A428 Black Cat to Caxton Gibbet improvements

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9.63 Updated Terrestrial Habitat Surveys 2021 Technical Note

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A428 Black Cat to Caxton Gibbet improvements

Development Consent Order 202[ ]

9.63 Updated Terrestrial Habitat Surveys 2021 Technical Note

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1 Summary

1.1.1 Phase 1 Habitat surveys were undertaken during July and August 2021 to include terrestrial habitats that may have been subject to changes since the last Phase 1 Habitat survey (completed between 2017 and 2020). The terrestrial habitats survey in 2021 included areas of grassland and arable flora surveys.

1.1.2 Recent aerial photography from publicly available sources accessed in 2021 was compared with the aerial photography as examined over the period 2017-2020 as part of the effort made to keep the Phase 1 Habitat baseline up to date.

1.1.3 It was identified that the Phase 1 Habitat database was up to date apart from three habitats where further survey was needed: grassland (including Protected Road Verge (PRV) S8 Elsworth), arable field margins and other habitats in the arable agriculture. All of the grassland parcels re-assessed as part of these terrestrial habitat surveys were also re-assessed with respect to their habitat condition as determined using the Defra Metric 2.0 method.

1.1.4 Grassland surveys were undertaken on 13 and 28 July and 18 August 2021 using a standard National Vegetation Classification (NVC) survey method [REF 1-1] in eighteen grassland parcels. All areas were classified as being either improved, semi-improved or poor semi-improved. No scarce (i.e. notable) or rare plant species were recorded. The outcome of these surveys confirms the assessment of these grasslands as being of no more than Site value.

1.1.5 The re-assessment of the flora of PRV S8 confirmed that the southern section of this PRV had been damaged and that the site was in unfavourable condition and declining in line with the most recent assessments undertaken by the Wildlife Trust (2019). PRV S8 is of District/County value.

1.1.6 Arable flora surveys were undertaken on the 13, 21 and 28 July 2021 in six arable fields. Of the five important arable weeds recorded in this survey, Dwarf Mallow and Slender Tare are widespread over the whole of Cambridgeshire, the latter most frequent in the west and north of Cambridge [REF 1-8]. The outcome of these surveys confirms the assessment of these arable margins as being from Site/Local to District value.

1.1.7 The locations of these parcels remain as reported in the account of the surveys undertaken in 2018 (Appendix 8.3, Terrestrial Habitats **[APP-190]** of the Environmental Statement).

2 Introduction

2.1.1 The purpose of the A428 Black Cat to Caxton Gibbet Improvements (the Scheme) is to address the problems of congestion, poor journey time reliability and poor resilience against incidents between the Black Cat and Caxton Gibbet roundabouts. The Scheme seeks to address these problems through construction of a new 10 mile (16 kilometres) dual 2-lane carriageway from the Black Cat roundabout to Caxton Gibbet roundabout, to be known as the A421 (hereafter referred to as the 'new dual carriageway') and in addition approximately 1.8 miles (3 kilometres) of tie-in works shown in schematic form in **Figure 2-1**.

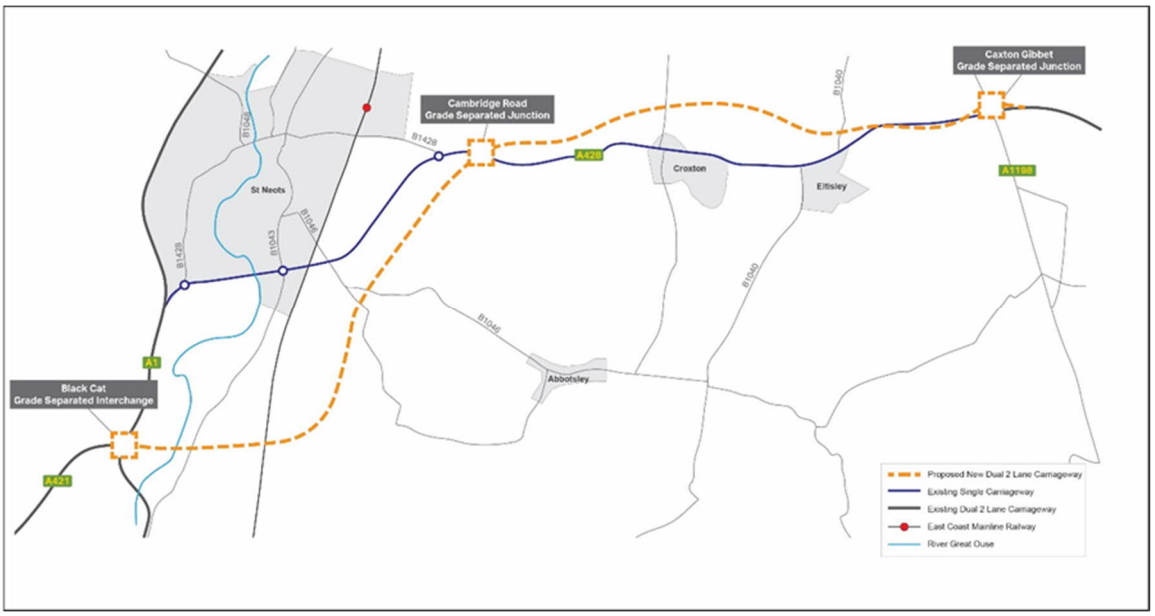

Figure 2-1 The Scheme

2.1.2 This technical note should be read in conjunction with Appendix 8.3, Terrestrial Habitats **[APP-190]** of the Environmental Statement.

2.1.3 Phase 1 Habitat surveys were undertaken to include terrestrial habitats that may have been subject to changes since the last Phase 1 Habitat survey (completed between 2017 and 2020) to confirm land cover and species content in those areas. This included areas of grassland habitat previously mapped as possible unimproved grassland, which may have changed from the baseline including pockets of grassland to check for species composition; and the Elsworth PRV, known as PRV S8, to determine their floral composition and Phase 1 grassland habitat type.

2.1.4 The terrestrial habitats surveys also included arable flora surveys. Arable flora is one of the priority habitats within the Order Limits. The surveys were used to reassess if the areas of arable flora previously identified as part of the 2018 arable flora surveys were still present, determine their condition and if any arable field margins supporting notable arable weeds are within the Order Limits.

2.1.5 This technical note describes the method, results and an assessment as to whether the information collected makes any material change to the information already presented as part of the submitted Development Consent Order (DCO) application.

2.1.6 Additionally, information in relation to the condition of these habitats was recorded to assist with Biodiversity Net Gain (BNG) assessment using the Defra Metric 2.0.

3 Methodology

3.1 Phase 1 Habitat survey

3.1.1 Recent aerial photography from publicly available sources was compared with the aerial photography as examined over the period 2017-2020 as part of the effort made to keep the Phase 1 Habitat baseline up to date.

3.1.2 It was identified that the Phase 1 Habitat database was up to date apart from three habitats where further survey was needed:

a. Grasslands (including PRV) where assessments had been made from public rights of way or from aerial photography due to lack of access prior to 2021.

b. Arable field margins and other habitats in the arable agriculture where the resolution of the location of notable arable weeds had been too coarse to determine where notable species and associated sections of margin were within the Order Limits.

c. The condition of these habitats in order to assist with BNG assessment using the Defra Metric 2.0.

3.1.3 The surveys were undertaken at an appropriate time of year during July and August 2021 and under suitable weather conditions for grassland survey.

3.1.4 The locations of the grasslands and arable field margins are reported in Appendix 8.3, Terrestrial Habitats **[APP-190]** of the Environmental Statement). The location of PRV S8 Elsworth is reported in Appendix 8.2, Designated Sites **[APP-189]** of the Environmental Statement.

3.2 Grassland (including Protected Road Verge (PRV) S8 Elsworth)

3.2.1 The survey was undertaken by experienced botanists on 13 and 28 July and 18 August 2021 using a standard National Vegetation Classification (NVC) survey method as detailed for grasslands in Rodwell (1992) [REF 1-1]. The NVC survey involved recording plant species present within a 4m x 4m quadrat (suitable for tall and more open herb communities). In each discrete grassland type, up to five randomly selected quadrats were recorded, depending on the extent and variability of the grassland. Each plant species in a quadrat was given a by eye estimate of cover using the Domin scale (refer to **Table 3-1**) and bare ground was recorded where present.

Table 3-1: Domin scale

Cover (%)	Domin
91-100	10
76-90	9
51-75	8

Cover (%)	Domin
34-50	7
26-33	6
11-25	5
4-10	4
<4 (many individuals)	3
<4 (several individuals)	2
<4 (few individuals)	1

3.2.2 NVC survey is not appropriate where vegetation has a history of prior disturbance, as heavily-disturbed or recently-established habitats would be unlikely to align with any of the described NVC communities. In these cases, an assessment of the grassland was based on professional judgement, notes were made on the species and abundance only, rather than an NVC survey.

3.2.3 For all surveys the rarity of higher plants given was based on Stace (2019) [REF 1-2]:

a. Uncommon (U) – a species found in not more than 250 different 10 x 10km grid squares in the British Isles since 1987.

b. Scarce (S) – a species found in not more than 100 different 10 x 10km grid squares since 1987.

c. Rare (R) – a species found in not more than 15 different 10 x 10km grid squares since 1987.

3.2.4 Protected species (Wildlife and Countryside Act 1980 (as amended Schedule 8)), priority species (Natural Environment and Rural Communities Act 2006 Section 41) and notable plant species are listed in the results.

3.3 Arable Flora

3.3.1 Surveys were undertaken of arable fields identified in 2018 as having important arable flora, with at least part of the field parcel being within the Order Limits. These fields were assessed and surveyed by two experienced botanists for important arable plant species at an optimal time of year for recording such species [REF 1-1]. The distribution of scarce arable plant species in the modern agricultural landscape is largely confined to arable field margins and similar areas of less intensive management [REF 1-1]. As such, the survey involved walking field boundaries and comparable areas of marginal habitat.

3.3.2 Lists of rare or scarce arable plant species were recorded for each field surveyed based on Plantlife's Important Arable Plant Areas Outstanding Assemblages (Criterion B) [REF 1-3]. Criterion B for outstanding assemblages utilises the same method for identifying sites of County, National and European Importance. This is a scoring system that tallies the weighted individual score for each of the species present according to their rarity and decline across Britain. The basic listing of arable species has been drawn from PLANTATT: Attributes of British and Irish Plants [REF 1-4], which provide the most comprehensive listing of species characteristic of arable land currently available. This has been supplemented with a selection of additional species considered to occur occasionally as characteristic members of the arable flora. It was not the intention of the survey to record all arable plant species present, only those listed in the Great Britain [REF 1-5] and England [REF 1-6] Red Data Lists as Critically Endangered, Endangered, Vulnerable and Near Threatened, and those listed by Byfield & Wilson (2005) [REF 1-7] as locally, regionally or nationally scarce. As such, data were only collected for those fields where scarce flora was found.

3.3.3 The survey results were used to determine the relative notability and importance of any scarce arable plant assemblages present. Byfield and Wilson (2005) [REF 1-7] set thresholds to support this and subsequent nature conservation evaluation.

4 Limitations

4.1.1 Grassland survey results, and the description of the types of communities (where applicable), represented a community current at the time of survey (as opposed to one seeking to describe what the community was before any human interference, or what it might become in the future). Hence, this is only a snapshot of the vegetation communities present and should not be interpreted as a static long-term reference.

4.1.2 There was no access to some fields (where stated in the text), but they were viewed from public rights of way where possible, which was adequate to determine Phase 1 Habitat type and dominant species for the purpose of this technical note.

5 Results

5.1 Phase 1 Habitat survey

5.1.1 Recent aerial photography identified that the Phase 1 Habitat database was up to date apart from areas of grassland including PRV S8 Elsworth, and arable margins and other arable habitat that might support notable arable weeds where the field was at least partly within the Order Limits.

5.1.2 Changes in land use were noted for:

a. The building out of the Wintringham residential development to the east of St Neots.

b. Works within the Breedon quarry site by the Black Cat roundabout.

c. Archaeological trial trench excavations undertaken by the Museum of London Archaeology (MOLA), undertaken as part of the Scheme.

d. Trees had been removed from a small area (less than 300m^2) of woodland near Weald Farm, to the south of the existing A428 at national grid reference TL 228 596.

e. Two small property developments.

5.1.3 The Phase 1 Habitat database was updated with respect to these changes using aerial photography.

5.2 Grassland (including Protected Road Verge (PRV) S8 Elsworth)

5.2.1 Eighteen grassland parcels were surveyed to reassess their flora. The locations of these parcels are as in the account of the surveys undertaken in 2018 (Appendix 8.3, Terrestrial Habitats **[APP-190]** of the Environmental Statement). The detail of the flora identified in these parcels is provided in Appendix B and Appendix E of this Technical Note.

G1

5.2.2 A recently sown wildflower meadow/pollinator grassland on recently disturbed ground (formerly arable) with abundant common bent (*Agrostis capillaris*) (A) and red fescue (*Festuca rubra* aggregate) (A) and frequent broad-leaved flowering species common knapweed (*Centaurea nigra*) (F), common bird's-foot trefoil (*Lotus corniculatus* variety *sativus*) (F), oxeye daisy (*Leucanthemum vulgare*) (O), lady's bedstraw (*Galium verum*) (F) and 20% bare ground. **The field is assessed as Site value**.

G2

5.2.3 A semi-improved sown wildflower/pollinator grassland dominated by common bird's-foot trefoil, oxeye daisy, lady's bedstraw, Yorkshire fog (*Holcus lanatus*) (O) and alsike clover (*Trifolium hybridum*) (O) with a high number of hoverflies and bees evident. Given the species composition, G2 was assessed using the National Vegetation Classification method (see Photos 5 and 6 in Appendix D and a full plant species list in Appendix E). **The field is assessed as Site value**.

G3

5.2.4 A former small grazing paddock with species poor semi-improved grassland and tall ruderal herbs including common nettle (*Urtica dioica*) (F), common ragwort (*Jacobaea vulgaris*) (F), creeping buttercup (*Ranunculus repens*) (A), common bent (F), meadow barley (*Hordeum* secalinum) (O) and creeping thistle (*Cirsium arvense*) (F) (see Photo 3 in Appendix D). **The field is assessed as Site value.**

G4

5.2.5 Improved grassland (mown lawn/paddock) with Italian rye-grass *(Lolium perenne*), daisy (*Bellis perennis*), white clover (*Trifolium repens*), a species of meadow-grass (a *Poa* species) and common bent (no access). **The field is assessed as Site value**.

G5

5.2.6 An uncut species poor semi-improved grassland dominated by grasses including false oat-grass, Yorkshire fog, cock's-foot (*Dactylis glomerata*) and marsh thistle (no access). **The field is assessed as Site value**.

G6

5.2.7 A semi-improved neutral to calcareous grassland field east of Roxton garden centre, with recent disturbance and 30% mown short grass for use as an overflow car-park with 50% bare ground and species including Dandelion (*Taraxacum officinalis* aggregate) (F), smooth hawk's-beard (*Crepis capillaris*) (A), lesser trefoil (*Trifolium dubium*) (O) and *Filago germanica* (O). The eastern section is larger with recent disturbance and unmanaged with a higher species diversity including Yorkshire fog (F), common ragwort (F), Italian rye-grass (F), common bent (F), cat's-ear (*Hypochaeris radicata*) (O), hop trefoil (*Melilotus officinalis*) (R), hop trefoil (*Trifolium campestris*) (O), blue fleabane (*Erigeron acris*) (R), common cudweed (*Filago germanica*) (O), common centaury (*Centaurium erythraea*) (A) with two strong calcareous indicator species, yellow-wort (*Blackstonia perfoliata*) (O), pyramid orchid (*Anacamptis pyramidalis*) (O-LF) (206 flowering spikes) (see Photo 4 in Appendix D). **The field is assessed as Site value**.

G8

5.2.8 Unmanaged semi-improved grassland with tall ruderal herbs and 40 to 50% encroaching scrub comprising bramble (*Rubus fruticosa* aggregate), *ash (Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*) and dogwood (*Cornus sanguinea*) bisected by a path and tree line. Some evidence of rabbit grazing. Species included common ragwort (F-LA), false oat-grass (F), American willowherb (*Epilobium ciliatum*) (O), Hogweed (*Heracleum sphondylium)* (F), field bondweed (*Convolvulus arvensis*) (F), *marsh thistle* (O), *Erigeron acer* (R), cock's-foot (F), wooly thistle (*Cirsium eriophorum*) (O), common self-heal (*Prunella vulgaris*) (R), spongy turf-moss (*Rhytidiadelphus squarrosus*) (O), hemlock (*Conium maculatum*) (R), *Helminthotheca echioides* (O), *creeping buttercup* (O-LF), wood dock (*Rumex sanguineus*) (O), smaller cat's-tail (*Phleum bertolonii*) (R), white dead-nettle (*Lamium album*) (O) and false broom

(*Brachypodium sylvatica*) (O). Bare ground 5 to 10% rabbit grazed. **The field is assessed as Site value**.

G10

5.2.9 A small fenced paddock mown/strimmed, comprising species poor semi-improved grassland with common ragwort (O), false oat-grass (F), marsh thistle (F), cock's-foot (F), bristly ox-tongue (*Helminthotheca echioides)* (A), broad-leaved dock (*Rumex obtusifolius*) (O). >10% bare ground. **The field is assessed as Site value**.

G13

5.2.10 A fenced horse/grazing field with semi-improved neutral grassland. Species include *Tripleurospermum inodorum* (F), *Trifolium pratense* (R), *nettle* (F), *Plantago lanceolata* (F) false oat-grass (F), *Crepis capillaris* (LF), *Cirsium arvensis* (F), *cock's-foot* (A), *broad-leaved dock* (O), *Sonchus oleraceus* (O), *Veronica chamaedrys* (F), *Chenopodium rubrum* (F) and *field bindweed* (O). Bare ground covers c.2%. **The field is assessed as Site value**.

G14

5.2.11 An improved grassland comprising a sown hay meadow with a species diversity. Species comprise crested dog's-tail (*Cynosurus cristatus*) (O), *Schedonorus arundinaceus* (F), *Bromus racemosus* (O), false oat-grass (A) and *cock's-foot* (A). **The field is assessed as Site value**.

G16

5.2.12 All grassland is species poor semi-improved with a new lake present over most of G16. Newly planted broad-leaved trees were present to the south of the new lake within grassland (e.g. pedunculate oak (*Quercus robur*)*, field maple Acer campestre*). **The field is assessed as Site value**.

5.2.13 Grassland is cut with a smaller area uncut southeast and around the new lake. Species include false oat-grass (D), *cock's-foot* (A), broad-leaved dock (O), creeping buttercup (O), tall fescue (*Schedonorus arundinaceus*) (O), *Phleum pratense (*F). A single plant of Filago *germanica* (R), and two plants of *Sanguisorba officinalis* (R) were recorded in the field margin. **The field is assessed as Site value**.

G17

5.2.14 Species poor semi-improved grassland, unmanaged, formerly grazed by horses. Species include *Agrostis capillaris* (F), false oat-grass (A), *Ervum tetraspermum* (R), *Holcus lanatus* (F), *Cirsium vulgare* (O), *Crepis capillaris* (R), *Dactylis glomerata* (F), *Rumex obtusifolius* (R), *Italian rye-grass* (F), *Cirsium arvense* (O), *Cynosurus cristatus* (O), Jacobaea vulgaris (O), smaller cat's-tail (R), *Convolvulus arvensis* (R), *Festuca rubra* (R), *Sonchus asper* (R), *Trifolium repens* (O), *Quercus robur* (R), *Plantago major* (R) and Tripleurospermum inodorum (F). **The field is assessed as Site value**.

G18

5.2.15 Improved mown grassland with *Lolium perenne* (D), *Trifolium repens* (A), *Taraxacum officinale* aggregate (F), *Agrostis capillaris* (F), *Poa annua* (R) and *Cerastium fontanum* (R). **The field is assessed as Site value**.

G19

5.2.16 Species poor semi-improved grassland, with tall ruderal herb (25%) and scattered scrub (10%). Species include *Arrhenatherum elatius* (D), *Dipsacus fullonum* (O), *Artemisia vulgaris* (O), *Calamagrostis epigejos* (LA), *Chamaenerion angustifolium* (F) *Cirsium arvense* (O), *Jacobaea vulgaris* (F), *Rubus fruticosa* aggregate (F), *Convolvulus arvensis* (F), and *Helminthotheca echioides* (O). **The field is assessed as Site value.**

G20

5.2.17 Recently developing grassland around a quarry lake with species poor semi-improved grassland, tall ruderal herbs and >30 % bare ground. Species include false oat-grass (A), *Rumex obtusifolius* (R), *Tripleurospermum inodorum* (F), *Holcus lanatus* (F), *Cirsium vulgare* (O), *Dactylis glomerata* (F), *Rumex obtusifolius* (R), *Cirsium arvense* (O), *Jacobaea vulgaris* (O), *Convolvulus arvensis* (O), *Festuca rubra* (R), *Trifolium repens* (R) and *Helminthotheca echioides* (F). **The field is assessed as Site value**.

G21

5.2.18 No access was possible to this field and it was viewed from an adjacent road. Mown species poor semi-improved grassland with a tall ruderal herb margin to the north. **The field is assessed as Site value**.

G22

5.2.19 No access was possible to this field and it was viewed from an adjacent road. Mown amenity grassland as mapped in Phase 1 Habitat database. Dominated by grasses *Lolium perenne, Agrostis* species and *Poa* species. **The field is assessed as Site value**.

G23

5.2.20 Species poor semi-improved grassland, formerly grazed. Species include Holcus lanatus (A), Crepis capillaris (O), Dactylis glomerata (F), Arrhenatherum elatius (F), Glechoma hederacea (O), Lamium album (R), Achillea millefolium (O), Cirsium arvense (O), Potentilla reptans (O) and Balota nigra (R). **The field is assessed as Site value**.

5.2.21 No pockets of grassland, e.g. road verges, which had notable flora were identified that warranted detailed survey.

5.3 Protected Road Verge S8 Elsworth (PRV S8)

5.3.1 PRV S8 is on the western side of Brockley Road, Elsworth and is approximately 400 m long and 5 to 6 m wide with a ditch to the west and minor road to the east. There were some scattered trees (comprising mainly planted European lime (*Tilia x europaea*)). The grassland was characterised by an abundance of false oat-grass (*Arrhenatherum elatius*) with a total of 38 species recorded on the verge, including tor-grass (*Brachypodium pinnatum*), cow parsley (*Anthriscus sylvestris*), lady's-bedstraw (*Galium verum*), chalk knapweed (*Centaurea debauxii*), betony (*Betonica officinalis*) and dropwort (*Filipendula vulgaris*) (see Appendix A). Nine Cambridgeshire neutral and/or calcareous grassland indicator species were present as shown in Appendix A. There was one nationally scarce species, Slender tare (*Ervum gracile*), present in small amounts at TL 30514 60845. Observations affecting condition included the presence of bramble scrub (5%), tree shading, and localised previous disturbance to the south of the PRV near to the cycleway/path adjacent to the A428. This disturbance to the south of PRV was observed in previous surveys undertaken by the Wildlife Trust (2019) which considered the southern section had "*been destroyed by roadworks and should be removed from the PRV*".

5.3.2 Appendix A presents a full plant species list for PRV S8 Elsworth with photographs of the site in Appendix D (Photos 1 and 2).

5.3.3 **PRV S8 is of District/County value.**

5.4 Arable Flora

5.4.1 Six arable fields were surveyed to reassess the presence and details of location for notable arable weeds. The locations of these parcels are reported in the account of the surveys undertaken in 2018 (Appendix 8.3, Terrestrial Habitats **[APP-190]** of the Environmental Statement). The detail of the flora identified in these parcels is provided in Appendix B and Appendix E.

AF1

5.4.2 Wheat crop on a clay soil type with a narrow sprayed margin around the edge; no important arable plant species were recorded. **The field is assessed as Site value**.

AF3a

5.4.3 Wheat crop on a clay soil type with two low scoring important arable plants recorded, smooth tare (*Ervum tetrasperma*) (O) (score 2) and dwarf mallow (*Malva neglecta*) (R) (score 2). The sections of field margin with smooth tare and dwarf mallow were outside the Order Limits. **The field is assessed as Site/Local value.**

AF3b

5.4.4 Bean crop on a clay soil type with three scoring important arable plants recorded, dwarf spurge (*Euphorbia exigua*) (R) (score 7), dwarf mallow (R) (score 2) and sharp-leaved fluellen (*Kickxia elatine*) (O) (score 2). The sections of field margin with dwarf spurge and dwarf mallow were outside the Order Limits. **The field is assessed as District value.**

AF3c

5.4.5 Bean crop on a clay soil type with three scoring important arable plants recorded, slender tare (*Ervum gracile*) (O) (score 7), smooth tare (O) (score 2) and sharp-leaved fluellen (O) (score 2). In accordance with the assessment method (refer to section 4: Methods). The sections of field margin with slender tare, smooth tare and sharp-leaved fluellen were outside the Order Limits. **The field is assessed as District value**.

AF3d

5.4.6 Wheat crop on a clay soil type; no important arable plants recorded. T**he field is assessed as Site value**.

A19

5.4.7 Wheat crop on a clay soil with a 10m wide, tall grassland margin with one low scoring important arable plant, smooth tare (O). The section of field margin with smooth tare was outside the Order Limits. **The field is assessed as Site/Local value.**

5.5 Condition Assessment for biodiversity net gain (BNG)

5.5.1 All of the grassland parcels re-assessed as part of these terrestrial habitat surveys were also re-assessed with respect to their habitat condition as determined using the Defra Metric 2.0 method. This information has been used for BNG calculations in relation to grassland condition.

5.5.2 The results are shown in Appendix C.

6 Discussion and Conclusions

6.1 Grassland parcels

6.1.1 The 18 grassland parcels surveyed were all classified as being either improved, semi-improved or poor semi-improved. No scarce (i.e. notable) or rare plant species were recorded. The outcome of this survey confirms the assessment of these grasslands as being of no more than Site value (Chapter 8, Biodiversity **[APP-077]** of the Environmental Statement).

6.2 Elsworth PRV S8

6.2.1 The re-assessment of the flora of PRV S8 confirmed the presence of nine Cambridgeshire neutral and/or calcareous grassland indicator species were present as shown in Appendix A. There was one nationally scarce species, Slender tare (*Ervum gracile*). It was also found that the southern section of this PRV had been damaged and that the site was in unfavourable condition and declining in line with the most recent assessments undertaken by the Wildlife Trust (2019) which considered the southern section had "*been destroyed by roadworks and should be removed from the PRV*". Overall, the value of PRV S8 is district/county value similar to assessed in the baseline (Chapter 8, Biodiversity **[APP-077]** of the Environmental Statement).

6.3 Arable flora

6.3.1 Of the five important arable weeds recorded in this survey, dwarf mallow and slender tare are widespread over the whole of Cambridgeshire, the latter most frequent in the west and north of Cambridge [REF 1-8]. Dwarf spurge is "*still a common plant in the southern part of the county [Cambridgeshire] especially in arable fields*" and, likewise, "*sharp-leaved fluellen is still widespread on the clays and chalk of the south of the county [Cambridgeshire*]" [REF 1-8]. Slender tare is a scarce plant in Cambridgeshire, *"its core area is the boulder clay…to the west of Cambridge*" [REF 1-8]. This background helps to put into perspective the assessment of the arable margins as being from Site/Local to District value.

6.3.2 These observations complement the assessment made of arable habitat in the 2018 surveys (Appendix 8.3 Terrestrial Habitats **[APP-190]** of the Environmental Statement), providing more specificity as to the locations of those notable arable weeds recorded.

6.3.3 As none of the arable margins supporting these important weeds are within the Order Limits, there will be no impact on the arable flora.

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Appendix A Elsworth PRV Species List

Plant Species	DAFOR[1]	Status/Cambridgeshire Grassland Indicator[2]
Agrimonia eupatoria	R	N, C
Agrostis stolonifera	R	
Allium vineale	O	
Alopecurus pratensis	O	
Anthriscus sylvestris	F	
Arrhenatherum elatius	A	
Betonica officinalis	O	
Brachypodium pinnatum	O-LF	SC
Bromus racemosus[3]	R	SN
Centaurea debauxii[4]	F	N, C
Cirsium arvense	R	
Cirsium vulgare	O	
Convolvulus arvensis	R	
Cruciata laevipes	O	
Dactylis glomerata	O	
Elymus repens	R	
Epilobium hirsutum	R	
Ervum gracile	R	Nationally Scarce, Red List Vulnerable
Festuca arundinacea	O	
Festuca rubra	R	
Filipendula vulgaris	O	SN, SC

Plant Species	DAFOR[1]	Status/Cambridgeshire Grassland Indicator[2]
Galium aparine	R	
Galium verum	F	N, C
Geranium disectum	R	
Glechoma hederacea	O	
Heracleum sphondylium	O	
Lamium album	O	
Lathyrus pratensis	O-LF	N
Plantago lanceolata	O	
Potentilla reptans	R	
Primula veris	O	N, C
Ranunculus repens	R	
Rubus fruticosa aggregate	O-LF	
Rumex conglomeratus	R	
Rumex obtusifolius	O	
Tragopogon pratensis	R	
Trisetum flavescens	F	N
Urtica dioica	R	
Valeriana officinalis	R	
Vicia tetraspermum	R	

[1] D=Dominant, A=Abundant, F=Frequent, O=Occasional, R= Rare, (L=Locally)
[2] C = Calcareous grassland indicator, N = Neutral grassland indicator, (S = Strong indicator)
[3] Includes *Bromus.commutatus* (Stace, C. 2019. New Flora of the British Isles, 4th Edition)
[4] Previously *Carex nigra*.

Appendix B Summary of grassland results and current Phase 1 Habitat types

Grassland area	Species and abundance (DAFOR)	Phase 1 Habitat type/UK habs
G1	Wildflower seeded field with *Agrostis capillaris (A), Festuca rubra agg.(A), Centaurea nigra (F), Lotus corniculatus var sativus (F), Leucanthemum vulgare (O), Galium verum (F), Achillea millefolium (F), Phleum pratense (F), Galium album (O)* and *Onobrychis viciifolia (O).*	Semi-improved neutral grassland/modified grassland
G2	Grassland with wildflower seed (see NVC form)	Semi-improved neutral grassland/modified grassland
G3	Ungrazed paddock with *Urtica dioica (F), Jacobaea vulgaris (F), Ranunculus repens (A), Agrostis capillaris (F), Hordeum secalinum (O), Cirsium arvense (F), Trifolium repens (F), Cirsium vulgare (F), Dipsacus fullonum (O), Helminthotheca echioides (O) (*viewed from pavement only)	Poor semi-improved and tall ruderal herbs/modified grassland
G4	Mown lawn including *Lolium perenne, Bellis perennis, Trifolium repens, Poa species, Agrostis capillaris* (no access)	Improved/modified grassland
G5	Field, uncut, dominated by grasses including *Arrhenatherum elatius, Holcus lanatus, Dactylis glomerata* and *Cirsium arvense* (no access)	Poor semi-improved/modified grassland
G6	A field east of Roxton garden centre, species including *Taraxacum officinalis* aggregate *(F), Crepis capillaris (A), Trifolium dubium (O) and Filago germanica (O, Holcus lanatus (F), Jacobaea vulgaris (F), Lolium perenne (O), Agrostis capillaris (F), Hypochaeris radicata (O), Melilotus officinalis (R), Trifolium campestris (O), Erigeron acris (R), Filago germanica (O), Centaurium erythraea (A)* with two strong calcareous indicators; *Blackstonia perfoliata (O), Anacamptis pyramidalis (O-LF)* (206 flowering spikes).	Semi-improved neutral grassland to calcareous grassland/other neutral grassland

Grassland area	Species and abundance (DAFOR)	Phase 1 Habitat type/UK habs
G8	Unmanaged semi-improved grassland with tall ruderal herbs and scrub. Species include *Jacobaea vulgaris (F-LA), Arrhenatherum elatius (F), Epilobium ciliatum (O), Heracleum sphondylium (F), Convolvulus arvensis (F), Cirsium vulgaris (O), Erigeron acer (R), Dactylis glomerata (F), Cirsium eriophorum (O), Prunella vulgaris (R), Rhytidiadelphus squarrosus (O), Conium maculatum (R), Helminthotheca echioides (O), Ranunculus repens (O-LF), Rumex sanguinea (O), Phleum bertolonii (R), Lamium album (O) and Brachypodium sylvatica (O).*	Semi-improved neutral grassland/other neutral grassland.
G10	Species poor semi-improved grassland with *Jacobaea vulgaris (O), Arrhenatherum elatius (F), Cirsium arvensis (F), Dactylis glomerata (F), Helminthotheca echioides (A), Rumex obtusifolius (O).* >10% bare ground.	Poor semi-improved/modified grassland
G13	Semi-improved neutral grassland. Species include *Tripleurospermum inodorum (F), Trifolium pratense (R), Urtica dioica (F), Plantago lanceolata (F) Arrhenatherum elatius (F), Crepis capillaris (LF), Cirsium arvensis (F), Dactylis glomerata (A), Rumex obtusifolius (O), Sonchus oleraceus (O), Veronica chamaedrys (F), Chenopodium rubrum (F)* and *Convolvulus arvensis (O).* Bare ground covers c.2%.	Semi-improved neutral grassland/modified grassland
G14	Improved grassland with *Cynosurus cristatus (O), Schedonorus arundinaceus (F), Bromus racemosus (O), Arrhenatherum elatius (A)* and *Dactylis glomerata (A).*	Improved/modified grassland
G16	Species poor semi-improved around new lake. Species include *Arrhenatherum elatius (D), Dactylis glomerata (A), Rumex obtusifolius (O), Ranunculus repens (O), Schedonorus arundinaceus (O), Phleum pratense (F), Filago germanica (R)* and *Sanguisorba officinalis (R)*.	Poor semi-improved/modified grassland
G17	Species poor semi-improved grassland. Species include *Agrostis capillaris (F), Arrhenatherum elatius (A), Ervum tetraspermum (R), Holcus lanatus (F), Cirsium vulgare (O), Crepis capillaris (R), Dactylis glomerata (F), Rumex obtusifolius (R), Lolium perenne (F), Cirsium arvense (O), Cynosurus cristatus (O), Jacobaea vulgaris (O), Phleum bertolonii (R), Convolvulus arvensis (R),*	Poor semi-improved/modified grassland

Grassland area	Species and abundance (DAFOR)	Phase 1 Habitat type/UK habs
	Festuca rubra (R), Sonchus asper (R), Trifolium repens (O), Quercus robur (R), Plantago major (R) and *Tripleurospermum inodorum (F).*	
G18	Improved mown grassland with *Lolium perenne (D), Trifolium repens (A), Taraxacum officinale* aggregate *(F), Agrostis capillaris (F), Poa annua (R)* and *Cerastium fontanum (R)*.	Improved/modified grassland
G19	Species poor semi-improved grassland, with tall ruderal herbs (25%) and scattered scrub (10%). Species include *Arrhenatherum elatius (D), Dipsacus fullonum (O), Artemisia vulgaris (O), Calamagrostis epigejos (LA), Chamaenerion angustifolium (F) Cirsium arvense (O), Jacobaea vulgaris (F), Rubus fruticosa* aggregate *(F), Convolvulus arvensis (F),* and *Helminthotheca echioides (O).*	Poor semi-improved/modified grassland
G20	Species poor semi-improved grassland, tall ruderal herbs and >30 % bare ground. Species include *Arrhenatherum elatius (A), Rumex obtusifolius (O), Tripleurospermum inodorum (F). Holcus lanatus (F), Cirsium vulgare (O), Dactylis glomerata (F), Rumex obtusifolius (R), Cirsium arvense (O), Jacobaea vulgaris (O), Convolvulus arvensis (O), Festuca rubra (R), Trifolium repens (R) and Helminthotheca echioides (F).*	Poor semi-improved/modified grassland
G21	No access, viewed from adjacent road. Mown species poor semi-improved grassland with a tall ruderal herb margin to the north.	Poor semi-improved/modified grassland
G22	Mown amenity grassland as mapped in Phase 1. Dominated by grasses *Lolium perenne, Agrostis* and *Poa* species.	Improved/modified grassland
G23	Species poor semi-improved grassland, Species include *Holcus lanatus (A), Crepis capillaris (O), Dactylis glomerata (F), Arrhenatherum elatius (F), Glechoma hederacea (O), Lamium album (R), Achillea millefolium (O), Cirsium arvense (O), Potentilla reptans (O)* and *Ballota nigra (R).*	Poor semi-improved/modified grassland

Appendix C Biodiversity Net Gain condition for grassland units as for Defra Metric 2.0

Site (Note 1)	Species per m2 (Note 2)	Flowering plants %	Undesirable species %	Bare %	Damage %	Bracken %	Bramble %	Scrub %
Elsworth PRV	>8	30	2	0	5	0	5	5 (planted trees)
G1	>8	50	1	20	0	0	0	0
G2	>8	50	1	1	0	0	0	0
G3	<8	50	40	5	5	0	0	0
G4	<8	5	5	0	0	0	0	5
G5	<8	5	5	0	0	0	0	0
G6	>8	30	5	10	30 (mown short / erosion from car park)	0	2	2
G8	>8	50	30	2	0	0	0	0
G10	<8	30	15	10	0	0	0	0
G13	>8	40	30	2	0	0	0	0
G14	<8	5	0	0	0	0	0	0
G16	<8	5	0	0	0	0	0	0
G17	>8	10	5	0	0	0	0	0
G18	<8	2	0	0	0	0	0	0
G19	<8	30	20	5	0	0	5	10
G20	<8	20	10	30	0	0	5	0
G21	<8	5	0	0	0	0	0	0
G22	<8	5	0	0	0	0	0	0

Site (Note 1)	Species per m2 (Note 2)	Flowering plants %	Undesirable species %	Bare %	Damage %	Bracken %	Bramble %	Scrub %
G23	<8	20	5	0	0	0	0	0

Note 1 – At least part of the field parcel was within the Order Limits.
Note 2 – Species per m^2 is relevant for condition of modified grassland types only under Defra Metric 3.0

Appendix D Photographs

Photo 1. Elsworth PRV

Photo 2. Elsworth PRV – close-up of species rich area

Photo 3. Grassland at G3 – former grazing field with tall ruderal herbs

Photo 4. Grassland at G6 next to Roxton Garden Centre

Photo 5. Grassland at G2, formerly arable field

Photo 6. Grassland at G2, formerly arable field

Appendix E National Vegetation Classification (NVC) survey results for grassland area G2

Project Name	A428	Date	13/7/21	Recorders	MP CL	Area	G2	Photo ref.	n/a	Sheet no.	x

Broad vegetation type	Swamp	☐	Grassland	X	Substrate	Acid	☐	Condition	Improved	☐							
	Mire	☐	Tall-herb fen	☐		Calcareous	☐		Semi-improved	X							
	Heath	☐	Open habitat	☐		Neutral	X		Unimproved	☐							
	Maritime	☐				Not known	☐		Not relevant	☐							
Hydrology	Wet	☐	Transitional	☐	Age/ origin	Sown/recent origin	X	Aspect	n/a	Slope	n/a	Water Depth	n/a				
	Dry	X				Semi-natural											

Layers Mean Height	0.8	m		m		cm		mm	Habitat Area	200	x	100	m	
Layers Cover	95	%		%		%		%	Quadrat/sample size	4m	x	4m	m	

Quadrat	1		2		3		4		5		Frequency (I-V)
Quadrat Grid Reference	TL15373 54921		TL15381 54931		TL15366 54971		TL15370 54999		TL15372 55031		
Species List	%	Domin	%	Domin	%	Domin	%	Domin	%	Domin	
Lotus corniculatus var sativus		4		6		7		8		6	V
Leucanthemum vulgare		7		5		4		4		3	V
Galium verum		7		6		2		2		4	V
Holcus lanatus		8		7		6		5		7	V
Trifolium hybridum		5		2		5		7		4	V
Dactylis glomerata		3		3		2				3	IV
Cynosurus cristatus		2									I
Achillea millefolium		5		4		2				1	IV
Arrhenatherum elatius		2		3							II
Trifolium campestris		4								2	II
Galium album		1		3							II
Medicago lupulina				2				1		1	III
Daucus carota		2		2		2		2			IV

Project Name	A428	Date	13/7/21	Recorders	MP CL	Area	G2	Photo ref.	n/a	Sheet no.	x

Festuca arundinacea				1		4		4		5	IV						
Heracleum sphondylium				1							I						
Ervum tetraspermum								1			I						
Ervilla hirsuta								1			I						
Taraxacum officinale aggregate								2			I						
Geranium disectum										1	I						
Glechoma hederacea																	
Helminthotheca echioides										1	I						
Bare rock/hardstanding %	0		0		0		0		0								
Bare soil %	0		5		0		0		0								
Leaf litter/ thatch %	0		0		0		0		0								
Permanent open water %	0		0		0		0		0								

Domin scale	1: few individuals, 2: several individuals, 3: many individuals, 4: 4-10%, 5: 11-25%, 6: 26-33%, 7: 34-50%, 8: 51-75%, 9: 76-90%, 10: 91-100%
Quadrat sizes	Short herbaceous 2x2m; tall and more open herb communities 4x4m; species poor, very tall herbaceous 10x10m; linear features such as streams, ditches, verges can use strips e.g. 1m x 4m, 2m x 8m.
Frequency	Number of quadrats which the species occurs in, use Roman numerals I to V, where I=20% of quadrats and V=100%.

Descriptive notes: negative indicators species (weeds), shrub/tree cover, management regime, other impacts, limitations
Wildflower seed mix dominated meadow. Does not fit into an NVC community type. Management unknown, of recent sown origin.

Photo 1. Overview

Photo 2. Close up of flora

Other flora in wider area:	*Silene dioica, Artemisia vulgaris.*