

# North Walsham and Dilham Canal Trust. Mitigation & Compensatory Plan- Section 2

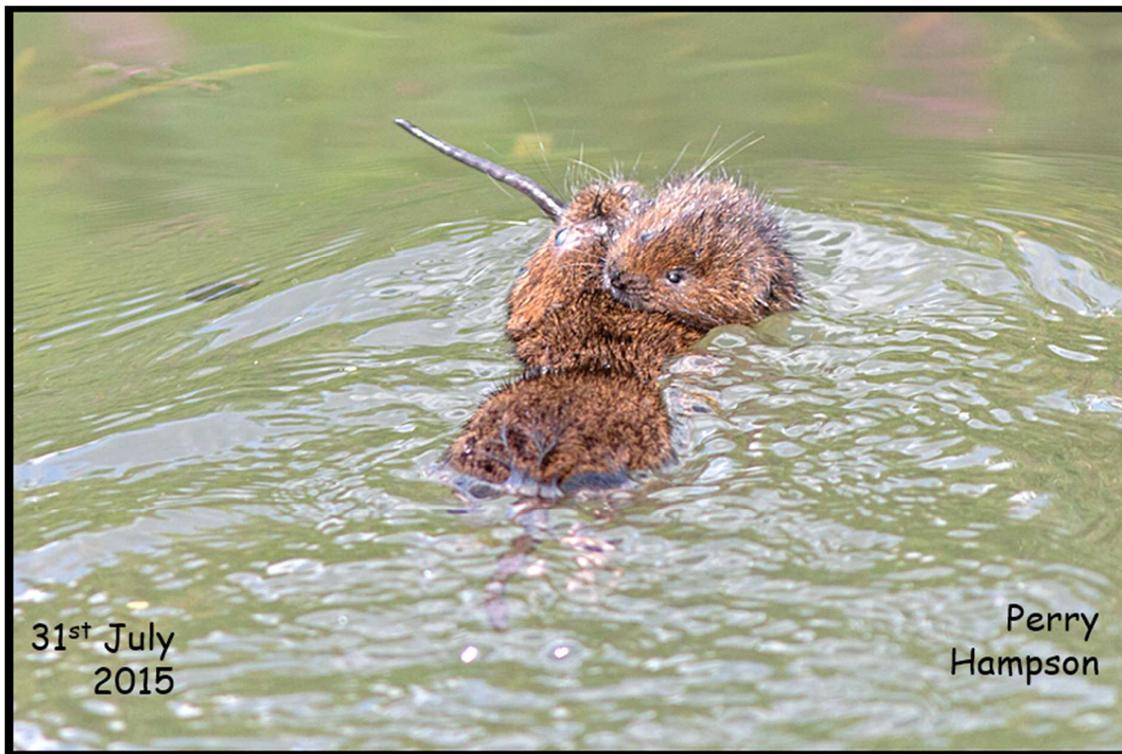
Covering that section owned by the Old Canal  
Company Ltd. (OCC) which runs from Swafield  
Road Bridge to 20m below Ebridge Lock No. 3.

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Prepared by the North Walsham & Dilham Canal Trust  
Mitigation & Compensatory Group

September 2020

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# Canal Ownership Plan

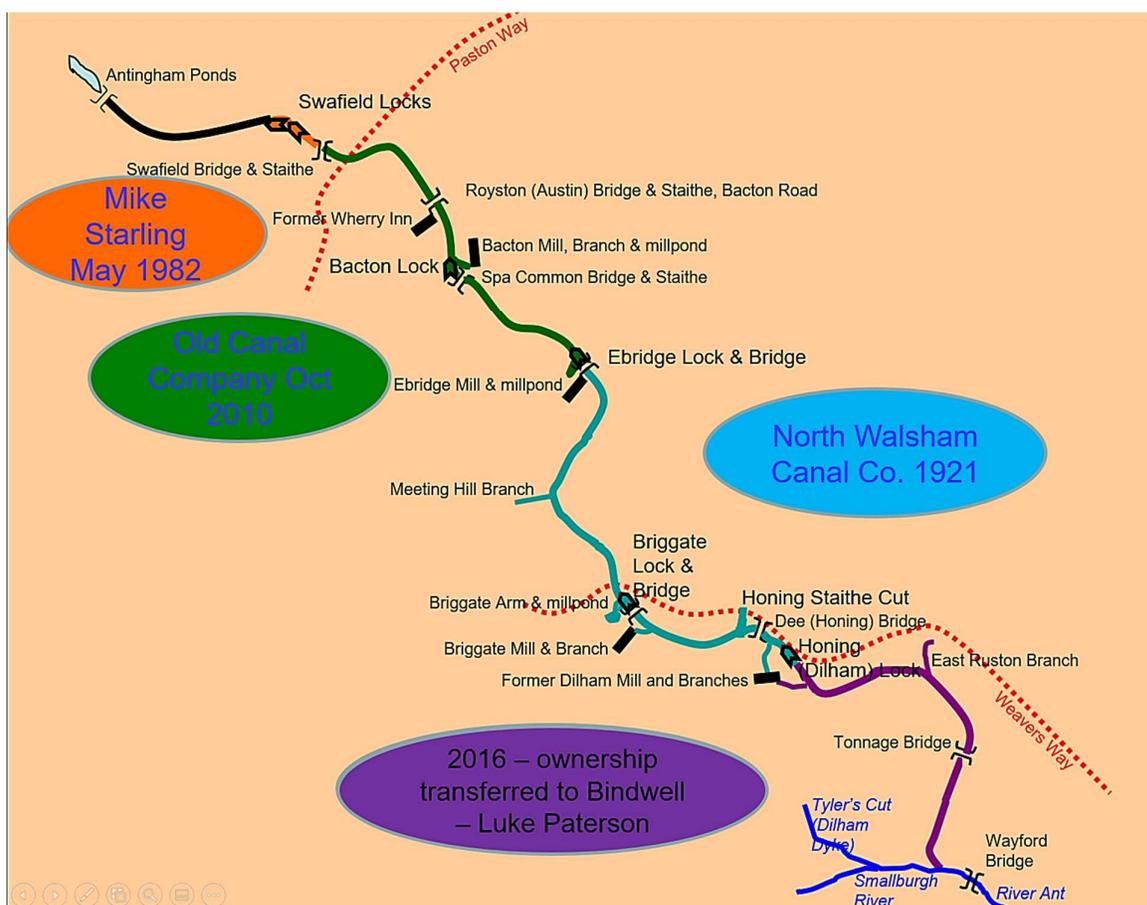
**Section 1, coloured orange, has been owned by Mike Starling since May 1982.**

**Section 2, coloured green, has been owned by the Old Canal Company Ltd since October 2010.**

**Section 3, coloured blue, has been owned by the North Walsham Canal Company Ltd since 1921.**

**Section 4, coloured purple, has been owned by Bindwell since 2016.**

This plan for section two, of the Canal, is the first to be produced and is intended to act as a template for the other sections. These are expected to use similar mitigation and compensatory techniques which will be adapted appropriately to that section's particular needs. The final documents will then form the basis for the Trust's overall Environmental Management Plan for assisting the owners with their restoration, maintenance and care for the Canal.



## Foreword

The restoration of the North Walsham and Dilham Canal was first mooted in the 1970's by the Broadland Canal Group, who sought the advice of the eminent restorer, David Hutchings. Following this, work started on the Lower Canal in the vicinity of the then collapsed Tonnage Bridge. In 1992 the East Anglian Waterways Association began the current restoration process. During the next eight years meetings were held with the various statutory bodies, canal owners, canal side landowners, Wildlife and Conservation officers. Lock, Channel and Ecological Reports were commissioned leading to the first work parties in 2001 at Briggate and Bacton Wood locks. At this time the North Walsham Canal Company were also authorising de-silting works to take place in the Spa Common area.

In 2008 the EAWA was the catalyst for the formation of the North Walsham and Dilham Canal Trust, encouraging more local ownership of the restoration process. Joint EAWA/NW&DCT work parties continued to work with the four owners on various projects from Swafield Locks to below Honing Lock. In 2009/10 negotiations between the Old Canal Company and the North Walsham Canal Co. led to the OCC taking over the Upper Canal from Swafield to 20m below Ebridge lock. The OCC had earlier obtained a licence to undertake de-silting of the Ebridge Reach. This reach had been in full water until 2006, but then emptied, due to leaks onto adjoining farmland, leading to a quick succession of reed and willow growing on the canal bed. During 2007/9 work parties took advantage of the empty canal to start the clearance of the bed and lock repairs. The newly formed OCC then undertook de-silting of the channel, raising banks, repairing leaks and re-watering the Canal. However, during this time the de-silting licence expired and accusations of ecological damage by a canal side landowner led to the Stop Notice being issued in 2012 as the *River Ant (NW&DC) is being, has been, and is likely to be harmed by dredging work*.



Since that date the OCC has concentrated its efforts on the restoration of the Bacton Wood Lock, and the Canal above Bacton Wood Millstream. Work below to Ebridge Lock has been mainly that of bank maintenance to prevent flooding, spot de-silting to allow continued navigation below Bacton Wood lock where a side stream continually deposits farm and road wash-off, and the rebuild (mainly undertaken by the Trust) of Ebridge spillway to control excess waterflows. Meanwhile the re-watered channel, banks and sokes have become a community asset. The banks have regrown, fish have repopulated the deep waters, the open ribbon of water has encouraged a complementary habitat to the reed beds that lie adjacent to the canal – to the extent

that the Norfolk Wildlife Trust now works alongside the OCC, for they consider the open linear watercourse to be an aquatic link between their County Wildlife Sites (CWS) at Antingham, Pigney's Wood Nature Reserve and the Spa Common CWS (which includes the OCC's Purdy's Marsh and part of the canal). The appendices (6a,10, 11, 12) to this document list the Trust's Wildlife, Fishery and Fauna officers' sightings and findings, showing the diverse range of flora and fauna that is now evident on the Ebridge reach.

The whole length of the Upper Canal has become an important community amenity, for walkers, runners, gongoozlers, picnickers, family outings, with the Ebridge Reach additionally attracting anglers, small boaters, canoeists, paddle-boarders and even wild swimmers. This Reach now has a regular passenger boat service on the Trust's solar powered trip boat *Ella II*. Following negotiations with the OCC the Trust has taken over the maintenance of the Reach, allowing the OCC to concentrate their efforts on the Bacton Wood - Swafeld section.



The NW&DC Trust gained Charitable Incorporated Organisation status in November 2018, enabling it to undertake contracts, own assets and exist as a legal entity. A successful "Big Society" bid has provided equipment for managing aquatic plant growth and complex bank side vegetation cutting regimes. A successful European Leader bid has provided monies towards the provision of new lock gates and the restoration of Ebridge Lock.

The Trust set up a permanent Mitigation & Compensatory sub-committee to evaluate and report on which aspects of the mitigation plan have already been realised and the



progress of those which are still under consideration. This document is the result of that Group's work.

Ivan Cane

Mitigation Group Chair,  
NW&DCT September  
2020

Family Fishing Ebridge Mill, Model Boat Club  
Landing stage 21 Aug 2018 -Gwennie Nunn

## Introduction

The purpose of the Trust's Mitigation and Compensatory Plan is to present a series of environmental techniques that will more than offset any adverse effects that restoration and maintenance work may have on the hydromorphology of the canal and its environs (the 'health' of that waterway). The aim is to balance the restoration and maintenance activities of the NW&DCT with the, sometimes conflicting, needs of the various stakeholders including:

- The historical obligations of navigation established by the 1812 Act of Parliament.
- Statutory requirements of the Environment Agency (EA).
- Requirements of the Internal Drainage Board (IDB) and Broads Authority (BA).
- Desires of Natural England (NE) as expressed by the Norfolk Wildlife Trust (NWT).
- The activities and needs of local, national, and international visitors.

As a working document under regular and active review it details those mitigation and compensatory techniques, which are already in place and those that are under consideration. It is expected to be modified on the basis of data derived from a number of sources including regular surveys of the wildlife species and numbers; water quality data derived from dissolved oxygen values, invertebrate species numbers and macrophyte populations; visitor numbers and the activities that they are engaged in.

The plan describes the methods proposed to maintain the canal in a sustainable way, such that the navigation is unhindered, but the ecology of the canal and surrounding area is maintained to at least a 'non-deterioration standard' and working towards 'improving'.

The NW&DCT and the OCC have worked together to explain what cannot be compromised by mitigation on their section of the canal. These eight givens are listed on page 10.

Similarly, the NW&DCT and the OCC have worked together to identify areas where ecosystem rehabilitation, restoration and offset measures are possible, both within the canal bounds and in the wider surrounds of the canal.

These eight areas of compensatory measures are listed starting on page 11.

The intention of the Plan is to describe workable enhancement of the ecology by identification of 'light touch' areas within the confines of the canal boundary and compensatory projects in the back-sokes and surrounds of the canal. The restored canal channel itself offers scope for mitigation but there should not be deterioration from its established state [the benchmark being the status of the canal water-body in the Ebridge pound referenced to the EA's 2014/2015 Biological Surveys].

This Mitigation and Compensatory Plan is to lead the maintenance guidance which the NW&DCT undertakes, on behalf of the OCC, first on the Bacton Wood to 20 yards below Ebridge Lock length, then, following re-watering, the length to Swafield Bridge. This will be undertaken to the best of the Trust's ability and for the foreseeable future, under the *General Agreement* set up in November 2018 between the NW&DCT and OCC for the Upper Canal. **(see p99)**

The method of weed control, bank maintenance, the limiting of public access to ecologically sensitive areas, water abstraction and pond formation are identified.



Reconstructed Ebridge spillway  
28 Dec 2017 – N.Thompson

It should be noted that when the Canal was constructed in 1825/6, under the 1812 Act, all watercourses within 1000 yards of the Canal were diverted to feed the Canal. This was undertaken so that the watercourses join soke dykes, that run on the outside of the embanked canal, and on three occasions pass under the canal in conduits. Any excess water in the Canal itself flows over spillways and is collected by the soke dyke. These soke dykes feed into the Canal below each lock, with the main soke dykes managed by the IDB (DRN013G1213/1214/1215/1216). The Trust and OCC maintain a good working relationship with the IDB.

The appendices show the results of surveys, undertaken by the Trust's Officers, into Fish, Bird, Plant and general species found along the Upper Canal, plus the NWT Management Statement for Purdy's Marsh. **(See appendices 6a, 10, 11,12)**

## Background

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### **1) Restoration to date and the resultant water-body.**

The Ebridge pound, especially north of Muckle Hill Farm, requires some de-silting. This is the result of silt/road particulates being introduced into the canal from North Walsham's surface drainage and from scour of the enlarged soke caused by the diverted canal feed-water around lock no.6 at Swafield. Recent surveys of aquatic invertebrates have shown that these are having a serious negative effect on the pound's water quality. The Environment Agency has identified the source of this siltage and ongoing negotiations are taking place with a landowner, additionally the possibility of forming a settlement pond to the side of the particular stream, is being investigated.

Bank profiling, except adjacent to Muckle Hill Farm land, has been completed on the Ebridge pound however small sections of bank are too low and will be raised.

The Ebridge spillway has been rebuilt and controls the normal level of the canal. It now overtops some 18cm lower than originally built, thus reducing pressure on the banks.

The Environment Agency 2012 'stop notice' referred to this pound, from Ebridge lock, north to the Bacton Wood millstream.

The Ebridge spillway drain had been compromised by a partial collapse adjacent to the road bridge, for some 20 odd years. Following negotiations with the Norfolk County Council Highways and Bridges, the IDB, EA and OCC, an arrangement was made for the Trust, in co-operation with the OCC, to repair the damaged culvert and backfill the hole. This was completed on 1<sup>st</sup> March 2020. At the same time, the NCC Highways cleared the blocked drains, that had been installed some ten years earlier in an attempt to prevent run-off, in times of heavy rain, from the road into the hole.

Following successful re-watering of the northern section of the OCC's Canal, the Trust will extend their maintenance schedule north to Swafield Bridge. At present (September 2020) the situation on the Bacton Wood Pound is as follows:

Bacton Wood Lock no.4 is near completion. Both sets of gates have been constructed and are in place. The top gates have had finishing work carried out on them and are ready to accept water. A stop plank facility has been installed by the Trust for the top gates. This will enable future lock maintenance taking place without affecting the water levels above. It will also enable a more controlled stepped re-watering of the pound when needed. Stop plank provision is still to be fitted to the bottom of the lock at Bacton Wood, which will remove the need for the present bund.

From Bacton Wood Lock to Swafield Bridge most of the channel restoration is complete. Approximately 30% of this section is dry. Profiling work has been carried out within the canal bed and most of the banks have been raised to their correct height.

Temporary bunds are in place across the canal, such as just upstream of the east soke Purdy's culvert. These are to enable controlled re-watering trials by the OCC on various lengths of the upper section of the dry bed section.

The majority of the banks downstream of Royston Bridge have been raised to the required height, but some require a layer of topsoil into which will be sown environmentally approved grass, to consolidate the surface.

The original spillway on the west bank below Royston Bridge is almost complete.

The replacement quay heading at the old Wherry Inn has had a final back-fill and is grassed over.

The former 'dry' canal channel down to the bund is now partially in water and is approximately 60cm deep and seven metres wide - consisting mostly of rainwater.

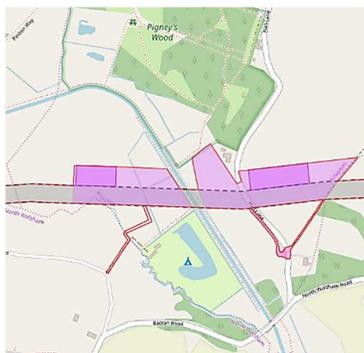
The steel culvert installed to replace the road-bridge adjacent to the old Wherry Inn blocks the canal navigation as it has virtually no headroom. Norfolk County Council has now agreed that they are legally responsible for returning the road bridge to a navigable height of 8 feet. The NCC have said that they wish to work with the Trust and the OCC to source funding for the re-build.

The section of canal upstream of the Royston Bridge has been re-profiled and the majority of the banks have been raised to their full height.

A temporary bund remains in place downstream and adjacent to the penstock to enable access for machinery and materials to build up the west bank. At present the penstock remains open and diverts the feed-water into the east back-soke which joins water emanating from Pigneys Wood, other ditches and land drains to the north-east.

At Swafield Bridge, now the terminus of the OCC section of the North Walsham & Dilham Canal, the large trees in the canal bed/basin have been removed. The top third of the canal is now much as it was in 1826.

Anglian Water have laid a new 180mm gravity foul sewer under the Canal just below Swafield Bridge. This is at a level of 1.917m below the canal bed. Anglian Water are also investigating the need and use/disuse of the hanging water pipe above Swafield Bridge.



Vattenfall's proposed underground cable corridor from Happisburgh to Necton is also planned to pass under the OCC's section of the Canal, just above the Royston penstock. ( *Left - Vattenfall Maps 16 June 2017*).

The Trust (Sept 2020) are presently working to fit lower gates to Ebridge Lock, following the successful EULEADER funded replacement of the top gates and stop plank provision in 2019. Other projects envisaged are the placing of a footbridge at the northern end of the truncated footpath NW19, enabling public access across the Canal, following the removal of the lower bund by the OCC.

## 2) Restrictions placed on the operation of the canal:

### Either explicitly stated or implied by the original 1812 Act of Parliament

1. The navigation remains unhindered by in-channel obstructions.
2. The navigation remains unhindered by excessive in-channel weed growth.
3. The depth of the channel is maintained to allow safe navigation, but not exceeding the maximum depth laid down in the 1812 Act.
4. The canal bank walks are kept mown to a width commensurate with their proper function.
5. The locks are kept free of silt build-up, which can present a safety hazard.
6. The back-sokes are kept flowing freely as the function of the back-sokes is primarily for water control.
7. The sources of siltation being carried directly and indirectly into the canal are fully addressed and minimised.

### By more recent statutory obligations

8. The sources of pollution being carried directly and indirectly into the canal are fully addressed and minimised.
- NB The above are not at all incompatible with healthy habitats supporting high levels of biodiversity

Mitigation can be achieved either **within the bounds of the canal** where possible, including its channel, staites, mill-ponds, banks, back-sokes and structures, **or by undertaking compensatory measures within the wider environment** where it is likely to be more effective.



Swans making use of Ebridge Spillway, re-built 2017. Photo Gwennie Nunn, November 2018.

### 3) Mitigation and compensatory methods and their likely effectiveness.

Mitigation can be achieved either **within the bounds of the canal**, including its channel, staites, mill-ponds, banks, back-sokes and structures, **or by undertaking compensatory measures within the wider environment**. Many of the methods suggested can be enshrined within an annual/biennial/triennial plan, which will aim to reflect the navigational needs whilst supporting the best interests of the environment, for example ensuring that certain areas of growth are left in place to provide ecological benefits as long as the required navigational needs are not impeded.

The effectiveness of individual techniques is evaluated using the grades **(H)igh**, **(M)edium** and **(L)ow** within the context of this canal section.

Potential mitigation and compensatory locations and the anticipated effectiveness are:-

1. Mitigation within the **canal water channel**.
  - a. Fish migration **H**
  - b. Manage aquatic plant growth. **H**
  - c. Monitor invertebrate populations. **H**
  - d. Pollution control. **H+**
  - e. Encouraging use of electrically, manually and wind powered vessels **M**
2. Mitigation within the **staites/millponds**.
  - a. As for the canal channel
  - b. Stepped bank modification. **H+**
3. Mitigation on the **canal bank walks and bank shoulders**
  - a. Manage ecology strips (buffer zones). **H**
4. Mitigation on the **canal banks**.
  - a. Banks maintained to be water-vole friendly. **M**
5. Mitigation on the **opposite banks to the canal bank walks**, where applicable.
  - a. Cut to a low frequency (typically once a year). **M**
  - b. Minimise access to sensitive wildlife areas by not providing mown paths. **M**
6. Mitigation on the **water margins**
  - a. Monitor and manage machophyte densities at water margins **H**
  - b. Stepped bank modification. **M**
7. Mitigation within the **back-sokes**.
  - a. Maintenance of the back-sokes for free-flowing running water. **H**
  - b. Banks maintained to be water-vole friendly. **H**
  - c. Cut banks to prevent dead vegetation falling in the water. **H**
  - d. East back-soke modification (installation of plank weirs). **H**
  - e. Maintaining a flowing habitat in the east soke below Royston Penstoke **H++**

- f. Encouraging the opportunity to enable connectivity for fish passage between the pounds **M**
8. Compensatory within the **wider surrounds of the canal boundary**.
- a. Formation of a new pond near Royston Bridge. **H+**
  - b. Restoring and maintaining Purdy's Marsh (CWS) **H+**
  - c. Regular monitoring of habitats, species, and water quality. **H**
  - d. Control of Invasive Species **H**
  - e. Installation of bird and bat boxes **L**
9. Compensatory **outside the canal boundary**.
- a. Formation of shallow pond/s in adjacent reed beds. **H**
  - b. Joint projects with NWT on adjacent local CWS areas.
  - c. Regular comparative evaluation of monitoring results. **H**
  - d. Viewing the Canal in a wider context as an important wildlife corridor **H**

For these mitigation techniques to be successful the health of the waterway and the biodiversity of the flora and fauna need to be regularly monitored. These results are then evaluated against baseline figures and actions decided upon this data.

#### 4) **Planned Routine Maintenance Tasks.**

A planned regular maintenance regime, based on the recommendations detailed in a paper by John Pomfret ('Wildlife Conservation', Seasonal Sensitivity), includes:

- Monthly mowing of pedestrian paths during May to August.
- Annual mowing of rough grass/ecology/buffer strips during September to April.
- Aquatic Plant Clearance during July to November.
- Purdy's Marsh Reed Cutting (on a four year rolling programme) during September to March.
- Other cutting/clearance work during September to March.

This regime will be developed over the next few years to maximise the desirable effects for all users. Further detail will be found in the appendices (7,8, & 9)



**Weedcutter,  
tractor,  
mower.  
Provided by  
North Norfolk  
District  
Council Big  
Society Grant**



## Realisation

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### 1. Mitigation within the canal water channel.

The re-watered canal section provides 3.73km of 'linear lake' water corridor-equivalent to 3.4 hectares (8.4 acres) of open water. On the NW&D Canal the sokes carry continuously flowing feed-water from many sources together with the excess feed-water flowing over the canal's weirs/spillways. Crucially the sokes bypass each lock and thus there is water continuity along its entire 3.73km length.

#### a. Fish migration **H**

This aspect of sokes linking the pounds, which is inherent to the original design of the canal, negates the problem of the locks blocking fish migration. This has been evidenced by the plentiful and varying quarry reported along the Ebridge pound since



de-silting. At the top of the fish apex pike are plentiful, small jacks of 1-2 lbs, all the way up to large females of around 20lbs mark, have been recorded and from pictures supplied they are all in a near perfect condition. Perch are also thriving with plenty of 1lbs plus specimens with the largest recorded of around 2lbs. Lots of pristine red fined roach along with the golden tinted rudd are caught regularly, all varying in size and some specimens well over the 1lbs mark. The canal also has lots of roach/rudd hybrids. tench and chub have been landed as has a 3lb 3oz bream/roach hybrid, proof the famous Canal bream still live on in this stretch of water. There are also reports of white orfe and other rogue goldfish that unfortunately have been secretly released into the canal. These thriving fish stocks are proof of a healthy well-balanced food chain from the tiny organisms at the bottom through to the predators at the apex. The Trust along with the landowner has now introduced fishing best practise rules to ensure the continued protection of the fish. **(see appendix 6b – General Angling Rules)**. Although, in the future, the use of locks will also aid migration between the various pounds, each pound's fish population is self-sufficient and none of the species present need to move along the full length of the canal. However, It is hoped that glass eels will return to the

canal when the lower and upper sections are re-connected. These eels are able to migrate up the lock cills and sokes – but other forms of diadromous fish could benefit from specific aids to enable up and downstream movements in the future. We see the maintenance of a healthy fish population throughout the canal as having a high mitigation value **H. See Appendix 6a - Canal's Fish**

The NW&DCT/OCC Fishing rules introduced an extended pike closed season from 2017. We see this as having a high mitigation value. **H See Appendix 6b - General Angling Rules**

**b. Manage aquatic plant growth. H**

The cutting of submerged aquatic plants in this water corridor will be built on a programme, where appropriate, developed from Broads Authority guidelines and based on the monitoring of dissolved oxygen levels as a pre-condition to any cut (**see appendix 7 Aquatic Plant Life Management**). It is seen as vital to the development of fish species and numbers, the encouragement of family fishing, and to the safety and ease of navigation. Sensitive cutting should prevent the disturbance of silt and maintain habitat for fish refuges.

Procedures
<b>1. Follow ESOP 1 Cutting Water Plants</b>
<p>Key information:            A minimum cutting height of 1' above canal bed; and            A minimum 2' of uncut margins when channel is &lt;20' wide.            A minimum 3'3" of uncut margins where channel is &gt;20' wide.            A minimum of uncut margins from bank of 6' when channel is &gt;40' wide</p> <p>Monitor water depth quarterly. Cutting should proceed with caution if water depth is &lt;3' and should not proceed if water depth does not exceed 1'6".</p>

Basic equipment to take dissolved oxygen and turbidity is now in hand and in regular use. More professional equipment is being sought. 01/01/2020

<b>2. Monitor water temperature and dissolved oxygen (DO) levels.</b>					
Use the MATRIX below before proceeding.					
<b>Water Temp &lt;10°C</b>		<b>Water Temp 10-15°C</b>		<b>Water Temp 15°C-20°C</b>	
<b>DO &lt; 43%</b>	<b>DO &gt; 43%</b>	<b>DO &lt; 49%</b>	<b>DO &gt; 49%</b>	<b>DO &lt; 55%</b>	<b>DO &gt; 55%</b>
<b>STOP</b>	<b>GO</b>	<b>STOP</b>	<b>GO</b>	<b>STOP</b>	<b>GO</b>
<b>Contact Canal Manager</b>		<b>Contact Canal Manager</b>		<b>Contact Canal Manager</b>	<b>1. Continue to check water temp &amp; DO levels at the start and end of each section</b>

CUTTING TO TAKE PLACE ONLY BETWEEN 16<sup>TH</sup> June and 14<sup>th</sup> March as needed.

- Cutting usually undertaken fortnightly during the high season.
- Arisings raked up and deposited on immediately adjacent banks.
- We consider that we are cutting SMALL amounts. Should weed density appear greater than “small amounts”, smaller sections will be cut, allowing the resultant cut material to be discharged over a longer time period.

- In addition to the above, monitor flow rates, especially in dry weather on each day cutting takes place. Check before cutting starts.
- Ensure canal owner, NW&CT Canal Manager, Fisheries & Boating Officers plus Canal Wild Swimming and Ebridge Model Boat Clubs are aware of cutting regime.
- Continual monitoring for the appearance of invasive plants, such as Floating Pennywort is essential, and if spotted, removal undertaken as according to the EA's guidelines.

We see this as having a high mitigation value **H**.

#### **c. Monitor invertebrate populations. H**

A recent survey into invertebrate populations in the canal has shown that they are very effective indicators of water quality and where it is being degraded. This technique has been incorporated into our regular survey programme and it is hoped to work with the EA's staff so as to inform the assessment of ecological quality. This is seen as having a high mitigation value **H**.



#### **d. Pollution control. H+**

Currently, silt and other pollutants are a significant problem in the canal, arising from fast flowing feed channels and road run-off from the North Walsham area washing into the canal at Spa Common and near the Paston Way Condensate bridge. This is of particular concern to our fisheries team and the affect that it has on spawning in the Spa Common area of the Canal. A potential area of mitigation would be for settling ponds or silt traps to be installed by those responsible for this pollution. Following efforts by the EA, the main source of the silt pollution at Spa Common has been identified and action is ongoing. Additionally the Trust are negotiating with a nearby landowner re the possibility of constructing settlement ponds. Meanwhile timely and adequate winter de-silting is necessary in the area, so as to give a sufficient water depth to maintain the fish stock and for navigational needs. This should take place when more water is running and the water temperature is low. We see pollution control as having a very high mitigating value, not only to this pound but also to broadland habitats downstream **H+**. See appendix 8 - De-silting programme.

#### **e. Encouraging use of electrically, manually and wind powered vessels M**

A very popular feature of our events program is the offer of regular waterborne tours of the canal on our electrically powered trip boat *Ella II*. Always oversubscribed it is a combination of wildlife, history and landscape tour. Powered by solar panels feeding a

low wash propeller the experience educates the public into taking things gently through the landscape whilst still having a good time. The majority of visiting craft are manually or wind controlled. However, there is the need for other types of propulsion at times, for example with maintenance craft and some larger visiting craft. In these cases the craft owners will be required to ensure that no pollution takes place from their engines and bilges, and that speeds are as such to maintain a low wash. We see this as having a medium mitigating value **M**.

## **2. Mitigation within the staithes/mill-ponds.**

As above 1a – 1d for the canal water channel. Additionally, the possibility of adding ‘stepped’ profiling to provide wet berms and shelves to steep sided banks is to be considered where they do not interfere with other users of the Canal. A stepped or gently sloping bank allows much more diversity of aquatic fringing vegetation that provides habitat and cover year-round for fish, invertebrates, birds and mammals. Whilst not a feature of the original canal, this would be beneficial for the ecology and maximise the multiple benefits that the canal provides the public and the local environment. encouraging colonisation by a more varied suite of emergent and marginal vegetation than can survive on very steep banks. We see this as having a high mitigating value **H+**.

## **3. Mitigation on the canal bank walks and bank shoulders.**

The canal bank walks have the potential to offer mitigation in the form of species rich zones (typically called ‘ecology strips’ or ‘buffer zones’), on the other hand they are importantly used by walkers, anglers and others, meaning that a compromise is needed so as to marry the conflicting requirements of nature and recreation. It is possible to leave areas of uncut vegetation adjacent to some paths so long as there is sufficient mown width to walk along. This tends to control incursion into the uncut areas and ease maintenance and has a high mitigation value **H**.

Where the bank tops are used as a footpath or for fishing and boating access they will be regularly mown during the growing season to a width of 2-3 metres. Where they are significantly wider than this, the mown area will be adjacent to the canal whilst the rest will be treated as a conservation area and only mown once a year (late summer/early autumn) ideally with an oscillating cutter. Arisings should be removed to discourage the over enrichment of these conservation areas.

After a re-survey during 2019 some banks were increased in height and more work is planned for 2020. This has left some areas in need of re-seeding during 2020. Material that is not from this area has been used in some cases and this is a dry loam that may well benefit from the addition of a wildflower seed restoration mix to encourage the re-establishment of meadow-like areas.

Where bank tops are not in regular use or where it is wished to discourage access, they will be managed as a conservation area with only a single cut each year. (See also the *Old Canal Company Restoration Mitigation Conservation Area Management Plan 2020* which shows how the North Walsham and Dilham Canal Trust (NWDCT) plans to manage it over 2020 in order to mitigate any adverse effects of its restoration, improving both its hydro morphology and bio-diversity). **See Appendix 9 OCC Conservation Area Management Plan.**

#### **4. Mitigation on the canal banks.**

The majority of the canal banks have sloping sides, one to the canal and the other to a ditch, drain or soke. Both need to be treated in the same way with a single cut in the late summer/early autumn, ideally with an oscillating cutter and with arisings being removed rather than being left to rot down. Additionally, any self-seeded saplings should be removed at this time together with any dead vegetation from the ditches, drains and sokes.

The Norfolk Rivers Drainage Board (NRIDB) routinely clear some of these drains (1213, 1214, 1215 & 1216) in accordance with their map of Catchment Area 013G – North Walsham & Dilham Canal. **See Appendix 9 OCC Conservation Area Management Plan.**

Undisturbed canal banks are ideal for water-vole (**see appendix 5 Water Vole Guidance Notes**). With the steep decline in their population this canal offers many kilometres of new water-vole habitat. They have already returned to the restored Ebridge pound because of the constant level of water and water-vole friendly conditions and have returned to the east soke by Ebridge weir/spillway where they are often seen. Maintaining the canal banks to be water-vole friendly has a high mitigation value but can result in damage to their basic function. Wherever possible we would try to encourage them to live in the back sokes to reduce potential damage. Because of this we see this location as a medium mitigation value **M**.

#### **5. Mitigation within the opposite banks to the canal walks, where applicable.**

These banks are used mainly for maintenance access and are treated as ecology strips or buffer zones being mown only once a year. This approach, combined with appropriate signage also discourages their public use, encourages bio-diversity and minimises incursion into private land. We see this as being of medium mitigation value **M**. **See Appendix 9 OCC Conservation Area Management Plan.**

#### **6. Mitigation on the water margins**

- a. **Monitor and manage machophyte densities at water margins L-M**

There could be potential areas of mitigation in the monitoring/management of macrophytes at the water margins using them as a long term indicator of water quality. We see this as low to medium mitigation value **L-M**.

b. **Stepped bank modification. M**

As in 2 above.

7. **Mitigation within the back-sokes.**

a. **Maintenance of the back-sokes for free-flowing running water. H**

The back-sokes resemble small continuously flowing streams. Their prime purpose is to gather and channel water collected within a 1000 yards either side of the canal (1812 Act), then taking the water alongside the Canal, feeding into the Canal below each lock, providing a continuous flow through the Canal's length. On the OCC section these sokes are culverted under the Canal three times (Upstream Royston Bridge, Purdy's Marsh and upstream Ebridge Lock). It is vital to maintain the function of these sokes as they transfer feed-water into and out of the pounds and transfer excess water during precipitation events.

**WEST SOKE AND CULVERT, ROYSTON  
BRIDGE FOLLOWING IDB CLEARANCE 1<sup>ST</sup>  
MARCH 2020 (photo IDB)**

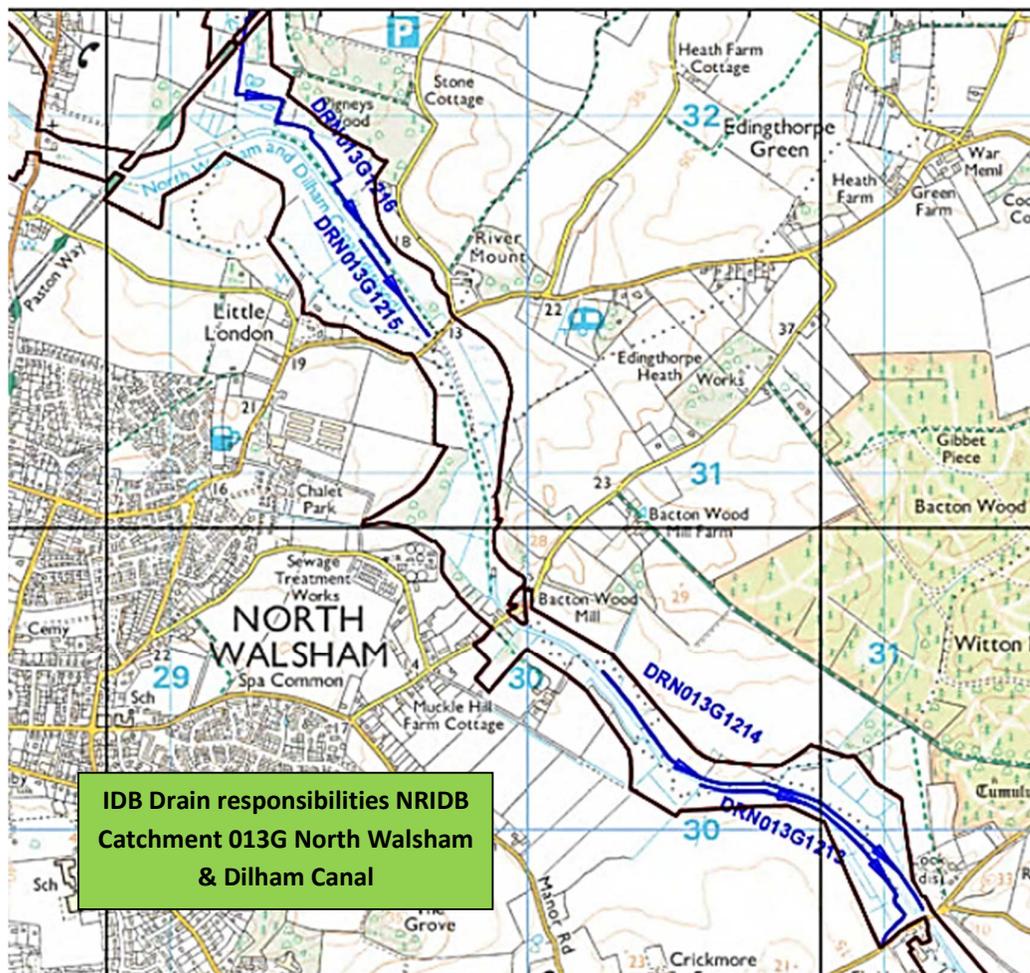
**Gravel bed Purdy's Marsh**



It is possible to use these drains for mitigation as they emulate a medium/ fast flowing stream, often with a gravel bed and in some cases goods quality water, which provides another habitat type to complement the restored Canal. At times these streams will carry high flows of water and need to be maintained with this primary purpose in mind. However, minor natural obstructions (e.g. fallen branches) can be left in situ where

they do not pose a land drainage problem or risk the integrity of the banks. This particularly applies to where the soke diverts around Purdy's Marsh (see 8a below) **H**.

The Internal Drainage Board have responsibility for the maintenance of parts of four of the back-sokes along the OCC's length – IDB013G1213/4/5/6. The Trust works closely with the IDB with the arranging and timing of the cuts. In order to minimise the extent to which cut bankside vegetation falls into the soke, hence de-oxygenating the water, the Trust arranges for the IDB to undertake a cut-and-collect system wherever possible.



The back-sokes also provide a continuous and unobstructed migration pathway for marine life and have a high mitigation value **H**.

#### **b. Banks maintained to be water-vole friendly. H**

Some areas of soke already have great flora value containing relatively rare and desirable species and these are well worth taking pains to protect and conserve. The IDB in discussion with the NW&DCT have already agreed to a joint program of annual bank cuts with particular attention being paid to how the soke banks are cut to encourage water vole habitats. For example, the IDB are requested to avoid cutting in the early spring when water vole activity increases and breeding commences, nor in

late autumn so that areas supporting core overwintering populations are not left void of vegetation.

We see this as having a high mitigating value **H**.

**c. Cut banks to prevent dead vegetation falling in the water. H**

The removal of dead vegetation to prevent the de-oxygenation of the water is seen as a vital part of this task and any modifications to the maintenance regime need to be very carefully evaluated and subsequently monitored as they are a vital part of the canal water management system. As seen in 6a above, the Trust work closely with the IDB for their maintenance programme, and similarly with the OCC, for maintenance of those sokes not designated as IDB responsibility. We see this as a having a high mitigation value **H**.

**d. East back-soke modification (installation of plank weirs). H**

As well as allowing minor natural obstructions (see 6a above) to allow some natural variation within the physical confines of the soke, 'Plank weirs' installed along the east back-soke at strategic places would maintain pools of water in times of drought or abstraction<sup>1</sup> of the canal water. In particular a 30cm plank in the oil containment catchment sluice below Royston Bridge would maintain a constant depth of water in the soke pond above the bridge. We see this as high mitigation value **H**.

**e. Maintaining a flowing habitat in the east soke below Royston Penstock H++**



The East soke in the Pigney's Wood's area takes the feedwater from an unnamed stream from Knapton. This is joined by waters passing through the penstock north of Royston Bridge. Keeping what is already established as a flowing habitat is of prime importance, in order to meet the requirements of the Water Framework Directive (no deterioration). A mitigation opportunity, which would not have a direct effect on the main purpose of the east back-soke would be to crack the Royston penstock, so as to enable a continuous flow, yet would not impact on either lock movements or milling requirements at Bacton Wood Mill. A further possibility would be to install a small 'bleed' spillway in the east bank located in the area of

Pigneys Wood. This would extend the east flowing length of the back-soke considerably and maintain a greater flow in the soke. We see this as having a high mitigation value **H++**.

**f. Encouraging the opportunity to enable connectivity for fish passage between the pounds M**

See 1a above

<sup>1</sup> All water abstraction from the top third of the canal has ceased – 1812 Act (The exception being Bacton Wood Water Mill)

## **8. Compensatory within the wider surrounds of the canal boundary.**

### **a. Formation of a new ponds near Royston Bridge. H+**

The canal boundary extends beyond the banks and back-sokes in some places. It is possible to create areas within this boundary to enhance the bio-diversity and ecological value of the canal.

The Executive Summary the EA's Biology survey specifically mentioned the ponded section formed by rainwater to the north of Royston Bridge. It is described as a 'good quality pond, possibly of Biodiversity Action Plan Priority Habitat Status'. The report recognised that the pond was temporary, but it would be an excellent mitigation project if this pond was moved, as it will be lost when the canal is fully re-watered. A site for an alternative pond on the other side of the east bank has been identified by the OCC and they are currently clearing the land bounded by the Bacton road, Pigneys Wood road, the east canal bank and the east back soke.



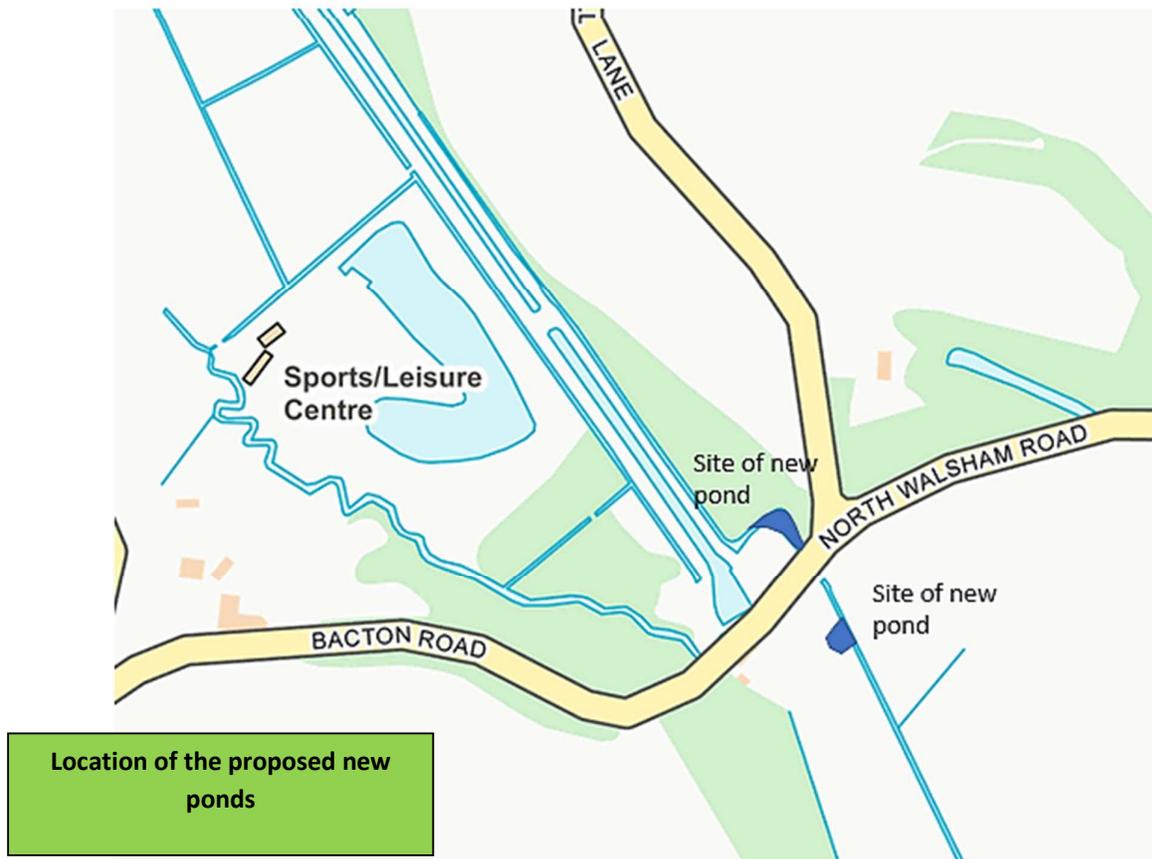
The new pond, see the diagram next page, is to be created here, connected to the east back soke but having a gradual shallowing bed sloping towards the east soke. This new pond will be only a few metres from the 'temporary pond', should be able to replicate



the ecological features which will otherwise be lost and has the potential to be 'managed' to enhance its ecological value further. We see this as a very high mitigation value

**H+.**

**Kingfisher below Bacton Wood Lock – Photo Perry Hampson**



A similar pond to be created on the west of the soke, below the culvert under North Walsham Road, within Purdy's Marsh, will meet similar aims. **H+**

**b. Restoring and maintaining Purdy's Marsh (CWS) **H+****

**Purdy's Marsh**

The area known as Purdy's Marsh was a drying out reed bed adjacent to the section of canal from Bacton Wood Lock to Royston Bridge and is part of County Wildlife Site no.1173 Spa Common. The OCC purchased the area known as Purdy's Marsh and the NW&DCT has commenced a four-year rolling program of reed cutting and Himalayan Balsam control with advice from the NWT. The intention is to restore this area to a good reed bed with some shallow turf ponds or scrapes added where appropriate to encourage bio-diversity.

The restored reed marsh will provide valuable foraging and/or breeding habitat for the Marsh Harrier (known to roost in the area) and the rarer Bittern, which have been observed on this marsh. Common creatures inhabit the marsh and surrounds - for example toads, frogs, water vole, grass snakes, adders and a wide variety of invertebrates. Crucially the marsh will not have any public access, thus keeping disturbance to a minimum.

Restoration of this area (see below) has been ongoing for five years (**see appendices 2a & 2b Purdy's Marsh**) and we see the overall project as having a very high mitigating value **H+**.



Purdy's Marsh vegetation clearance

**c. Regular monitoring of habitats, species and water quality. H**

The regular monitoring of habitats, species, and numbers is seen as vital to be able to judge the effectiveness of our mitigation efforts. A good baseline data set has been established since 2015, of flora, fauna and aquatic life (see appendices 6a,10,11,12). In addition we are developing our ability to assess water quality and the factors that affect it. We regard this monitoring effort as having a high mitigation value **H**.

**d. Control of Invasive Species H**

Various techniques have been involved to find the most effective way of controlling Himalayan Balsam on Purdy's Marsh and elsewhere. The effectiveness of this is being monitored as is the presence of any other invasive species. This we see as having a high mitigation factor **H**



**e. Installation of bird and bat boxes L**

Installation of bird and bat boxes around the general area of the canal is a possibility. We see this as having a low mitigation value **L**.

## 14. Compensatory outside the wider surrounds of the canal boundary.

### a. Formation of shallow turf pond/s in adjacent reed beds. **H**

There is further scope for mitigation within the Pigneys Wood Nature Reserve as it adjoins the canal corridor for some considerable distance. It is now managed by the Norfolk Wildlife Trust and the NW&DCT has already suggested that it support and help to enhance an area near the canal. Our first joint efforts with the Norfolk Wildlife Trust (NWT) involved the formation this year of shallow turf ponds or 'scrapes' in Purdy's Marsh. This is regarded as a high mitigation value project **H** and one capable of more development over the years.



Duke of Edinburgh volunteers  
from North Walsham High School  
digging turf pond (Feb 2019)

### b. Joint projects with NWT on adjacent local CWS areas.

The Norfolk Wildlife Trust also sees the canal as an important open water corridor, improving connectivity of areas of sedge fen and reed beds between their CWS sites nos. 1176 and 1177 at Antingham Ponds, Pigneys Wood reed beds, Spa Common (Purdy's Marsh) no. 1173 and Ebridge Farm Meadows no. 2215. This has already been

recognised as a successful Marsh Harrier route and habitat and we look forward to further joint developments with the NWT.

**c. Regular comparative evaluation of monitoring results. H**

The regular comparative evaluation of yearly survey results against baseline figures is a very necessary part of the mitigation task. It is only this evaluation which allows us to judge the effectiveness of our mitigation efforts and to develop and adapt them as needed. This task is regarded as having a high mitigating value **H**.

**d. Viewing the Canal in a wider context as an important wildlife corridor  
H**

The Trust wishes to flag that it increasingly looks at the Canal and its habitats in a wider context - viewing it as an important wildlife corridor in the North Norfolk area. Taking this view encourages us to make even greater efforts to maximise its biodiversity and bring benefits to a wide range of species along its length. The Trust will explore the possible benefits in seeking to have the whole site in the Trust's current care designated as a *CWS* or as a *Bee Line* or even both. **(see appendices 1 County Wildlife Sites, 3 – Canal a Wildlife Corridor, 4 Bee-Line)**

In addition, Norfolk Wildlife Trust's Living Landscapes Officer, Matt Jones, has encouraged us (Nov 2019) to consider the development of additional nature-friendly areas beyond the Canal's formal boundaries, and has suggested that it might be worth trying to encourage sympathetic neighbouring landowners to take on board a wider vision of the Canal's wildlife potential. The Trust intends to discuss this with sympathetic owners who have land adjacent to the canal that appears not to be under active agricultural management. In these cases, we will suggest that to these 'frontagers' that it might be possible to enhance such areas for the benefit of wildlife (or at least continue to do nothing, if that is beneficial). Not only would this be valuable in itself, but it could also provide opportunities to off-set other impacts e.g. of the re-watering of the canal by the creation of ponds to provide refuges for aquatic and wetland plants.



Roach c year2. Bacton Wood 4  
Jun 2019 – Photo Tracey Cosford

## **10 Current Status of the Mitigation Programme (2020)**

In the following tables those Mitigation activities highlighted in light blue are still under evaluation as to whether they are appropriate and if so, the best way in which they might be implemented. All others are in place and in operation.

<b>Mitigation Realisation</b>	<b>Description</b>	<b>Time of Year</b>	<b>Details</b>
1 Canal channel, Linear Lake, Fish Migration, water bypass.	Bypass route inherent in canal design.	Avoid work during fish breeding season.	Ensure any maintenance or restoration work does not block fish migration bypass route.
1&2 Canal channel, Staithes and Millponds, Manage general Aquatic Plant growth.	Manage to increase bio-diversity, fish habitats and ease of navigation (First channel profile cuts made in 2019)	Cutting June to March only.	Monitor and manage as appropriate, as per ESOP1.  Dissolved Oxygen data used to guide cutting regime.
1,2 & 6 Canal channel, Staithes and Millponds, Water margins, Water quality indicators. (Macrophyte densities)	Monitor and manage macrophyte populations as an indicator of water quality	Cutting June to March only.	Monitor and manage as appropriate
1&2 Canal channel, Staithes and Millponds, Water quality. (Aquatic Invertebrates)	Regular monitoring of aquatic invertebrates at key local particularly at drain outfall locations. First Survey Data (Spring 2019)	Year round	Note local abstraction and/or precipitation levels prior to and during measurement.
1&2 Canal channel, Staithes and Millponds, Pollution control.	Unwanted pollution from surface water drains and field run-off.	Year round	Silt and road particle traps under consideration. Source of Spa Common pollution established by EA 2020, and being pursued.
1&2 Canal channel, Staithes and Millponds, Encouraging use of electrical, manual or wind powered Vessels	Recommended use of environmentally friendly powered vessels to reduce pollution and disturbance to the habitats.	Year round	Trust's trip boat <i>Ella II</i> , solar powered electrically driven since 2018.
2 Staithes and Millponds, Stepped Bank modification.	Consider installation of berms or 'Bank steps' at the waterline to increase habitat.	Install during September to March.	Encourages marginal vegetation and water vole population

Mitigation Task and Value	Description	Time of Year	Details
3, 4 &5 Canal walking paths, opposite banks, ecology strips.	Walking path widths kept to a minimum and mown so as to leave 'ecology strips' wherever possible.	Avoid cutting May to August Max.Frequency 2 cuts/year	Allows plants to flower and set seed, producing a more bio-diverse habitat.
3, 4 &5 Ecology Strips, Buffer Zones, Rough Grass, Limiting access	Sensitive areas should only be cut once a year and allowed to overgrow.	Avoid cutting May to August Max.Frequency 2 cuts/year	Limits access to sensitive areas.
4 Canal Banks, Water Vole population.	Develop suitable habitats by selective vegetation cutting.	Cut during September to March.	Encourages further breeding.
7 Back-Sokes, free flow.	Monitor and clear as necessary to ensure free flow of water and encourage biodiversity, working in conjunction with IDB on their respective drains.	Year round	There is also a possibility to develop the biodiversity of these areas but only if their function as drains is not compromised.
7 Back-Sokes, Water Vole population.	Develop suitable habitats by selective vegetation cutting.	Cut during September to March.	Encourages further breeding.
7Back-Sokes, Clearance.	Ensure sokes clear of dead vegetation. Joint NW&DCT/IDB cutting program to start Autumn 2019	Cut during September to March	Prevents de-oxygenation of the water.
7 Back-Sokes, Pigneys Wood – penstock control and 'bleed' spillway	Penstock to be cracked to enable continuous flow. Addition of a 'bleed' spillway to be considered to increase the length of the east back-soke.	In progress	Planned for completion Autumn/Winter 2020/21.
7 Back-Sokes, Plank Weirs.	Addition of 'Plank Weirs', or natural barriers e.g. small fallen branches, in the east back-soke to retain pools of water.	Year round	These would retain water and support habitats in times of drought or abstraction of the canal water.

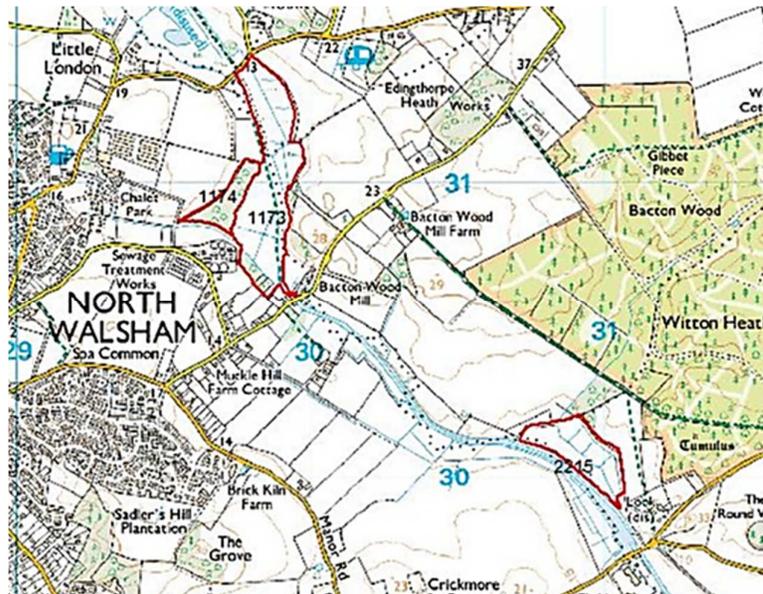
Compensatory Task and Value	Description	Time of Year	Details
8 Wider Surrounds, New Ponds.	The creation of a new pond above Royston Bridge	2014 (2020/1 additions)	Pond with a shallow sloping bed offering a similar habitat to the current temporary pond.
	The creation of a new pond in Purdy's Marsh	In progress	Planned for completion Autumn/Winter 2020/21
8 Wider Surrounds, Purdy's Marsh restoration.	A four year rolling program (25%/year) of reed clearance (3 <sup>rd</sup> year just completed 2019)	Cut and rake off during September to March	Target is a good reed bed with enhanced bio-diversity.
8 Wider Surrounds, Regular monitoring of habitats, species and water quality.	A range of regular surveys and condition monitoring of the whole area.	In progress	Acquire sufficient data each year to enable the evaluation of mitigation activities.
8 Wider Surrounds, Bird and Bat boxes.	Installation of bird and bat boxes as the opportunity presents itself.	In progress	Boxes to be installed wherever feasible and sensible.
9 Outside Canal Boundary, Installation of Shallow turf ponds.	Installation of shallow turf ponds, 'scrapes' in appropriate locations.	September to March. First two installed in Purdy's Marsh March 2019	Enhances bio-diversity
9 Outside Canal Boundary, Comparative Evaluation of Survey results	Evaluation of yearly data against baseline survey figures.	In progress	To be completed in Autumn 2020.
9 Viewing the Canal in the wider context	Consideration of benefits of classifying the whole site in a wildlife category	2020/23	To consider benefits of CWS, Bee Line or similar in conjunction with NWT and other bodies
	Development of nature friendly areas beyond the formal boundary	2020/25	To discuss with frontagers.

## Appendix 1 - County Wildlife Sites - Managing Local Sites



# Norfolk Local Sites Handbook

- a guide to the County Wildlife Site (CWS) and County Geodiversity Site (CGS) systems in Norfolk.



## Promoting positive management of CWS

The majority of County Wildlife Sites in Norfolk are in private ownership, with many of the rest being owned by parish councils and local poor trusts or fuel allotment trusts.

The CWS Partnership recognises that it is important that landowners are aware of the presence and significance of their site for wildlife and the role of the CWS system as a tool for achieving nature conservation objectives. In order to deliver this aim, landowners are offered support and encouragement to maintain and enhance their sites.

### Providing information to landowners & managers

The key to conservation is information. It is crucial that people are aware of where CWS are and why they are important. With this information, landowners and conservation bodies can work together to safeguard sites and secure their future management.

Private landowners and managers play a crucial role in protecting and enhancing sites, whilst local authorities, including parish councils, have a duty to have regard for biodiversity when planning the management of land they are responsible for.

Consistent and regular contact with landowners is essential. From the outset, CWS owners will be provided with both information on how the CWS system works and its implications, as well as information on their site/s.

Once a site is selected as a CWS, landowners/managers are provided with an information sheet on CWS. This emphasises that the majority of ordinary land management and agricultural operations remain unaffected and that identification of a CWS does not give anyone other than the landowner/manager control over the land management, but that there is a need for the site to retain its wildlife interest. The information sheet also sets out the help and advice available from NWT and can be found at [www.norfolkwildlifetrust.org.uk](http://www.norfolkwildlifetrust.org.uk).



Volunteers tackle scrub clearance at CWS 1221

# Advice to CWS owners

Norfolk Wildlife Trust is the main contact for advice on the care and management of County Wildlife Sites in Norfolk; however, other organisations, including Natural England and the Forestry Commission, may also give advice.

In order to deliver the very best for biodiversity, NWT is able to provide the following to landowners and managers:

- Site visits to discuss management and advise on the best way to care for sites,
- Written management plans or shorter management statements,
- Advice on possible sources of grant aid and help with applying for grants. Funding is often the key to encouraging positive management for nature conservation on a CWS because management sympathetic to wildlife is characteristically less intensive and often less economically productive than the current 'norm',
- Information on contractors, graziers and volunteer groups able to carry out practical site management.

Organisations providing conservation management advice in Norfolk need to work closely together to ensure that expertise is used to its full potential for the benefit of the CWS; it is important

to avoid duplication of effort on sites, especially where advice leads to securing a management grant. Much of the communication for this work is delivered through the CWS panel and by maintaining a high level of contact with other conservation organisations.



# CWS condition monitoring

Monitoring the condition of CWS is essential for the following reasons to:

- Ensure CWS data is up-to-date
- Help focus resources on priority sites
- Assess the effectiveness of site protection
- Assess the effectiveness of site management
- Increase the understanding of causes of site loss and damage and habitat change
- Establish and justify the need for continued action
- Report against performance indicators and to record progress against BAP targets
- Record positive management as a contribution towards the County Council's responsibility to report to government on SDL 160 (previously NI197) – an indicator assessing local sites in Positive Conservation Management

The distribution and abundance of habitats and species is always changing in response to natural and man-made influences. CWS are vulnerable to change so regular surveying and monitoring are needed to help keep CWS data up to date and to support action that will protect and enhance CWS. In general terms the CWS Panel aims to ensure that all CWS are comprehensively resurveyed on a rolling programme.

Monitoring is a valuable tool for assessing how successful the CWS system is in achieving its aim of protecting and enhancing sites, and in determining how to use the system to maximise its effectiveness. A common condition monitoring methodology has been developed for Norfolk and is capable of providing robust information to inform monitoring of the Biodiversity Action Plans and other indicators such as those included in Sustainable Community Strategies and Local Development Frameworks.

Positive conservation management is management that contributes to maintaining or enhancing the features of interest for which a site has been selected. To show that positive conservation management has been or is being implemented on a CWS, there must be documented evidence of appropriate management activities. NWT is working closely with NCC to gather information on the management of sites and to report on the progress of meeting the biodiversity indicator targets for Norfolk.

**SOURCE – NORFOLK LOCAL SITES HANDBOOK, 2014, NORFOLK WILDLIFE TRUST  
PP26-29**

## **County Wildlife Site: Part of 'Spa Common' CWS 1173**



### **Overview**

The site forms part of the wider CWS known as Spar Common CWS and is managed by the North Walsham and Dilham Canal Trust (NWDCT). The land represents an area of former fen meadow which has suffered from lack of management for some years and has become scrubbed up, rank and species poor. This has resulted in the accumulation of a deep litter and humic layer which has contributed to the land becoming dryer and nutrient rich. Since the winter of 2016/2017 both scrub removal and the cutting of the sward has occurred with arisings raked off and the NWDCT wish to manage the area by cutting into the future in order to restore and diversify the site.

The area of the entire site is 1.86ha and the area of the fen meadow is 1.33ha (excluding canal and Embankments)

### **Current site condition & site management**

*F1;B5;A2 – Swamp; Grassland and marsh/marshy grassland; Scrub scattered*

Until the winter of 2015/2017 the site has been unmanaged and as a result has become rank and species poor. The recent management work consists of scrub removal and a cut and collect across a portion of the fen meadow. Common reed and reed sweet-grass dominate many areas and with both common nettle and creeping thistle being frequent. Other species include wild angelica, hedge mustard, water figwort, hedge bindweed, common hogweed and hemp nettle. Occasional stands of young *Salix* sp. scrub is also present.

*B6 – Grassland and marsh/poor semi-improved*

This is located on the top and sides of the embankments and is mown and the arisings not collected. Oxeye daisy ranges from rare to frequent on top of the embankments.

*G2.1 - Open water/running water/eutrophic (canalised channel of the River Ant)*

This is situated above the surrounding land and is contained by embankments. The channel was re-wetted in the summer of 2017.

*G2.1 – Open water/running water/eutrophic (boundary ditch)*

A shallow stream with a sluggish flow flows south. It does not support floating aquatic plants although marginal vegetation is occasionally present. Himalayan balsam is present along its bankside and especially along the neighbouring bank.

### **Ideal site condition**

*F1;B5;A2 – Swamp; Grassland and marsh/marshy grassland; Scrub scattered*

Through the establishment of an annual cutting regime, the fen meadow is diversified botanically by an annual cut and collect, green hay strewing and ideally turf stripping. The area could provide a valuable foraging and/or breeding habitat for marsh harrier

(known to roost and forage in the local area), frog, toad, grass snake, water vole, bats and a wide array of invertebrates.

The aspiration of the NWDCT is that milk parsley will become established within the fen meadow. Swallowtail butterfly occasionally migrate up the River Ant corridor and are seen in the urban fringes of North Walsham and it is hoped that the fen meadow will contribute with other land to providing a refuge for the species.

### **Note on turf stripping**

An option for reducing excessive nutrients most importantly bio-available phosphorus on the fen meadow is to remove the enriched surface layer in which nutrients have accumulated in plant and peat material by turf removal in order to remove the litter and humus layer and the top layers of peat. This can simultaneously make the surface wetter by lowering it relative to the groundwater and create conditions suitable for the development of a more diverse nutrient-poor vegetation.

Turf stripping can also be useful in bringing the surface level of the peat closer to the current water table level, re-creating wetter conditions at the peat surface, along with removing any unwanted plant species from the seed bank. It may, however, also remove any remnant seed bank of fen species and it would be beneficial to combine turf stripping with the spreading of 'green hay' from a 'target' habitat type to encourage rapid re-establishment.

Depending on the depth of the litter and humic layer, turf stripping to a depth of between 10 and 15cm is deemed appropriate for this site but this will need to be confirmed by a thorough ground survey as wide variations may occur across the site. Due to the significant work involved this could be prioritised in locations where the litter and humic layer are at their deepest. If extensive areas are to be stripped this should be carried out over 3 years in order to maintain extensive vegetation cover to provide a refuge for fauna and flora.

*Peat is defined as slowly decomposing plant matter which has been created in low-oxygen environments such as fens **and can be many 100's of years old and is always acidic. Humus is newly rotted vegetable matter and tends to be mainly neutral to slightly alkaline pH.***

#### *B6 – Grassland and marsh/poor semi-improved*

Understandably due to the steepness of the embankments it is has been found to be impractical to collect arising from its sides. Ideally though if the arisings on the top of the embankment are collected this would assist in creating a linear strip of neutral grassland.

#### *G2.1 - Open water/running water/eutrophic (canalised channel of the River Ant)*

A rich marginal vegetation community establishes over time and floating aquatic plants colonise the channel.

#### *G2.1 – Open water/running water/eutrophic (boundary ditch)*

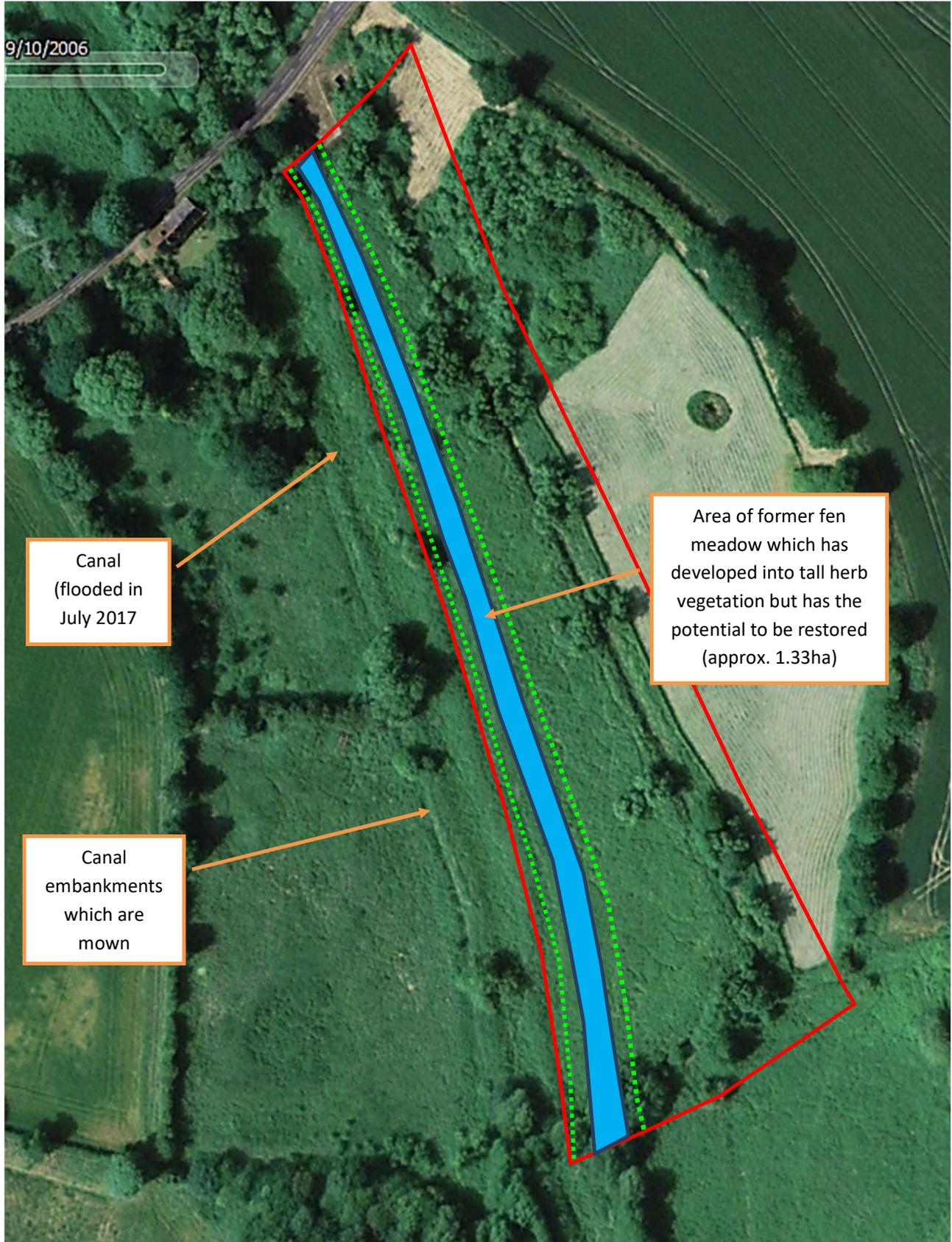
The himalayan balsam is kept under control by pulling before it flowers and spread once again into the fen meadow.

### **Conservation priorities in brief**

- Enhance the fen meadow through an annual cut and collect.
- Carry out turf stripping within the fen meadow.
- Spread green hay on newly turf stripped areas or where soil disturbance has occurred.
- Cut and collect arisings along the top of the embankment in order to restore these areas to species rich neutral grassland.

<b>Conservation priority &amp; description</b>	<b>Prescriptions</b>	<b>Time of year</b>	<b>Who to deliver</b>	<b>Details</b>
Fen Meadow is rank and composed of competitive tall herb vegetation. Increase diversity through an annual cut	Remove cuttings from fen, transporting off site or piling up in higher drier areas on edge of site  If turf removal is not carried out, undertake a conservation cut, removing cuttings from fen meadow  Hand removal of thistles and himalayan balsam to prevent flowering	Early August – early September  Early – late April for the first 2 years  Undertaken in June, July and August for the first 2 years	Contractors/ volunteers  Contractors/ volunteers	Cutting produces a uniform sward so advisable to leave approx. 25% uncut each year, a different area each time to provide a refuge for fauna  Will help to reduce the nutrient status of soil. leave approx. 25% uncut each year, a different area each time to provide a refuge for fauna  For thistles top plants to near ground level and for himalayan balsam 'pull' entire plant
Neutral grassland of embankments is restored to species rich grassland by an annual cut and collect	Annual cut removing arisings from entire embankments or if not practicable the top of the embankments.	Late July – late August	Contractors/ volunteers	
Turf removal on fen meadow	Depending on the depth of the litter and humic layer turf stripping to a depth of between 10 and 15cm is deemed suitable  Could be carried out over 4 years in order to maintain vegetation cover to provide a refuge for fauna and flora	Avoid bird nesting season (March – August). Undertake on rotation to allow some undisturbed habitat to remain	Contractors/ volunteers	A 360 degree tracked excavator is most commonly used, with preference for relatively lightweight (12t) machines, ideally on wide tracks. A bulldozer may also be effective and would prove more time efficient. Excavated material should be removed off-site
Green hay strewing	Spread on the same day as cutting. Either spread on newly turf stripped areas or on newly cut areas where soil disturbance has occurred	End July – mid-August	Contractors/ volunteers	Soil disturbance could be achieved by harrowing the area to create ideally 50% bare soil
Sapling scrub	Control scrub to prevent it invading the fen meadow	October - February	Volunteers/ contractor	Cut to ground level. Remove brash and stack under trees Treat stumps with Timbrel or similar herbicide within an hour of cutting if contractor has licence. Leave if job carried out by volunteers

**ANNOTATED MAP**



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## *Appendix 2b - Purdy's Marsh Management Report NW&DCT/NWT 2019*

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*Suki Pryce, Wildlife Officer*

This March, Ivan Cane, Alan Bertram, Mark Shopland, and Suki Pryce met Sam Brown (Conservation Officer with the Norfolk Wildlife Trust) at Purdy's Marsh to review its management. Now owned by The Old Canal Company, The Marsh is a County Wildlife Site and part of the larger Spa Common CWS. It's an area of former fen meadow (1.33 ha excluding the Canal and embankments) which had previously lacked management for years. Without reed cutting or grazing, it had been accumulating organic matter, and this had led to the site getting dryer, more nutrient-rich, and dominated by competitive plants like Common Reed, Hogweed, Creeping Thistle, Nettle, Bramble, and Willow.

**Recent Management** The Canal Trust has managed the site since the winter of 2016/17, and since 2018 they have been following guidelines provided by the NWT. The main work has been to cut-and-collect the marsh vegetation on a 3-year rotation in an attempt to control the more dominant plants present, and give a wider range of species the chance to grow. Self-sown scrub/trees are also removed, and Himalayan Balsam controlled as much as manpower allows. However, Work Party Officer Alan feels that the recommended cutting regime has – if anything – *increased* the amount of coarse agricultural-weed type species present (like Creeping Thistle, Nettle and Bramble) without noticeably encouraging more attractive/less competitive plants. It's also very hard, rather uninspiring work for the volunteers involved.

**Recommendations** Species-poor reed beds do have their own value – for example as homes for invertebrates and small mammals, and as hunting grounds for Barn Owls. So even if the NW&DCT did very little with Purdy's, the Marsh would still be a reasonably worthwhile site environmentally. However, if more *can* be done cost-effectively to improve it's biodiversity, we want to do it! So after walking the site, and discussing the options, we settled on several low-key recommendations to follow:

- in order to help keep up the morale of work party volunteers, investigate using appropriate **contractor(s)** to do the bulk of the cut-and-collect work
- cut only a **quarter** of the site/year
- **rake off** as much smothering litter as possible after any cut
- dig a few '**turf ponds**'/'**mini-scrapes**' (a sort of localised turf-stripping), in order to create some topographical diversity in the Marsh
- aim for creating reasonable **physical variety** along the **back soke** by creating open bank areas (cut and rake off), and also keeping some areas with scrub/tree shade
- aim to just **keep on top of**, rather than eradicate, **Himalayan Balsam**.

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### *Appendix 3 - Viewing the Canal in a wider aspect as an important wildlife corridor – Suki Pryce*

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*Appendix for Mitigation Report, Suki Pryce, Wildlife Officer, Mar 2020*

The Trust wishes to flag up that it increasingly looks at the Canal and its habitats in a wider context - viewing it as an important **wildlife corridor** in the North Norfolk area. Taking this view encourages us to make even greater efforts to maximise its biodiversity and bring benefits to a wide range of species along its length. It has already been suggested to the Trust (Jan 2019) that there might be benefits in seeking to have the whole site in the Trust's current care designated as a **CWS** (or even just considered as a Bee Line!)

In addition, Norfolk Wildlife Trust's Living Landscapes Officer Matt Jones has encouraged us (Nov 2019) to consider the development of additional nature-friendly areas **beyond the Canal's formal boundaries**, and has suggested that it might be worth trying to encourage sympathetic neighbouring landowners to take on board a wider vision of the Canal's wildlife potential. In particular, we intend to discuss this with sympathetic owners who have **land adjacent to the canal that appears not to be under active agricultural management**. In these cases, we will suggest that to these 'frontagers' that it might be possible to enhance such areas for the benefit of wildlife (or at least continue to do nothing, if that is beneficial). Not only would this be valuable in itself, but it could also provide opportunities to off-set other impacts e.g. of the re-watering of the canal by the creation of ponds to provide refuges for aquatic and wetland plants.



Land adjoining west bank above Paston Way footbridge could be a possible candidate for liaising with frontage.

15 Dec 2019.

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## *Appendix 4 – Bee-Line – Mary Black 2019*

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Bee-line

A "motorway for bees" is being planned along a South Norfolk river valley in a bid to reconnect vital habitats for threatened pollinators.

Wildlife groups are hoping to build collaborations with farmers, landowners and councils to turn the Chet valley into a B-Line – a wildflower-rich pathway for insects to roam across the countryside – by bridging the gap between nature reserves and focus areas.

The Chet B-Line would start at the source of the River Chet at Poringland and end where the river joins the Yare near Reedham.

The Bergh Apton Conservation Trust's 10-acre nature reserve of marshes, ponds and woodland lies midway along the corridor, and other wildlife hotspots include Chedgrave Common, the Woodland Trust's property at Sisland Carr, and a grassed-over council landfill site.

Tony Davy, an emeritus professor at the UEA and chairman of the Bergh Apton Conservation Trust, said the idea is supported by the South Yare Wildlife Group and the Norfolk Wildlife Trust, along with parish councils in Porlingland, Chedgrave, Loddon and Bergh Apton.

"It is in the planning system, but it is only just at the beginning," he said. "The river is already an embryonic B-Line, as it is a ribbon of wildlife in an agricultural desert.

"You see these big fields of wheat and barley and there's very little biodiversity in that, but if we go to the river you have woods and marshes filled with wildlife. It is a B-Line waiting to happen.

"We are trying to get a lot of people talking to each other to get the co-operation we need to get this going."

The Chet B-Line would be part of a nationwide network being mapped by insect charity Buglife, whose fundraising and communications director Paul Hetherington travelled to Norfolk this week to offer advice on the project.

He explained the value of pollinators to Norfolk's farmed landscape, and the potential for insect corridors to reverse the alarming decline in their numbers since the 1930s – which he attributed to factors including climate change and a loss of habitats as farming intensified.

"It is loss of habitat, fragmentation of habitat and a loss of connectivity between habitat," he said. "The distance has become too great for our pollinators to get between these special places.

“So the concept of B-Lines is about joining these places up and making a motorway for our pollinators to get through. We are starting to fill in the gaps.

“People will say it is impossible to build a motorway for bees because you will always run into obstacles, but you don’t need to fill the whole thing. You need to have filled in at least 10pc, spread along it, for a B-Line to be functional.

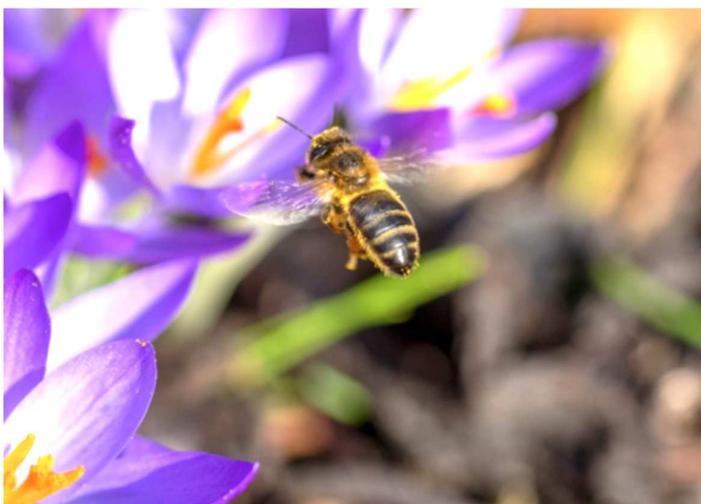
“People with large tracts of land like farmers have a big role to play in building the service stations along this motorway. Most farms have some areas of land that does not really get used for agricultural purposes, these are ideal places to start creating little mini-meadows and thinking about what is in your hedgerows and trying to get year-round flowering plants. There are so many things that can be done.”

One of Mr Hetherington’s meetings was at the Chet and Waveney Valley Vineyard, where grape grower and winemaker John Hemmant explained the ecological features being managed alongside his vines.

He said he was keen to make extra efforts to help pollinators as part of the B-Line project, and took advice from Mr Hetherington on creating bee banks – sheltered patches of south-facing bare ground where solitary bees can nest.

Mr Hemmant added that such measures were not only an important part of the provenance of his wine, but will also be necessary in order to attract grant funding in future.

“Obviously with the European grant system falling away there is an opportunity to look at the grant system going forward and Michael Gove [the environment secretary] is telling farmers: Yes you can have money for hedges, but we are looking for greater public access and greater conservation effort,” he said. “So in order to get grants in future we would need to improve the management of the environment for flora and fauna.”



**A bee collecting  
crocus pollen.  
Rebecca McGe., in  
EDP Article  
*Motorway for Bees*  
15 March 2019**

## **Guidance - Water Voles:surveys and mitigation**

Survey reports and mitigation plans are required for development projects that could affect protected species, as part of getting planning permission or a mitigation licence. Surveys need to show whether protected species are present in the area or nearby, and how they use the site. Mitigation plans show how you'll avoid, reduce or manage any negative effects to protected species.

Ecologists need to decide which survey and mitigation methods are right for the project they're working on. If this standing advice isn't followed, they'll have to include a statement with the planning application explaining why.

Where this guide says 'you' it means the applicant or their ecologist.

### **What you must not do**

The water vole is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 and is a priority conservation species.

You're breaking the law if you:

- intentionally capture, kill or injure water voles
- damage, destroy or block access to their places of shelter or protection (on purpose or by not taking enough care)
- disturb them in a place of shelter or protection (on purpose or by not taking enough care)
- possess, sell, control or transport live or dead water voles or parts of them (not water voles bred in captivity)

If you're found guilty of an offence you could get an unlimited fine and up to 6 months in prison.

## **Decide if you need to survey**

Survey for water voles if:

- distribution and historical records suggest they may be present
- if the habitat is suitable for water voles, eg if there's diggable earth or silt-shored banks for burrowing, wide swathes of soft vegetation growing from the banks and water and slow-flowing and relatively deep water courses

The absence of a record doesn't mean there are no water voles in the area but could be a result of there being no survey data available for that location.

## **Survey methods**

Surveys should be done between April and October by an ecologist experienced in water vole ecology.

Closely examine the waterway and pond banks, up to at least 2 metres from the water. Look for the following signs and record them on a detailed map:

- faeces
- latrines
- feeding stations
- burrows
- footprints
- runs or pathways

The survey should aim to gather information on the size and extent of the population on and adjacent the development site.

## Assess the impacts

Activities that can harm water voles include:

- destroying or disturbing their habitat
- destroying or disturbing places used for shelter or protection
- changing water quality

In most cases you should be able to avoid harming the water voles, damaging or blocking access to their habitats.

Assess the harm this development would have on water voles if no mitigation measures were planned and submit it with your planning application. Include the potential effects of work to the watercourse itself and work nearby.

## Avoidance and mitigation methods

You should address the potential impacts you've identified on water voles with your mitigation plans.

Aim to avoid negative effects by:

- avoiding works to areas where there are water voles
- avoiding habitat fragmentation and isolation by ensuring connectivity of habitat
- limiting damage to water vole habitat

If this isn't possible, use mitigation measures to reduce the impacts by habitat manipulation – encouraging them to move to a connected habitat

Only capture and move (translocate) water voles if there's no reasonable alternative, eg there's no way to allow the water voles to stay in the same place or nearby. The habitat you're moving the voles to needs to be capable of supporting the water vole population. You'll have to prove that capturing and moving the water voles as part of any development work would help their conservation.

SOURCE: Extracts from <https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences>

## Compensation methods

Use compensation measures to offset any remaining negative impacts for water voles that can't be solved using mitigation.

Compensation measures can include:

- providing more or better habitat for the water voles, to make up for any lost through development
- improving water quality
- enhancing bank and vegetation structure

It is also strongly advised that you carry out mink control as part of any mitigation, compensation and licensed action when you're dealing with water voles.

## Additional licensing information

This additional licensing information is for ecologist and developers who are considering applying for protected species licence.

If a protected species licence is needed the application needs to follow the above standing advice and this additional licensing information.

Water voles, their breeding sites and resting places are protected by law. In most cases, you should be able to avoid harming water voles by adjusting your planned work. If you can't avoid disturbing them or damaging their habitats, you may be able to [get a licence from Natural England](#).

Licences can't be issued for the specific purpose of development. In some circumstances Natural England will consider issuing a licence in relation to a development proposal if the licensed action is going to provide a conservation benefit for water voles. If you need planning permission, you must get for it before you apply for a licence.

You can do work like building or waterway maintenance near water voles but you must comply with the laws protecting them even when planning permission isn't needed.

# Pike (*Esox lucius*)



Appearance: They have large bony heads with prominent forward/upward looking eyes, a broad flattened snout and a large mouth. The mouth contains a fierce arsenal of teeth, with rows of backward pointing, razor sharp teeth in the top jaw and larger needle-like teeth in the lower jaw. The head is mounted on a long, torpedo shaped body with fins being primarily rear positioned for fast acceleration. Individual marking patterns are unique to each pike, like fingerprints to humans.

While fierce looking, the pike is a very fragile fish and the upmost of care must be taken when handling these fish on the bank and when returning them back to the water something the Trust takes seriously with the creation of specialist Pike Fishing Rules.

The apex predators are abundant in the Canal, with pike catches regularly posted on the Trusts social media pages. The largest

Pike said to have been caught is 20lbs and many dozens more into double figures.



# Perch (*Perca fluviatilis*)



Appearance: the perch has a greeny-brown back with a series of dark vertical bars across the upper sides and bright orange or red pelvic and anal fins. They have a very spikey dorsal fin and pointed gill covers and care should be taken when handling them.

Perch are also numerous in the canal and it has proven to have become a popular local water for perch fishing. Largest reported catch was 2lb and many of around 1lbs plus.





# Roach (*Rutilus rutilus*)



Appearance: the roach is a shoaling fish, silver in colour with grey-brown to orange fins. Roach can be confused with rudd, to check you can count the lateral line scales (rudd have 40-55), look at the shape of the mouth (rudd have an upturned mouth as they primarily feed at the surface) and make sure the front of the dorsal fin is in line with the pelvic fins (In rudd the dorsal fin is well to the rear of the pelvic fins).

Roach are the regular catch of the canal for the pleasure angler, catches from small fish up to specimen size of nearly 2lbs.

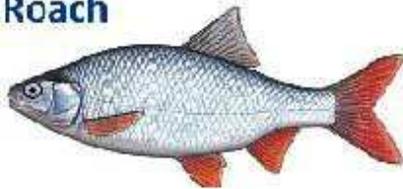




# Rudd (Scardinius erythrophthalmus)



Roach



Appearance: coppery golden in colour with bright blood red fins and an upturned mouth for surface feeding.

Rudd are primarily surface feeding fish so not as easy to catch as roach but for those who know how to catch them there are plenty to be caught and nice sizes too.



# Tench (Tinca tinca)



Appearance: Tench are easily recognised by their olive green colouration and small red eyes. They have a stout body and rounded powerful fins. They can on rare occasions be of golden colouration.

The canal stretch above Ebridge was once famous for its tench and they can still be found today, these two beauties were caught in the summer on 2018 by a local angler.



# Bream (Abramis brama)



Appearance: the bream is a deep-bodied fish with a high back and flattened sides. Typically it is dark brown or greyish on the back with younger fish being much more silvery.

Bream tend to shoal away from other fish making them a little allusive for pleasure anglers to catch, but we have bream in the OCC waters as the bream/roach hybrid below will prove.



The more secretive anglers have confirmed “off the record” of catching bream and its only time before we get some further photographic proof.

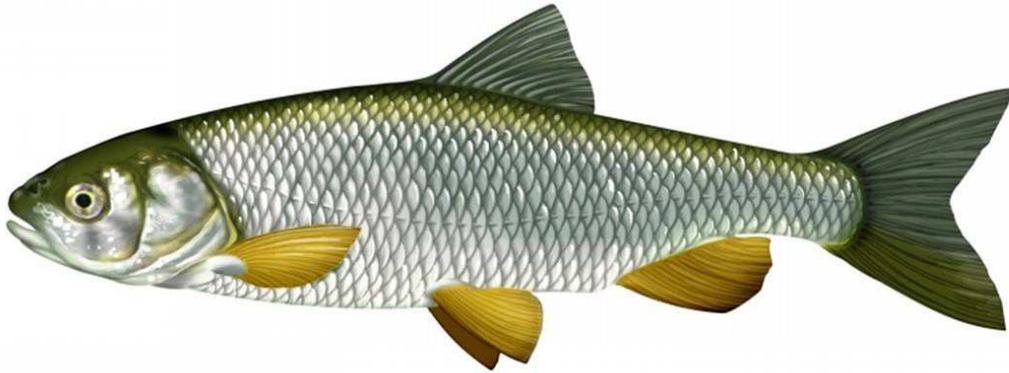
# Dace (*Leuciscus leuciscus*)



Appearance: dace are a small silvery fish and tend to occur in the lower reaches of rivers. They can sometimes be confused for a small chub. Check the lateral line scale count (chub have 44-46) and fin shape. Chub have a convex outer edge to their dorsal and pelvic fins while dace have a concave outer edge. Chub tend to have much more distinct wide mouth shape but this should be used as an identification tool along with the other features given.

Small dace are caught at Elbridge, I once spent a fair bit of time identifying it wasn't a chub with the angler who caught it. I have also seen small shoals of what I believe to be dace in the waters above Royston Bridge.

# Chub (*Squalius cephalus*)



Appearance: A shoaling fish, dusky silver in colour often with a brown to bronze sheen. They are quite distinctive with a blunt snout, rounded body and very large mouth. Small chub can often be confused with Dace. Check the lateral line scale count (Dace have 47-53) and fin shape. Chub have a convex outer edge to their dorsal and pelvic fins while Dace have a concave outer edge.

Report from work party volunteer that they witnessed someone releasing some chub into the canal in 2017.

Again a few more of the secretive anglers have told me “off the record” of rare chub catches.

# Eel (*Anguilla Anguilla*)



- Listed as Critically Endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species
- UKBAP Priority Species
- OSPAR list of threatened and/or declining species and habitats

Appearance: eels have a distinctive elongated, cylindrical body shape with small gill openings, one pair of pectoral fins and no pelvic fins.

Perry Hampson our former Wildlife Officer passed on to me reports of work party volunteers seeing the occasional eel.

# **FISHING**

**Between Ebridge Millpond & Swafield Bridge**

**Permission to fish is kindly granted from the owner**

**This is a privilege and not a right, respect the rules at all times**

## **Pike Fishing - Close Season 1st March to 30<sup>th</sup> September**

- Hooks - Single and barbless, max size 4, NO TREBLES.
- Baits - Sea fish dead baits only, NO LIVE baiting.
- Traces - Stainless steel traces 15 inches minimum.
- Line - 20lbs Monofilament and 30lbs Braid minimum.
- Equipment - Large knotless landing net with a minimum of 36in long arms, large unhooking mat, 12in long artery forceps, side cutters.

## **General Fishing - Close Season – 15th March to 15th June**

- Hooks - Single barbless, all methods, NO EXCEPTIONS.
- Baits - No cereal ground bait or boilies, surplus bait must not be dumped in the canal.
- Equipment - Disgorger/forceps/unhooking mat/landing net.

## **General Rules**

- NO KEEP NETS, fish can be rapidly weighed in nets.
- NO vehicles on banks and keep walk ways clear of tackle.
- Dawn till dusk fishing only.
- Avoid dangerous gorging, strike early.
- Maximum of 2 rods, always attended.
- Movement of fish is prohibited.
- Treat the environment, other canal users and wildlife with respect at all times.

**North Walsham and Dilham Canal Trust Aquatic Plant life Management.**

**Weed-cutting Guidance Sheet.**

**Reed and sedge not to be cut near banks (see 'procedures') after mid-July.**

**Floating weed not to be cut before June.**

Future mitigation:-

Timely and adequate winter de-silting to ensure sufficient water depth to maintain the fish stock is vital. This should take place when more water is running and temperatures are lower, over the winter. EA have been approached to help with prevention of or reduction in significant silt deposit mass.

Cutting Water Plants **sensitively** should prevent the disturbance of silt and maintain habitat for fish refuges.

Re-instatement of water in Bacton Wood Pound and use of Bacton Wood Lock might help to reduce silt deposits immediately below the lock, but not necessarily.

Installing a settling pond/bubble tube between Spa Common Staithe and the Sewage works might reduce silt deposits in the canal. NWDCT Liaison Officer is attempting to progress this. EA also looking into the possibility.

The cutting of submerged aquatic plants in this water corridor will be built on a programme, where appropriate, developed from Broads Authority Environment Standard Operating Procedure 1 (ESOP 1) and based on the monitoring of dissolved oxygen levels as a pre-condition to any cut.

<b>Procedures</b>
<b>3. Follow ESOP 1 Cutting Water Plants</b>
Key information: A minimum cutting height of 1' above canal bed; and A minimum 2' of uncut margins when channel is <20' wide. A minimum 3'3" of uncut margins where channel is >20' wide. A minimum of uncut margins from bank of 6'6" when channel is >40' wide  Monitor water depth quarterly. Cutting should proceed with caution if water depth is <3' and should not proceed if water depth does not exceed 1'6".

Impact	Likelihood	Mitigation
Introducing invasive non-native species to other sites on machinery / equipment	High	Refer to Biosecurity ESOP – assess risks on site by site basis & mitigate accordingly.
Heaps of decaying cut material deoxygenating the watercourse	High	Cut heaps to be 2 to 3 m from water's edge, or half way between channel and soke dyke
Removal of invertebrates	High	Disposal of cut material to allow proximity to waterway (as above)
Uprooting of plants in windy conditions	Medium	Avoid windy conditions
Cutting or damaging rare/protected aquatic plants	Medium	m Raise cutting height; pre-survey for such species
Disturbance of silt substrate	Low	Monitor water depth regularly
Creation of floating material	Low	Small cut fragments that escape the harvester to be collected

Basic D/O monitoring equipment is now in hand and in regular use. More professional equipment is being sought. 01/01/2020

4. Monitor water temperature and dissolved oxygen (DO) levels.					
Use the MATRIX below before proceeding.					
Water Temp <10°C		Water Temp 10 – 15 °C		Water Temp 15 – 20 °C	
DO < 43%	DO > 43%	DO < 49%	DO > 49%	DO < 55%	DO > 55%
<b>STOP</b>	<b>GO</b>	<b>STOP</b>	<b>GO</b>	<b>STOP</b>	<b>GO</b>
Contact Graham Pressman		Contact Graham Pressman		Contact Graham Pressman	2. Continue to check water temp & DO levels at the start and end of each section

**CUTTING TO TAKE PLACE ONLY BETWEEN 16<sup>TH</sup> June and 14<sup>th</sup> March as needed.**

**Cutting usually undertaken fortnightly during the season and only as necessary.**

**Arisings raked up and deposited on immediately adjacent banks.**

We consider that we are cutting SMALL amounts. Should weed density appear greater than “small amounts”, smaller sections will be cut, allowing the resultant cut material to be raked and spread/deposited on the banks.

In addition to the above, monitor flow rates, especially in dry weather on each day cutting takes place. Check before cutting starts.

Ensure canal owner is aware of cutting regime.

Ensure that NWDCT are aware of cutting regime

Ensure Fisheries and boating officer is aware of cutting regime.

Ensure that Ebridge Model Boat Club is aware of cutting regime.



Sources:

Aquatic Weed Control Operation Best Practice Guidelines – Technical Report WIII. Environment Agency/Broads Authority

## DE-SILTING GUIDELINES

**The removal of silt from the canal channel for the benefit of wildlife, water control, public recreational use and navigation. Ebridge to Swafield only.**

EA permits must first be obtained, prior to any work being undertaken.

De-silting should only take place between October and April.

All efforts must be made to minimise turbidity.

Material should only be placed on the banks adjacent to the place it has been removed from the canal.

Environment Agency regulations regarding control of waste materials (including quantity, placement and quality) must be followed.

There are known trouble spots at Paston Way railway bridge and below Bacton Wood Lock/Spa Common. Every effort must be made to limit inflow of silts etc at these points by negotiation with the various agencies and authorities concerned. Spot dredging as necessary!

*Picture shows pollutant inflow at Spa Common from side drain 28 May 2018.*

Any remaining silt should be removed to adjacent banks as necessary, from time to time (maybe once in 10 years).

Historic build-up (over the past 2-3 years), as yet un-dealt-with, should be removed and may only be deposited locally and according to EA guidelines.

Method: Wherever possible de-silting to be carried out from floating machinery such as the ex-BWB de-silter, *Weasel*, in preference to the use of heavy machinery on the raised banks.

### Channel Dimensions

#### Craft Dimensions

The wherries for which the canal was built were 50ft long, 12ft 4in beam and 3ft 3in draught (Ref: *Martin H Press. Edwards: Inland Waterways of G.B.* also gives 3ft 3" draught. A typical draught for a modern pleasure cruiser is under 2ft. Figures provided by the Broads Authority suggest that typical boats likely to use the canal are under 9ft beam.

#### Channel Width

It is most unlikely that broad, 12' 4", beam craft at full 3' 3" draught will frequently navigate the canal in future; so the chance of their passing in a section of 'standard' channel is discounted. Instead the following passing options are used:-

- a) Two broad boats, each drawing 2ft.
- b) A broad boat at full draught and a 9ft boat drawing 2ft.

Given 1:2 channel sides the surface width required is 30ft in general in cases (a) and (b). Allowing for 2in fluctuation of water level due to differing flows over the by-wash weirs gives 30ft width at NTWL. In places the Canal will be wider, due to passing places, staithe, turning areas as per the 1812 Act (up to 60 feet), in others less due to natural features.



### **Channel Depth**

3ft 3in draught vessels require more water depth than 3ft 3in to prevent grounding on chance debris and to minimise turbidity. A depth of 4' 6" (as per existing sill depths) is a sensible post-de-silting norm, since North Walsham & Dilham Canal was probably not clay-puddled for part of its length.

### **Design Cross-Section**

The current channel cross-section shows reasonable consistency with the original earthworks. A 1:2 channel cross section should be maintained in order to encourage natural growth at the banks. It is proposed that shelves of 6" in depth be left/built-up wherever that is practical for the purpose of encouraging reed grown at the banks. This will help to reduce erosion and offer sanctuary for wildlife, especially on the off-side banks.



**The Trust has just taken a long lease on the ex-British Waterways dredger "Weasel."  
January 2020**

Sources:

Channel Management Handbook – Report - SC110002 and Project SC120008/R4 Environment Agency/Broads Authority

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## *Appendix 9 - OCC Conservation Area Management Plan – M. Shopland. 2020+*

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### **1 - Introduction**

This document covers that area of the North Walsham and Dilham Canal that is owned by the Old Canal Company and that runs from Ebridge Mill to Swafield Bridge. It shows how the North Walsham and Dilham Canal Trust (NWDCT) plans to manage it over 2020+ in order to mitigate any adverse effects of its restoration, improving both its hydro morphology and bio-diversity.

The realisation of this plan depends on the availability of volunteers, the weather and the reliability of the equipment being used. It may well be modified to accommodate further restoration tasks that lead to the expected re-watering of the Bacton Wood/Royston Bridge/Swafield reaches later on in the year.

With the acquisition of a compact Tractor with a flail attachment the NWDCT managed, for the first time, to cut all of the bank tops and conservation areas, at least once in 2019. Unfortunately the flail attachment was limited in its reach and angle of adjustment so proved unable to adequately cut the bank sides. The Canal owner cut the bank sides with his machinery during 2019 and we have since been offered an oscillating cutter attachment for the tractor which should be able to carry out this cutting requirement from 2020.

The two tractor attachments produce different effects with the flail effectively mulching the arisings to provide nutrients to the vegetation and as such, it is ideally suited to the regular maintenance of grassed footpaths. The oscillating cutter does not mulch the arisings but leaves them to be subsequently cleared by hand. As long as this is done within a few weeks it means the soil does not become enriched and encourages the re-establishment of the indigenous species.

### **2 – Bank Tops - General**

Where the bank tops are used as a footpath or for fishing and boating access they will be regularly mown during the growing season to a width of 2-3 metres. Where they are significantly wider than this, the mown area will be adjacent to the canal whilst the rest will be treated as a conservation area and only mown once a year (late summer/early autumn) ideally with an oscillating cutter. Arisings should be removed to discourage the over enrichment of these conservation areas.

After a re-survey during 2019 some banks were increased in height and more work is planned for 2020. This has left some areas in need of re-seeding during 2020. Material that is not from this area has been used in some cases and this is a dry loam that may well benefit from the addition of a wildflower seed restoration mix to encourage the re-establishment of meadow-like areas.

Where bank tops are not in regular use or where it is wished to discourage access they will be managed as a conservation area with only a single cut each year.

### 3 – Bank Sides - General

The majority of the canal banks have sloping sides, one to the canal and the other to a ditch, drain or soke. Both need to be treated in the same way with a single cut in the late summer/early autumn, ideally with an oscillating cutter and with arisings being removed rather than being left to rot down. Additionally any self-seeded saplings should be removed at this time together with any dead vegetation from the ditches, drains and sokes.

The Norfolk Rivers Drainage Board (NRIDB) routinely clear some of these drains (1213, 1214, 1215 & 1216) in accordance with their map of Catchment Area 013G – North Walsham & Dilham Canal (see page 9 of this document).

### 4 – Special Conservation Areas

There are a number of areas which will require special treatment:

4.1 Pigney’s Wood Entrance, where there is a wide swath of meadow-like area between the canal-side path and the fenced entrance. There is also a problematic area of ground here that needs to be dealt with to encourage re-growth.

4.2 Purdy’s Marsh where an experimental four year cycle of reed cutting has been introduced to re-establish a healthy reed bed. Experiments are being made with different styles of cutting using a rotary brush cutter, mulching flail cutter and an oscillating cutter to see which best encourages regeneration. Varying depths of scrapes are also being tried to see if they offer any benefits.

4.3 Re-built Canal Tops where sandy soil from a different area has been used. The addition of a wildflower meadow mixture of seeds for a dry loam may prove beneficial, increasing the floristic value and the number of pollinators.

4.4 Mini- nature reserve NW of Royston Bridge has now had the good bank clearance requested courtesy of the IDB. But will need monitoring.



4.5 Lady Fern (*Athyrium filix-femina*) patch NW of Pigneys needs some kind of permanent marker to prevent unintended mowing.

## 2020+ Monthly Work Programme

<b>MOWN SECTIONS</b>	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ebridge Pound			T/F	T/F	T/F	T/F	T/F	T/F	Osc	T/F	
Ebridge West Car Park		R/S	T/F	T/F	T/F	T/F	T/F	T/F	Osc	T/F	
Ebridge West Footpath			T/F	T/F	T/F	T/F	T/F	T/F	Osc	T/F	
Bacton Lock/Spillway West			T/F	T/F	T/F	T/F	T/F	T/F	Osc	T/F	
Royston/Paston Way West		R/S	T/F	T/F	T/F	T/F	T/F	T/F	Osc	T/F	
Little London Footpath			H		H		H		H		
Paston Way/Swafield West									H		
Ebridge East Car Park		R/S	T/F	T/F	T/F	T/F	T/F	Osc	T/F	T/F	
Ebridge /Bacton Lock East		R/S	T/F	T/F	T/F	T/F	T/F	Osc	T/F	T/F	
Bacton Lock/Royston East			T/F	T/F	T/F	T/F	T/F	Osc	T/F	T/F	
Royston/Paston Way East		R/S	T/F	T/F	T/F	T/F	T/F	Osc	T/F	T/F	
Paston Way/ Swafield East			T/F	T/F	T/F	T/F	T/F	Osc	T/F	T/F	
<b>CONSERVATION CUT</b>											
Ebridge Culvert Entrance											H
Purdy's Marsh Section											Osc
Pigney's Wood Entrance											Osc

T/F = Tractor/Flail

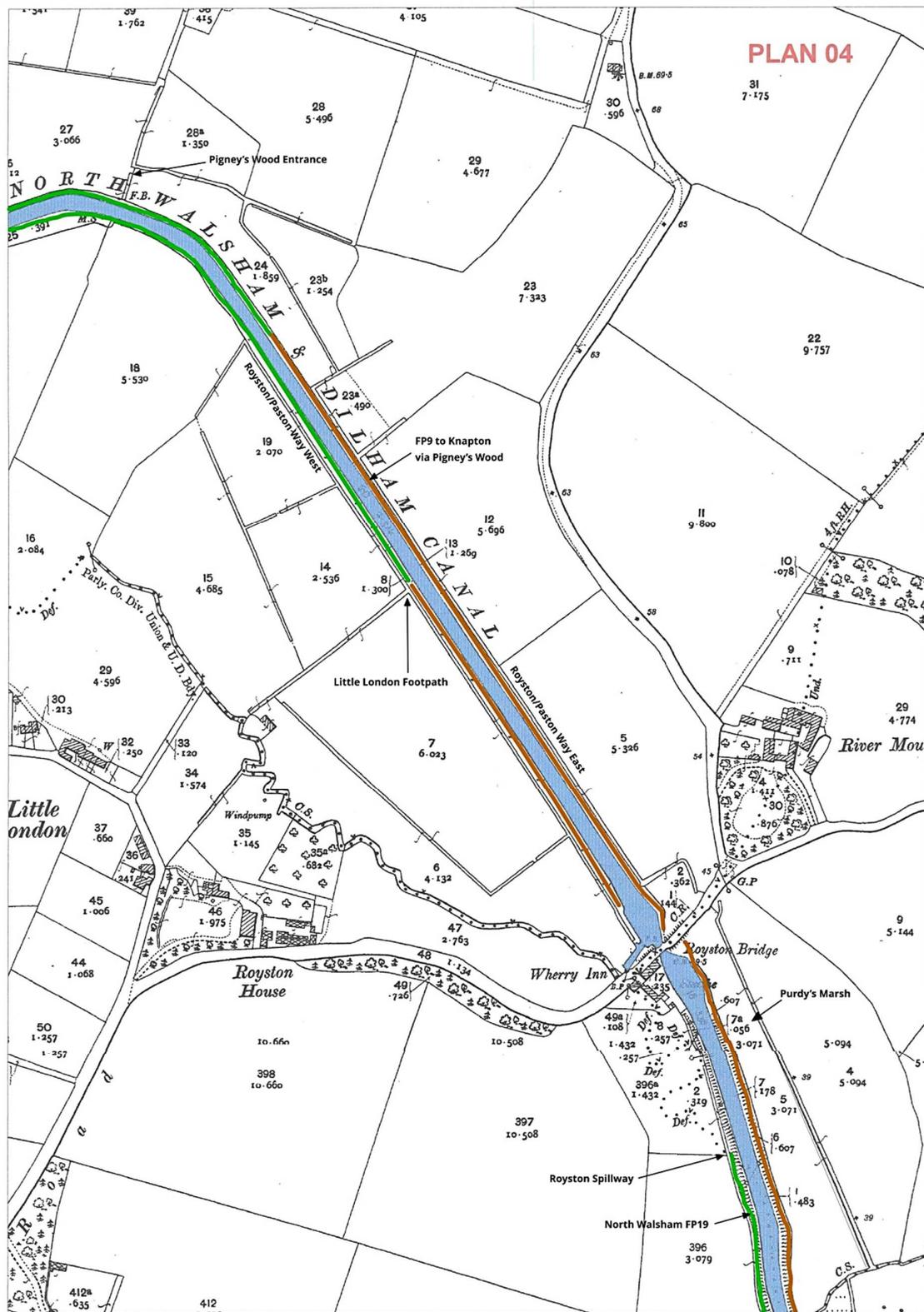
Osc = Tractor/Scythe

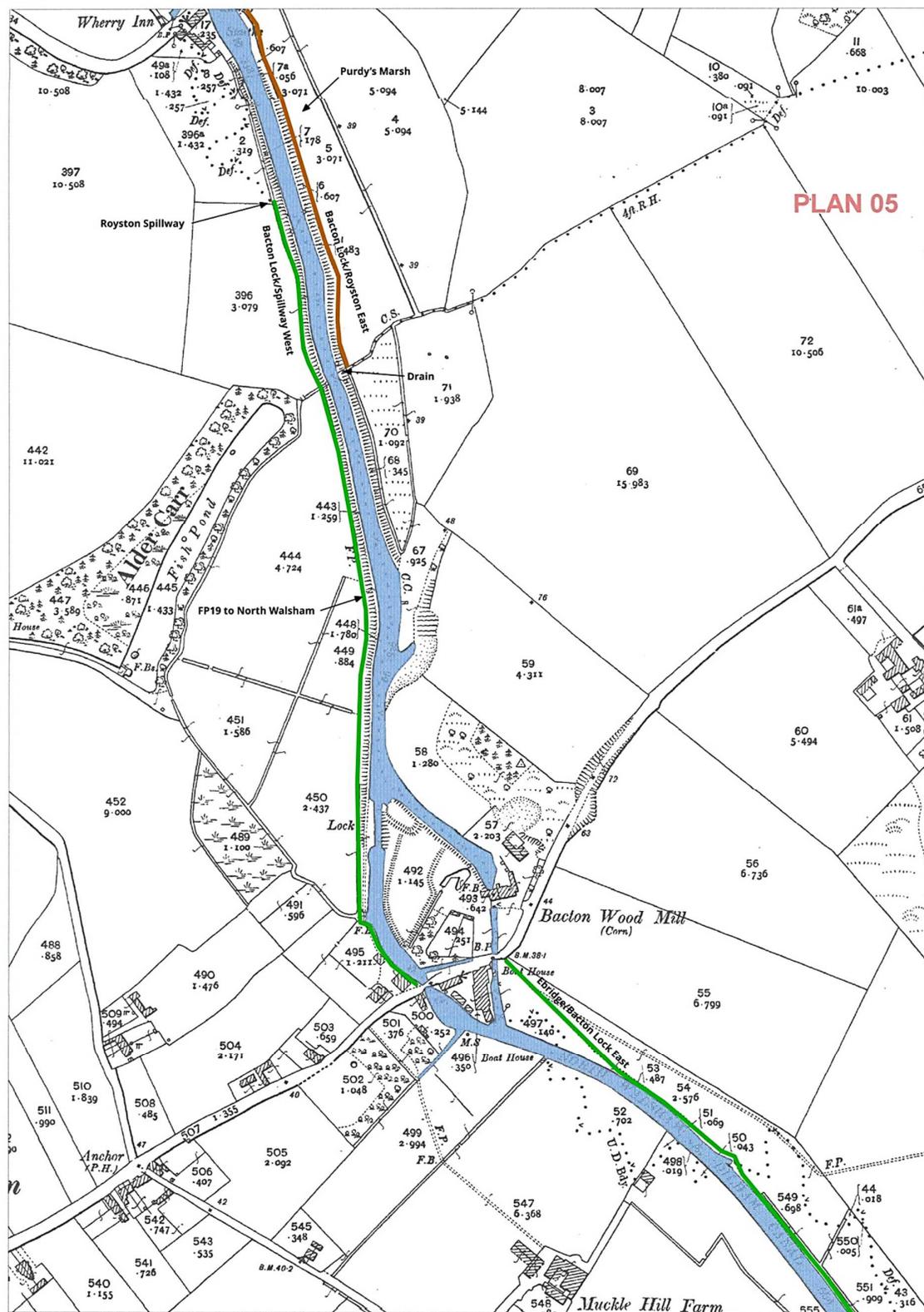
H = By hand (using a Mower  
or Brush Cutter)

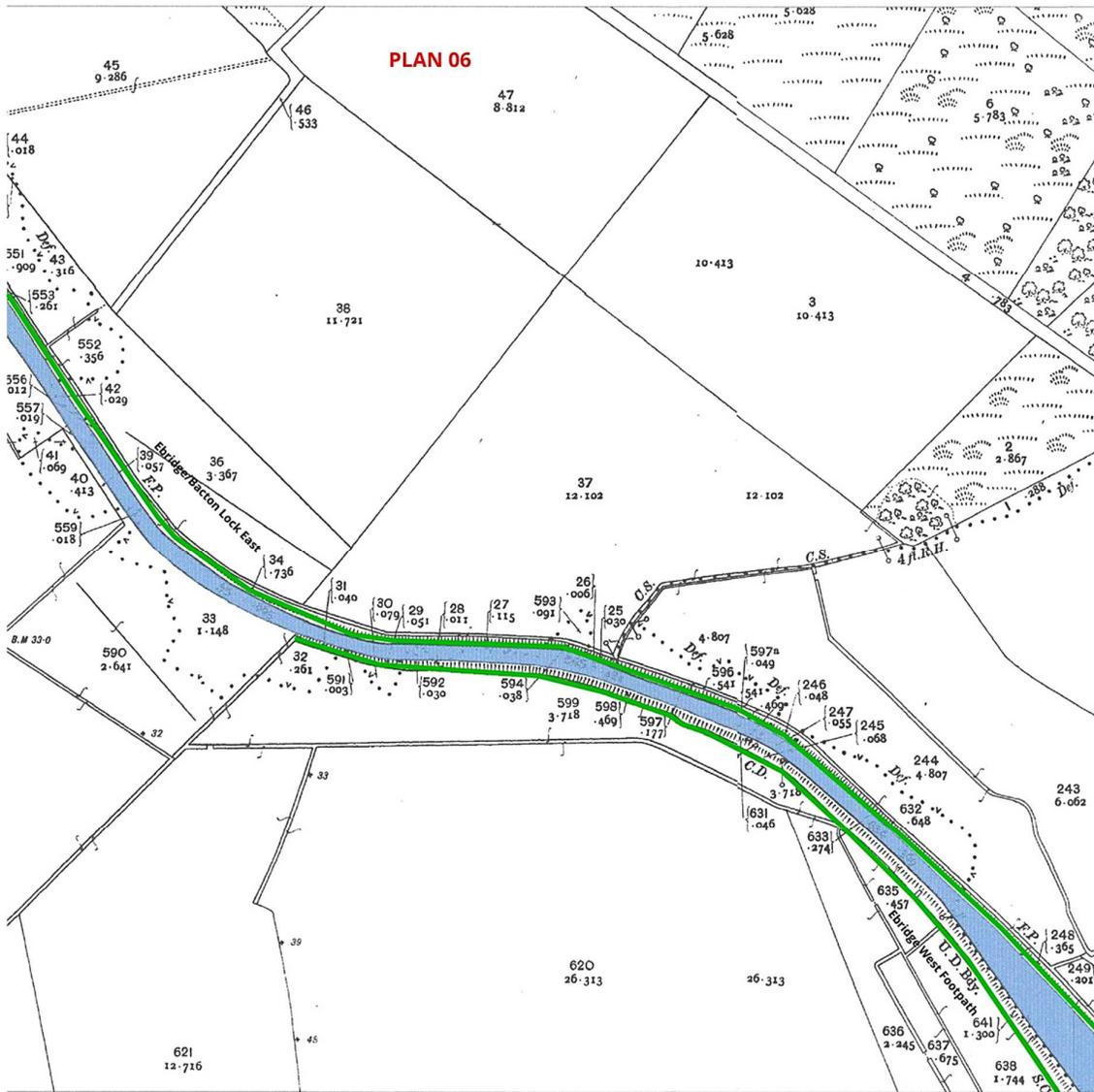
R/S = Possible re-seeding  
(Sand coloured paths on  
the maps.)

The following maps indicate the areas of the canal to be maintained (paths in green and sand) and where the removal of the two bunds, one above Bacton Wood locks and the other above Royston Bridge prior to re-watering may prove problematic for both public and maintenance access.











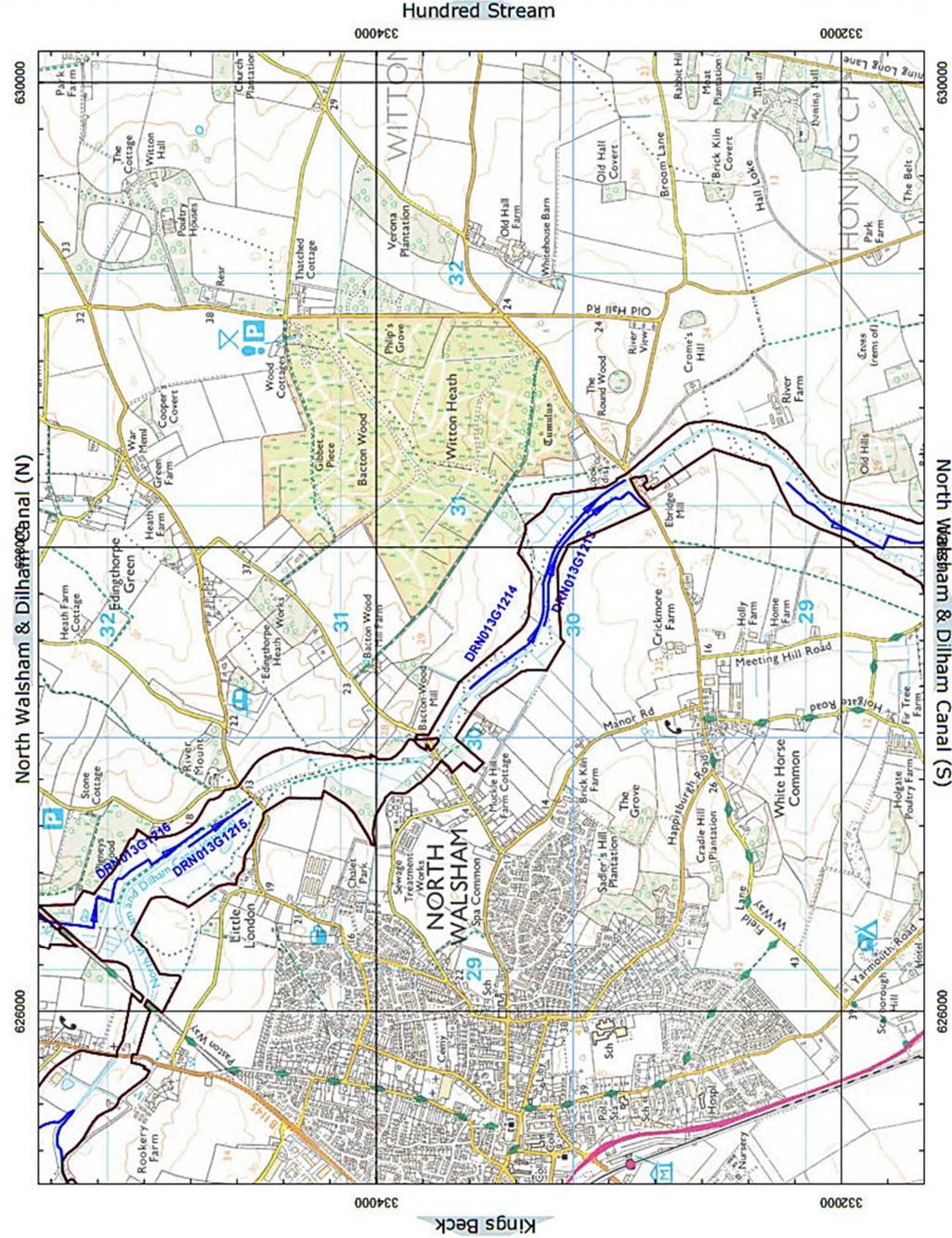
N.WALSHAM & DILHAM CANAL (C)

**LEGEND**

- - Board's Boundary
- - Hydrological catchment
- - IDB Watercourses
- ⊗ - Pumping Station
- ⊗ - Water Control Structure
- ⊗ - Sluice

**KEY MAP**

SCALE	SHEET NO	+	-
BEST FIT	CM T013C		
PLOT DATE	13/01/2015		
FILE NAME	NRIDB_webmap2		



Appendix 10 General Species List 2015-2017 – Perry Hampson 2018

Beetle Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
158	<i>Carabus granulatus</i>		Linnaeus, 1758	1	1	2016	2016	
191	<i>Cicindela campestris</i>	Green Tiger Beetle	Linnaeus, 1758	2	1	2016	2017	
323	<i>Pterostichus melanarius</i>		(Illiger, 1798)	1	1	2016	2016	
585	<i>Hydropilus piceus</i>	Great Silver Water Beetle	(Linnaeus, 1758)	1	1	2017	2017	RDB3
2561	<i>Glischrochilus hortensis</i>		Fourcroy, 1785)	1	1	2016	2016	
2792.1	<i>Harmonia axyridis</i>	Harlequin Ladybird	(Pallas, 1773)	1	1	2015	2015	
2798	<i>Coccinella septempunctata</i>	7-spot Ladybird	Linnaeus, 1758	3	0	2015	2015	
3014	<i>Oedemera nobilis</i>	Swollen-thighed Beetle	(Scopoli, 1763)	3	3	2015	2016	
3097	<i>Leptura quadrifasciata</i>		Linnaeus, 1758	2	2	2016	2016	
	<i>Pterostichus</i>							
327.1	<i>nigrita/thaeticus</i>			1	1	2016	2016	
3607	<i>Phyllobius pomaceus</i>		Gyllenhal, 1834	1	0	2016	2016	

Butterfly Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
56.003	<i>Papilio machaon</i>	Swallowtail	Linnaeus, 1758	2	2	2017	2017	RDB2
			(Ochsenheimer, 1808)					
57.005	<i>Thymelicus lineola</i>	Essex Skipper	(Poda, 1761)	1	1	2016	2016	
57.006	<i>Thymelicus sylvestris</i>	Small Skipper	(Linnaeus, 1758)	1	0	2016	2016	
58.003	<i>Anthocharis cardamines</i>	Orange-tip	(Linnaeus, 1758)	9	2	2016	2017	
58.006	<i>Pieris brassicae</i>	Large White	(Linnaeus, 1758)	11	0	2015	2016	

58.007	<i>Pieris rapae</i>	Small White	(Linnaeus, 1758)	3	0	2015	2016	
58.008	<i>Pieris napi</i>	Green-veined White	(Linnaeus, 1758)	5	1	2015	2017	
58.013	<i>Gonepteryx rhamni</i>	Brimstone	(Linnaeus, 1758)	5	7	2016	2017	
59.003	<i>Pararge aegeria</i>	Speckled Wood	(Linnaeus, 1758)	1	1	2016	2016	
59.01	<i>Maniola jurtina</i>	Meadow Brown	(Linnaeus, 1758)	6	0	2015	2016	
59.011	<i>Pyronia tithonus</i>	Gatekeeper	(Linnaeus, 1771)	3	0	2015	2016	
59.023	<i>Vanessa atalanta</i>	Red Admiral	(Linnaeus, 1758)	13	7	2015	2017	Migrant
59.024	<i>Vanessa cardui</i>	Painted Lady	(Linnaeus, 1758)	4	4	2015	2016	Migrant
59.026	<i>Aglais io</i>	Peacock	(Linnaeus, 1758)	9	3	2015	2016	
59.027	<i>Aglais urticae</i>	Small Tortoiseshell	(Linnaeus, 1758)	24	20	2015	2017	
59.031	<i>Polygonia c-album</i>	Comma	(Linnaeus, 1758)	3	3	2015	2016	
61.001	<i>Lycæna phlaeas</i>	Small Copper	(Linnaeus, 1761)	3	3	2015	2017	
61.012	<i>Celastrina argiolus</i>	Holly Blue	(Linnaeus, 1758)	3	3	2016	2016	

#### Cranefly Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
14	<i>Nephrotoma cornicina</i>		(Linnaeus, 1758)	1	1	2015	2015	

#### Flies (Diptera) Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
14	<i>Nephrotoma cornicina</i>		(Linnaeus, 1758)	1	1	2015	2015	
4655	<i>Dasyvirphus tricolor</i>	a hoverfly	(Fallén, 1817)	1	1	2016	2016	
4667	<i>Episyrphus balteatus</i>	a hoverfly	(De Geer, 1776)	6	7	2015	2016	
4670	<i>Euceodes corollae</i>	a hoverfly	(Fabricius, 1794)	2	2	2016	2016	
4674	<i>Euceodes luniger</i>	a hoverfly	(Meigen, 1822)	2	2	2015	2015	
4716	<i>Sphaerophoria scripta</i>	a hoverfly	(Linnaeus, 1758)	3	2	2015	2016	
4722	<i>Syrphus ribesii</i>	a hoverfly	(Linnaeus, 1758)	4	2	2015	2016	
4724	<i>Syrphus vitripennis</i>	a hoverfly	(Meigen, 1822)	2	1	2015	2015	
4743	<i>Chelisia illustrata</i>	a hoverfly	(Harris, [1780])	1	0	2015	2015	

4813	<a href="#">Eristalis horticola</a>	a hoverfly	(De Geer, 1776)	2	2	2015	2015
4814	<a href="#">Eristalis interruptus</a>	a hoverfly	(Poda, 1761)	2	2	2015	2015
4814	<a href="#">Eristalis nemorum</a>	a hoverfly	(Linnaeus, 1758)	3	1	2015	2016
4816	<a href="#">Eristalis pertinax</a>	a hoverfly	(Scopoli, 1763)	1	0	2015	2015
4819	<a href="#">Eristalis tenax</a>	a hoverfly	(Linnaeus, 1758)	1	1	2015	2015
4823	<a href="#">Helophilus pendulus</a>	a hoverfly	(Linnaeus, 1758)	6	3	2015	2016
4824	<a href="#">Helophilus trivittatus</a>	a hoverfly	(Fabricius, 1805)	1	1	2016	2016
4827	<a href="#">Myathropa florea</a>	a hoverfly	(Linnaeus, 1758)	2	2	2015	2015
4859	<a href="#">Sericoomyia silentis</a>	a hoverfly	(Harris, [1776])	1	0	2015	2015
4863	<a href="#">Volucella pellucens</a>	a hoverfly	(Linnaeus, 1758)	2	1	2016	2016
7499	<a href="#">Mesembrina meridiana</a>		(Linnaeus, 1758)	2	2	2015	2015
7947	<a href="#">Phasia hemiptera</a>		(Fabricius, 1794)	1	1	2015	2015
8038	<a href="#">Tachina fera</a>		(Linnaeus, 1761)	1	1	2015	2015

#### Grasshopper (Orthoptera) Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
9	<a href="#">Metrioptera roeselii</a>	Rossel's Bush Cricket	(Hagenbach, 1822)	2	2	2015	2015	Nb
10	<a href="#">Conocephalus discolor</a>	Long-winged Conehead	(Thunberg, 1815)	2	2	2015	2016	Na
13	<a href="#">Leptophyes punctatissima</a>	Speckled Bush Cricket	(Bosc, 1792)	2	2	2015	2015	
29	<a href="#">Chorthippus brunneus</a>	Common Field Grasshopper	(Thunberg, 1815)	1	1	2016	2016	

#### Bugs (Hemiptera) Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
331	<a href="#">Lycocoris tripustulatus</a>		(Fabricius, 1781)	1	1	2015	2015	Very common
529	<a href="#">Coreus marginatus</a>	Dock Bug	(Linnaeus, 1758)	1	1	2016	2016	Common
542	<a href="#">Tritomegas bicolor</a>	Pied Shieldbug	(Linnaeus, 1758)	1	1	2016	2016	Common
545	<a href="#">Dolycoris baccarum</a>	Hairy Shieldbug	(Linnaeus, 1758)	1	1	2015	2015	Common
547	<a href="#">Eurydema oleracea</a>	Crucifer Shieldbug	(Linnaeus, 1758)	1	1	2015	2015	Local
555	<a href="#">Pentatoma rufipes</a>	Red-legged Shieldbug	(Linnaeus, 1758)	1	1	2015	2015	Common

Bees & Wasps (Hymenoptera) Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
240	<i>Vespa crabro</i>	The Hornet	Linnaeus, 1758	6	4	2015	2017	
460	<i>Bombus hypnorum</i>	a bumblebee	Linnaeus, 1758	1	1	2017	2017	
467	<i>Bombus pascuorum</i>	Common Carder Bee	(Scopoli, 1763)	1	1	2015	2015	
477	<i>Bombus terrestris</i>	Buff-tailed Bumble Bee	(Linnaeus, 1758)	1	0	2015	2015	
1452	<i>Amblyteles armatorius</i>	an ichneumon	(Forster, 1771)	1	1	2015	2015	
1576	<i>Ichneumon stramentor</i>	an ichneumon	Rasnitsyn, 1981	1	1	2015	2015	

Mammals Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
5	<i>Neomys fodiens</i>	Water Shrew	(Pennant, 1771)	1	0	2016	2016	
9	<i>Talpa europaea</i>	Northern Mole	Linnaeus, 1758	4	0	2015	2016	
33	<i>Vulpes vulpes</i>	Red Fox	(Linnaeus, 1758)	5	6	2015	2017	
39	<i>Mustela erminea</i>	Stoat	Linnaeus, 1758	1	2	2015	2015	
84	<i>Hydropotes inermis</i>	Chinese Water Deer	Swinhoe, 1870	1	1	2018	2018	Introduced alien
85	<i>Muntiacus reevesi</i>	Chinese Muntjac	(Ogiby, 1839)	7	7	2015	2018	Introduced alien
86	<i>Capreolus capreolus</i>	Roe Deer	(Linnaeus, 1758)	13	35	2015	2018	
89	<i>Sciurus carolinensis</i>	Grey Squirrel	Gmelin, 1788	3	3	2015	2016	Naturalise
92	<i>Arvicola amphibius</i>	Northern Water Vole	(Linnaeus, 1758)	3	8	2015	2017	
112	<i>Oryctolagus cuniculus</i>	Rabbit	(Linnaeus, 1758)	3	1	2015	2015	
		Otter						

**Dragonflies and Damselflies (Odonata) Species List for North Walsham & Dilham Canal**

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
103	<i>Calopteryx splendens</i>	Banded Demoiselle Willow/Green Emerald	(Harris, 1782) (Vander Linden, 1825)	16	4	2012	2016	
407	<i>Lestes viridis</i>	Damselfly	(Sulzer, 1776)	2	1	2017	2017	
601	<i>Pyrrosoma nymphula</i>	Large Red Damselfly	(Vander Liden, 1823)	6	2	2015	2017	
801	<i>Ischnura elegans</i>	Blue-tailed Damselfly	(Charpentier)	8	0	2015	2016	
901	<i>Enallagma cyathigerum</i>	Common Blue Damselfly	(Linnaeus, 1758)	1	0	2016	2016	
1007	<i>Coenagrion puella</i>	Azure Damselfly	(Hansemann, 1823)	15	6	2015	2016	
1101	<i>Erythronuma najas</i>	Red-eyed Damselfly	(Linnaeus, 1758)	3	2	2015	2016	
2207	<i>Aeshna grandis</i>	Brown Hawker	(Müller, 1764)	4	4	2015	2016	
2209	<i>Aeshna cyanea</i>	Southern Hawker	(Latrielle, 1805)	1	1	2015	2015	
2210	<i>Aeshna mixta</i>	Migrant Hawker	Leach, 1815	5	2	2015	2017	
2401	<i>Anax imperator</i>	Emperor Dragonfly	(Linnaeus, 1758)	8	7	2015	2016	
2701	<i>Cordulia aenea</i>	Downy Emerald	(Linnaeus, 1758)	1	1	2010	2010	
3201	<i>Libellula depressa</i>	Broad-bodied Chaser	Müller, 1764	2	0	2015	2015	
3202	<i>Libellula fulva</i>	Scarce Chaser	(Linnaeus, 1758)	1	1	2016	2016	
3309	<i>Orthetrum cancellatum</i>	Black-tailed Skimmer	(Charpentier, 1840)	7	3	2015	2016	
3803	<i>Sympetrum striolatum</i>	Common Darter	(Müller, 1764)	7	3	2015	2017	
3810	<i>Sympetrum sanguineum</i>	Ruddy Darter		1	0	2015	2015	

**Reptiles Species List for North Walsham & Dilham Canal**

Code	Taxon	Vernacular	Authority	Records	Individuals	First Recorded	Last Recorded	Status
	<i>Natrix helvetica</i>	Grass Snake	(Linnaeus, 1758)	4	5	2016	2017	
	<i>Zootoca vivipara</i>	Common Lizard	Jacquin, 1787	1	0	2015	2015	

Spiders (Arachnids) Species List for North Walsham & Dilham Canal

Code	Taxon	Vernacular	Authority	Records	Individuals	Records	Individuals	First Recorded	Last Recorded	Status
369	<a href="#">Tetragnatha extensa</a>		(Linnaeus, 1785)	1	0	1	0	2016	2016	Common
393	<a href="#">Larinioides cornutus</a>		(Clerck, 1757)	3	3	3	3	2015	2017	Common
456	<a href="#">Pisaura mirabilis</a>		(Clerck, 1757)	1	1	1	1	2015	2015	Common
605	<a href="#">Xysticus cristatus</a>		(Clerck, 1757)	1	0	1	0	2016	2016	Common
627	<a href="#">Salticus scenicus</a>		(Clerck, 1757)	2	2	2	2	2016	2016	Common

Moth Species List for North Walsham & Dilham Canal as at 14/02/2019

Code	Taxon	Vernacular	Authority	Records	Individuals	Records	Individuals	First Recorded	Last Recorded	Status
63.115	<a href="#">Acentria ephemerella</a>	Water Veneer	(Denis & Schiff., r.l., 1775)	1	2	1	2	2015	2015	Common
49.071	<a href="#">Acleris emargana</a>		(Fabricius, 1775)	1	1	1	1	2015	2015	Common
49.062	<a href="#">Acleris forsskaeana</a>		(Linnaeus, 1758)	1	1	1	1	2015	2015	Common
73.045	<a href="#">Acronicta rumicis</a>	Knot Grass	(Linnaeus, 1758)	1	1	1	1	2015	2015	Common
49.109	<a href="#">Agapeta hamana</a>		(Linnaeus, 1758)	5	7	5	7	2015	2017	Common
32.035	<a href="#">Agonopterix veatiana</a>		(Fabricius, 1781)	1	1	1	1	2017	2017	Local
63.093	<a href="#">Agriphila stramineella</a>		(Denis & Schiff., r.l., 1775)	2	2	2	2	2015	2015	Common
73.317	<a href="#">Agrotis exclamationis</a>	Heart and Dart	(Linnaeus, 1758)	2	3	2	3	2016	2017	Common
73.325	<a href="#">Agrotis puta</a>	Shuttle-shaped Dart	(Hübner, [1803])	1	1	1	1	2017	2017	Common
49.06	<a href="#">Alemma loeflingiana</a>		(Linnaeus, 1758)	1	2	1	2	2016	2016	Common
73.062	<a href="#">Amphipyra pyramidea</a>	Copper Underwing	(Linnaeus, 1758)	2	5	2	5	2015	2015	Common
63.025	<a href="#">Anania hortulata</a>	Small Magpie	(Linnaeus, 1758)	1	1	1	1	2017	2017	Common
73.255	<a href="#">Anarta trifolii</a>	Nutmeg	(Hufnagel, 1766)	1	2	1	2	2015	2015	Common
49.216	<a href="#">Ancylis mitterbacheriana</a>		(Denis & Schiff., r.l., 1775)	1	1	1	1	2017	2017	Common
48.001	<a href="#">Anthophila fabriciana</a>		(Linnaeus, 1767)	7	1	7	1	2015	2017	Common
73.156	<a href="#">Apamea crenata</a>	Clouded-bordered Brindle	(Hufnagel, 1766)	2	2	2	2	2016	2017	Common
73.163	<a href="#">Apamea lithoxyloa</a>	Light Arches	(Denis & Schiff., r.l., 1775)	1	1	1	1	2016	2016	Common
73.162	<a href="#">Apamea monoglypha</a>	Dark Arches	(Hufnagel, 1766)	1	1	1	1	2016	2016	Common

73.158	<i>Apamea sordens</i>	Rustic Shoulder-knot	(Hufnagel, 1766)	1	2	2016	2016	2017	Common
73.164	<i>Apamea subultrix</i>	Reddish Light Arches	(Esper, 1788)	1	1	2016	2016	2016	Local
73.159	<i>Apamea unanix</i>	Small Clouded Brindie	(Hübner, [1813])	2	2	2016	2016	2017	Common
62.001	<i>Aphomia sociella</i>	Bee Moth	(Linnaeus, 1758)	1	1	2017	2017	2017	Common
72.026	<i>Arctia ceta</i>	Garden Tiger	(Linnaeus, 1758)	1	1	2015	2015	2015	Common
73.137	<i>Arenostola phragmitidis</i>	Fen Wainscot	(Hübner, [1803])	1	4	2015	2015	2015	Local
73.219	<i>Atethmia centrigo</i>	Centre-barred Sallow	(Haworth, 1809)	2	2	2015	2015	2015	Common
73.015	<i>Autographa gamma</i>	Silver Y	(Linnaeus, 1758)	5	7	2015	2016	2016	Migrant
73.328	<i>Axylia putris</i>	Flame	(Linnaeus, 1761)	3	5	2016	2016	2017	Common
49.194	<i>Bactra lancealana</i>		(Hübner, [1799])	1	1	2016	2016	2016	Common
	<i>Bactra lancealana/lactisana</i>			1	1	2017	2017	2017	
70.252	<i>Biston betularia</i>	Peppered Moth	(Linnaeus, 1758)	1	1	2017	2017	2017	Common
70.251	<i>Biston strataria</i>	Oak Beauty	(Hufnagel, 1767)	1	2	2017	2017	2017	Common
35.028	<i>Brachmia blandella</i>		(Fabricius, 1798)	1	1	2016	2016	2016	Common
73.084	<i>Bryophila domestica</i>	Marbled Beauty	(Hufnagel, 1766)	1	1	2015	2015	2015	Common
70.278	<i>Cabera exanthemata</i>	Common Wave	(Scopoli, 1763)	4	5	2015	2015	2017	Common
63.079	<i>Calamotropha paludella</i>		(Hübner, [1824])	2	2	2015	2015	2015	Local
72.015	<i>Calliteara pudibunda</i>	Pale Tussock	(Linnaeus, 1758)	2	3	2016	2016	2017	Common
	<i>Caloptilia</i>								
	<i>alchimiella/robustella</i>			1	1	2017	2017	2017	
70.283	<i>Campaea margaritaria</i>	Light Emerald	(Linnaeus, 1761)	7	9	2015	2015	2017	Common
73.095	<i>Caradrina clavipalpis</i>	Pale Mottled Willow	(Scopoli, 1763)	1	1	2017	2017	2017	Common
73.092	<i>Caradrina morpheus</i>	Mottled Rustic	(Hufnagel, 1766)	1	2	2016	2016	2016	Common
63.116	<i>Cataclysta lemnata</i>	Small China-mark	(Linnaeus, 1758)	5	7	2015	2015	2016	Common
72.078	<i>Catocala nupta</i>	Red Underwing	(Linnaeus, 1767)	2	2	2015	2015	2016	Common
49.166	<i>Celypha lacunana</i>	Treble Lines	(Denis & Schiff., [1775])	8	25	2015	2015	2017	Common
73.101	<i>Charanva trigrammica</i>		(Hufnagel, 1766)	3	6	2016	2016	2017	Common
63.077	<i>Chilo phragmitella</i>		(Hübner, [1810])	3	3	2015	2015	2016	Local
63.08	<i>Chrysoteuchia culmella</i>	Garden Grass-veneer	(Linnaeus, 1758)	5	8	2015	2015	2016	Common
65.007	<i>Cilix glaucata</i>	Chinese Character	(Scopoli, 1763)	1	1	2016	2016	2016	Common
73.182	<i>Cirrhia icteritia</i>	Sallow	(Hufnagel, 1766)	2	2	2015	2015	2017	Common
49.037	<i>Clepsis spectrana</i>	Cyclamen Tortrix	(Treitschke, 1830)	2	5	2016	2016	2017	Common
49.049	<i>Cnephasia incertana</i>	Light Grey Tortrix	(Treitschke, 1835)	1	1	2016	2016	2016	Common

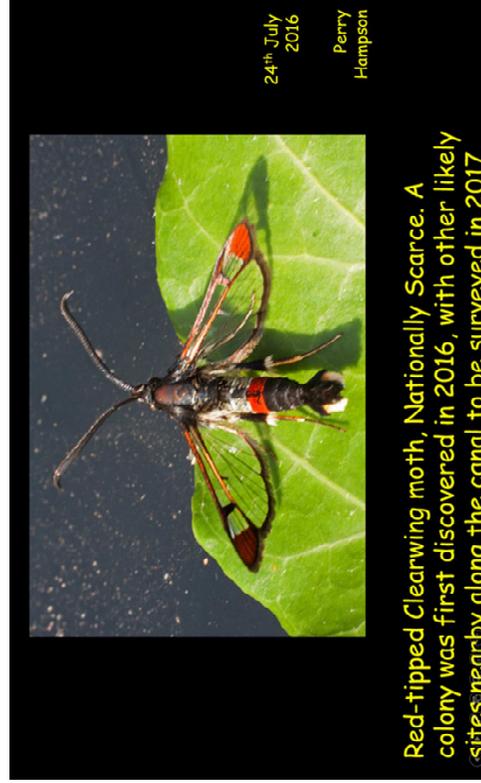


70.093	<i>Gandaritis pyraliata</i>	Barred Straw	(Denis & Schiff...[J], 1775)	1	2	2016	2016	Common
19.007	<i>Glyptopterix simplicicella</i>	Cocksfoot Moth	(Stephens, 1834)	1	0	2016	2016	Common
73.121	<i>Gortyna flavago</i>	Frosted Orange	(Denis & Schiff...[J], 1775)	3	3	2015	2015	Common
49.157	<i>Hedya pruniana</i>	Plum Tortrix	(Hübner, [1799])	2	2	2016	2017	Common
73.119	<i>Heliothrips leucostigma</i>	Crescent	(Hübner, [1808])	2	8	2015	2015	Local
3.005	<i>Hepialus humuli</i>	Ghost Moth	(Linnaeus, 1758)	3	2	2015	2017	Common
73.099	<i>Hoplodrina ambigua</i>	Vine's Rustic	(Denis & Schiff...[J], 1775)	2	2	2015	2015	Local
73.096	<i>Hoplodrina octogenaria</i>	Uncertain	(Goszka, 1781)	1	3	2016	2016	Common
73.123	<i>Hydracacia micacea</i>	Rosy Rustic	(Esper, 1789)	5	19	2015	2015	Common
70.075	<i>Hydriomena impluviata</i>	May Highflier	(Denis & Schiff...[J], 1775)	1	2	2016	2016	Common
72.003	<i>Hypona proboscidalis</i>	Snout	(Linnaeus, 1758)	5	7	2015	2017	Common
70.268	<i>Hypomecis punctinalis</i>	Pale Oak Beauty	(Scopoli, 1763)	1	1	2016	2016	Common
70.016	<i>Idaea aversata</i> ab. <i>remutata</i>	Riband Wave [non-banded form]		1	1	2015	2015	Common
70.013	<i>Idaea biselata</i>	Small Fan-footed Wave	(Hufnagel, 1767)	1	1	2016	2016	Common
70.011	<i>Idaea dimidiata</i>	Single-dotted Wave	(Hufnagel, 1767)	2	2	2015	2017	Common
3.002	<i>Korscheltellus lupulina</i>	Common Swift	(Linnaeus, 1758)	2	5	2016	2017	Common
73.267	<i>Lacanobia oleracea</i>	Bright-line Brown-eye	(Linnaeus, 1758)	3	7	2016	2017	Common
70.103	<i>Lampropteryx suffumata</i>	Water Carpet	(Denis & Schiff...[J], 1775)	2	6	2017	2017	Common
69.003	<i>Laotoe populi</i>	Poplar Hawk-moth	(Linnaeus, 1758)	1	1	2016	2016	Common
73.168	<i>Lateroligia ophiogramma</i>	Double Lobed	(Esper, 1794)	1	2	2015	2015	Local
73.139	<i>Lenisa geminipuncta</i>	Twin-spotted Wainscot	(Haworth, 1809)	1	1	2015	2015	Local
34.004	<i>Linnaecia phragmitella</i>	Grey Shoulder-knot	Stainton, 1851	1	2	2015	2015	Common
73.202	<i>Lithophane ornitopus</i>	Grey Shoulder-knot	(Hufnagel, 1766)	1	1	2017	2017	Common
70.207	<i>Lomaspilis marginata</i>	Clouded Border	(Linnaeus, 1758)	3	4	2016	2017	Common
70.28	<i>Lomographa tenerata</i>	Clouded Silver	(Denis & Schiff...[J], 1775)	1	1	2016	2016	Common
72.01	<i>Lynantria monacha</i>	Black Arches	(Linnaeus, 1758)	1	2	2015	2015	Local
69.01	<i>Macroglossum stellatarum</i>	Humming-bird Hawk-moth	(Linnaeus, 1758)	1	1	2015	2015	Migrant
73.274	<i>Manestra brassicae</i>	Cabbage Moth	(Linnaeus, 1758)	1	1	2015	2015	Common
35.093	<i>Mesapamea secalis</i> agg.	Common Rustic agg.		5	25	2015	2016	Common
40.01	<i>Mirificarma multinella</i>		(Zeller, 1839)	1	1	2015	2015	Common
40.002	<i>Mompha epilobiella</i>		(Denis & Schiff...[J], 1775)	1	1	2015	2015	Common
73.297	<i>Mompha ochraceella</i>		(Curtis, 1839)	1	2	2016	2016	Common
	<i>Mythimna albipuncta</i>	White-point	(Denis & Schiff...[J], 1775)	2	2	2015	2017	Migrant

73.293	<i>Myrthimna impura</i>	Smoky Wainscot	(Hübner, [1808])	4	14	2015	2016	Common
73.291	<i>Myrthimna pallens</i>	Common Wainscot	(Linnaeus, 1758)	1	2	2015	2015	Common
73.294	<i>Myrthimna straminea</i>	Southern Wainscot	(Treitschke, 1825)	1	1	2016	2016	Local
73.345	<i>Noctua comes</i>	Lesser Yellow Underwing Broad-bord. Yellow	Hübner, [1813]	2	5	2015	2015	Common
73.343	<i>Noctua fimbriata</i>	Underwing	(Schreber, 1759)	1	1	2015	2015	Common
73.346	<i>Noctua interjecta</i>	Least Yellow Underwing Lesser Broad-bord. Yel.	Hübner, [1803]	1	2	2015	2015	Common
73.348	<i>Noctua janthe</i>	U/wing	(Borkhausen, 1792)	2	10	2015	2015	Common
73.342	<i>Noctua promuba</i>	Large Yellow Underwing	(Linnaeus, 1758)	6	50	2015	2016	Common
74.004	<i>Nola confusalis</i>	Least Black Arches	(Herrich-Schäffer, 1847)	1	1	2017	2017	Local
63.052	<i>Nomophila noctuella</i>	Rush Veneer	(Denis & Schuff. r], 1775)	1	5	2015	2015	Migrant
73.136	<i>Nonagra typhae</i>	Bulrush Wainscot	(Thunberg, 1784)	4	8	2015	2015	Common
49.298	<i>Notocelia trimaculana</i>		(Haworth, 1811)	2	2	2016	2017	Common
71.012	<i>Notodonta dromedarius</i>	Iron Prominent	(Linnaeus, 1767)	2	2	2015	2016	Common
63.118	<i>Nymphula nitidulata</i>	Beautiful China-mark	(Hufnagel, 1767)	2	3	2015	2016	Local
73.329	<i>Ochropleura plecta</i>	Flame Shoulder	(Linnaeus, 1761)	9	23	2015	2017	Common
70.24	<i>Odontopera bidentata</i>	Scalloped Hazel	(Clerck, 1759)	2	2	2016	2017	Common
73.176	<i>Oligia fasciuncula</i>	Middle-barred Minor	(Haworth, 1809)	3	5	2016	2017	Common
	<i>Oligia sp.</i>			1	3	2016	2016	
	<i>Oligia strigilis agg.</i>	Marbled Minor agg.	Unknown	3	3	2016	2017	
73.193	<i>Omphaloscelis lunosa</i>	Lunar Underwing	(Haworth, 1809)	1	1	2015	2015	Common
70.226	<i>Opisthograpis luteolata</i>	Brimstone Moth	(Linnaeus, 1758)	6	6	2015	2017	Common
73.244	<i>Orthosia cerasi</i>	Common Quaker	(Fabricius, 1775)	4	23	2017	2017	Common
73.245	<i>Orthosia cruda</i>	Small Quaker	(Denis & Schuff. r], 1775)	1	2	2017	2017	Common
73.249	<i>Orthosia gothica</i>	Hebrew Character	(Linnaeus, 1758)	3	3	2017	2017	Common
73.242	<i>Orthosia incerta</i>	Clouded Drab	(Hufnagel, 1766)	3	13	2017	2017	Common
73.241	<i>Panolis flammea</i>	Pine Beauty	(Denis & Schuff. r], 1775)	1	1	2017	2017	Common
63.117	<i>Parapoynx stratiotata</i>	Ringed China-mark	(Linnaeus, 1758)	5	14	2015	2016	Common
70.144	<i>Pasiphila rectangularata</i>	Green Pug	(Linnaeus, 1758)	1	1	2016	2016	Common
70.258	<i>Peribatodes rhomboidaria</i>	Willow Beauty	(Denis & Schuff. r], 1775)	3	3	2015	2016	Common
70.132	<i>Perizoma affinitata</i>	Rivulet	(Stephens, 1831)	1	1	2017	2017	Common
70.133	<i>Perizoma alchemillata</i>	Small Rivulet	(Linnaeus, 1758)	1	1	2016	2016	Common

70.222	<i>Petrophora chlorosata</i>	Brown Silver-line	(Scopoli, 1763)	1	2	2017	2017	Common
71.018	<i>Phaeosia gnoma</i>	Lesser Swallow Prominent	(Fabricius, [1777])	1	1	2016	2016	Common
72.024	<i>Phragmatobia fuliginosa</i>	Ruby Tiger	(Linnaeus, 1758)	2	13	2015	2015	Common
63.038	<i>Pleuroptva ruralis</i>	Mother of Pearl	(Scopoli, 1763)	4	10	2015	2015	Common
73.022	<i>Plusia festucae</i>	Gold Spot	(Linnaeus, 1758)	2	2	2015	2016	Common
18.001	<i>Plutella xylostella</i>	Diamond-back Moth	(Linnaeus, 1758)	7	1104	2015	2016	Migrant
49.091	<i>Pseudargyrotoza conwagana</i>		(Fabricius, 1775)	1	1	2016	2016	Common
71.02	<i>Prorostoma palpina</i>	Pale Prominent	(Clerck, 1759)	2	2	2016	2017	Common
70.038	<i>Rhodometra sacra</i>	Vestal	(Linnaeus, 1767)	1	1	2015	2015	Migrant
72.002	<i>Rivula sericealis</i>	Straw Dot	(Scopoli, 1763)	10	34	2015	2017	Common
73.102	<i>Rusina ferruginea</i>	Brown Rustic	(Esper, 1785)	1	2	2017	2017	Common
68.001	<i>Saturnia pavonia</i>	Emperor Moth	(Linnaeus, 1758)	2	3	2016	2016	Common
63.064	<i>Scoparia ambigualis</i>		(Treitschke, 1829)	1	1	2016	2016	Common
70.237	<i>Selenia dentaria</i>	Early Thorn	(Fabricius, 1775)	2	3	2017	2017	Common
32.002	<i>Semioscopis steinkellneriana</i>		(Denis & Schiff., r.j., 1775)	1	1	2017	2017	Local
69.002	<i>Smerinthus ocellata</i>	Eyed Hawk-moth	(Linnaeus, 1758)	1	1	2016	2016	Common
72.02	<i>Spilosoma lubricipeda</i>	White Ermine	(Linnaeus, 1758)	4	7	2016	2017	Common
72.019	<i>Spilosoma lutea</i>	Buff Ermine	(Hufnagel, 1766)	3	2	2015	2017	Common
4.045	<i>Stigmella aurella</i>		(Fabricius, 1775)	1	0	2015	2015	Common
52.008	<i>Synanthedon formicaeformis</i>	Red-tipped Clearwing	(Esper, 1782)	5	24	2016	2018	Nb
35.143	<i>Teletodes luculella</i>		(Hübner, [1813])	1	1	2016	2016	Common
65.01	<i>Tethea ocellaris</i>	Figure of Eighty	(Linnaeus, 1767)	1	1	2016	2016	Common
70.079	<i>Thera britannica</i>	Spruce Carpet	(Turner, 1925)	1	1	2017	2017	Common
70.081	<i>Thera obeliscata</i>	Grey Pine Carpet	(Hübner, [1787])	1	1	2017	2017	Common
70.029	<i>Timandra comae</i>	Blood-Vein	Schmidt, 1931	3	3	2016	2017	Common
12.032	<i>Tinea semifulvella</i>		Haworth, 1828	1	1	2016	2016	Common
49.059	<i>Tortrix yridana</i>	Green Oak Tortrix	Linnaeus, 1758	3	4	2016	2016	Common
72.031	<i>Tyria jacobaeae</i>	Cinnabar	(Linnaeus, 1758)	3	1	2016	2017	Common
63.033	<i>Udea lutealis</i>		(Hübner, [1809])	1	1	2015	2015	Common
63.037	<i>Udea olivalis</i>		(Denis & Schiff., r.j., 1775)	4	6	2016	2017	Common
65.002	<i>Watsonalla binaria</i>	Oak Hook-tip	(Hufnagel, 1767)	1	1	2017	2017	Common
70.049	<i>Xanthorhoe fluctuata</i>	Garden Carpet	(Linnaeus, 1758)	3	4	2015	2015	Common
70.054	<i>Xanthorhoe montanata</i>	Silver-ground Carpet	(Denis & Schiff., r.j., 1775)	6	9	2015	2017	Common

73.359	<i>Xestia c-nigrum</i>	Setaceous Hebrew Character (Linnaeus, 1758)	8	19	2015	2017	Common
73.358	<i>Xestia sexstingata</i>	Six-striped Rustic (Haworth, 1809)	1	3	2015	2015	Common
73.361	<i>Xestia triangulum</i>	Double Square-spot (Hufnagel, 1766)	1	1	2016	2016	Common
73.357	<i>Xestia xanthographa</i>	Square-spot Rustic (Denis & Schiffert, 1775)	5	67	2015	2015	Common
73.069	<i>Xylocampa areola</i>	Early Grey (Esper, 1789)	1	2	2017	2017	Common



24<sup>th</sup> July  
2016

Perry  
Hampson

Red-tipped Clearwing moth, Nationally Scarce. A colony was first discovered in 2016, with other likely sites nearby along the canal to be surveyed in 2017.

**Appendix 11 – Bird Species List – 2018 Perry Hampson**

**Bird Species List for North Walsham & Dilham Canal**

<b>Code</b>	<b>Taxon</b>	<b>Vernacular</b>	<b>Authority</b>	<b>Records</b>	<b>Individuals</b>	<b>First Recorded</b>	<b>Last Recorded</b>	<b>Status</b>
0	<i>Columba livia</i> (feral)	Feral Pigeon		5	0	2016	2017	
6	<i>Branta canadensis</i>	Canada Goose	(Linnaeus, 1758)	7	13	2015	2018	A
13	<i>Anser anser</i>	Greylag Goose	(Linnaeus, 1758)	4	7	2015	2018	A
161a	<i>Anser anser</i> x hybrid	Greylag Goose Hybrid (Farmyard type)		1	1	2016	2016	
17	<i>Anser brachyrhynchus</i> <i>Anas platyrhynchos</i> x hybrid	Pink-footed Goose	Baillon, 1834	5	180	2015	2017	A
186c	hybrid	Mallard Hybrid (Farmyard type)		2	2	2015	2015	
24	<i>Cygnus olor</i>	Mute Swan	(Gmelin, JF, 1789)	58	169	2015	2018	A
39	<i>Mareca penelope</i>	Wigeon	(Linnaeus, 1758)	1	3	2017	2017	A
41	<i>Anas platyrhynchos</i>	Mallard	Linnaeus, 1758	40	73	2015	2018	A
45	<i>Anas crecca</i>	Teal	Linnaeus, 1758	1	3	2016	2016	A
54	<i>Aythya fuligula</i>	Tufted Duck	(Linnaeus, 1758)	4	5	2018	2018	A
89	<i>Alectoris rufa</i>	Red-legged Partridge	(Linnaeus, 1758)	1	0	2015	2015	C
95	<i>Phasianus colchicus</i>	Pheasant	Linnaeus, 1758	54	5	2015	2017	C
131	<i>Tachybaptus ruficollis</i>	Little Grebe	(Pallas, 1764)	4	8	2015	2019	A
161	<i>Ardea cinerea</i>	Grey Heron	Linnaeus, 1758	34	34	2015	2018	A
1663	<i>Acanthis flammea</i> agg.	Redpoll sp.		2	10	2015	2017	
169	<i>Egretta garzetta</i>	Little Egret	(Linnaeus, 1766)	10	10	2011	2018	A
178	<i>Phalacrocorax carbo</i>	Cormorant	(Linnaeus, 1758)	5	6	2016	2017	A
190	<i>Accipiter nisus</i>	Sparrowhawk	(Linnaeus, 1758)	18	18	2015	2019	A
194	<i>Circus aeruginosus</i>	Marsh Harrier	(Linnaeus, 1758)	1	1	2016	2016	A
208	<i>Buteo buteo</i>	Buzzard	(Linnaeus, 1758)	72	104	2015	2018	A
214	<i>Rallus aquaticus</i>	Water Rail	Linnaeus, 1758	2	2	2016	2018	A
225	<i>Gallinula chloropus</i>	Moorhen	(Linnaeus, 1758)	43	37	2015	2017	A

227	<i>Fulica atra</i>	Coot	Linnaeus, 1758	3	3	2016	2018	A
235	<i>Haematopus ostralegus</i>	Oystercatcher	Linnaeus, 1758	1	1	2016	2016	A
313	<i>Gallinago gallinago</i>	Snipe	(Linnaeus, 1758)	4	11	2015	2018	A
321	<i>Actitis hypoleucos</i>	Common Sandpiper	(Linnaeus, 1758)	4	14	2016	2017	A
323	<i>Tringa ochropus</i>	Green Sandpiper	Linnaeus, 1758	1	1	2017	2017	A
	<i>Chroicocephalus</i>							
347	<i>ridibundus</i>	Black-headed Gull	(Linnaeus, 1766)	12	25	2015	2017	A
355	<i>Larus canus</i>	Common Gull	Linnaeus, 1758	2	1	2016	2017	A
367	<i>Larus argentatus</i>	Herring Gull	Pontoppidan, 1763	3	5	2015	2015	A
376	<i>Larus fuscus</i>	Lesser Black-backed Gull	Linnaeus, 1758	5	4	2015	2016	A
434	<i>Columba oenas</i>	Stock Dove	Linnaeus, 1758	24	29	2015	2017	A
436	<i>Columba palumbus</i>	Woodpigeon	Linnaeus, 1758	92	0	2015	2017	A
443	<i>Sireptopelia decaocto</i>	Collared Dove	(Fridvaldskj, 1838)	22	10	2015	2017	A
449	<i>Cuculus canorus</i>	Cuckoo	Linnaeus, 1758	7	7	2015	2016	A
451	<i>Tyto alba</i>	Barn Owl	(Scopoli, 1769)	1	1	2015	2015	A
457	<i>Strix aluco</i>	Tawny Owl	Linnaeus, 1758	1	2	2015	2015	A
482	<i>Apus apus</i>	Swift	(Linnaeus, 1758)	13	44	2015	2016	A
490	<i>Alcedo atthis</i>	Kingfisher	(Linnaeus, 1758)	30	35	2015	2017	A
		Lesser Spotted Woodpecker	(Linnaeus, 1758)	1	1	2015	2015	A
501	<i>Dryobates minor</i>	Great Spotted Woodpecker	(Linnaeus, 1758)	18	17	2015	2017	A
503	<i>Dendrocopos major</i>	Green Woodpecker	Linnaeus, 1758	2	1	2015	2017	A
506	<i>Picus viridis</i>	Kestrel	Linnaeus, 1758	37	34	2015	2018	A
509	<i>Falco tinnunculus</i>	Merlin	Linnaeus, 1758	1	1	2017	2017	A
516	<i>Falco columbarius</i>	Jay	(Linnaeus, 1758)	48	31	2015	2018	A
548	<i>Garrulus glandarius</i>	Magpie	(Linnaeus, 1758)	75	140	2015	2017	A
551	<i>Pica pica</i>	Jackdaw	(Linnaeus, 1758)	39	83	2015	2017	A
558	<i>Coloeus monedula</i>	Rook	Linnaeus, 1758	19	0	2015	2018	A
561	<i>Corvus frugilegus</i>	Carrion Crow	Linnaeus, 1758	70	9	2015	2017	A
564	<i>Corvus corone corone</i>	Coal Tit	(Linnaeus, 1758)	5	2	2015	2016	A
572	<i>Parus ater</i>	Blue Tit	(Linnaeus, 1758)	50	0	2015	2017	A
584	<i>Cyanistes caeruleus</i>	Great Tit	Linnaeus, 1758	34	1	2015	2018	A
587	<i>Parus major</i>							

597	<i>Alauda arvensis</i>	Skylark	Linnaeus, 1758	10	0	2015	2016	A
608	<i>Riparia riparia</i>	Sand Martin	(Linnaeus, 1758)	6	2	2015	2016	A
612	<i>Hirundo rustica</i>	Swallow	Linnaeus, 1758	44	39	2015	2018	A
615	<i>Delichon urbicum</i>	House Martin	(Linnaeus, 1758)	17	16	2015	2017	A
620	<i>Cettia cetti</i>	Cetti's Warbler	( <del>Temminck</del> , 1820)	5	4	2015	2016	A
622	<i>Aegithalos caedatus</i>	Long-tailed Tit	(Linnaeus, 1758)	25	10	2015	2018	A
625	<i>Phylloscopus trochilus</i>	Willow Warbler	(Linnaeus, 1758)	1	0	2016	2016	A
628	<i>Phylloscopus collybita</i>	Chiffchaff	( <del>Vieillot</del> , 1817)	48	10	2015	2018	A
640	<i>Phylloscopus inornatus</i>	Yellow-browed Warbler	( <del>Blyth</del> , 1842)	2	2	2016	2017	A
653	<i>Acrocephalus schoenobaenus</i>	Sedge Warbler	(Linnaeus, 1758)	21	1	2015	2017	A
656	<i>Acrocephalus scirpaceus</i>	Reed Warbler	(Hermann, 1804)	12	5	2015	2016	A
678	<i>Sylvia atricapilla</i>	Blackcap	(Linnaeus, 1758)	22	5	2015	2017	A
690	<i>Sylvia communis</i>	Whitethroat	Latham, 1787	33	3	2015	2017	A
705	<i>Regulus regulus</i>	Goldcrest	(Linnaeus, 1758)	7	1	2015	2018	A
707	<i>Troglodytes troglodytes</i>	Wren	(Linnaeus, 1758)	59	9	2015	2018	A
727	<i>Sturnus vulgaris</i>	Starling	Linnaeus, 1758	13	251	2015	2016	A
739	<i>Turdus torquatus</i>	Ring Ouzel	Linnaeus, 1758	1	1	2016	2016	A
741	<i>Turdus merula</i>	Blackbird	Linnaeus, 1758	66	16	2015	2018	A
748	<i>Turdus pilaris</i>	Fieldfare	Linnaeus, 1758	3	3	2015	2018	A
749	<i>Turdus iliacus</i>	Redwing	Linnaeus, 1758	6	16	2015	2016	A
752	<i>Turdus philomelos</i>	Song Thrush	Brehm, CL, 1831	27	20	2011	2018	A
756	<i>Turdus viscivorus</i>	Mistle Thrush	Linnaeus, 1758	2	3	2015	2015	A
766	<i>Eritriacus rubecula</i>	Robin	(Linnaeus, 1758)	40	2	2015	2018	A
794	<i>Saxicola rubetra</i>	Whinchat	(Linnaeus, 1758)	1	1	2016	2016	A
816	<i>Cinclus cinclus cinclus</i>	Dipper	(Linnaeus, 1758)	1	1	2019	2019	A
817	<i>Passer domesticus</i>	House Sparrow	(Linnaeus, 1758)	17	0	2015	2015	A
826	<i>Prunella modularis</i>	Duncock	(Linnaeus, 1758)	22	5	2015	2016	A
840	<i>Motacilla cinerea</i>	Grey Wagtail	Tunstall, 1771	37	44	2015	2018	A
843	<i>Motacilla alba varrellii</i>	Pied Wagtail	Gould, 1837	23	26	2015	2017	A
864	<i>Fringilla coelebs</i>	Chaffinch	Linnaeus, 1758	43	5	2015	2018	A
873	<i>Pyrrhula pyrrhula</i>	Bullfinch	(Linnaeus, 1758)	4	5	2015	2016	A
879	<i>Chloris chloris</i>	Greenfinch	(Linnaeus, 1758)	17	12	2015	2018	A

884	<del>Linaria cannabina</del>	Linnet	(Linnaeus, 1758)	7	9	2015	2017	A
890	<del>Acanthis cabaret</del>	Lesser Redpoll	(Status Müller, PL, 1776)	1	13	2015	2015	A
900	<del>Carduelis carduelis</del>	Goldfinch	(Linnaeus, 1758)	34	31	2015	2017	A
904	<del>Spinus spinus</del>	Siskin	(Linnaeus, 1758)	1	0	2016	2016	A
930	<del>Emberiza citrinella</del>	Yellowhammer	Linnaeus, 1758	3	3	2016	2016	A
951	<del>Emberiza schoeniclus</del>	Reed Bunting	(Linnaeus, 1758)	31	8	2015	2018	A



3<sup>rd</sup> April  
2016

Perry  
Hampson

**Water Rail. Often heard and occasionally seen moving along the back-sokes. A very shy species that seems to be doing well.**

Appendix 12 Plant Survey - Suki Pryce 2018

North Walsham and Dilham Canal Plant Lists

Name of site:	North Walsham and Dilham Canal
Date of surveys:	Sep 2018 - Suki Pryce,
Surveyors:	Suki Pryce,

D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare

A = Swafield to Royston Bridge, Pound 5 North  
 B1 = Royston Bridge to Spa Common  
 B2 = Purdy's Marsh  
 C = Spa Common to Ebridge Mill  
 D = Briggate  
 E = Honing

CANAL SECTIONS

	A	B1	B2	C	D	E	Det	Grid (all TG)
Field Maple		R	R					
<i>Acer campestre</i>		R	R					
Sycamore		R			O			
<i>Acer pseudoplatanus</i>		R			O			
Yarrow	O	O			R			2954 3167
<i>Achillea millefolium</i>	O	O			R			
Sneezewort (double variety)	R							
<i>Achillea ptarmica flore pleno</i>	R							
Ground Elder	R	R		R	R			
<i>Aegopodium podagraria</i>	R	R		R	R			
Horse Chestnut	R	R						
<i>Aesculus hippocastanum</i>	R	R						
Fool's Parsley	R	R		R				
<i>Aethusa cynapium</i>	R	R		R				
Common Bent	R	R		R				
<i>Agrostis capillaris</i>	R	R		R				
Creeping Bent	O	IA		R				
<i>Agrostis stolonifera</i>	O	IA		R				2984 3109
Water-plantain	R	R		R				
<i>Alisma plantago-aquatica</i>	R	R		R				
Garlic Mustard			O, IA	R	O, IA			
<i>Alliaria petiolata</i>			O, IA	R	O, IA			
Alder	O, IA	O	O	O, IA	O			
<i>Alnus glutinosa</i>	O, IA	O	O	O, IA	O			
Meadow Foxtail		R		R				
<i>Alopecurus pratensis</i>		R		R				
Common Ragweed	R							
<i>Ambrosia artemisiifolia</i>	R							
Fiddleneck	R							
<i>Amsinckia micrantha</i>	R							
Scarlet Pimpernel	O	R		R				
<i>Anagallis arvensis</i>	O	R		R				
Bugloss	R							
<i>Anchusa arvensis</i>	R							
Balkan Anemone	R							2951 3170, 2959 3159
<i>Anemone blanda</i>	R							





















## Appendix 13 – Biodiversity Net Gain

Managing impacts on biodiversity has long been a part of infrastructure development, however, the question that is now being asked is how does one improve infrastructure while protecting and

**Biodiversity Net Gain: Good practice principles for development** (CIEEM, 2016) sets out ten fundamental principles to support the incorporation of BNG into the design, construction, operation and maintenance phases of development projects.

**The ten good practice principles for development are as follows:**

<b>Mitigation Hierarchy</b>	Avoid or minimise the impacts on biodiversity and only compensate where these cannot be achieved
<b>Impacts on Irreplaceable Biodiversity</b>	Avoid losing biodiversity that cannot be offset by gains elsewhere e.g. SSSI
<b>Be Inclusive and Equitable</b>	Engage stakeholders early and include them throughout the project lifecycle
<b>Address Risks</b>	Mitigate difficulty, uncertainty and other risks to achieve net gain, by incorporating contingencies
<b>Measurable Net Gain Contribution</b>	Achieve an overall gain for biodiversity, ecosystem services and nature conservation priorities
<b>Best Results for Biodiversity</b>	Use credible evidence and local knowledge to justify BNG choices over the project for best results
<b>Be Additional</b>	Achieve nature conservation outcomes that demonstrably exceed existing obligations
<b>Net Gain Legacy</b>	Ensure your Net Gain is sustainable beyond the construction phase and is well managed into the future
<b>Optimise Sustainability</b>	Prioritise BNG and where possible the wider environmental benefits for sustainable society and economy
<b>Be Transparent</b>	Communicate all net gain activities in a timely and transparent manner with stakeholders

ideally enhancing, biodiversity? The concept of BNG is that development needs to leave biodiversity in a measurably better state than before.

This principal is easy where a development is confined to a distinct area, but in the case of a canal restoration project, which is a long, thin and not confined to one distinct area, the calculations for measuring losses and gains will become much more complex. As such, until BNG becomes embedded in the planning system, it will not be fully understood how it will apply to restoration. The NW&DCT fully supports the concept of BNG and will keep abreast of the guidance from the *Inland Waterways Association/Canal & River Trust Restoration Hub* over the coming time and cater for the eventual inclusion of BNG in its project planning when required.

There may also be opportunities for the canal's restoration projects to present themselves as the net gain benefit for other infrastructure developments, supporting developers in the provision of mitigating measures. Additionally, BNG costs will become an expected part of future funding bids, as funders will be looking at ensuring that the environment is fully considered within a project.

The NW&DCT will continue to carefully monitor the advice issued to Waterways Restoration Groups, the first of which is the IWA's

*Introduction: Biodiversity Net Gain for Canal Restoration published 2020 (waterways.org.uk/biodiversity).*

**(SOURCE RESTORATION HUB: WHAT BIODIVERSITY MEANS FOR THE WATERWAYS IN IWA WATERWAYS SUMMER 2020 PP28/29)**

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## *Acknowledgements*

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Alan Bertram – Work Party Leader  
Chris Black – Former NW&DCT Vice Chair and Mitigation Group Chair  
Mary Black – Former NW&DCT Trustee  
Sam Brown – Norfolk Wildlife Trust CWS Conservation Officer  
Ivan Cane – EAWA Archivist for the NW&DC Records  
Tom Carr – NW&DCT Chair  
Adam Comerford – National Hydrology Manager, Canal and River Trust  
Matt Dayne – Maintenance Supervisor, Broads Authority  
Ebridge Model Boat Club  
Ken Fowler – Principal Water Engineer, East Midlands Region, Canal & River Trust  
Perry Hampson – NW&DCT Wildlife Consultant  
Chris Heath – Work Party Volunteer, Purdy’s Marsh  
Matt Jones – Norfolk Wildlife Trust, Living Landscapes Officer  
Nick Lewis – Volunteer Aquatic Invertebrate Surveyor  
Jamie Manners, Environment Officer, Water Management Alliance  
Norfolk Flora Group  
Jo Parmenter, Partner, the Landscape Partnership  
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Graham Pressman – Project Officer  
Suki Pryce – NW&DCT Wildlife Officer  
Rory Sanderson – Catchment Manager, Norfolk, Environment Agency  
Paul Separovic – Waterways Team Leader (Gt Ouse), Environment Agency  
Mark Shopland – NW&DCT Work Party Organiser  
Sue Stephenson – Environmental Design Team, Broads Authority  
North Walsham High School - Duke of Edinburgh Co-ordinator  
Roy Webster – NW&DCT Fisheries Consultant  
Tom Webster – NW&DCT Fisheries Officer  
Stephanie Witham, North East Norfolk Bird Club  
Gordon Woolcock - Volunteer Aquatic Invertebrate Surveyor

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*Extracts from the General Agreement drawn up between the OCC and the  
NW&DCT on the 18th November 2018:*

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**BACKGROUND**

- A) The OCC is of the opinion that the NW&DCT has the necessary experience and abilities to provide services to the OCC.
- B) The NW&DCT is agreeable to providing such services to the OCC on the terms and conditions set out in this agreement.

IN CONSIDERATION OF the matters described above and of the mutual benefits and obligations set forth in this Agreement, the receipt and sufficiency of which consideration is hereby acknowledged. The OCC and The NW&DCT ('the Parties') agree as follows:

**SERVICES PROVIDED**

- 1. The OCC hereby agrees to engage NW&DCT to provide the OCC with the following services ('the Services'):  
Assist with restoration work on the North Walsham and Dilham Canal pounds under ownership of The OCC.
- 2. The Services will also include any other tasks which the Parties may agree on. The NW&DCT hereby agrees to provide such Services to the OCC. (*e.g. maintenance of the pounds*).

**TERM OF AGREEMENT**

- 3. The term of this Agreement ('the Term') will begin on the date of this Agreement and will remain in full force until terminated as provided in this Agreement
- 4. In the event of either party wishes to terminate this Agreement, that party will be required to give 30 days written notice to the other party
- 5. In the event that either Party breaches a material provision under this agreement, the non-defaulting Party may terminate this agreement immediately and require the defaulting party to indemnify the non-defaulting party against all reasonable costs
- 6. This agreement may be terminated at any time by mutual agreement of the Parties
- 7. Except as otherwise provided in this agreement, the obligations of the NW&DCT will end upon the termination of this Agreement

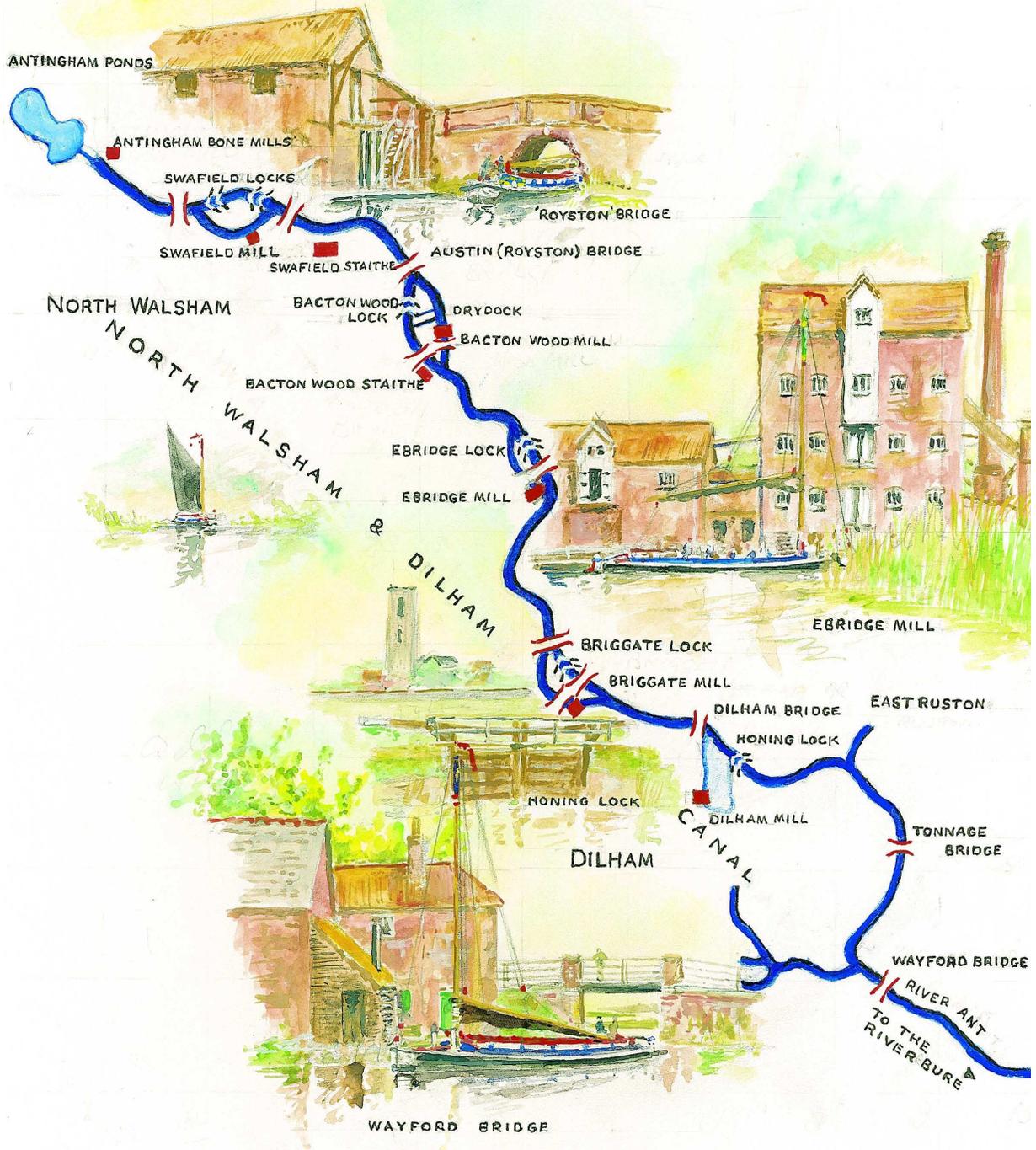
**PERFORMANCE**

- 8. The Parties agree to do everything necessary to ensure that the terms of this agreement take effect.

\*\*\*\*\*

**The Old Canal Company Ltd**  
**Bacton Wood Mill**  
**Spa Common,**  
**North Walsham**  
**Norfolk.**  
**NR28 9SJ**  
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E.W. PAGET-TOMLINSON, MARCH 2002

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