodies, including local authorities, to consider whether their activities can contribute to the protection of wildlife. The duty is created by section 40(1) of the Act, which states that: "Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity." Section 41 requires the Secretary of State to work with Natural England to publish a list of habitats and species that are a priority for local authorities to take into account, for example when assessing planning applications.

In addition, the Hedgerows Regulations 1997 were introduced to protect important hedgerows from destruction. However the legislation does not apply to any hedgerow that is within or marking the boundary of the curtilage of a dwelling or house. For the regulations to be applicable the hedgerow must be at least 20m in length (or if less than this, meet a hedgerow at each end). A hedgerow is deemed to be important if it is more than 30 years old and meets at least one of the criteria listed in Part II of Schedule 1 of the Regulations.

The reader is referred to the original legislation for definitive interpretation.

4.2 Policy

The recommendations of this report are in line with the key principles of the National Planning Policy Framework (ref. 4) and Government Circular 06/05 (ref. 5).

Local planning policies relating to ecology are invariably based on the conservation of species protected under the above legislation, including species and habitats of principal importance listed under Section 41 of the NERC Act 2006; and the protection of designated sites. All of these features are considered within the scope of this document and therefore any recommendations made herein are likely to be in line with this policy.

Cambridgeshire and Peterborough Biodiversity Partnership have produced information on how County Wildlife Sites are selected and this information is available for download on the council's website (ref. 6). The Cambridgeshire Green Infrastructure Strategy (ref. 7) sets out a framework for shaping and coordinating the delivery of green infrastructure in the county. The Peterborough Biodiversity Strategy (2018) (ref. 8) sets out the strategy for biodiversity in Peterborough and surrounding areas, promoting biodiversity and green infrastructure in planning with an aim to create an ecological network improving connectivity to valuable habitat for wildlife and people. Policy LP32 in the proposed Huntingdonshire Local Plan to 2032 (Biodiversity and Geodiversity) (ref. 9) states that "A proposal will ensure no net loss in biodiversity and provide a net gain where possible, through the planned retention, enhancement and creation of habitats and wildlife features, appropriate to the scale, type and location of development."

The Nene Valley Nature Improvement Area (NIA) project (ref. 10) aims to recreate and reconnect natural areas along the Nene and its tributaries in order to provide a space for wildlife to thrive and adapt to climate change.

5 Methodology

5.1 Personnel

The site survey was undertaken by Alanna Cooper BSc (Hons) CEnv CSci C.WEM MCIEEM MCIWEM who has over 14 years' experience as an ecological consultant, including detailed vegetation surveys and National Vegetation Classification (NVC) surveys of coastal communities, habitat enhancement plans and ecological impact assessments, and Beck Harrington-Harding BSc (Env) MCIEEM who has over six years' experience of ecological consultancy including detailed botanical surveys. Both surveyors hold an industry recognised Field Identification Skills Certificate (FISC) level 4.

This report has been prepared by Alanna Cooper and reviewed by Beck Harrington-Harding. It has been approved by Martin Brammah PhD MA (Cantab) BA (Hons) CEcol MCIEEM MRSB who has 10 years' experience in ecological consultancy and botanical surveys. Martin also holds a FISC level 4.

5.2 Dates and Weather Conditions

The site was walked over on four dates between 25 June and 6 July 2020. The weather recorded for each date is listed in table 5.1 below.

Table 5.1. Weather Conditions During Botanical and Hedgerow Survey

Date of Survey	Weather Conditions
25 June 2020	Clear, slight breeze, 25-30°C
28 June 2020	Partly cloudy, windy, 17-20°C
1 July 2020	Cloudy/partly sunny, gentle breeze, 17-20°C
6 July 2020	Overcast, windy, 15°C.

5.3 Botanical Survey

The survey was an update of a previous botanical survey carried out by Amey in 2017 (ref. 1) between 18 and 21 July 2017, providing a detailed assessment of habitats identified during a previous phase 1 habitat survey (carried out as part of the Stage 1 and Stage 2 Environmental Assessment Reports by Amey), and also took into consideration the phase 1 habitat survey carried out in May 2018 (ref. 2) by the Sweco Mott MacDonald Joint Venture to ensure habitat descriptions were still valid. The survey focussed on areas of neutral and calcareous grassland, deciduous woodland and lowland fen priority habitat, which were mostly within designated sites along the proposed route of the A47 improvement works between Wansford and Sutton.

During the 2020 botanical survey, the locations of all botanical target notes within the ecological baseline report (ref. 1) were referred to and these areas were targeted for resurvey. Where findings including species composition and distribution within habitats were very similar to previously surveyed, detailed species lists were not rerecorded. Where there were any variances in findings compared to the previous survey reports species lists were updated. Target notes follow the same numbering system as the previous botanical survey for continuity. Where additional features of note were encountered, additional target notes were recorded and species lists compiled. Habitats described in the text of the report from the 2017 and 2018 surveys were compared to findings on site during the 2020 surveys, and where conditions were not significantly changed, descriptions were not changed.

Common names and binomial scientific names of plant species identified are as they appear in Stace 2019 (ref. 11). Plant status was obtained by consulting the Red List for England (ref. 12) and the Cambridgeshire (v.c.29) Rare Plant Register (ref. 13).

5.3.1 DAFOR Survey

The relative frequency and cover of each species identified, as they are distributed in each notable habitat, was estimated using the DAFOR scale (ref. 14) as follows:

- D - dominant - >75% cover
- A - abundant – 51-75% cover
- F - frequent – 26-50% cover
- O- occasional – 11-25% cover
- R - rare – 1-10% cover
- LF - Locally frequent is also used where the frequency and distribution is patchy.

Every attempt was made to resurvey all areas target noted to have botanical interest in the previous survey and repeat the DAFOR species lists as best of possible. This was carried out in all areas apart from the areas along the road verge between the A1 roundabout and Sacrewell Farm entrance, since a minimum clearance of 1.2m was not possible along this road verge. The southern verge could not be accessed at all whereas the northern verge was target noted and a single DAFOR list was taken as this seemed more appropriate than carrying out the non-standard 4mx4m DAFOR quadrats recorded in the 2017 survey.

5.3.2 National Vegetation Classification (NVC) Survey

Vegetation communities were assigned in accordance with the NVC methodology following systematic analysis using keys in the British Plant Communities series keys (refs. 15, 16, 17, 18 and 19) and comparison of results with floristic tables. Species names including scientific and common names within constancy tables and quadrat sheets are as they appear in Stace 2019 (ref. 11), although it is important to note many names have changed from those listed in the British Plant Communities series which is based on Stace 1997 (ref. 20) and this was taken into account. The systematic analysis and assignment of a vegetation community's types based on using the NVC keys, review of constancy tables and detailed descriptions of communities was undertaken by Alanna Cooper.

A 2m x 2m quadrat formed the primary recording unit in the grassland habitats; with all species of vascular plant and bryophytes recorded. The percentage cover of each species within the quadrats was selected as a percentage of the cover of the layer the species occupied in the vegetation (%).

Quadrat surveys were carried out in the horse-grazed field at Sutton Meadows North CWS and Sutton Heath and Bog SSSI. This was notably a single community so five quadrats were carried out to allow analysis of data using a constancy table.

Calcareous grassland extent on the raised bank near Sutton Disused Railway CWS was so limited only DAFOR was recorded as quadrats were not considered feasible. This does not have a significant effect on the analysis of the results since the community was recognisable and did not require analysis of constancy data to confirm.

For the survey of Sutton Heath and Bog SSSI, following the first visit to site it was clear that vegetation community boundaries identified in the 2018 survey had changed (most likely due to sustained dry periods between 2018 and 2020) so more effort was focussed on mapping community boundaries than producing quadrat data. In this instance, for significant vegetation communities identified on site, lists of species within habitats recorded were taken using a DAFOR scale, supported by limited quadrat data using percentage cover where possible in the time allowed. This meant that in most cases constancy could not be calculated, and instead the quadrat data was analysed in a similar way to the 2018 survey report.

Constancy tables were assessed for the MG1 grassland encountered in Sutton Meadows North CWS and the CG5 grassland encountered at Sutton Heath and Bog SSSI only.

5.4 Hedgerow Survey

A hedgerow survey was carried out on the two hedgerows identified as "important" considering the wildlife and landscape criteria of the Hedgerow Regulations 1997 by the previous survey (ref. 1) and all hedgerows included within the DCO boundary that were not previously surveyed. The purpose of the resurvey was to ensure hedgerows previously identified as important still met the criteria, and provide data on hedgerows not previously considered, to determine if they should be considered important hedgerows.

5.5 Identification of Potential Effects

This is a factual report and an assessment of ecological impacts has not been carried out. However potential effects have been identified, based on the geographical significance of botanical and habitat features encountered during the survey in accordance with CIEEM guidance (ref. 21). The locations of important features identified were compared to the overall proposals shown on drawing HE551494-GTY-EGN-000-DR-GI-00001 to identify whether or not features of note may be directly affected by the proposed scheme. Where direct effects were identified as likely possible mitigation measures that may be considered are provided in a general sense. These are not prescriptive measures and a full ecological impact assessment and biodiversity net gain assessment will be required to determine the detail of mitigation and compensation measures to be employed.

5.6 Survey-specific Limitations

Where limitations specifically affected survey methodology this is described in the sections above.

All botanical and hedgerow surveys were undertaken in suitable weather conditions but were carried out during a finite period in one season only. This report highlights habitats and species evident at the time of the survey and does not record features that may only appear at other times of year. The survey was carried out after many weeks of dry weather which meant some species had finished flowering and needed to be identified vegetatively, making recording species presence and distribution more difficult, resulting in a risk that some species, mainly grasses, may have been overlooked.

Some areas including roundabouts and road verges where a distance of 1.5m away from the road could not be maintained were not surveyed since they could not be accessed safely (walking within 1.2m of the roads was prohibited for safety purposes). There were a few areas of land parcels where access was not granted. Areas that could not be accessed during the survey are shown on drawing 778574-MLM-ZZ-XX-DR-J-0002. Although access could not be gained to these areas, they could be viewed in a limited way from fields or in a vehicle along the road. This showed that road verges were mainly rank similar to areas where road verges could be surveyed, so they were likely to be species-poor. Other land parcels where access could not be gained were either secondary or plantation woodland and/or scrub. These are unlikely to be of significant botanical value. If conservative assumptions are made about the condition of habitats that could not be accessed when assessing future effects on these habitats, the lack of detailed survey should not be a significant constraint.

Not all data gathered in previous botanical surveys of the sites within the DCO boundary carried out historically were available to view to support this update survey (ref. 1). Details of previous surveys referred to in the baseline report were not appended or provided. Species lists were not included in the details provided for the phase 1 habitat survey report (ref. 2). This is not considered a significant limitation to this report since all areas highlighted as being of botanical interest via target notes were revisited and resurveyed, and in most instances the descriptions were consistent with what was found on the ground. Where differences were found in 2020 they are noted in this report. Where it was considered necessary additional botanical target notes recorded in 2020 are included in this report. The description of the botanical features identified in this report of the 2020 survey is a factual account of what was present at the site at the time of the survey and should be viewed as an update to any previous information. As such, the lack of background data provided is not considered a significant constraint to the survey or report findings.

Detailed data collected for the hedgerow surveys were not included in the baseline information reported in 2017 (ref. 1). Resurvey of hedgerows previously surveyed and identified as not meeting criteria as "important" surveys was not part of the brief for the 2020 survey. This said, whilst carrying out the extensive botanical survey, hedgerows were viewed and compared with the general description included for all "not important" hedgerows, as well as the map provided identifying them as intact species-poor, defunct species-poor, species-poor with trees, etc. These observations confirmed the general descriptions of hedgerows not identified as important in 2017 so this lack of data provided is not considered a constraint to the 2020 survey.

For the survey of Sutton Heath and Bog SSSI, constancy tables for the NVC survey carried out by Toby Abrehart in 2018 and descriptions of NVC communities mapped were not provided in the report (ref. 3). In addition, no details of data previously collected in surveys referred to in 1997 and 2017 were provided. However, the lack of this background data did not affect the results of the 2020 survey detailed in this report, because:

- This report is a factual record of species and habitats as encountered at the time of the survey.
- Although detailed descriptions and constancy tables for NVC communities would have assisted with planning and targeting specific areas for the 2020 survey, they were not necessary as boundaries of habitats found during 2020 were mapped and compared with those from 2018.
- Where communities mapped in the 2018 survey report were not found in 2020, this is discussed in the results section of this report.

For the survey of Sutton Heath and Bog SSSI, following the first visit to site it was clear that vegetation boundaries identified in the 2018 survey had changed, so this required a reestablishment of the methodology planned. The site condition was much drier and less grazed than was encountered previously and, with just a two year gap between surveys, there were major differences between what could be seen on the ground versus the map of vegetation communities identified in the previous report (ref. 3). Instead of focussing on delivering many quadrats, the focus changed to mapping habitat boundaries. Although this approach reduced the amount of quantitative data available for analysis, it ensured that vegetation communities were mapped as accurately as possible so their extents could be compared to the previous survey with confidence.

Mapping equipment used software on the iPhone which is accurate to 3m. This included the GPS OS app and the What3Words app. For this reason there may be some discrepancies between the locations of target notes and quadrats and the points shown on maps. The mapping of communities should be viewed as indicative only, since in many areas boundaries between different communities (particularly grassland and mire communities) are ill-defined.

The purpose of this survey was to update previous survey results, so habitats where descriptions were very similar to those recorded in previous surveys were not surveyed in detail. For example, locations of target notes in the previous detailed botanical survey (ref. 2) were inspected and if species composition was observed to be the same as previously recorded this was noted and detailed species lists were not repeated.

6 Results of the Botanical Survey within DCO Boundary

6.1 General

The site survey was carried out to confirm all areas of botanical interest within the DCO boundary, highlighted by target notes, as in the previous botanical survey and identify any potential new areas of botanical interest. Most areas within the DCO boundary are arable land and species-poor hedgerows of low botanical interest, but some areas of woodland and grassland of higher botanical value are present.

Target notes follow the same numbering system as the previous botanical survey (ref. 1) for continuity. Where observations of target notes are very similar to the prior survey the wording is similar to that in the previous report. Scientific names of species encountered are presented in the species list tables and only the common name is used in the descriptive text.

6.2 Target Notes

All previous target notes from the 2017 survey (ref. 1) (target notes 1 to 13 inclusive) were resurveyed, with additional target notes (14-19) added during the update survey. The locations of target notes are shown on drawing no. 778853-MLM-ZZ-XX-DR-J-0003. The descriptions of each target note are included in table 6.1 below. Species lists (including both common and scientific names) are included within the descriptions of the habitat types below.

Table 6.1. Descriptions of Target Notes

Target Note	Broad Habitat Type	Description
Target Note 1	Broadleaved plantation woodland	Mature plantation woodland with fringe of scrub on western edge and closed canopy (no access granted so only viewed from western edge and southern side of A47). Hybrid black poplar is dominant, with frequent elder, blackthorn and occasional field maple, white willow and sycamore. Ground flora is limited due to shading and wet in some areas, with abundant common nettle and occasional common reed the only ground cover that could be viewed from a distance.
Target Note 2	Unimproved neutral grassland	Verge and bank along east side of road to Sacrewell Farm, alongside sheltered slope. Sward open and unmanaged in places with rabbit grazing. Species-rich, forb-rich MG1 *Arrhenatherum elatius* grassland. Notable abundant and frequent species in the sward include wild marjoram, greater knapweed, ox-eye daisy, upright hedge parsley and dark mullein.
Target Note 3	Semi-improved neutral grassland	Verge and bank along A47 to east of Sacrewell Farm entrance. Species-poor MG1 *Arrhenatherum elatius* grassland with overgrowing tall ruderal dominant in most places. Closer to TN2 grassland in 50m section nearest Sacrewell entrance. Much rabbit activity. Abundant rape, false-oat grass and hemlock.
Target Note 4	Mixed plantation woodland	Mature mixed plantation woodland along A1, largely closed canopy with moderate understory. Abundant beech with frequent Scot's pine and larch. Many of the conifers were standing deadwood. Ground cover closed and limited with abundant common nettle.
Target Note 5	Broadleaved plantation woodland	Shelter belt of hybrid black poplar.
Target Note 6	Mixed plantation woodland	Semi-mature mixed plantation woodland along west side of road to Sacrewell Farm, closed canopy with limited understory. Line of hawthorns to east side. Abundant beech, frequent Scot's pine, cypress, sycamore, field maple. Significant amount of standing deadwood, mainly larch. Ground flora very sparse, with rare occurrences of lords and ladies, stinking iris and cleavers.

Target Note	Broad Habitat Type	Description
Target Note 7	Mixed plantation woodland	Mature mixed plantation woodland, closed canopy with sparse understory and poor ground flora. Dominant ash and frequent elder and oak. Ground flora abundant in some places, mainly common nettle, garlic mustard and dog's mercury. East corner more semi-natural in character, possible remnant woodland, with more open canopy and developed ground flora towards road but closed canopy with limited ground flora elsewhere. Some recent planting towards road (north side) but otherwise appears unmanaged. Fallen and standing deadwood present.
Target Note 8	Broadleaved woodland	North end of Sutton Disused Railway CWS subsumed into scrub and developing into woodland. Dominant hawthorn and abundant elder with occasional ash and field maple. Ground flora mostly absent but where present is locally frequent sweet violet, dog's mercury and common nettle.
Target Note 9	n/a	Scattered clumps of Himalayan balsam (*Impatiens glandulifera*) along stream bank. Mature pollarded white willow (qualifying feature of Sutton Meadows North CWS) are present along this stream to south of A47.
Target Note 10	Broadleaved plantation woodland	Mature broadleaved plantation woodland with character being planted trees in parkland. All trees are hybrid black poplar. Groundcover is grassland described in target note 11.
Target Note 11	Semi-improved neutral grassland	Semi-improved neutral grassland described as recently mown in the 2017 survey but had not been mown at the time of the 2020 survey. Sward is species-rich in places subject to disturbance by rabbits. Plants associated with disturbed ground are growing in the vicinity of a large rabbit warren. Grassland is MG1 *Arrhenatherum elatius* with frequent Yorkshire-fog and occasional creeping bent and false oat-grass, locally frequent lesser burdock, hedge bedstraw, silverweed, creeping buttercup and common nettle. Vegetation closer to the river is associated with wetter conditions, including wild angelica and locally frequent silverweed and hogweed. Two veteran oak trees with deadwood are located at the southern base of the A47 embankment.
Target Note 12	Broadleaved plantation woodland	Mature broadleaved plantation woodland in linear strip north of and parallel to A47. Uniform in character throughout, subsuming hawthorn hedges along both sides. Some signs of management of woodland and small amounts of standing deadwood. Closed canopy and poorly developed ground flora. Abundant sycamore and hawthorn, with frequent pedunculate oak, hazel, elder and field maple. Occasional ash, silver birch, blackthorn, wild cherry and false-acacia. Ground flora is abundant garlic mustard, common nettle, ground ivy and wood avens.
Target Note 13	Broadleaved plantation woodland	Semi-mature broadleaved plantation on bund to south of dualled section of A47. Some signs of management. Old unmanaged hawthorn hedge along footpath through middle of plantation woodland. Abundant hawthorn and frequent ash, wild cherry, sessile oak, field maple, white willow and small leaved-lime. Ground flora is abundant common ivy where present.
Target Note 14	Semi-improved neutral grassland	Area of semi-improved neutral grassland along the A47 verge and the arable field margin. Most areas along the verge could not be accessed due to safety reasons and could only be viewed from the arable field margin. The ground level of the verge was considerably lower than the arable field margin due to the land being cut to build the road in this location. This likely absence of a significant topsoil layer due to the cutting may explain why the grass verge is more species rich than the arable field margin.

Target Note	Broad Habitat Type	Description
Target Note 15	Bare ground	Area of recently disturbed land where new cycleway/footpath has been put in adjacent to the A47/A1 picnic area. Mainly bare ground where soil has been disturbed and topsoil placed next to footpath. Species between bare ground and River Nene is abundant hemlock.
Target Note 16	Semi-improved neutral grassland	Grassland outside pumping station and in area with unknown landowner. No signs of management. Sward kept short due to rabbit grazing. Sward species-rich in places, with significant stands of tall ruderal species in places. Frequent false oat-grass, Yorkshire-fog, white clover and creeping cinquefoil, with occasional red fescue, perennial rye-grass, creeping bent, creeping thistle, creeping buttercup, wild teasel and selfheal. In the lowest part of the field is an area of S7 *Carex acutiformis* swamp where lesser pond sedge is dominant.
Target Note 17	Semi-improved calcareous grassland	Small area of a raised bank adjacent to Sutton Disused Railway CWS, located within the field where horses are present but outside of the area subject to horse grazing. Grassland is CG5 *Bromus erectus-Brachypodium pinnatum* grassland due to the presence of abundant heath false-brome and occasional upright brome. The grassland is tussocky and not particularly species-rich with forbs only rarely present.
Target Note 18	Semi-improved neutral grassland	Grassland in field grazed by horses subject to NVC quadrats to carry out quantitative analysis of species-richness. Grassland is MG1a *Arrhenatherum elatius* with constant false oat-grass, red fescue, Yorkshire-fog and creeping thistle. Forb distribution is rare with locally frequent common nettle.

6.3 Arable Land

Most areas within the DCO boundary are arable land planted with monocultures including rye-grass, barley and wheat (photos 1, 2 and 3). Field margins around the arable fields are mainly limited in extent and of low botanical interest and bounded by hawthorn dominated species-poor hedgerows. No species of note were recorded within the arable fields during the survey.

Photo 1. Arable land south of the A47 near the A1 (barley crop)

Photo 2. Arable field north of the A47 adjacent along the A1 (rye grass and red clover cover crop, with adjacent species-poor field margin)

Photo 3. Arable land south of the A47 and east of The Drift (wheat crop)

6.4 Semi-improved Neutral Grassland

After arable land, the next most extensive habitat within the DCO boundary is semi-improved neutral grassland. Semi-improved neutral grassland is present within most of the areas surveyed, mainly along road verges and between the River Nene and the A47 and arable field margins. Road verges identified were predominantly species-poor (photos 4, 5 and 6), equating closely to MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community in the NVC methodology with the exception of a thin strip from the A1 roundabout to the Sacrewell Farm entrance (photos 7 and 8), where construction of the A47 road cut into the natural landscape, removing topsoil and making this area nutrient-poor. In this location (target note 14) the NVC community is closest to the *Festuca rubra* sub-community *Centaurea scabiosa* variant. This area was previously designated as part of the A47/A1 Interchange Road Verges CWS until 2017 when the site was deselected due to continuing deterioration of the habitats associated with nutrient enrichment and a lack of appropriate management. Species diversity on the verge on the eastern side of the entrance to Sacrewell Farm is of considerably lower diversity with a much higher proportion of tall ruderals (target note 3, photo 9). This is likely to due to both underlying geology changing in this area and changes in management practices.

Semi-improved grassland south of the A47 is generally of a lower diversity, apart from areas where rabbit grazing and ground disturbance along the footpath along the River Nene has created more opportunities for forb species to proliferate (target notes 11 and 16, photos 10 to 13 inclusive). Species of note in the sward include common centaury, lady's bedstraw and musk thistle. A low point in the field nearest the pumping station supports a distinct area of S7 *Carex acutiformis* swamp where lesser pond sedge is dominant (photo 11).

The field adjacent to the A47 and the Sutton Disused Railway CWS is managed by grazing, with some areas remaining ungrazed, resulting in a rank tussocky sward (target note 18) in some areas and shorter cropped grassland in other areas (photo 14). All fields south of this area are outside of the DCO boundary and were mown at the time of the survey (photo 15).

The differences in species diversity south and north of the A47 is likely mainly due to management but also can be explained by the underlying geology: grasslands surveyed south of the A47 to the Nene Washes were primarily on the Grantham Formation (sedimentary bedrock), a combination of sandstone siltstone and mudstone, whereas for the road verges north of the A47 from the Sacrewell Farm entrance to the A1 the underlying geology is the Lower Lincolnshire Limestone Member.

Photo 4. Species-poor semi-improved neutral grassland along the western road verge of the A1


Photo 5. Species-poor semi-improved neutral grassland along the eastern road verge of the A1


Photo 6. Species-poor road verge along The Drift


Photo 7. Species-rich neutral grassland north of the A47 between the A1 and the entrance to Sacrewell Farm (target note 14)


Photo 8. Species-rich neutral grassland along northern verge of the A47 between the A1 and the entrance to Sacrewell Farm (target note 14)


Photo 9. Grassland changes from species-rich unimproved grassland (target note 2) to species-poor semi-improved grassland (target note 3) at this location.

Photo 10. Rabbit grazed field outside pumping station south of the A47 (west of target note 16) within Sutton Meadows North CWS

Photo 11. Field managed by irregular mowing (target note 16) within Sutton Meadows North CWS – area of swamp vegetation can be seen between the telephone poles.

Photo 12. Top of rabbit warren in field south of the A47 within Sutton Meadows North CWS (field is target note 11)

Photo 13. Difference in mowing regime resulting in difference in sward between the field referred to by target note 16 (to the left) and field referred to be target note 11 (to the right)

Photo 14. Field managed by extensive horse grazing within Sutton Meadows North CWS (target note 18)

Photo 15. Mown field outside of the DCO boundary within Sutton Meadows North CWS boundary, south of the field managed by horse grazing

Species recorded during the survey in areas of semi-improved neutral grassland are listed in table 6.2 below.

Table 6.2. Species Recorded in the Semi-improved Neutral Grassland

Common Name	Scientific Name	TN3 - tall ruderal area east of species-rich grassland	TN11 - CWS field adjacent to horses	TN14 - margin from A1 along Sacrewell boundary	TN16 - rabbit grazed floodplain meadow	TN19 - CWS horse field
Moss	*Bryophyta*			R		
Grasses and Sedges						
Common bent	*Agrostis capillaris*		R			R
Creeping bent	*Agrostis stolonifera*		O		O	R
Meadow foxtail	*Alopecurus pratensis*		R			
Barren brome	*Anisantha sterilis*			R		R
False oat-grass	*Arrhenatherum elatius*	A	O	R	F	A
Soft-brome	*Bromus hordeaceus*			R		R
Lesser pond-sedge	*Carex acutiformis*				LF	
False fox-sedge	*Carex otrubae*					R
Sedge	*Carex* sp		R			
Cock's-foot	*Dactylis glomerata*		R	LF		R
Red fescue	*Festuca rubra*		R	O	O	O
Yorkshire-fog	*Holcus lanatus*		F	R	F	A
Meadow barley	*Hordeum secalinum*		R			
Perennial rye-grass	*Lolium perenne*		R	R	O	
Timothy	*Phleum pratense*					R
Annual meadow-grass	*Poa annua*			R		
Smooth meadow-grass	*Poa pratensis*					R
Meadow-grass	*Poa* sp		R			
Forbs						
Yarrow	*Achillea millefolium*	R	R	R		
Garlic mustard	*Alliaria petiolata*		R			
Wild angelica	*Angelica sylvestris*		R			R

Common Name	Scientific Name	TN3 - tall ruderal area east of species-rich grassland	TN11 - CWS field adjacent to horses	TN14 - margin from A1 along Sacrewell boundary	TN16 - rabbit grazed floodplain meadow	TN19 - CWS horse field
Cow parsley	*Anthriscus sylvestris*		R			
Lesser burdock	*Arctium minus*		LF	R		
Mugwort	*Artemisia vulgaris*	F		R		
Black horehound	*Ballota nigra*		R	R		
Rape	*Brassica napus*	A				
Welted thistle	*Carduus crispus*			R		
Musk thistle	*Carduus nutans*		R			R
Common knapweed	*Centaurea nigra*	R		R		
Greater knapweed	*Centaurea scabiosa*			R		
Common centaury	*Centaurium erythraea*				O	
Common mouse-ear	*Cerastium fontanum*		R			R
Creeping thistle	*Cirsium arvense*	O	R	R	O	R
Spear thistle	*Cirsium vulgare*		R	R		R
Hemlock	*Conium maculatum*	A	R	R		
Field bindweed	*Convolvulus arvensis*		R			R
Smooth hawk's-beard	*Crepis capillaris*		R	R		R
Wild teasel	*Dipsacus fullonum*	R	R		O	R
Common stork's-bill	*Erodium cicutarium*		R			
Meadowsweet	*Filipendula ulmaria*		R			
Hedge bedstraw	*Galium album*		LF	R		R
Cleavers	*Galium aparine*					R
Lady's bedstraw	*Galium verum*		R	R		
Dove's-foot crane's-bill	*Geranium molle*		R	R		
Meadow crane's-bill	*Geranium pratense*					R
Ground-ivy	*Glechoma hederacea*		O	R		R

Common Name	Scientific Name	TN3 - tall ruderal area east of species-rich grassland	TN11 - CWS field adjacent to horses	TN14 - margin from A1 along Sacrewell boundary	TN16 - rabbit grazed floodplain meadow	TN19 - CWS horse field
Bristly oxtongue	*Helminthotheca echioides*			R		
Hogweed	*Heracleum sphondylium*		R	R		R
Cat's-ear	*Hypochaeris radicata*		R			
Great lettuce	*Lactuca virosa*			R		
White dead-nettle	*Lamium album*		R	R		
Common toadflax	*Linaria vulgaris*	R		R		
Common bird's-foot-trefoil	*Lotus corniculatus*			R		R
Common mallow	*Malva sylvestris*		R	O		
Black medick	*Medicago lupulina*		R	R		
Forget-me-not	*Myosotis* sp			R		
Wild parsnip	*Pastinaca sativa*	R		R		
Ribwort plantain	*Plantago lanceolata*			R		R
Greater plantain	*Plantago major* subsp. *major*		R			
Silverweed	*Potentilla anserina*		LF			
Creeping cinquefoil	*Potentilla reptans*		R		F	
Selfheal	*Prunella vulgaris*				O	
Meadow buttercup	*Ranunculus acris*		R			R
Creeping buttercup	*Ranunculus repens*		LF		O	R
Wild mignonette	*Reseda lutea*			R		
Weld	*Reseda luteola*		R	R	R	
Common sorrel	*Rumex acetosa*		R			
Clustered dock	*Rumex conglomeratus*		R			R
Curled dock	*Rumex crispus*			R		
Broad-leaved dock	*Rumex obtusifolius*					R
Wood dock	*Rumex sanguineus*		R			
Common ragwort	*Senecio jacobaea*		R	R	R	
Oxford ragwort	*Senecio squalidus*		R	R		
White campion	*Silene latifolia*		R	R	R	

Common Name	Scientific Name	TN3 - tall ruderal area east of species-rich grassland	TN11 - CWS field adjacent to horses	TN14 - margin from A1 along Sacrewell boundary	TN16 - rabbit grazed floodplain meadow	TN19 - CWS horse field
Prickly sow-thistle	*Sonchus asper*		R			
Dandelion	*Taraxacum* sect. Ruderalia.		R			R
Upright hedge-parsley	*Torilis japonica*	R				R
Goat's-beard	*Tragopogon pratensis*					R
Lesser trefoil	*Trifolium dubium*					R
Red clover	*Trifolium pratense*			R		
White clover	*Trifolium repens*		R	O	F	R
Common nettle	*Urtica dioica*	LF	LF	O		LF
Small nettle	*Urtica urens*					R
Dark mullein	*Verbascum nigrum*			R		
Germander speedwell	*Veronica chamaedrys*			R		R
Common vetch	*Vicia sativa*					R
Shrubs						
Bramble	*Rubus fruticosus* agg.			R		

Five quadrats were carried out in the semi-improved grassland in the field not managed by cutting with extensive grazing by horses (target note 19) to determine the species-richness of the grassland in this area of the CWS. This identified the grassland as MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community in the NVC methodology, with constant false oat-grass, cock's-foot, Yorkshire-fog, red fescue and creeping thistle, with a low forb-diversity including occasional ribwort plantain, ground ivy and germander speedwell. The details recorded for each of the quadrats in the Sutton Meadows North CWS are included at Appendix A and the constancy table calculated is below.

Table 6.3. Constancy Table for Species Recorded in Quadrats in the MG1a Grassland Within the Sutton Meadow CWS

Species	Constancy	Percentage Cover within Quadrat (%)				
		CWS1	CWS2	CWS3	CWS4	CWS5
Arrenatherum elatius	V	30	50	10	30	30
Festuca rubra	V	20	15	3	50	30
Holcus lanatus	V	50	40	15	20	30
Cirsium arvense	IV	3	1	3		2
Dactylis glomerata	IV	2	5	70		3
Agrostis capillaris	III	4	5	1		
Glechoma hederacea	III	10	3			1
Plantago lanceolata	III			3	2	15
Veronica chamaedrys	III		1	2		5
Agrostis stolonifera	II	1		1		
Heracleum spondyllium	II	3				1
Carex obtrubae	I					6
Galium mollugo	I		15			
Helminthotheca echioides	I				1	
Phleum pratense	I					3
Poa pratensis	I			2		
Ranunculus acris	I			3		
Rumex conglomeratus	I					1
Taraxaceum officinale agg.	I					1
Torilis japonica	I				2	
Urtica dioica	I	2				
Urtica urens	I				5	
Vicia sativa	I			1		

6.5 Unimproved Neutral Grassland

Unimproved neutral grassland is located on the raised bank at the entrance to Sacrewell Farm off the A47 (target note 2, photos 16 and 17), equating loosely to MG1e *Arrhenatherum elatius* grassland *Centaurea nigra* sub-community in the NVC methodology. The sward is forb-rich with few grass species and has a relatively high species-diversity compared to other areas of neutral grassland in the area. The main characteristic of this area is its general high diversity over a relatively small area. The sward is likely kept species-rich with positive management and its raised nature ensures the grassland remains unimproved. In addition its aspect faces southwest which is beneficial to flowering species. There are a number of notable species, suggesting this may have been seeded in the past. Notable species include greater knapweed, red valerian, ploughman's-spikenard, ox-eye daisy, cowslip and dark mullein.

Photo 16. Species-rich neutral unimproved grassland on bank along entrance to Sacrewell farm

Photo 17. Species-rich neutral unimproved grassland on bank along entrance to Sacrewell farm

Species recorded during the survey in the area of unimproved neutral grassland are listed in table 6.4 below.

Table 6.4. Species Recorded in the Unimproved Neutral Grassland

Common Name	Scientific Name	TN2 - Sacrewell entrance
Grasses		
False Oat-grass	*Arrhenatherum elatius*	R
Cock's-foot	*Dactylis glomerata*	R
Yorkshire-fog	*Holcus lanatus*	R
Smooth meadow-grass	*Poa pratensis*	R
Forbs		
Yarrow	*Achillea millefolium*	R
Lesser burdock	*Arctium minus*	R
Rape	*Brassica napus*	R
Musk thistle	*Carduus nutans*	R
Common knapweed	*Centaurea nigra*	O
Greater knapweed	*Centaurea scabiosa*	R
Red valerian	*Centranthus ruber*	R
Common mouse-ear	*Cerastium fontanum*	R
Spear thistle	*Cirsium vulgare*	R
Field Bindweed	*Convolvulus arvensis*	R
Smooth hawk's-beard	*Crepis capillaris*	R
Wild teasel	*Dipsacus fullonum*	R
Hedge bestraw	*Galium album*	A
Cut-leaved crane's-bill	*Geranium dissectum*	R
Bristly 0xtongue	*Helminthotheca echioides*	R
Perforate St John's-wort	*Hypericum perforatum*	R
Ploughman's-spikenard	*Inula conyzae*	R

Common Name	Scientific Name	TN2 - Sacrewell entrance
Great lettuce	*Lactuca virosa*	R
Oxeye daisy	*Leucanthemum vulgare*	O
Common toadflax	*Linaria vulgaris*	R
Common bird's-foot-trefoil	*Lotus corniculatus*	R
Black medick	*Medicago lupulina*	R
Field forget-me-not	*Myosotis arvensis*	R
Wild marjoram	*Origanum vulgare*	A
Wild parsnip	*Pastinaca sativa*	R
Ribwort plantain	*Plantago lanceolata*	R
Greater plantain	*Plantago major* subsp. *intermedia*	R
Cowslip	*Primula veris*	R
Selfheal	*Prunella vulgaris*	R
Meadow buttercup	*Ranunculus acris*	R
Common ragwort	*Senecio jacobaea*	R
Oxford ragwort	*Senecio squalidus*	R
Red campion	*Silene dioica*	R
White campion	*Silene latifolia*	R
Upright hedge-parsley	*Torilis japonica*	R
Hop trefoil	*Trifolium campestre*	R
Common nettle	*Urtica dioica*	R
Dark mullein	*Verbascum nigrum*	R
Germander speedwell	*Veronica chamaedrys*	R
Shrubs		
Field maple	*Acer campestre*	R
Hawthorn	*Crataegus monogyna*	R
Dog-rose	*Rosa canina*	R
Bramble	*Rubus fruticosus* agg.	R

6.6 Semi-improved Calcareous Grassland

At the edge of the field grazed by horses is a raised bank adjacent to Sutton Disused Railway CWS within the extents of Sutton Meadows North CWS with calcareous grassland that is a distinctive CG5 *Bromus erectus – Brachypodium pinnatum* grassland community (typical sub-community), albeit species-poor with evidence of improvement (target note 18, photos 18 and 19). This is likely grassland created from a seedbank from a species-rich area imported when the bank was created, so is most likely man-made in origin. Species of note rarely occurring in the sward include mouse-ear hawkweed, thyme-leaved sandwort and musk thistle.

Photo 18. Semi-improved calcareous grassland on bank in horse field (photo looking north)

Photo 19. Semi-improved calcareous grassland on bank in horse field (photo looking south)

Species recorded during the survey in the area of semi-improved calcareous grassland are listed in table 6.5 below.

Table 6.5. Species recorded in the semi-improved calcareous grassland

Common Name	Scientific Name	TN18 - calcareous raised bank in CWS horse field
Grasses		
False oat-grass	*Arrhenatherum elatius*	R
Heath false-brome	*Brachypodium pinnatum*	A
Upright brome	*Bromopsis erecta*	O
False fox-sedge	*Carex otrubae*	R
Cock's-foot	*Dactylis glomerata*	R
Red fescue	*Festuca rubra*	R
Perennial rye-grass	*Lolium perenne*	LF
Smooth meadow-grass	*Poa pratensis*	R
Yellow oat-grass	*Trisetum flavescens*	R
Forbs		
Yarrow	*Achillea millefolium*	R
Thyme-leaved sandwort	*Arenaria serpyllifolia*	R
Musk thistle	*Carduus nutans*	R
Common mouse-ear	*Cerastium fontanum*	R
Field bindweed	*Convolvulus arvensis*	R
Smooth hawk's-beard	*Crepis capillaris*	R
Lady's bedstraw	*Galium verum*	R
Wood avens	*Geum urbanum*	R
Ground-ivy	*Glechoma hederacea*	R
Perforate St John's-wort	*Hypericum perforatum*	R
Common bird's-foot-trefoil	*Lotus corniculatus*	R
Black medick	*Medicago lupulina*	R

Common Name	Scientific Name	TN18 - calcareous raised bank in CWS horse field
Mouse-ear-hawkweed	*Pilosella officinarum*	R
Ribwort plantain	*Plantago lanceolata*	R
Silverweed	*Potentilla anserina*	R
Selfheal	*Prunella vulgaris*	R
Sheep's sorrel	*Rumex acetosella*	R
Oxford ragwort	*Senecio squalidus*	R
Dandelion	*Taraxacum* sect. Ruderalia	R
Upright hedge-parsley	*Torilis japonica*	R
White clover	*Trifolium repens*	R
Germander speedwell	*Veronica chamaedrys*	R
Shrubs		
Hawthorn	*Crataegus monogyna*	R
Dog-rose	*Rosa canina*	R
Bramble	*Rubus fruticosus* agg.	R

6.7 Broadleaved Woodland

One area of natural broadleaved woodland associated with the Sutton Disused Railway CWS was identified, where scrub is developing into a secondary woodland with a poor ground flora (target note 8, photos 20 and 21). Hawthorn is dominant and elder abundant but occasional field maple and ash are also present. Ground flora is sparse and absent in places, but where present is mainly locally frequent dog's mercury and common nettle.

Photo 20. Broadleaved woodland developing from scrub within the Sutton Disused Railway CWS as seen from the Sutton Meadows North CWS grassland

Photo 21. Broadleaved woodland developing from scrub within the Sutton Disused Railway CWS showing the cutting into the ground from the former railway

Species recorded during the survey in the area of broadleaved woodland are listed in table 6.6 below.

Table 6.6. Species recorded in the broadleaved woodland

Common Name	Scientific Name	TN8 - northern end of Sutton Disused Railway CWS
Forbs		
Lords-and-ladies	*Arum maculatum*	R
Dog's mercury	*Mercurialis perennis*	LF
Common nettle	*Urtica dioica*	LF
Sweet violet	*Viola odorata*	R
Trees and Shrubs		
Field maple	*Acer campestre*	O
Hawthorn	*Crataegus monogyna*	D
Ash	*Fraxinus excelsior*	O
Crab apple	*Malus sylvestris*	R
Wild cherry	*Prunus avium*	R
Elder	*Sambucus nigra*	A

6.8 Broadleaved Plantation Woodland

The broadleaved plantation woodlands identified during the survey have changed little from previous surveys. These are mature planted woodlands, all trees being of similar age, with closed canopies and poor ground flora. Hybrid black poplar is the dominant species in what could be seen of the woodland south of Sutton Heath and Bog SSSI (target note 1, no photo available) which was viewed only from south of the A47 as access to this area was not granted. Hawthorn and field maple are the main components of the planted woodland on both sides of the A47 east of this (target notes 12 and 13, photos 22 and 23). A shelter-belt of hybrid black poplar is also present west of Sacrewell Farm near the A1 (target note 5, photo 24). A number of mature hybrid black poplar are planted in the grassland near the River Nene. These trees have more of a parkland character given the open canopy and mown semi-improved grassland understorey (target note 10, photo 25).

Photo 22. Pathway through broadleaved plantation woodland southeast of Sutton roundabout (target note 13)

Photo 23. Linear plantation woodland north of A47 (target note 12)

Photo 24. Shelter belt of hybrid black poplar (target note 5)

Photo 25. Hybrid black poplar plantation with open parkland character (target note 10)

Species recorded during the survey in the area of broadleaved woodland are listed in table 6.7 below. Since only hybrid black poplar are recorded in the shelter belt (target note 5) and the trees in the grassland (target note 10) they are not included in the table.

Table 6.7. Species Recorded in the Broadleaved Plantation Woodland

Common Name	Scientific Name	TN1 - black poplar planted woodland	TN12 - mature broadleaved plantation woodland in linear strip along N side of A47 at Sutton	TN13 - semi-mature woodland on bund to south of duelled section of A47
Grasses				
Red fescue	*Festuca rubra*			R
Common reed	*Phragmites australis*	O		
Forbs				
Lords-and-ladies	*Arum maculatum*		R	
Wood avens	*Geum urbanum*		LF	
Ground-ivy	*Glechoma hederacea*		LF	
Colt's-foot	*Tussilago farfara*		LF	
Common nettle	*Urtica dioica*	A	A	
Trees and Shrubs				
Field maple	*Acer campestre*	O	F	F
Sycamore	*Acer pseudoplatanus*	O	A	
Silver birch	*Betula pendula*		O	R
Hazel	*Corylus avellana*		F	
Hawthorn	*Crataegus monogyna*		A	A
Ash	*Fraxinus excelsior*		O	F
Common ivy	*Hedera helix*			D
Scots pine	*Pinus sylvestris*			R

Common Name	Scientific Name	TN1 - black poplar planted woodland	TN12 - mature broadleaved plantation woodland in linear strip along N side of A47 at Sutton	TN13 - semi-mature woodland on bund to south of duelled section of A47
Black poplar (hybrid)	*Populus x canadensis* agg	D		
Wild cherry	*Prunus avium*		O	F
Blackthorn	*Prunus spinosa*	F	O	O
Sessile oak	*Quercus petraea*			F
Pedunculate oak	*Quercus robur*		F	
False-acacia	*Robinia pseudoacacia*		R	
White willow	*Salix alba*	O		F
Elder	*Sambucus nigra*	F	F	
Small-leaved lime	*Tilia cordata*			F

6.9 Mixed Plantation Woodland

Mixed plantation woodland is present along the A1 (target note 4, photo 26), adjacent to the west of the entrance to Sacrewell Farm (target note 6, photo 27) and immediately east of the Sutton Disused Railway CWS (target note 7, photo 28). A notable proportion of coniferous trees in each of these woodland blocks are standing or fallen deadwood. Coniferous species present include Scots pine, European larch and Lawson's cypress. Broadleaved species include abundant beech in the woodlands north of the A47, and abundant ash with an elder and hawthorn understorey east of the disused railway. The mixed plantation woodlands north of the A47 have a very sparse ground flora, whereas the woodland east of the disused railway is more open in character with a species-poor but abundant ground flora in places, including locally frequent garlic mustard, ground-ivy, dog's mercury and common nettle. In some places in the woodland at target note 7 there are rare occurrences of other broadleaved species including pedunculate oak, hawthorn and sycamore.

Photo 26. Mixed plantation woodland along the A1 (target note 4)

Photo 27. Mixed plantation woodland next to Sacrewell Farm entrance (target note 6)

Photo 28. Mixed plantation woodland east of the Sutton Disused Railway CWS (target note 7)

Species recorded during the survey in the area of broadleaved woodland are listed in table 6.8 below.

Table 6.8. Species recorded in the mixed plantation woodland

Common Name	Scientific Name	TN4 - Mature mixed plantation woodland along the A1	TN6 - Semi-natural mixed plantation woodland along west side of road to Sacrewell Farm	TN7 - Mature mixed plantation woodland
Grasses				
Yorkshire-fog	*Holcus lanatus*			O
Forbs				
Garlic mustard	*Alliaria petiolata*			LF
Lesser burdock	*Arctium minus*			R
Lords-and-ladies	*Arum maculatum*		R	O
Creeping thistle	*Cirsium arvense*			R
Cleavers	*Galium aparine*	R		
Wood avens	*Geum urbanum*			R
Ground-ivy	*Glechoma hederacea*			F
Stinking iris	*Iris foetidissima*	R	R	R
Dog's mercury	*Mercurialis perennis*			LF
Common nettle	*Urtica dioica*	A		LF
Trees, Shrubs and Woody Climbers				
Field maple	*Acer campestre*		F	
Sycamore	*Acer pseudoplatanus*		F	F
Silver birch	*Betula pendula*			R
White bryony	*Bryonia dioica*			R
Lawson's cypress	*Chamaecyparis lawsoniana*	F	F	

Common Name	Scientific Name	TN4 - Mature mixed plantation woodland along the A1	TN6 - Semi-natural mixed plantation woodland along west side of road to Sacrewell Farm	TN7 - Mature mixed plantation woodland
Hazel	*Corylus avellana*			R
Hawthorn	*Crataegus monogyna*		O	O
Beech	*Fagus sylvatica*	A	A	
Ash	*Fraxinus excelsior*			D
European larch	*Larix decidua*	F		R
Scots pine	*Pinus sylvestris*	F		
Wild cherry	*Prunus avium*			R
Pedunculate oak	*Quercus robur*			O
Dog-rose	*Rosa canina*			R
Bramble	*Rubus fruticosus* agg.			R
Goat willow	*Salix caprea*		F	R
Elder	*Sambucus nigra*			F
Lilac	*Syringa vulgaris*			R
Lime	*Tilia platyphyllos x cordata = T. x europaea*			R

6.10 Riparian Vegetation Along the River Nene

Goat willow and white willow trees line the River Nene, and vegetation along its bank is mainly tall ruderal, including locally frequent hemlock (photo 29), common nettle and creeping thistle with some areas dominated by sea club-rush (*Bolboschoenus maritimus*), yellow iris and hedge bindweed near the water's edge (photos 30 and 31). In many areas riparian vegetation is rank grassland consisting of species present in adjacent fields, dominated by coarse species including false oat-grass, cock's-foot and red fescue (photo 32).

Photo 29. Typical vegetation along the River Nene (south of area referred to by target note 15)

Photo 30. Typical vegetation along the River Nene (south of field referred to by target note 16, location of target note 17)

Photo 31. Typical vegetation along the River Nene (south of field referred to by target note 17)

Photo 32. Typical vegetation along the River Nene (south of field referred to by target note 19)

6.11 Hedgerows

Hedgerows are discussed in more detail in section 7 below and the hedgerow survey is summarised on drawing 778574-MLM-ZZ-XX-DR-J-0004. Species-poor hedgerows are present in most places, with species-rich hedgerows being present along The Drift (hedgerows H8 and H9) and along Sutton Heath Road (H19 and H24). Ground flora is consistently species-poor for all hedgerows, particularly those at field boundaries.

6.12 Bare Ground

The area adjacent to the A1 has a recently constructed cycleway that goes from the picnic area under the A1 bridge over the River Nene (target note 15, photos 33 and 34). Areas associated with this construction are bare ground, with the zone between the newly constructed cycleway and the River Nene dominated by hemlock.

Photo 33. New cycle path recently built near the River Nene at the picnic area near the A1 showing some of the extent of bare ground (photo looking west)

Photo 34. Bare ground in foreground, with tall ruderal vegetation near the River Nene and scrub in the background (photo looking east)

6.13 Invasive Species

During the survey, searches were made for the presence of non-native invasive species listed on Schedule 9 of the Wildlife and Countryside Act. These species are notably largely absent from the areas that could be searched with the DCO boundary. The only occurrence recorded was a stand of Himalayan balsam noted in the stream at target note 9.

7 Hedgerow Survey within the DCO Boundary

7.1 Previous Survey Results

The locations of all hedgerows and their importance are summarised on drawing 778574-MLM-ZZ-XX-DR-J-0004.

There are few details of the results of the 2017 hedgerow survey (ref. 1). Only two hedgerows were noted as important and these were subject to resurvey in 2020, hedgerows H8 and H9. All other hedgerows did not meet the definition of "Important" considering the wildlife and landscape criteria of the Hedgerow Regulations 1997. The remaining hedgerows were species-poor and not considered to be important hedgerows during the 2017 survey, being largely hawthorn and blackthorn dominated. Hedgerows H1, H15, H16 and H18 all contained mature standard trees which were mainly sycamore, ash and lime. All previously surveyed hedgerows were viewed during the 2020 survey and their descriptions were considered still valid, meaning these hedgerows were all species-poor and would not meet the criteria to be considered "Important" hedgerows.

7.2 2020 Survey Results

Hedgerows H8 and H9, which met the criteria of "Important" under the Hedgerow Regulations 1997 were resurveyed (photos 35 and 36). Given slight changes in the DCO boundary, six additional hedgerows required survey in 2020: Hedgerows H19, H20, H21, H22, H23, H24 and H25 (photos 37 to 43 inclusive). These were all along Sutton Heath Road and the arable fields to the east of the road. The purpose of the resurvey was to ensure hedgerows previously identified as important still met the criteria, and provide data on hedgerows not previously considered, to determine if they should be considered important hedgerows.

Photo 35. H8 (meets criteria as important) - Species-rich hedgerow with trees along The Drift

Photo 36. H9 (meets criteria as important) – Species-rich intact hedgerow along The Drift

Photo 37. H19 (meets criteria as important) – Species-rich hedgerow with trees along Sutton Heath Road

Photo 38. H20 – Species-poor hedgerow dominated by hawthorn with some multi-stemmed sycamore trees

Photo 39. H21 - Species-poor thin hedgerow dominated by hawthorn

Photo 40. H22 - Species-poor defunct hedgerow

Photo 41. H23 - Species-poor hedgerow dominated by hawthorn with some standard ash and field maple

Photo 42. H24 (meets criteria as important) – Species-rich hedgerow with trees along east side of Sutton Heath Road

Photo 43. H25 – Species-poor hedgerow with trees along west side of Sutton Heath Road

The hedgerow survey results for species per 30m section are tabulated below:

Table 7.1. Species Surveyed per 30m Dduring the Hedgerow Survey 2020

Common Name	Scientific Name	H8	H9	H19	H20	H21	H22	H23	H24	H25
Shrub/Tree										
Ash	*Fraxinus excelsior*	S/T*	S					T		
Blackthorn	*Prunus spinosa*	S	S			S	S		S	
Bramble	*Rubus fruticosus agg.*	S	S	S	S	S	S	S	S	S
Dog rose	*Rosa canina*	S	S	S					S	
Elder	*Sambucus nigra*		S	S						
Elm	*Ulmus sp.*			T					S/T	S
Field maple	*Acer campestre*	S	S	S			T	T		
Hawthorn	*Crataegus monogyna*	S	S	S	S	S	S	S	S	S
Hazel	*Corylus avellana*						S			
Hornbeam	*Carpinus betulus*	T								
Sycamore	*Acer pseudoplatanus*			T	T				T	T
Climber										
Ivy	*Hedera helix*		S	S					S	S
Black bryony	*Tamus communis*		S	S						
Traveller's joy	*Clematis vitalba*			S						

* S = shrub layer; T = standard tree

Hedgerows H8 and H9 are confirmed to be "Important" hedgerows, as categorised in the previous survey. Hedgerow H8 averaged seven woody species per 30m, was intact, contained one mature tree per 50m, had a dry ditch along its length and was adjacent to a parallel hedge within 15m. Hedgerow H9 had an average of nine woody species per 30m including climbers, was mostly intact, was on a bank and was adjacent to a parallel hedge within 15m.

Of the seven newly surveyed hedgerows in 2020, two are considered important: hedgerows H19 and H24. Both hedgerows are located along Sutton Heath Road. Hedgerow H19 averaged 10 woody species per 30m including climbers, was intact, on a bank, and adjacent to a parallel hedge within 15m. H24 is congruous with H19, also along Sutton Heath Road, had an average of seven woody species including climbers per 30m, on a bank and adjacent to a parallel hedge within 15m.

Of the other five hedgerows surveyed, H20 to H23 inclusive were all hedgerows along field boundaries and H25 was present along Sutton Heath Road forming the boundary of Sutton Heath and Bog SSSI. These hedgerows surveyed were species-poor in composition and mainly dominated by hawthorn with a poor ground flora.

8 Botanical Survey of Sutton Heath and Bog SSSI

8.1 General

The site survey was carried out to provide an update assessment of vegetation communities within Sutton Heath and Bog SSSI, following detailed surveys carried out in 2018, 2017 and 1999 (ref. 3). The survey in 2018 compared the more recent data sets with that available for the 1999 survey. The main findings were:

- A significant decrease in MG1 *Arrhenatherum elatorius* grassland habitat (7.5ha to 4.48ha) and a corresponding increase in CG5 *Bromus erectus-Brachypodium pinnatum* grassland habitat, showing management of the grassland has been beneficial.
- A change in swamp community from 1.29ha to 1.52ha, dominated by S7 *Carex acutiformis* swamp.
- A reduction in the M13 *Schoenetum nigricans-Juncus subnodulosus* mire.

It is interesting to compare the findings of the distribution of plant communities in the 2018 report with this 2020 survey, since in 2020 the site was much drier and communities, particularly in the areas of mire and swamp habitats, have changed notably. The 2018 survey focused on plotting the flush and rarer mire communities and therefore did not provide a detailed description of the grassland habitats. The 2018 survey also focussed particularly on plotting where rare species were noted, so a repeat of this was not considered warranted in 2020. Given this, for completeness, the full 2018 report including maps showing the locations of rare species identified is included as Appendix B.

8.2 Unimproved Calcareous Grassland

Unimproved calcareous grassland was identified in most of the grazed areas that were on higher ground within the boundary of Sutton Heath and Bog SSSI. This included CG4 *Brachypodium pinnatum* grassland (photo 44) and CG5 *Bromus erectus-Brachypodium pinnatum* grassland (photo 45). The CG4 grassland is more limited in extent and is adjacent to the mire communities, whereas the CG5 is more extensive across the site covering most of the extensively grazed areas in higher areas of the site. The boundaries between the CG4 and CG5 grasslands are not obvious and there is considerable transition between these two similar habitats, so it may not be exactly as shown on drawing 778574-MLM-ZZ-XX-DR-J-0005.

Where grazing is more intensive the sward is short and heath false-brome and upright brome is less abundant, whereas in other areas where grazing is not as frequent these grasses dominate and form a rank tussocky more species-poor sward (photo 46). This is particularly true of higher areas of the site where hawthorn trees are present. These areas were shown as W21 *Crataegus monogyna-Hedera helix* scrub in the previous NVC report, but given the grazed nature of this site and the presence of grassland around these open trees that are poor parkland in character this was considered a poor fit and this whole area was plotted as CG5 grassland.

Photo 44. Close-up of sward for CG4 grassland

Photo 45. Typical view of more grazed CG5 grassland

Photo 46. Typical view of less grazed more tussocky CG5 grassland, showing openly growing hawthorn trees.

Species recorded within the calcareous grassland within the Sutton Heath and Bog SSSI are included in table 8.1 below.

Table 8.1. Species Recorded within the Unimproved Calcareous Grassland at Sutton Heath and Bog SSSI

Common Name	Scientific Name	Grassland in Horse-grazed Area (CG4)	Most extensive grassland in cattle-grazed field (CG5)
Grasses, Sedges and Rushes			
Common bent	*Agrostis capillaris*	O	
Sweet vernal-grass	*Anthoxanthum odoratum*	R	
False oat-grass	*Arrhenatherum elatius*		R
Heath false-brome	*Brachypodium pinnatum*	F	
Quaking-grass	*Briza media*	R	R
Upright brome	*Bromopsis erecta*		F
Crested dog's-tail	*Cynosurus cristatus*		R
Cock's-foot	*Dactylis glomerata*		R

Common Name	Scientific Name	Grassland in Horse-grazed Area (CG4)	Most extensive grassland in cattle-grazed field (CG5)
Sheep's-fescue	*Festuca ovina*		R
Red fescue	*Festuca rubra*		R
Yorkshire-fog	*Holcus lanatus*		O
Perennial rye-grass	*Lolium perenne*		R
Smaller cat's-tail	*Phleum bertolonii*		R
Smooth meadow-grass	*Poa pratensis*		R
Tall fescue	*Schedonorus arundinaceus*	R	
Horsetails			
Field horsetail	*Equisetum arvense*	R	
Forbs			
Yarrow	*Achillea millefolium*		R
Agrimony	*Agrimonia eupatoria*	R	
Thyme-leaved sandwort	*Arenaria serpyllifolia*	R	
Daisy	*Bellis perennis*	R	R
Clustered bellflower	*Campanula glomerata*		R
Musk thistle	*Carduus nutans*	R	O
Common knapweed	*Centaurea nigra*		R
Greater knapweed	*Centaurea scabiosa*	R	
Common mouse-ear	*Cerastium fontanum*	R	R
Creeping thistle	*Cirsium arvense*		R
Woolly thistle	*Cirsium eriophorum*		R
Spear thistle	*Cirsium vulgare*	R	R
Field bindweed	*Convolvulus arvensis*	R	R
Smooth hawk's-beard	*Crepis capillaris*		R
Meadowsweet	*Filipendula ulmaria*	R	
Dropwort	*Filipendula vulgaris*	R	
Hedge bestraw	*Galium album*	R	
Lady's bedstraw	*Galium verum*		O
Hogweed	*Heracleum sphondylium*	R	
Perforate St John's-wort	*Hypericum perforatum*	R	
Cat's-ear	*Hypochaeris radicata*	R	R
Field scabious	*Knautia arvensis*	R	R
Meadow vetchling	*Lathyrus pratensis*	R	
Rough hawkbit	*Leontodon hispidus*		R
Fairy flax	*Linum catharticum*		R
Common bird's-foot-trefoil	*Lotus corniculatus*		R
Ribwort plantain	*Plantago lanceolata*		R
Greater plantain	*Plantago major*	R	

Common Name	Scientific Name	Grassland in Horse-grazed Area (CG4)	Most extensive grassland in cattle-grazed field (CG5)
Creeping cinquefoil	*Potentilla reptans*	R	R
Salad burnet	*Poterium sanguisorba* ssp *sanguisorba*	R	R
Selfheal	*Prunella vulgaris*	R	
Meadow buttercup	*Ranunculus acris*	R	
Weld	*Reseda luteola*		R
Yellow-rattle	*Rhinanthus minor*		R
Common sorrel	*Rumex acetosa*	R	R
Sheep's sorrel	*Rumex acetosella*	R	
Oxford ragwort	*Senecio squalidus*	R	
Upright hedge-parsley	*Torilis japonica*		R
Goat's-beard	*Tragopogon pratensis*		R
Red clover	*Trifolium pratense*		R
White clover	*Trifolium repens*		R
Common nettle	*Urtica dioica*		R
Germander speedwell	*Veronica chamaedrys*		R
Trees, Shrubs and Woody Climbers			
Hawthorn	*Crataegus monogyna*	R	R

Five quadrats were carried out in the calcareous grassland in the grazed fields, with three quadrats (SHB1, SHB2 and SHB3) in the cattle grazed field and two quadrats (SHB4 and SHB5) at higher points within the fenced in area containing the bog and mire habitats. This identified the grassland as CG5 typical sub-community, but it was a poor fit. Quadrats SHB1, SHB2 and SHB3 in the cattle-grazed field show some affinity to the MG1 *Arrhenatherum elatius* grassland of which it was likely more representative in the past, whereas the quadrats SHB4 and SHB5 in the cattle grazed area are likely within the transition of the boundary between CG4 and CG5 grassland communities. The previous NVC survey stated that there was a significant decrease in MG1 habitat in preference for CG5 habitat when comparing the 1999 and the 2017/2018 studies.

Although analysis of the constancy tables of this community identify it as CG5, it has only occasional heath false-brome and upright brome which are constants for CG5, whereas false oat-grass was constant, along with cock's-foot, common knapweed, crested dog's-tail and red fescue. These constant species fit better with an MG1e *Arrhenatherum elatius* grassland *Centaurea nigra* sub-community in the NVC methodology. However the presence of heath false-brome and upright brome along with constant and frequent species that are characteristic of CG5, including salad burnet and lady's bedstraw indicate that overall this community should be viewed as a CG5, with the potential to easily revert to an MG1 should management measures change in future.

The details recorded for each of the quadrats in the Sutton Heath and Bog SSSI site are included at Appendix C and the constancy table for the CG5 grassland is below.

Table 8.2. Constancy Table for Species Recorded in Quadrats in the CG5 Grassland Within the Sutton Heath and Bog SSSI

Species	Constancy	Percentage Cover within Quadrat (%)				
		SHB1	SBH2	SHB3	SBH4	SBH5
Galium verum	V	10	10	5	5	5
Poterium sanguisorbia spp. *sanguisorbia*	V	1	4	5	6	5
Arrhenatherum elatius	IV	2	2	2		2
Centaurea nigra	IV		1	5	10	10
Cynosurus cristatus	IV	1	2	3		2
Dactylis glomerata	IV	3	2	5	3	
Festuca rubra	IV	3	2		20	5
Holcus lanatus	IV		2	10	15	10
Plantago lanceolata	IV	1		3	1	5
Potentilla reptans	IV	1	1	2		5
Veronica chamaedrys	IV	1	1	5	1	
Achillea millifolium	III	3	2	5		
Bromopsis erectus	III	45	50			2
Cirsium arvense	III	2		2	1	
Festuca ovina	III	3	2	10		
Phleum bertolonii	III	4	1	2		
Torilis japonica	III	1	2	2		
Trifolium pratense	III		3	5	1	
Trifolium repens	III	1	1	8		
Anthoxanthum oderatum	II				20	5
Brachipodium pinnatum	II				10	50
Cerastium fontanum	II			2		5
Convolvulus arvensis	II	5		5		
Lolium perenne	II	2		2		
Lotus corniculatus	II		2			5
Agrimonia eupatoria	I					5
Agrostis stolonifera	I			15		
Briza media	I				2	
Campanula glomerata	I		1			
Carduus nutans	I			1		

Species	Constancy	Percentage Cover within Quadrat (%)				
		SHB1	SBH2	SHB3	SBH4	SBH5
Cerastium fontanum	I	3				
Cirsium eriphorum	I		3			
Crataegus monogyna	I		1			
Crepis capillaris	I	1				
Hypochaeris radicata	I				1	
Poa pratensis	I	2				
Rhinanthus minor	I		1			
Rumex acetosella	I				1	
Tragopogon pratensis	I	1				

8.3 Unimproved Neutral Grassland

The areas of unimproved neutral grassland identified fit into the following NVC types:

- MG1 *Arrhenatheretum elatius* grassland: MG1a *Festuca rubra* sub-community, MG1c *Filipendula ulmaria* sub-community and MG1e *Centaurea nigra* sub-community.
- MG9b *Holcus lanatus-Deschampsia cespitosa* grassland, *Arrhenatherum elatius* sub-community
- MG10a *Holcus lanatus-Juncus effusus* rush-pasture, *Juncus inflexus* sub-community.

The MG1 *Arrhenatheretum elatius* grassland is a community in which coarse grasses including false oat-grass, cock's foot and Yorkshire-fog are always conspicuous and generally dominant. This grassland is associated with extensive grazing or sites where grazing is absent. This is of interest in this site where grazing is extensive and not continuous. The previous survey report stated that improvements in grazing management has resulted in a significant decrease in the coverage of MG1 habitat and an increase in coverage of CG5 grassland. MG1 grassland is diverse with five recognised sub-communities, three of which are found on site:

- MG1a: The northernmost cattle-grazed field where grazing pressure is highest has occasional false oat-grass and cock's-foot is occasional with red fescue being more dominant. In this area there are occasional and locally frequent dicotyledons including ground ivy, white clover, creeping buttercup, dandelion and creeping thistle (photo 47). This area is dominated by grasses and generally species-poor. This area therefore fits best as the *Festuca rubra* sub-community of the MG1 *Arrhenatheretum elatius* (MG1a) grassland but is transitioning towards an MG6 *Lolium-perenne-Cynosurus cristatus* grassland given the high grazing pressure. The boundary between this grassland and the adjacent CG5 is likely not as linear as shown on drawing 778574-MLM-ZZ-XX-DR-J-0005; this line is a fence-line that is defunct allowing cattle to pass easily between the two fields so the two qrassland types transition into each other more gradually than drawn.
- MG1c: The grassland between the M27 mire and the enclosed fence-line looks like it has not been grazed in many years. This is the rankest grassland found at the site (photo 48). Its positioning beside the M27 mire allows a natural sharp transition between this grassland and the mire as the ground slopes upwards. This grassland has a close fit with the MG1c *Arrhenatheretum elatius, Filipendula ulmaria* subcommunity. Meadowsweet is occasional throughout the sward and is locally frequent in places; great willowherb is also locally frequent. Grasses associated with this sub-community, including cock's-foot, rough meadowgrass and tufted hair-grass, are also present. A DAFOR species list was recorded

for the MG1c sub-community since this was on the margin of the M27 mire, to better consider the boundary between the mire and the grassland.

- MG1e: The highest ground between the northernmost and central flush in the fenced in area that is horse-grazed is MG1e *Arrhenatheretum elatius, Centaurea nigra* subcommunity (photo 49). This area is irregularly lightly grazed and the boundaries between this community and the adjacent CG5 and MG9 grasslands are ill-defined. It is species-rich but coarse grasses dominate, so it is more characteristic of an MG1 grassland than a CG5 grassland, and is significantly different in character to the grassland between the central flush and southernmost flush which is CG5 grassland transitioning into CG4 grassland in places, and is also different to the grassland to the west on lower slopes which is primarily MG9 grassland with some small areas of MG10 grassland. The species in this area of MG1 grassland include frequent common knapweed and meadow vetchling, and occasional agrimony and lady's bedstraw.

The MG9b *Holcus lanatus-Deschampsia cespitosa* grassland, *Arrhenatherum elatius* sub-community is present either side of the northernmost flush, present on gently and more sharply sloping areas towards the swamp vegetation (photo 50). The tufted hairgrass tussocks are close in some areas near the S4 swamp but are generally quite spread out. Where horses have created preferential commuting and grazing pathways a mosaic of species-richness is apparent, and in some areas the numbers of heath spotted orchid spikes present is striking (photo 51). Between tufted hairgrass tufts the sward is a mosaic of Yorkshire-fog, creeping bent, false-oat grass, wild angelica, marsh thistle and water mint, with rare occurrences of heath false-brome, rough meadow-grass, cock's-foot, hard rush, hogweed and meadowsweet. In more grazed areas silverweed, white clover and common vetch are more common with rare occurrences of marsh horsetail and fen bedstraw being notable (photo 52). Quadrat data in more grazed areas identified grasses occupying about half of the percentage cover, with the main grasses/rushes red fescue, Yorkshire-fog, hard rush and false oat-grass having more or less even cover, with silverweed and fen bedstraw being important components. Given the constancy of false oat-grass and high proportion of common knapweed, as well as its adjacency beside an MG1 grassland, this is considered to be the *Arrhenatherum elatius* sub-community. Generally this habitat is more diverse in the wetter areas near the flush and swamp areas, and less diverse along its ill-defined boundary with the MG1e grassland surrounding it. On higher areas this grassland has only rare occurrences of tufted hair-grass and no notably mature/large tussocks. In less grazed areas tufted hair-grass and hard rush is more abundant. Heath spotted orchid is constant but widely spread throughout the habitat.

The MG10a *Holcus-lanatus-Juncus effusus* rush-pasture, *Juncus inflexus* sub-community has a relatively small extent at the site with some present either site of the central flush (photo 53). The abundance of hard rush and relatively poor coverage of soft rush identifies this as the *Juncus inflexus* sub-community. One quadrat was carried out in this area. This grassland, like the MG9, is orchid-rich (photo 54) and the boundaries between the MG10 and MG9 grasslands are ill-defined. There is less Yorkshire-fog than in the MG9 but it is still constant, and the grassland has a higher proportion of rushes and is generally more species-rich, generally occurring on lower and wetter areas.

The 2018 survey (ref. 3) identified MG13b *Agrostis stolonifera-Alopecurus geniculatus* grassland in the legend of the drawing showing the NVC communities, but it was unclear where on the drawing this community was identified. This community was not found during the 2020 survey since in no location were the two constant species found together. Creeping bent was found to be occasional in the MG9, but marsh foxtail (*Alopecurus geniculatus*) was not found. It is considered likely marsh foxtail was overlooked during the 2020 survey, but not to the extent of missing this highly distinctive community. It is therefore considered that this community either no longer exists on the site or it occupies such a small area that it is not important.

Photo 47. Close-up of closely cropped sward for MG1a grassland

Photo 48. Typical view of the MG1c grassland

Photo 49. Typical view of the MG1e grassland

Photo 50. Typical view of the MG9b grassland

Photo 51. Typical sward of MG9b grassland

Photo 52. Very grazed area of MG9 grassland on the boundary of rush-dominated area of the M22 mire

Photo 53. Boundary of MG10a grassland and M22 mire (with S7 swamp in the background)

Photo 54. Typical sward of MG10a grassland

Species recorded within the unimproved neutral grassland within the Sutton Heath and Bog SSSI are included in table 8.3 below.

Table 8.3. Species recorded within the unimproved neutral grassland at Sutton Heath and Bog SSSI

Common Name	Scientific Name	Grassland adjacent to southern flush (MG1c)	Grassland on gently sloping areas in horse-grazed area (MG9b)	Grassland near swamp either side of central flush (MG10a)
Grasses, Sedges and Rushes				
Common bent	*Agrostis capillaris*		R	R
Creeping bent	*Agrostis stolonifera*		O	
Sweet vernal-grass	*Anthoxanthum odoratum*	R		
False oat-grass	*Arrhenatherum elatius*	A	O	R
Heath false-brome	*Brachypodium pinnatum*		R	R
Glaucous sedge	*Carex flacca*			R
Hairy sedge	*Carex hirta*			R
Cock's-foot	*Dactylis glomerata*		R	R
Tufted hair-grass	*Deschampsia cespitosa* subsp. *cespitosa*	R	O	R
Red fescue	*Festuca rubra*		O	O
Yorkshire-fog	*Holcus lanatus*	F	O	F
Soft-rush	*Juncus effusus*	R	R	R
Hard rush	*Juncus inflexus*	O		LF
Blunt-flowered rush	*Juncus subnodulosus*	R		R
Perennial rye-grass	*Lolium perenne*		R	
Timothy	*Phleum pratense*		R	
Rough meadow-grass	*Poa trivialis*	R	R	R
Horsetails				
Field horsetail	*Equisetum arvense*			R

Common Name	Scientific Name	Grassland adjacent to southern flush (MG1c)	Grassland on gently sloping areas in horse-grazed area (MG9b)	Grassland near swamp either side of central flush (MG10a)
Marsh horsetail	*Equisetum palustre*		R	R
Forbs				
Yarrow	*Achillea millefolium*	R		
Agrimony	*Agrimonia eupatoria*		R	
Wild angelica	*Angelica sylvestris*	R	O	R
Mugwort	*Artemisia vulgaris*		R	R
Common knapweed	*Centaurea nigra*	R		R
Creeping thistle	*Cirsium arvense*	R	R	O
Marsh thistle	*Cirsium palustre*		O	R
Heath spotted-orchid	*Dactylorhiza maculata*	R	R	R
Great willowherb	*Epilobium hirsutum*	LF		
Meadowsweet	*Filipendula ulmaria*	LF	R	R
Cleavers	*Galium aparine*	O		
Fen bedstraw	*Galium uliginosum*	R	R	R
Lady's bedstraw	*Galium verum*	O	R	R
Ground-ivy	*Glechoma hederacea*		R	R
Hogweed	*Heracleum sphondylium*		R	R
Square-stalked St John's-wort	*Hypericum tetrapterum*			R
Meadow vetchling	*Lathyrus pratensis*		R	R
Common bird's-foot-trefoil	*Lotus corniculatus*	R	R	R
Black medick	*Medicago lupulina*			R
Water mint	*Mentha aquatica*	R	O	R
Forget-me-not	*Myosotis* sp	R		
Common poppy	*Papaver rhoeas*	R		
Ribwort plantain	*Plantago lanceolata*			R
Silverweed	*Potentilla anserina*		R	O
Tormentil	*Potentilla erecta*		R	
Creeping cinquefoil	*Potentilla reptans*			R
Salad burnet	*Poterium sanguisorba* ssp *sanguisorba*	R		
Selfheal	*Prunella vulgaris*	R		R
Common fleabane	*Pulicaria dysenterica*			O
Meadow buttercup	*Ranunculus acris*	R	R	R
Creeping buttercup	*Ranunculus repens*	R		R
Common sorrel	*Rumex acetosa*		R	
Clustered dock	*Rumex conglomeratus*	R		

Common Name	Scientific Name	Grassland adjacent to southern flush (MG1c)	Grassland on gently sloping areas in horse-grazed area (MG9b)	Grassland near swamp either side of central flush (MG10a)
Marsh dock	*Rumex palustris*	R		
Water figwort	*Scrophularia auriculata*	R		R
Skullcap	*Scutellaria galericulata*			R
Common ragwort	*Senecio jacobaea*		R	R
White clover	*Trifolium repens*		R	R
Marsh arrowgrass	*Triglochin palustris*			LF
Germander speedwell	*Veronica chamaedrys*	R		
Tufted vetch	*Vicia cracca*	R		
Common vetch	*Vicia sativa*		R	R
Shrubs/Trees				
Hawthorn	*Crataegus monogyna*		R	

8.4 Flushes, Mires and Fen-meadow

The habitats identified around the flushes at the site identified fit into the following NVC types:

- M13 *Schoenus nigricans-Juncus subnodulosus* mire
- M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow
- M27 *Filipendula ulmaria-Angelica sylvestris* mire

The M13 *Schoenus nigricans-Juncus subnodulosus* mire is closely associated with outcroppings of the Lincolnshire Limestone and is strongly associated with groundwater springs. At the site it is closely associated with the flushes occurring from where seepage begins and transitioning to swamp the lowest areas at the site. This is the most diverse community at the site. There are a number of rare species that have been recorded at the site during both this survey and previous surveys associated with the M13 mire habitat, including common yellow sedge, slender spike-rush, black bog rush, fen bedstraw, marsh pennywort, ragged robin, lesser spearwort, marsh arrowgrass and marsh valerian. The central flush is the best example of this community at the site (photos 55 and 56) but this community is also evident along the northern-side of the southernmost flush (photo 57). The quality of this habitat is lower in the southern flush. Although the previous survey (ref. 3) showed part of this as M24 (noting in the text *Schoenus nigricans* is still dominant), due to the absence of most species that should be constant in M24 this was considered a poorer fit and this area is mapped as M13.

The M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow (photos 58 to 61 inclusive) is present along the northernmost flush in the horse-grazed field (photo 58) and the southernmost flush in the cattle-grazed field, as well as adjacent to the S7 swamp where it is significantly less grazed and the vegetation attains heights above 50cm in places (photo 60). This habitat has a distinctly different composition in areas where it is more grazed but blunt-flowered rush is always a key component of the sward and the vegetation is generally luxuriant. Species of note identified within this habitat include fen bedstraw, recorded widespread throughout the community and grass-of-Parnassus, recorded at one location near the boundary with the S7 swamp.

In one area of the M22 fen-meadow between the S4 and S7 swamp communities rushes dominate and in particular soft rush is frequent (photo 61). This area is much less species-diverse than the M22 community it is adjacent to. This is close to the M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture but is a poor-fit. It is better to consider this whole area as being within the M22 habitat, particularly given the absence of marsh bedstraw (*Galium palustre*), and the frequency of blunt-flowered rush (one of the constants of M22) and hard rush. As described in Rodwell (ref. 16), these two species of rushes "…are best represented on more base-rich soils to the east of Britain, are hardly ever found [in the M23 community] and their absence provide a good separation of this community from more calcicolous kinds of rush-dominated vegetation in the *Holco-Juncetum* and, more particularly, the *Juncus-Cirsium* fen-meadow." In addition the range for M23 habitat is described to be confined to western Britain.

M27 *Filipendula ulmaria-Angelica sylvestris* mire was identified in the southernmost flush in an area adjacent to the MG1c grassland where meadowsweet is also a key component (photo 62). This area was generally wet underfoot at the time of the survey, with frequent meadowsweet, water mint and blunt-flowering rush. It is more species-poor than other mire vegetation at the site, primarily due to the coverage of the tall meadowsweet plants shading out less robust species.

Mire habitats mapped in the 2018 (ref. 3) survey and not found in the 2020 survey include M5 *Carex rostrata-Sphagnum squarrosum* mire, M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture and M24 *Molinia caerulea-Cirsium dissectum* mire. The M5 and M24 habitats were shown in the legend of the drawing showing the NVC communities, but it was unclear where on the drawing this community was identified. By contrast, the M23 habitat was shown occupying a large area between the northern and central flushes. These are discussed as follows:

- Searches were made within the mire and S7 swamp communities for the M5 habitat and it was not found to be present in any of the areas of the site. This is a distinctive habitat and the constant species, including most notably spiky bog-moss (*Sphagnum squarrosum*) were not found despite concerted efforts to find them. It is considered likely this habitat is no longer present at the site, however there is a possibility it was overlooked.
- It is considered likely that the M23 habitat was incorrectly categorised in the previous survey for the reasons described above. The rushy area between the S4 and S7 swamp is better considered as M22 habitat, particularly given the absence of marsh bedstraw (a constant of M23) and the frequency of blunt-flowered rush and hard rush, the absence of which is a feature of M23. The drier areas mapped as M23 in the 2018 survey were found to be much more characteristic of mesotrophic grasslands MG9 and MG10 which they are mapped as in the 2020 survey. It is therefore considered likely that M23 is absent from the site and the previous survey plotted its presence incorrectly, possibly due to it being a much wetter year and the area probably being inundated and less visible.
- Searches were made for the M24 habitat and this was not found. The report of the previous survey stated that an area of M13 in the southern flush was more characteristic of M24 but observations in 2020 did not confirm this since most species constant for M24 were notably absent. It is possible a small area of M24 was overlooked during the 2020 survey but this is not considered a major constraint because it is likely these areas were instead mapped as M13, to which M24 has a high affinity.

Photo 55. M13 mire community at central flush

Photo 56. View of M13 mire community at central flush from CG5 grassland (photo looks towards the north)

Photo 57. M13 mire community along southernmost flush, with CG5 grassland in foreground and MG1c grassland in background

Photo 58. M22 fen-meadow community at northernmost flush

Photo 59. View of M22 fen-meadow community in southern flush from CG5 grassland (photo looks south)

Photo 60. Close-up of vegetation in M22 fen-meadow in less grazed area adjacent to S7 swamp

Photo 61. Ranker less diverse M22 fen-meadow between the S4 swamp and S7 swamp

Photo 62. M27 mire adjacent to MG1c grassland

Species recorded within the mire, fen-meadow and rush-pasture habitats within the Sutton Heath and Bog SSSI are included in table 8.4 below.

Table 8.4. Species recorded within the mire, fen-meadow and rush-pasture habitats at Sutton Heath and Bog SSSI

Common Name	Scientific Name	Mire in central and southern flush in Sutton Heath and Bog (M13)	Mire in northern flush (M22)	Species-rich mire near swamp (M22)	Species-poor mire near swamp (M22)	Meadow-sweet dominated mire in southern flush (M27)
Grasses, Sedges and Rushes						
Common bent	*Agrostis capillaris*	R				
Creeping bent	*Agrostis stolonifera*	R				
False oat-grass	*Arrhenatherum elatius*		LF	R		
Heath false-brome	*Brachypodium pinnatum*	R	R			
Common yellow-sedge	*Carex demissa*	R				
Glaucous sedge	*Carex flacca*	LF	LF			
Tawny sedge	*Carex hostiana*		R			
Long-stalked yellow-sedge	*Carex lepidocarpa*	R	R			
Bottle sedge	*Carex rostrata*	R				
Cock's-foot	*Dactylis glomerata*		R	R		
Tufted hair-grass	*Deschampsia cespitosa* subsp *cespitosa*		R	O		R

Common Name	Scientific Name	Mire in central and southern flush in Sutton Heath and Bog (M13)	Mire in northern flush (M22)	Species-rich mire near swamp (M22)	Species-poor mire near swamp (M22)	Meadow-sweet dominated mire in southern flush (M27)
Slender spike-rush	*Eleocharis uniglumis*	R				
Red fescue	*Festuca rubra*				R	
Floating sweet-grass	*Glyceria fluitans*	R				
Yorkshire-fog	*Holcus lanatus*	O	R	O	R	O
Bristle club-rush	*Isolepis setacea*		R			
Sharp-flowered rush	*Juncus acutiflorus*	LF	LF			
Soft-rush	*Juncus effusus*	O			F	R
Hard rush	*Juncus inflexus*	LF	O	O	LF	
Blunt-flowered rush	*Juncus subnodulosus*	O		R	LF	LF
Perennial rye-grass	*Lolium perenne*	R				
Purple moor-grass	*Molinia caerulea*	R				
Rough meadow-grass	*Poa trivialis*		R			
Black bog-rush	*Schoenus nigricans*	LF				
Horsetails						
Field horsetail	*Equisetum arvense*					
Water horsetail	*Equisetum fluviatile*		R			R
Marsh horsetail	*Equisetum palustre*			R		
Forbs						
Agrimony	*Agrimonia eupatoria*		R			
Wild angelica	*Angelica sylvestris*		R	R		R
Thyme-leaved sandwort	*Arenaria serpyllifolia*	R				
Common knapweed	*Centaurea nigra*	R	R			R
Creeping thistle	*Cirsium arvense*		LF			R
Marsh thistle	*Cirsium palustre*	R	R	R	O	R
Common spotted-orchid	*Dactylorhiza fuchsii*	R				

Common Name	Scientific Name	Mire in central and southern flush in Sutton Heath and Bog (M13)	Mire in northern flush (M22)	Species-rich mire near swamp (M22)	Species-poor mire near swamp (M22)	Meadow-sweet dominated mire in southern flush (M27)
Heath spotted-orchid	*Dactylorhiza maculata*	R	R	R	R	
Great willowherb	*Epilobium hirsutum*		LF		R	LF
Hemp-agrimony	*Eupatorium cannabinum*	O	LF		O	O
Meadowsweet	*Filipendula ulmaria*	LF	LF	O	R	F
Cleavers	*Galium aparine*					R
Fen bedstraw	*Galium uliginosum*	R	R	O		R
Lady's bedstraw	*Galium verum*		R	R		R
Ground-ivy	*Glechoma hederacea*		R			
Marsh pennywort	*Hydrocotyle vulgaris*		R			
Square-stalked St John's-wort	*Hypericum tetrapterum*	R	R			
Yellow iris	*Iris pseudacorus*				R	R
Meadow vetchling	*Lathyrus pratensis*		R	R	R	R
Oxeye daisy	*Leucanthemum vulgare*		R			
Common bird's-foot-trefoil	*Lotus corniculatus*	R				
Greater bird's-foot-trefoil	*Lotus pedunculatus*	R				R
Purple-loosestrife	*Lythrum salicaria*	R	R			R
Water mint	*Mentha aquatica*	O	LF	O		F
Water-cress	*Nasturtium officinale*	R	R			
Grass-of-parnassus	*Parnassia palustris*			R		
Ribwort plantain	*Plantago lanceolata*	R	R			
Silverweed	*Potentilla anserina*	R	LF	R		
Tormentil	*Potentilla erecta*	R				
Creeping cinquefoil	*Potentilla reptans*		R			
Salad burnet	*Poterium sanguisorba* ssp. *sanguisorba*					R
Selfheal	*Prunella vulgaris*	R				R

Common Name	Scientific Name	Mire in central and southern flush in Sutton Heath and Bog (M13)	Mire in northern flush (M22)	Species-rich mire near swamp (M22)	Species-poor mire near swamp (M22)	Meadow-sweet dominated mire in southern flush (M27)
Common fleabane	*Pulicaria dysenterica*	R	R	O	R	
Meadow buttercup	*Ranunculus acris*	R				
Lesser spearwort	*Ranunculus flammula*	R				
Creeping buttercup	*Ranunculus repens*		R			
Yellow-rattle	*Rhinanthus minor*					R
Clustered dock	*Rumex conglomeratus*					R
Marsh dock	*Rumex palustris*					R
Brookweed	*Samolus valerandi*	R				
Water figwort	*Scrophularia auriculata*		R	R	O	R
Hoary ragwort	*Senecio erucifolius*					R
Common ragwort	*Senecio jacobaea*		R			
Oxford ragwort	*Senecio squalidus*	R				
Ragged robin	*Silene flos-cuculi*	R				
Bittersweet	*Solanum dulcamara*	R	R		R	
Lesser stitchwort	*Stellaria graminea*	R				
Dandelion	*Taraxacum* sect. Ruderalia.		R			
White clover	*Trifolium repens*	R				
Marsh arrowgrass	*Triglochin palustris*	R				
Common nettle	*Urtica dioica*					R
Marsh valerian	*Valeriana dioica*	R				
Brooklime	*Veronica beccabunga*	R				
Common vetch	*Vicia sativa*		R	R		R
Trees, Shrubs and Woody Climbers						
Hawthorn	*Crataegus monogyna*	R	R	R		R
Bramble	*Rubus fruticosus* agg.		R			
Goat willow	*Salix caprea*		R		R	R

8.5 Swamp

The swamps identified on site were a patch of S4 *Phragmites australis* swamp in the northwest corner of the site and S7 *Carex acutiformis* swamp along the lowest point of the site adjacent to the W2 woodland along the western site boundary. These habitats were generally species-poor and boundaries were easily identifiable. A DAFOR list was taken for each swamp, which has relatively low diversity. The S4 *Phragmites australis* swamp was dominated by common reed with some locally frequent stands of great willowherb, but all other species were rarely distributed. Only the outside of this community was accessed (no photo is available). The S7 *Carex acutiformis* swamp was dominated by lesser pond-sedge, in many places to the exclusion of all other species, giving this community a distinctive and homogenous appearance (photo 63).

Photo 63. S7 swamp (with MG1c grassland in foreground)

Species recorded within the swamp habitats within the Sutton Heath and Bog SSSI are included in table 8.5 below.

Table 8.5. Species recorded within the swamp habitats at Sutton Heath and Bog SSSI

Common Name	Scientific Name	Phragmites patch Sutton Heath & Bog (S4)	Wetland/swamp in Sutton Heath & Bog (S7)
Grasses, Sedges and Rushes			
False oat-grass	*Arrhenatherum elatius*	R	
Lesser pond-sedge	*Carex acutiformis*	O	D
Pendulous sedge	*Carex pendula*		R
Cock's-foot	*Dactylis glomerata*	R	
Yorkshire-fog	*Holcus lanatus*	R	
Hard rush	*Juncus inflexus*	O	
Common reed	*Phragmites australis*	D	
Wood club-rush	*Scirpus sylvaticus*		R
Horsetails			
Marsh horsetail	*Equisetum palustre*		R
Forbs			
Hedge bindweed	*Calystegia sepium*		R
Marsh thistle	*Cirsium palustre*		R

Common Name	Scientific Name	Phragmites patch Sutton Heath & Bog (S4)	Wetland/swamp in Sutton Heath & Bog (S7)
Great willowherb	*Epilobium hirsutum*	LF	R
Hemp-agrimony	*Eupatorium cannabinum*		R
Meadowsweet	*Filipendula ulmaria*		R
Fen bedstraw	*Galium uliginosum*	R	
Yellow iris	*Iris pseudacorus*		R
Purple-loosestrife	*Lythrum salicaria*		R
Water mint	*Mentha aquatica*		R
Common fleabane	*Pulicaria dysenterica*		R
Marsh dock	*Rumex palustris*	R	
Dock	*Rumex* sp		R
Water figwort	*Scrophularia auriculata*	R	R
Skullcap	*Scutellaria galericulata*	R	
Bittersweet	*Solanum dulcamara*	R	R
Common vetch	*Vicia sativa*	R	R
Trees and Shrubs			
Hawthorn	*Crataegus monogyna*		LF
Goat willow	*Salix caprea*		LF

8.6 Woodland and Scrub

Woodland and scrub habitats were not surveyed in detail since effort was focussed on mire, swamp and grassland communities. DAFOR species lists were not recorded.

W2 *Salix cinerea-Betula pubescens-Phragmites australis* woodland is present along the lowest part of the site (photo 64). Species present include dominant goat willow with some grey willow (*Salix cinerea*) and likely their hybrids, with occasional hawthorn and rare occurrences of hairy birch (*Betula pubescens*). The understorey is dominated by common reed in places and bramble in drier areas.

The W21 *Crataegus monogyna-Hedera helix* scrub is mainly associated with the species-poor hedgerow with trees that forms the boundary of the site along Sutton Heath Road (photo 65). This is H25 assessed in section 7 of this report. This is only shown on drawing 778574-MLM-ZZ-XX-DR-J-0005 along the southernmost part of this boundary simply because the red-line for the SSSI boundary does not include this hedgerow for the northern stretch of this road. Most areas plotted as W21 scrub in the previous survey report are openly growing hawthorn trees that do not have the character of a W21 scrub woodland; these areas are better described as scattered hawthorn trees growing within the CG5 grassland (see section 8.2 above).

Photo 64. W2 woodland along western site boundary

Photo 65. W21 scrub (species-poor hedgerow with trees) along eastern site boundary

8.7 Open Habitats

Open habitats were not surveyed in detail since effort was focussed on mire, swamp and grassland communities. DAFOR species lists were not recorded and photographs of these habitats are not available.

OV21 *Poa annua-Plantago major* community is associated with heavily poached areas within the MG1 grassland and areas where vehicle movements have compacted the ground exposing bare ground. This habitat is very species-poor with annual meadow-grass, ribwort and greater plantain and ground ivy present.

OV26 *Epilobium hirsutum* community is present in a somewhat linear stretch along the transition between a heavily grazed MG1 patch near swamp vegetation within the cattle grazed field, forming a transition between this habitat and the CG5 grassland. Greater willowherb is dominant but silverweed, common fleabane, ribwort plantain and creeping thistle are occasional.

8.8 Rare, Scarce and/or Declining Species of Conservation Concern

All species identified at the site in the 2020 survey, and all those listed in the report of the 2018 survey, were compared with the Red List for England (ref. 12) and the Cambridgeshire (v.c.29) Rare Plant Register (ref. 13). This identified the species of interest listed in table 8.6 below.

Table 8.6. Rare, Scarce and/or Declining Species of Conservation Concern Identified Within Sutton Heath and Bog SSSI

Common Name	Scientific Name	Status in Cambridgeshire	Status in England
Quaking-grass	*Briza media*	Not listed	Near threatened
Clustered bellflower	*Campanula glomerata*	Endangered	Least concern

Common Name	Scientific Name	Status in Cambridgeshire	Status in England
Common yellow-sedge	*Carex demissa*	Rare	Least concern
Oval sedge*	*Carex leporina*	Rare, Critically endangered	Least concern
Pill sedge*	*Carex pilulifera*	Rare	Least concern
Bottle sedge	*Carex rostrata*	Rare	Least concern
Slender spike-rush	*Eleocharis uniglumis*	Scarce, Endangered	Least concern
Cotton grass*	*Eriophorum angustifolium*	Rare, critically endangered	Vulnerable
Fen bedstraw	*Galium uliginosum*	Endangered	Least concern
Marsh pennywort	*Hydrocotyle vulgaris*	Not listed	Near threatened
Sharp-flowered rush	*Juncus acutiflorus*	Endangered	Least concern
Field scabious	*Knautia arvensis*	Not listed	Near threatened
Grass-of-parnassus**	*Parnassia palustris*	Extinct	Near threatened
Marsh lousewort*	*Pedicularis palustris*	Extinct	Vulnerable
Common butterwort*	*Pinguicula vulgaris*	Extinct	Vulnerable
Tormentil	*Potentilla erecta*	Scarce, Endangered	Near threatened
Lesser spearwort	*Ranunculus flammula*	Not listed	Vulnerable
Black bog-rush	*Schoenus nigricans*	Rare, Critically endangered	Least concern
Wood club-rush	*Scirpus sylvaticus*	Rare	Least concern
Ragged robin	*Silene flos-cuculi*	Not listed	Near threatened
Marsh arrowgrass**	*Triglochin palustris*	Scarce, Endangered	Near threatened
Marsh valerian	*Valeriana dioica*	Not listed	Near threatened

* Identified in 2018 survey only

** Identified in 2020 survey only

Status in Cambridgeshire:

- Rare: occurring in 1-6 monads
- Scarce: occurring in 7-16 monads
- Not listed: common and data deficient
- Vulnerable (decline >30%)
- Endangered (decline >50%)
- Critically endangered (decline >80%)
- Extinct (listed as not being seen in the county for at least 30 years)

Status in England:

- Least concern
- Near threatened (decline ≥20%)
- Vulnerable (decline ≥30%)
- Endangered (decline ≥50%)

Common Name	Scientific Name	Status in Cambridgeshire	Status in England
• Critically endangered (decline ≥80%)			

Species listed as near threatened in England include quaking-grass, marsh pennywort, field scabious, grass-of-Parnassus, tormentil, ragged robin, marsh arrowgrass and marsh valerian. Species listed as vulnerable in England include cotton grass, lesser spearwort, marsh lousewort and common butterwort.

Of the species of conservation concern in England, grass-of-Parnassus, marsh lousewort and common butterwort are listed as extinct in the Cambridgeshire rare plant register (ie not recorded in the county in the last 30 years). Cotton grass is listed as rare and critically endangered in the county, and tormentil and marsh arrowgrass are listed as scarce and endangered in the county. All other species of conservation concern in England are not listed on the Cambridgeshire rare plant register, presumably because they are common in this locality; these include quaking-grass, marsh pennywort, field scabious, lesser spearwort, ragged robin and marsh valerian.

Species of least concern in England that are noted to be species of importance on the Cambridgeshire rare plant register include clustered bellflower, fen bedstraw, sharp-flowered rush, common yellow-sedge, oval sedge, pill sedge, bottle sedge, wood club-rush, black bog-rush and slender spike-rush. These species are considered important at a county level and therefore should be considered priority conservation concerns for the scheme. Species only listed as rare (occurring in 1-6 1km x 1km squares) with no conservation status include common yellow-sedge, pill sedge, bottle sedge and wood club-rush. Slender spike-rush is noted as scarce and endangered; clustered bellflower, fen bedstraw and sharp-flowered rush are listed as endangered. Oval sedge and black bog-rush are noted as rare and critically endangered in the county.

Other species identified in the 2018 survey (ref. 3) as species of note that are of least concern nationally and do not appear in the Cambridgeshire rare plant register include adder's-tongue fern (*Ophioglossum vulgatum*), bristle club-rush, long-stalked yellow sedge and heath spotted orchid.

No species recorded are listed on Schedule 8 of the Wildlife and Countryside Act (plants which are protected).

9 Identification of Potential Ecological Effects

9.1 Designated Sites

There should be no direct effect on Sutton Heath and Bog SSSI. If assessment of indirect impacts on Sutton Heath and Bog SSSI identify potential effects, for example from changes in air quality or hydrological regimes, measures should be put in place to avoid these impacts and ensure these habitats remain unaffected by the construction phase or operational phase of the proposed scheme.

Minimal areas within Sutton Meadows North CWS will be affected by the scheme; these are mainly associated with the necessary creation of new embankments. This will likely require the removal of defunct hedgerow along the A47 and some of the semi-improved grassland within the CWS. This should affect a small enough area to have no effect on the designation of this area as a CWS.

9.2 Important Habitats

Important grassland habitats identified in the botanical survey within the DCO boundary include the unimproved neutral grassland on the bank outside the entrance to Sacrewell Farm (target note 2), the semi-improved calcareous grassland on the bank in the horse-grazed meadow in Sutton Meadows North CWS (target note 17), and to a lesser extent the semi-improved grassland on the northern verge and field margin between the A1 and the entrance to Sacrewell Farm (target note 14). The unimproved neutral grassland and semi-improved calcareous grassland are important habitats at a county level, whereas the species-rich semi-improved neutral grassland is important at a local level. None of these habitats have rare or protected species, but are significant in their own right for being species-rich and rare in the county. All of the unimproved grassland on the eastern side of the entrance to Sacrewell Farm is likely to be lost to the construction of the scheme, as is the species-rich grassland between the A1 and entrance to Sacrewell Farm. It is likely that the semi-improved calcareous grassland within Sutton Meadows North CWS will remain unaffected by the scheme, but this is dependent on the final route of the new cycleway that is to be confirmed. All other grassland, although not important botanically, is nonetheless habitat of some wildlife benefit and compensation for any loss of grassland habitat should be considered.

None of the woodlands within the DCO boundary are important above a local level, since all are either plantation woodland or secondary woodland and none of the woodlands surveyed had diverse ground flora. This said, broadleaved woodland is a priority habitat and the broadleaved plantation woodland as well as the mixed plantation woodland present at the site has the potential with positive management and time to attain good condition and priority status. Woodland cover is scarce within Cambridgeshire so these habitats are considered important at a local level. The scheme should not affect the broadleaved woodland at the site but will require removal of significant areas of the mixed plantation woodland at target notes 4 and 6.

Some hedgerows will require removal to construct the proposed scheme. These include species-rich hedgerows with trees and a species-rich hedgerow along both Sutton Heath Road and the Drift, as well as intact and defunct species-poor hedgerows along the A47. Species-rich hedgerows are considered a priority habitat and important at a county level, with intact hedgerows being important at a local level for the benefit they provide to wildlife. Care should be taken to consider compensation for the loss of any hedgerow required for the scheme.

Sutton Heath and Bog SSSI supports nationally important mire and calcareous grassland habitat. There will be no direct impacts on these habitats resulting from the construction of the scheme. Every effort should be made to avoid any possible indirect impact and this should be carefully considered at the impact assessment stage.

9.3 Important Hedgerows

Hedgerows identified that meet the definition of "Important" considering the wildlife and landscape criteria of the Hedgerow Regulations 1997 are H8 and H9 either side of The Drift south of the A47 at Sutton, and hedgerows H19 and H24 on the east side of Sutton Heath Road north of the A47. The northernmost extent of H8 and H9 will require removal to construct the scheme, allowing for construction of a roundabout at the junction of the Drift and the A47. A portion of H19 and H24 will need removal to allow for the new access to Sutton Heath Road from the new roundabout at the Drift and the A47. Compensation measures will be required to mitigate for the loss of these sections of important hedgerows.

9.4 Important Plants

All plants of conservation concern were found outside of the DCO boundary and within Sutton Heath and Bog SSSI.

All plants identified as near threatened or vulnerable in England should be considered a priority conservation concern for the scheme. Species listed as near threatened in England include quaking-grass, marsh pennywort, field scabious, grass-of-Parnassus, tormentil, ragged robin, marsh arrowgrass and marsh valerian. Species listed as vulnerable in England include cotton grass, lesser spearwort, marsh lousewort and common butterwort.

Of the species of conservation concern in England, grass-of-Parnassus, marsh lousewort and common butterwort are of particular importance to the county as they are listed as extinct in the Cambridgeshire rare plant register. Cotton grass is listed as rare and critically endangered in the county, and tormentil and marsh arrowgrass are listed as scarce and endangered in the county. All other species of conservation concern in England are not listed on the Cambridgeshire rare plant register, presumably because they are common in this locality; these include quaking-grass, marsh pennywort, field scabious, lesser spearwort, ragged robin and marsh valerian. These species should be viewed as important on a county level as well as a national level, as it is important to conserve habitats where threatened species occur commonly.

Species of least concern in England that are noted to be species of importance on the Cambridgeshire rare plant register include clustered bellflower, fen bedstraw, sharp-flowered rush, common yellow-sedge, oval sedge, pill sedge, bottle sedge, wood club-rush, black bog-rush and slender spike-rush. These species are considered important at a county level and therefore should be considered priority conservation concerns for the scheme.

Provided the scheme has no effect on Sutton Heath and Bog SSSI, no species of conservation concern should be affected by the proposal.

9.5 Invasive Plants

It is possible that, whilst carrying out work to build the new embankment for the A47, the existing population of Himalayan balsam (an invasive plant listed on Schedule 9 of the Wildlife and Countryside Act) at target note 9, might be spread.

9.6 Possible Mitigation Measures

For areas to be directly affected by the scheme, compensation for the loss of all grassland and woodland habitats should be considered and are likely to be required should the scheme target no net loss of biodiversity.

The woodlands to be affected by the scheme are of low quality so there are opportunities replace these with more diverse and varied habitats should implementation of a long-term management plan following planting be possible.

Replacement of hedgerows to be lost should be like-for-like or better if no net loss of biodiversity is targeted for the scheme. More hedgerow should be planted than what is lost.

For the grassland habitats of note that are to be lost, consideration of translocation of these habitats should be included when determining mitigation measures. The interest is primarily in the seedbank associated with the substrate, so translocation of soils and their placement along areas to be protected and positively managed for biodiversity as meadow habitats should retain some of this interest. For the particularly species-rich areas within the bank along the entrance to Sacrewell Farm, consideration of translocation of turves may be more appropriate, as this is more likely to retain the greatest number of species present and has the advantage of reducing the damage to the grassland community as much as possible. This should also be considered should for any reason the semi-improved calcareous grassland be affected by the scheme (at present it should not be).

It will be important to employ biosecurity measures to avoid spreading Himalayan balsam either on site or off-site. Consideration of implementing measures to eradicate this species should be made as this will contribute to achieving a biodiversity gain at the site.

If assessment of indirect impacts on Sutton Heath and Bog SSSI identify potential effects from changes in air quality or hydrological regimes, measures should be put in place to avoid these impacts and ensure these habitats and the rare and threatened species they support remain unaffected by the construction and operational phase of the proposed scheme. If potential impacts are identified and cannot be avoided, there are unlikely to be any effective mitigation or compensation measures that could be implemented to ensure no effect on this designated site and the important habitats and species it supports.

10 Conclusions

The existing A47 single-carriageway is to be upgraded to dual-carriageway standard (D2AP). It will be constructed slightly to the north of the existing A47 from the A1/A47 junction for approximately 800m, before crossing the existing A47 where it will be constructed to the south of the existing alignment until it ties into the existing dual-carriageway east of Nene Way. Grassland, hedgerow and woodland habitats within the DCO boundary will require removal to construct the scheme. This includes some hedgerows identified as important under the wildlife and landscape criteria of the Hedgerows Regulations, and some species-rich grassland on the north side of the A47 between the A1 and the Sacrewell Farm boundary.

There should be no direct effect on Sutton Heath and Bog SSSI. Sutton Heath and Bog SSSI supports nationally important mire and calcareous grassland habitat and all plants of conservation concern were found within Sutton Heath and Bog SSSI which is outside of the DCO boundary. There will be no direct impacts on these habitats resulting from the construction of the scheme or the operational phase of the scheme, provided measures are taken to prevent any pollution or road run-off entering into the protected site. Every effort should be made to avoid any possible indirect impact and this should be carefully considered at the impact assessment stage.

Minimal areas within Sutton Meadows North CWS will be affected by the scheme and this will not have an effect on the designation of this site as a CWS.

For those areas that will be directly affected by the scheme, compensation for the loss of all grassland and woodland habitats should be considered and is likely to be required should the scheme target no net loss of biodiversity. The woodlands to be affected by the scheme are of low quality so there are opportunities to replace these with more diverse and varied habitats should implementation of a long-term management plan following planting be possible. Replacement of hedgerows to be lost should be like-for-like or better if no net loss of biodiversity is targeted for the scheme. More hedgerow should be planted than what is lost. For the grassland habitats of note that are to be lost, consideration of translocation of these habitats should be included when determining mitigation measures.

11 References

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Drawings

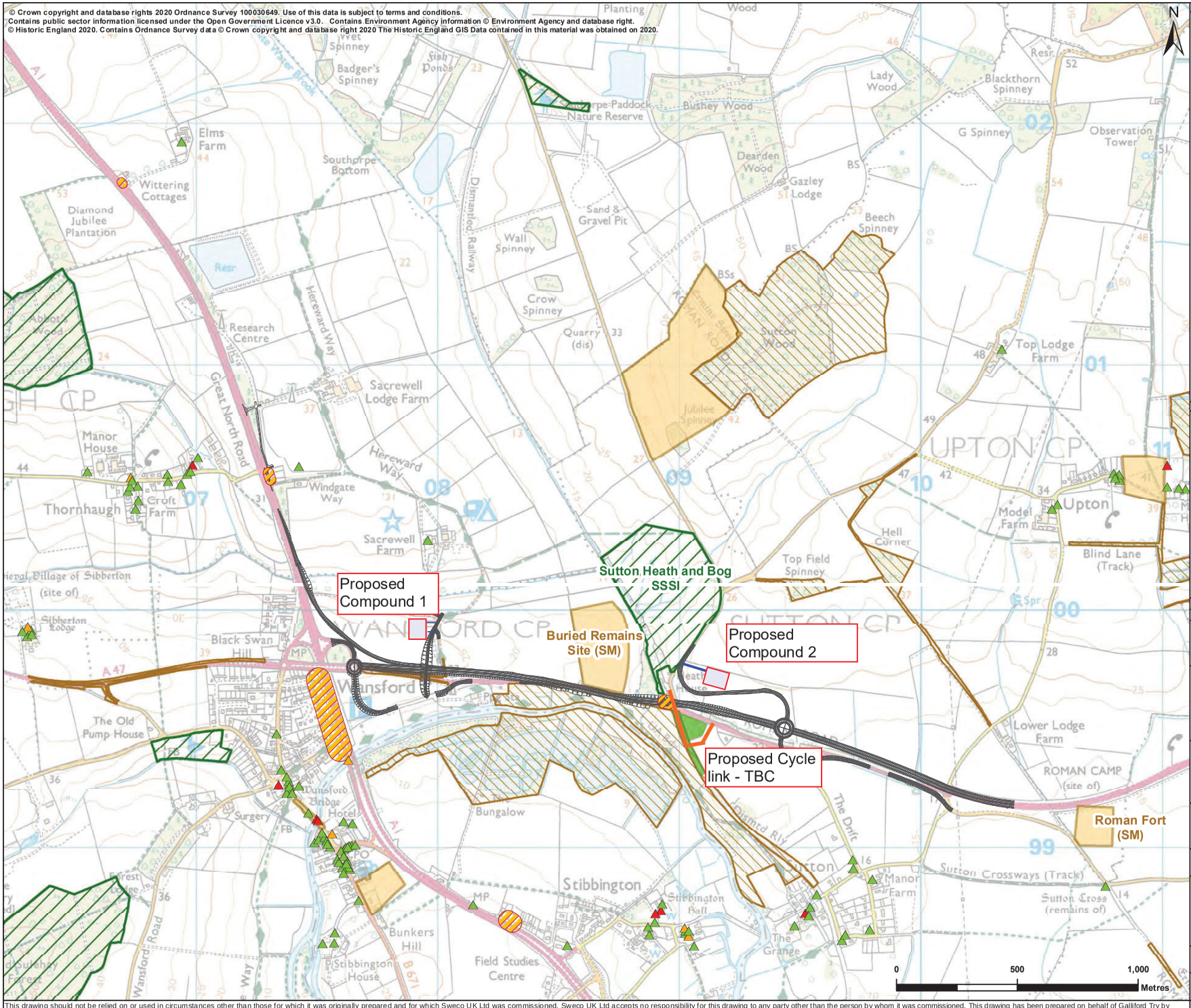
HE551494-GTY-EGN-000-DR-GI-00001: PCF Stage 3 Main Environmental Constraints Plan

778574-MLM-ZZ-XX-DR-J-0002: Indicative DCO Boundary and Areas Accessed

778574-MLM-ZZ-XX-DR-J-0003: Botanical Survey Summary

778574-MLM-ZZ-XX-DR-J-0004: Hedgerow Survey Summary

778574-MLM-ZZ-XX-DR-J-0005: Sutton Heath and Bog Botanical Survey Summary



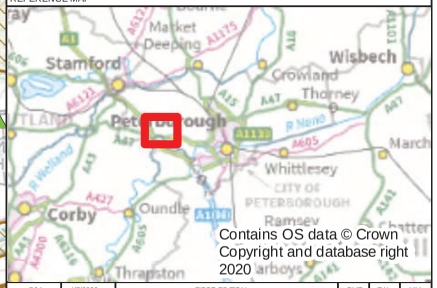
LEGEND

- A47 Wansford to Sutton Proposed Alignment

Listed Building

- Grade I (Buildings of Exceptional Interest)
- Grade II* (Particularly Important Buildings)
- Grade II (Buildings of Special Interest)
- Noise Important Area (NIA)
- Group Tree Preservation Order
- Site of Special Scientific Interest (SSSI)
- County Wildlife Site (CWS)
- Scheduled Monument

REFERENCE MAP



REV	DATE	REVISION NOTE	ORG	CHK'D	APP'D
P01	4/7/2020	FIRST EDITION	RMT	ZW	MM

DESIGNER: SWECO

CONTRACTOR: GallifordTry

CLIENT: highways england

PROJECT TITLE: A47 WANSFORD TO SUTTON

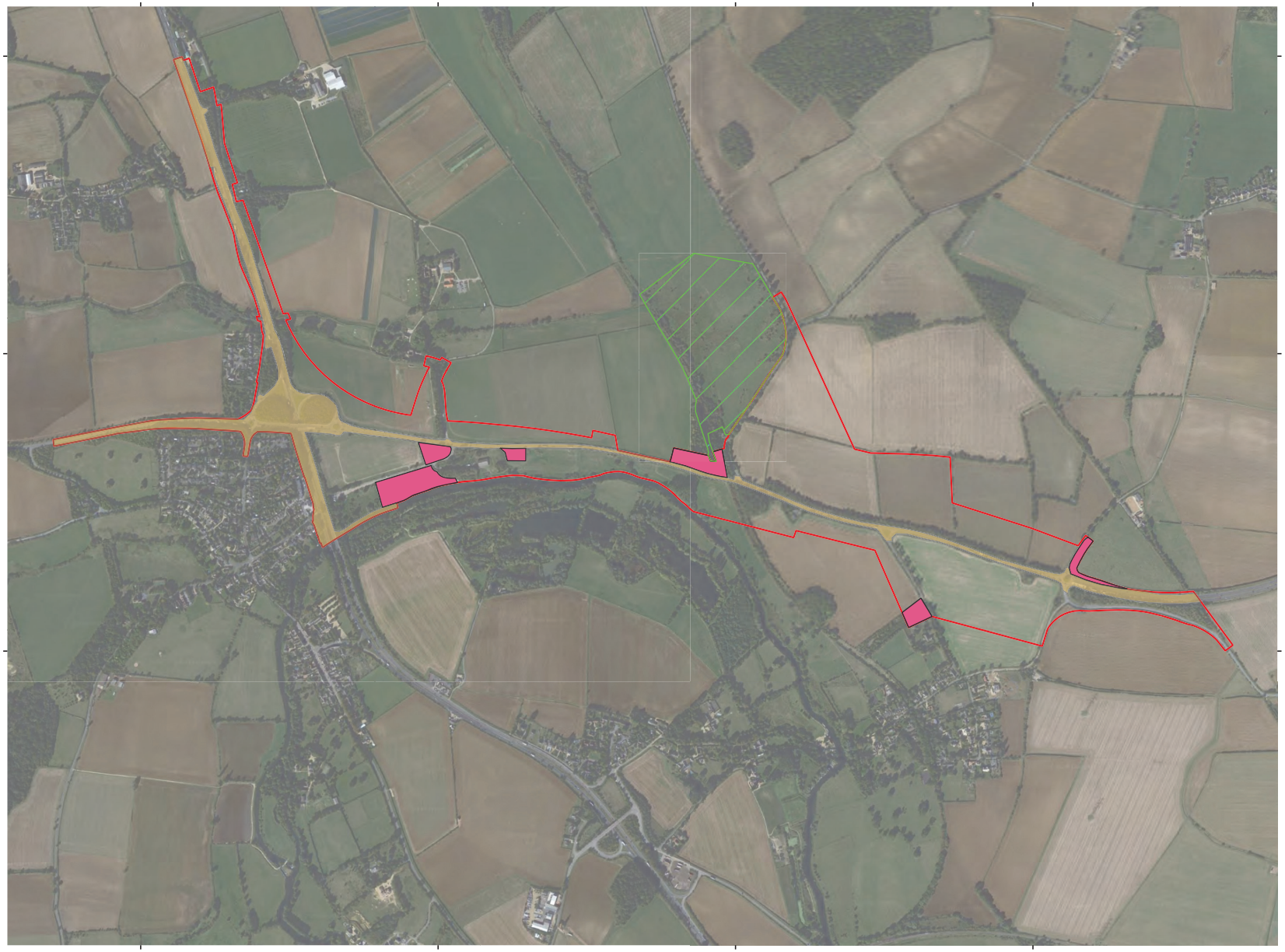
PROJECT STAGE: PCF STAGE 3

DRAWING TITLE: MAIN ENVIRONMENTAL CONSTRAINTS PLAN

SUITABILITY: FOR INFORMATION

SHEET SIZE	SCALE	STATUS
A3	1:15,000	S2

DRAWING NUMBER: HE551494-GTY-EGN-000-DR-GI-00001



LEGEND

- INDICATIVE DCO BOUNDARY
- AREAS FOR WHICH ACCESS WAS NOT GRANTED
- AREAS NOT ACCESSED FOR REASONS OF SAFETY
- AREA SURVEYED OUTSIDE OF THE INDICATIVE DCO BOUNDARY

NOTE: ANYTHING WITHIN THE INDICATIVE DCO BOUNDARY THAT IS NOT HIGHLIGHTED WAS SURVEYED

0 250 500 750 1000 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:14000
BASEMAP SOURCE: IMAGERY ©2020 BLUESKY, CNES/ AIRBUS, GETMAPPING PLC, INFOTERRA LTD & BLUESKY, LANDSAT/COPERNICUS, MAXAR TECHNOLOGIES, MAP

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group Part of Sweco

DRAWING STATUS: FINAL

CLIENT: HIGHWAYS ENGLAND

PROJECT: A47 WANSFORD TO SUTTON

DRAWING TITLE: INDICATIVE DCO BOUNDARY AND AREAS ACCESSED

DRAWN/DESIGN:	BHH	DATE:	10/11/2020	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 778574-MLM-ZZ-XX-DR-J-0002

LEGEND

- INDICATIVE DCO BOUNDARY
- SUTTON MEADOWS NORTH CWS NVC QUADRATS

TARGET NOTES

- BARE GROUND
- HIMALAYAN BALSAM (IMPATIENS GLANDULIFERA) - SCHEDULE 9 NON-NATIVE INVASIVE SPECIES
- MIXED PLANTATION WOODLAND
- SEMI-IMPROVED NEUTRAL GRASSLAND
- UNIMPROVED NEUTRAL GRASSLAND
- SEMI-IMPROVED CALCAREOUS GRASSLAND
- BROADLEAVED PLANTATION WOODLAND
- BROADLEAVED WOODLAND

0 250 500 750 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:14000
BASEMAP SOURCE: BLUESKY, CNES / AIRBUS, GETMAPPING PLC, INFOTERRA LTD & BLUESKY, MAXAR TECHNOLOGIES

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group Part of Sweco

DRAWING STATUS: FINAL

CLIENT: HIGHWAYS ENGLAND

PROJECT: A47 WANSFORD TO SUTTON

DRAWING TITLE: BOTANICAL SURVEY SUMMARY

DRAWN/DESIGN:	BHH	DATE:	09/11/2020	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 778574-MLM-ZZ-XX-DR-J-0003

LEGEND

HEDGEROWS

- IMPORTANT HEDGEROW - SPECIES-RICH HEDGEROW WITH TREES
- IMPORTANT HEDGEROW - SPECIES-RICH INTACT HEDGEROW
- SPECIES-POOR DEFUNCT HEDGEROW
- SPECIES-POOR HEDGEROW WITH TREES
- SPECIES-POOR INTACT HEDGEROW
- INDICATIVE DCO BOUNDARY

HEDGEROWS SHOWN AS "IMPORTANT" MEET THE WILDLIFE AND LANDSCAPE CRITERIA OF THE HEDGEROW REGULATIONS 1997. HEDGEROWS NOT SHOWN AS IMPORTANT DO NOT MEET THE CRITERIA

0 250 500 750 1000 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:14000
BASEMAP SOURCE: BLUESKY, CNES / GETMAPPING PLC, INFOTERRAL LTD & BLUESKY, MAXAR TECHNOLOGIES

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group Part of Sweco

DRAWING STATUS: FINAL

CLIENT: HIGHWAYS ENGLAND

PROJECT: A47 WANSFORD TO SUTTON

DRAWING TITLE: HEDGEROW SURVEY

DRAWN/DESIGN:	BHH	DATE:	09/11/2020	STATUS:	S2
CHECKED:	AC	APPROVED:	AC	REVISION:	C01

DRAWING NO: 778574-MLM-ZZ-XX-DR-J-0004

LEGEND

- SUTTON HEATH AND BOG SSSI BOUNDARY LINE
- FLUSHES
- SUTTON HEATH AND BOG NVC QUADRATS
- CG4 BRACHYPODIUM PINNATUM GRASSLAND
- CG5 BROMUS ERECTUS-BRACHYPODIUM PINNATUM GRASSLAND
- MG1A ARRHENATHERETUM ELATIUS GRASSLAND, FESTUCA RUBRA SUB-COMMUNITY
- MG1C ARRHENATHERETUM ELATIUS GRASSLAND, FILIPENDULA ULMARIA SUB-COMMUNITY
- MG1E ARRHENATHERETUM ELATIUS GRASSLAND, CENTAUREA NIGRA SUB-COMMUNITY
- MG9A HOLCUS LANATUS-DESCHAMPSIA CESPITOSA GRASSLAND, ARRHENATHERUM ELATIUS SUB-COMMUNITY
- MG10A HOLCUS LANATUS-JUNCUS EFFUSUS RUSH-PASTURE, JUNCUS INFLEXIS SUB-COMMUNITY
- M27 FILIPENDULA ULMARIA-ANGELICA SYLVESTRIS MIRE
- M13 SCHOENUS NIGRICANS-JUNCUS SUBNODULOSUS MIRE
- M22 JUNCUS SUBNODULOSUS-CIRSIUM PALUSTRE FEN-MEADOW
- OV21 POA ANNUA-PLANTAGO MAJOR COMMUNITY
- OV26 EPILOBIUM HIRSUTUM COMMUNITY
- S4 PHRAGMITES AUSTRALIS SWAMP AND REED-BEDS
- S7 CAREX ACUTIFORMIS SWAMP
- W21 CRATAEGUS MONOGYNA-HEDERA HELIX SCRUB
- W2 SALIX CINEREA-BETULA PUBESCENS-PHRAGMITES AUSTRALIS WOODLAND

ALL COMMUNITY BOUNDARIES ARE INDICATIVE ONLY

0 50 100 150 200 m

THIS DRAWING IS INDICATIVE ONLY

COORDINATE SYSTEM: BRITISH NATIONAL GRID
UNITS: METRE
SCALE: 1:3200
BASEMAP SOURCE: IMAGERY ©2020 CNES/AIRBUS, GETMAPPING PLC, INFOTERRA LTD & BLUESKY, MAXAR TECHNOLOGIES, MAP DATA ©2020

REV	DATE	DESCRIPTION	MADE	CKD

MLM. Group Part of Sweco

DRAWING STATUS: FINAL

CLIENT: HIGHWAYS ENGLAND

PROJECT: A47 WANSFORD TO SUTTON

DRAWING TITLE: SUTTON HEATH AND BOG BOTANICAL SURVEY SUMMARY

DRAWN/DESIGN:	AC	DATE:	18/10/2020	STATUS:	S2
CHECKED:	BHH	APPROVED:	MB	REVISION:	C01

DRAWING NO: 778574-MLM-ZZ-XX-DR-J-0005

Appendix A - Quadrat Data for Sutton Meadows North CWS

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TL 0888 9955	**Region:** Cambridgeshire
NVC Community:	MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community		
Date: 28/06/2020		**Weather:** Dry, partly cloudy, wind 4 (Beaufort), temperature 17°C	
Quadrat ID: CWS1		**Layers Mean Height:** ground level / 30cm / 50cm	
Geology: Grantham Formation - Sandstone, Siltstone And Mudstone		**Layers Cover:** 30% / 40% / 30%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: Old grassland with no signs of recent management; unlikely to have been cut in recent years. Possible light horse grazing in the past. In area of field horses are currently excluded from.			

Species List

Plant Name	Plant Density (%)
Agrostis capilaris	4
Agrostis stolonifera	1
Arrhenatherum elatius	30
Dactylis glomerata	2
Festuca rubra	20
Holcus lanatus	50
Cirsium arvense	3
Glechoma hederacea	10
Heracleum sphondylium	3
Urtica dioica	2
Otter spraint	1

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TL 0892 9954	**Region:** Cambridgeshire
NVC Community:	MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community		
Date: 28/06/2020		**Weather:** Dry, partly cloudy, wind 4 (Beaufort), temperature 20°C	
Quadrat ID: CWS2		**Layers Mean Height:** ground level / 30cm / 50cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 40 / 50 / 10	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: Quadrat just inside area grazed by horses.			

Species List	
Plant Name	**Plant Density (%)**
Arrhenatherum elatius	50
Agrostis capilaris	5
Dactylis glomerata	5
Festuca rubra	15
Holcus lanatus	40
Cirsium arvense	1
Galium album	15
Glechoma hederacea	3
Veronica chamaedrys	1

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TL 0897 9951	**Region:** Cambridgeshire
NVC Community:	MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community		
Date: 28/06/2020		**Weather:** Dry, partly cloudy, wind 4 (Beaufort), temperature 20°C	
Quadrat ID: CWS3		**Layers Mean Height:** 15cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 100%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: In grazed area – much more grazed than CWS2			

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	15
Agrostis capilaris	1
Agrostis stolonifera	1
Dactylis glomerata	3
Festuca rubra	70
Holcus lanatus	10
Poa pratensis	2
Cirsium arvense	3
Plantago lanceolata	3
Ranunculus acris	3
Veronica chamaedrys	7
Vicia sativa	1

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TL 0897 9944	**Region:** Cambridgeshire
NVC Community:	MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community		
Date: 28/06/2020		**Weather:** Dry, partly cloudy, wind 4 (Beaufort), temperature 20°C	
Quadrat ID: CWS4		**Layers Mean Height:** 15cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 100%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: In grazed field near fence-line separating grazed pasture from meadow; a bit more grazed than previous quadrat with rougher areas nearby			

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	30
Festuca rubra	50
Holcus lanatus	20
Helminthotheca echioides	1
Plantago lanceolata	2
Torilis japonica	2
Urtica urens	5
Bare ground	5

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TL 0891 9946	**Region:** Cambridgeshire
NVC Community:	MG1a *Arrhenatherum elatius* grassland *Festuca rubra* sub-community		
Date: 28/06/2020		**Weather:** Dry, partly cloudy, wind 4 (Beaufort), temperature 20°C	
Quadrat ID: CWS5		**Layers Mean Height:** 5cm / 30cm / 50cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 5 / 60 / 35	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: edge of horse grazed field near River Nene			

Species List	
Plant Name	**Plant Density (%)**
Arrhenatherum elatius	30
Carex otrubae	6
Dactylis glomerata	3
Festuca rubra	30
Holcus lanatus	30
Phleum pratense	3
Cirsium arvense	2
Glechoma hederacea	1
Heracleum sphondylium	1
Plantago lanceolata	15
Rumex conglomeratus	1
Taraxacum officinale agg.	1
Veronica chamaedrys	5

Appendix B - Appendix to Sutton Heath and Bogs SSSI NVC Report 2018

Appendix to Sutton Heath and Bogs SSSI NVC Report 2018

July 2018

For Mott MacDonald

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1 Introduction

A vegetation survey was carried out by S.J.J. Lambert in July, August and September 1997. An updating survey was carried out on 1st June 2018 by Toby Abrehart and included the entire Sutton Heath and Bogs SSSI.

The 2018 field survey carried out on 1st June was undertaken to update the survey results and identify species of interest that may not have been flowering/obvious during the 2017 survey – for example adder's tongue fern (*Ophioglossum vulgatum*).

The field survey used standard NVC techniques to describe all NVC types present in the survey area and discuss their floristics. A map of all NVC types was produced for the area.

Aims of the study

As part of the ongoing work around the proposal for a new route for the A47 heading towards the A1 roundabout. AMEY asked for an NVC of Sutton Heath and Bogs SSSI as part of their continuing studies into the wildlife in the area and Mott MacDonald asked for an update at a different time of year.

It is proposed that the site will not be affected by the current works and that this work will support the planning for new route. The overall aim is for there to be no nett loss of habitat and condition due to the works on the site.

The extent of SSSI in 18.29Ha.

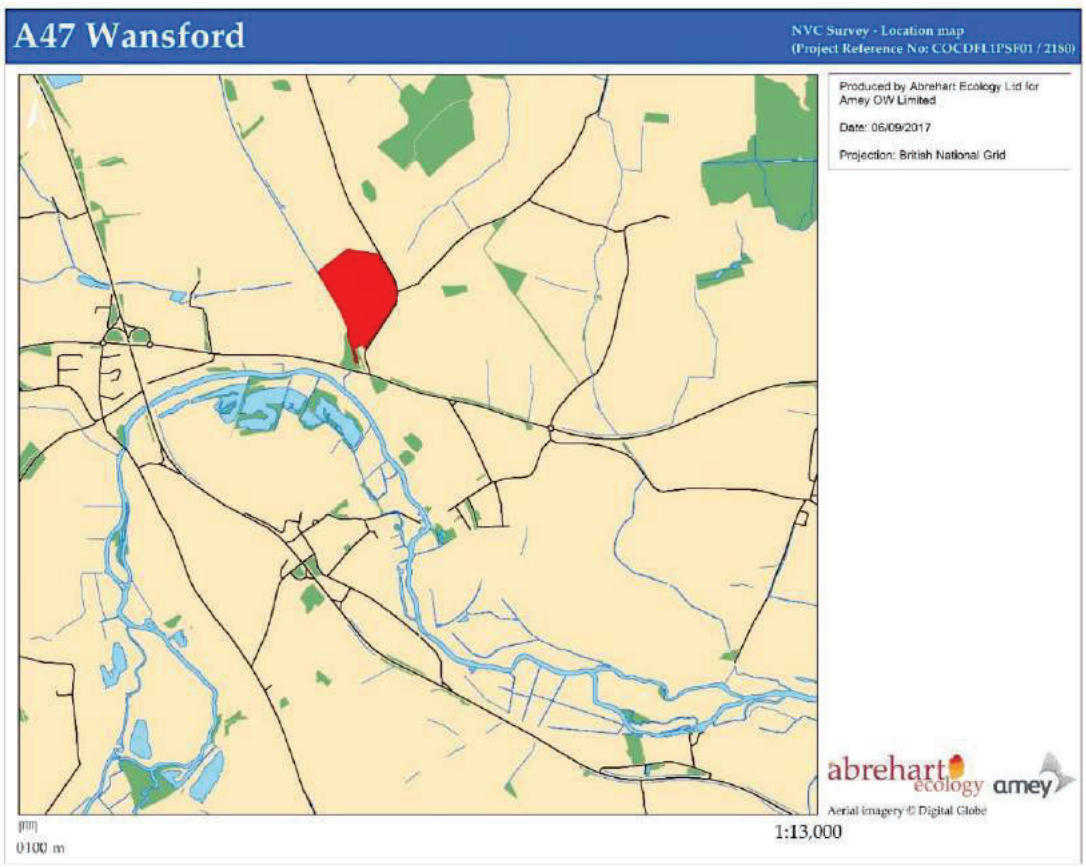

Figure 1. Overview map of the survey area at Sutton Heath and Bog, Suffolk.

2 Methods

2.1 Survey Area

A total of 20.63 hectares was surveyed on 1st June 2018. A previous NVC survey had been carried out over three months (July, August and September) in 1997 by S.J.J. Lambert and again by T.R. Abrehart (July 2017). This current map was digitised and is an updated version of the 2017 map.

2.2 Botanical field survey methods

Fieldwork was carried out on 1st June 2018 with reference to the standard NVC survey techniques described by Rodwell (1991, 1992, 1995; 2000, 2006). Survey methods appropriate to each habitat were used to carry out this survey.

The hand drawn maps were then digitised in GIS using georeferenced, google earth aerial photography from 2011, at a scale of between 1:400 and 1:2000 depending on the complexity of the habitat. Digitisation was carried out to the SSSI unit boundaries supplied by Natural England at www.gis.naturalengland.org.uk/pubs/gis/GIS_register.asp

Please note that 10 figure grid references for each quadrat were collected using a handheld GPS unit accurate at best to 5 ft. and at worst to 10 ft., therefore there are some discrepancies in the location of quadrats and corresponding habitat polygons, particularly in highly complex habitats.

Table 1. DAFOR scale categories and definitions

DAFOR scale	Percentage cover
D - Dominant	Over 75% cover
A - Abundant	75-51% cover
F - Frequent	50-26% cover
O - Occasional	25-11% cover
R - Rare	10 - 1% cover

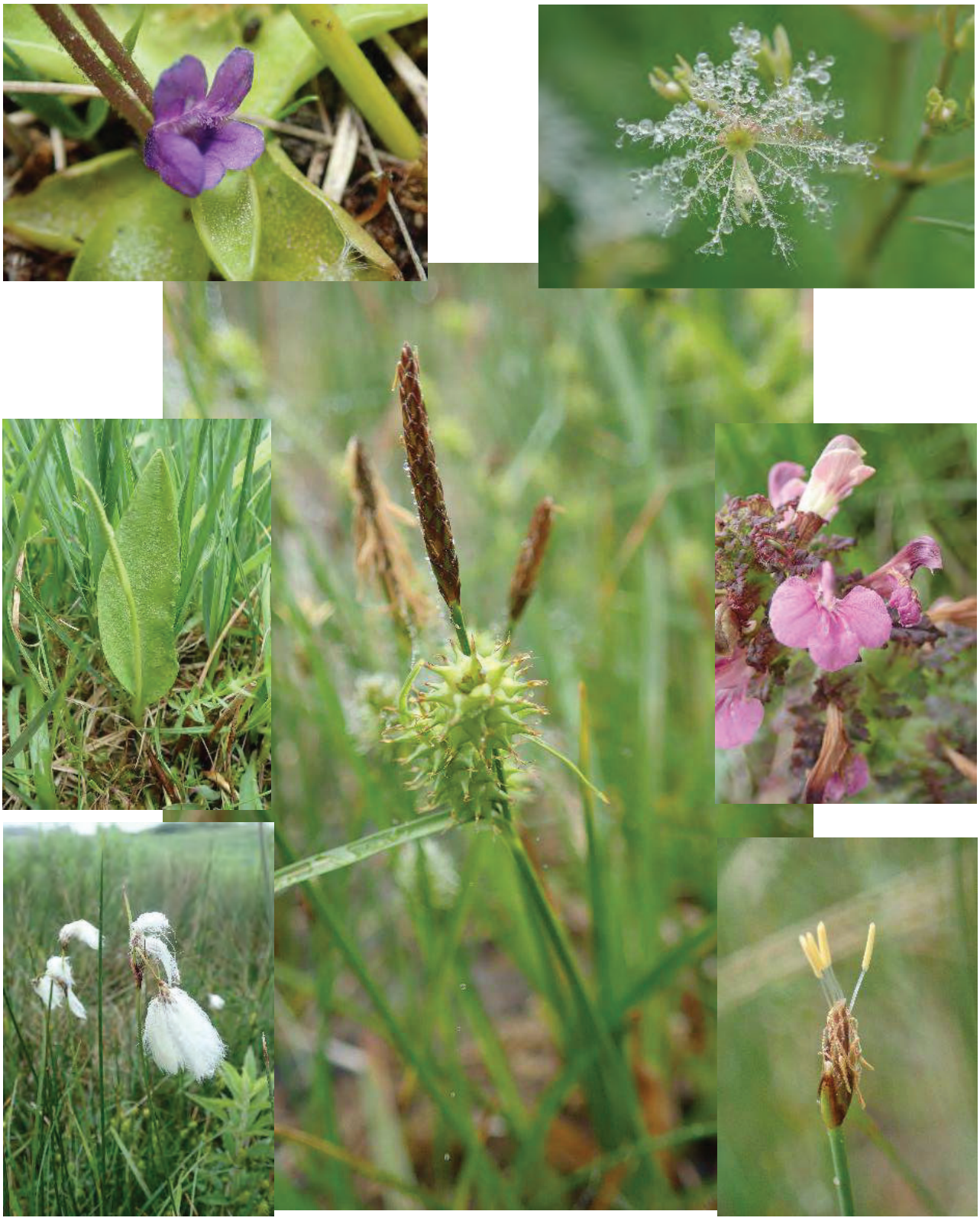

Plate 1 - Mire and Swamp photos 2018

(Clockwise from top left – Pinguicula vulgaris, Valeriana dioica, Pedicularis sylvatica, Eleocharis uniglumis, Eriophilum angustifolia, Ophioglossum vulgatum and Carex lepidocarpa (centre).

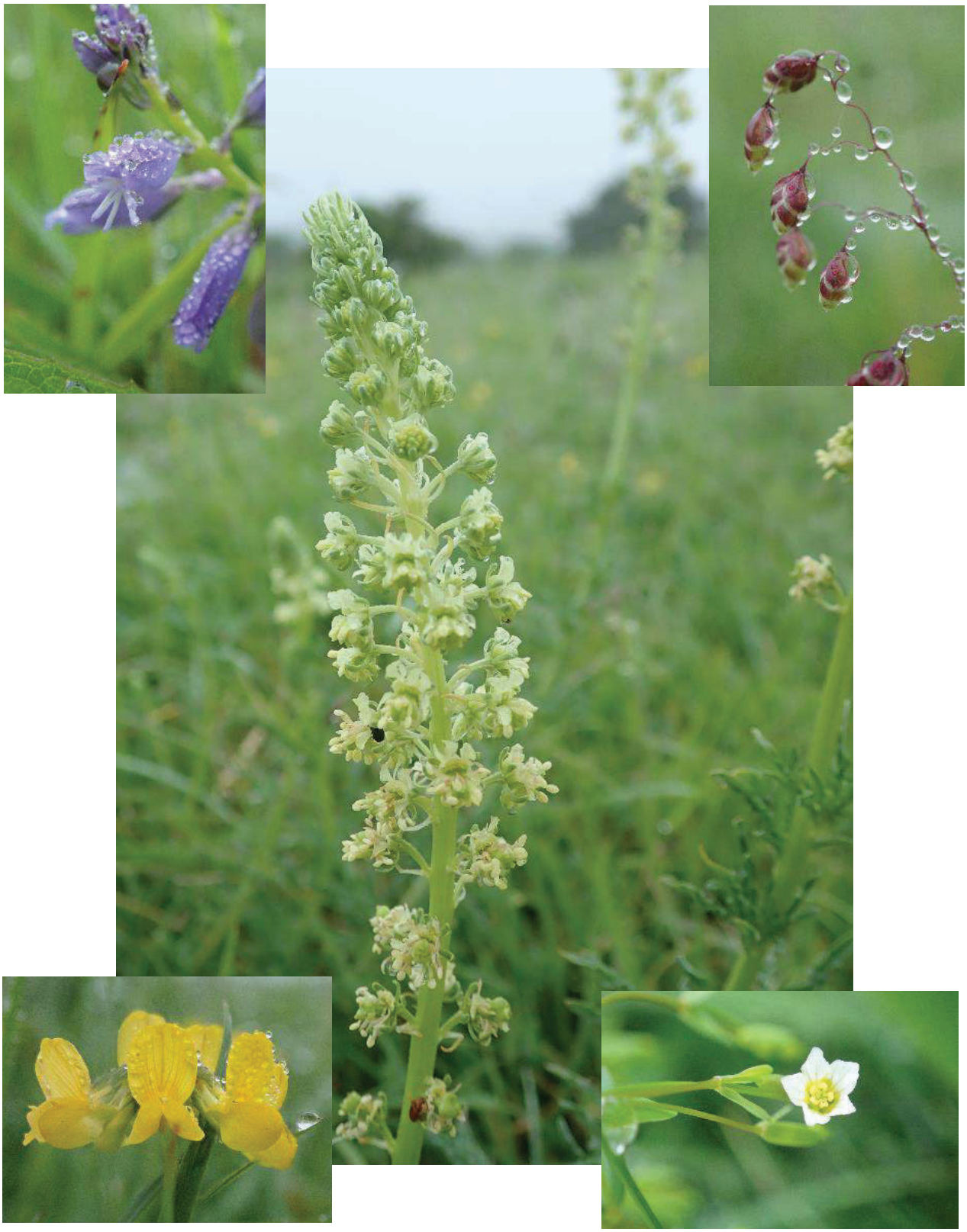

Plate 2 - Calcareous Grassland photos 2018

(Clockwise from top left– Polygala vulgaris, Briza media, Linum catharticum, Hippocreppis comosa and Reseda luteola (centre)

3 Results

The comparison between the two data sets shows some marked changes in the 20 year period between the surveys. The most obvious changes were in the grasslands (the largest habitat) where the area of MG1 changed from 7.5Ha to 4.48Ha. Corresponding to this loss was an increase in the area of the CG5 grasslands in 2017, going from a combined (CG4 and CG5) 1.51Ha to 6.12Ha. This increase in a nationally important community shows that management on the site has been beneficial for the community. It is expected that this area will grow further if the management of the site continues.

The other significant changes were in the swamp communities in the base of the valley. In 1997 there were 1.29Ha of swamp vegetation, in 2017 there were 1.52Ha. This was dominated with S7 *Carex acutiformis* swamp. In 1997 this community was limited to three small stands in the north of the site covering 0.26Ha, in 2017 this was 1.37Ha. This community change will have had a significant effect on the invertebrates on the site, particularly the rare molluscs dependant on this habitat. There were several records of *Vertigo moulinsiana,* with the latest in 1995 (Bratton). Full surveys conducted in 2017 showed that all of the S7 habitat across the site supported *Vertigo moulinsiana*. The site now holds a significant population of this rapidly declining species.

The other main changes in community were the mire vegatations. The was a reducion in the M13 where the density of *Schoenus nigricans*, and the exposed tufa forming sections of the springs, were reduced and only the central spring supported this community at a high quality. The remainder of the previously plotted area was more a form of M24b where the *S. nigricans* was still a dominant species in the sward. It was less dominant within the community due to increased competition from more robust species. There were no tufa forming areas in the springs north and south of the centrral spring.

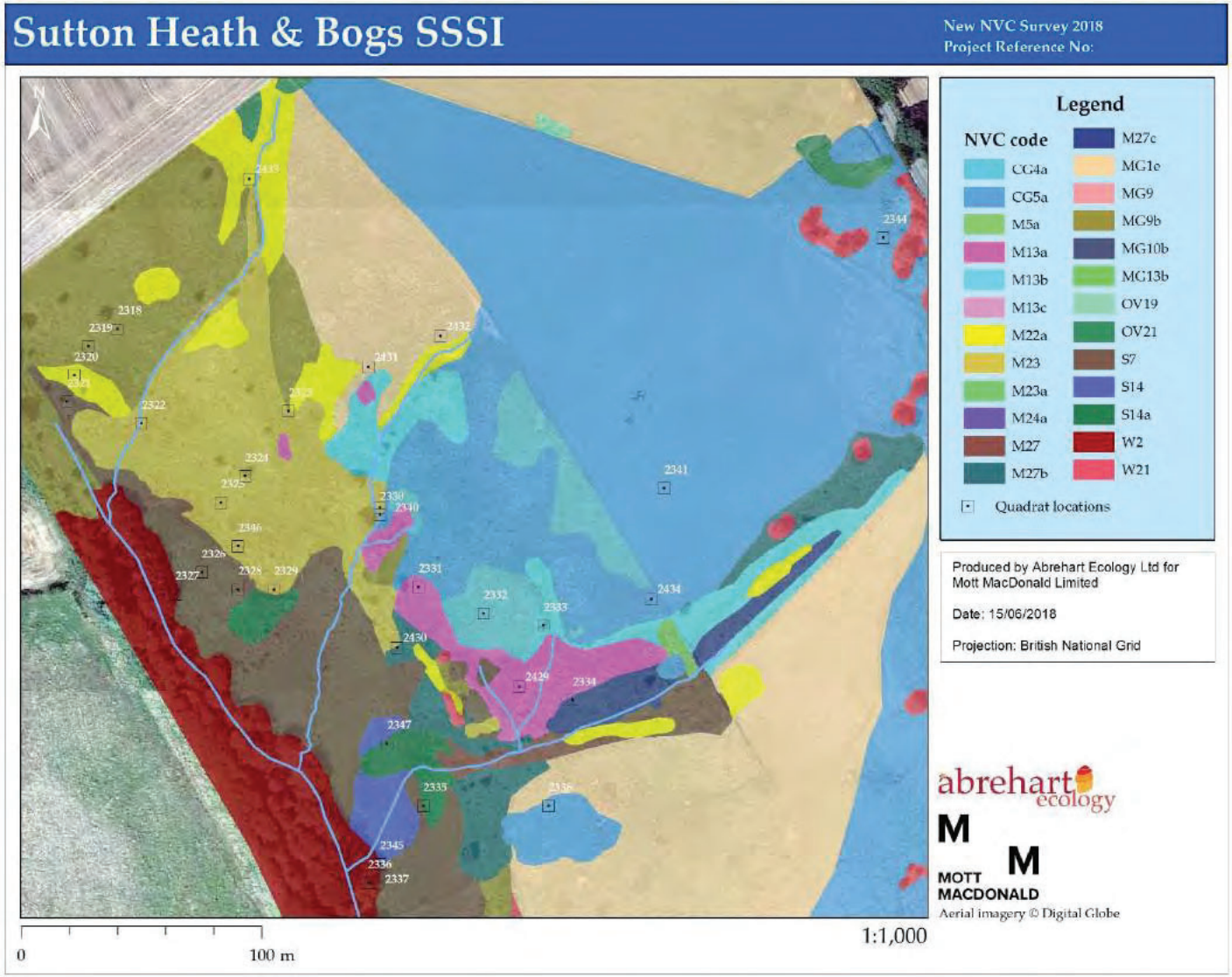

Figure 2. Updated NVC map of the main area of interest – Flushes and Calcareous grasslands

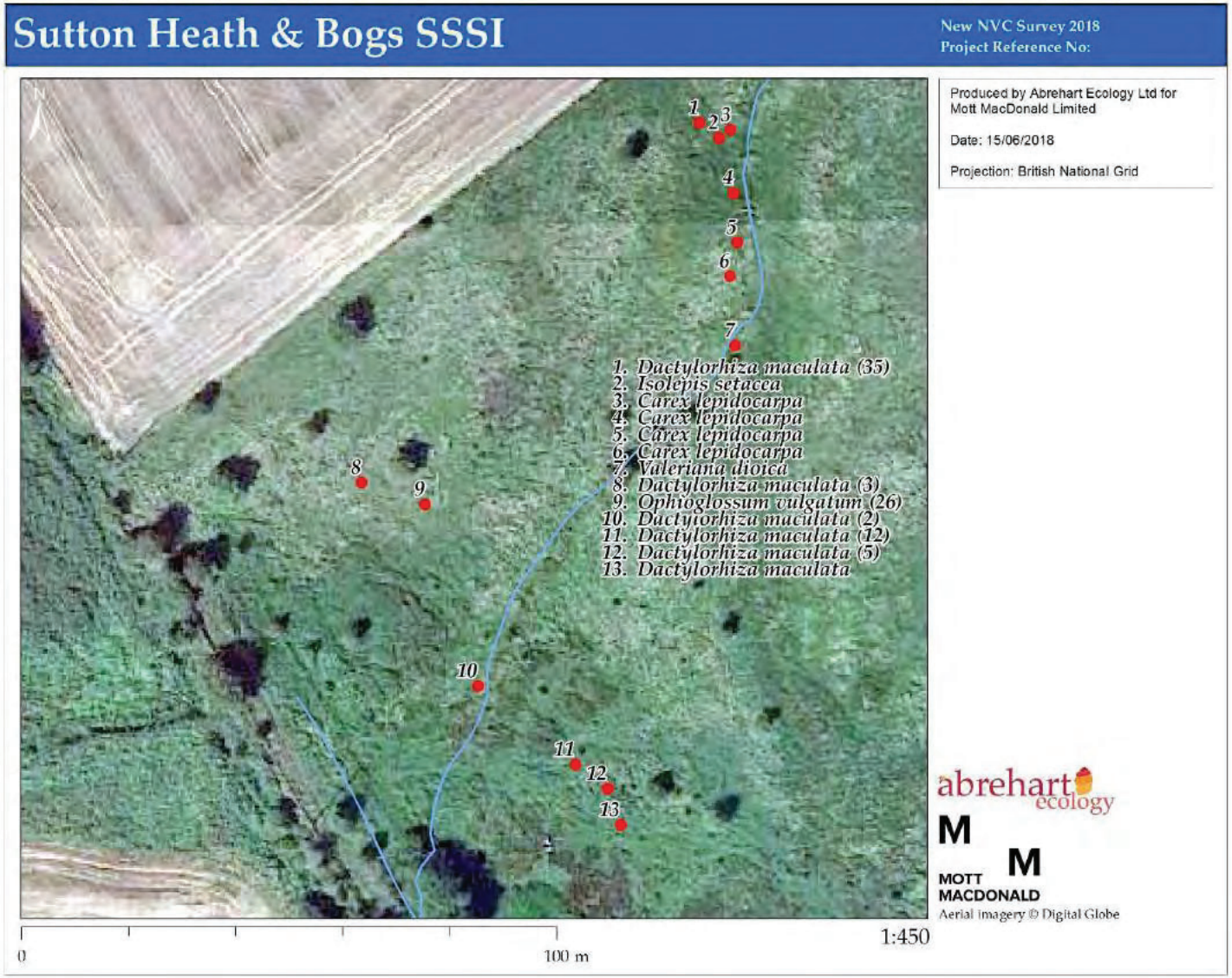

Figure 3. Additional uncommon species from 2018 survey – Flushes and Calcareous grasslands

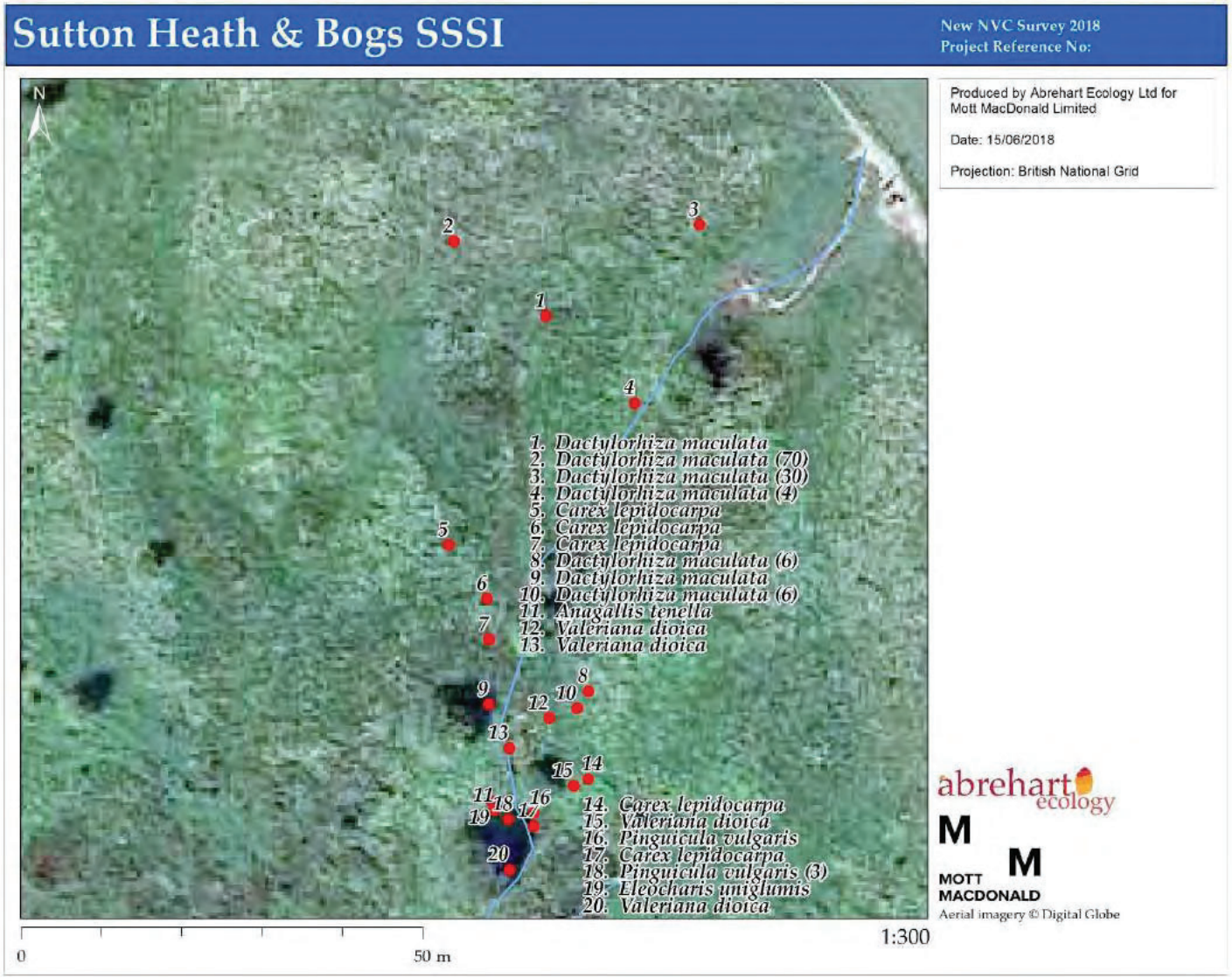

Figure 4. Additional uncommon species from 2018 survey – Flushes and Calcareous grasslands

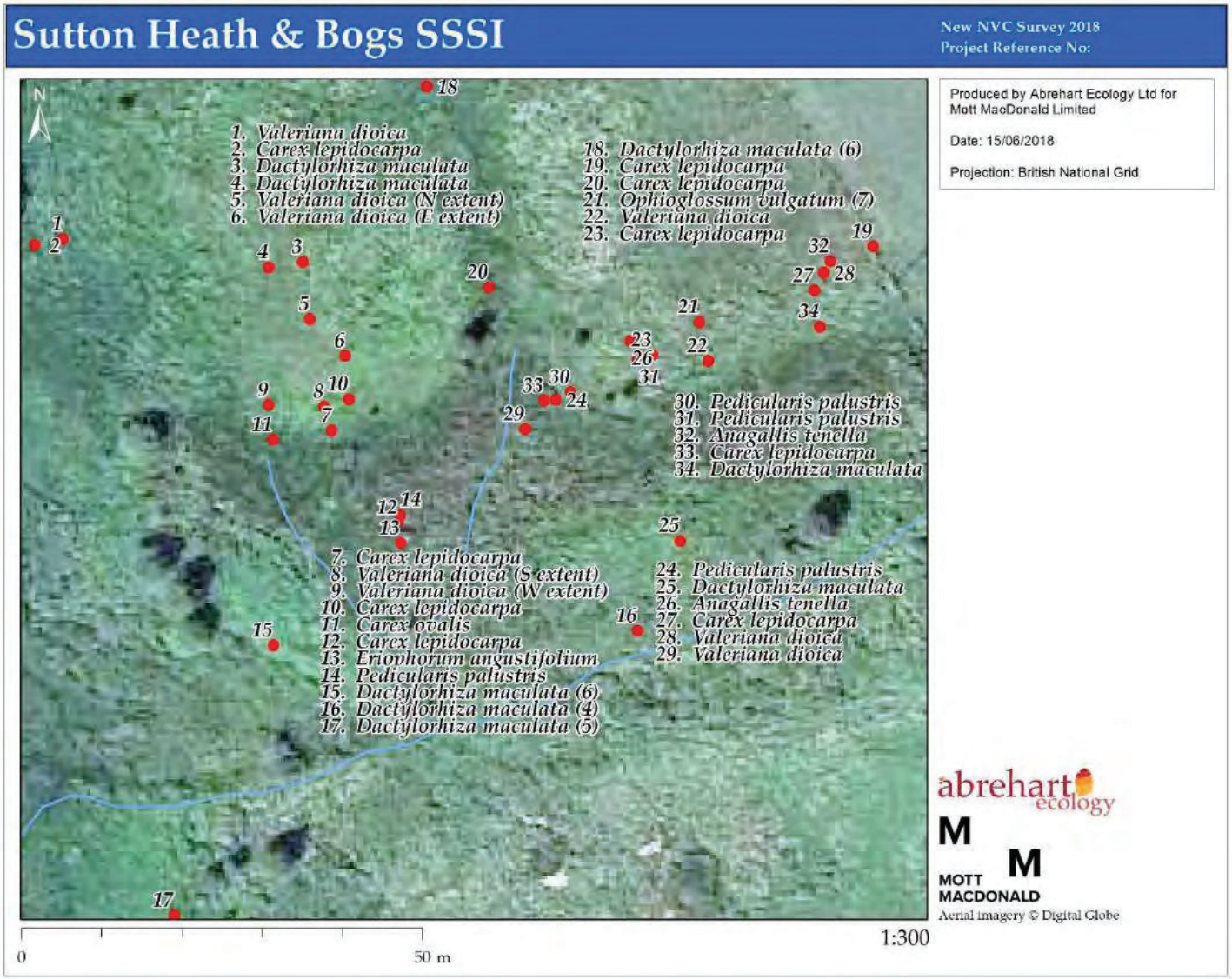

Figure 5. Additional uncommon species from 2018 survey – Flushes and Calcareous grasslands

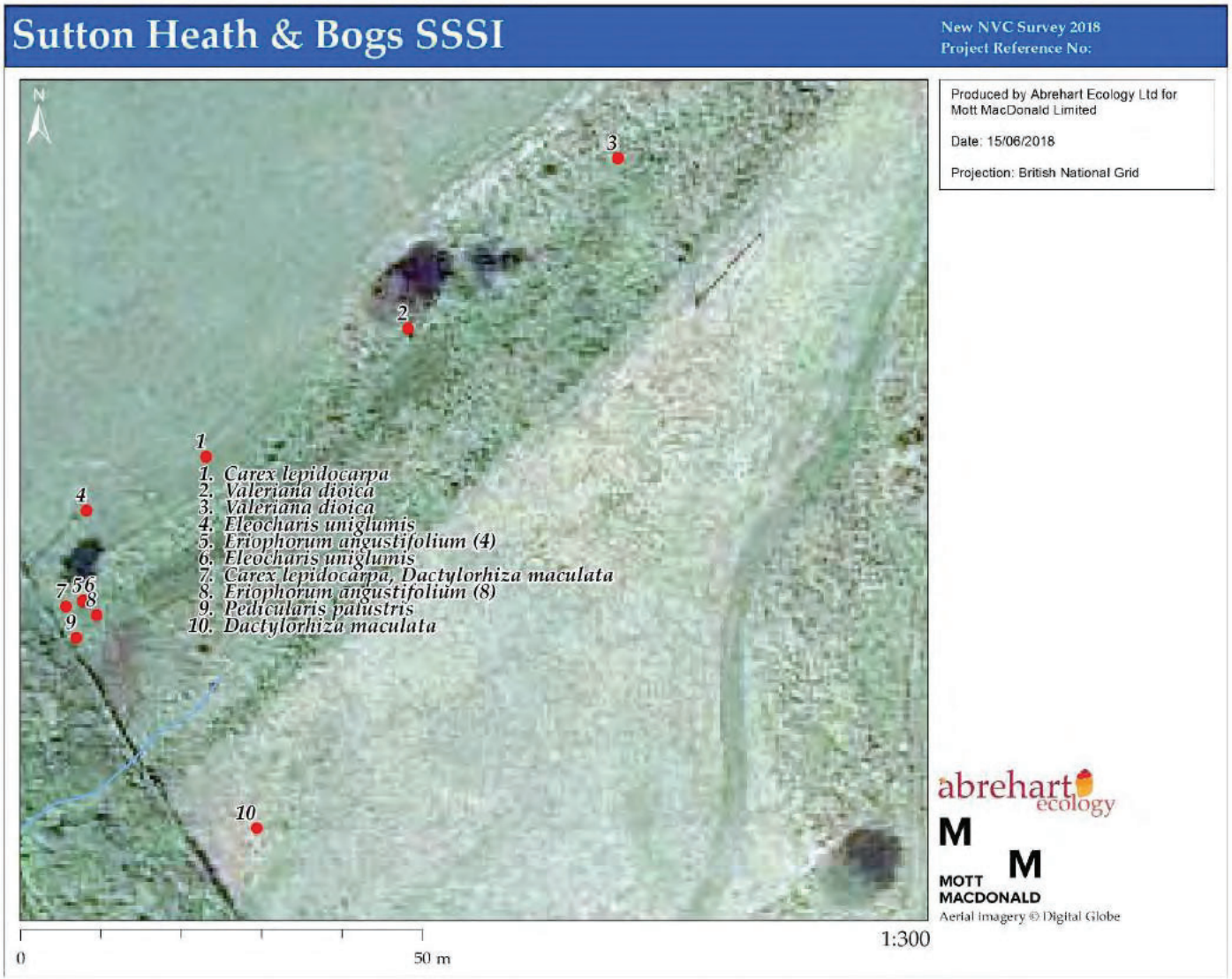

Figure 6. Additional uncommon species from 2018 survey – Flushes and Calcareous grasslands

4 Plant communities – Range and Diversity

A total of 145 vascular plants were recorded during the two surveys. This is not a particularily high number of species and a survey focused on the rarer species over mapping and quadrat work would no doubt discover more of these uncommon species, though only Purple milk vetch was not found from previous surveys (1997)

The main aim of the survey was plotting the flush and rarer mire commumities and focus was made in these sections of the site.

4.1 RAMSAR species at Sutton Heath and Bogs

All the species below are additional species of interest found during the 2018 re-survey.

Common Butterwort – *Pinguicula vulgaris*

Only two plants were found on the site, this was on the northern edge of the central flush under a stand of Schoenus nigricans on nearly bare soils and above (5cm) the main running flush. This plant had just finished flowering in 2018 as seen with the remains of a flower stem. Quadrat ID 2330

Cotton grass – Eriophorum angustifolium

Was found across one area on the northern side of the southern most flush line. There were three distinct patches scattered across this area with upwards of 40 plants found. Quadrat ID 2429 and 2438.

Adder's-tounge Fern – Ophioglossum vulgatum

This was present in two areas, the north western patch was in the short turf above the the valley bottom, there were at least 20 plants here. The other patch was found in the northern side of the southern flush with at least 20 plants across one area on the site. Quadrat ID 2325 and 2438.

Yellow Sedge – *Carex lepidocarpa*

This small sedge was found across a larger area than in 2017, it was scattered across all the flush communities over the site at each of the calcareous flushes and on the central seepline. Quadrat ID 2429, 2431, 2432, 2433, 2434 and 2438.

One glumed spike rush - *Eleocharis uniglumis*

This species was found in two areas during this survey in the central and southern flush edges were the vegetation was not too dense. Quadrat ID 2432, 2438

Marsh valerian – *Valeriana dioica*

Was scattered around the site in the areas close to the flushes and on the wettest areas of the slopes of the site where there was some localised seeps. Quadrat ID 2431, 2434 and 2438.

Isoleps setacea – Bristle rush

Two small stands were found on the site, the one area in the main flush site with an additional area on the upper flush at the northern area of the site. Quadrat ID 2433.

Heath spotted orchid – *Dactylorhiza maculata*

This was found along the seep edge across the site in small numbers. Quadrat ID 2430 and 2434.

No other plant species listed on the local RAMSAR citation was present on the site.

5 Discussion and management issues

Between the two surveys (2017–2018) there were no substantial changes with the exception that there had been a wet winter with a very cold spring that may have had a slight effect to the flowering communities across the site. This in turn may have had an effect on grazing either access across the site or selection of what was grazed. With more time to assess the more botanically important areas on the site more uncommon species were noted in this update survey including a number of species found in the 1997 survey that were not found in the 2017 assessment. There was only one species found during that time that was not found in the 2018 survey, this was Purple Milk Vetch.

Flushes

The flush communities appeared to cover a larger extent in 2018 with a lighter grazing across the site this allowed larger distrubutions of the uncommon species on the site. An earlier survey period also will have contributed to this change. The site currently still holds a number of rare and uncommon species.

Calcareous grasslands

The grazing across the grasslands was light and with the later flowering season a more diverse grassland community was noted.

6 Acknowledgments

We would like to thank the owners of the SSSI and to the help and support of Ant Gagen of Mott MacDonald for commissioning the survey. Also to Kate Fagan of Natural England for allowing us to access to the site at short notice.

7 References

To be cited as: Abrehart, T. R. 2018. *Appendix to Sutton Heath and Bog NVC Survey 2018*. Report for Mott MacDonald by Abrehart Ecology

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Appendix A – NVC cards 2018

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	1	TF0896600071	Cambridgeshire	Toby Abrehart

NVC community:	M13 Schoenus nigricans-Juncus subnodulosus mire		
Date:	28/09/2018	**Stand Area:**	30m x 15m
Quadrat ID:	2429	**Sample Area:**	2m x 2m
Altitude:	19m	**Layers mean height:**	55cm, 30cm, 10cm
Soil Depth:	15cm		
Geology:	Calcareous flush	**Layers Cover:**	45%, 35%, 20%

Description:

Calcareous flush dominated with *Juncus subnodulosus* and frequent stands of *Carex lepidocarpa.* Water was running at time of survey. 21 *Eriophorum angustifolium* plants with *Carex lepidocarpa* covered and area of 3m x 15m. *Lychnis flos-cuculi* was on the north bank and *Carex rostrata* scattered though the lower portion of the sample. This area was horse grazed with light poaching across the area.

Species list

Plant Name	Plant Density (%)
Agrostis stolonifera	1
Angelica sylvestris	1
Carex ovalis	1
Carex pilulifera	2
Carex rostrata	2
Carex lepidocarpa	5
Cerastium fontanum	1
Equisetum arvense	2
Eriophorum angustifolium	1
Eupatorium cannabinum	2
Juncus subnodulosus	50
Lotus pedunculatus	2
Lychnis flos-cuculi	2
Lythrum salicaria	1
Mentha aquatica	1
Pedicularis palustris	2
Potentilla anserina	2
Schoenus nigricans	10

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	2	TF0886500064	Cambridgeshire	Toby Abrehart

NVC community:	MG10b Holcus lanatus-Juncus effusus rush-pasture, Juncus inflexus sub-community		
Date:	28/09/2018	**Stand Area:**	20m x 30m
Quadrat ID:	2430	**Sample Area:**	2m x 2m
Altitude:	18m	**Layers mean height:**	55cm, 20cm, 5cm
Soil Depth:	20cm		
Geology:		**Layers Cover:**	50%, 30%, 20%

Description:

Horse grazed drier taller sward on the higher up the slope from the flush areas. The herbs within this sward were dominated with *Potentilla anserina, Lathyrus pratensis, Cirsium arvensis* and *Dactylis glomeratus*. Sedges include *Carex hirta* and *C. flacca* and grasses *Brachypodium pinnatum.*

Species list

Plant Name	Plant Density (%)
Brachypodium pinnatum	5
Carex flacca	2
Carex hirta	2
Cirsium arvense	5
Dactylis glomerata	10
Dactylorhiza maculata	2
Equisetum arvense	2
Festuca rubra	19
Glechoma hederacea	2
Juncus subnodulosus	2
Lathyrus pratensis	5
Lotus corniculatus	2
Poa trivialis	1
Potentilla anserina	10
Pulicaria dysenterica	2
Ranunculus acris	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	3	TF0885500184	Cambridgeshire	Toby Abrehart

NVC community:	M13b Schoenus nigricans-Juncus subnodulosus mire, Briza media-Pinguicula vulgaris sub-community		
Date:	28/09/2018	**Stand Area:**	10m x 20m
Quadrat ID:	2431	**Sample Area:**	1m x 4m
Altitude:	17m	**Layers mean height:**	35cm, 15cm, 0c,
Soil Depth:	2cm		
Geology:	Limestone	**Layers Cover:**	30%, 50%, 20%

Description:

On the upper slopes of calcareous flush, with frequent stands of *Carex lepidocarpa*, *Schoenus nigricans* and *Valeriana dioica* were all common (0201). The flush was grazed by horses giving space for rarer species to florish. There where small standing pools of water across this sample area created by grazing. All vegetation was short at under 30cm high even the *Molinia caeurlea* was short in this section.

Species list

Plant Name	Plant Density (%)
Carex flacca	5
Carex lepidocarpa	5
Galium uliginosum	5
Hydrocotyle vulgaris	10
Juncus subnodulosus	5
Mentha aquatica	5
Molinia caerulea	20
Schoenus nigricans	20
Valeriana dioica	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	4	TF0888500194	Cambridgeshire	Toby Abrehart

NVC community:	M13b Schoenus nigricans-Juncus subnodulosus mire, Briza media-Pinguicula vulgaris sub-community		
Date:	28/09/2018	**Stand Area:**	40m x 20m
Quadrat ID:	2432	**Sample Area:**	2m x 2m
Altitude:	19m	**Layers mean height:**	45cm, 30cm, 15cm, 0cm
Soil Depth:	6cm		
Geology:	Limestone flush	**Layers Cover:**	15%, 30%, 30%, 25%

Description:

Upper flush area with running water. The majority of the vegetation here was *Juncus subnodulosus* with a high frequency of *Valeriana dioica, Carex lepidocarpa, Ranunculus flammula, Rorippa nasturtium-aquaticum* and *Carex ovalis.* 30% of the quadrat was base soil of pools of water. This area was grazed by a low density of horses (3) and their poaching created some of the small pools here. Adjacent to this stand were occasional stands of *Eupatorium cannabium* with scattered *Crateagus monogyna*.

Species list

Plant Name	Plant Density (%)
Berula erecta	3
Carex ovalis	3
Carex lepidocarpa	10
Cirsium palustre	1
Dactylorhiza maculata	1
Eupatorium cannabinum	3
Galium uliginosum	3
Glyceria fluitans	3
Juncus subnodulosus	10
Mentha aquatica	5
Ranunculus flammula	2
Rorippa nasturtium-aquaticu	4
Valeriana dioica	10
Eleocharis uniglumis	1

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	5	TF0880500258	Cambridgeshire	Toby Abrehart

NVC community:	M13 Schoenus nigricans-Juncus subnodulosus mire		
Date:	28/09/2018	**Stand Area:**	1.5m x 40m
Quadrat ID:	2433	**Sample Area:**	1m x 4m
Altitude:	20m	**Layers mean height:**	45cm, 20cm, 5cm
Soil Depth:	10cm		
Geology:	Calcareous flush	**Layers Cover:**	50%, 30%, 20%

Description:

Upper end of calcareous stream, upstream of the small crossing point. *Juncus subnodulosus* and *Eleocharis palustris* were dominant. There were two plant of *Isolepis setacea* on the side of stream. This area was horse grazed, heavily on the banks with lighter grazing in the stream itself. This habitat extended to the north west and the gate in the corner.

Species list

Plant Name	Plant Density (%)
Agrostis stolonifera	5
Carex flacca	1
Carex lepidocarpa	1
Eleocharis palustris	15
Isolepis setacea	1
Juncus inflexus	5
Juncus subnodulosus	40
Lythrum salicaria	5
Mentha aquatica	3
Potentilla anserina	5
Pulicaria dysenterica	1
Rorippa nasturtium-aquaticu	3
Veronica beccabunga	1

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	6	TF0897400081	Cambridgeshire	Toby Abrehart

NVC community:	M13 Schoenus nigricans-Juncus subnodulosus mire		
Date:	28/09/2018	**Stand Area:**	15m x 50m
Quadrat ID:	2434	**Sample Area:**	2m x 2m
Altitude:	18m	**Layers mean height:**	40cm, 25cm, 10cm 0cm
Soil Depth:	15cm		
Geology:	Calcareous flush	**Layers Cover:**	30%, 25%, 15%, 30%

Description:

Seep on side of stream. Good density of *Carex lepidocarpa* and *Valeriana dioica*. Nearby small stand of seven *Ophioglossum vulgaris* plants. *Anagallis tenella* and *Schoenus nigricans* were scattered through this site at a low to moderate density. *Juncus subnodulosus* was common throughout. There were numerous bare soil areas with standing water and a low level flow across the area. This area was horse grazed and was benefiting from this management.

Species list

Plant Name	Plant Density (%)
Agrostis stolonifera	10
Anagallis tenella	2
Carex flacca	1
Carex lepidocarpa	5
Cirsium palustre	2
Dactylorhiza maculata	1
Festuca rubra	2
Juncus subnodulosus	25
Molinia caerulea	5
Poa trivialis	10
Potentilla anserina	2
Schoenus nigricans	15
Valeriana dioica	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	7	TF0890000142	Cambridgeshire	Toby Abrehart

NVC community:	CG5a Bromus erectus-Brachypodium pinnatum grassland, typical sub-community		
Date:	28/09/2018	**Stand Area:**	10m x 15m
Quadrat ID:	2435	**Sample Area:**	2m x 2m
Altitude:	20	**Layers mean height:**	5cm
Soil Depth:			
Geology:		**Layers Cover:**	100%

Description:

Upper horse grazed calcareous meadow species poor and dominated with *Ranunculus repens, Centaurea nigra, Plantago lanceolata, Brachypodium pinnatum* and frequent *Hypochaeris radicata, Sanguisorba minor* and scattered *Agrostis stolonifera.*

Species list

Plant Name	Plant Density (%)
Agrostis stolonifera	15
Brachypodium pinnatum	2
Carex flacca	1
Centaurea nigra	15
Cirsium arvense	1
Cirsium eriophorum	1
Cirsium vulgare	1
Crepis vesicaria	2
Galium verum	10
Holcus lanatus	3
Hypochaeris radicata	5
Linum catharticum	2
Lotus corniculatus	5
Luzula campestris	2
Plantago lanceolata	10
Potentilla reptans	5
Ranunculus repens	15
Sanguisorba minor	10
Senecio jacobaea	3
Trifolium repens	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	8	TF0895700096	Cambridgeshire	Toby Abrehart

NVC community:	CG5a Bromus erectus-Brachypodium pinnatum grassland, typical sub-community		
Date:	28/09/2018	**Stand Area:**	50m x 30m
Quadrat ID:	2436	**Sample Area:**	2m x 2m
Altitude:	20m	**Layers mean height:**	15cm, 5cm
Soil Depth:			
Geology:		**Layers Cover:**	20%, 80%

Description:

Short horse grazed grassland dominated with flowering *Ranunculus repens*, *Plantago lanceolata* and *Galium verum*.

Species list

Plant Name	Plant Density (%)
Agrostis stolonifera	15
Brachypodium pinnatum	5
Bromopsis erecta	2
Carex flacca	1
Centaurea nigra	10
Cirsium vulgare	1
Crepis vesicaria	2
Galium verum	5
Holcus lanatus	5
Hypochaeris radicata	5
Linum catharticum	1
Lotus corniculatus	5
Luzula campestris	5
Plantago lanceolata	10
Potentilla reptans	4
Ranunculus repens	14
Sanguisorba minor	5
Senecio jacobaea	4
Trifolium repens	10

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	9	TF0890700000	Cambridgeshire	Toby Abrehart

NVC community:	MG1c Arrhenatherum elatius grassland, Filipendula ulmaria sub-community		
Date:	28/09/2018	**Stand Area:**	10m x 5m
Quadrat ID:	2437	**Sample Area:**	2m x 2m
Altitude:	16m	**Layers mean height:**	60cm, 40cm, 15cm
Soil Depth:			
Geology:		**Layers Cover:**	50%, 35%, 15%

Description:

Damp transitional grassland above the *Carex acutiformis* valley swamp. Community dominated with herbs including *Pulicaria dysentrica, Potentilla anserina, Mentha aquatica* and V*icia cracca* with P*oa trivialis, Agrostis stolonifera, Briza media* and *Brachypodium pinnatum.*

Species list

Plant Name	Plant Density (%)
Arrhenatherum elatius	20
Brachypodium pinnatum	2
Carex hirta	3
Epilobium hirsutum	2
Festuca rubra	2
Heracleum sphondylium	5
Juncus inflexus	3
Lotus corniculatus	1
Lotus pedunculatus	2
Lythrum salicaria	2
Mentha aquatica	2
Plantago lanceolata	5
Poa trivialis	5
Potentilla anserina	10
Pulicaria dysenterica	15
Ranunculus repens	5
Vicia cracca	5
Vicia sativa	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	10	TF0898800046	Cambridgeshire	Toby Abrehart

NVC community:	M13c Schoenus nigricans-Juncus subnodulosus mire, Caltha palustris-Galium uliginosum sub-community		
Date:	28/09/2018	**Stand Area:**	20m x 10m
Quadrat ID:	2438	**Sample Area:**	2m x 2m
Altitude:	16	**Layers mean height:**	60cm, 30cm, 15cm
Soil Depth:			
Geology:		**Layers Cover:**	40%, 30%, 30%

Description:

Transitional flush marsh on the east facing slope. Species rich commminty with supporting plants of *Scheonus nigricans, Carex lepidocarpa, Valeriana dioica, Eriophorum angustifolium* and *Ophioglossum vulgatum*. Lightly horse grazed with light poaching. *Juncus subnodulosus* was the dominant species in this section

Species list

Plant Name	Plant Density (%)
Agrostis stolonifera	3
Angelica sylvestris	2
Carex flacca	2
Carex panicea	2
Carex lepidocarpa	1
Equisetum arvense	2
Eriophorum angustifolium	1
Galium verum	5
Holcus lanatus	15
Mentha aquatica	5
Molinia caerulea	10
Ophioglossum vulgatum	1
Plantago lanceolata	2
Poa trivialis	10
Valeriana dioica	5
Vicia sativa	5
Eleocharis uniglumis	1

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	11	TF0907000081	Cambridgeshire	Toby Abrehart

NVC community:	CG5a Bromus erectus-Brachypodium pinnatum grassland, typical sub-community		
Date:	28/09/2018	**Stand Area:**	
Quadrat ID:	2439	**Sample Area:**	2m x 2m
Altitude:	15m	**Layers mean height:**	10cm
Soil Depth:			
Geology:		**Layers Cover:**	100%

Description:

Short cattle grazed sward dominated with grasses *Brachypodium pinnatum* and *Holcus lanatus*.

Species list

Plant Name	Plant Density (%)
Brachypodium pinnatum	10
Carex flacca	2
Cerastium fontanum	3
Cirsium arvense	2
Cynosurus cristatus	5
Dactylis glomerata	4
Festuca ovina	5
Festuca rubra	5
Holcus lanatus	15
Leontodon hispidus	0
Lotus corniculatus	5
Poa trivialis	2
Potentilla reptans	2
Ranunculus acris	3
Ranunculus repens	5
Rumex acetosa	2
Sanguisorba minor	5
Trifolium repens	5
Veronica chamaedrys	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	12	TF0910600101	Cambridgeshire	Toby Abrehart

NVC community:	CG5a Bromus erectus-Brachypodium pinnatum grassland, typical sub-community		
Date:	28/09/2018	**Stand Area:**	
Quadrat ID:	2440	**Sample Area:**	2m x 2m
Altitude:	18m	**Layers mean height:**	40cm, 15cm
Soil Depth:			
Geology:		**Layers Cover:**	60%, 40%

Description:

Lightly cattle grazed calcareous grasslands dominated with B*rachpodium pinnatum* and a light encroachment of scrub with short <1m high *Crataegus monogyna* present.

Species list

Plant Name	Plant Density (%)
Brachypodium pinnatum	50
Cerastium fontanum	2
Dactylis glomerata	1
Festuca rubra	5
Glechoma hederacea	5
Holcus lanatus	20
Poa trivialis	10
Rumex acetosa	2
Trifolium repens	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	14	TF0899000045	Cambridgeshire	Toby Abrehart

NVC community:	M22b Juncus subnodulosus-Cirsium palustre fen-meadow, Briza media-Trifolium spp. sub-community		
Date:	28/09/2018	**Stand Area:**	
Quadrat ID:	2441	**Sample Area:**	2m x 2m
Altitude:	15m	**Layers mean height:**	65cm, 30cm 10cm
Soil Depth:			
Geology:		**Layers Cover:**	55%, 30%, 15%

Description:

Lightly horse cattle grazed *Juncus subnodulosus* flush on the eastern side of the valley.

Species list

Plant Name	Plant Density (%)
Briza media	3
Epilobium hirsutum	5
Epilobium parviflorum	2
Festuca rubra	10
Galium palustre	3
Juncus subnodulosus	30
Lathyrus pratensis	3
Lotus pedunculatus	5
Lychnis flos-cuculi	10
Mentha aquatica	2
Poa trivialis	10
Pulicaria dysenterica	2
Ranunculus acris	5
Senecio jacobaea	2
Taraxicum officinalis	2
Vicia sativa	5

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	15	TF0905100122	Cambridgeshire	Toby Abrehart

NVC community:	M22 Juncus subnodulosus-Cirsium palustre fen-meadow		
Date:	28/09/2018	**Stand Area:**	
Quadrat ID:	2442	**Sample Area:**	2m x 2m
Altitude:	16m	**Layers mean height:**	70cm, 40cm, 10cm
Soil Depth:			
Geology:		**Layers Cover:**	50%, 40%, 10%

Description:

Lightly cattle grazed flush community in the upper slopes of the larger eastern valley running north to the road.

Species list

Plant Name	Plant Density (%)
Arrhenatherum elatius	10
Carex hirta	3
Cerastium fontanum	2
Cirsium palustre	3
Dactylis glomerata	5
Epilobium hirsutum	2
Festuca rubra	10
Holcus lanatus	10
Juncus inflexus	20
Juncus subnodulosus	10
Poa trivialis	5
Potentilla anserina	10
Potentilla reptans	3
Rumex acetosa	1
Rumex conglomeratus	2
Taraxicum officinalis	2

Location:	Sample ID:	Grid referance	Region	Author:
Area 2	16	TF0889800007	Cambridgeshire	Toby Abrehart

NVC community:	S7 Carex acutiformis swamp		
Date:	28/09/2018	**Stand Area:**	
Quadrat ID:	2443	**Sample Area:**	2m x 2m
Altitude:	16m	**Layers mean height:**	60cm, 30cm, 10cm
Soil Depth:			
Geology:		**Layers Cover:**	60%, 30%, 10%

Description:

Transitional swamp community above the *Carex acutiformis* valley swamp community dominated with *Filipendula ulmaria* with *Potentilla anserina*.

Species list

Plant Name	Plant Density (%)
Arrhenatherum elatius	10
Carex acutiformis	5
Dactylis glomerata	2
Epilobium hirsutum	2
Equisetum arvense	2
Filipendula ulmaria	40
Glechoma hederacea	2
Heracleum sphondylium	5
Holcus lanatus	10
Mentha aquatica	2
Poa trivialis	10
Potentilla anserina	10
Ranunculus acris	10
Rumex acetosa	2

Appendix C - Quadrat Data for Sutton Heath and Bog SSSI

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TF 0902 0022	**Region:** Cambridgeshire
NVC Community:	CG5 *Bromus erectus-Brachypodium pinnatum* grassland		
Date: 06/07/2020	**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C		
Quadrat ID: SHB1		**Layers Mean Height:** 10cm	
Geology: Lower Lincolnshire Limestone Member - Limestone.		**Layers Cover:** 100%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: Cattle grazed and closely cropped. Cattle in field at time of survey. Area near highest point of site			

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	2
Bromopsis erectus	45
Cynosurus cristatus	1
Dactylis glomerata	3
Festuca ovina	3
Festuca rubra	3
Lolium perenne	2
Phleum bertolonii	4
Poa pratensis	2
Achillea millifolium	3
Cerastium fontanum	3
Cirsium arvense	2
Convolvulus arvensis	5
Crepis capillaris	1
Galium verum	10
Plantago lanceolata	1
Potentilla reptans	1
Torilis japonica	1
Tragopogon pratensis	1
Trifolium repens	1

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TF 0902 0022	**Region:** Cambridgeshire
		Veronica chamaedrys	1
		Bare ground	5

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Beck Harrington-Harding	TF0903 0015	Cambridgeshire
NVC Community:	CG5 *Bromus erectus-Brachypodium pinnatum* grassland		
Date: 06/07/2020	**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C		
Quadrat ID: SHB2		**Layers Mean Height:** 15cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 100%	
Sample Area: 2m x 2m		**Aspect/Slope:** East facing slope	
Description: Cattle grazed and closely cropped. Cattle in field at time of survey.			

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	2
Bromopsis erectus	50
Cynosurus cristatus	2
Dactyis glomerata	2
Festuca ovina	2
Festuca rubra	2
Holcus lanatus	2
Phleum bertolnii	1
Achillea millifolium	2
Campanula glomerata	1
Centaurea nigra	1
Cirsium eriphorum	3
Galium verum	10
Lotus corniculatus	2
Potentilla reptans	1
Poterium sanguisorbia spp sanguisorbia	4
Rhinanthus minor	2
Trifolium pratense	1
Trifolium repens	3
Veronica chamaedrys	1
Crataegus monogyna	1
Bare ground	4

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Alanna Cooper	TF 08927 00246	Cambridgeshire
NVC Community:	CG5 *Bromus erectus-Brachypodium pinnatum* grassland		
Date: 06/07/2020	**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C		
Quadrat ID: SHB3		**Layers Mean Height:** 5cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 100%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: Cattle grazed and closely cropped. Cattle in field at time of survey.			

Species List

Plant Name	Plant Density (%)
Agrostis stolonifera	15
Arrhenatherum elatius	2
Cynosurus cristatus	3
Dactylis glomerata	5
Festuca ovina	10
Holcus lanatus	10
Lolium perenne	2
Phleum bertolonii	2
Achillea millifolium	5
Carduus nutans	1
Centaurea nigra	5
Cerastium fontanum	2
Cirsium arvense	2
Convolvulus arvensis	5
Galium verum	5
Plantago lanceolata	3
Potentilla reptans	2
Poterium sanguisorbia spp sanguisorbia	5
Torilis japonica	2
Trifolium pratense	5
Trifolium repens	8
Veronica chamaedrys	5
Bare ground	2

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Beck Harrington-Harding	TF 0896 0009	Cambridgeshire
NVC Community:	CG5 *Bromus erectus-Brachypodium pinnatum* grassland		
Date: 06/07/2020	**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C		
Quadrat ID: SHB4		**Layers Mean Height:** 10cm, 40cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 20%, 80%	
Sample Area: 2m x 2m		**Aspect/Slope:** East facing slope	
Description: Quadrat within fence-line of horse-grazed area near low point of site and associated M13 and M27 vegetation communities			

Species List	
Plant Name	**Plant Density (%)**
Anthoxanthum oderatum	20
Brachipodium pinnatum	10
Briza media	2
Dactylis glomerata	3
Festuca rubra	20
Holcus lanatus	15
Centaurea nigra	10
Cirsium arvense	1
Galium verum	5
Hypochaeris radicata	1
Plantago lanceolata	1
Poterium sanguisorbia spp sanguisorbia	6
Rumex acetosella	1
Trifoilium pratense	1
Veronica chamaedrys	1
Bare ground	3

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Alanna Cooper	TF 08923 00135	Cambridgeshire
NVC Community:	CG5 *Bromus erectus-Brachypodium pinnatum* grassland		
Date: 06/07/2020	**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C		
Quadrat ID: SHB5		**Layers Mean Height:** 5cm / 30cm / 50cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 5% / 70%/ 25%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: Less grazed area with more grassy tufts – horse grazed			

Species List

Plant Name	Plant Density (%)
Anthoxanthum oderatum	5
Arrhenatherum elatius	2
Brachipodium pinnatum	50
Bromopsis erectus	2
Cynosurus cristatus	2
Festuca rubra	5
Holcus lanatus	10
Agrimonia eupatoria	5
Centaurea nigra	10
Cerastium fontanum	5
Galium verum	5
Lotus corniculatus	5
Plantago lanceolata	5
Potentilla reptans	5
Poterium sanguisorbia spp sanguisorbia	5
Bare ground	2

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Beck Harrington-Harding	**Grid Reference:** TF 0876 0017	**Region:** Cambridgeshire
NVC Community:	M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow		
Date: 06/07/2020		**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C	
Quadrat ID: SHB6		**Layers Mean Height:** ground level, 50cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 10, 90	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: Area near boundary of fen meadow and MG9 grassland			

No photo available

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	1
Deschampsia cespetosa	5
Holcus lanatus	1
Juncus inflexus	40
Epilobium hirsutum	40
Galium aparine	2
Galium uliginosum	2
Lathyrus pratensis	4
Potentilla anserina	1
Rumex palustre	1
Scrophularia auriculata	3

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Alanna Cooper	TF 08782 00144	Cambridgeshire
NVC Community:	MG9 *Holcus lanatus-Deschampsia cespitosa* grassland		
Date: 06/07/2020		**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C	
Quadrat ID: SHB7		**Layers Mean Height:** ground level, 20cm, 70cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 5%, 90%, 5%	
Sample Area: 2m x 2m		**Aspect/Slope:** Gentle west facing slope – almost flat	
Description: Next to rush pasture then S7 swamp to vegetation to the west			

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	10
Carex hirta	2
Dactylis glomerata	5
Deschampsia cespitosa	5
Festuca rubra	10
Holcus lanatus	10
Juncus inflexus	15
Phleum bertolonii	1
Poa trivialis	2
Angelica sylvestris	1
Centaurea nigra	4
Cirsium arvense	4
Dactylorhiza maculata	1
Galium uliginosum	15
Lathyrus pratensis	2
Lotus corniculatus	1
Lotus pendiculatus	2
Potentilla anserina	15
Prunella vulgaris	1
Pulicaria dysenterica	5
Ranunculus acris	2

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Alanna Cooper	TF 08782 00144	Cambridgeshire
		Ranunculus repens	2
		Senecio erucifolius	1
		Vicia cracca	1

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Beck Harrington-Harding	TF 0881 0013	Cambridgeshire
NVC Community:	MG9 *Holcus lanatus-Deschampsia cespitosa* grassland near boundary with M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow		
Date: 06/07/2020		**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C	
Quadrat ID: SHB8		**Layers Mean Height:** 5cm, 50cm, 90cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 5%, 90%, 5%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: poorly drained permanent pasture			

Species List	
Plant Name	**Plant Density (%)**
Deschampsia cespetosa	10
Juncus inflexus	60
Angelica sylvestris	10
Cirsium palustre	3
Dactylorhiza fuschii	4
Epilobium hirsutum	5
Filipendula ulmaria	2
Galium uliginosum	2
Lathyrus pratensis	2
Pulicaria dysenterica	10
Scrophularia auriculata	4

Location:	**Surveyor:**	**Grid Reference:**	**Region:**
A47 Wansford to Sutton Sutton Heath and Bog SSSI	Alanna Cooper & Beck Harrington-Harding	TF 08865 00065	Cambridgeshire
NVC Community:	MG10 *Holcus lanatus-Juncus effusus* rush-pasture		
Date: 25/06/2020		**Weather:** Dry, no cloud cover, wind 1 (Beaufort), temperature 24°C	
Quadrat ID: SHB9		**Layers Mean Height:** 5cm, 20cm, 50cm	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 20%, 30%, 50%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	

Description: Horse grazed drier sward on higher up the slope from the flush areas. Sward is dominated mainly with *Holcus lanatus, Dactylis glomerata, Potentilla anserine, Lathyrus pratensis* and *Cirsium arvense.*

Species List

Plant Name	Plant Density (%)
Arrhenatherum elatius	5
Brachipodium pinnatum	5
Carex hirta	4
Festuca rubra	5
Juncus effusus	2
Juncus inflexus	4
Poa trivialis	1
Angelica sylvestris	1
Cirsium arvense	25
Dactylorhiza maculata	2
Filipendula ulmaria	1
Galium uliginosum	10
Glechoma hederacea	3
Heracleum sphondylium	1
Lathyrus pratensis	5
Mentha aquatica	2
Potentilla anserina	15
Potentilla reptans	1
Pulicaria dysenterica	5

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TF 08865 00065	**Region:** Cambridgeshire
		Ranunculus acris	1
		Scrophularia auriculata	1
		Bare ground	1

Location: A47 Wansford to Sutton Sutton Heath and Bog SSSI	**Surveyor:** Alanna Cooper & Beck Harrington-Harding	**Grid Reference:** TF 08865 00065	**Region:** Cambridgeshire
NVC Community:	M22 *Juncus subnodulosus-Cirsium palustre* fen-meadow		
Date: 06/07/2020		**Weather:** Dry, cloud cover 100%, wind 4 (Beaufort), temperature 15°C	
Quadrat ID: SHB10		**Layers Mean Height:** ground level, 50cm, 1m	
Geology: Lower Lincolnshire Limestone Member - Limestone		**Layers Cover:** 5%, 85%, 10%	
Sample Area: 2m x 2m		**Aspect/Slope:** Flat	
Description: flat, very rush, fen meadow, near S7 swamp habitat.			

Species List	
Plant Name	**Plant Density (%)**
Holcus lanatus	5
Juncus inflexus	50
Equisetum palustre	2
Scrophularia auriculata	10
Angelica sylvestris	10
Cirsium palustre	5
Epilobium hirsutum	10
Galium uliginosum	10
Cirsium arvense	25
Mentha aquatica	15

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