NAILSEA ENVIRONMENT & WILDLIFE TRUST

MANAGEMENT PLAN 2021 - 2031

Moorend Spout Nature Reserve

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1 INTRODUCTION

1.1 Purpose of the Plan

This plan has been prepared in order to identify the specific objectives, priorities and aspirations in relation to the current and future management of Nailsea Environment and Wildlife Trust's (NEWT) nature reserve at Moorend Spout over the next 10 years.

Management plans are a core element of nature reserve and woodland management work. This plan has been prepared in order to provide a framework within which all future tasks can be carried out and to enable any person to understand how and why decisions are taken. The plan will also ensure members and visitors will be engaged with the reserve's ongoing management.

Accurately planning activities for up to ten years in advance is clearly subject to many variables and so this plan has been designed to be a 'working document' and may therefore be added to or amended as necessary during the timeframe of this document.

This is the second management plan that has been written for the Moorend Spout Nature Reserve. This plan covers the time period 2021 - 2031.

1.2 Management Plan Structure

This plan describes the geology, history, archaeology, flora and fauna of the nature reserve as well as its past management. It presents a detailed strategy for the reserves and documents the tasks to be undertaken over the next ten years to achieve the strategic goals.

2 SITE DESCRIPTION

2.1 Location and Access

Moorend Spout Nature Reserve is situated on the low-lying land between the northern edge of Nailsea and the Tickenham Ridge. The central grid reference for the site is ST 467716 and the land lies between 5 and 10 metres above sea level. The reserve covers approximately 6 acres/2.4 hectares.

The reserve falls within the Tickenham Parish Boundary and the local planning authority is North Somerset Council.

Although the reserve is situated within a rural location, approximately half a million people live within a 10 mile radius of the site, with the city of Bristol and the towns of Nailsea and Clevedon being large centres of population.

There is pedestrian access to the reserve from a public footpath leading off Pound Lane, Nailsea and from Stone Edge Batch in Tickenham on the B3128. NEWT has also created numerous permissive paths to enable visitors to reach parts of the site that were previously inaccessible.

There is permissive access via a neighbouring property for grazing animals and agricultural machinery

2.2 Relation to other Green Infrastructure (Figure 1)

Moorend Spout Nature Reserve (Figure 2) is located within the flood plain on the eastern edge of Nailsea Moor. Tickenham Ridge lies to the north where the tree canopy runs in almost an unbroken line from Clevedon to Portbury.

2.3 Ownership

Nailsea Environment and Wildlife Trust is the sole owner of Moorend Spout Nature Reserve. The purchase of the site was facilitated with financial assistance from YANSEC and additional funding was provided by Nailsea Town Council, North Somerset Council and the Bristol Naturalists' Society.

Nailsea Environment and Wildlife Trust was formed in 2009 and is a registered charity (number 1132465).

The Trust's constitutional objectives are:

- To promote for the benefit of the public the conservation, protection and improvement of the physical and natural environment by promoting biodiversity.
- To advance the education of the public in the conservation, protection and improvement of the physical and natural environment.

2.4 Land Acquisition

NEWT is receptive to acquiring suitable new land to manage as nature reserves providing suitable funds could be raised.

2.5 Overview of the Reserves

The reserve essentially consists of three separate areas:

- The eastern portion is mainly made up of wet, rough grassland, contains two ponds and a hedgerow.
- The central area is an Alder carr (wet woodland).
- The western portion is an area of rough, wet grassland with sedge/reeds and patches of dense Bramble.

The Land Yeo (a man-made river constructed in the 13th -14th century to provide a leate to Tickenham Mill) forms the northern boundary. The Middle Yeo River (Jackland's Rhyne) and a shallow rhyne form the southern and part of the western boundary. The remainder of the western boundary is a ditch with a short length of fencing. The eastern boundary is defined by a wire fence with a planted hedge on the reserve side of the fence. Apart from the bank of the Land Yeo, the whole of the reserve is normally wet, with standing water in places during the winter, although the water table can drop by over a metre in summer.

At the south entrance to the reserve, the Middle Yeo cascades in over a small waterfall beneath the footbridge. The water flow at this point is variable but there is always some water flowing regardless of the season. The flow can be controlled by the Internal Drainage Board (IDB) using the sluice valves at Jackland's Bridge.

The three physically different parts of the reserve each have their own importance. The species records are incomplete since until recently, little detailed systematic recording has been done. The encroachment of Brambles and Bindweed on the western side of the reserve together with the lush growth of the sedges and reeds in this area has lead to the loss of some plant species (e.g. Marsh Orchids). The increased area of Brambles has however, benefitted the population of Whitethroats.

The Alder carr, which contains some Willow, was invaded by Ash, Hawthorn and Bramble prior to NEWT's involvement. Much of the Ash and Hawthorn was removed during the winter of 2009/2010. Within the carr there are many ponds and ditches although these areas of water are often choked with dead leaves and decaying organic matter. A small stream ducts spring water flowing out of the carr towards the boardwalk, forming several, overgrown, small ponds along its course. This water sinks into the ground in the general area of the boardwalk and is presumably ducted into the rhyne to the west.

One of the ponds within the carr produces occasional outbursts of gas bubbles (probably carbon dioxide), reminiscent of the activity in the bubbling pond at Towerhouse Wood, about 1 km away.

The wet grassland, which forms the largest area of the reserve, is botanically rich with patches of rushes a significant component. This area may have been 'improved' since the grass growth is very lush.

The rivers and ditches around the reserve are important for plant and insect species. Dragonflies are common, with several species recorded. The male Banded Demoiselle, the emblem of NEWT, is particularly noticeable during the summer months.

Various surveys of birds, butterflies and insects have been performed. To date, the most important records are those for several Whitethroat breeding territories in the Bramble areas on the western part of the reserve (and on the adjacent property). Kingfishers, Herons, Kestrels and Barn Owls have also been seen.

It appears that Otters pass through the reserve, since spraint has been found near to the waterfall, but at present there is no evidence that they stay for any significant time. The presence of Trout in the Land Yeo and in the nearby fish farm is undoubtedly attractive to Otters. Mink would also be expected in the area and there were reports of possible sightings in 2013. The watercourses are probably suitable habitats for water voles but none have yet been reported.

2.5.1 Conservation Status

The western part of the reserve is a Regional Wildlife Site and the rhyne at the southern corner is within the Tickenham and Nailsea Moors Site of Special Scientific Interest (SSSI). The wet meadow area is classified as floodplain grazing marsh – a priority habitat under the North Somerset Biodiversity Action Plans (BAP). The Alder carr is also a rare habitat in the UK and is recorded as a priority habitat under the North Somerset BAP.

2.5.2 Amenity Value and Public Use

There is a public footpath linking Tickenham and Nailsea running north to south across the reserve, well used by local people and by walking groups from further afield. Children visit the Land Yeo for paddling and general enjoyment. The river bank is sometimes used as a picnic site by some of these visitors. An important visual feature of the reserve is the 'Spout' or waterfall, known as 'Moorend Spout'. Water runs from the reserve over the waterfall into the Middle Yeo where the water table is approximately 2 metres lower. On a broader scale, the most noticeable aspect of the reserve is the Alder carr. This can be seen from the surrounding area and is a visually important part of the local landscape. To the north of the nature reserve (outside the reserve boundary) there is a large forked Corsican Pine.

The full species list can be found on the NEWT website (www.newtnailsea.org.uk) under 'species list'.

3 HISTORY

The field boundaries have been unchanged since at least 1884. There is no evidence of cultivation, probably because of the very wet nature of the site.

Jackland's Tunnel, a pipe buried at a depth of approximately 1.5 metres, was installed in the early 1800s to channel excess water from the surrounding fields to beyond the spout where the water table is much lower and in so doing, improve the drainage of the land.

There is historical evidence on maps for the use of the river to power a pump to deliver water to Nailsea at the point where the footpath crosses the river. The remains of a similar pumping system can be found on the Land Yeo near to Towerhouse Wood.

Little is known about the archaeology of the site. We have found no evidence of habitation but it is likely that the field has been grazed for at least the last two centuries.

The nearby Tickenham Mill was established by the Canons of the Abbey of Saint Augustine (now Bristol Cathedral) in 1148 using the flow of the Land Yeo to power a water wheel. The mill at Middletown in Tickenham is sited on a fault line which gives a 12 feet head of water from an 'over shot' or 'high breast' shot wheel. The mill was later purchased by Lady Smyth of Ashton Court and converted to a water pump to supply water to her farms. The water was pumped to tanks at Cadbury Camp from a well in Tickenham Court. The mill is now a private dwelling house.

The Land Yeo originates from springs arising on Dundry Hill and although part of its route to the sea at Clevedon is through a natural watercourse, the section flowing past the reserve and on to Tickenham is contained within a man-made embankment. The river has provided power to at least ten watermills along its length for more than a thousand years, although only one is still operating today.

4 NATURE RESERVE MANAGEMENT 2011 - 2021

4.1 Reserve Management

Commencing in 2009, a series of reserve management projects have been undertaken with the aim of transforming what was once neglected, species-poor wet woodland and grassland into a thriving nature reserve rich in plant and animal life.

Tasks are undertaken throughout the year, almost exclusively by volunteers.

4.2 Management Aims

- To maintain and improve the biodiversity of Moorend Spout Nature Reserve.
- To maintain and improve the visual amenity of the reserve.
- To educate visitors about the wildlife present.

4.3 The Seven Key Objectives of NEWT's Management Plan are:

- To maintain and improve the quality and diversity of the grassland.
- To control the Bramble and sedge west of the Alder carr.
- To manage the waterside vegetation.
- To maintain the ponds in the grassland.
- To maintain the paths across the reserve.
- To encourage responsible use of the reserve by visitors.
- To meet all safety and legal requirements.

4.3.1 Maintaining and Improving the Quality and Diversity of the Grassland

The Coronation Meadow Project

Across the UK, only small fragments of wildflower-rich meadows and grasslands still survive and a staggering 97% of wildflower meadows have been lost in the last 75 years.

In 2012, Plantlife published 'Our Vanishing Flora', a report highlighting the loss of wildflowers from individual counties across Great Britain since the Coronation. In his foreword for the report, Plantlife's Patron, HRH The Prince of Wales, called for the creation of new wildflower meadows, at least one in every county, to celebrate the 60th anniversary of the Coronation.

The Coronation Meadows Project Team was tasked with identifying a single flagship 'Coronation Meadow' in each county across Britain. These species-rich meadows were selected as places where people could enjoy a spectacular display of wildflowers and an abundance of wildlife in settings that have remained largely unchanged since the Coronation.

The Team then identified new meadows at 'recipient' sites in the same county, using the Coronation Meadow as source of seed. In this way, new Coronation Meadows were created, increasing the area of this valuable habitat, providing new homes for bees, butterflies and other pollinators and helping to secure our wildflower heritage for the next 60 years and beyond.

In the county of North Somerset, Netcott's Meadow (a then Avon Wildlife Trust nature reserve, now sadly damaged by the new owner) was selected as the 'donor' site and Moorend Spout selected as the 'recipient' site. During 2012 and 2013, large areas of the Moorend Spout's reserve grassland was harrowed and then spread with wildflower seed-rich cuttings from the donor site. The effect has been to increase both the wildflower species present and the overall number of flowers on the reserve which continue to propagate and spread each year.

In an attempt to increase the biodiversity of the meadow still further, during 2020, three hundred wildflower plug-plants were planted in the grassland and a seed-bed prepared and sown with UK-sourced wildflower seed.

The meadow has been subsequently managed each year either by cutting (mechanical and/or hand scything) or grazed in the late summer to reduce the dominance of the grass which, over time, should reduce the fertility of the soil.

Fencing has been erected to the east of the carr, on the eastern boundary of the reserve and around the 'Jacklands Tunnel' air vent. These barriers will ensure the safety of grazing animals and people by restricting access to certain areas of the site.

Specimen trees have been planted in the meadow and on other parts of the reserve, most notably the rare Black Poplar. Approximately two thirds of the trees on the eastern boundary of the site have been laid as a hedgerow.

The rough grassland supports a large population of Field Voles and therefore should be an attractive hunting area for Barn Owls. In light of this, two barn owl boxes have been installed at opposite ends of the meadow. Numerous other bird boxes have been installed in the carr woodland.

To support the pollination of the wildflowers, a 'insect hotel' has been constructed on the eastern edge of the carr.

4.3.2 To <u>Control the Bramble and Sedge West of the Alder Carr</u>

There are dense areas of sedge bordered by the carr, the boardwalk and the Middle Yeo. In the past, it has been reported that orchids once grew in this area before the sedge became dominant. Additionally, there are dense patches of Bramble, mainly between the boardwalk and the reserve's western boundary.

The sedge has been cut annually during the winter months which have helped the wildflowers growing there to slowly proliferate. The sedge in this area is very dense and it is anticipated that restoring some of the low growing wildflowers to this area will be a long-term aim.

The Bramble patches have been cautiously reduced in size to allow the ground flora to regenerate whilst still retaining the habitat for nesting Whitethroats which are not common in the vicinity. 'Bays' have been cut into the Bramble to provide sheltered habitats for insects and a more varied habitat for birds.

4.3.3 To Manage the Waterside Vegetation

The reserve is surrounded by waterways with their associated bank, submerged and waterside flora. The Land Yeo river vegetation is periodically cleared by the Environment Agency and the Middle Yeo by the Internal Drainage Board, although not always using an environmentally friendly method.

The outflow from the natural springs in the carr that drain into the rhyne to the western boundary of the site can quickly become choked with vegetation. This growth is removed on a bi-annual basis to keep the water flowing and to create open areas of water close to the boardwalk.

4.3.4 To Install and Maintain Ponds in the Grassland

Two ponds were created using a mechanical excavator in the grassland during the summers of 2013 and 2015. Both ponds are unlined and therefore rely on the predominately clay soil to retain some water and also on a continuously-running siphon which extracts river water from the Land Yeo. (NEWT, as a 'riparian owner', is permitted to extract 20 tonnes of water from the river per day). The ponds are checked at least every two weeks during the summer months to ensure the siphons are operating correctly.

Whilst some water plants have been introduced in and around the ponds, a high degree of natural colonisation of both plants and animals has rapidly taken place since their construction.

A dipping platform was installed on the edge of the lower pond during 2018 to enable visitors and school groups to identify some of the pond life they contain.

The two ponds receive water extracted from the Land Yeo. One consequence of this is that the river can be subject to fertiliser run-off from agricultural fields along its length which will therefore ultimately find its way into the ponds. This increase in nitrogen may well be one factor responsible for the prolific growth of blanket weed and other pond plants that has occurred. If necessary, blanket weed is removed from the ponds during the growing season on a monthly basis and other vegetation as required.

In 2018, the tunnel (known locally as 'Jackland's Tunnel') which was installed in the early 1800s to improve drainage of the adjacent fields, became blocked. This has resulted in the area around the blockage becoming waterlogged and as a consequence, a third, possibly seasonal, pond has naturally formed in the grassland.

4.3.5 To Maintain the Paths Across the Reserve

In the summer of 2010, a wooden boardwalk was installed to raise the public footpath over the marshy ground to the west of the carr. Encroaching vegetation on this walkway has been cut back on a bi-annual basis. A 'willow tunnel' has been created at the northern end of the boardwalk.

Entry to the reserve from Nailsea is achieved by a footbridge (replaced in 2020 by North Somerset Council) over the spout. Encroaching vegetation is controlled in this area to allow visitors safe access and also to maximise the visibility of the waterfall and the surrounding rhynes.

Access up the embankment of the Land Yeo has been improved by the installation of steps.

Numerous permissive paths have also been created to allow visitors to access areas of the reserve not served by public footpaths.

A bench has been installed under an ash tree to the west of the site and a seat next to the upper pond in the grassland.

4.3.6 To Encourage Responsible use of the Reserve by Visitors

While most visitors do not stray far from the footpaths, during the summer months, the Land Yeo especially, can be a popular place for picnics which can often result in litter. Two interpretation boards have been installed to inform visitors of the wildlife that can be found on the site and it is hoped that this will help in educating the public to respect their local natural environment.

The carr woodland is extremely marshy and could present a danger to visitors straying off the path. To deter this, cut material has been used as barriers to block any access to the carr.

4.3.7 To Meet all Safety and Legal Requirements

The activities of the NEWT volunteers are always subject to a risk assessment for each individual task undertaken. Health and Safety issues are reviewed, at least, annually by the trustees and the site is continually monitored for hazards. A first aid box is always available during volunteer work sessions.

We have a child safeguarding policy in the event that any under 18s join us at volunteer events.

5 COMMUNITY INVOLVEMENT

5.1 Volunteers

NEWT performs all of its reserve management projects, as well as the day-to-day running of the group, almost exclusively with volunteers.

Regular work mornings are held on the first Saturday of each month as well as additional days for specific projects. The number of volunteers working for the group has steadily increased over the years and between 2012 and 2020, a total of 4,217 volunteer hours were recorded.

5.2 Events

NEWT holds events on the nature reserves for the benefit of the community highlighting the wildlife of the site.

5.3 Community Use

The various footpaths and permissive paths are well used by walkers, from both the local community and further afield.

5.4 Schools

Local schools make regular visits to the reserves to study the wildlife.

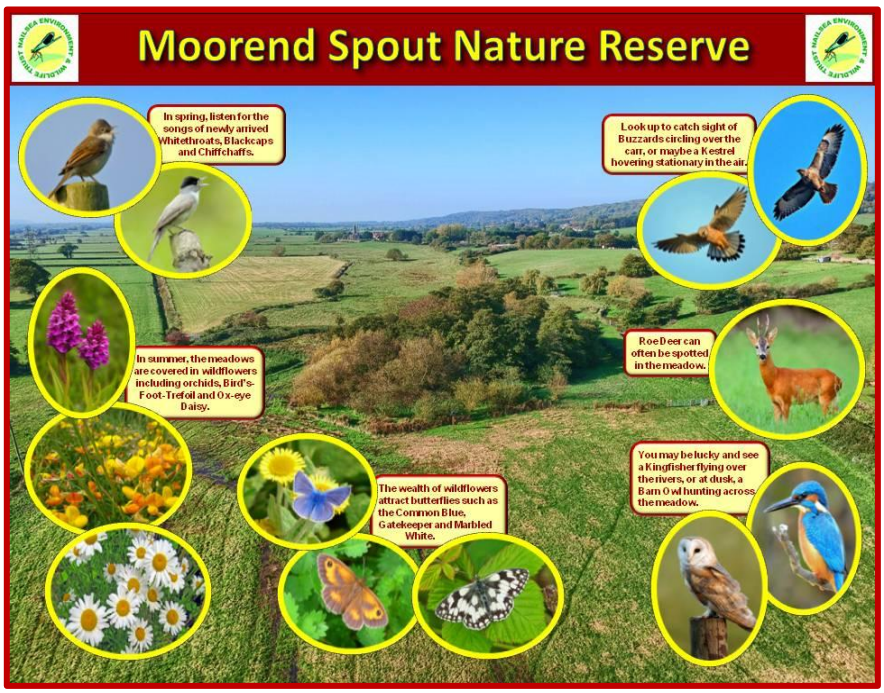
5.5 Website

NEWT has a very detailed and comprehensive website giving details of every aspect of the Trust as well as highlighting our ongoing projects. http://www.newtnailsea.org.uk

5.6 Newsletters

NEWT publishes monthly newsletters to inform and update the group's supporters on the activities of the Trust.

5.7 Interpretation Boards



There are two large interpretation boards at the southerly entrance to the reserve and adjacent to the main field explaining the wildlife of the reserves. The southern entrance has a leaflet dispenser giving visitors extra information about NEWT and a map of the reserves. The map of the reserve can be downloaded from the NEWT website.

5.8 Publicity

NEWT is regularly featured in the local press which helps to publicise the group and to keep the wider public informed of our activities and discoveries.

6 HEALTH AND SAFETY

All footpaths are checked for potential safety issues on a regular basis and remedial action taken if necessary. The reserve and the surrounding fields however are very low lying and therefore very prone to becoming waterlogged and muddy.

The carr is a very marshy area with potentially very deep areas of mud. Access to it is restricted, however if entry is required, at least two NEWT volunteers should be present at any one time. Potential entrances to the woodland have been closed off with cut material to deter access by members of the public.

The area surrounding the air vent to the 19th century Jackland's Tunnel has recently become flooded. Although the seasonal pond which has been created is small, the water is in the region of 1.5 metres deep so the area has been fenced to stop the general public and grazing animals gaining access.

Risk assessments are produced for each volunteer work session and for all events.

Volunteers are trained in the safe use of tools and the correct way to perform tasks.

At least one Certified First Aider is present at each work session together with a first aid kit and an automated external defibrillator (AED).

The use of mechanical strimmers is kept to the absolute minimum but, when necessary, only operators with suitable training are permitted to use them.

Chainsaws are used very rarely on the reserve to assist with trees that are too large for the volunteers to fell safely. Only suitably qualified and insured contractors are to be used for this work.

The use of systemic herbicides is also kept to the absolute minimum with only suitably trained and approved personnel allowed to use them.

Ticks and Lyme Disease

Ticks are tiny spider-like creatures found in woodlands, heaths, parks and gardens throughout the UK, Europe and North America. They feed on the blood of birds and mammals, including humans, and some carry the bacteria responsible for Lyme disease. NEWT's nature reserve would appear to have a low incidence of ticks, however care should still be taken to check for their presence after visiting the site.

7 NATURE RESERVE MANAGEMENT 2021 - 2031

7.1 Introduction

NEWT's priority is to establish an effective work programme for the next ten years with the primary objective of maintaining and enhancing the various diverse habitats of the nature reserve. They contain an extremely wide variety of plants and animals, including numerous species included in the UK Biodiversity Action Plan (UK BAP) that lists the species that are considered most at risk and in urgent need of conservation.

7.2 Constraints on Reserve Management

7.2.1 Influence of Visitors

The reserve is well used by walkers, some of them with dogs. Since the site may be grazed at times, suitable warning notices will need to be erected when grazing animals are present. Although most visitors stay on the path, a few use the river bank for occasional picnics giving rise to a minor litter problem.

7.2.2 Practicality of Grazing the Reserve

One option for the management of the grassland is to use grazing animals. However, the presence of the Land and Middle Yeo rivers, the carr and the field's ponds present a safety hazard for animals and will need to be secured using permanent and/or electric fencing. Additionally, animals can also detrimentally graze on hedging plants so this too will need to be secured.

Access for vehicles to the reserve can be facilitated with the agreement of the owner of the adjacent field to the east. However, experience has shown that attempts to gain access over the field should be limited to those occasions when the ground is firm and not waterlogged since heavy vehicles and agricultural machinery can easily cause ruts in the grassland.

7.2.3 The Carr Woodland

Management of the carr woodland is constrained by the presence of deep mud, standing water and active springs. In light of the potential health and safety issues working within the woodland, access to it is restricted and should only be considered after a full risk assessment has been undertaken.

7.2.4 Financial Aspects of Reserve Management

At present, Moorend Spout nature reserve receives no regular payments for the ongoing operation of the site. Large projects are therefore largely dependent on grant funding being secured.

However, the cost of running the reserve is relatively low. The majority of tasks are undertaken by volunteers and operational running costs such as annual insurance and tool replacement can usually be met from the group's funds.

7.2.5 Presence of Underground Pipelines

There are a number of (currently unused) oil pipelines at a depth of approximately 1 – 2 metres under the grassland. They consist of five parallel 8" metal pipes, extending over a width of about 5 metres. NEWT understands that these pipes are now filled with static water. The pipeline route is regularly monitored by a government appointed body, Fisher German CLH Pipeline System Ltd, both from the air and by occasional site visits to ensure no activities contravene the security of the pipelines.

The siting of the ponds and some other activities have been influenced by the location of these pipes as it is essential that any non-agricultural work does not take place within 3 metres either side of the pipelines. However, this restriction does not extend to normal agricultural practices.

7.2.6 Government Agencies

The Environment Agency (EA) removes the vegetation growing on the Land Yeo embankment within the reserve boundaries on an annual basis. The Internal Drainage Board (IDB) dredges sections of the Middle Yeo, also annually, just outside of the reserve. NEWT is not able to permanently exclude access to these two government agencies performing works on the reserve.

7.3 Ten-Year Work Programme

The work programme has been structured and presented as follows:

- Four areas of the nature reserve have been identified as benefitting from specific management tasks.
- These four 'compartments' are described in Table 1 and shown in Figure 3.
- Tables 2 - 5 describe the tasks to be carried out in each compartment.
- Each table describes the primary objectives, tasks and timescales for all the tasks listed.

7.4 Vision

By 2031, after the all objectives of this ten-year plan have been achieved, the nature reserve will exhibit:

- An increase in the number of wildflowers in the meadows.
- An increase in the number of pollinating insects.
- All invasive species, both native and non-native, under control.
- All pathways (footpaths, boardwalk and permissive paths) in good order.

8 MONITOR AND REVIEW

This management plan will be reviewed annually by the trustees to ensure the work programme continues to deliver the required results.

Photographic records will be kept to identify changes to the flora on the nature reserves.

Bird boxes will be inspected annually and the results recorded.

The nature reserves' combined species list shall be updated as appropriate and the results shared with the Bristol Regional Environmental Records Centre (BRERC).

NEWT will monitor the satisfaction of visitors and supporters by maintaining good communications (telephone, email, or letter) and holding an annual general meeting (AGM).

9 ACKNOWLEDGEMENTS

NEWT would like to thank the trustees and supporters for their contributions to this Management Plan.

	Table 1 - Nature Reserve Compartments (Figure 3)
Compartment	**Compartment Description**
MS 1	The wet grassland, which forms the largest section (approximately 4 acres) of the reserve, is bordered by the Land Yeo to the north, the Middle Yeo to the south, the carr woodland to the west and a hedgerow to the east. It is botanically rich with patches of rush a significant component. The grassland may have been 'improved' in the past as the grass growth is very lush. The Coronation Meadow is situated within the grassland and has resulted in an increase in both the number and diversity of the wildflowers there. Two permanent and one seasonal pond are also located within the meadow, one where a 'dipping platform' has been installed. The water table in the meadow changes by over a metre between winter and summer seasons. Consequently, the field is often waterlogged between autumn and spring but can also be very dry during the summer months. These changes in water levels clearly present challenges for the plants trying to establish there. The rough grassland supports a large population of Field Voles which, in turn, will make it attractive to both Barn Owls and other birds of prey. Two Barn Owl boxes have been put up at either end of the field. In 2020, Harvest Mice were also discovered nesting in the long grass. Hazel trees have been planted on the western boundary to increase the area of woodland and to increase the biodiversity of tree species. Hawthorn has been planted by the top pond and close to the Middle Yeo.
MS 2	This compartment of mainly dry, rough grassland is bordered by the Land Yeo to the north, the carr to the south, the grassland (MS1) to the east and a rough hedge to the west. It has almost certainly been 'improved' in the past as there is a significant patch of nettles and the grass growth here is vigorous with few wildflowers. However, wildflowers surviving in the shelter of the hedgerow would suggest that this area was once botanically richer, so there may be the potential to increase its biodiversity over the longer term with careful management. There are thick bramble bushes along part of the Land Yeo embankment offering a good source of nectar, berries and shelter for birds, rodents and insects. There is a spring (or possibly a leak from the Land Yeo) emanating from the Land Yeo embankment flowing into the carr which has detrimental effects on the path during the winter months. Hazel trees have been planted on the eastern boundary. An 'insect hotel' has been constructed at the edge of the carr. The public footpath crosses the Land Yeo on a bridge heading in the direction of Tickenham.

MS 3	This compartment of wet meadow is bordered by the carr to the north, the spout to the south, the Middle Yeo to the east and a thick bramble patch to the west. It is dominated by reeds today but reports suggest that it has been richer in wildflowers in the past. It contains quite extensive areas of thick bramble which is especially important for nesting birds. NEWT has constructed a raised wooden boardwalk to take the public footpath through this often boggy area. Specimen trees have been planted in this area most notably, the rare Black Poplar. A 'willow tunnel' has been planted and woven at the end of the boardwalk. Two watercourses emanating from the carr cross this area to flow into either the Middle Yeo or rhynes.
MS 4	The carr woodland is located west of centre in the reserve and is bordered by the other three compartments. It is predominately made up of Alder and Willow trees. Within the carr there are ponds and ditches. These areas of water are choked with dead leaves and decaying organic matter. Two small streams duct spring water out of the carr, one flowing to the west towards the board walk forming several small, overgrown ponds along its course. The water eventually sinks into the ground close to the boardwalk and presumably flows underground into the rhyne to the west. The second spring flows to the south into the Middle Yeo. The presence of the springs and deep mud to be found within the woodland makes routine entry into it potentially dangerous. The pond in the woodland has bubbles of carbon dioxide gas issuing from the floor similar of the 'bubbling pond' located in Towerhouse Woods nearby. Numerous bird boxes have been put up within the woodland.

	Table 2 – Compartment MS1 Management
PRIMARY OBJECTIVES	To increase the number of wildflowers by an annual cutting or grazing of the meadows. To encourage wildflowers to grow in areas where grass has become the dominant species. To improve the habitat for small mammals, birds, butterflies, aquatic life and invertebrates. To improve the habitat of the ponds. To maintain and lay more hedgerows along the eastern boundary. To maintain all permissive paths in good order.
TASKS	Cut or graze up to 50% of the grassland concentrating on the areas where wildflowers are most prolific and rake off. All cut material to be placed in piles on the edge of the meadows. The remaining grassland should be left uncut for small mammals and will only require selected cutting should scrub invasion become a problem. As the compartment is close to agricultural fields, remove the seed-heads of ragwort and thistles to stop their spread onto adjacent land and/or reduce their density by pulling out the plants if they occur in large numbers. In sections of grassland with lower densities of wildflowers, create seed beds and sow reserve-collected or UK-sourced seed. Cut back the encroaching reeds between the top pond and the hedgerow. Lay the hedge at the south-eastern edge of the compartment. Maintain the siphon to the ponds. Remove blanket weed and other excess vegetation from the ponds and reduce the proliferation of pond edge reeds encroaching into the ponds. Install a second ‘insect hotel’ close to the hedgerow at the eastern boundary.
TIMESCALES	Cut or graze meadows annually between mid August and December. Sow wildflower seeds in the spring or autumn. Lay hedges preferably in the winter when the trees have reached a suitable height. The siphon to the two ponds should be checked at least every two weeks in the summer months to ensure it is operating efficiently. Remove excess vegetation from the ponds between spring and autumn as necessary. Cut back the pond edge reeds every five years in the summer. Check/clean out the two owl boxes in the winter months using a Natural England licensed handler.

	Table 3 – Compartment MS2 Management
PRIMARY OBJECTIVES	To increase the number of wildflowers by an annual cutting of the grass. To encourage wildflowers to grow in areas where grass has become the dominant species. To improve the habitat for small mammals, birds, butterflies and invertebrates. To maintain all public footpaths and permissive paths in good order.
TASKS	Cut up to 70% of the grassland and rake off. All cut material to be placed in a pile on the edge of the carr. The remaining grassland should be left uncut for small mammals. As the compartment is close to agricultural fields, remove any seed-heads of ragwort and thistles to stop their spread onto adjacent land and/or reduce their density by pulling out the plants if they occur in large numbers. Create seed beds and sow reserve-collected or UK-sourced seed to increase wildflower numbers. Cut back the nettles. Cut back vegetation encroaching on the public footpath. Maintain the steps. Maintain the 'insect hotel'. Improve the permissive path between the carr and the Land Yeo.
TIMESCALES	Cut the grass annually between June and December. Cut the nettles in early June. Cut vegetation close to the paths to stop encroachment throughout the year. Sow seeds, preferably in the autumn, otherwise in the spring.

	Table 4 – Compartment MS3 Management
PRIMARY OBJECTIVES	To maintain all public footpaths and the boardwalk in good order. To increase the number of wildflowers by an annual cutting of the sedge. To improve the habitat for small mammals, birds, butterflies, aquatic life and invertebrates. To stop vegetation encroaching on to the public footpath. Maintain open water in the carr outflows. Maintain the 'willow tunnel'.
TASKS	Cut all of the sedge to the south of the carr to reduce its vigour and encourage wildflowers. Rake off and burn the cut material if possible. Cut back the vegetation either side of the footpath to a depth of 1 - 2 metres. Cut back all vegetation touching the boardwalk keep the wood in good order. Replace/repair sections of the boardwalk. Maintain the bench. Cut back encroaching vegetation around the bench. Prune and re-shape the 'willow tunnel'. Remove aquatic vegetation from the carr outflows. Cut back bramble only where it encroaches on the meadow to the south and west of the carr. When cutting back is necessary, shape 'bays' in the bramble to create sheltered, sunny areas. Always maintain a secure bramble barrier to deter access into the carr. Leave large patches of bramble intact as bird nesting sites. Fell the ash tree by the bench should it show signs of ash dieback disease.
TIMESCALES	Cut back the vegetation next to the public footpath and the boardwalk on a regular basis. Cut the sedge and bramble to the south of the carr during the winter. Replace rotting/damaged sections of boardwalk as necessary. Prune and re-shape the 'willow tunnel' during the winter. Remove aquatic vegetation from the carr outflows as necessary from spring to autumn.

	Table 5 – Compartment MS4 Management
PRIMARY OBJECTIVES	To maintain the quality of the carr woodland. To stop entry into the carr by the general public. To maintain the bird boxes.
TASKS	Remove Hawthorn and Ash trees from the woodland. Coppice Alder trees on the south side of the carr to let in more light. Selectively coppice the Willows on the carr's eastern edge. Maintain a secure natural barrier of vegetation to block unauthorised entry to the carr. Maintain the tree-mounted bird boxes.
TIMESCALES	Remove Hawthorn and Ash as required. Coppice Alder trees during the winter months between 2021 and 2026. Coppice Willow trees on a rotational basis between 2026 and 2031. Inspect and clean out bird boxes annually during the winter.

Figure 1 - Relation to other Green Infrastructure

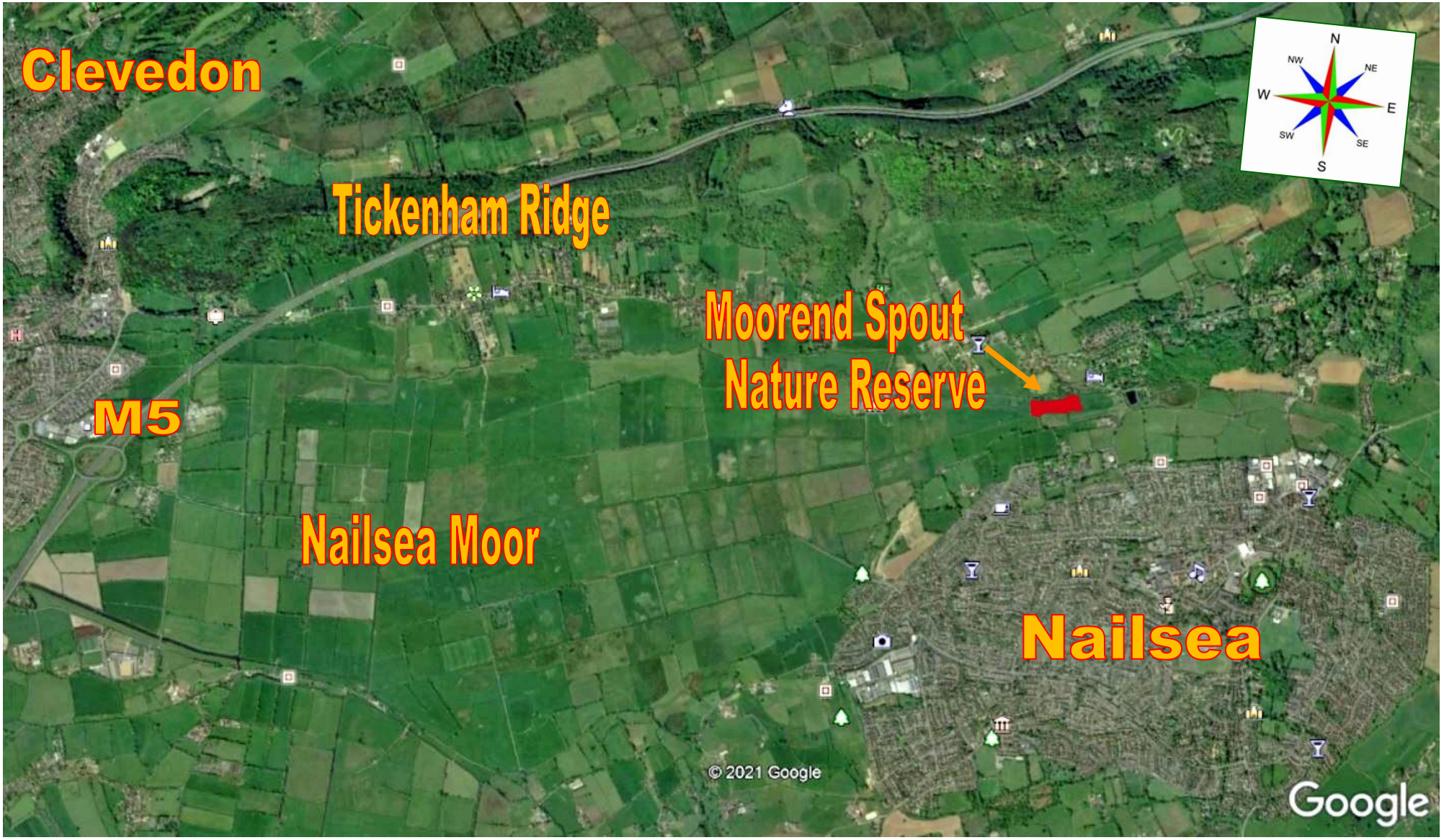


Figure 2 – Moorend Spout Nature Reserve

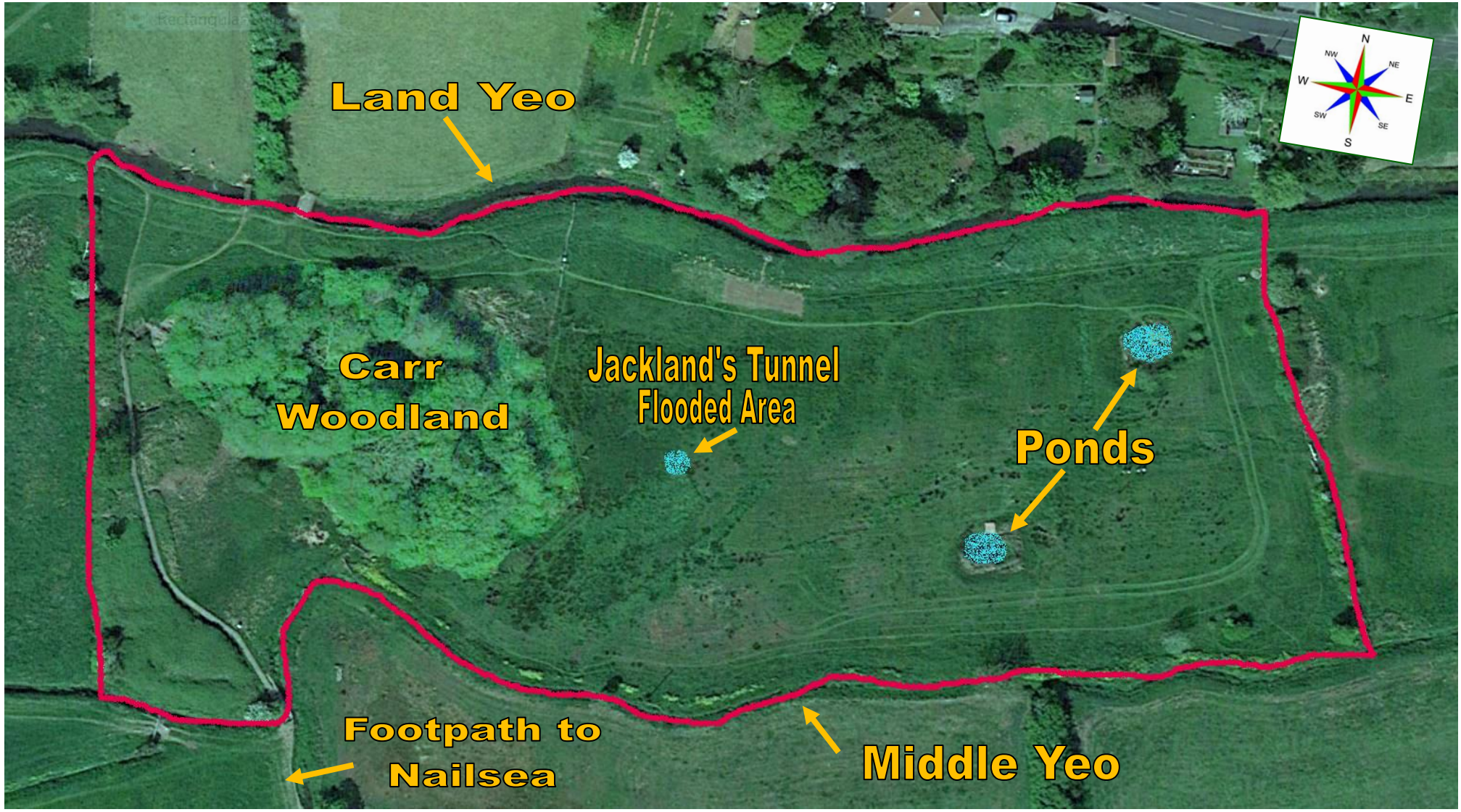


Figure 3 - Reserve Management Compartments