EWT
Roding Valley Meadows
Management Plan

2021-2026

Authors: Jamie White & Cassie Chanin

Minor changes during the life of this Plan:

-
-
-

New projects during the life of this Plan:

-
-
-

N.B. ANY NEW PROJECTS I.E. THOSE NOT DETAILED IN THIS PLAN, WILL NEED SEPARATE CONSENT FROM EWT AND RELEVANT STATUTORY AGENCIES


Essex
Wildlife Trust


Grange Farm


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List of Abbreviations

A/H	**A**rchaeological and **H**eritage features
BAP	**B**iodiversity **A**ction **P**lan
ERDL	**E**ssex **R**ed **D**ata **L**ist
EWT	**E**ssex **W**ildlife **T**rust
GCN	**G**reat **C**rested **N**ewt
HLS	**H**igher **L**evel **S**tewardship
LNR	**L**ocal **N**ature **R**eserve
MG	**M**esotrophic **G**rasslands
NERC	**N**atural **E**nvironment and **R**ural **C**ommunities
NVC	**N**ational **V**egetation **C**lassification
RVM	**R**oding **V**alley **M**eadows
RVMNR	**R**oding **V**alley **M**eadows **N**ature **R**eserve
SSSI	**S**ite of **S**pecial **S**cientific **I**nterest
VI	**V**isitor **I**nfrastructure
WE	**W**ildlife **E**xperience

1. THE VISION

Essex Wildlife Trust aims to restore the ancient species-rich grasslands within Roding Valley Meadows, whilst maintaining and improving the other valuable habitats found on the reserve. The reserve will also be an integral part of the local community and a wider living landscape.

In 25 years:

- All SSSI units will be in favourable condition.
- A diverse assemblage of plants indicative of MG4 and MG5 grassland will be present across the site's floodplain meadows and upper hay meadows.
- The woodland will contain a mosaic of trees and scrub of varying age, size and species, including a well-established and varied understory.
- All veteran trees present on the site will be in a healthy condition.
- A network of ancient and new hedgerows and treelines will be present.
- A natural river channel will be present, including structurally diverse features and marginal habitats. The river will be subject to reduced pollution incidents and will support a diverse community of flora and fauna.
- The hydrology of the fen will be controlled, resulting in a range of water depths, including permanently wet areas. Vegetation of a variety of species and ages will be present.
- The ponds on site will comprise a mixture of open water habitat and stands of emergent plants.
- An established and flexible grazing and cutting regime will be in place across all meadows.
- An effective monitoring programme with clear milestones and outcomes will be used to inform management decisions.
- Community engagement will promote the aims of EWT, increasing both support for wildlife conservation and community involvement in management of the reserve.
- Effective communication will ensure site users are kept up to date about events and news regarding the reserve.
- EWT will be involved in a wide range of successful partnerships, having an active and effective presence in the local area.
- A network of appropriate and accessible paths and infrastructure complimented by clear interpretation will be in place across the site.
- Heritage features will be protected.

2. RESERVE MANAGEMENT EVALUATION

2.1. Rationale for Management of the Reserve for Wildlife

Roding Valley Meadows Nature Reserve supports a significant area of species-rich grasslands and represents the largest traditionally managed river valley landscape in Essex. The central area of flood meadows, fen, and dry hay meadows contains several rare and declining plant species of unimproved grassland and fen, and has been designated a SSSI. The reserve contains the following UK BAP habitats: Lowland Meadows, Lowland Fens and Hedgerows; and the Essex Biodiversity Action Plan (BAP) habitats: Lowland Grassland, Ancient/Species Rich Hedgerows and Green Lanes.

The reserve has a mixture of priority and designated habitats, as well as additional habitats which contribute to the site's overall value. Management is required to maintain and enhance the conservation value of the site.

For the purposes of this management plan, the various components of the reserve have been divided into six main management features according to habitat types. The reasons why the habitat need management are explained, and the different approaches and methods each will require, are outlined.

Floodplain Meadows

The six lower meadows of the reserve make up the largest existing floodplain meadow system in Essex. The meadows flood sporadically after periods of heavy rainfall when the River Roding bursts its banks, predominantly during the winter months. Except for these periods of flooding, most of the area is dry, although there are several marshy flushes present. Previously a network of ditches fed the flood meadows to the south of the river; however, these were cut off by the construction of the M11. It is, therefore, likely these meadows are drier than pre-M11 construction, resulting in changes to the plant communities present.

Hither/Middle River Mead and Further River Mead can be regarded as Lowland Meadow UK BAP habitat and Lowland Grassland Essex BAP habitat as they are largely unimproved and floristically species-rich. A range of herbs are present across the meadows, although individual compartments differ in condition and National Vegetation Classification (NVC) community.

The flood meadows contain areas of the NVC community MG4, Burnet floodplain meadow, of which there are only approximately 1100 ha remaining in the UK. There is a clear need to conserve this rare habitat type and prevent further loss. Management will aim to improve the floodplain meadows species composition and diversity.

The flood meadows would have traditionally been managed through grazing and cutting for hay; there is unlikely to have been any rigid or formal arrangement to how this was done but rather cattle would have been allowed to graze extensively and areas of higher productivity would have been cut for hay as winter livestock feed. Hay making would have taken place around midsummer when weather conditions would have been reliably warm and dry, and the process would have been done entirely by hand. When scything and processing the hay by hand, smaller areas would have been cut at a time so this would

have made the process take a lot longer in comparison to modern methods with machinery.

Grazing animals affect vegetation as they preferentially eat plants higher in nitrogen, phosphorous and energy. These plants tend to be more vigorous, so grazing promotes species diversity by preventing them from becoming dominant and creating space in the sward for less competitive species. Long-term restoration studies have shown using cattle for aftermath grazing results in greater plant and invertebrate diversity.

Due to the regular input of nutrients, flood plain meadows were often highly prized as an agricultural asset before the introduction of artificial fertilisers. The annual haycut in summer followed by an aftermath graze, prevented the taller coarser species from becoming dominant and encouraged diverse flower-rich swards. Because of the silt deposition from river floods, the nutrients removed in the hay crop are replenished naturally without the need for artificial fertilisers. The naturally high fertility enables the grasses to continue to grow strongly after the hay cut, allowing the 'aftermath' graze from August/September. Floodplain meadows were traditionally cattle-grazed through the autumn with sheep in winter if the soil was not too wet.

Nutrients enter floodplain meadows from numerous sources, such as flood-deposited silts, farm-yard manure, and atmospheric deposition. An annual hay crop balances these inputs by removing nutrients in the form of biomass, i.e. hay. If the amount of available biomass removed as hay is reduced through leaving it beyond its optimal cutting date, then the nutrient status of soil will rise, and the vegetation community will respond accordingly with coarser species outcompeting the smaller herbs.

The best time to cut a hay meadow to achieve the best feed quality for stock, and when it is possible to remove the greatest amount of biomass, is as soon as the grass has started to set seed but before the seed has dropped. Historically this is what farmers would have logically aimed for. If the hay is left to stand past being "ready", then its nutritive value will reduce quite quickly, partly due to seed shedding and partly as a result of mobile nutrients, such as nitrogen being taken back into the base of the plant. Consistent late cutting will, therefore, lead to increased fertility of the soil, which usually results in the loss of species richness over time. Even without the nutrient factor, persistent late cutting can reduce species richness by allowing dominance of some coarser species that bulk up later in the summer (e.g., Meadowsweet, *Filipendula ulmaria*), shading out other species and gaining a strong competitive advantage. This can currently be seen across most of the flood meadows, with meadowsweet being well established; though it is generally a positive indicator species, persistent late cutting (as dictated by the Higher-Level Stewardship (HLS) agreement) has led to it becoming too dominant and, therefore, threatening the floristic diversity of the habitat.

Currently all of the flood meadows are in the HLS agreement and cutting for hay is limited to after 15th July. Some guidance advises meadow managers to leave the hay cut as late as August to allow the plants to set seed. However, the Floodplain Meadows Partnership advises that of the eighty plant species regularly encountered in floodplain meadows, only a handful are annuals or biennials. The vast majority, including all the keystone species are perennial and most of them are very long-lived. Annual seed rain, therefore, has a very minor role in maintaining the plant community. The perennial species do need to set seed occasionally, and this will happen under normal practice whenever there is a wet summer.

There may also be some seed rain from uncut margins, so it is generally unnecessary to deliberately leave the hay itself to stand for this purpose.

Without regular cutting and grazing on these meadows the balance of soil nutrients will not be maintained; an increase in soil fertility favours coarser grasses which will dominate the sward. A lack of cutting and grazing allows scrub encroachment, and also leads to the formation of a 'thatch' of dead material which inhibits the growth of the target wildflowers species.

Flood Meadows Management

A grazing and hay cutting regime should attempt to replicate traditional styles of management, with flexible and varied timings of hay cutting. Specifically, it should ensure that meadows are not cut at the same time every year in order to avoid favouring certain species at the expense of others, and grazing intensity should adapt to how the sward in the meadows is growing. However, experience has shown that suitable weather conditions cannot be relied upon, so a balance must be struck with trying to spread out hay cutting with what is practical to make sure essential management happens.

The main challenge in managing the flood meadows is reducing the current nutrient load which is encouraging the growth of coarse grasses and undesirable species, and, therefore, suppressing the growth of positive indicator species. Currently all of the flood meadows are in the HLS agreement and cutting for hay is limited to after 15th July.

A Derogation/Minor Temporary Adjustment will be applied for 2021 so that some of the flood meadows can be cut in June (weather permitting). Once the agreement expires, in February 2022, there may be more flexibility in the timings of hay cutting across the reserve, depending on entering another agri-environment scheme, e.g., Countryside Stewardship (CSS).

Additionally, the extent of the grazing management needs to be increased as, at present, only two out of the six flood meadows (Further River Mead and Lower Mead) have suitable stock proof fencing. Priority will be given to installing fencing on the remainder of the SSSI units and then the other flood meadows to allow re-establishment of grazing.

Upper Hay Meadows

The upper hay meadows of the reserve represent a large and important area of grassland habitat where the drier ground conditions and soil types result in a finer, shorter grassland sward than the flood meadows. The upper slopes of Lower Mead provide a good benchmark condition for the other upper meadows, as this area still contains several scarce/indicator species including grass vetchling, rough hawkbit, devil's-bit scabious and lady's bedstraw, as well as a good range of finer grasses.

The last NVC survey was undertaken in 2008 (see Table 23). This survey shows that all six of the upper hay meadows contain areas of the target MG5 community, as well as more degraded areas of the MG1 community.
MG5 grasslands are more commonly called unimproved neutral grassland; this definition includes hay meadows. This NVC community is listed as a habitat of principal importance under section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

This grassland type was once the ubiquitous type of old meadow and pasture in the English lowlands. Since the late 1960's it has sustained large losses due to drainage, ploughing and re-seeding and from the use of high rates of fertilisers. There is now less than 6,000 ha remaining in England.

To prevent further losses of this type of habitat and deterioration, management intervention is required. Controlling encroaching scrub, preventing formation of thatch, controlling negative indicator species (e.g., ragwort, thistle), encouraging diversity of sward structure and species diversity are all required actions.

Upper Hay Meadows Management

Essex Wildlife Trust began managing the reserve in 1986; records indicate the upper hay meadows have been cut for hay since at least 1995, and grazed since 1990, on a semi-regular basis. These records do not appear to be complete, so in some years it is not certain what management took place.
Hay cutting is a useful management tool on these meadows, although they do not receive the same nutrient input from flooding due to being higher up in the valley. This means less frequent hay cutting is needed to maintain the balance of soil nutrient levels and extensive grazing can be used to effectively manage these meadows and achieve good sward structure. Hay cutting should be used where needed to periodically remove build-up of thatch and address if grazing is not able to achieve this.
The extent of the grazing management needs to be increased as currently three meadows: Four acre, 22 Acre, and 18 Acre field, cannot be grazed due to lack of livestock fencing. A management priority will be to install suitable fencing in order to reintroduce grazing.
Scrub management of the upper hay meadows is also a key consideration; over the course of this management plan, the aim will be to maintain the current extent of all meadows and, using historic maps and aerial photos as reference, re-establish field boundaries where scrub has encroached. Scrub clearance work will be an important part of installing new fencing and reinstating grazing management.
This is particularly relevant for 18 Acre; the area of this field north of the concrete track had a number of non-native poplars planted in it and has also been subject to scrub encroachment.

Fen

Great Horseley Fen can be regarded as a Lowland Fen UK BAP habitat, supporting a range of marsh flora. Brown sedge, *Carex disticha*, an Essex Red Data List (ERDL) species, forms a large sedge bed (the largest for the species in Essex), which is concentrated on the southern side of the east-west footpath.

Fen vegetation forms in shallow valleys and depressions where drainage is poor and a constant input of water or periodic flooding causes waterlogging. It is a transitional habitat that would over time, develop into wet woodland if there is no intervention. Fens are variable habitats, occurring across: the pH range (acid to highly alkaline), nutrient gradient (highly eutrophic to oligotrophic), and along a wetness gradient from seasonally waterlogged to permanent standing water. A well-managed fen will have a diverse structure with wet hollows, pools of water, grazed/mown patches, interspersed with tussocky areas with deep litter.

The extent of Great Horseley fen is defined by the drains that feed it, as well as the moving groundwater and changes in the water table during the year. Previously it has been noted/believed that the fen is retreating south-eastwards as it dries at the western end.

Management intervention is needed on the fen to control scrub and tree encroachment. Scrub species will outcompete the target fen community and contribute to drying out the soil which will negatively affect the habitat. Michaelmas daisy and creeping thistle are well established in places and require management to prevent them from dominating. Cutting or grazing is needed to promote structural diversity within the fen, and prevent scrub establishment.

Fen Management

Using a mixture of grazing and manual cutting, the aim will be to create a varied vegetation structure with different species, ages and heights to encourage development of the sedgebed. Preference will be given to grazing to manage this habitat, but manual cutting will be required where control of invasive species is necessary and may also be needed where a thatch of vegetation is unpalatable to livestock.

To achieve one of the key aims in the vision, a hydrological survey of the fen will be commissioned during the life of this management plan. Understanding the hydrology of the fen will aid management efforts to achieve the aim of better control of water levels, resulting in a range of water depths, including permanently wet areas.

Woodland and Scrub

Woodland habitat is largely confined to several discrete areas. Lower Brick Clamp comprises secondary woodland and scrub, which has become established since the 1970s. The canopy consists mainly of pedunculate oak, while the scattered understorey includes hawthorn, holly, elder and abundant bramble. Extensive areas of blackthorn scrub dominate the western parts, which open to form a tussocky area of rough grassland and scattered scrub.

The second main area of woodland is the motorway embankment which extends down to the edge of Luscious Mead and incorporates the old parish boundary between Chigwell and Loughton. The bank has mixture of planted species, field maple and non-native Populus spp., as well as mixed conifers with a species-poor scrubby ground layer.

There is a small area of mixed planted and successional woodland in the remnant of 5-acre field. The old field boundary which separates this unit from Eight and Four acre, Further Six acre, and Lower Mead has a good number of mature and veteran trees which have seeded into the woodland.

Hall Field and the Barrage Balloon Rotundas have a mix of scrubby grassland and secondary woodland comprising mainly blackthorn, hawthorn, ash, oak and bramble. These areas are small and offer a good variety of habitat with trees and interspersed open areas of grassland.

The remaining woodland can be found in 18 Acre, of which large parts are now overgrown with scrub and woodland. Non-native poplars have become established in the northern

compartment and are spreading from this area to the meadows to the north. A dense blackthorn and bramble thicket has also become established along the southern margins of the field. A proposal to revert sections to open meadow habitat has been included in the felling licence application.

Woodland and Scrub Management

A felling licence will be applied for; when this is granted it will run for 5 years and will allow for structured woodland management to take place. The current limit of trees that can be felled without a licence is 5 cubic metres per calendar quarter (with some exemptions for safety, trees under 8cm diameter etc).

Woodland management will be mostly standard thinning, with compartments worked on in separate sections over the course of the licence period. This will entail removal of non-native species and, maintenance of woodland rides and glades; management will also aim to maintain the veteran and mature trees which formerly denoted field boundaries. Within woodland/scrub habitat, deadwood will be retained where safe and feasible to do so (e.g., away from pathways) and will also be created through selective ring barking of trees. Unless specified otherwise in individual compartment works descriptions of the felling licence, thinning of compartments will aim for an approximate 30% reduction. Ring barking of trees to create deadwood habitat will count towards thinning percentage targets set out in proposed works.

Of the timber/cut material produced, a minimum of 50% will be retained within the woodland to provide habitat. Retained cut material will be used to make habitat piles and dead hedge the boundaries of woodland compartments, this is to provide habitat and to prevent disturbance, e.g., from people/dogs walking off paths.

Where felling is taking place to benefit other habitats such as: species rich grassland (some of which is SSSI), fen, riparian vegetation, most or all of the cut material will be relocated to remove a source of nutrient enrichment which would negatively affect these habitats.

Trees with bat roost potential will be retained unless not practical, bat surveys will be commissioned if an identified tree with good roost potential needs works and resulting advice adhered to.

Felling works will take place outside of bird nesting season to avoid disturbance, if any tree work is required during nesting season (e.g., for safety reasons), a survey will be commissioned where feasible before works commence and resulting advice adhered to. Scrub will be managed to encourage a range of age classes throughout the reserve, to provide suitable habitat for bird to nest, feed, and roost for those migrating through. Varied scrub age classes will also benefit a range of invertebrate species.

Green Lane/lapsed hedgerow and Recent Hedgerows

Historically the meadows on the reserve had hedgerows and ditches to denote their boundaries; these field boundaries are evident in the earliest Ordnance Survey maps. Over time the majority of these have ‘lapsed’ out of regular hedgerow management, i.e., hedgelaying, and have become established tree lines. Whilst these lapsed hedgerows are

no longer stockproof, they are valuable as habitat and historic features. These tree lines often resemble woodland edge habitat with a scrub margin, young trees and a taller canopy of mature trees. A significant number of veteran trees, predominantly oak, can be found scattered across the reserve, many of which are concentrated in the old/lapsed hedgerows and the green lane. The provision of standing dead wood, hollows, and other features found in these trees will be maintained wherever feasible.

There are several areas with more recently planted hedgerow which have been laid; the longest stretch is along the balloon rotunda tracks. These newer hedgerows are a source nectar, berries, nuts and leaves, providing food for an assortment of invertebrates, mammals and birds, as well as shelter and nesting opportunities for a variety of bird species.

Functional hedgerows should be maintained, and where appropriate species may be planted to increase species diversity. The presence of poor colonising species such as field maple, hazel, dogwood and spindle often indicate older hedges (or ones more recently planted by those with the aim of promoting biodiversity). Examples of this can be seen in several places across the reserve.

Green Lane/lapsed hedgerow and Recent Hedgerows

Veteran and mature trees shall be monitored; there will be considerable overlap with the regular tree safety inspection. Veteran and notable trees (those with particular features of interest) will be recorded and mapped. A minimum intervention route will be taken with regards to managing these kinds of trees, with the aim to maintain them as long as possible. Young trees with potential to reach a similar size and age will be retained (see section on woodland and scrub management) to promote a continuous full age range of trees.

Recent hedges will be re-laid as necessary to prevent them spreading and becoming tall scrub or secondary woodland. with side growth cut back along important access routes e.g., balloon rotunda tracks. Cutting back of hedges on both sides of the hedge in the same year should be avoided. Management will be required to prevent scrub encroachment from hedgerows into the meadows.

River Corridor

The stretch of the River Roding contained within the reserve has retained much of its meandering flow and represents one of the last semi-natural flood plain river segments left in south-east England. The central section of the river contains many natural channel features, including varying bank and channel profiles, meanders, shallow stony riffles, deep pools, and erosion and accretion zones. The river corridor supports a range of wildlife associated with these diverse habitat types, such as invertebrates and small fish species. The northern and southern sections of river running through the reserve have been straightened and re-profiled. These areas provide limited wildlife value, although the channel formations of pool and riffle zones, and the low-level sand and mud bars that are exposed during the drier summer months maintain a variety of aquatic and emergent flora and fauna.

The wildlife value of the river corridor is enhanced by bankside vegetation, comprising trees, brambles, nettles and willowherbs. Large crack willows, including pollards, provide habitat for birds and fallen limbs can be used as holts by otters.

The River Roding is acknowledged as being one of the fastest eroding lowland rivers in the east of England, and this is evident by the significant undercutting of the banks and development of curved meanders. Vertical banks provide habitat for burrowing invertebrates and nesting kingfisher, whilst slumping banks and silt deposits support a variety of marginal and aquatic plants. Aquatic and semi-aquatic plants include Yellow Loosestrife, Water Plantain and Arrowhead.

Outside the reserve along the western banks, the land largely comprises regularly mown recreation ground.

The Environment Agency is responsible for maintenance of the river channel, and so they should be consulted on all proposed works to the channel. In addition, the Roding Water Level Management Plan, Roding Valley Meadows Diffuse Water Pollution Plan and the Roding, Beam and Ingrebourne Catchment Plan provide further guidance on management of the River Roding.

Ponds

Ponds provide valuable freshwater habitat for a range of plants, invertebrates and other wildlife. Two thirds of all Britain's freshwater plants and animals can be found in permanent and temporary ponds, far more than in rivers and lakes. Not only are they a valuable resource for wildlife, but they also provide an important part of our history and culture, a visual focus in many landscapes, and an amenity for many communities (Freshwater Habitats Trust 2015).

Four ponds are found within the reserve: Andrew's Pond, Great Horseley Pond (also known at Pat's Pond), Hall Field Pond (also referred to as car park pond), and an additional pond north of 'football pitch meadow' called Peter's Pond. A temporary pond was previously noted in Further Six Acre but was apparently filled in; it's unclear whether this was deliberate or a natural process. However, this pond has records of Great Crested Newts in 2004 and so a project will look at the possibility of restoring this pond during the life of this management plan.

Andrew's Pond is fed via run-off from the M11 motorway, where nutrients and pollution entering the pond have previously been identified as a problem. A reedbed and gravel filtration system was installed in 2010 at the entrance to the pond, however, no monitoring data either before or after installation is available to measure the success of this. Several sandbags have become dislodged and have moved into the ditch which need addressing. Shading of the pond has also been an issue in the past; to promote a healthy pond habitat, at least 50%, but ideally 90%, of the total pond edge should be kept open to sunlight. Anecdotal records indicate the pond was used to test equipment during the Second World War and is believed to contain debris of machinery. The pond was dredged in 1999, and also dredged in late 2010; levels of siltation should be monitored, and dredging undertaken when necessary.

A new pond (Peter's pond) was created in 2014 in an attempt to help manage water levels within Great Horseley mead and the fen by storing run off water from Lower Brick Clamp

and directing into the eastern ditch. The shallow sloping banks of Great Horseley Pond have supported a large amount of Reed Sweet-grass and other marginal/emergent vegetation including Reedmace, Yellow Iris and Purple Loosestrife in the past. At present, it appears that no follow up management has taken place on this pond or the surrounding area as the pond is surrounded by dense scrub which may be reducing the light levels and suppressing the growth of desirable species. In the original proposal there was mention of creating a reedbed in addition to the pond to help filter run off water of potential pollutants before it was directed to the SSSI.

Pond management

Ideally, ponds should broadly meet the following criteria to best benefit biodiversity:

- Optimal plant cover during summer should be between 60-85% of water volume
- Less than 5% algal cover
- Less than 50% of the total pond edge overshadowed – ideally 90% of the edges should be open and sunny
- Leave 25% of the pond dense with plants
- A range of depths, but less than 30cm deep is where most wildlife is found, and an area at least 1m deep to prevent freezing and provide refuge for species in winter. A shallow pond with an average depth of less than 1m may lose 0.5m depth in a dry summer, which can benefit 'beach margin species', but increase the concentration of remaining nutrients.

The best management options should take into consideration an individual pond's characteristics and the surrounding habitat. For example, veteran trees should not be removed from a pond edge to reduce overshading; instead, pruning just a few lower limbs which cast the most shade and regularly removing leaf litter may be required.
Coppicing pond margins in later winter could be done on a rotation of several years on a large pond to ensure there is always some shrub growth, but a small pond may require flailing every other year to keep the pond open and reduce leaf litter.
Regular, gentle thinning out of excess aquatic vegetation every autumn on ponds affected by excess nutrients may aid reducing nitrate and phosphate build up. Roding Valley Meadows has recorded high levels of phosphate and nitrate on the SSSI in areas near to the river and on areas likely to be flooded (Cranfield University 2017). As the ponds are fed by run-off water from the M11 and the fen, it is likely that the ponds will also have a high nutrient load, which will contribute to excess aquatic vegetation. In addition to this, occasional removal of invasive, dominant plants on an opportunistic or little-and-often basis in the winter is a good idea and removes the need for a more drastic restoration job later.
The silt at the bottom of a pond is sometimes a lingering store of accumulated pollution or naturally occurring substances, which lowers the water quality. Dredging a pond to de-silt it every ten years or when required is usually the only practical solution. Completing this in one phase and at certain times of the year is best to minimise damage to wildlife. If Great Crested Newts (GCNs) may be present, the pond should only be dredged between November and February when most have left the pond and a survey by a licence holder will be required prior to any work.

The pond should be checked and photographed every few months to record changes and monitor how successful the management has been and inform further management decisions.

2.2. Rationale for People Engagement

Lying close to densely populated residential areas, the reserve is an important breathing space highly valued by local residents. The reserve is visited by a wide range of user groups including walkers, dog walkers, families, school groups, horse riders, joggers and naturalists. These varied site users present a range of engagement opportunities but must also be managed in a way that is compatible with the sensitive habitats found on the reserve.

For the purposes of this management plan, the various aspects of people engagement have been split into the following categories.

Community Engagement

The proximity to large urban areas means there is a large audience close to the reserve which can be targeted. The majority of events are delivered by the Education and Community Officer, and other staff in the EWT Education team. Events currently run on the reserve are mainly focussed on children and families, and include Nature Tots groups, Forest School sessions and holiday events. The Grange Farm Centre has toilet facilities and two halls which can be used to provide indoor sessions where appropriate. Due to the distance from the centre to the reserve, most children's events are run in the nearby Chigwell Meadows (managed by Grange Farm staff with EWT input) rather than the main reserve.

As well as these children's events, a programme of other events are also delivered, including guided walks and mammal trapping.

Being such an urban site, developing and maintaining a good relationship with the local community is vitally important. Social media is used to keep people updated on events/sightings/work on the reserve, and a Consultative Group is held twice a year with representatives from various user groups and councils. Partnership working is also extremely important, and many opportunities exist in the local area.

Education

As with community engagement, the reserve's location means there are a large number of schools close to the reserve which can be targeted. Up to now, education on the reserve has focussed mainly on delivering primary school visits. For the same reasons as events, most education sessions are delivered in Chigwell Meadows. The meadows have an excellent pond with a dipping platform, as well as a variety of other habitats which can be used for a wide range of educational topics.

As well as visits to the reserve, outreach sessions have also been made to local schools.

Access and Infrastructure

A network of footpaths and other reserve infrastructure is found across the reserve, including benches, bridges and steps. Previously, several paths were mown across the meadows, however, in recent years this has ceased due to potential damage to the flora of the meadows. Most of the remaining paths are directed around the edges of fields to limit

damage due to trampling and to allow visitors to be separated from cattle when on site. There is potential to develop a waymarked route around the reserve to direct new visitors to the site. There is a threat to the meadows from trampling damaging the flora, having too many desire line footpaths across fields is detrimental to the condition of the habitat. A project to upgrade some paths with surfacing and use of waymarking should help direct visitors and minimise this.

In the life of this management a major update to maps and noticeboards will be carried out with the design done by EWT in house marketing team. A project to update and expand the interpretation on the reserve will also take place.

Volunteering

There are currently several volunteering opportunities on the reserve, with role descriptions produced for each of these. Two weekly practical work parties are currently run on the reserve on Tuesdays and Wednesdays. There is the possibility of increasing the number of work party days, this will be trialled to see if this is beneficial. Volunteers have also been involved in checking cattle and assisting with events and educational visits. In addition, a group from Voluntary Action Epping Forest (VAEF) attend once a week, corporate groups are hosted, and a Volunteer Ranger role has been developed.

2.3. Identification of Features Influencing Management

The following tables list all the important features of the main habitats present on the reserve and identify which of these are the **Features Influencing Management**. These include:

✓✓ = Features for which we have legal responsibilities (e.g. SSSI interest features) and which will influence the management we undertake at the site.

✓= Features for which we have legal responsibilities (e.g., SSSI interest features) but which will not influence the management we undertake at the site.

** = Features which are the prime reason for EWT maintaining the reserve and which will drive its management.

* = other important conservation features whose requirements we need to take into account when deciding management of the site.

WE = Wildlife Experience (features of particular importance to visitors)

VI = Visitor Infrastructure

A/H = Archaeological and Heritage features

Table 1. Features influencing management of each habitat.

Flood Meadows			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
Plant assemblage	✓✓ ** WE	SSSI feature, HLS targets	Mix of MG4 and degraded areas
Wet flush in Hither and Middle River Mead	✓✓ **	SSSI feature, HLS targets	Southern March orchids, ragged robin, and other plant species of interest recorded.
Hedgerows	✓✓ ** WE	SSSI feature	Mature and veteran trees present, historic feature of landscape, good habitat potential for bats and invertebrates

Upper Hay Meadows			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
Plant assemblage	✓✓ ** WE	SSSI feature, HLS targets	Gradual improvement since the trust began management. Lower Mead is the best example of species rich meadow. Other meadows should be managed to emulate, with aim for MG5 or similar plant communities.
Hedgerows	✓✓ ** WE	SSSI feature	Mature and veteran trees present, historic feature of landscape, good habitat potential for bats and invertebrates
Fen			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
Plant assemblage	✓✓ **	SSSI feature, HLS targets	Brown sedgebed one of the largest in Essex
Snipe	✓✓ *	HLS targets	Snipe has been sighted on occasion, most recently in Great Horseley Meadow on 07/01/21.
Reed bunting	✓✓ *	HLS targets	
Woodland and Scrub			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
Mosaic of scrub and woodland habitats	** WE	Presence of this habitat is used by birds for nesting and feeding. Various invertebrates will use this habitat.	A felling licence has been applied for, if granted commencing in 2021 and running for 5 years. Details of woodland management will be included in this.
Veteran trees	** WE	Provides valuable specialist habitats for many species that rely on veteran tree features e.g., bats, invertebrates, birds.	Veteran trees are being recorded and mapped in ArcGIS app with data accessible to reserve staff, so management will be easier to monitor.
Deadwood	**	Provides valuable specialist habitats for many species that rely on standing deadwood e.g., fungi, invertebrates.	Deadwood habitat piles have been left in areas where tree safety works have been completed.

River Corridor			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
River corridor	** WE	Important habitat for various species e.g., kingfisher, otter, little egret, dragonfly spp, damselfly spp. etc	Kingfisher has been spotted several times by the river.
Bankside vegetation	**	Important habitat for various species e.g., kingfisher, otter, water vole, little egret, dragonfly spp, damselfly spp. etc	
Healthy riverine ecosystem	*	Important habitat for various species e.g., kingfisher, otter, little egret, dragonfly spp, damselfly spp. etc	Will require partnership work with Environment Agency, Natural England etc. to reduce pollution.
Ponds			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
Mosaic of open water, emergent and marginal vegetation	* WE	Important habitat for Great Crested Newts as well as other species of amphibian, invertebrates and birds.	Great Crested Newt found in some ponds on site in 2004 survey.
Healthy pond ecosystem	*	Important habitat for Great Crested Newts as well as other species of amphibian, invertebrates and birds.	Great Crested Newt found in some ponds on site in 2004 survey.
Rough Grass			
Important Feature	**Influencing Management?**	**Why? (status, designation)**	**Comments (population size, trend, other info)**
Mosaic of open ground, short and tall sward heights	*	Supports different plant assemblage to the meadow grasslands, useful as a refuge area. Habitat used by: amphibians, reptiles, small mammals, invertebrates, and birds.	Harvest mice nests have been found in Hall Field area. They utilise tall grass, reeds, bramble and similar vegetation. Barn Owl recorded on reserve, may use this habitat for feeding.

2.4. Condition of the Features Influencing Management and the Main Factors affecting them

The following tables identify the target condition of the Features Influencing Management and the Main Factors influencing whether these target conditions are attained.

Table 2. Conditions of features influencing management of each habitat and the main factors affecting them.

Flood Meadows				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Plant assemblage	Frequency of positive indicator species Frequency of negative indicator species Diversity of positive indicator species Herb/grass ratio Scrub extent Vegetation height Bare ground	SSSI condition unfavourable for units 2, 4, 5	Meet HLS targets Favourable SSSI condition	Grazing regime Mowing regime Scrub removal Removal of negative indicator species Nutrient enrichment from flood events Vehicle use Use by public (walkers, horse riders)
	Extent of meadow habitat		Extent maintained	
Wet flush	Plant assemblage	Southern marsh orchid population variable, last recorded in 2018 – 6 spikes	Presence of Southern marsh orchid, carnation sedge and marsh marigold	Grazing regime Mowing regime Scrub removal Hydrology
	Extent		Extent maintained	
Hedgerow	Extent	Approx 1100m (across whole site)	No loss of extent	Annual hedgerow management

	Diversity of ages	Diverse ages present	Structurally diverse hedges of different ages present across the reserve	
Upper Hay Meadows				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Plant assemblage	Frequency of positive indicator species Frequency of negative indicator species Diversity of positive indicator species Herb/grass ratio Scrub extent Vegetation height Bare ground	See Table 23 and Figures 34-37.	Meet HLS targets	Grazing regime Mowing regime Scrub management Negative indicator species management Vehicle use Use by public (walkers, horse riders)
	Extent of meadow habitat	See Figure 18.	Extent maintained	
Hedgerows	Extent	Approx 1100m (across whole site)	Extent maintained	Annual hedgerow management Veteran tree management
	Diversity of ages	Diverse ages present	Structurally diverse hedges of different ages present across the reserve	
Fen				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Plant assemblage	Frequency and diversity of positive indicator species (wild angelica, cuckooflower, marsh bedstraw, ragged robin, gypsywort, water mint)	No data available	At least two species at least occasional	Hydrology Cutting regime Scrub management

	Extent of brown sedge	No data available	Survey and establish current extent Extent at least maintained	Surface wetness
Snipe	Presence	Regular sightings over winter	Recorded at least occasionally	Availability of dense cover and feeding areas
Reed bunting	Presence	Breeding confirmed and regularly seen over winter	Recorded at least occasionally	Availability of food and nest sites
Woodland and Scrub				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Mosaic of scrub and woodland habitats	Diversity of species	Variety of broadleaved species present	Species variety maintained Non-native species targeted for removal	Thinning of trees Planting of understory species
	Density	Understory present in places, mostly bramble and scrub, little or no understory present in others	Varied canopy and understory present including plants of various ages and sizes Some areas of dense scrub maintained for breeding birds	Scrub removal and thinning
Veteran trees	Health	Veteran trees in a variety of states of decay	Variety of states of decay maintained	Tree management work
Deadwood	Extent	Standing deadwood and habitat piles of cut deadwood present	All deadwood continues to be retained	Tree management work
River Corridor				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
River channel	Diverse range of natural channel features, including meanders, shallow stony riffles, deep pools, and	Range of features present	Maintain	Channel management

	erosion and accretion zones			
Bankside vegetation	Varied structure	Varied structure present	Maintain	Grazing regime Mowing regime Tree works Management of negative indicator species
	Willow pollards	Shading from trees becoming problematic in some areas	Pollards in positive management	
	Presence of invasive/negative indicator species	Patches of Himalayan balsam along river	No Himalayan balsam present	
Healthy riverine eco-system	Range of indicator species present in the river and in adjacent habitat	Frequent pollution entering river water course	Through reporting and partnership working reduce occurrence of pollution	Water quality
Ponds				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Mosaic of open water, emergent and marginal vegetation	Extent	Mosaic of features present Overshading	Plant cover 60-85% of water volume, maintain mosaic of features Less than 5% algal cover 90% pond edges open and sunny	Water level Shading Vegetation management Silt deposits Pollution
Healthy pond ecosystem	Presence of invasive/negative indicator species	Dominance of bulrush, need to check for invasive species	No invasive species or dominance by one species No fish, or disturbance by dogs	Water quality (excess nutrients, turbidity)

2.5. Identification of Features Influencing People Engagement

The following tables list all the important **Features Influencing People Engagement**. These include:

✓✓ = Features for which we have legal responsibilities and which will influence the people engagement we undertake.

✓= Features for which we have legal responsibilities but which will not influence the people engagement we undertake.

** = Features which are the prime reason for EWT maintaining the reserve and which will drive people engagement activities.

* = other important features whose requirements we need to take into account when deciding on people engagement activities.

WE = Wildlife Experience (features of particular importance to visitors)

VI = Visitor Infrastructure

A/H = Archaeological and Heritage features

Table 3. Features influencing people engagement.

Community Engagement			
Important Feature	**Influencing People Engagement?**	**Why? (status, designation)**	**Comments**
Events programme	✓✓	Part of Grange Farm agreement Part of EWT strategic plan	EWT Education & Community Officer runs a regular programme of events. An online events programme has been running through 2021 organised by EWT central team.
Community involvement	✓✓ **	Part of Management Agreement Part of EWT strategic plan	The reserve has a group of regular volunteers who attend work parties on the reserve. Representatives of local groups are invited to attend Consultation Group meetings held twice annually.
Partnership working	✓✓ **	Part of Management Agreement Part of EWT strategic plan	EWT regularly work with Grange Farm staff
Media	*	Part of EWT strategic plan	

Education			
Important Feature	**Influencing People Engagement?**	**Why? (status, designation)**	**Comments**
Primary school visits	✓✓	Part of Grange Farm agreement	EWT Education & Community Officer and EWT Education team host school visits
Outreach visits	*	Part of EWT strategic plan	EWT Education & Community Officer and EWT Education team coordinate visits
Access and Interpretation			
Important Feature	**Influencing People Engagement?**	**Why? (status, designation)**	**Comments**
Network of paths and visitor infrastructure	✓✓ ** VI	H&S requirements and improve accessibility.	Regular inspections are done of visitor infrastructure Within the life of this management plan there is a project to resurface some paths.
On-site interpretation	* VI	To inform visitors and make them feel welcome.	EWT has an ongoing interpretation project and will be updating all reserve signage over the course of 2021.
Green Flag status	*	Grange Farm request EWT apply for the award to advertise the site's standards to visitors.	Green Flag award applied for annually.
Volunteering			
Important Feature	**Influencing People Engagement?**	**Why? (status, designation)**	**Comments**
Volunteering opportunities	*	Without volunteers a substantial proportion of reserve management work would not be completed.	It is important to maintain volunteer work party numbers and look for opportunities to recruit new people.

2.6. Condition of the Features Influencing People Engagement and the Main Factors affecting them

The following tables identify the target condition of the Features Influencing People Engagement and the Main Factors influencing whether these target conditions are attained.

Table 4. Condition of the features influencing people engagement and the main factors affecting them.

Community Engagement				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Events programme	Number of events			Effective promotion Variety of events offered
	Attendance			
Community involvement	Consultative Group	2 meetings a year	2 meetings a year	
Partnership working	Work with managing partners	3 meetings a year and ad hoc communication	3 meetings a year and ad hoc communication	
Media	Reach			
	Number of followers/page likes			
Education				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Primary school visits	Number of school visits			Effective promotion Variety of programmes offered
Outreach visits				
Access and Interpretation				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Network of paths and visitor infrastructure	Condition	See Figure 7.	See section 3.3	Paths and visitor infrastructure must be well-maintained and accessible.

On-site interpretation	Permanent interpretation	Noticeboards are out-of-date/missing.	Install new noticeboards and update signage.	Signs must be clear, accurate and contain useful, up-to-date information.
	Temporary interpretation	Signs are not up currently.	Put up signs when cattle are on-site.	
Green Flag status	Attainment	Not attained	Maintain attainment	Ensure site is welcoming, safe, well maintained with good environmental management, community involvement and communication.
Volunteering				
Feature	**Attribute(s)**	**Current**	**Target(s) for attribute**	**Main factor(s)**
Volunteers	Number of volunteers	13		Range of opportunities offered
	Number of roles	1		

2.7. Condition of Visitor Infrastructure and Maintenance Implications

Site checks of infrastructure are carried twice yearly and recorded using a form with the following headings:

Table 5. Template for condition of visitor infrastructure and maintenance form.

ID number	Description	Condition (1-5)	Actions	Date for completion

For condition ratings, the following scale is used:

1 – No damage
2 – Minor damage
3 – Moderate damage
4 – Not fit for purpose
5 – Unsafe

Photographs of all infrastructure and interpretation boards are taken as part of the biannual H&S survey carried out for the reserve. Detailed descriptions, locations, and photographs of all infrastructure and interpretation are held in the reserve site checks folder on the R:drive.

Any infrastructure with a score of five is taped off from the public immediately and remedial works actioned within one week. A score of three or four will result in actions to improve condition factored into the work plan for the following year, if funding allows.

3. MANAGEMENT OBJECTIVES

3.1. Conservation Objectives and Outputs

3.1.1. Conservation objectives and outputs for reserve habitats

Table 6. Conservation objectives and outputs for reserve habitats.

Flood Meadows and Upper Hay Meadows				
Objective	**Output**	**Target**	**Timing**	**Schedule**
Manage and enhance the traditional flood and hay meadows, primarily for the benefit of wildflower species.	Grazing	Extent of grazing managed to benefit wildflowers. Spring graze when necessary to remove early growth, and aftermath graze to break up thatch and meet HLS height targets. HLS requirement: cattle excluded from parcel 0467 (Luscious Mead) for a six-week period from 1st May to 31st July. Grazing and ground conditions monitored to avoid poaching.	April – November	All years
	Early cut	Where coarse grasses are becoming dominant, look at utilising an earlier cut to remove more nutrients and reduce dominance. In May 2019: early sileage cut take under derogation/MTA from Natural England on Further River Mead and Hither/Middle River Mead. In 2021: derogation/MTA approved for early haycut (1st June to 15th July) in Great Horseley, Middle/Hither River Mead and Luscious Mead.	April/May	2021 initially

		Results monitored, and if successful, consider periodic early cuts of flood meadows going forward as required.		
	Hay cut	Hay cut each year and arisings removed, rotating order of fields cut. At least 10% left uncut as margins and refuge areas, rotated to prevent scrub encroachment from hedgerows.	After July 15th while under HLS agreement. Revisit after the end of HLS in 2022, variation in timing of haycuts, including earlier cutting, will benefit a wider range of species.	All years
	Scrub management	Scrub cut from field edges to prevent encroachment into meadows from hedgerows, with material stacked into habitat piles or dead hedges. Scrub removed if nutrient input likely to affect sensitive habitats.	Autumn/winter	All years
	Negative indicator species management	Saplings and negative indicator species (ragwort/dock/thistle) controlled by cutting or pulling and removed.	Summer (pre-haycut)	All years
	Hedgerow management	Up to 100m hedge laid annually (management within ELS guidelines). HLS: EB3 Enhanced hedgerow management. Quantity: 3,724m Actual measurement is 1,100m (original survey included treelines which doesn't 'count). Laid hedges cut back on rotation (no more than 1/3 each year).	October - March	All years

		New hedges planted if appropriate.		
	Access management	No footpaths cut through meadows. Limit vehicle use to field edges and fill in any ruts as necessary. Monitor wet areas; consider installing boardwalks if use by walkers causes damage. Close off paths if necessary/attempt to redirect desire lines.	All year	All years
Fen				
Objective	**Output**	**Target**	**Timing**	**Schedule**
Manage and enhance fen habitat, maintaining brown sedge extent, and providing a varied structure for the benefit of fen species including snipe and reed bunting.	Grazing	Grazing to promote a mosaic of ages and structures present, including areas of dense vegetation and open areas.	August and November	All years
	Rotational cutting	As a replacement for grazing only. 25% cut annually and arisings removed. Ensure a mosaic of ages and structure is present, including areas of dense vegetation and open areas.	August - October	When grazing not achieved.
	Scrub management	Scrub, particularly willows, cut from within extent of fen area.	Autumn/Winter	All years
	Invasive species management	Monitor and control invasive species e.g., Michaelmas daisy, thistle.	May to October	All years
	Management of hydrology	Report commissioned and, if possible, measures taken to gain control of fen water levels.	Ongoing	Within management plan period
Woodland and Scrub				
Objective	**Output**	**Target**	**Timing**	**Schedule**
Manage secondary woodland to maintain a	Tree management work	Areas of woodland thinned as necessary – monitor need annually.	Autumn/winter	All years

varied structure, including a mosaic of scrub and woodland habitats.		New pollards created where appropriate. Deadwood and brash piles created from any timber resulting from tree work. Where possible standing deadwood retained.		
	Veteran tree management	Veteran trees surveyed annually across the reserve, build a record and complete recommended management work.	Autumn/winter	All years
	Scrub management	Retain mosaic of dense and more open scrub patches for breeding birds by removing and thinning some dense areas of scrub annually. Remove encroaching scrub from woodland/meadow boundary.	Autumn/winter	All years
	Planting	Plant understory species where appropriate e.g., rowan, hazel, spindle, guelder rose.	Autumn	As required
	Tree H&S work	H&S surveys carried out and resulting works completed in accordance with Tree Safety Policy.	Summer/autumn	All years
River Corridor				
Objective	**Output**	**Target**	**Timing**	**Schedule**
Manage habitats associated with the river corridor to promote a healthy river system.	Channel management	As far as possible, river channel allowed to develop naturally, unless health and safety issues arise.	All year	All years
	Grazing	Poaching of riverbanks/margins monitored where cattle have access to the river and riverbanks. Cattle moved/excluded from problem areas if required.	April – November	All years
	Mowing	Areas of bankside vegetation should be left to provide cover for wildlife. Where grazing is not enough to control nettles/thistle/hemlock, areas should be cut back to provide variation of vegetation structure and to prevent	Summer/Autumn	All years

		encroachment of scrub and negative indicator species into the meadows.		
	Invasive/negative indicator species management	Himalayan balsam pulled or cut where possible, before setting seed.	Summer	All years
	Tree management work	Willow pollards managed and re-pollarded where required. Some individual trees left to collapse to provide potential holts for otters and standing and fallen dead wood retained for invertebrates. Where shading becomes detrimental to areas of marginal and bankside vegetation pollards and trees removed completely.	Winter	All years
	Pollution management	All suspected pollution events reported to Environment Agency for further investigation and remediation works where necessary. Work with partner organisations, landowners and statutory bodies to deliver Roding Valley Meadows Diffuse Water Pollution Plan.	All year	All years
Ponds				
Objective	**Output**	**Target**	**Timing**	**Schedule**
Manage the four ponds on the reserve to provide a mosaic of habitats, and favourable conditions for pond species.	Vegetation management	Optimal vegetation cover during summer is between 60-85% water volume and less than 5% algal cover. Rake out submerged plants, leave on pond edge overnight, then move away from pond or species rich vegetation (to prevent nutrient release as it rots). Leave 25% of pond dense with plants. Retain a fringe of marginal and emergent vegetation around at least half a pond's edge. Refugia around pond edge for amphibian hibernation, dispersal and foraging.	Winter	All years

	Tree management work	Manage surrounding trees through coppicing to ensure less than 20% of pond is overshadowed on southern side, less than 50% total pond edge overshadowed.	Winter	All years
	Water level management	Allow water levels to fluctuate naturally, rising in winter and falling in summer. Maintain inflow and outflow structures. Keep pond depth to approximately 30cm but keep an area at a depth of 1m to provide refuge for newts etc if pond freezes and can minimise algal growth in hot, droughty years.	All year	All years
	Dredging	Monitor silt deposits and bring in contractors to dredge when necessary, across a maximum of 1/2 of each pond in any one year. Avoid smothering nearby vegetation.	Winter	As required
	Pollution management	Maintain reed/gravel filtration system at Andrew's pond in good condition. All suspected pollution events in water courses reported to Environment Agency for further investigation and remediation works where necessary.	All year	All years

3.1.2. Monitoring

Table 7. Conservation objectives and outputs for monitoring

Objective	Output	Target	Timing	Schedule
A comprehensive monitoring regime undertaken to assess the state of management features and the effectiveness of management operations. The results will be used as	Fixed point photography	Fixed point photography used to assist in monitoring changes, including expansion and contraction, in habitats. Mapped points will form the scope of monitoring, to monitor change both throughout the year and on a long-term basis.	March, July and November (Figure 1).	All years

the basis to inform future management decisions. Records will be submitted to the Biological Records Centre and, where possible, submitted to national recording schemes.	National Vegetation Classification (NVC)	A full NVC survey conducted within the period of each management plan, providing detailed data on changes in the vegetation communities present on site.	May – August (Figure 1).	Once within plan period
	Rapid Grassland Assessments	All meadows surveyed using EWT Rapid Grassland Assessment methodology, using HLS targets as desired conditions	June to July (Figure 1).	Whole site surveyed over three-year period
	Butterflies	Butterflies monitored in line with the UK Butterfly Monitoring Scheme methodology (UKBMS). A fixed transect comprising all habitats found on the reserve provides information on the extent, frequency and abundance of species. Results submitted to UKBMS website.	April to September (Figure 1).	All years
	Bees	Bumblebees monitored using the Bumblebee Conservation Trust BeeWalk methodology, using the same transect as used for butterfly surveys. Results submitted to Bumblebee Conservation Trust.	April to September (Figure 1).	All years
	Dragonflies and damselflies	Ad hoc records will be made and submitted to the Biological Records Centre.	May to September (Figure 1).	All years
	Small mammals	Ad hoc records will be made and submitted to the Biological Records Centre.	August to November (Figure 1).	All years
	Reptiles	Ad hoc records will be made and submitted to the Biological Records Centre.	April to May, September to October (Figure 1).	All years
	Ponds	Survey for amphibians by refuge searching, egg searching, torching, or netting. Licence required if GCN may be disturbed (recorded in FSA temporary pond in 2004 – has since been filled in). See GCN Conservation Handbook. Use Freshwater Habitats Trust Rapid Pond Survey methodology for invertebrates.	June to September (Figure 1).	All years

		Submit ad hoc records to the Biological Records Centre. Take photos of ponds every few months to monitor changes.		
	Mink	Two mink rafts record the presence of mink on the stretch of the River Roding on the reserve as part of an Essex-wide monitoring scheme. Photographic results will be submitted to the River Catchment Coordinator. The presence of other aquatic mammals such as otters and water voles will also be indirectly monitored as part of the mink monitoring regime.	All year round (Figure 1).	All years
	Bats	Use static detector to record bats on the reserve.	April, September – October (Figure 1).	All years

Survey	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tree safety surveys												
Fixed Point Photo												
Rapid grassland assessments												
Butterflies												
Additional surveys subject to available resources												
Bumblebees												
Dragonflies & Damselflies												
Small mammals												
Reptiles												
Ponds												
Mink												
Barn owls												
Bats												
Grassland fungi												
Breeding birds												

Figure 1. Annual survey schedule.

Optimal survey period **Sub-optimal survey period**

3.1.7. Legal Obligations

Table 8. Conservation objectives and outputs for legal obligations.

Objective	Output	Target	Timing	Schedule
To meet legal obligations and protect reserve assets.	SSSI	To maintain and enhance the SSSI units, aiming for favourable condition, in particular the: • Meadow and marshland communities, including Brown Sedge on the fen. • Hay meadows and flood meadows. • River Roding and associated riparian fringe.	All year round.	All years.
	ELS/HLS	To meet all requirements under the HLS agreement. The HLS agreement ends in 2022.	All year round.	2022
	Grange Farm Centre Trust	To consult with and inform of management decisions.	Biannually	All years.
	Epping Forest District Council	To consult with and inform of management decisions.	Biannually	All years.

3.2. Conservation Project Descriptions

Table 9. Conservation project descriptions.

Feature / Project	Priority	Timescale	Project manager
Livestock water supply. There is no reliable water supply for any of the meadows/grazing compartments. Currently water is supplied via a trailer bowser and pasture pumps. Installation of a water supply to troughs would ensure clean water is always available to livestock, reduce workload to staff to refill the bowser, and reduce soil compaction as fewer journeys would need to be made with the vehicle & trailer.	High	2021	Jamie White
Stock fencing each grazing compartment. The current fencing on much of the reserve is inadequate or incomplete. Stock fencing each grazing compartment will allow us to better control grazing on the reserve, allow grazing in areas not grazed for several years, and improve health and safety by reducing incidents of cattle escaping from fields.	High	2021	Jamie White
Eighteen-acre meadow restoration In the felling licence application the two areas proposed for restoration are compartments 6A and 6B. These areas of former grassland habitat are adjacent to the RAF concrete track (on both sides), planted with non-native populus spp trees and had scrub encroachment. They have started developing towards secondary woodland, resulting in a loss of historic meadow extent. Re-opened area to be included within fenced area and grazed by cattle, and emerging scrub controlled.	Medium	2021-26	Jamie White
Veteran tree works. A site survey of veteran trees was undertaken in 2016, with management recommendations produced for individual trees. An updated list made using the ESRI ArcGIS mapping application to record photos of trees and their tags, the GPS position and specific feature details will build on this and ensure that records are accurate and easily updated.	Medium	2021-26	Jamie White
River tree works. Ken Adams, a local botanist and member of the Consultative Group has identified shading by trees as a threat to scarce bankside vegetation	Medium	2021-26	Jamie White

such as wood club-rush. Re-pollarding or removing some of these trees would improve conditions for these and other riverbank species.			
Pond restoration Andrew's Pond is the highest priority for restoration. It would benefit having accumulated silt, plants and organic matter dredged as it hasn't been done for 10 years. Hall Field Pond and Pat's Pond would benefit from a reduction in scrub surrounding the pond to allow more light in. Breeding great crested newts were recorded Further Six Acre temporary pond in 2004. Wond restoration has a variety of wildlife benefits, such as a reliable breeding place for GCN, breeding habitat for a variety of inverts, which in turn would benefit a number of small mammal species, bats, and grass snake. A pond in Further Six Acre could also help collect and store water from the 'upper' meadow and provide a more reliable ground flow of water down the slope across Further River Mead (SSSI unit).	Medium	2022	Cassie Chanin
Soil sampling Soil samples of the meadows will allow us to measure the nutrient levels and establish whether the hay cutting, and other management practices, are effective at removing nutrients. We can compare this to the values in the Cranfield University 2017 report.	Low	2022-26	Jamie White
Hydrology report for fen The size, composition and location of the fen area of the reserve are changing. This is presumed to be through changing hydrology on this part of the reserve. An investigation and report into the hydrology of this area would allow us to tailor our management to ensure we do not lose the extent of fen habitat.	Low	2023-26	Jamie White
Bat survey Bats are an under-recorded group on the reserve; purchase of survey equipment would help identify species present on the reserve and the	Low	2021-26	Cassie Chanin

areas they are using. We can then use this information to help inform management decisions. - Waterway survey for Daubenton's (BCT) in August - Sunset/sunrise surveys - Static detector £840 for Anabat express. <u>Moth survey</u> With remaining survey equipment budget, purchase a new Heath moth trap (~£125) to survey moths on the reserve.			

3.3. People Engagement Objectives and Outputs

Table 10. People engagement objectives and outputs.

Community Engagement				
Objective	**Output**	**Audience**	**Target**	**Schedule**
Inspire local communities and visitors about the reserve and generate a greater understanding of its worth. Community involvement and partnership working are an integral part of reserve management.	Publicise and deliver a varied programme of informal education	Aim to appeal to a wide range of audiences.	Use social media and signage to keep visitors informed of reserve news.	Each month
	Help people understand and learn about the sensitivity of habitats and wildlife through relevant interpretation.	Site users	Participate in the EWT-wide updated interpretation project to improve signage at reserve entrances, thus improving opportunities for visitors to learn about the reserve.	2021-22
	Promote EWT, work on the reserve and events through a variety of media.	Local community	Continued use of social media to share news, photos and advertise events for RVMNR.	Each month
	Continue close partnership working with The Grange Farm Trust and Epping Forest District Council	GFT and EFDC staff and volunteers	As stated in Output.	All years
	Continue to meet with the Consultative and Management Groups at least twice a year. Alert them to any changes and seek their advice where appropriate.	Group representatives and partners	As stated in Output.	Biannually
	Offer clear routes of communication with the public and respond promptly to concerns.	Existing and potential site users	Ensure signs have up-to-date contact number/email address for the public to use if they have concerns.	All years
	Attend and participate in local events, e.g., Epping Town Show, Loughton Festival	Local community	As stated in Output.	All years
Access and Interpretation				

Objective	Output	Audience	Target	Schedule
Provide a high-quality visitor experience that is compatible with the sensitive nature of the habitats found on the reserve.	Maintain all public access routes and infrastructure in a good standard of repair.	Site users	Check and maintain infrastructure and public access routes as required.	All years
	Permanent interpretation in place to inform visitors of access routes.	Site users	Participate in the EWT-wide updated interpretation project to improve signage at reserve entrances and on the reserve, with updated maps displaying access routes clearly.	2021-22 to implement
	Interpretation in place to educate visitors on the wildlife found on the reserve and the history of the site.	Site users	Participate in the EWT-wide updated interpretation project to improve signage with information on the wildlife and history of the site.	2021-22 to implement
	Permanent, seasonal and temporary signs used to help people understand the sensitivity of habitats and wildlife.	Site users	Participate in the EWT-wide updated interpretation project to improve signage around the site with information on the wildlife and habitats.	All years.
	Clear and sensitive 'behaviour' signage and face to face engagement to encourage respect between different user groups and to limit habitat damage.	Site users	Participate in the EWT-wide updated interpretation project to improve signage across the reserve.	All years.
	Achieve and maintain Green Flag status for the reserve. Judging feedback will be considered and suggestions to improve standards implemented where possible.	Green Flag judges	Implement judging feedback to improve standards where possible. Submit application for GFA 2021 before 15th Feb deadline.	All years.
Volunteering				
Objective	**Output**	**Audience**	**Target**	**Schedule**

Offer a varied and fulfilling programme of volunteering opportunities on the reserve.	Weekly practical work parties delivered throughout the year.	Existing and potential volunteers	Continue running Tuesday and Wednesday work parties with volunteers.	All years.
	When appropriate, new volunteers recruited to support the existing volunteer group.	Aim to appeal to a wide range of potential new volunteers	Advertise volunteering opportunity to local community. Try to recruit more volunteers for Tuesday work party as attendance is poorer than Wednesdays.	As required
	Volunteer Ranger programme developed offering experience for those seeking a career in conservation.	People looking for career in conservation	Develop programme and recruit Volunteer Ranger to assist with tasks and species monitoring.	All years
	Host corporate volunteer groups.	Corporate members, local businesses and organisations	Offer group volunteering opportunities for businesses to partake in.	All years
	Work in collaboration with local established volunteer groups such as Voluntary Action Epping Forest	Local volunteer groups	Continue to work with local volunteer groups.	All years
	Recruit additional education volunteers to help with the delivery of education activities and community events.	Aim to appeal to a wide range of potential new volunteers	As stated in Output.	As required
	Surveying and monitoring of butterflies and bees	Local people interested in wildlife	Recruit volunteer(s) to do butterfly and bee transect surveying.	All years

3.4. People Engagement Project Descriptions

Table 11. People engagement project descriptions.

Feature / Project	Priority	Timescale	Project manager
Re-surfacing paths Several years ago, surfaced paths were installed in some areas of the reserve between the balloon circles and green lane to allow wheelchair access. Over the years, deterioration of these paths means they are no longer easily accessible to disabled users. Re-surfacing them would allow much easier access to the reserve. Resurfacing the paths between the green lane and the balloon circles, which are concrete tracks, would allow for better reserve access.	Medium	2023-24	Jamie White
Interpretation The reserve maps will be updated so that they are more accurate and informative. There will be more information focusing on RAF Chigwell and the history of the meadows. New noticeboards have been purchased and will be installed (one has been installed at	Medium	2021-26	Cassie Chanin

northern M11 bridge gate entrance). Signage will be designed in house by EWT's graphic designer and interpretation team. Signage for temporary notices around the reserve have been made which will be used to inform the public of cattle location when they are grazing on-site. This would allow the public to avoid fields with cattle in if they chose so. Noticeboards should include information about litter and vandalism to educate the local community and discourage anti-social behaviour.			

4. MAPS

4.1 Location of the reserve

4.1.1. Reserve boundary

Figure 2. Roding Valley Meadows reserve boundary outlined in red on a base map and satellite image.

4.1.2. Reserve Location

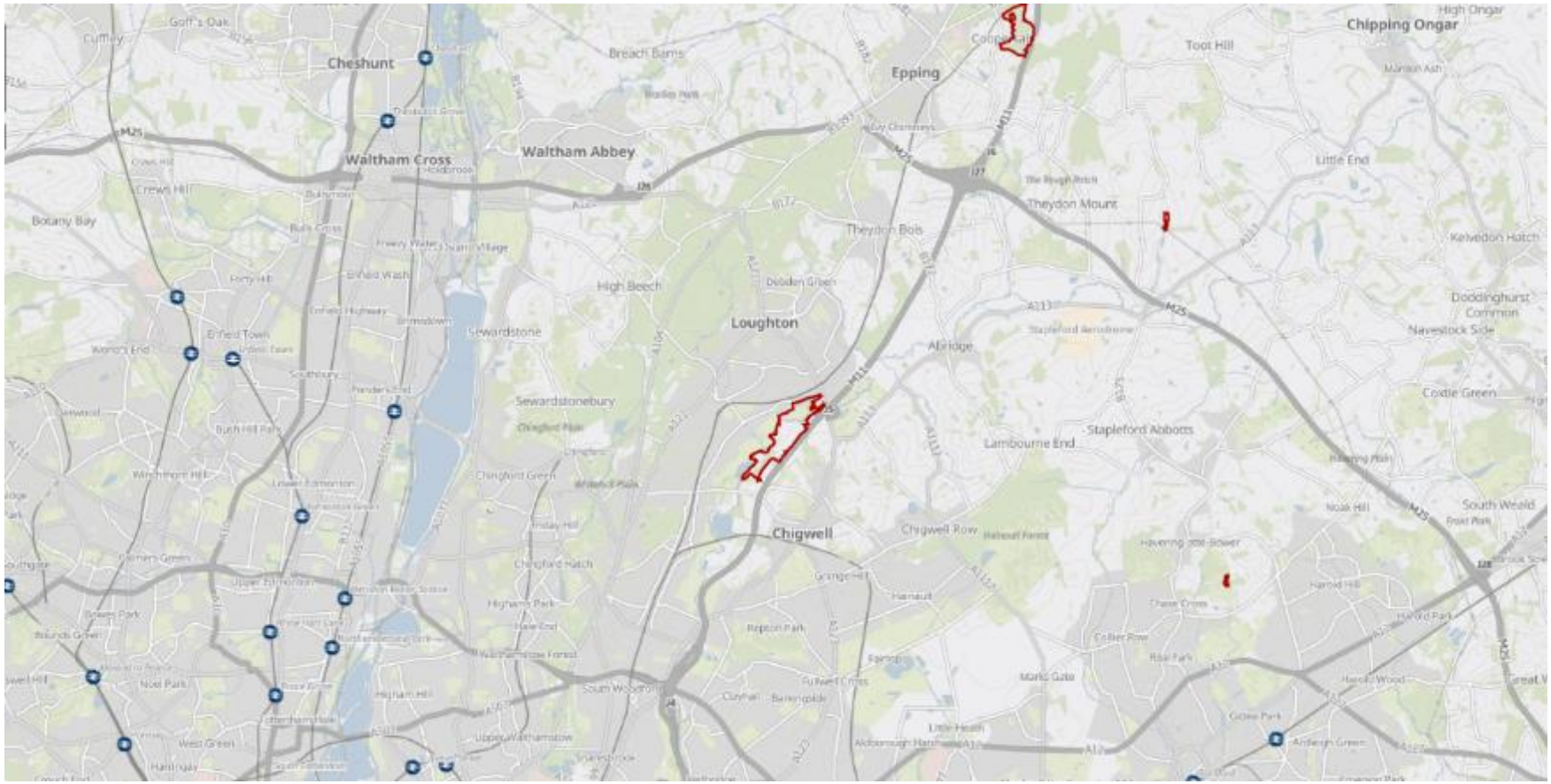

Figure 3. Roding Valley Meadows location, between Loughton and Chigwell.

4.2. Statutory, planning, archaeological and other designations

4.2.1. Natural Designations

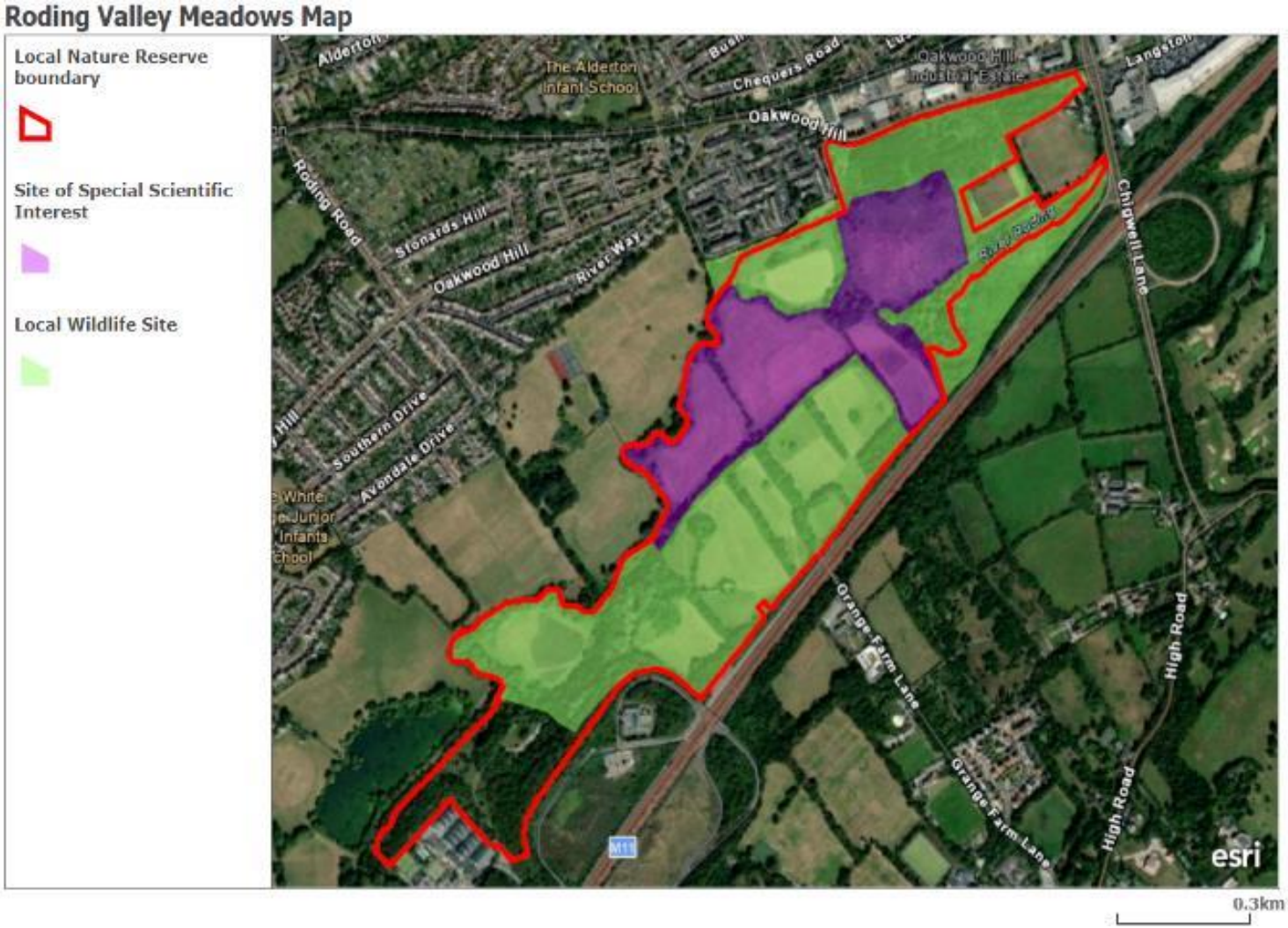

Figure 4. Roding Valley Meadows designations, including Local Nature Reserve, SSSI and Local Wildlife Site.

4.2.2. Field Names and Numbers

Figure 5. Roding Valley Meadows field names and numbers.

4.3. Land/rights held by EWT

Figure 6. Epping Forest District Council and Grange Farm land rights for the reserve.

4.4 Public access

Figure 7. Map of all currently used paths. Paths on the reserve are permissive but many are unofficial/desire lines created by walkers.

4.5. Revenue grants schemes and area-based subsidies

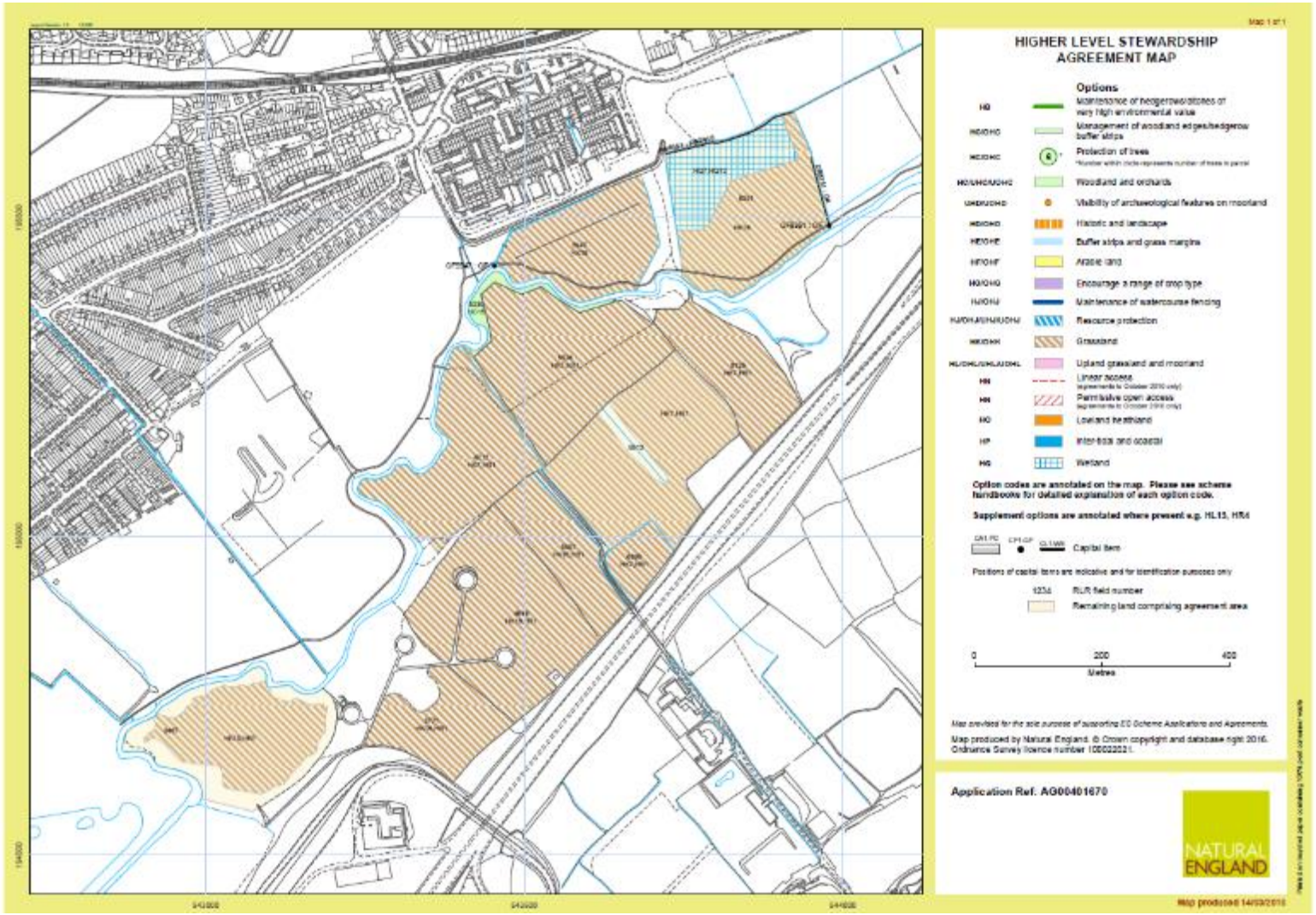

Figure 8. Higher Level Stewardship Scheme map for Roding Valley Meadows.

4.6. Main fixed assets

4.6.1. Archaeological and historic assets

Figure 9. Aerial photograph of Roding in 1961 when it was RAF Chigwell.

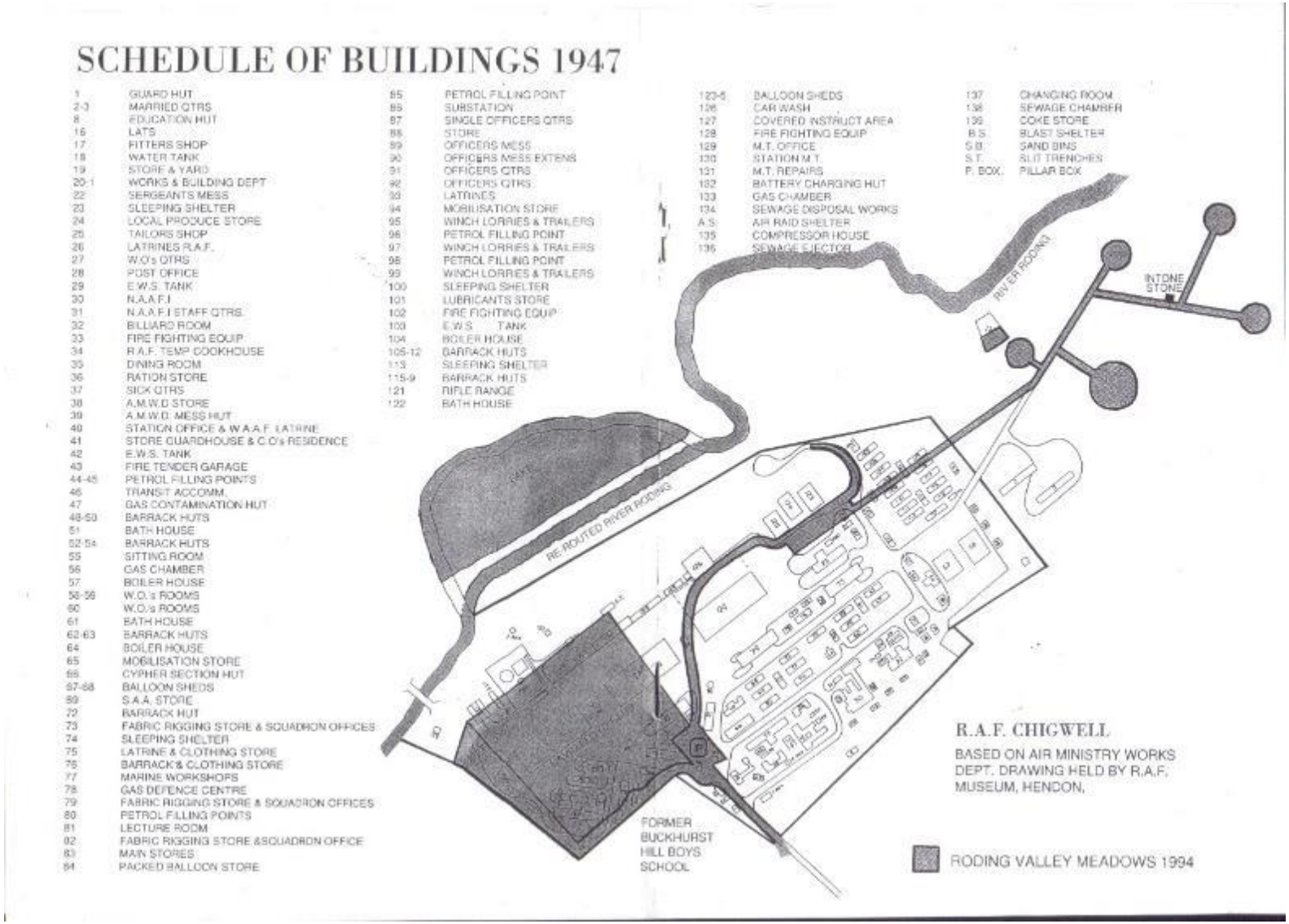

Figure 10. List of buildings on site at RAF Chigwell in 1947.

4.7. Geology and soils

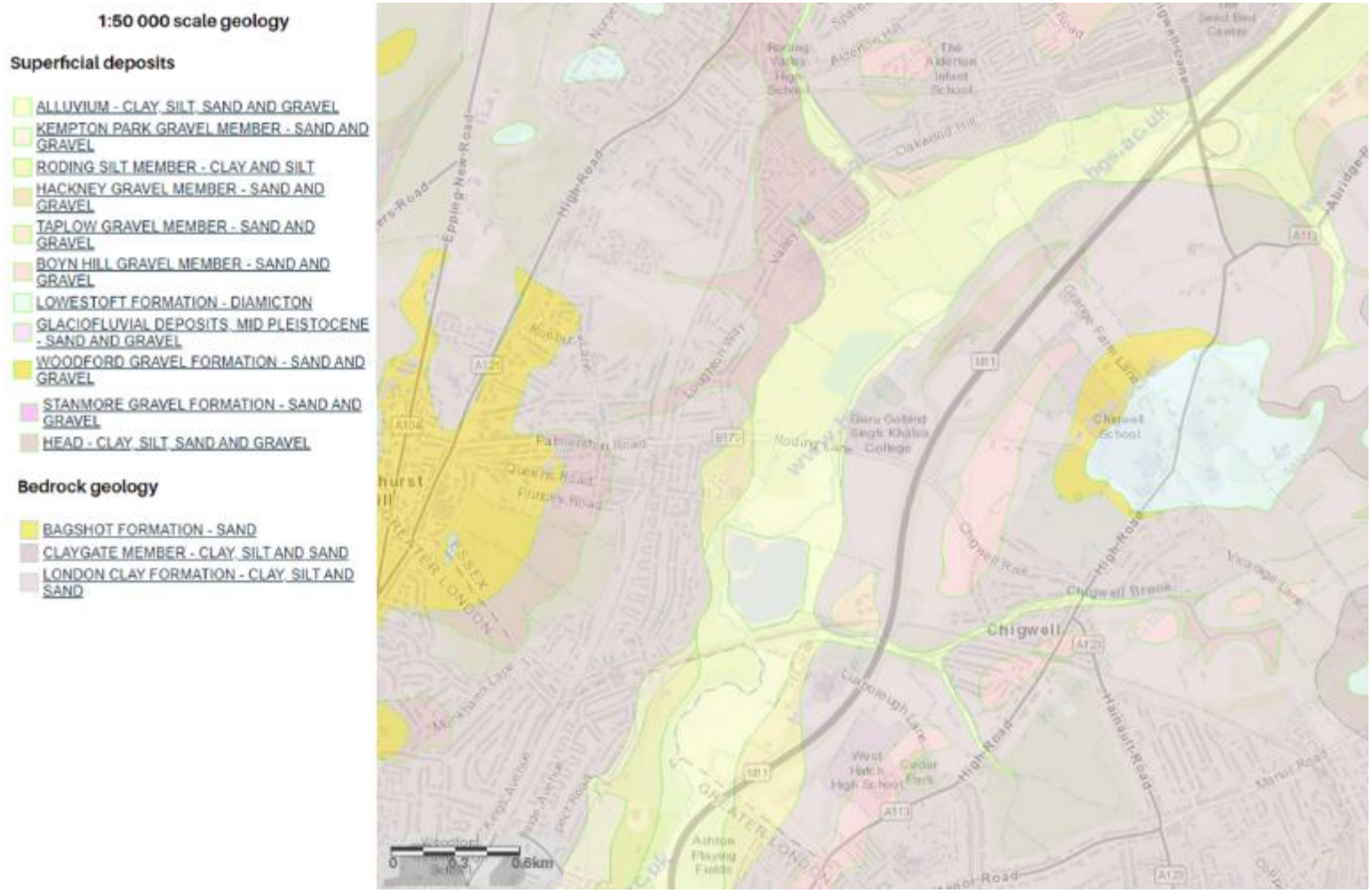

Figure 11. Superficial soil deposits and bedrock ecology of area surrounding Roding Valley Meadows.

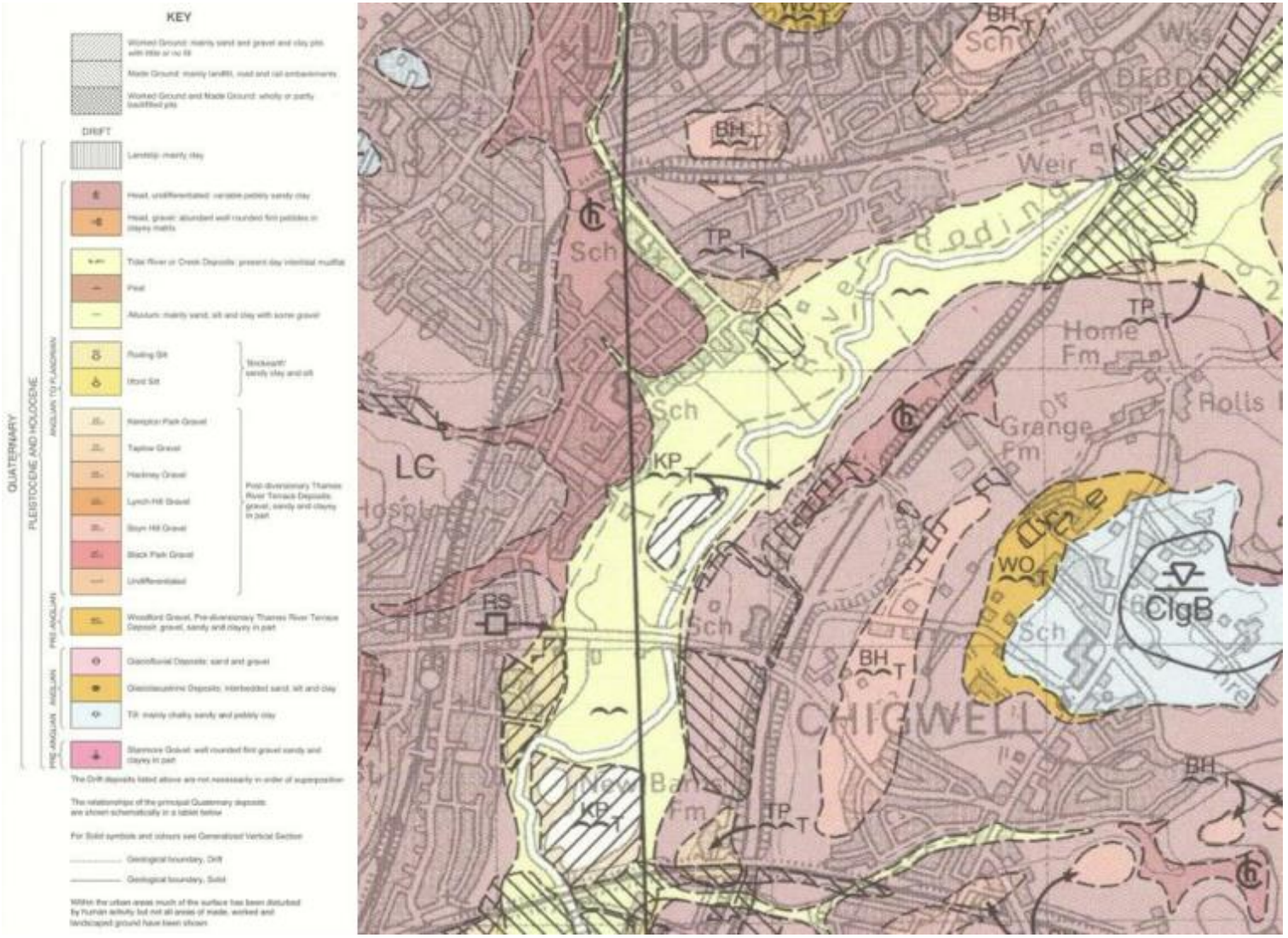

Figure 12. British Geological Survey map of Solid and Drift Geology in Romford area.

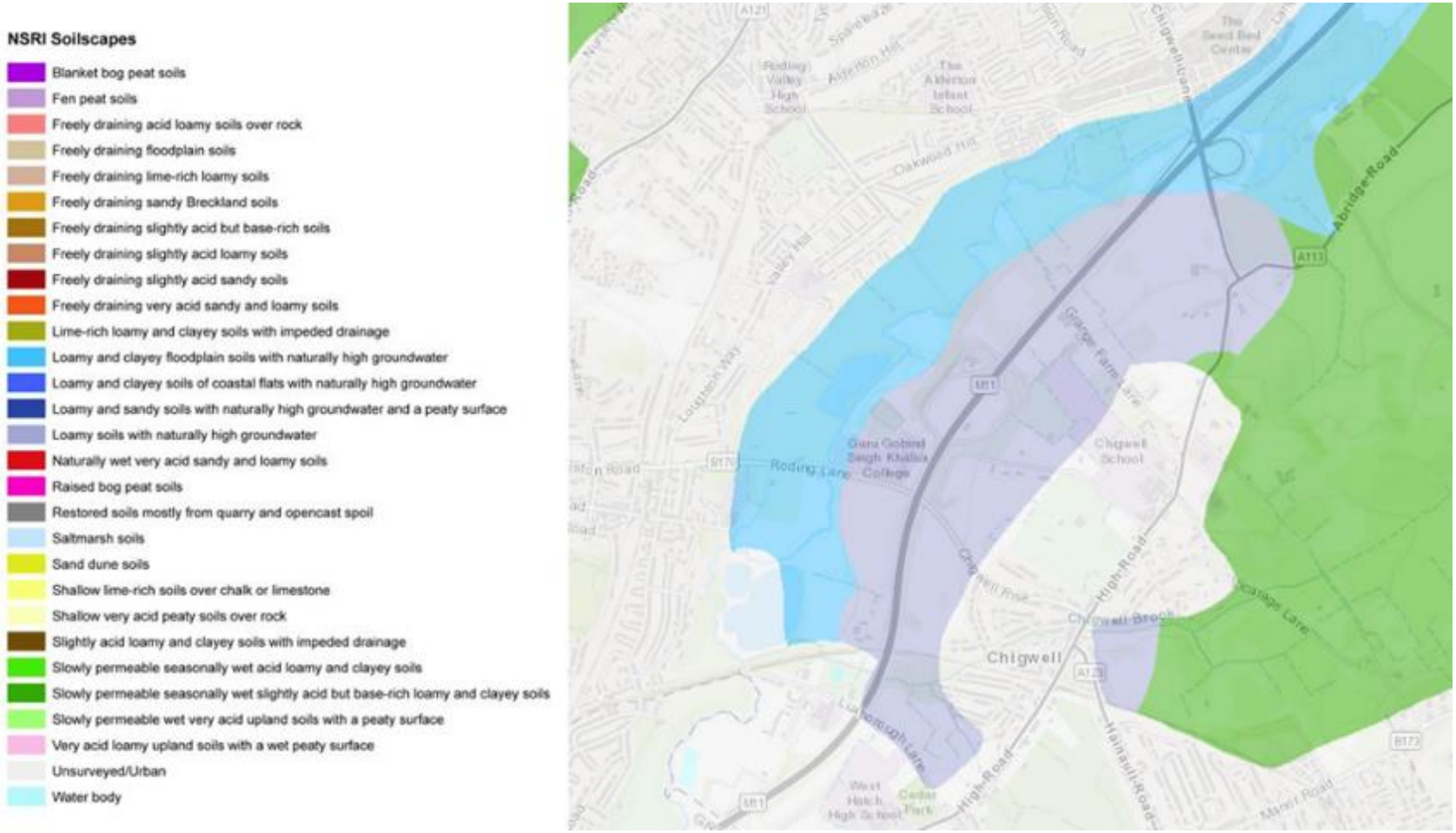

Figure 13. NSRI Soilscapes of Roding Valley Meadows area. Roding is composed of mostly loamy soils with naturally high groundwater and loamy and clayey floodplain soils with naturally high groundwater.

4.9. Reserve recording areas

4.9.1 Rapid Grassland Assessment surveys

Figure 14. Rapid Grassland Assessment survey areas on basemap (L) and satellite image (R). The colour denotes which year each area will be surveyed; blue is year one, yellow is year two and pink is year three.

4.9.3. Butterfly transect(s)

Figure 15. Location of butterfly transects, divided into sections.

4.9.4. Other recording areas

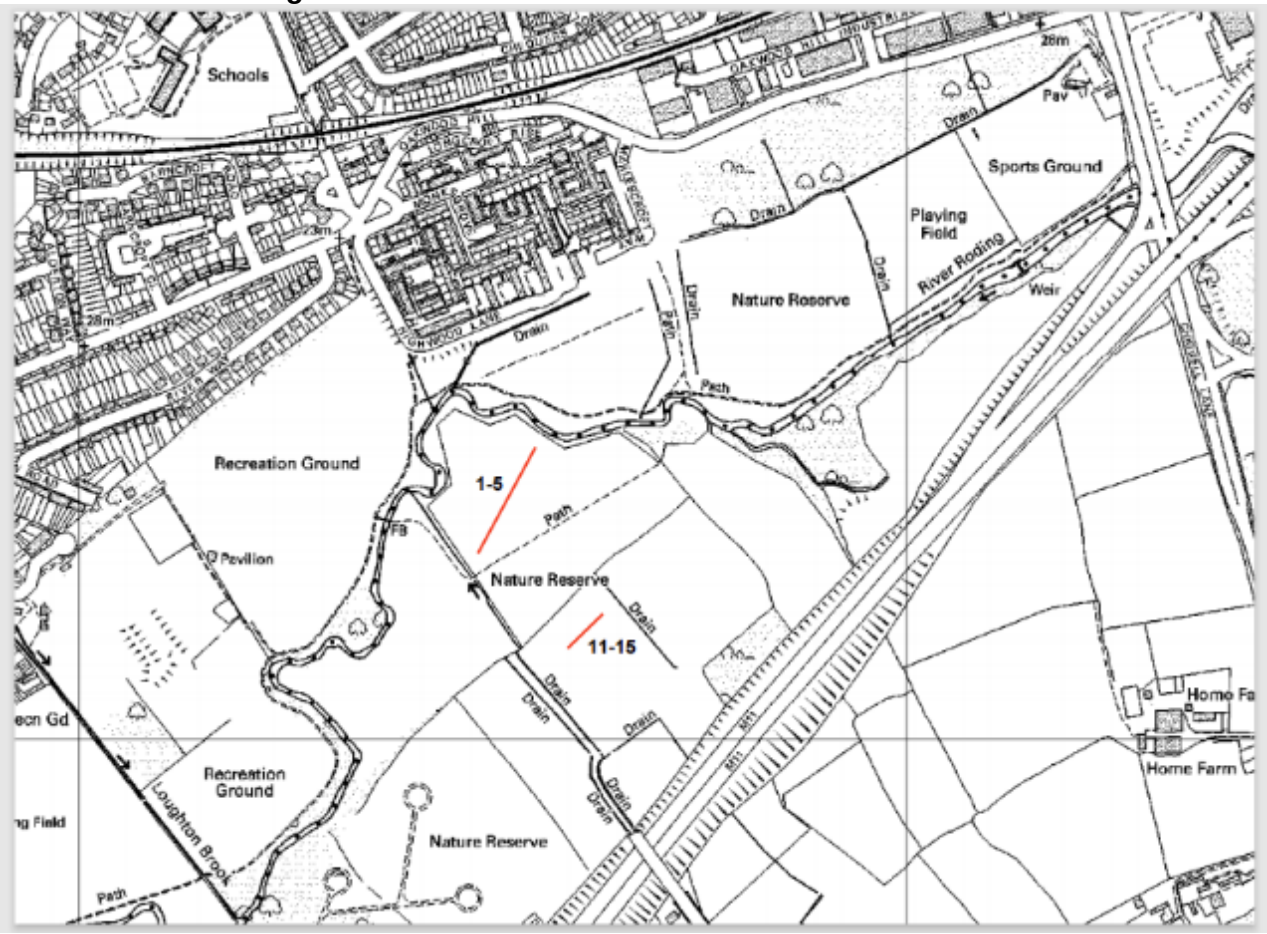

Figure 16. NVC 2008 quadrat locations.

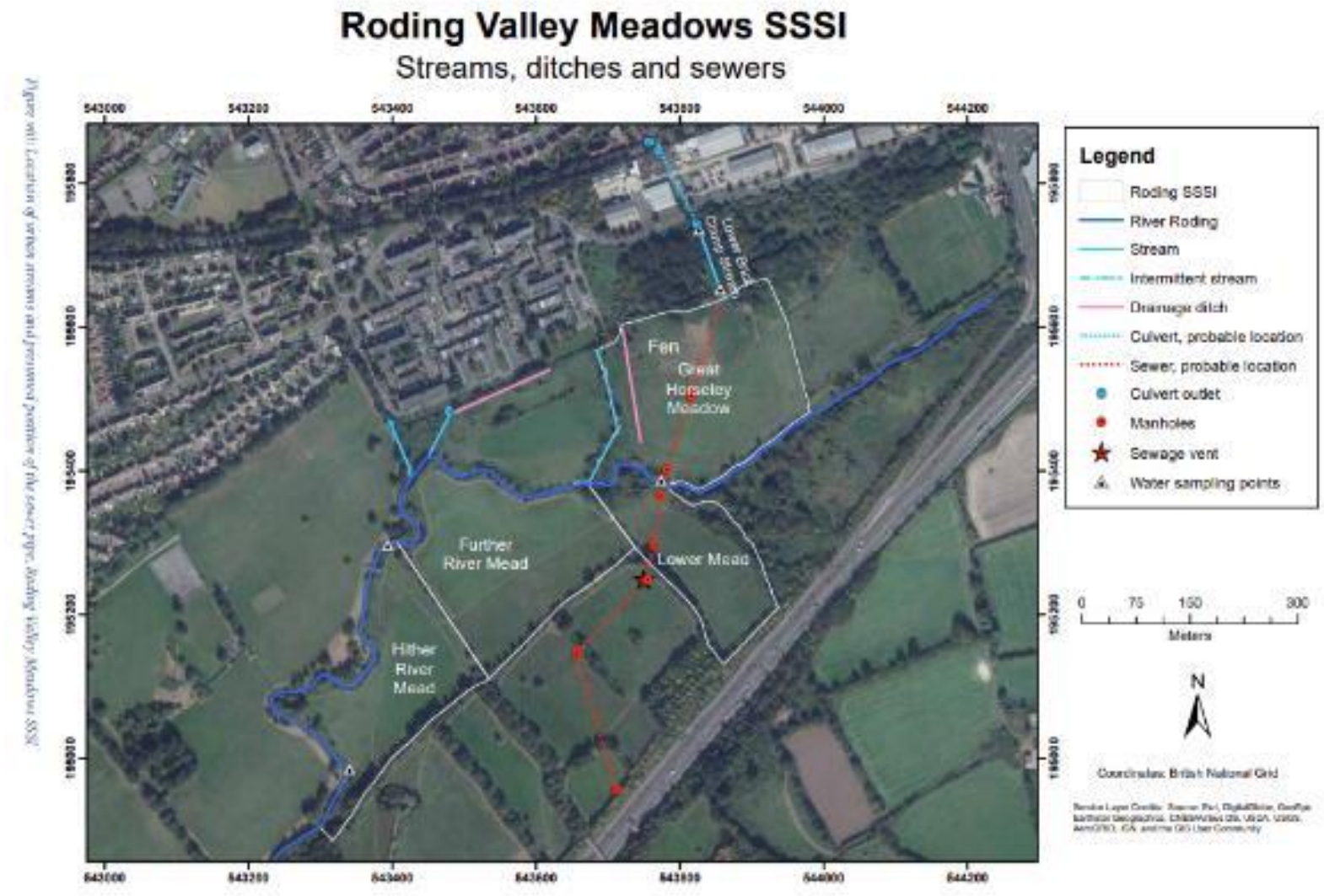

Figure 17. Locations of streams, ditches and sewers on the reserve.

4.10 Habitats on the reserve

4.10.1. Habitats on the reserve in 2021

Figure 18. Map of current habitats on the reserve as of March 2021.

4.11 Veteran trees

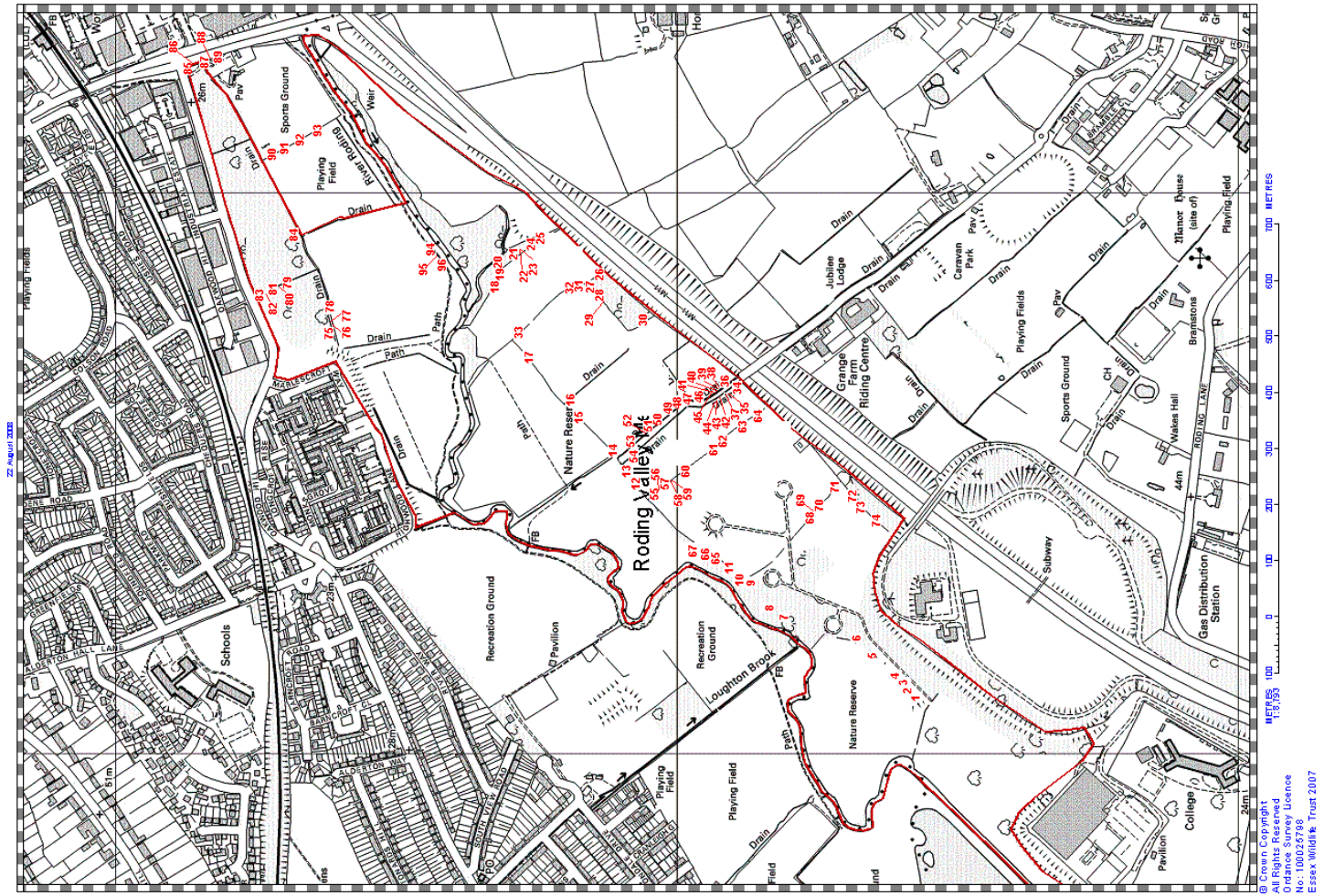

Figure 19. Location of veteran trees on the reserve. Over the life of this management plan a new online map will be made.

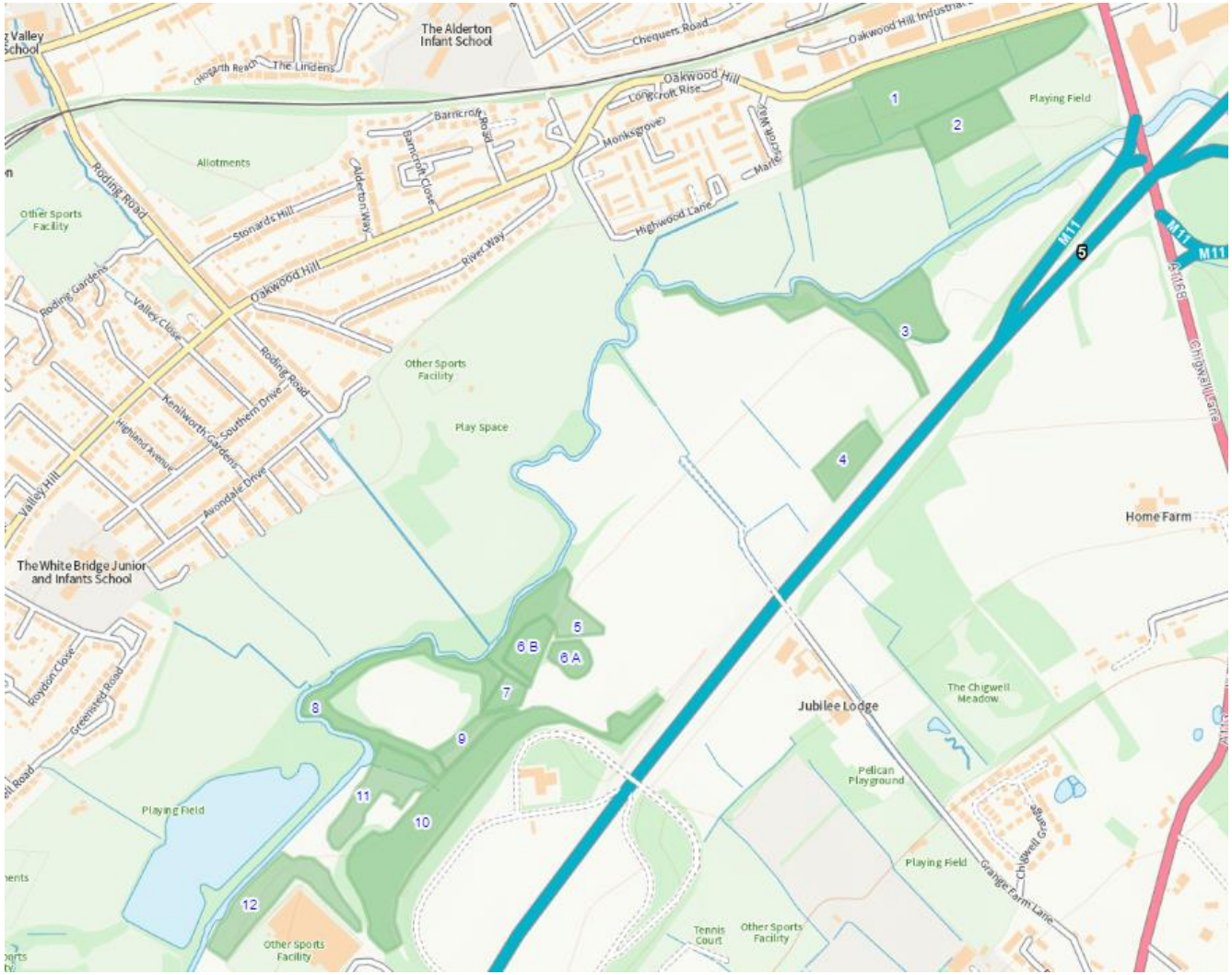

Figure 20. Map of woodland management compartments submitted to the Forestry Commission in Felling Licence application.

4.13. Special projects over the period (2021-26)

Figure 21 Fencing project 2021. Green: existing livestock fencing and gates, Blue: planned new fencing and gates. Lines: Fence, Squares: Gates

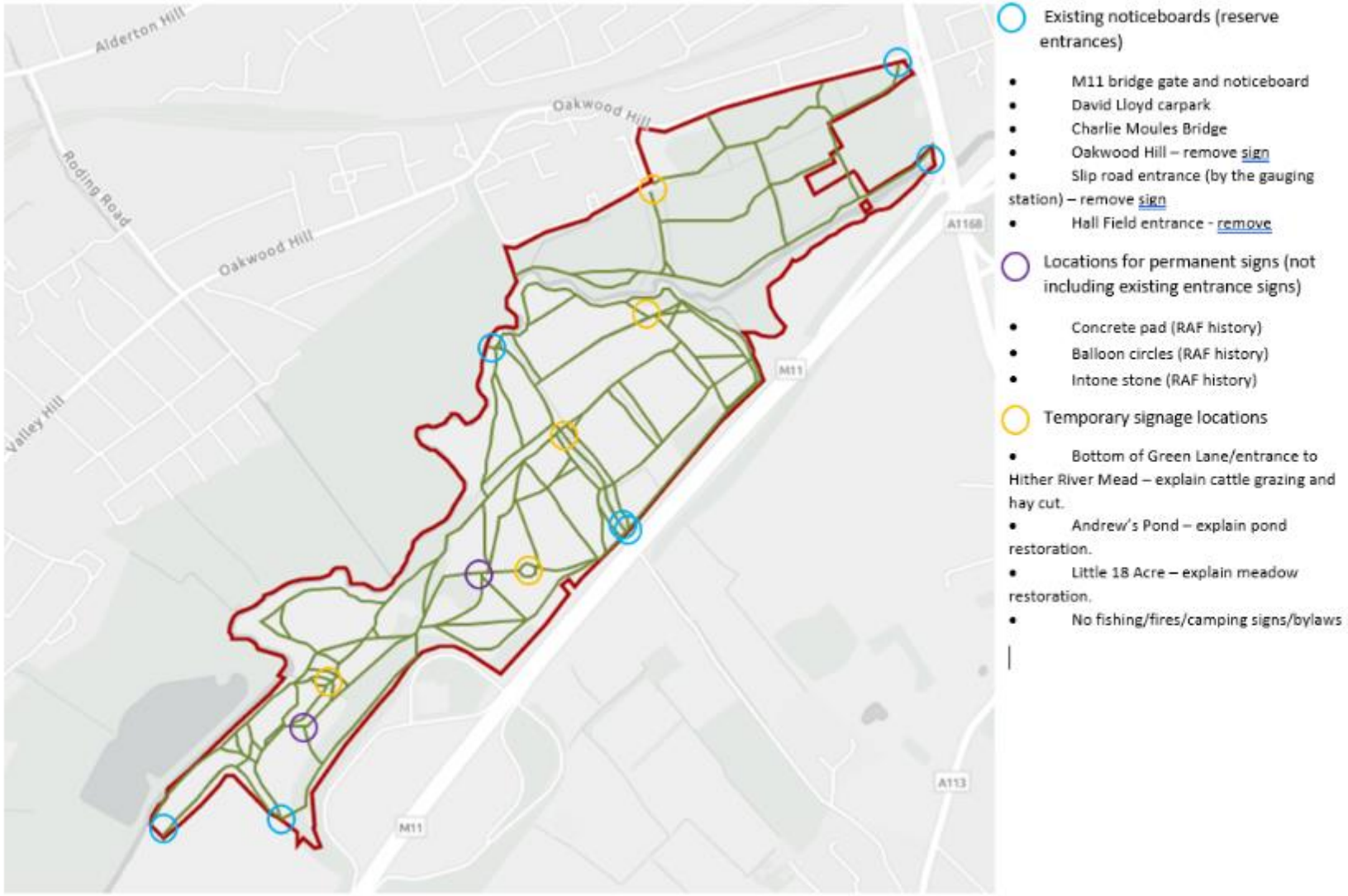

Figure 22. Interpretation project 2021-26.

Path resurfacing

Figure 23. Path resurfacing project 2021-2025. The solid yellow lines indicate where surfaced paths were previously laid, these paths are now very narrow, approximately 1 foot wide, and are not well used. Repair or replacement of these paths will improve access and should alleviate some issues of poaching/trampling of meadows by providing better ground conditions. These paths can also be used by reserve vehicles to reduce soil compaction and ruts.

The dashed yellow line indicates a new surfaced track route which could be made. This route is used extensively by walkers, joggers etc. and regularly becomes much wider and rutted in winter. Installing a surfaced track should alleviate some of these issues, and would also improve vehicle access, linking the motorway bridge entrance to the RAF tracks which continue all the way to the entrance next to the David Lloyd gym.

Andrews Pond restoration/maintenance work

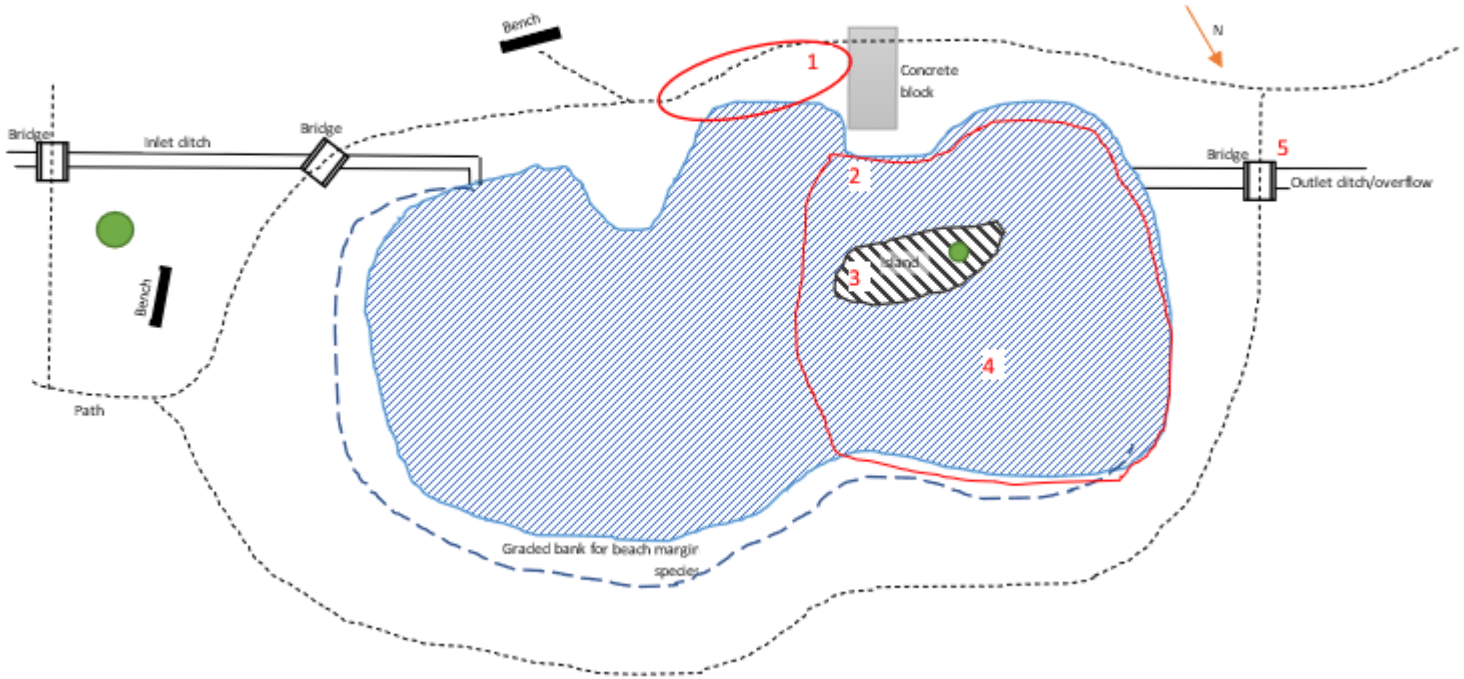

Figure 24. Andrew's Pond restoration project 2023. 1) Thin out any trees overshading the pond on the southern edge (90% should be open and sunny). 2) Dredge silt from a maximum of half of the pond in one phase between November and February. 3) Build up island again if eroded. 4) Remove most of the dominant bulrush but leave 25% of pond dense with plants. 5) Rebuild sandbags in outlet ditch and clear vegetation from bridge.

Eighteen-acre meadow restoration

Project to restore areas of former open grassland/meadow.

Figure 25. Eighteen-acre meadow restoration project 2021-26. Pink areas are to be reverted back to meadow/open habitat. Pink line is new footpath created to allow reserve users to bypass grazing unit if so desired. Blue lines are where livestock proof fencing will be installed to create grazing units. Green lines are footpaths and red line is the boundary of the reserve.

4.16. Grazing compartments

Figure 26. Grazing compartments on the reserve, each coloured area indicates a field or fields which can be closed to contain livestock. Some adjacent compartments can be combined into larger areas if required.

4.17. Visitor infrastructure

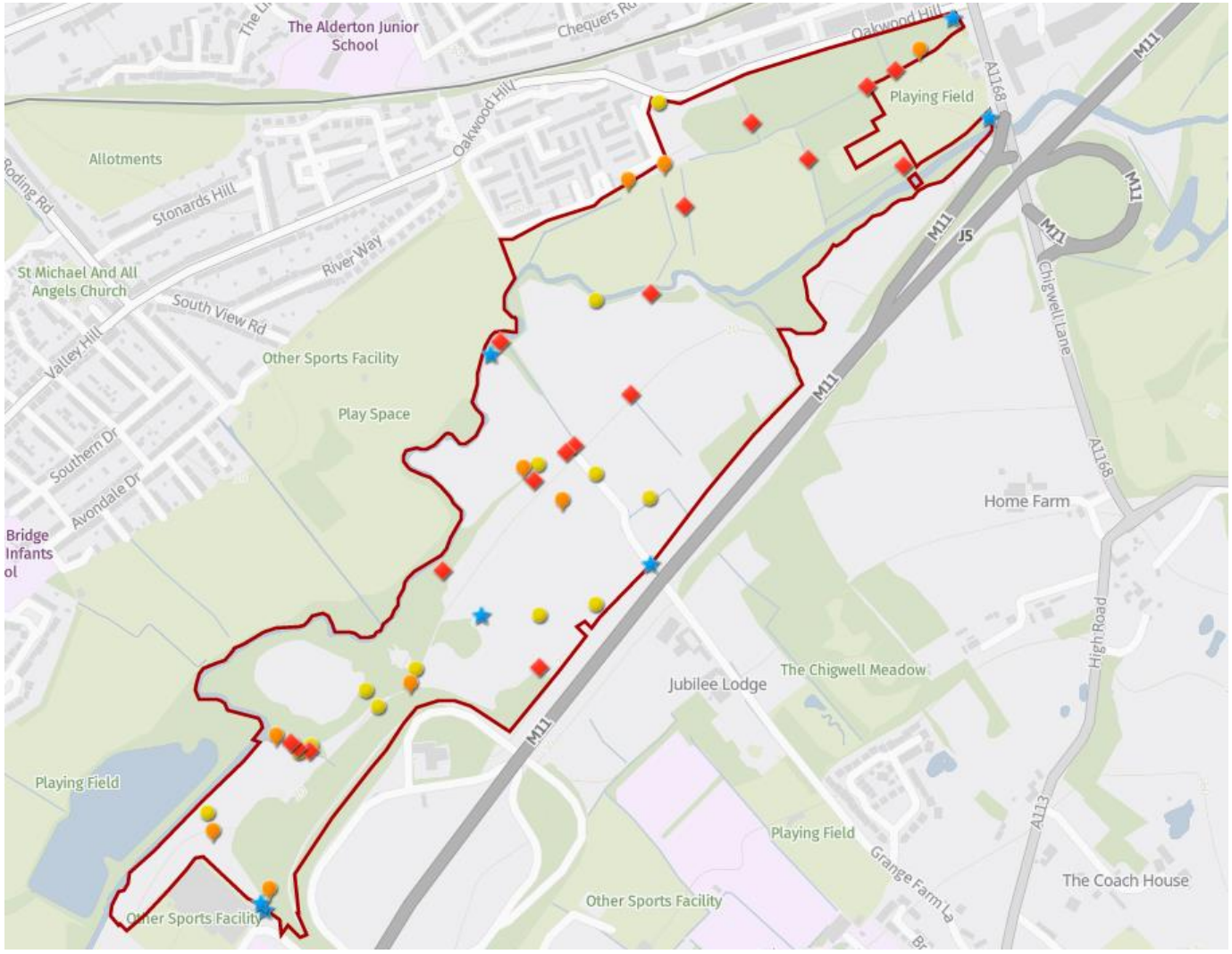

Figure 27 Map of visitor infrastructure in 2021. Yellow dot: Benches, Blue star: signage, Red diamond: bridges, Orange dot: steps.

APPENDIX 1. Site Location and Designation

A1.1. Location and relevant authorities

The location of the reserve is shown in Figure 3 and details of relevant authorities given in the table below.

Table 12. Site information.

Site name	Roding Valley Meadows
SSDB/CMS code	
Area (ha)	64.6
Grid ref (centre of reserve)	TQ 43528 95103 (bottom of green lane)
District	Epping Forest
County Council * [1]	Essex County Council
District Council[2]**	Epping Forest District Council
Parish Council	Chigwell Parish Council Loughton Parish Council Buckhurst Hill Parish Councils
Parliamentary Constituency	Epping Forest
Local Environment Agency office[3]	Hatfield Office Apollo Court 2 Bishops Square Business Park St Albans Road West Hatfield Hertfordshire AL10 9EX
Drainage Authority[4]	
Airport Safeguarding zone	

* mineral planning authority
** general planning authority

[1] or Unitary Authority
[2] or London Borough Council
[3] or relevant authority in Scotland
[4] or Internal Drainage Board

A1.2. Designations

Details of statutory, planning and other designations are given in the following table and shown in Figure 4.

Table 11. Statutory designations.

Designation	All or part of site?	Name and other details
SSSI	Part	Roding Valley Meadows Lower Mead (Unit 2), Great Horseley Meadow (Unit 3), Further River Mead (Unit 4), Hither & Middle River Mead (Unit 5).
LNR	All	Roding Valley Meadows Local Nature Reserve
Past military land use	Part	RAF Chigwell
Other	Part	Local Wildlife Site G10: Roding Valley Meadows EWT Reserve G12: Roding Meadow (Football Pitch Meadow)

A1.3. Statutory site condition assessment

Details of Roding Valley Meadows SSSI units are given below.

Table 12. SSSI Unit Assessment.

EWT Responsible					
SSSI/ASSI name	Unit or feature	Assessment	Date	Reason	Remedy
Roding Valley Meadows	002 1004759 Neutral Grassland Lowland	Unfavourable - Recovering	11/08/2011	The unusually hot and dry early spring followed by a very wet late spring summer meant the flowering season was earlier than normal and relatively brief. This in combination with the necessity to adjust the hay cut according to the weather meant that the best flowering period was missed. However, uncut margins did permit condition monitoring provided some indication of floristic diversity/structure.	
Roding Valley Meadows	003 1004757 Neutral Grassland Lowland	Favourable	11/08/2011	Invasive hawthorn was noted during previous visit in May 2011. However, during assessment visit no scrub was noted presumably following hay cut. Although the peak flowering season had been missed a good range of indicator spp were recorded.	
Roding Valley Meadows	004 1027237 Neutral Grassland Lowland	Unfavourable - No change	29/01/2014		
Roding Valley Meadows	005 1027238 Neutral Grassland Lowland	Unfavourable - No change	29/01/2014		
EWT not responsible					
SSSI/ASSI name	Unit or feature	Assessment	Date	Reason	Remedy
N/A					

A1.4. SSSI citation

County: Essex Site Name: Roding Valley Meadows
District: Epping Forest
Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981
Local Planning Authority: Epping Forest District Council
National Grid Reference: TQ 436953
Area: 19.8 (ha) 48.92 (ac)
Ordnance Survey Sheet 1: 50 000: 167, 177 1: 10 000: TQ 09 NW
Date Notified (Under 1949 Act): -
Date of Last Revision: -
Date Notified (Under 1981 Act): 1987
Date of Last Revision: -
Other Information: This is a new site. The site is part of a proposed Local Nature Reserve under Section 21 of the National Parks and Access to the Countryside Act 1949.

Description and Reasons for Notification: Roding Valley Meadows form one of the largest continuous areas of species-rich grassland in Essex, comprising traditionally managed hay meadows, flood meadows and marsh. Situated in the gently sloping floodplain of the River Roding, the area is divided into several small fields by a long-established system of hedges and ditches. The meadow and marshland communities include a diverse assemblage of plant species, many of which are uncommon in Essex, and the site includes the largest known bed of the Brown Sedge *Carex disticha* in Essex.

The hay meadows are dominated by a mixture of grasses, including Meadow Foxtail *Alopecurus pratensis*, Meadow Fescue *Festuca pratensis* and Red Fescue *F. rubra* with frequent Sweet Vernal-grass *Anthoxanthum odoratum*, Crested Dog's-tail *Cynosurus cristatus,* Meadow Barley *Hordeum secalinum*, Yellow Oat-grass *Trisetum flavescens* and Meadow Brome *Bromus commutatus*. The uncommon Fescue - Rye-grass hybrid *Festulolium loliaceum* is also present. The grassland is herb-rich and includes Common Knapweed Centaurea nigra, Burnet-saxifrage *Pimpinella saxifraga*, Sneezewort *Achillea ptarmica*, Pepper-saxifrage *Silaum silaus* and Devil's bit Scabious *Succisa pratensis*. The flood meadows are of particular interest since they contain a number of species which are uncommon and declining in Essex, including the Carnation Sedge *Carex panicea*, Marsh-marigold *Caltha palustris* and Southern Marsh-orchid *Dactylorhiza praetermissa*. In places where the water-table is high, the meadows grade into marsh characterised by a dense growth of sedges, including the Brown Sedge *Carex disticha* which is known from only eleven sites in Essex. A number of species, such as Cuckoo flower *Cardamine pratensis* and Ragged-Robin *Lychnis flos-cuculi*, occur throughout the grassland and marsh.

The River Roding and associated riparian fringe is an integral and valuable part of the site. Aquatic and semi-aquatic plants include Yellow Loosestrife *Lysimachia vulgaris*, Water Plantain *Alisma plantago-aquatica* and Arrowhead *Sagittaria sagittifolia*.

The network of mature hedges bounding the fields is typical of a traditional pattern of management formerly widespread in East Anglia which is now uncommon as a result of agricultural change. They include tree and shrub species, such as Midland Hawthorn *Crataegus laevigata*, Crab Apple *Malus sylvestris* and Hornbeam *Carpinus betulus*, and form valuable additional habitat for invertebrates and birds.

A1.5. SSSI Conservation Objectives

Conservation Objectives

The Conservation Objectives for this site are, subject to natural change, to maintain the following habitats and geological features in favourable condition[1], with particular reference to any dependent component special interest features (habitats, vegetation types, species, species assemblages etc.) for which the land is designated (SSSI, SAC, SPA, Ramsar) as individually listed in Table 13.

Habitat Types represented (Biodiversity Action Plan categories)

Neutral Grassland - lowland

Geological features (Geological Site Types)

Not Applicable

Standards for favourable condition are defined with particular reference to the specific designated features listed in Table 15, and are based on a selected set of attributes for features which most economically define favourable condition as set out in Table 16 and Table 17:

[1] or restored to favourable condition if features are judged to be unfavourable.

Table 13. Standards for favourable condition for individually designated Special Interest Features.

BAP Broad Habitat type / Geological Site Type	Specific designated features	Explanatory description of the feature for clarification	SSSI designated interest features	SAC designated interest features	SPA bird populations dependency on specific habitats			Ramsar criteria applicable to specific habitats			
					Annex 1 species	Migratory species	Waterfowl assemblage	1a Wetland characteristics	2a Hosting rare species &c	3a 20000 waterfowl	3c 1% of population
Neutral grassland – lowland	MG4 *Alopecurus pratensis-Sanguisorba officinalis* grassland	Lowland neutral grassland	*								
	MG5a *Cynosurus cristatus-Centaurea nigra* lowland meadows	Lowland hay meadow	*								

NB. 1). Features where asterisks are in brackets (*) indicate habitats which are not notified for specific habitat interest (under the relevant designation) but because they support notified species. 2) The requirements of species (including SPA bird species) are reflected in the Conservation Objectives for habitat features on which they depend. In some specific situations, direct population measures for species may also be used to provide supporting information to confirm habitat quality measures.

Table 14. Extent objectives for habitat features.

Conservation Objective for habitat extent	To maintain the designated habitats in favourable condition, which is defined in part in relation to a balance of habitat extent (extent attribute). Favourable condition is defined at this site in terms of the following site-specific standards (Table 17).
Extent - Dynamic balance	On this site favourable condition requires the maintenance of the extent of each designated habitat type. Maintenance implies restoration if evidence from condition assessment suggests a reduction in extent.

Table 15. Estimated extent of habitat features and targets selected based on a set of attributes for features which most economically define favourable condition.

Habitat Feature (BAP Broad Habitat level, or more detailed level if applicable)	**Estimated extent (ha) and date of data source/estimate**	**Site Specific Target range and Measures**	**Comments**
Lowland neutral grassland MG4	Total unit area 14.81 ha, ENSIS 28.1.05 Unit 5 – Hither River Mead – 4.53ha Unit 4 - Further River Mead - 5.71ha Unit 2 – Great Horsley Mead - 5.94 ha	No reduction in area and any consequent fragmentation without prior consent This area will increase or decrease at expense of fen area.	MG4 contains an area of fen which supports *Carex distincha*; this not a notified NVC community. The boundary zone between MG4 community and the area dominated by *Carex* Spp will vary from year to year in response to naturally fluctuating water levels.
Lowland neutral grassland MG5	Total unit area 3.16 ha, ENSIS 28.1.05 (includes 5-10% scrub in this figure). Unit 3 – Lower Mead 3.16ha	No reduction in area and any consequent fragmentation without prior consent Increase at expense of scrub and secondary woodland	Scrub can contribute to the overall biodiversity associated with these meadows but should be monitored and controlled to ensure that it does not exceed 10% of the area.

Details of the estimated habitat extent since notification in 1987 are given in the table below. Site specific definitions of favourable condition for MG4 and MG5 grasslands are outlined in Table 19 and Table 20.

Table 16. Rationale for habitat extent attribute.

Audit Trail
Rationale for habitat extent attribute (Include methods of estimation (measures), and the approximate degree of change which these are capable of detecting).
The total site area at notification (1987) was 19.8ha. Estimates of extent could be achieved through an NVC survey and possible use of fixed point and/or aerial photography. The site will benefit from the retention of non-notifiable habitats that contribute to the overall diversity of the site, such as the network of hedgerows. However, visitor pressure remains a potential threat to the integrity of the site. The habitat MG4 occurs on low-lying ground, usually on river floodplains, and occupies a section of a range of habitats that occur in these landscapes. This can include open and flowing freshwater and swamp and fen habitats. Transitions to wetter swamp and grassland communities (e.g., S24 and MG13) are found. In response to fluctuating water levels from year to year, the boundary zones between these habitats can drift up and down. The range in area value assigned to MG4 has tried to account for such fluctuations.
Rationale for site-specific targets (including any variations from generic guidance)
No variation from generic guidance
Other Notes
Unit 1 – Hither River Mead and Further River mead has been archived. Unit 2- Great Horsley Mead; Unit 3 – Lower Mead; Unit 4 – Further River Mead; Unit 5 – Hither River Mead Critical influences on the habitat are the catchment hydrology, water quality and variations in climate. NB The regular collection of data pertaining to extent of communities as well as species composition e.g., fen area associated with MG4 community can be useful in assessing the effect of long-term climate change.

Table 17. Site-Specific definitions of Favourable Condition.

Conservation Objective for this Habitat / Geological Site-Type	To maintain the lowland neutral grassland habitats at this site in favourable condition, with particular reference to relevant specific designated interest features. Favourable condition is defined at this site in terms of the following site-specific standards:
Site-specific details of any geographical variation or limitations (where the favourable condition standards apply)	
Avoid recording atypical areas where animals tend to congregate.	
Site-specific standards defining favourable condition	

Table 18. Criteria, measures and targets for MG4.

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward structure: bare ground	Record bare ground extent, noticeable without disturbing the vegetation. Measured annually in summer if possible and once every three years in aftermath grazing period.	No more than 5% of the sward.	Outside target indicates problems with stock management e.g., poaching, supplementary feeding or extended flooding in growing season. Bare ground is often associated with paths at sites which have high visitor numbers. Visitor pressure associated with these meadows should continue to be monitored and if necessary restricted to prevent adverse impact to the flora and fauna of the site.	
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward structure: litter	Record cover of litter where in a more or less continuous layer, distributed either in patches or in one larger area and once every three years in aftermath grazing period.	Total extent no more than 25% of the sward	Outside target indicates biomass removal is insufficient e.g., not cut for hay or no aftermath grazing.	

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward structure: average height	Record sward height in summer period. NB If site is permanent pasture in summer period discuss with site manager.	Sward 10cms or above	Outside target indicates site may not be managed as hay meadow.	
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward composition: grass/herb ratio	Proportion of non-Graminae ("herbs"), in period late May -early July, before hay cut. MG5 in period mid- May - early July, before hay cut (meadows), or mid-May - late July (pastures).	40-90% herbs	MG4 Areas of flooding are causing the extent of certain herbs to not match with the 40% generic criteria Low proportion outside target indicates eutrophication, usually from fertilisers, or insufficient removal of biomass, leading to dominance by grasses. Persistent early cutting and no grazing promotes vegetative propagation of grasses whilst preventing seeding of some of the mid- to late – flowering forb species, so reducing their occurrence within the sward. Lack of grazing also reduces the potential for bare ground typically created through trampling and reduced the potential for regeneration and colonisation of forb species. Ideally cut should be later than 1st July and aftermath grazing.	Yes

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward composition: positive indicator species	Record the frequency of positive indicator species from lists A and B. Species on list A can substitute for species on list B to give an overall total of 2 frequent and 3 occasional or locally abundant. Record in period late May - early July, before hay cut. List A*: **Filipendula ulmaria**, Leontodon autumnalis, Oenanthe silaifolia, **Persicaria bistorta, Sanguisorba officinalis, Silaum silaus, Succisa pratensis, Thalictrum flavum***. List B: ***Centaurea nigra, Filipendula vulgaris, Galium verum, Lathyrus pratensis, Leucanthemum vulgare, Lotus corniculatus**, Primula veris, Rhinanthus minor, Serratula tinctoria, Stachys officinalis, **Tragopogon pratensis**.*	Overall total of at least two species frequent plus at least three species occasional throughout the sward or locally abundant in more than 10% of the sward, including at least one species frequent and one occasional or locally abundant from list A	Choice of species related to NVC type, restriction to unimproved grassland and wetness characteristics of habitat, all satisfactory when inside target. Among possible species that could be used, choice further restricted by ease of identification, visibility in recording period. **Emboldened species are those that have been previously recorded at the site during past condition assessments.**	Yes
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward composition: rare species	Record numbers (sample if required) of flowering Fritillaria meleagris (specific to certain sites) mid-late April to early May depending on early/late Spring.	Population level maintained at least above lower 10% variation from average of counts in 20 years since notification (or shorter period depending on notification date)	Fritillaria is one of species important in SAC MG4 sites but main growth outside of summer assessment period and may be affected by impacts e.g., spring grazing, not picked up by other attributes.	Yes

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward composition: indicators of waterlogging	Record % cover of *Juncus spp,* ***Deschampsia cespitosa***, large *Carex* spp. (leaves more than 5mm wide) e.g., *Carex acutiformis*, large grasses (leaves more than 10mm wide, stout stems) i.e., *Glyceria maxima, Phalaris arundinacea, Phragmites australis*. Record in period late May -early July, before hay cut.	No species/taxa together or singly covering more than 10% of the sward	Species chosen to indicate waterlogging problems when outside target e.g., from raised water tables. ***Deschampsia cespitosa* was recorded at levels exceeding 10% area in 2002 at Hither River Mead and Further River Mead.** **Great Horseley Meadow receives a higher quantity of flood water than Hither and Further River Meads and consequently a large expanse of the meadow supports tall fen vegetation dominated by *Carex* spp. This should not be recorded as a reason for unfavourability during condition assessments since the wet areas add to the overall diversity of a wetter MG4 community.**	Yes
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward composition: negative indicator species	Record frequency of negative indicator species. Record in period late May - early July, before hay cut. *Senecio aquaticus*	No more than occasional throughout the sward	Outside target can discourage hay management because the species is believed to be toxic, and is palatable when dry.	
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward composition: negative indicator species	Record the frequency and % cover of negative indicator species. Record in period late May -early July, before hay cut. ***Anthriscus sylvestris, Cirsium arvense,*** *Cirsium vulgare,* ***Rumex crispus****, Rumex obtusifolius, Senecio jacobaea ,****Urtica dioica.***	No species more than occasional throughout the sward or singly or together more than 5% cover	Invasive species chosen to indicate problems of eutrophication and disturbance from various sources when outside target e.g., poaching, stock feeding, late flooding. **Emboldened species refer to those previously recorded during past condition assessments. Their occurrence in the sward should therefore be monitored and controlled where necessary.**	Yes

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG4 *Alopecurus pratensis-Sanguisorba officinalis* lowland neutral grassland	Sward composition: negative indicator species	Record the frequency and % cover of negative indicator species. All tree and scrub species, considered together.	No more than occasional throughout the sward or more than 1% cover.	Invasive species outside target shows that habitat is not being managed sufficiently e.g., not cut for hay each year. An area of plantation occurs at the south western corner of Hither River Mead. This should not be considered a reason for unfavourability but the plantation area should not exceed current extent (see Figure 18.) and colonisation by tree and shrub species should be monitored and controlled.	Yes

Table 19. Criteria, measures and targets for MG5.

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward structure: bare ground	Record extent of bare ground distributed through the sward, visible without disturbing the vegetation. Record in period late May -early July, before hay cut, or mid-May - late July (pastures). Also record sometimes in aftermath grazing period in hay meadows.	No more than 5%	Outside target indicates problems with stock management e.g., poaching, supplementary feeding. Bare ground is often associated with paths at sites which have high visitor numbers. Visitor pressure associated with these meadows should continue to be monitored and if necessary restricted to prevent adverse impact to the flora and fauna of the site.	

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward structure: litter	Record cover of litter where in a more or less continuous layer, distributed either in patches or in one larger area. Record in period late May -early July, before hay cut, or mid-May - late July (pastures). Also record sometimes in aftermath grazing period in hay meadows.	Total extent no more than 25% of the sward	Outside target indicates biomass removal is insufficient e.g., not cut for hay or insufficient grazing.	
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward structure: average height	Record sward height in period mid-May - late July. Upper target refers to pastures only.	Sward 5-15 cm	Sward height above upper target shows that habitat is not being managed sufficiently e.g., lack of or insufficient grazing or if below lower target, is being overgrazed.	
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward composition: positive indicator species	Record the frequency of positive indicator species in period mid-May – early July, before hay cut, (meadows), or mid-May - late July (pastures). *Agrimonia eupatoria, Alchemilla spp., Anenome nemorosa,* ***Centaurea nigra****, Euphrasia spp.,* ***Filipendula ulmaria,*** *Filipendula vulgaris,* ***Galium verum****, Genista tinctoria, Lathyrus linifolius (=montanus),* ***Lathyrus pratensis****, Leontodon hispidus/L. saxatilis,* ***Leucanthemum vulgare, Lotus corniculatus****, Pimpinella saxifraga, Polygala spp.,* ***Potentilla erecta****, Primula veris, Rhinanthus minor, Sanguisorba minor, Sanguisorba officinalis, Serratula tinctoria,* ***Silaum silaus,*** *Stachys officinalis,Succisa pratensis, Tragopogon*	At least two species/taxa frequent plus at least four species/taxa occasional throughout the sward.	Choice of species related to NVC type and restriction to unimproved grassland, considered satisfactory when inside target. Among possible species that could be used, choice further restricted by ease of identification, visibility in recording period. **Emboldened species are those that have been previously recorded during past condition assessments.**	Yes

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
		pratensis, small blue-green *Carex* spp. (leaves less <5mm wide) (C.flacca).			
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward composition: indicators of waterlogging	Record % cover of *Juncus spp, Deschampsia cespitosa*, large *Carex* spp. (leaves more than 5mm wide) e.g., *Carex acutiformis*, large grasses (leaves more than 10mm wide, stout stems) i.e., *Glyceria maxima, Phalaris arundinacea, Phragmites australis*. Record in period late May -early July, before hay cut, or mid-May - late July (pastures). Note: Care is required on ridge-and-furrow fields where the furrows may support a different interest feature (e.g., wet grassland).	No species/taxa together or singly covering more than 10% of the sward	Species chosen to indicate waterlogging problems when outside target e.g., from raised water tables	Yes
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward composition: negative indicator species	Record the frequency and % cover of negative indicator species in period mid-May – early July, before hay cut, (meadows), or mid-May - late July (pastures). *Anthriscus sylvestris**,*** ***Cirsium arvense,*** *Cirsium vulgare, Galium aparine, Plantago major, Pteridium aquilinum,* ***Rumex crispus****, Rumex obtusifolius, Senecio jacobaea* ,***Urtica dioica.***	No species more than occasional throughout the sward or singly or together more than 5% cover	Invasive species chosen to indicate problems of eutrophication and disturbance from various sources when outside target e.g., poaching, stock feeding. Emboldened species are those that have previously been recorded during past condition assessments.	Yes

Criteria feature	Attribute term in guidance	Measure	Site specific Targets	Comments	Use for CA?
MG5 *Cynosurus cristatus-Centaurea nigra* lowland meadows	Sward composition: negative indicator species	Record the frequency and % cover of all tree and scrub species, considered together. NB If scrub/tree species in pastures are more than occasional throughout the sward but less than 5% cover, they are soon likely to become a problem if grazing levels are not sufficient or if scrub control is not being carried out.	No more than 5% cover.	Invasive species outside target shows that habitat is not being managed sufficiently e.g., not cut for hay each year or inadequately grazed. Scattered trees occur along the eastern boundary of Lower Mead and a hedge is found along the western boundary of the site. These habitat features enhance the overall diversity potential of the site and should not be a reason for unfavourability. However colonisation by tree and scrub species within the main area of the meadow should be monitored and controlled to ensure that levels do not exceed 5% cover.	Yes

As time and money are often limited in conservation, analysing where efforts may be best focused to achieve the greatest gains are often necessary. The rationale for limiting standards to specified parts of the site, as well as for site-specific targets and the selection of measures for condition are given below.

Table 20. Rationale for site standards, targets and selection of measures of condition.

Audit Trail
Rationale for limiting standards to specified parts of the site
Atypical areas tend to be of lower value.
Rationale for site-specific targets (including any variations from generic guidance)
The site has become vulnerable to flooding, changing sward composition, so may not match certain generic criteria. Maintain hedgerows for the benefit of associated flora and fauna. Maintain, and where appropriate, take measures to control visitor pressure on the site to prevent damage to its wildlife interest. Monitor water levels and quality on the site since these will influence habitat type and extent.

Rationale for selection of measures of condition (features and attributes for use in condition assessment) (The selected vegetation attributes are those considered to most economically define favourable condition at this site for the broad habitat type and any dependent designated species).
Other Notes

Roding Valley Meadows SSSI comprises of part of network of meadows along the River Roding to form the largest continuous traditionally managed hay meadows, flood meadows and marsh in Essex. The 4 meadows (Hither & Further River Meads, Lower Mead and Great Horsley Meadow) that make up the SSSI were notified because the meadow and marshland communities include a diverse assemblage of plant species, many of which are uncommon to Essex, and the site includes the largest known bed of the Brown Sedge (*Carex distincha*) in Essex.

The hay meadow (Lower Mead) is dominated by a mixture of grasses, including Meadow Foxtail (*Alopercrus pratensis*), meadow fescue (*Festuca pratensis*) and red fescue (*Festuca Rubra*) with frequent sweet vernal grass (*Anthoxanthum odoratum*), crested dog's-tail (*Cynosurus cristatus*), meadow barley (*Hordeum secalinum*) yellow oat grass (*Tristum flavescens*) and meadow brome (*Bromus commutatus*). The uncommon fescue – rye grass hybrid (*Festulolium loliaceum*) is also present.

The grassland flood meadows (Hither & further River Meads and Great Horsley Mead) are herb rich and support species such as common knapweed (*Centaurea nigra*), pepper saxifrage (*Siliaum silaus*) and Devil's bit scabious (*Succisa pratensis*). They also contain a number of species that are uncommon and declining in Essex including carnation sedge (*Carex panacea*), marsh marigold (*Caltha palustris*) and southern marsh orchid (*Dactylorhiza praetermissa*). In places where the water level is high there is a dominance of Brown sedge (*Carex distincha*) which is known from only 11 sites in Essex. A number of notable species such as cuckooflower (*Cardamine pratensis*) and ragged robin (*Lychnis flos-cuculi*) occur throughout the grassland and marsh.

The meadows have been previously used as an airfield and it is likely that this use necessitated the sward being kept reasonably short throughout the year. The lush and productive nature of the sward in some areas may also indicate some past fertilizer input. This is likely to have been confounded by high nutrient inputs from floodwater of the River Roding. Species poor grassland dominated areas coincide with land closest to the river and may be influenced by flooding and water quality. Diffuse pollution issue should be discussed with the Environment Agency.

Lower species diversity on the Hither & Further River Meads could be rectified by considering seed harvest from lower mead and sowing on Hither and Further River Mead.

Great Horsley Mead is wetter than both Hither and Further River Meads with a high influence of *Carex* species. If managed correctly with appropriate grazing this could give rise to a very interesting wetter variation of MG4 association.

A small area of plantation is found in the south western corner of Hither River Mead. This support Ash (*Fraxinus excelsior*) and oak (*Quercus* sp) with some Norway spruce (*Picea abies*). Ground flora is dominated by false oat grass and (*Arrhenatherum elatius*) and stinging nettles (*Urtica dioica*)

Additional Habitats

The River Roding and associated riparian fringe is an integral and valuable part of the site. Aquatic and semi-aquatic plants include yellow loosestrife (*Lysimachia vulgaris*), water plantain (*Alisma plantago-aquatica*) and arrowhead (*Sagittaria sagittifolia*). The ditch habitats vary in diversity but are less species rich than the river possibly as a result of periodic maintenance clearance or shading. Species present include reed sweet grass (*Glyceria maxima*), Reed canary grass (*Phalaris arundinacea*), Gypsywort (*Lycopus europaeus*), Water mint (*Mentha aquatica*) and comfrey (*Symphytum officinale*)

The network of mature hedges bounding the fields is typical of a traditional pattern of management formerly widespread in East Anglia which is now uncommon as a result of agricultural change. They are variable in age and species rich. These include Oak (*Quercus Robur*), Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Field Maple (*Acer campestre*), Hornbeam (*Carpinus betulus*) Hazel (*Corylus avellana*) Midland Hawthorn (*Crataegus laevigata*), crab apple (*Malus sylvestris*) and Elder (*Sambucus ni*gra) Aspen (*Populus tremula*), willow (*Salix fragilis, Salix alba*) Dog rose (*Rosa canina*), red campion (*Silene dioica*) and greater stitchwort (*Stellaria holostea*), and form valuable additional habitat for invertebrates and birds.

Other meadows within the Roding valley meadow network that still retain their rich flora and fauna include River Mead, Spittle Mead, Great Maple, Great Hamon Mead, Three and a Half Acres, Further Six Acres, Hither Six Acres with Bell Rope Acre, The Eight and Four Acres, Four Acre Field and Twenty-Two acres, Eighteen Acres and Luscious Mead

A1.6. Public Access

There are no public rights of way over the land – all paths are permissive footpaths.

APPENDIX 2. Environmental Information

A2.1. Geology and soils

Geology
The reserve extends along the flood plain of the River Roding, which includes meandering central stretches and canalised sections. On the flood plain, silty alluvium overlies London Clay, with lenses of gravel laid down by the river in former times and by the post glacial Thames. The eastern rim of the flood plain forms an erosional bluff in the London Clay slope, separating the upper hay meadows from those of the flood plain. Along the edge of the bluff several lenses of river gravel give rise to marshy seepages and result in local variations in soil conditions. To the west of the river the land is gently sloping to the south-east, whilst the eastern slopes of the reserve have a steeper gradient sloping upward towards the embankment of the M11 motorway, with a north-westerly aspect.

Soils
Fluvial alluvium in the bottom of the flood plain giving way to more clayey, poorly draining soils further up slope. Gravel lenses give locally more freely draining soils within the flood plain. The Essex Wildlife Trust holds a copy of an MSc thesis (Phillips, 1995) which is a detailed study of the geology and soils of the reserve.

Table 21. Stratified soil parameter summary for Roding Valley Meadows SSSI.

Stratum	Parameter	Mean	Standard deviation	Minimum	Maximum
Matrix	Available phosphorus (mg/kg)	20.0	14.1	5.1	56.0
	Ammonium-N (mg N/kg)	3.0	10.6	0.0	62.6
	TON (mg N/kg)	3.4	5.5	0.0	29.0
	Available nitrogen (mg/kg)	6.4	15.4	0.0	91.6
	pH	6.35	0.43	5.42	7.34
	Total carbon (%)	8.5	2.3	3.4	12.5
	Effective PSD (%)	8.6	5.8	1.8	33.9
River Buffer	Available phosphorus (mg/kg)	42.8	24.0	10.1	99.3
	Ammonium-N (mg N/kg)	7.6	18.7	0.0	62.6
	TON (mg N/kg)	11.8	8.2	0.0	29.0
	Available nitrogen (mg/kg)	19.4	25.4	1.5	91.6
	pH	6.85	0.46	5.72	7.53
	Total carbon (%)	6.9	1.2	5.5	9.6
	Effective PSD (%)	10.9	7.1	2.4	27.2
Wetland	Available phosphorus (mg/kg)	18.7	11.8	7.2	40.9
	Ammonium-N (mg N/kg)	1.3	2.3	0.0	3.5
	TON (mg N/kg)	0.0	0.0	0.0	0.0
	Available nitrogen (mg/kg)	1.3	1.3	0.0	3.5
	pH	5.99	0.73	5.08	7.18
	Total carbon (%)	12.3	8.4	2.2	25.9
	Effective PSD (%)	8.3	5.1	1.6	16.0

In 2017, a survey was carried out by Cranfield University students into the nutrient levels found on the SSSI, including phosphorus, nitrogen, pH and carbon.

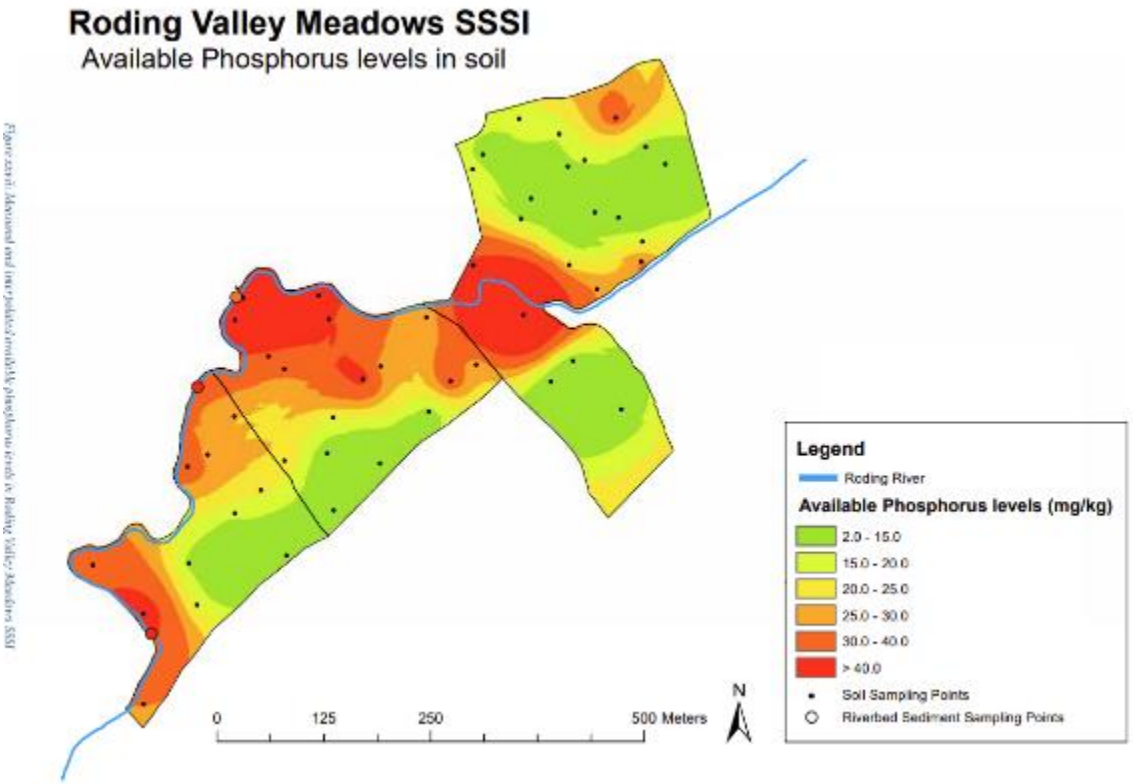

Figure 28. Available Phosphorus levels in soil at Roding Valley Meadows SSSI.

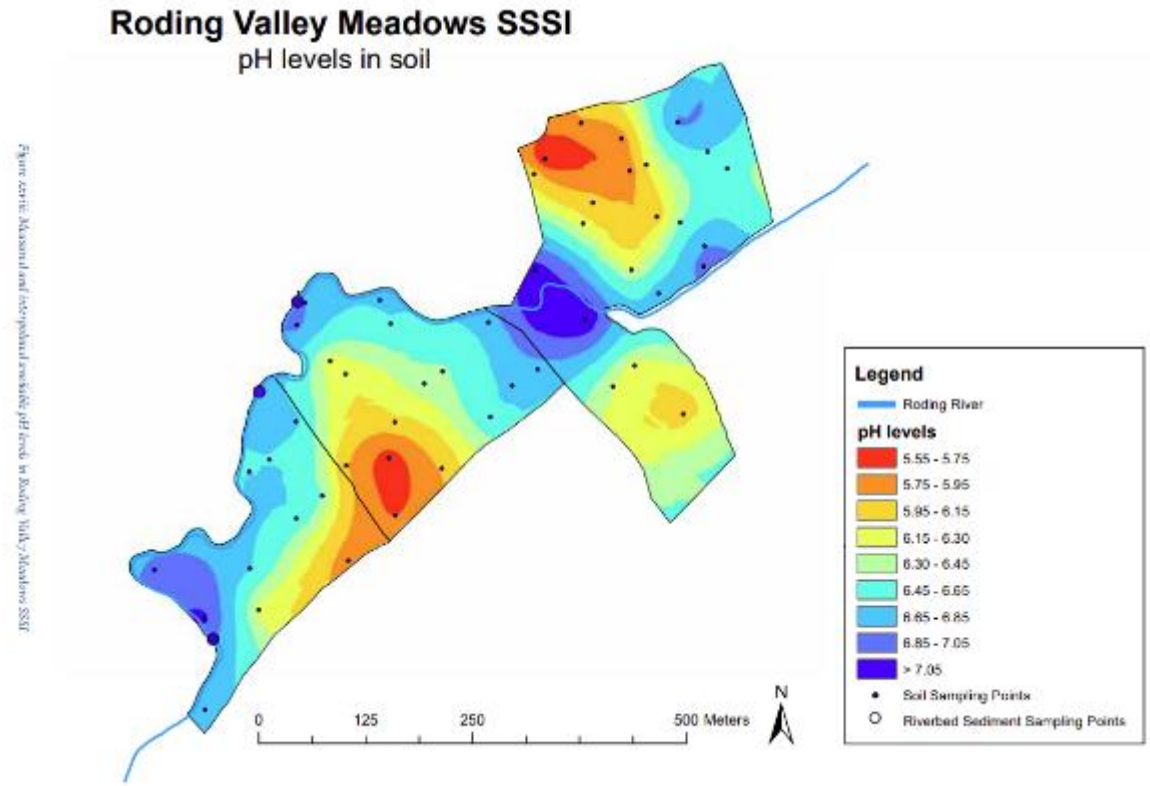

Figure 29. pH levels in soil at Roding Valley Meadows SSSI.

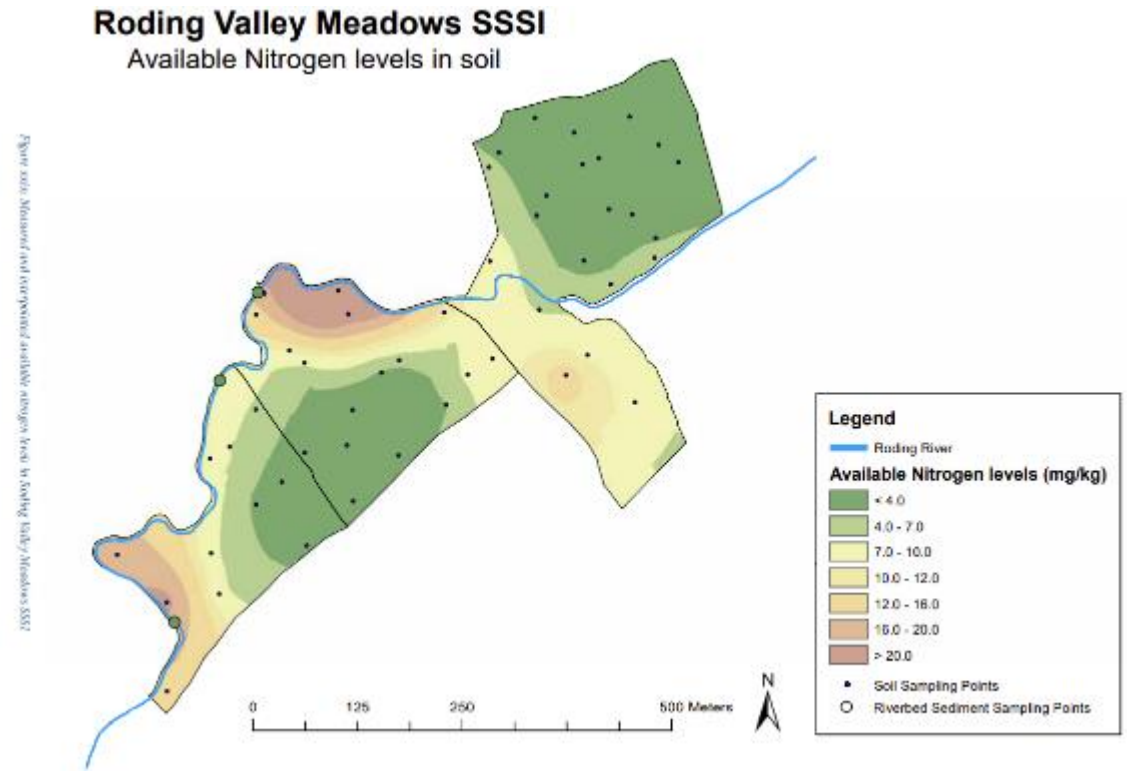

Figure 30.Available Nitrogen levels in soil at Roding Valley Meadows SSSI.

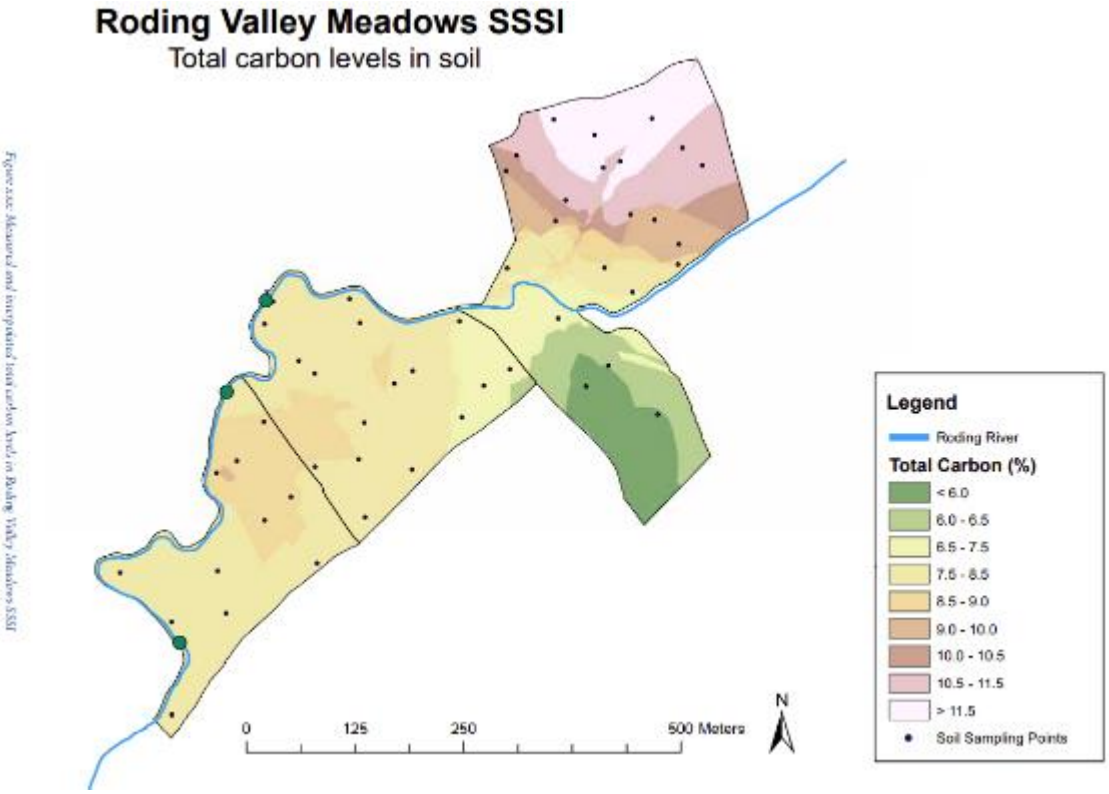

Figure 31.Total carbon levels in soil at Roding Valley Meadows SSSI.

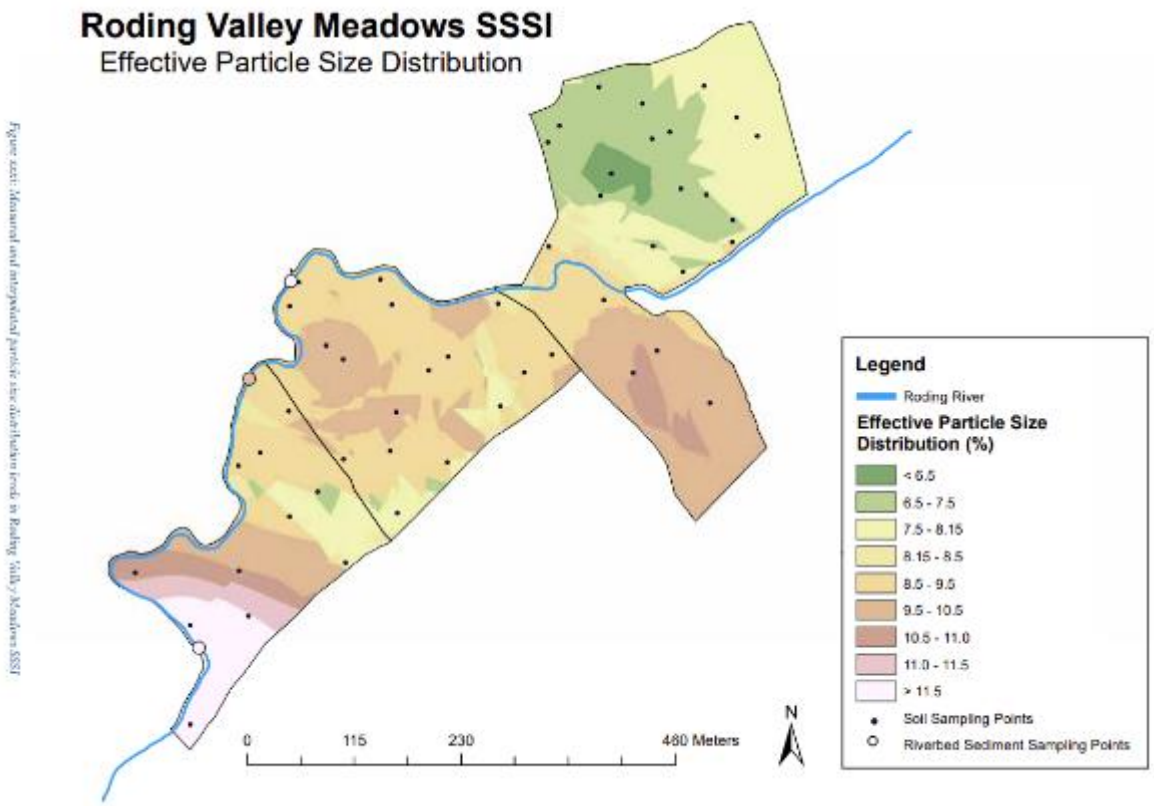

Figure 32. Effective particle size distribution at Roding Valley Meadows SSSI.

A2.2. Hydrology

The River Roding forms a dominant feature within the reserve, and it regularly inundates the adjacent flood meadows. It is a small, lowland clay river approximately 80 kilometres in length which drains a narrow catchment of approximately 342 km^2. Straightening and shortening of the river course over a period of years have resulted in increased erosion of the banks. It enters the reserve from the north under Chigwell Lane and leaves to the south at Roding Lane. The gradient of the river within the reserve is gentle at around 1:100 and contains a number of meanders and natural channel features including vertical banks, pools, riffles and silt deposits.

The large amount of extraction from the River Roding is offset by a similar volume of filtered sewage which is discharged into the river. Deposition of silt on the flood meadows following winter flooding highlights the likely enrichment caused by the nutrient rich flood waters. Leaking sewage pipes under the reserve have also been a problem in recent years.

There is a drainage ditch that flows through Lower Brick Clamp and, along with a network of largely overgrown ditches, plays an important role in the hydrology of Great Horseley Fen. This ditch is periodically subject to oil pollution from the north. The level of the water table is thought to largely define the extent of fen/marsh within the reserve.

The mean annual rainfall for the reserve is 681mm, with the maximum soil moisture deficit reached in July. Summer storms are therefore unlikely to produce any serious water logging problems and, indeed, drought stress is noticeable during the height of summer. The period when the site starts to return to field capacity (zero soil moisture deficit) is during the latter part of September. The wettest period on average in previous years has been October (figures from the Environment Agency).

A2.3. Projected changes in climate

Climate change has the potential to cause a range of issues that will pose future challenges for grazing marsh habitats nationwide. Primary concerns are an increase in the frequency of extreme climatic events such as droughts and flooding, increasing temperatures which will lead to a lengthened grass-growing season and pollution incidents.

Climate change may lead to hotter drier summers and milder wetter winters in the UK, which will affect seasonal reserve works. Drier summers could decrease average summer river flows, leading to a lower river quality, reduced water availability and less recharge of groundwater [2] This has important implications for livestock due to water shortages, heat stress and a reduction in forage. Whilst a drier summer may have a positive benefit for hay cutting, it can lead to certain vegetation species becoming dominant if fields are cut at the same time each year. The effects on the water table may result in a loss of important species that rely on wet meadows such as Brown Sedge which is only known to 11 sites in Essex.
In contrast, wetter winters may lead to increased incidents of flooding on the reserve which results in higher nutrient levels and pollution from sewer systems. Flooding restricts access on the reserve for scrub management and other tasks on the lower meadows during the winter as the ground becomes too waterlogged for machinery such as the flail to be used. This could result in a loss of nature conservation benefits and have implications for SSSI and HLS obligations. [2] There will likely be a greater importance placed on the reserve as a source of flood alleviation in the local community, which has been affected by flooding in the past.

Management of invasive species such as thistle may have to be altered if climate change leads to an extended growing period and late flowering. It could also mean that the cutting regime would need to be altered to maintain the correct sward height for target species in the SSSI agreement after livestock have been taken off the reserve. An extended growing period and increased temperatures may also facilitate range shifts for established and non-established invasive species. Often, species that are better able to tolerate and adapt to environmental change are the ones that succeed and dominate over other species, leading to changes in vegetation diversity and composition. [2]

References:

[1] Climate change impacts and adaptation (2017) *Environment Agency*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/758983/Climate_change_impacts_and_adaptation.pdf

[2] Joyce, C. B., Simpson, M., and Casanova, M.. (2016). Future wet grasslands: ecological implications of climate change. *Ecosystem Health and Sustainability* 2(9):e01240. 10.1002/ehs2.1240 https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ehs2.1240#:~:text=Climate%20change%20may%20have%20particularly,income%20or%20nature%20conservation%20benefits.

A2.4. History of management

Brief history of the area

The meadows came into existence centuries ago under an historic system of grazing and hay cutting. Although the specifics are largely unknown, it is likely this management was sporadic in nature. The green lane running through the centre of the reserve served as an old drover's road from Epping Forest to Romford Market, and the meadows would have been used as a stop off en-route for cattle going to market. The meadows would also have likely been used by local people for grazing and production of hay. This would likely have resulted in unpredictability in both timing and intensity of grazing, making current attempts to mimic any historic management difficult.

More recently, areas of the reserve have been used as an RAF base and evidence of this use can still be seen across the site. Parts of the reserve were used for recreational purposes, with a camp site occupying an area of the upper meadows.

History of EWT involvement

EWT took on management of the site in 1987 on behalf of Epping Forest District Council under a 21-year Management Agreement. This agreement was renewed in 1999, and then updated in 2010 to bring in the Grange Farm Centre Trust as the other landowner.

Management in the last 5 years

Recent management has been primarily focussed on complying with HLS prescriptions. This involves early bite spring grazing, followed by a hay cut after the 15th July, and then aftermath autumn grazing. Ideally this would occur across all meadows, however, recent challenges with fencing condition and the number of available cattle have meant this has not been possible, and so grazing has been focussed on the flood meadows where greatest benefit could be delivered. Limiting hay cutting to after the 15th July has also created challenges, with the hay cuts not being possible to complete in some years due to weather constraints. There is also evidence from the Floodplain Meadows Partnership that an earlier hay cut would benefit the flood meadows, taking more nutrients out of the system and benefitting less vigorous species. Therefore, any re-application to Environmental Stewardship once the current HLS agreement runs out should take this into consideration when looking at what options to choose, or whether to apply at all.

A2.5. Current issues and constraints

- Grazing restrictions – currently only one grazing compartment can be grazed at a time, and poor fencing condition has meant some fields have not been grazed for several years.
- HLS restrictions – hay cutting limited to after 15th July. This may be negatively impacting flood meadows and makes completing the haycut across all meadows challenging with variable weather.

- Land-use change – construction of M11 cut off drainage ditches leading to the reserve, changing hydrology and therefore flora of the meadows.
- Lack of monitoring data and recording of management activities – difficult to look back on past management to see the effect of current management practices. This is being addressed with new monitoring and recording regimes.
- Pollution – both diffuse pollution from the Roding catchment, and acute local pollution incidents, have affected nutrient loads in the river Roding. This has resulted in excessive nutrients being deposited on to flood meadows, affecting flora. Run-off from the M11 likely affects Andrew's Pond, and pollution incidents in Debden can drain into the fen area through drainage ditches. There have also been historic leaks from sewage pipes running under the reserve. Pollution incidents have also affected the health of the river with several fish kills in recent years.
- Lack of hydrology control – more control over hydrology of the fen area would allow areas to be kept from drying out.
- Invasive species – both mink and signal crayfish are present in the river, and Himalayan balsam is found in patches on the riverbank.
- Heavy public use – the reserve is well used by local people, possible side effects of this include disturbance, excessive trampling resulting in loss of habitat, and enrichment from dog fouling.
- Antisocial behaviour – some low-level vandalism occurs on site, e.g., burning hay bales, fly-tipping, damage to signage, infrastructure and equipment.

APPENDIX 3: Biological Information

Recording areas are shown in Figures 13-15.

A3.1. Habitats and Vegetation communities

The distribution of habitats on the reserve is shown in Figure 17.

An NVC survey was done in 2008 .No mapping or area calculations of NVC communities are available, but the communities recorded in each of the meadows are shown in the table below.
The most recent NVC survey of the entire reserve was undertaken in 2017.

Table 22. NVC communities in the reserve meadows in 2008.

Field Name	NVC Community	Condition
Flood meadows		
Great Horsley Meadow	MG7c	Species-poor
Upper River Mead	MG7/MG9	Little botanical interest
Lower Mead	MG5a (80%) MG1e MG7c	Upper part is best upper/dry area on the reserve, remainder degraded
Further River Mead	MG7c	Probably nutrient enriched
Further River Mead (wet flush)	M27	Best area on the reserve
Hither (Middle) River Mead	MG7c MG9b	Diversity reduced by excessive nutrients
Hither River Mead (wet flush)	M27	Very species-rich in past; recovery possible
Luscious Mead	M7 MG1	Very little botanical interest
Upper hay meadows		
Lower Mead	MG5a (80%) MG1e MG7c	Upper part is best upper/dry area on the reserve, remainder degraded
Further Six Acres	MG5a MG1e MG9b	Species-rich & degraded areas
Hither Six Acres	MG5a MG1e	Species-rich & degraded areas
Four Acre	MG5a MG1e MG9b	Species-rich & degraded areas
Twenty-Two Acre	MG5a MG1	Species-rich & degraded areas
Eighteen Acre	MG5a MG1	Species-rich & degraded areas

Since these NVC surveys were undertaken, a new classification system for flood meadows has been developed. These new classifications have more options available which may better describe the flood meadow habitats on the reserve, and therefore inform on management best practice.

Additional plant communities (and sub-communities) have been, and are being, recognised since the final volume of British Plant Communities was published in 2000 (e.g. Rodwell et al. 2000). This handbook includes descriptions of several such communities/sub-communities that occur on floodplain meadows (see Chapter 8).

Cranfield University completed a vegetation survey in 2017, in which they recorded the percentage cover of each species found on the SSSI (Table 25).

Table 23. Species recorded on Roding Valley Meadows SSSI and their percentage cover.

Species/features	Cover	Species/features	Cover
Medium-bladed grass (including species as *Carex spp.* or *Alopecurus spp.*)	25.23%	*Urtica dioica*	0.28%
Broadleaved grass (including species as *Phragmites spp., Holcus lanatus* or *Festuca spp.*)	15.44%	Moss	0.27%
Very thin grass (including species as *Carex sp.* or *Poa sp.*)	13.86%	*Rumex crispus*	0.25%
Litter	13.24%	*Cardamine pratensis*	0.23%
Urtica urens	8.81%	*Rubus fruticosus*	0.22%
Bare ground	4.70%	*Trifolium repens*	0.15%
Potentilla anglica	3.02%	*Plantago lanceolata*	0.11%
Filipendula ulmaria	2.86%	*Rhinanthus minor*	0.10%
Ranunculus repens	1.78%	*Achillea ptarmica*	0.09%
Ranunculus acris	1.38%	*Crepis sp.*	0.08%
Lysimachia vulgaris	1.26%	*Bellis perennis*	0.07%
Open water	1.25%	*Alisma plantago aquatica*	0.05%
Taraxacum spp.	0.98%	*Barbarea sp.*	0.05%
Symphytum officinale	0.77%	*Anthriscus sylvestris*	0.03%
Galium aparine	0.73%	*Mentha aquatica*	0.02%
Lathyrus pratensis	0.71%	*Silaum silanus*	0.02%
Caltha palustris	0.56%	*Hedera helix*	0.01%
Rumex obtusifolius	0.40%	*Carex distichia*	0.01%
Rumex acetosa	0.39%	*Heraclium sphondylium*	0.01%
Cirsium arvense	0.28%		
Holcus lanatus	0.28%	**Total**	**100%**

Cranfield University also completed a NVC survey on the SSSI. The sampling layout and results are shown below.

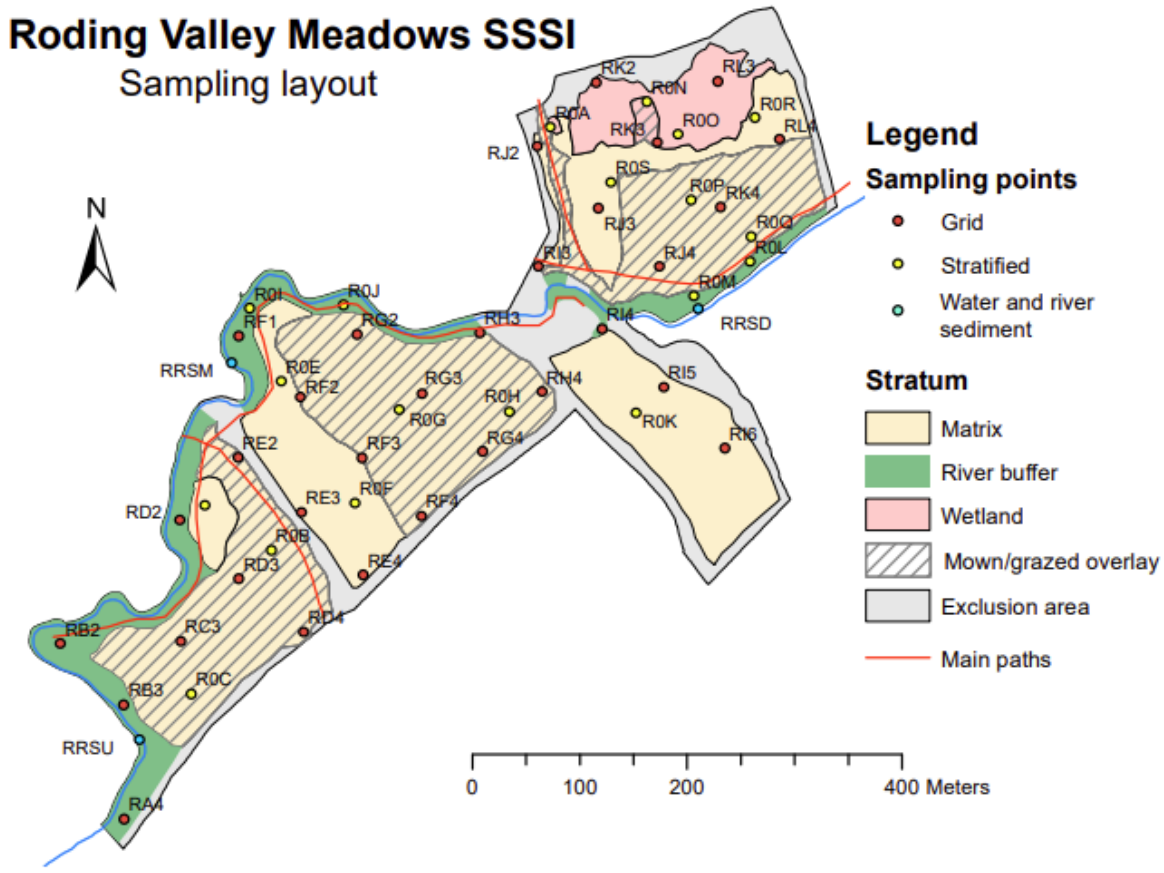

Figure 4: Layout of vegetation and soil sampling locations for the two sites: Hunsdon Mead (top) and Roding Valley Meadowns (bottom).

Figure 33. Soil and vegetation sampling sites surveyed by Cranfield University at Roding Valley Meadows SSSI.

Table 24. Roding Valley Meadows SSSI, species recorded by Cranfield University in each of the sampling quadrats. Species in bold are the most abundant. See Figure 33 (above) for reference to the sampling points.

Reference	NVC	Main species
RA4	M28b *Urtica – Galium aparine* sub-community	*Caltha palustris, Galium aparine, Bellis perennis,* Moss, ***Urtica urens***
RB3	W21 *Crataegus monogyna - Hedera helix* scrub	*Anthriscus sylvestris, Cirsium arvense,* Moss, *Bellis perennis, Caltha palustris,* ***Galium aparine****, Hedera helix,* ***Urtica urens*** (near *Crataegus*)
RB2	M28b *Urtica - Galium aparine* sub-community	Thin grass, Moss, *Bellis perennis, Cardamine pratensis, Galium aparine, Anthriscus sylvestris,* ***Urtica urens***
RC3	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, *Holcus lanatus,* ***Taraxacum sect. vulgaria****, Potentilla reptans, Cirsium arvense, Ranunculus acris*
RD4	M22c *Briza media - Trifolium spp.* subcommunity	**Thin grass**, Medium grass, *Trifolium repens, Potentilla reptans, Ranunculus acris, Rumex crispus*
RD3	MG10 *Holcus lanatus - Juncus effusus*	Thin grass, **Medium grass**, *Holcus lanatus, Rumex crispus, Ranunculus acris*
RD2	M28b *Urtica - Galium aparine* sub-community	**Medium grass**, Broad grass, *Carex distichia, Heraclium sphondylium, Symphytum officionale, Bellis perennis, Galium aparine, Cirsium arvense,* ***Urtica dioica****,* ***Urtica urens***
RE2	MG11 *Festuca rubra - Agrostis stolonifera - Potentilla anserina* inundation grassland	Thin grass, Medium grass, **Broad grass** (Festuca sp.) (dry grass)
RE3	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, *Ranunculus acris, Rumex crispus, Potentilla reptans,* ***Ranunculus repens***
RE4	MG4c *Holcus lanatus* subcommunity	**Thin grass, Medium grass**, Broad grass, ***Lysimachia vulgaris****, Rumex acetosa* (**dry grass**)
RF4	MG5 *Cynosurus cristatus - Centaurea nigra* lowland hay meadow and pasture	**Thin grass**, Medium grass, Broad grass, ***Lysimachia vulgaris****, Mentha aquatica, Rumex acetosa, Lathyrus pratensis, Plantago lanceolata,Ranunculus acris* (**dry grass**)
RF3	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, ***Ranunculus acris****, Filipendula ulmaria,* ***Ranunculus repens***
RF2	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, Broad grass, *Ranunculus acris, Ranunculus repens, Cardamine pratensis,* ***Filipendula ulmaria****, Potentilla anglica, Plantago lanceolata*
RF1	M28b *Urtica - Galium aparine* sub-community	Caltha palustris, Galium aparine, **Urtica urens** (bare ground)
RG2	MG4c *Holcus lanatus* subcommunity	**Thin grass**, Medium grass, **Broad grass**, *Rumex acetosa, Taraxacum sect. vulgaria,* ***Potentilla anglica****, Plantago lanceolata, Ranunculus acris*
RH3	M28b *Urtica - Galium aparine* subcommunity	Thin grass, **Broad grass**, *Cirsium arvense,* ***Urtica urens***
RG3	M27a *Filipendula ulmaria - Angelica sylvestris* mire	Thin grass, Medium grass, *Broad grass, Rumex crispus,* ***Filipendula ulmaria****, Rhinanthus minor*

RH4	MG4c *Holcus lanatus* subcommunity	**Thin grass**, Medium grass, Broad grass, *Taraxacum sect. vulgaria, Cardamine pratensis, Cirsium arvense, Ranunculus acris*
RG4	M22 *Juncus subnodulosus - Cirsium palustre* fen-meadow	Thin grass, **Medium grass**, Broad grass, *Lysimachia vulgaris, Cardamine pratensis, Lathyrus pratensis, Mentha aquatica,* ***Potentilla anglica****, Plantago lanceolata, Rumex acetosa, Ranunculus acris*
RI4	M22 *Juncus subnodulosus - Cirsium palustre* fen-meadow	Thin grass, Medium grass, Broad grass, *Ranunculus repens, Taraxacum sect. vulgaria,* ***Rumex obtusifolius*** **(dry grass)**
RI5	MG4c *Holcus lanatus* subcommunity	**Thin grass**, Medium grass, Broad grass, *Lysimachia vulgaris, Plantago lanceolata, Ranunculus repens, Rumex crispus, Rhinanthus minor,* ***Taraxacum sect. vulgaria****, Trifolium repens, Galium aparine, Lathyrus pratensis*
RI6	M27a *Filipendula ulmaria - Angelica sylvestris* mire	Medium grass, **Broad grass**, *Rumex acetosa, Lathyrus pratensis* (dry grass)
RJ2	M27 *Filipendula ulmaria - Angelica sylvestris* mire	Broad grass, *Symphytum officionale,* ***Filipendula ulmaria*** (dry grass)
ROA	S4 *Phragmites australis* swamp and reed beds	Broad grass and water surface
ROS	S4 *Phragmites australis* swamp and reed beds	**Medium grass**, Broad grass, *Ranunculus repens, Rumex obtusifolius, Rumex crispus* **(dry grass)**
RK2	M27 *Filipendula ulmaria - Angelica sylvestris* mire	Broad grass, Moss, *Achillea ptarmica, Barbarea sp., Bellis perennis, Cardamine pratensis,* ***Filipendula ulmaria,*** *Silaum silanus, Rumex obtusifolius*
RON	M27 *Filipendula ulmaria - Angelica sylvestris* mire	**Broad grass** (as Poa trivialis), Filipendula ulmaria **(water surface)**
RK3	S4 *Phragmites australis* swamp and reed beds	Broad grass
RO0	S4 *Phragmites australis* swamp and reed beds	Medium grass, *Achillea ptarmica, Cardamine pratensis* **(dry grass** and water surface)
RL3	M27 *Filipendula ulmaria - Angelica sylvestris* mire	Broad grass, *Filipendula ulmaria, Galium aparine, Rumex obtusifolius* **(dry grass)**
ROR	MG4c *Holcus lanatus* subcommunity	Medium grass, *Filipendula ulmaria, Lathyrus pratensis, Potentilla anglica,* ***Rubus fruticosus*** **(dry grass)**
RI3	M28b *Urtica – Galium aparine* sub-community	Broad grass, *Caltha palustris, Galium aparine,* ***Urtica urens***
RJ4	S4 *Phragmites australis* swamp and reed beds	Thin grass, **Medium grass**, Broad grass (Phragmites sp.), *Taraxacum sect. vulgaria*
ROP	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, Broad grass, *Barbarea sp., Rhinanthus minor, Lathyrus pratensis*
RK4	MG4c *Holcus lanatus* subcommunity	Thin grass, Medium grass, Broad grass, *Ranunculus repens, Caltha palustris,* ***Lathyrus pratensis****,* ***Potentilla anglica***
ROQ	MG4c *Holcus lanatus* subcommunity	**Thin grass**, Medium grass, Broad grass, *Rubus fruticosus,* ***Taraxacum sect. vulgaria****, Lathyrus pratensis, Potentilla anglica, Ranunculus acris, Rumex acetosa*

RL4	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, Broad grass, *Crepis sp., Ranunculus acris, Ranunculus repens, Taraxacum sect. vulgaria, Lathyrus pratensis, Potentilla anglica, Rumex acetosa*
ROM	MG4c *Holcus lanatus* subcommunity	Medium grass, **Broad grass**, *Symphytum officionale,* ***Cirsium arvense***
RJ3	M27 *Filipendula ulmaria - Angelica sylvestris* mire	Medium grass, ***Symphytum officionale***, *Filipendula ulmaria, Lathyrus pratensis* (**dry grass**)
ROK	M22 *Juncus subnodulosus – Cirsium palustre* fen-meadow	Thin grass, Medium grass, **Broad grass**, *Crepis sp.,* ***Lysimachia vulgaris,*** *Galium aparine, Lathyrus pratensis, Ranunculus acris, Rumex acetosa*
ROH	MG4c *Holcus lanatus* subcommunity	Thin grass, Broad grass, *Ranunculus repens, Taraxacum sect. vulgaria,* ***Potentilla anglica***
ROG	M27 *Filipendula ulmaria - Angelica sylvestris* mire	Thin grass, Broad grass, *Caltha palustris* , ***Filipendula ulmaria***
ROJ	S26 *Phragmites australis - Urtica* fen	Broad grass (*Phragmites sp.*), *Galium aparine,* ***Urtica urens***
ROI	M28b *Urtica - Galium aparine* subcommunity	***Urtica urens***
ROE	MG4c *Holcus lanatus* subcommunity	**Medium grass**, Broad grass, *Ranunculus repens,* ***Potentilla anglica***
ROF	MG4c *Holcus lanatus* subcommunity	Medium grass, Broad grass, *Alisma plantago aquatic, Ranunculus repens* (**dry grass**)
ROB	MG4c *Holcus lanatus* subcommunity	Thin grass, **Medium grass**, Broad grass, ***Ranunculus repens***
ROD	MG4c *Holcus lanatus* subcommunity	**Medium grass**, Broad grass, Crepis sp., *Ranunculus repens, Taraxacum sect. vulgaria, Lathyrus pratensis,* ***Potentilla anglica***
ROC	M22 *Juncus subnodulosus - Cirsium palustre* fen-meadow	Thin grass, **Medium grass**, Broad grass, *Cardamine pratensis,* ***Filipendula ulmaria****, Lathyrus pratensis, Ranunculus acris*

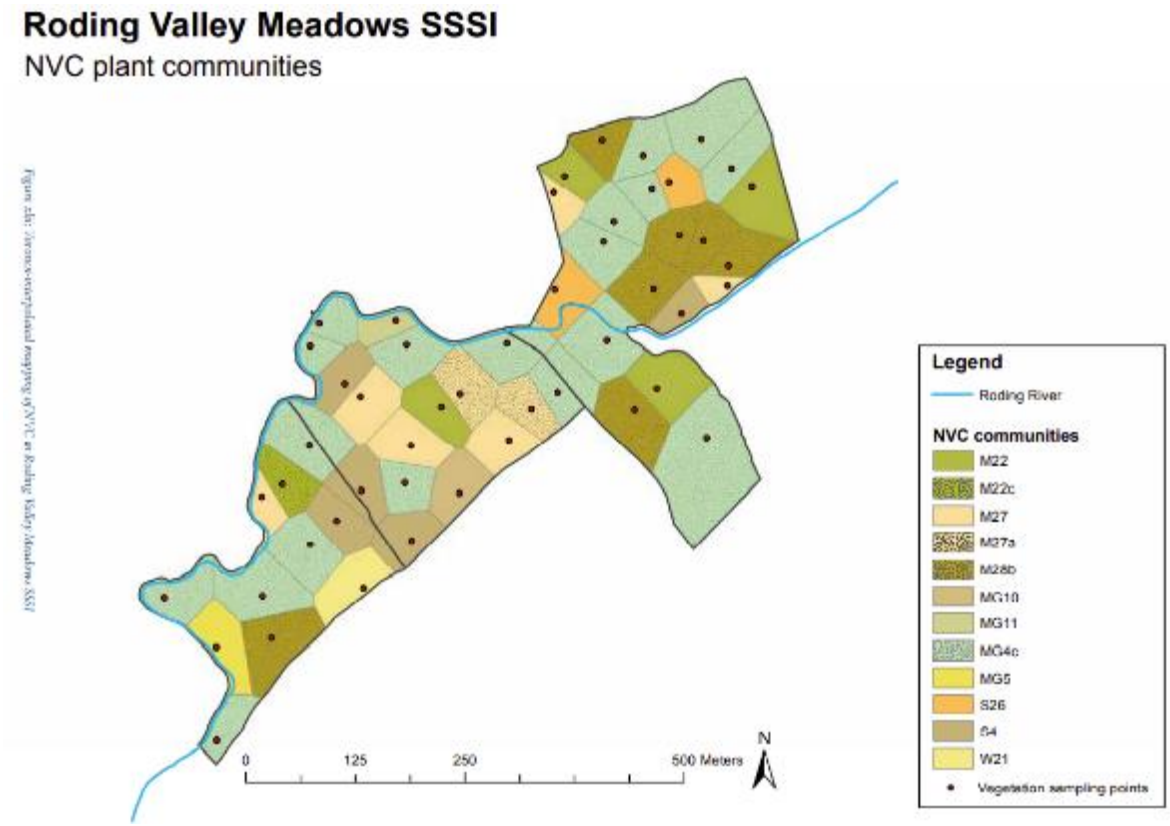

Figure 34. NVC plant communities at Roding Valley Meadows SSSI.

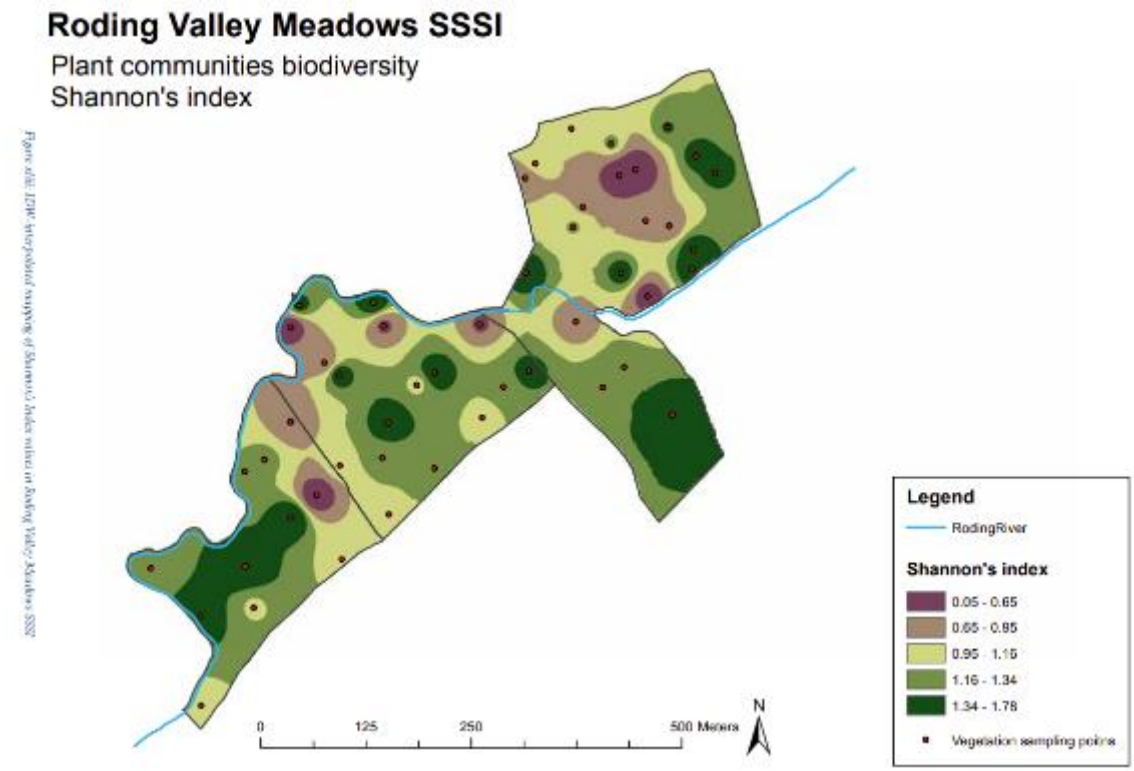

Figure 35. Plant communities biodiversity Shannon's index at Roding Valley Meadows.

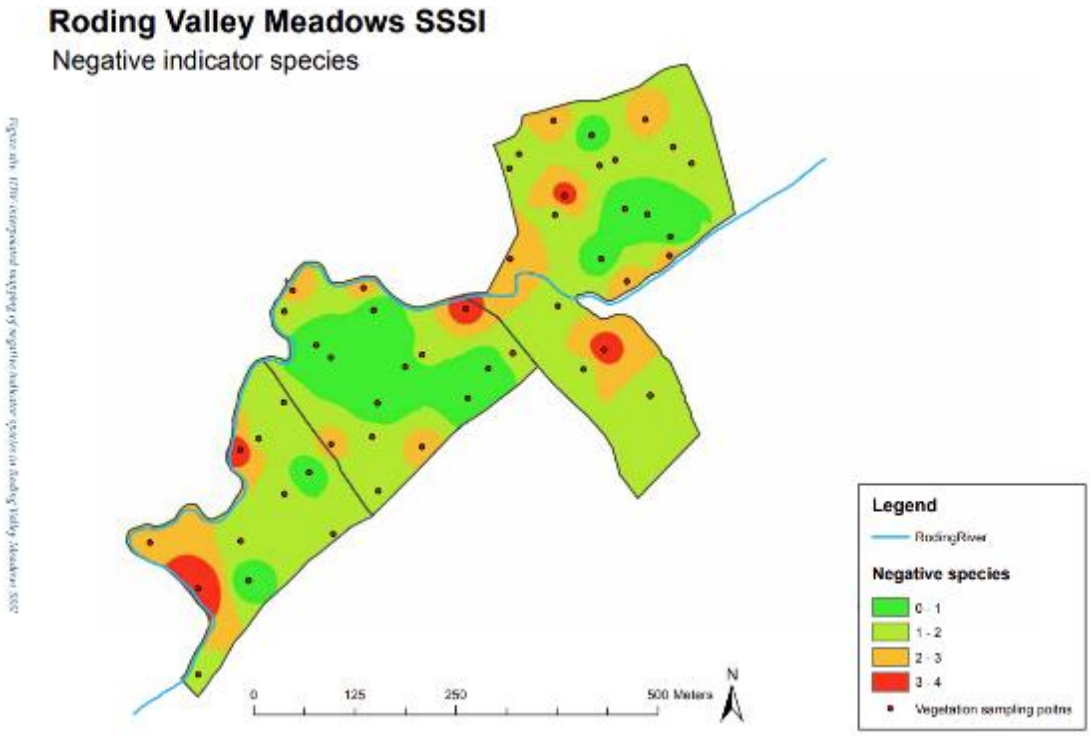

Figure 36. Negative indicator species at Roding Valley Meadows SSSI.

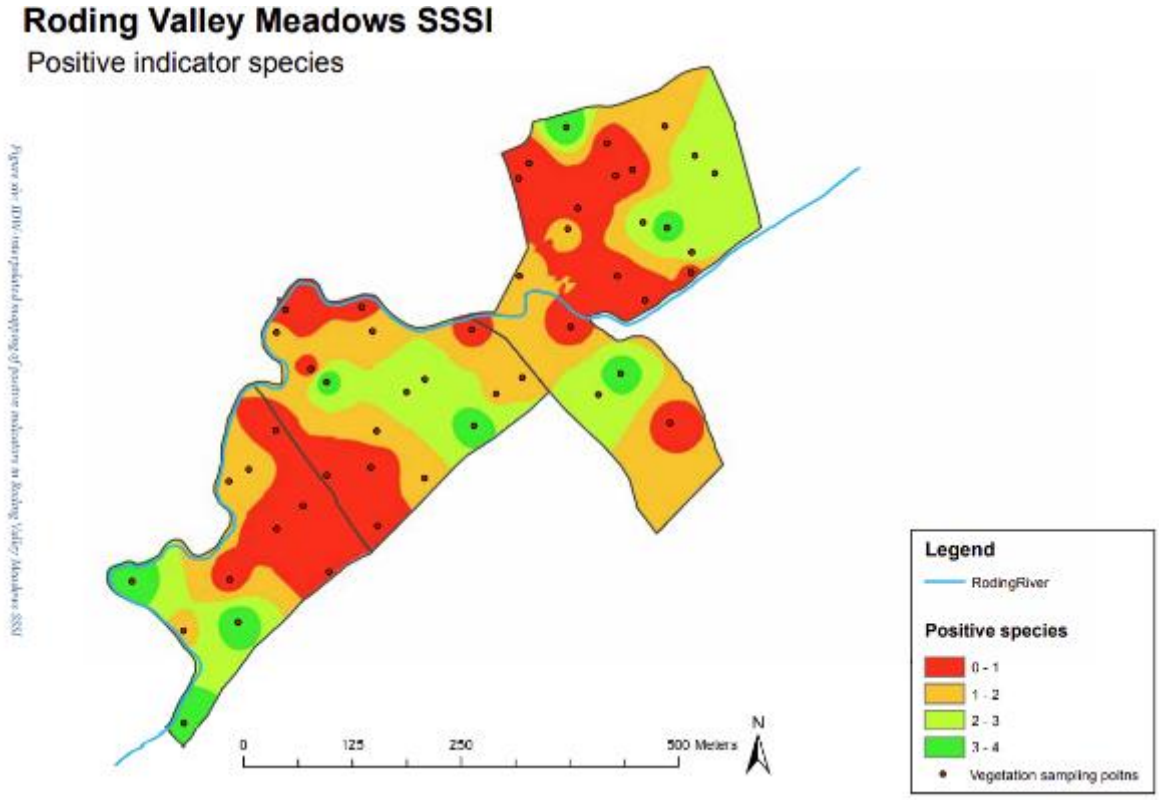

Figure 37. Positive indicator species at Roding Valley Meadows SSSI.

A3.2. Important species

Table 25. Important species and their status.

Scientific name	English name	Popn. Size and Date Last Recorded	Status	Comments
Plants				
Carex disticha	Brown sedge		Essex Red data List species	Occurs in compartment 3, largest brown sedge bed in Essex
Dactylorhiza praetermissa	Southern marsh orchid	3 spikes recorded in 2015, 6 spikes in 2018	Essex Red data List species	Occurs in compartment 23
Scirpus sylvaticus	Wood club rush		Essex Red data List species	Previously found by the river on the southern edge of compartment 4
Silaum silaus	Pepper saxifrage		Essex Red data List species	Several patches in compartment 16 and 18
Succisa pratensis	Devil's bit scabious		Essex Red data List species	Occurs in compartments 16, 18, 19 and 21
Achillea ptarmica	Sneezewort		Essex Red data List species	Occurs in compartments 18, 23 and 25
Mammals				
Lutra lutra	Otter	Footprints on mink raft recorded in 2017	NERC Act 2006	
	Bat spp. Common pipistrelle, soprano pipistrelle, Daubenton's			No official species data, but roosts and flying individuals detected
Birds				
Locustella naevia	Grasshopper warbler	Individual last recorded in summer 2016, reeling for multiple weeks but no successful breeding	Red list 'Birds of Conservation Concern', NERC Act 2006	Non-breeding
Sturnus vulgaris	Starling		Red list, NERC Act 2006	Breeding status unknown

Turdus pilaris	Fieldfare		Red list	Non-breeding
Turdus philomelos	Song thrush	Recorded late March 2017 by Cranfield University students.	Red list, NERC Act 2006	Breeding
Turdus iliacus	Redwing		Red list	Non-breeding
Turdus viscivorus	Mistle thrush		Red list	Breeding
Passer domesticus	House sparrow		Red list, NERC Act 2006	Breeding
Motacilla flava	Yellow wagtail		Red list, NERC Act 2006	Non-breeding, passage migrant
Motacilla cinerea	Grey wagtail		Red list	Non-breeding
Linaria cannabina	Linnet	Recorded late March 2017 by Cranfield University students.	Red list	Non-breeding
Gallinago gallinago	Common Snipe		Amber List	Non-breeding
Alcedo atthis	Kingfisher		Amber List	Breeding in local area
Apus apus	Swift		Amber List	Non-breeding
Falco tinnunculus	Kestrel		Amber List	Breeding
Prunella modularis	Dunnock	Recorded late March 2017 by Cranfield University students.	Amber List, NERC Act 2006	Breeding
	Meadow Pipit	Recorded late March 2017 by Cranfield University students.		
Emberiza schoeniclus	Reed bunting	Recorded late March 2017 by Cranfield University students.	Amber List, NERC Act 2006	Breeding
	Herring Gull	Recorded late March 2017 by Cranfield University students.		
	Wood Sandpiper	Recorded late March 2017 by Cranfield University students.		

	Greylag Goose	Recorded late March 2017 by Cranfield University students.		
Reptiles				
Lacerta vivipara	Common lizard		NERC Act 2006	
Natrix natrix	Grass snake		NERC Act 2006	Recorded across site
Invertebrates				
Coenonympha pamphilus	Small heath		NERC Act 2006	Occasional records
Platycnemis pennipes	White-legged damselfly		Essex Red Data List species, Vulnerable/ threatened	
Sympetrum sanguineum	Ruddy darter		Essex Red Data List species	
Satyrium w-album	White letter hairstreak		UK BAP Priority species, Essex Red Data List species	Occasional records

A3.3. Trends of important species

No data available.

A3.4. Predicted impacts of climate change on existing/potentially Important Features

In general, climate change is anticipated to create more unpredictable and extreme weather conditions that will theoretically impact the habitats and species composition, and therefore the management, of the reserve.

Table 26. Predicted impacts of climate change on existing/potentially important features.

Important feature	**Predicted impacts of climate change on the condition of the feature over the next *ca* 25 years, if no adaptation measures are taken**	**Potential adaptation measure(s)**
Floodplain meadows	More frequent and extreme flooding Longer growing seasons - favours more dominant grasses	Alternatives sought for spring grazing if conditions are persistently too wet Flexible grazing and mowing regime
Upper hay meadows	Longer growing seasons - favours more dominant grasses	Flexible grazing and mowing regime
Fen	High rates of evaporation - conditions favoured by scrub, willow carr and grasses	Manage scrub encroachment Take measures to artificially control hydrology regime

A3.5. Partnership working

EWT is already involved in several successful partnerships at Roding Valley Meadows. These include:

- **The Grange Farm Centre Trust** – Owner of part of the reserve, providing an annual management contribution, as well as funding extra projects on the reserve.
- **Epping Forest District Council** – Owner of part of the reserve, providing an annual management contribution, as well as running joint events with EWT.
- **Voluntary Action Epping Forest** – Disabled Conservation Group volunteer on a fortnightly basis.

Opportunities

There are a number of other conservation bodies operating in the local area. These include:

- **Epping Forest District Council** – CountryCare department manage a number of nature reserves and wildlife sites within the district. Some joint work already, they have assisted with management of Hawkesmere Springs and fen cutting at Roding Valley Meadows.
- **London Wildlife Trust** – neighbouring Wildlife Trust who manages a number of nature reserves within London, including the nearby Walthamstow Wetlands.
- **Corporation of London** – manage Epping Forest.
- **Floodplain Meadows Partnership (FMP)** – one of the reserve meadows is currently part of a study of floodplain meadows co-ordinated by the FMP. They have also visited the reserve and advised on management.
- **Environment Agency** – undertakes maintenance work of the river channel, e.g. tree works. Also undertake monitoring of the river channel, including regular fish studies and nutrient monitoring. Potential for project funding as part of flood prevention/habitat enhancement works.
- **Natural England** – advise on SSSI and HLS.
- **London Grassland Network** – network of conservation organisations in London managing grassland sites. Meet occasionally for site visits, to discuss issues/successes and to share experiences.
- **Essex Botanical Society** – local group undertaking surveys throughout Essex. They are also represented on the Consultative Group.

APPENDIX 4: People Engagement Information

A4.1. Public Access

The reserve is accessible to the public year-round and is open throughout the day. Although the reserve is accessible at night, this is not openly advertised and use of the reserve at night is not actively encouraged, other than through specific events. There are a variety of access points to the reserve by foot, and parking is available at a public car park at The David Lloyd Centre (20 spaces) and The Grange Farm Centre (100 spaces).

Footpaths provide access across the site to limit trampling the wildflower meadows by visitors. The onsite footpaths are variable in condition and are predominantly not accessible for disabled visitors due to their uneven nature. There is a section of concrete pathway at the west end of the reserve and a hard trail that with some improvements and maintenance could be made wheelchair/pushchair accessible.

Access, car parking and public rights of way are shown in Figure 6.

Table 27. Reserve information.

Reserve information	
Reserve opened to visitors:	Declared a Local Nature Reserve in 1986
Visitor Centre / Information point opening hours throughout the year (if applicable)	Grange Farm Centre open 9am – 5pm weekdays

A4.2. Headlines and Review of People Engagement targets

People Engagement Objectives from last management plan

Visitor objectives were not included in the last management plan, other than maintaining pathways, infrastructure and interpretation boards.

Headlines & celebrations

Despite no people engagement objectives being included in the last management plan, great improvements have been made in the last few years to develop and enhance visitor engagement:

- Provision of primary education visits, working with Grange Farm Centre to provide excellent facilities.

- Increase in the amount and quality of informal events, including ambitious and innovative new events.
- Opportunities developed through new working relationships with partner organisations, such as with Voluntary Action Epping Forest

A4.3. Wildlife Experiences

Table 28.Monthly wildlife experiences at the reserve.

January	Winter flooding, snowy landscapes
February	Winter flooding, Migratory birds
March	Blossoming trees and bluebells
April	Dawn chorus
May	Butterflies
June	Wildflower meadows
July	Grassland invertebrates
August	Dragonflies and damselflies, devil's-bit scabious flowering
September	Autumn colours
October	Autumn colours, fungi
November	Winter flooding, fungi
December	Winter flooding, winter thrushes

A4.4. Visitor Income

Income is generated through school visits, informal events and talks to local groups. Income generated in recent years is outlined below.

Table 29.Visitor income generated by formal education and informal events from 2013-18.

Year	Formal education (£)	Informal events (£)	Total (£)
2018	4,411	2,122	6,533
2017	3,272	2,303	5,575
2016	4,381	1,333	5,714
2015	3,199	1,123	4,322
2014	1,358	588	1,946
2013	340	171	511

A4.5. Membership recruitment

Membership posters are in noticeboards at major entrances, and a membership ask is made at all events.

A4.6. Sustainability

A4.7. Outreach

Local Events

- Loughton Festival
- Epping Town Show

Educational Outreach Visits

- Ramsden Academy
- Forest School

A4.8. Partnership working

In recent years, EWT have worked with a number of other organisations to increase engagement, with the potential to develop these relationships further. These include:

- **Colebrook Royals Football Club** – Local football club based at the Grange Farm Centre, have worked with them on a number of events for other charities including Haven House Hospice and AKO Autism Awareness.
- **Chigwell Riding Trust for the Disabled** – Use the reserve widely and represented on the reserve Consultative Group.

Further Opportunities

Local Charities

- **Suntrap** – local education centre operating in Epping Forest.
- **Lambourne End** – local education centre.
- **Haven House** – local hospice, have run events at Grange Farm as well as in the hospice grounds.

Local Clubs

- **Loughton Athletics Club** – use the reserve several times a year for organised running events.
- **Epping Forest Orienteering Group** – have had conversations in the past about setting up a route on the reserve.

A4.9. Current issues and constraints

- Due to its proximity to a large population, the reserve can be used by a wide range of individuals and groups. Both the reserve and the Grange Farm Centre are unlikely to be discovered by accident as they have little to no through traffic, and unlike other visitor centres have no shop or café. In 2020 due to the Covid-19 pandemic there was a large increase in the number of people using the reserve and other local greenspace for exercise. Currently the reserve infrastructure is not well suited to handle large volumes of visitors.

A4.10. Rationale for any changes to visitor objectives and targets

APPENDIX 5: References and Data Sources

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APPENDIX 6: LAND AGENCY INFORMATION

A6.1. Tenure

Land or rights let out by EWT.

Table 30. Land/rights held by EWT.

Land / Rights held by EWT					
Freehold					
Land Agency Deed ref No.	**Agreement date**	**Vendor**	**Area (ha)**	**Comments**	
Leasehold					
Land Agency Deed ref No.	**Agreement date**	**Lessor**	**Area (ha)**	**Term and expiry date**	**Rent review dates and break-clauses**
Management agreements, licences, consents and other rights					
Land Agency Deed Ref No.	**Management agreement /licence/ consent etc.**	**Agreement date**	**Lessor**	**Area (ha)**	**Term and expiry date**
Rights not let at the discretion of the EWT (applies to Scotland only)					
Land Agency Deed ref No	**Land/right**	**Tenant**	**Area**	**Comments**	
Land/rights let by EWT					
Leases					
Land Agency Deed ref No.	**Land/right**	**Date**	**Lessee**	**Area**	**Term and review/expiry date**
Tenancies					
Land Agency Deed ref No.	**Land/right**	**Date**	**Lessee**	**Area**	**Term and review/expiry date**

Licences					
Land Agency Deed ref No.	**Land/right**	**Date**	**Licensee**	**Area**	**Term and review/expiry date**

A6.2. Wayleaves and easements

There are no records of wayleaves or easements at Roding Valley meadows.

A6.3. Planning permissions, statutory consents and statutory licences

There are no planning permissions, statutory consents or statutory licences at Roding Valley Meadows.

A6.4. Revenue grant schemes and area-based subsidies

Land entered into revenue grant schemes is shown on Figure 7. Further details are given in the table below.

Table 31. Revenue grant schemes and area-based subsidies.

Scheme	Commencement and expiry dates	Tier/landscape type etc	Area (ha)	Capital works	Who receives grant	Comments
Environmental Stewardship	01/03/2012 – 28/02/2022	Higher Level			EWT	The agreement is stored on the EWT R:drive and a hard copy in the Roding Valley Meadows office
Environmental Stewardship	01/03/2012 – 28/02/2022	Entry Level			EWT	The agreement is stored on the EWT R:drive and a hard copy in the Roding Valley Meadows office
	Applied for annually	Basic Payment Scheme			EWT	Continued application and funding will depend on eligibility based on RPA inspections

	2010 – 2035	Epping Forest District Council contribution to management costs			EWT	Payment to EWT to manage RVMNR on EFDC's behalf
	2010 – 2035	Grange Farm Trust contribution to management costs			EWT	Payment to EWT to manage RVMNR on GFC's behalf
	2013 – 2035	Grange Farm Trust contribution to Assistant Ranger costs			EWT	Extra contribution to fund education element of Assistant Ranger role

A6.5. Main fixed assets

There are no fixed assets at Roding Valley meadows.