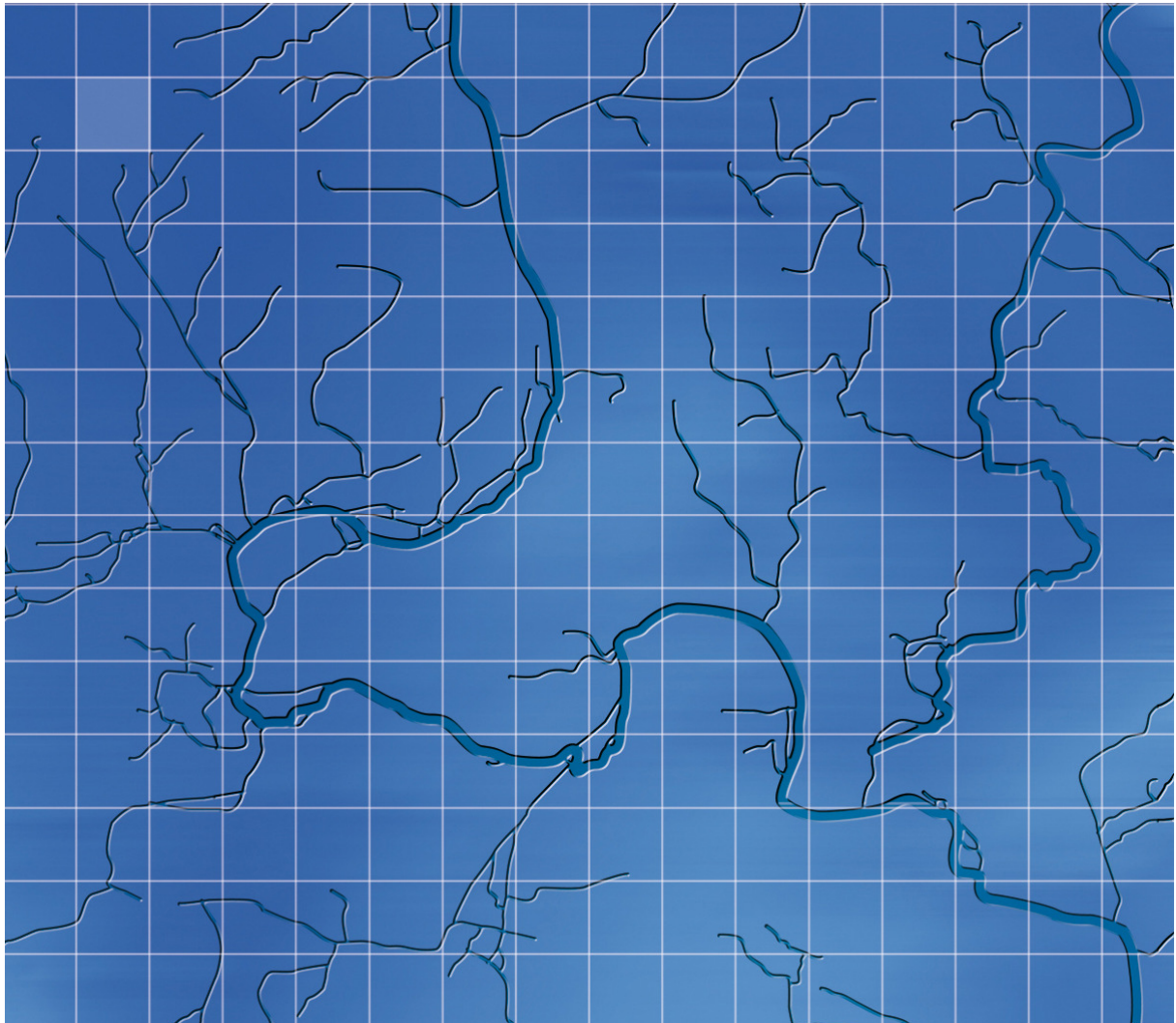


Network Rail - Home Farm barn and access track

February 2015

Potential effects on the hydrological integrity of the Wendlebury Meads and Mansmoor Closes SSSI



Wallingford HydroSolutions Limited

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For and on behalf of Wallingford HydroSolutions Ltd.

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1 Introduction

This report provides an assessment of the impacts of development activities associated with East West Rail Phase 1 project on the Wendlebury Meads and Mansmoor Closes Special Site of Scientific Interest (SSSI). Wallingford Hydrosolutions has been commissioned to assess the impacts the development of Home Farm barn and access track will have on the hydrological integrity of the SSSI as part of the associated planning application. The development activities assessed within this report consist of the construction of a 4m wide unreinforced concrete access track and development of a barn and associated hardstanding located at NGR SP 560179. The total area of development assessed within this report is 2575m², the development areas are identified in Figure 1. This report firstly describes the assessment methodology in Section 2, followed by a description of the designated site in Section 3. An assessment of the impacts on the designation and a description of any proposed mitigation is presented in Section 1. A summary of the findings are then presented in Section 1.

2 Methodology

Evaluation of the existing SSSI baseline environment will be assessed through a desk based study considering the following sources of information:

- Natural England SSSI Citation
- OS Mapping at 1:10,000
- LiDAR 2m Topographic Data

Due to the presence of a designated site this area is considered to have a high sensitivity. The assessment of impacts on the surface water and SSSI baseline environment of the development has been conducted using the following process:

1. Examination of infrastructure design and construction methodologies.
2. Identification of potential impacts.
3. For each potential impact, identification of best practice and mitigation measures to avoid, minimise or remedy any adverse effects and enhancement measures to deliver potential positive benefits.
4. Identification of residual impacts and assessment of effects following the implementation of mitigation measures. The residual magnitude of change will be determined using the criteria presented in Table 1.

Table 1: Magnitude of Change

Magnitude	Changes to the Baseline Environment
Large	Long term loss of resource and/or quality; partial loss of or damage to key characteristics, features or elements.
Moderate	Long term measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements; or Short term loss of resource and/or quality; partial loss of or damage to key characteristics, features or elements.
Small	Long term very minor loss or detrimental alteration to one or more characteristics, features or elements; or Short term measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.

Magnitude	Changes to the Baseline Environment
Negligible	Short term very minor loss or detrimental alteration to one or more characteristics, features or elements.
No Change	No loss or alteration of characteristics, features or elements.

The final level of effect of the residual impacts upon the SSSI is defined as a function of the sensitivity of the receptor (high) and the magnitude of change to the baseline environments as presented in Table 2. Moderate or Major effects are deemed significant. Effects that are of a Minor, Negligible change or result in No Change are judged to be not significant.

Table 2: Significance Criteria

Site Sensitivity	Magnitude of Change				
	Large	Moderate	Small	Negligible	No Change
High	Major	Moderate	Minor	Negligible	None

3 Designation

The Wendlebury Meads and Mansmoor Closes SSSI is located approximately 5km south of Bicester, 1.5km southeast of the village of Wendlebury and 100m south of the M40 motorway (approx. 20m at its closest point) as presented in Figure 1. The SSSI lies either side of the railway line, totals 254.1 ha in size and includes 10 fields.

The SSSI consists of a series of traditionally-managed unimproved neutral meadows supporting a complex variety of plant communities¹. The meadows represent a rare calcareous clay pasture community which have increased in rarity as a result of agricultural improvement and urbanisation. The history of the fields is varied with some being used for arable farming during the early 1900’s and others used primarily for summer grazing and haymaking. The use of pesticides and herbicides has been very limited and ploughing has not been undertaken since 1920.

The ridge and furrow fields (historically ploughed) and hayfields contain different grassland and plant species. The hedgerows also provide further habitat not found within the fields themselves. A full description of the plant communities are presented in the SSSI citation in Appendix 1. One field located on the edge of the tributary of the River Ray, consists of the sedge-rich meadow type which is predominantly a western community. This field is the only known place where the community is found growing in association with several ridge and furrow species.

The SSSI is underlain by impermeable Oxford Clay and much of the area is covered by loamy or clayey soil. There are four recognised soil types within the area and short term flooding from the River Ray is common. The area has a gentle downward sloping gradient to the south east with a total elevation change of approximately 7 m. The two highest points are located in the far west of the site (66 m Above Ordnance Datum (AOD)) and northwest point of the eastern section (65 m AOD) as shown in figure 1.

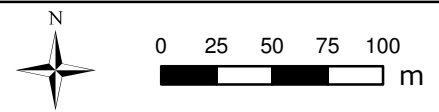
¹ Wendlebury Meads and Mansmoor Closes SSSI Citation. Available at: (<http://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1001141&SiteName=WENDLEBURY MEADS &countyCode=&responsiblePerson=>)

- LEGEND**
- Planning Boundary
 - SSSI
 - Topographic Flow Direction
 - 0.5m Contours

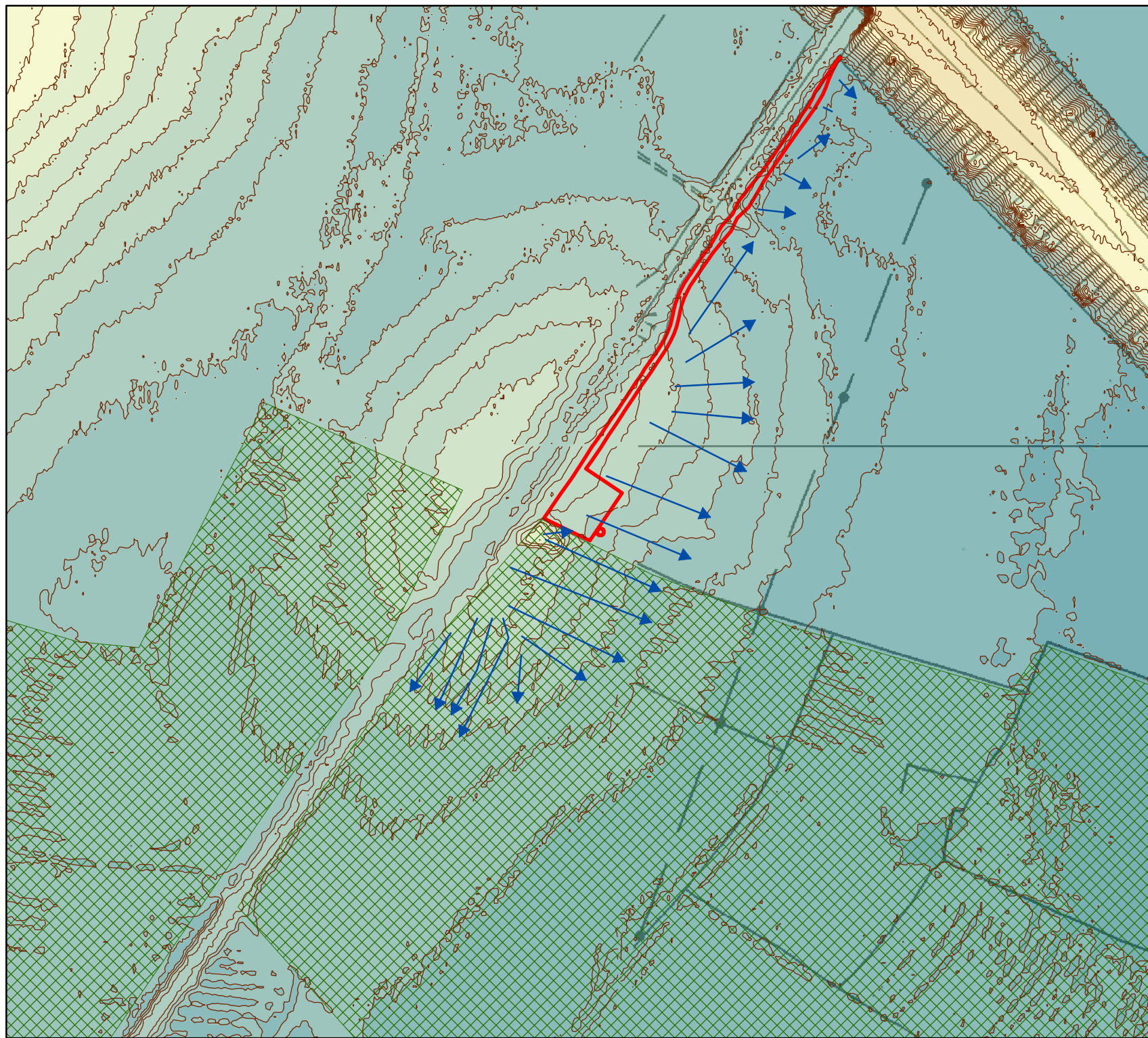
Elevation (m)

58 - 59	67 - 68
59 - 60	68 - 69
60 - 61	69 - 70
61 - 62	70 - 71
62 - 63	71 - 72
63 - 64	72 - 73
64 - 65	73 - 74
65 - 66	74 - 75
66 - 67	75 - 76

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Title: Figure 1



4 Assessment of Impacts

This section assesses the potential impacts on the SSSI which could arise as a result of the development described in Section 1. This is then followed by a description of any mitigation measures which would alleviate or reduce the potential impacts. The resultant residual impacts following the implementation of the mitigation measures are then presented.

4.1 Potential Impacts

The development areas for the Home Farm barn, associated hardstanding and access tracks are located alongside the railway line to the north of the SSSI boundary (Figure 1). Therefore the direct potential impacts of the proposed development on the SSSI are on the water quality, surface drainage and flood risk, as detailed below.

4.1.1 Reduced Water Quality

Any reduced water quality within runoff from the proposed access track and barn during construction or in the long term could impact on the plant species of the SSSI resulting in a detrimental effect.

Necessary ground disturbance would occur during the construction period, where the covering vegetation would be disturbed within construction zones, exposing the underlying soils. Temporarily exposed and stockpiled soil offer a readily mobilised source of sediment. The access track and barn are proposed within an agricultural field, which is shown to be ploughed within aerial photography. The exposure of the soils during construction would be no greater than following ploughing, where the exposed soils would cover a much greater area than the constructions zone.

Due to its location along the ridge of the hill, it is unlikely that surface water flows would enter excavations. Control of groundwater levels however, could be required during excavation works for the barn foundations to ensure the excavation do not fill with water. Any direct or pumped runoff from the excavation works is likely to contain very high sediment concentrations.

There would be the potential during the construction period for pollution from accidental spillage, leakage of stored materials, incorrect use of toxic substances and runoff during storm events which could pollute the areas surrounding the construction zone. In the long term, use of the barn and hardstanding within animal husbandry could also result in increased nutrient levels within the runoff from these areas. Figure 1 presents the detailed topography of the area on a 2m grid and 0.5m contours. This is a very flat and dry area (Standardised Annual Average Rainfall: 608 mm) and therefore surface runoff would be limited and slow. The proposed barn and hardstanding are located towards the peak of a small rise in the local topography. The peak is located to the west of the barn within the SSSI and therefore runoff from the barn would flow away from the SSSI. Due to the slight ridge along the edge of the field to the south of the proposed barn, surface runoff from the barn would flow south east away from the SSSI, as illustrated in Figure 1.

4.1.2 Surface Drainage and Flood Risk

As noted above the topography of the area, means that runoff from the application boundary would not directly flow into the SSSI. The increased semi-permeable hardstanding and impermeable foundations and track have the potential to increase runoff rates from these areas. The development of the access track and the proposed barn structure are both within Flood Zone 1, meaning that it is not at any significant risk of flooding.

4.2 Mitigation

The following measures would be used to mitigate any potential impacts on the water quality and surface water drainage:

- Best practice construction methods would be followed in accordance with the Environment Agency Pollution Prevention Guidance.
- During construction cut-off drains would be utilised along the western boundary, if existing field drains are not present along the field boundaries, to ensure that the runoff from the construction area does not enter the SSSI.
- Equipment would be provided to contain and clean up any spills. If any on-site storage of fuels, lubricants or chemicals is required, these would be contained within an area bunded to 110 %.
- Any refuelling of machinery would be within the bund or have secondary containment. Associated pipework would be located above ground and protected from accidental damage.
- Drip trays would be placed under standing machinery.
- Routine monitoring of any sediment control measures implemented would be undertaken by the contractor on a weekly basis (more frequently following heavy rainfall) to ensure the measures are still functioning correctly.
- If dewatering of excavations is required, pumped discharges would be treated before release to the surrounding land away from the SSSI. Measures would be taken to ensure water flowing away from dewatering / washout areas does not re-enter excavations.
- The movement of construction traffic would be controlled to minimise soil compaction and disturbance.
- Correct design of the track and barn drainage is an important element in minimising erosion and the potential for pollution. Long term drainage from the hardstanding and barn would be directed away from the SSSI.

4.3 Residual Impacts

The potential impacts of this development on the SSSI are primarily related to decreased water quality during both construction and long term use of the barn and track. Only a small section of track and barn borders the SSSI boundary. Where the development area does not border the SSSI boundary the risk of pollution of the SSSI is greatly reduced. Any runoff from the construction of the track is likely to be attenuated by the surrounding fields and will not drain directly to the SSSI. The topography of the area is such that runoff would not drain towards the SSSI and mitigation measures will ensure that runoff is directed away from the SSSI. Best practice pollution prevention measures would be followed throughout construction. The changes in water quality are considered to have a negligible magnitude of change resulting in a **negligible** residual impact.

It is considered that there would be no significant increase in flood risk from increased impermeable areas resulting in no significant impact.

5 Summary

The Wendlebury Meads and Mansmoor Closes SSSI is designated for its series of traditionally-managed unimproved neutral meadows supporting a complex variety of plant communities. The development areas, which consist of an access track and new barn lie to the north of the main SSSI and outside of the drainage pathway to the SSSI.

The main potential impacts to the SSSI as a result of the development is through reduced water quality. This is both through the construction of the access track and barn foundations as well as continued use of the track and barn. Through the incorporation of pollution prevention and drainage mitigation measures the impact of reduced water quality is greatly reduced. The residual impacts of the effects of reduced water quality on the SSSI are considered to be of negligible significance.

Appendix 1 Wendlebury Meads and Mansmoor Closes SSSI Citation

The flora is exceptionally diverse with more than 160 plant species present, many of which are widely distributed throughout the site and are intricately mixed within the fields.

As with all suites of meadows there are individual differences resulting from varying drainage patterns, management (summer grazing or hay) and soils. However, the general grassland type of the ridges is that of common bent *Agrostis capillaris*, red fescue *Festuca rubra*, sweet vernal grass *Anthoxanthum odoratum* and quaking grass *Briza media*, together with yellow rattle *Rhinanthus minor*, pepper-saxifrage *Silaum silaus* and devil's-bit scabious *Succisa pratensis*. The furrows are characterised by marsh foxtail *Alopecurus geniculatus*, tufted hair-grass *Deschampsia cespitosa*, amphibious bistort *Polygonum amphibium*, lesser spearwort *Ranunculus flammula*, creeping Jenny *Lysimachia nummularia*, ragged robin *Lychnis flos-cuculi* and lady's smock *Cardamine pratensis*.

Plants confined largely to the hayfields include sneezewort *Achillea ptarmica*, common spotted orchid *Dactylorhiza fuchsii*, dropwort *Filipendula vulgaris*, adder's tongue *Ophioglossum vulgatum*, green-winged orchid *Orchis morio*, common milkwort *Polygala vulgaris*, cowslip *Primula veris* and saw-wort *Serratula tinctoria*. Plants confined to the grazed field are fewer in number and include species typical of poached ground such as yarrow *Achillea millefolium*, daisy *Bellis perennis* and creeping thistle *Cirsium arvense*, all occurring within a species-rich mixture. Plants particularly associated with the sedge-rich meadow include carnation, glaucous, brown, spring and tawny sedges *Carex panicea*, *C. flacca*, *C. disticha*, *C. caryophylla* and *C. hostiana* respectively, occurring with heath grass *Danthonia decumbens* and locally abundant meadow thistle *Cirsium dissectum*. Other plants recorded which are characteristic of traditionally managed grasslands include frog orchid *Coeloglossum viride*, betony *Stachys officinalis*, dyer's greenweed *Genista tinctoria*, spiny restharrow *Ononis spinosa* and great burnet *Sanguisorba officinalis*. There is a particularly diverse flora of dandelions *Taraxacum* spp. with 11 different species currently recorded.

The hedges provide a habitat for other plants not found within the fields. They are mainly composed of hawthorn, with blackthorn and rose also abundant. The hedges with the greatest variety of species are those bordering the Mansmoor Closes and the one alongside the parish boundary. The latter has a total of 14 species recorded including field maple *Acer campestre* and spindle *Euonymus europaeus*, both of which are often associated with long-established hedges.

The bird fauna of Wendlebury Meads includes breeding snipe and curlew. Other species recorded include golden plover, whitethroat, lesser whitethroat, reed bunting, green woodpecker, grasshopper warbler and barn owl. The meadows support large numbers of common butterflies, including meadow brown, hedge brown, small copper, common blue, green veined white and marbled white.