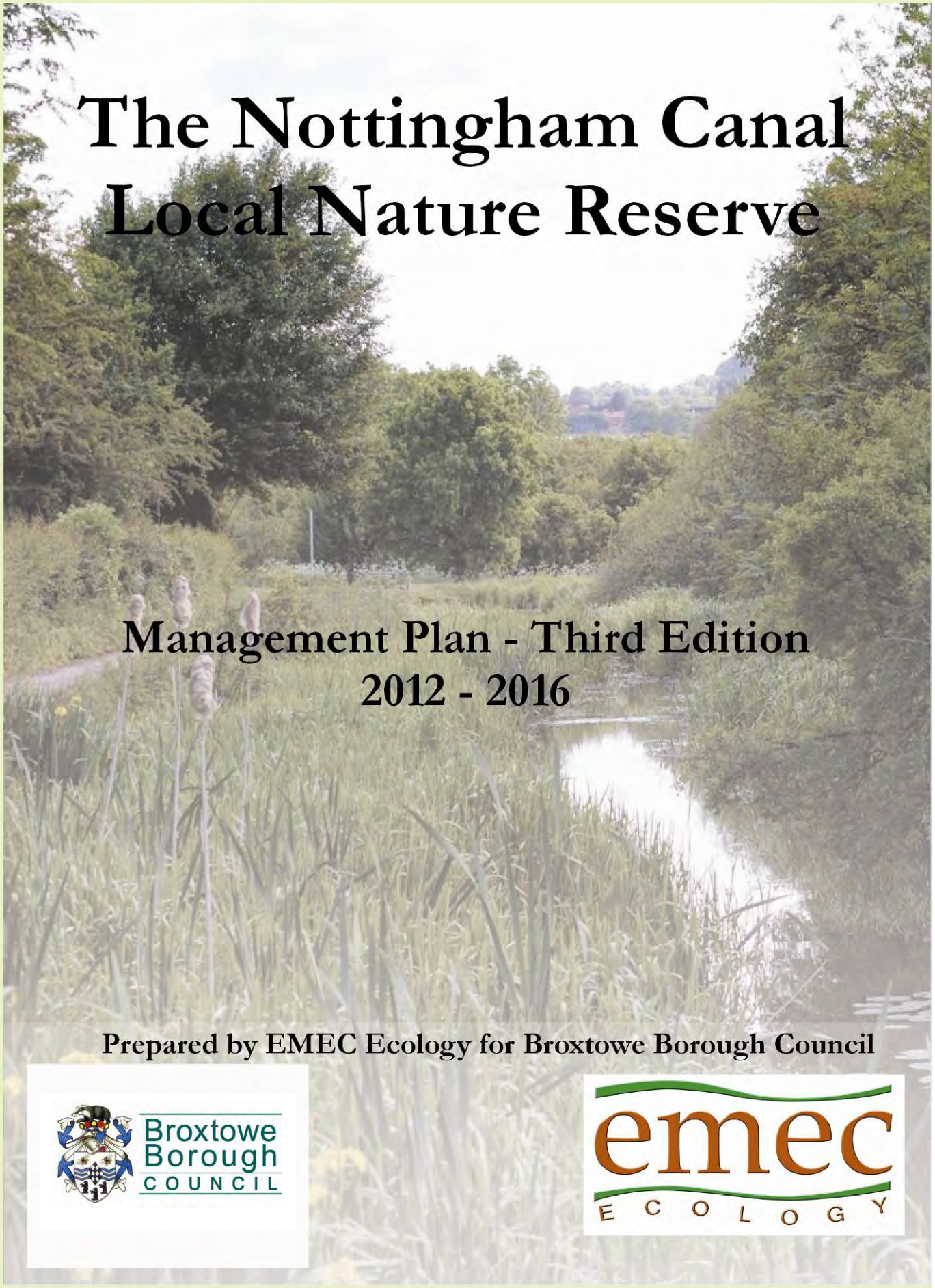


The Nottingham Canal Local Nature Reserve

Management Plan - Third Edition 2012 - 2016

Prepared by EMEC Ecology for Broxtowe Borough Council

Broxtowe Borough COUNCIL

emec ECOLOGY

CONTENTS

1. INTRODUCTION 3

2. SITE INFORMATION 5
2.1 General 5
2.2 Ecological Baseline 6

3. EVALUATION 19
3.1 Evaluation of Features 19
3.2 Factors Influencing Management 26

4. MANAGEMENT OPERATIONS 27
4.1 Management Objectives 27
4.2 Management Rationale 28
4.3 Management Operations: Plan of Work 45

REFERENCES 55
APPENDIX 1: FIGURES 57
Figure 1: Nottingham Canal LNR Location Plan 57
Figure 2: Nottingham Canal LNR, Northern Section - Site Details 58
Figure 3a: Nottingham Canal LNR, Southern Section - Site Details 60
Figure 3b: Nottingham Canal LNR, Southern Section - Site Details 61
Figure 4: Nottingham Canal LNR, Open Water Habitat Management Areas 62
Figure 5: Proposed Nottingham Canal LNR, Northern Section 64
Figure 6a: Proposed Nottingham Canal LNR, Southern Section 66
Figure 6b: Proposed Nottingham Canal LNR, Southern Section 67
APPENDIX 2: SITE PHOTOGRAPHS 68
APPENDIX 3: SPECIES LISTS 71
APPENDIX 3: SPECIES LISTS 72
APPENDIX 4: RECOMMENDED SPECIES FOR PLANTING 82
APPENDIX 5: PROTECTED SPECIES LEGISLATION 83
APPENDIX 6: POTENTIAL SITE ENHANCEMENTS 86

1. INTRODUCTION

1.1 This Management Plan has been prepared by EMEC Ecology, the consultancy arm of the Nottinghamshire Wildlife Trust (NWT), for Broxtowe Borough Council (BBC). It provides the details of the ecological management of the Nottingham Canal Local Nature Reserve (LNR), hereafter referred to as the site. The site is located on the north western urban fringe of central Nottingham, in Nottinghamshire. The LNR is located between Anchor Road in Eastwood and Latimer Drive in Bramcote, approximately 6 miles in length.

1.2 This Management Plan follows on from two previous reports. The first was produced by EMEC Ecology, who surveyed the site in 1993, and produced the First Edition Management Plan, hereafter referred to as 'First Edition' (EMEC Ecology 1993). In 1999 the NWT produced the Second Edition Management Plan (NWT 1999) to update the former report, hereafter referred to as 'Second Edition'. Due to the time elapsed, combined with the potential establishment of opencast mining near the LNR, this Third Edition Management Plan has been commissioned to update the previous reports. This Third Edition, as with the previous Management Plans is designed to improve and maintain the site as a wildlife-rich area as well as an enjoyable amenity area for the public to enjoy.

1.3 The site comprises of the former canal route, with the former towpath acting as a public right of way through the LNR. Since its abandonment, some sections have been filled in, now comprising of habitats such as woodland and grassland habitat. Large areas have been retained as open water habitat with areas of reed habitat also present. The site also includes a range of scrub habitat, hedgerows and woodland throughout the site and occasional scattered trees.

1.4 The Nottingham Canal LNR is part of the Erewash Valley Trail (EVT), a 30 mile circular trail focused around the Erewash Valley. The route is available for walking and cycling and offers good access to the rich wildlife and heritage features which make this area so interesting.

EREWASH VALLEY TRAIL

The EVT partners work together to enhance the biodiversity, amenity and healthy living opportunities in the valley and recognising the unique character of the area. This partnership created the Trail in 2010.

It is a very important area for wildlife with key wildlife habitats along the valley supporting both common and rare plants and animals, making

Prepared by EMEC Ecology
Tel. 0115 964 4828

the valley a key landscape area for biodiversity. To be able to fully appreciate this importance, raise awareness of the rich biodiversity of the area and ensure that this is preserved and enhanced through current and future land management, it is essential to maintain up to date information.

1.5 EMEC Ecology's brief was to provide a five-year Management Plan for the site (as a Third Edition), with the objective of maintaining and where possible enhancing its ecological value.

1.6 To provide a recent ecological baseline for the site, ecological walk-over surveys were carried out by a suitably experienced ecologist. The walk-over surveys comprised of habitat and botanical surveys, with any sightings or evidence of protected / notable faunal species recorded.

1.7 This Management Plan will be the responsibility of Broxtowe Borough Council, as the site is located within their remit. The Third Edition Management Plan covers a five-year period, after which it should be reviewed.

2. SITE INFORMATION

2.1 General

2.1.1 The Nottingham Canal LNR lies to the north west of central Nottingham, as shown on Figure 1, in Appendix 1. The site extends from Anchor Road in Eastwood (SK 457467), running south easterly to Latimer Drive in Bramcote (SK 509394). For the purpose of the Management Plan (as with the First Edition), the site has been divided into two sections; This is due to the canal being left with two remnants, largely as a result of open cast mining :

- The Northern Section (Eastwood Section)
- The Southern Section (Awsworth to Bramcote)

The route is available for both cyclists and walkers and offers access to wildlife and heritage features.

2.1.2 The LNR follows the former towpath of the Nottingham Canal. One of the key habitats along the route is open water, formulated from the former canal and several ponds and ditches along the route. Areas that have been filled in include woodland and grassland habitats. The site also provides scrub and tall ruderal habitat, with scattered trees and hedgerows throughout.

2.1.3 The LNR is located on the urban fridge of Nottingham and passes through several villages, as shown on Figure 1, in Appendix 1. It is in close proximity to residential areas as well as rural habitats such as woodland and arable / pasture fields. Several main roads, including the M1, pass both over and in close proximity to the LNR, creating easy access to several different locations with car parking also available. The Erewash Canal and the River Erewash are also located in close proximity to the canal.

Located approximately 50m east of the Robbinetts Arm section of the LNR (within the Southern Section) is Robbinetts Site of Special Scientific Interest (SSSI), as shown on Figure 3a, in Appendix 1. It is approximately 6.2 (ha) and has been designated as it contains one of the best examples of acidic grassland in the county. It comprises of a mosaic of grassland, varying in wetness and acidity, typical of the west Nottinghamshire coal measures which now supports few remaining areas of unimproved grassland.

2.1.4 The current site management is primarily undertaken by Broxtowe Borough Council with help from BTCV which runs an annual programme of habitat management work within the site. It has been noted however that several local residents carry out general litter picking along the towpath.

The current annual budget for work (other than grassland and hedgerow management and works carried out by BTCV) is approximately £9,000.00. However, further funding may become available through other initiatives.

2.1.5 The site is owned by the BBC, who are responsible for the future management of the site. As a LNR the local authority accepts a commitment to manage the land as such and to protect it from inappropriate uses or development. The contact details for the BBC are:

Broxtowe Borough Council
Foster Avenue
Beeston
Nottingham
NG9 1AB

Current Contact: Steve Fisher - Environmental Projects Officer
Phone: 0115 9173634
Email: steve.fisher@broxtowe.gov.uk

2.2 Ecological Baseline

2.2.1 *Site Survey*
Surveys of the site were conducted and notes were made on the habitat types present and their suitability for protected species. Target Notes were used to record any habitats or features of particular interest and any sightings, signs or evidence of protected or notable faunal species or any potential habitat for such species, as detailed below:

- The suitability of habitats for badgers (*Meles meles*) was recorded and any evidence of badgers including setts, dung pits, badger paths, hairs, bedding, footprints and scratching trees was noted;
- Trees with features suitable for roosting bats were noted, such as hollows, cracks and cavities within trunks and branches (e.g. old woodpecker holes), crevices behind loose bark and ivy growth;
- The suitability of habitats was assessed for amphibians (including great crested newt *(Triturus cristatus*) and reptiles;
- The suitability of the open water habitat was also assessed for water vole (*Arvicola terrestris*) and otter (*Lutra lutra*);
- The suitability of habitats was assessed for nesting birds.

2.2.2 *Survey Details*
EMEC Ecology carried out the above surveys over several visits to the site, between the 21st April and the 20th May 2011.

2.2.3 *Survey Limitations*

Only a brief assessment was made and no other systematic surveys to establish the presence / absence of protected species were undertaken. As such, a lack of evidence of a protected species does not indicate an absence of the species.

2.2.4 *Sites of Nature Conservation Importance*

The Nottingham Canal was designated as a LNR in 1993, a non-statutory designation. The Cossall section of the LNR has also been previously assessed at a county level (Grade 1) 'Site of Importance for Nature Conservation' by the Nottinghamshire Biological and Geological Records Centre (Second Edition).

2.2.5 *Habitat Types*

The approximate distribution of habitats and the location of Target Notes are shown on Figures 2, 3a and 3b, in Appendix 1. The following broad habitat types were recorded:

- Dense scrub
- Dry ditch
- Fence
- Grassland (poor semi-improved)
- Grassland (semi-improved)
- Hedgerow (species-poor intact)
- Hedgerow with trees
- Himalayan balsam
- Japanese knotweed
- Open water
- Reed area
- Road
- Scattered scrub
- Scattered tree
- Tall ruderal
- Towpath (Public Right of Way)
- Woodland

In the report text, species are referred to using their English names. Appendix 3 provides the complete lists of floral species including scientific names. Nomenclature follows that of Stace (1997). A variety of plant species were present on the site, reflecting both previous planting and characteristic species which have colonised naturally.

2.2.6 *Target Notes*

As identified on Figure 2, in Appendix 1:

1) Bailey Grove - woodland, an un-managed immature plantation woodland with some small areas of open canopy.
2) Area of semi-natural grassland supporting species such as bird's-foot trefoil, bugle, black knapweed and oxeye daisy.
3) A small stream that leads into a boggy area of reed within the dense scrub.
4) An adult female smooth newt (*Lissotriton vulgaris*) seen within the small stream during the walk-over survey.

5) A mallard (*Anas platyrhynchos*) duck nest next to an inlet pipe along the canal.
6) Hedgerow overhangs the towpath.
7) Area of semi-natural grassland along the towpath and hedgerow supporting species such as black knapweed, bush vetch and oxeye daisy.

As identified on Figure 3a, in Appendix 1:

8) Area of built up rubbish by Newton's Lane's bridge within the open water.
9) Hedgerow overhangs the towpath.
10) Bin thrown into the open water.
11) Area of exposed lining from the open water habitat of the canal.
12) Bench with overgrown common nettle making the bench currently un-useable.
13) Area of semi-improved grassland where disturbance is minimal along the footpath and supporting occasional species such as black knapweed, bush vetch, bugle and oxeye daisy.
14) Overgrown hedgerow that requires cutting back.
15) Water flows from the Robbinettes SSSI, through the currently dried out reed area.
16) Dead tree that has fallen into the canal.
17) Missing bench, concrete holes in the ground still apparent.
18) Bench has been uprooted and thrown in the reed along the margin of the canal.

As identified on Figure 3b, in Appendix 1:

19) Bench present, however it is well worn (also shown on Figure 3a, in Appendix 1).
20) Bench present, however it is well worn.
21) Hedgerow shows some signs of previous laying.

2.2.7 *Habitat Descriptions*

(i) *Northern Section*

This section is detailed on Figure 2, in Appendix 1. This section ran from Anchor Road to a small footpath that joined with Halls Lane in Eastwood (not shown on Figure 2, in Appendix 1). The description of habitats starts at the north boundary (Anchor Road) heading in a southerly direction.

Between Anchor Road and Tinsley Road

From Anchor Road the LNR passed 'Bailey Grove' an immature plantation woodland, located to the east of the towpath, with trees reaching up to 10m tall (see Target Note 1, on Figure 2, in Appendix 1). A variety of species were present including dominant alder with hawthorn, hazel, beech, silver birch, ash, oak, Scot's pine, lime, willow, whitebeam and dogwood. The woodland appeared to be unmanaged and the large number of tree specimens were densely compacted and difficult to pass through. Some limited areas of open canopy were

accessible where species such as red fescue, black knapweed, lord-and-ladies and wild teasel were present. The majority of the woodland was inaccessible due to the number of immature trees and understory. A small amount of Japanese knotweed was recorded at the north of the Bailey Grove (as shown on Figure 2, in Appendix 1).

On the west of the towpath was an area of dense scrub and scattered trees. Species included ash, apple, holly, alder, hawthorn and elder. The scrub was located on the edge of the Erewash Canal.

Further south of Bailey Grove (woodland) was an area of dense scrub and tall ruderal and a large area of grassland at the rear, accessible by a narrow footpath (see Target Note 2, on Figure 2, in Appendix 1). The grassland species included dominant bird's foot trefoil, black knapweed, mouse-eared hawkweed, dove's-foot crane's-bill, oxeye daisy, bugle and black medick (see Photograph 6, in Appendix 2). West of the grassland was a damper area where reed was located, species included reed sweet-grass, meadowsweet, broad-leaved willow-herb and soft rush (see Target Note 3, on Figure 2, in Appendix 1 and Photograph 5, in Appendix 2). The reed area was present north of a small stream that flowed into this area. A female smooth newt was noted during the survey within the stream (see Target Note 4, on Figure 2, in Appendix 1).

Further woodland was located at the south west of the towpath. It was immature to semi-mature and trees were up to 12m tall. The woodland appeared un-managed and the understory was growing up with dominant bramble and other scrub species. Tree species included cherry, yew, rowan apple, as well as various conifers. Due to the dense understory, the majority of the site was inaccessible. Some areas of Japanese knotweed were also recorded along the woodland, some areas appeared to have been treated; however specimens remained present.

South of the woodland was a hedgerow with trees along the western edge of the towpath. The hedgerow was up to 5m tall and included saplings such as lime, ash, horse chestnut, oak, beech, hawthorn, willow, field maple, sycamore and blackthorn. On the east of the towpath was open water habitat within a shallow depression that was partially choked with reed vegetation, including species such as reed sweet-grass and bulrush. On the west of the open water habitat was a thin strip of tall ruderal and on the east of the open water was a hedgerow dominated by hawthorn.

Tinsley Road and the Footpath that Joined with Halls Lane
The LNR towpath passed between Tinsley Road and Newmanleys Road. From this point the towpath followed along the former canal where open water was present (see Photograph 1, in Appendix 2). Some areas were choked with vegetation (see Photograph 2, in Appendix 2). A hedgerow was located along the west of the towpath

that occasionally overhung the footpath (see Target Note 6, on Figure 2, in Appendix 1 and Photograph 4, in Appendix 2). Areas of tall ruderal, dense scrub scattered trees and scrub were also located along this stretch of the canal. A mallard was also recorded nesting along the eastern bank of the canal (see Target Note 5, on Figure 2, in Appendix 1). Japanese knotweed was located along this section of the canal, close to Newmanleys Road.

The final section had been filled in from Newmanleys Road. Along the south west edge of the towpath and a small section at the north east was a species-poor section of hedgerow comprising of dominant hawthorn. There were several immature scattered trees also located along the south west boundary of the towpath. A small strip of grassland ran parallel to the north east hedgerow and species included oxeye daisy, black knapweed, bush vetch, meadow buttercup, white dead-nettle, yarrow and creeping cinquefoil (see Target Note 7, on Figure 2, in Appendix 1). The remaining grassland habitat on the south west of the towpath contained a lower proportion of species and was dominated by grass species with only a few herbaceous species including dandelion and red clover.

(ii) *Southern Section*

This section runs from a small car park off Shilo Way (A6096) in Awsworth to Latimer Drive in Bramcote. One of the main significant differences between this section and the northern section is the larger open areas of water.

Shilo Way to Newton's Lane

The stretch between Shilo Way cark park and Newton's Lane was leased out to the Awsworth Angling Club (see Photograph 7, in Appendix 2). The towpath followed the former canal and there were several fishing platforms along the bank that were in regular use. This section was re-constructed after open cast mining and has had very little emergent vegetation. The water appeared deep and species within the water included yellow lily. Marginal vegetation included occasional bulrush, gypsywort, meadowsweet, marsh marigold, water figwort, water dock and yellow iris.

Newton's Lane to Mill Lane

From Newton's Lane the open water habitat was similar, however no fishing is permitted in this area. Several fish have found there way out of the main fishing area during periods of flooding and this often attracts illegal angling for the large carp in particular. Previously Awsworth Angling Club have tried (with permission from Broxtowe Borough Council) to electro fish the area to retrieve the more valuable fish in order to reduce illegal fishing. The electro fishing was generally unsuccessful however, and therefore several carefully selected member of the Awsworth Angling club were allowed a period of one week to fish this length. This attempt was successful and illegal fishing appears to have reduced as a reult.

Small areas of vegetation included reed sweet-grass and bulrush with yellow lily and other marginal vegetation present. An area has built up with rubbish by Newton's Lane bridge (see Target Note 8, on Figure 3a, in Appendix 1).

From Newton's Lane, along the west of the towpath was a hedgerow dominated by hawthorn. There was also a thin strip of woodland towards Coronation Road that included species such as hawthorn, willow, elder, cherry, crack willow, ash, sycamore, field maple, oak and rowan. There were also two small areas of woodland and scattered scrub east of the open water habitat that were dominated by willow.

After Coronation Road the hedgerow continues along the western border of the towpath and at several points it overhangs the footpath (see Target Note 9, on Figure 3a, in Appendix 1). The water appears deep and fish including carp (*Cyprinidae* sp.) and rudd (*Scardinius erythrophthalmus*) were seen throughout the area. Several nesting mallard, moorhen (*Gallinula Chloropus*) and coot (*Fulica atra*) were recorded along the stretch of water and mute swan (*Cygnus olor*) and grey heron (*Ardea cinerea*) were also recorded. The towpath followed a large mixed plantation woodland located to the west and species-poor hedgerows and scattered scrub located to the east of the open water habitat.

Mill Lane to Cossall Road Car Park

After Mill Lane a small area of canal liner material was exposed (see Target Note 11, on Figure 3a, in Appendix 1), therefore suggesting this area has previously lost water through leakage. West of Dead Lane the canal appeared to be shallower and it was noted that the marginal vegetation had begun to expand from the edges to the central section of the open water habitat.

East of Dead Lane was a further stretch of the canal known as 'Robinnettes Arm'. This stretch leads from a small stream that passes Robbinettes SSSI and into the canal via a reed bed. This stretch passed through an area of semi-natural grassland where disturbance appeared minimal. The footpath supported species such as black knapweed, bush vetch, bugle and oxeye daisy (as identified by Target Note 13, on Figure 3a, in Appendix 1). The dense scrub in this area was overgrown where the footpath passes through.

The next section of the canal that runs parallel to Cossall Road was also predominantly open water with some areas dominated by marginal vegetation, choking the canal. There was a fallen tree within the canal (see Target Note 16, on Figure 3a, in Appendix 1). There was also a large area of grassland on the eastern edge of the canal surrounded by dense scrub, however this area was not accessed during the survey.

Cossall Road Car Park to Nottingham Road

From the car park off Cossall Road the canal was predominantly filled in and therefore dry, however several ponds were located beside the towpath. The area closest to the car park had the central area of the former canal planted with woodland species. Species were varied and included silver birch, whitebeam, Swedish whitebeam, goat willow, white willow, blackthorn, elder, bastard service tree, buckthorn, hazel, oak, ash, elm, field maple and crack willow. The understory included primrose, honeysuckle, cleavers, cock's-foot, greater stitchwort, hogweed, cow parsley, bluebell, common sorrel, bramble and meadow foxtail.

Pond 5 was located within the area of the former canal, a former swing bridge / lock (see Photograph 23, in Appendix 2). It was approximately 8m by 30m and had reinforced banks. The vegetation within the pond included curled pondweed and broadleaved pondweed that covered approximately 60% of the pond's surface. The bench next to the pond appeared worn.

South of Pond 5 there was a woodland located to the east of the towpath, with a dry ditch located in the grassland verge running along its edge. The woodland had Himalayan balsam within the ground flora that was also apparent in areas of the grassland and dry ditch. The grassland strip comprised of species including meadow vetchling, tansy, pignut, ragged robin, red campion, common comfrey, horse radish, common ragwort, creeping buttercup, common bent, cock's-foot and white dead-nettle.

Pond 3 and 4 were located at the west of the woodland (see Photograph 21 & 22, in Appendix 2). Pond 4 was heavily surrounded by trees that created a shaded habitat. Reed sweet-grass was located at the edge of the pond. Pond 3 was located south of Pond 4. It was also shaded by the surrounding trees, however the trees were large and mature. Within the water there was lots of rubbish including three wheelbarrows and a chair. There was also a small area of the ditch that had retained water, referred to as Ditch 1.

Further south, the towpath was surrounded by hedgerows on either side and the former canal had been filled in, now comprising of a grassland habitat with species similar to the previous grass verge. This area has been sown previously with a wildflower seed mix, funded by the Erewash Valley Trail partners. A fence was located backing onto the dwellings of Hill Rise. The Towpath passes underneath Nottingham Road, where another patch of Japanese knotweed was present.

From Nottingham Road to Latimer Drive

After Nottingham Road, dominant reed habitat was present, dominated by common reed, bulrush, reed sweet-grass and yellow iris. As the LNR continues in an easterly direction the habitat becomes drier and continues to tall ruderal habitat followed by scrub before reaching the underpass for the M1.

East of the M1 the canal had been filled, and a woodland and tall ruderal habitat was now present. South of the towpath is a hedgerow with trees. Pond 2 was located east of the towpath. It was approximately 30m in diameter. There was an area of bulrush and reed sweet-grass on the margin of the pond. The pond was directly linked to the open water south east of the pond that also had large areas chocked with marginal reed vegetation. A garden centre (Trowel Garden Centre) was located along the Nottingham Canal LNR; however the site is linked with a footpath bordering the garden centre.

South east of the garden centre the towpath had a depressed area north of the footpath. This was predominantly reed habitat, dominated by reed sweet-grass, and tall ruderal habitat. There was a large area dominated by Himalayan balsam also located along the depression (dry canal bed) north of the towpath (as shown by Figure 3b, in Appendix 1). A hedgerow follows the southern border of the towpath and showed some signs of previous laying (see Target Note 21, on Figure 3b, in Appendix 1).

A small area of open water was apparent to the east of the section before Coventry Lane that was surrounded by reed sweet-grass and meadowsweet. Directly before Coventry Lane there was a small strip of woodland either side of the towpath. Species included ash, hawthorn, elm, dogwood, willow, blackthorn, oak and sycamore. The ground flora included red campion, cow parsley, dog's-mercury, herb-Robert, common ragwort, bluebell, cleavers and ivy.

The LNR continues past Coventry Lane through a woodland. Pond 1 was located within the woodland habitat, north of the towpath by the railway. It was approximately 3m x 6m. There was an accumulation of litter within the pond and some marginal reed vegetation. The woodland leads to Latimer Drive.

2.2.8 *Fauna*

a) *Amphibians*

One female smooth newt was recorded on the survey within the small stream in the northern section. Local records from the Nottinghamshire Amphibian and Reptile Group (NARG) also showed the following maximum results from recent torch surveys of the ponds (NARG 2011).

Table 2.1: Amphibians Recorded within the LNR in 2011

Pond No.	Frog (*Rana temporaria*)	Toad (*Bufo bufo*)	Smooth newt (*Lissotriton vulgaris*)	Fish
Pond 5	0	0	0	0
Pond 4	3 adults and spawn	0	0	present

Pond 3	1 adult and spawn	0	0	present
Pond 2	Not Surveyed			
Pond 1	5 adults	15 adults + spawn	25 adults	0
Ditch 1	spawn	0	2 adults	0

There were several ponds and areas of open water suitable to provide potential breeding habitat for amphibians. Due to large areas of open water containing large fish (predators of juveniles, spawn and newt eggs) these areas were considered sub-optimal habitat for some amphibian species, i.e. great crested newt. However Ponds 1 - 5, the Northern Section and also areas of reed habitat (with occasional open water) were considered to provide potential breeding habitat for all amphibian species. However due to the ponds being generally full of leaf litter and stagnant (with the exception of Pond 5), and the smaller areas of open water being susceptible to drying out), these habitats were not considered optimal.

There are several other ponds, outside of the LNR boundary in the Cossall area, near Coronation Road. The possibility of the surrounding residential dwellings having ponds is also considered likely.

The scrub, woodland and hedgerow provided potential sheltering habitat and the grassland, tall ruderal and reed habitat provided potential terrestrial foraging habitat.

b) *Badger*

No evidence of badger activity was found within the site, although the site provided some potential habitat for sett building within the woodland (including the adjacent woodlands), hedgerow and scrub habitat. The site also provided foraging habitat within the tall ruderal and grassland habitats.

c) *Bats*

No trees within the site were identified as providing features (such as knot holes, flaking bark and deep fissures) potentially suitable for roosting bats. It is however possible that some of the scattered mature trees and trees within the woodland contained features that were obscured, or behind ivy, that would potentially be suitable as bat refugia.

The woodland, hedgerows, reed areas, scrub and scattered trees, provided potential foraging habitat for bats and the open water (including the canal and the ponds) were considered to provide potential foraging habitat for the Daubenton's (*Myotis Daubentonii*) bat, a species which hunts low over ponds and water courses, catching insects which are close to, or on, the waters surface.

d) *Nesting Birds*

Several birds have been recorded on the site (as detailed in Table 2.2 overleaf); however it is considered that a full bird survey would identify a large number of species. The scattered trees, woodland habitats, scrub and hedgerows provided potential for nesting birds. The grassland and tall ruderal habitats also provided some potential habitat for ground nesting birds. The open water habitat and the reed areas also provided potential habitat for water fowl.

The site also provided ideal habitat for small mammals such as mice and voles and therefore will provide foraging habitat for raptors, including owls.

Table 2.2: Bird Species Recorded within the LNR in 2011

Common Name	Scientific Name	RSPB List
Blackbird	*Turdus merula*	Green status
Blue tit	*Cyanistes caeruleus*	Green status
Bullfinch	*Pyrrhula pyrrhula*	Amber status
Coot	*Fulica atra*	Green status
Goldcrest	*Regulus regulus*	Green status
Great tit	*Parus major*	Green status
Grey heron	*Ardea cinerea*	Green status
Kingfisher	*Alcedo atthis*	Amber status
Little grebe	*Tachybaptus ruficollis*	Amber status
Mallard	*Anas platyrhynchos*	Amber status
Moorhen	*Gallinula chloropus*	Green status
Mute swan	*Cygnus olor*	Green status
Robin	*Erithacus rubecula*	Green status
Spotted fly catcher	*Muscicapa striata*	Red status
Willow tit	*Poecile montanus*	Red status

e) *Otter*

Although no potential refuges, such as potential holt sites, were recorded on the canal, the open water habitat was considered to provide foraging opportunities for otters; this was due to the large fish populations, a primary food source. The connection between the Nottingham Canal and both the River Erewash and the Erewash Canal (specifically towards the north of the LNR) also creates a potential wildlife corridor.

f) *Reptiles*

Grass snakes (*Natrix natrix*) have been recorded in several areas of the Nottingham Canal and terrapins (a non-native species) have also been recorded within the Cossall section, near Mill Lane (pers. comm. Steve Fisher, Environmental Projects Officer, BBC).

The site provided a mosaic of habitats for reptile species, including foraging opportunities within the grassland, reed habitat, tall ruderal

and within the open water habitat (including the ponds and canal). The woodland, scrub and hedgerow habitat also provided good sheltering and winter refuge sites. The canal and ponds also created a corridor for reptiles, specifically grass snake (known to inhabit the area) to commute to and from the site, with other water courses in close proximity including the River Erewash and the Erewash Canal.

g) *Invertebrates*

The mosaic of habitats on the site included grassland, hedgerow, scrub, tall ruderal, open water and woodland that would provide opportunities for a range of species. The following terrestrial species were recorded during the production of this report in 2011:

Table 2.3: Invertebrate Recorded within the LNR in 2011

Common Name	Scientific Name
Common blue	*Polyommatus icarus*
Small copper	*Lycaena phlaeas*
Speckled wood	*Pararge aegeria*
Gatekeeper	*Pyronia tithonus*
Small white	*Pieris rapae*
Green veined white	*Pieris napi*
Holly blue	*Celastrina argiolus*
Emperor dragonfly	*Anax imperator*
Brown hawker	*Aeshna grandis*
Ruddy darter	*Sympetrum sanguineum*
Comma butterfly	*Polygonia c-album*
Peacock butterfly	*Inachis io*
Blue tailed damselfly	*Ischnura elegans*

An aquatic invertebrate baseline survey was carried out in 1999 (Holditch 1999). Due to the potential establishment of opencast mining near the LNR, which could affect the quality of the water flowing into the reserve an interim aquatic macroinvertebrate re-survey was carried out within a small section of the canal in December (EMEC Ecology 2011). A more detailed and comprehensive survey will take place between March and May 2012.

h) *Water Vole*

Water vole have been historically recorded within the LNR. Training days carried out in 2011 as part of the Nottinghamshire Biodiversity Action Group along the Cossall section of the Nottingham Canal, recorded field signs of water vole along several sections. The area surveyed was located between Newton's Lane and the car park south of Cossall. Several areas within this stretch were found to support high levels of water vole field survey signs, however other areas presented no field signs, although this was likely to be due to the overgrown willow scrub on the banks.

The canal habitat was varied; however it generally provided suitable foraging opportunities within the marginal vegetation and the reed

areas, and burrowing opportunities within the earthy stretches of the canal bank. The ponds also provided some limited potential habitat for water voles and the ditches and terrestrial habitat provided potential commuting routes.

2.3 Infrastructure

2.3.1 *Access*

The LNR is easily accessible to the public. The main access points include:

- Anchor Road, Eastwood
- Tinsley Road and Newmanleys Road off Church Street, Eastwood
- Halls Lane, Giltbrook
- Smithhurst Road, Giltbrook
- Newton's Lane, Awsworth
- Coronation Road, Cossall
- Cossall Village
- Trowell Village off Nottingham Road
- Pit Lane, Trowell
- Coventry Lane
- Latimer Drive, Bramcote

All of the entrance points are permanently open to the public.

2.3.2 *Pathways*

The former towpath of the Nottingham Canal provides a Public Right of Way through the entire LNR. Several other public footpaths pass through the site along the route, providing further access points to the LNR.

3. EVALUATION

3.1 Evaluation of Features

3.1.1 *Approach*

The parameters used to evaluate the site are taken from the criteria used in Ratcliffe (1977). To evaluate individual habitats and species, reference to the following has been made: the Wildlife and Countryside Act 1981 (as amended), the National Biodiversity Action Plan (BAP) (HMSO 1995), Nottinghamshire BAP (Nottinghamshire BAG 1998) and the Birds of Conservation Concern (Eaton et al 2009).

3.1.2 *Key Ecological Features*

The key habitats on the site include open water, hedgerow, woodland, semi-improved grassland and reed habitat.

3.1.3 *Size*

The LNR is narrow and approximately 6 miles in length and covers 30.6 hectares.

3.1.4 *Geology and Hydrology*

These details have not been studied as part of the Third Edition Management Plan and the following information has been extracted from the First Edition or from pers. comm.

There is a 'pump and abstraction license' that allows the Broxtowe Borough Council (BBC) to 'top up' the Nottingham Canal from the River Erewash during dry conditions (pers. comm. Steve Fisher, Environmental Projects Officer, BBC). The pump is located close to Mill Lane, within the Southern Section of the canal, as located on Figure 3a, in Appendix 1. The fluctuating water levels can cause problems as the clay liner can dry out and crack, giving rise to leaks which ultimately can result in embankment collapse. The drainage at the foot of embankments is also crucially important as wet areas at the base of the embankments often cause major slippage.

The canal is separated from its original water supply, the Langley Mill Basin, so over the years BBC have been actively seeking potential water supplies to connect the canal, in an attempt to maintain the wetland habitat.

The canal lies in coal measure materials consisting mainly of clays, shales and coal of variable chemistry dynamics. The site generally has a low water permeability. The southern section (by Awsworth) has been mixed with substra from previous opencast mining.

Northern Section

The northern section has little inflow consisting primarily of field drainage. The northern most drainage feature is an open pipe on the

south side of the field next to Anchor Lane. The pipe enters at the west side of the grassland and pond (presumably by the area of reed south of Bailey Grove).

A small stream flows along the southern side of the pond (pond identified as reed habitat south of Bailey Grove) from a culvert under the A610, flowing from an industrial area (Eastwood). The stream joins with the ditch and flows under the canal emerging on the western boundary of the site next to the Erewash Canal and then passes into another culvert under the Erewash Canal into the River Erewash. The stream trickle feeds the pond and marshy area with any overflow returning to the stream. Near Newmanleys Road there is also a flow from a culvert under the A610 that feeds the canal via a piped connection across Newmanleys Road.

Southern Section
The southern section near Coventry Lane has a sandy substrata giving rise to problems with leakage and bank stability in wet conditions. Excavation by rabbits aggravates this problem and permits have been issued to several individuals to control this by use of ferrets.

The primary feed to the water system is from the brook flowing from Strelly under the M1 towards the Nottingham Canal, flowing in a westerly direction. Water surface run-off from the M1 is likely to enter the stream from Oldmoor Pond in Oldmoor Wood (located directly west of the M1) passing through Robbinetts Arm of the Canal.

A small stream feeds into the northern point of this section of the Nottingham Canal (by the area leased by Awsworth Angling Club), passing through an area of marsh land before entering the canal. The stream takes surface water run off from the village of Awsworth.

The central area of this section has been filled in.

The Trowel to Bramcote section is fed by field drainage and a dyke at east of the M1. There are several ponds located throughout the southern section of the LNR, including east of the canal beyond an area of woodland (not included within the LNR). There is also a ditch near Coventry Lane which along with highway drainage feeds a pond and adjacent wetland. Details of the canal drainage system are currently being put on to the BBC GIS mapping system.

3.1.5 *Soil Substrates*
The canal is lined with clay (First Edition) and will subsequently influence both the floral and fauna diversity. It is believed that now some areas of the canal are lined (see Target Note 11, on Figure 3a in Appendix 1). The clay influences the water chemistry, flora and fauna. Clay has a high buffering capacity and the pH of the water in the Cossall Section is predicted to be neutral.

The footpaths are now resurfaced, however the substrates (including the embankment substrates) include limestone and calcareous clay in places, which will also influence the floral community, specifically along Robbinettes Arm.

Anchor Lane field (Northern Section) was restored to grassland after opencast mining. Bailey Bridge Marsh (identified by reed habitat on Target Note 2, on Figure 2, in Appendix 1 and Photograph 5, in Appendix 2) was restored after the opencast mining had finished and has a rich clay loam on the east side. Bailey Bridge Marsh is a site where the topsoil was stripped but not restored which is why clay is exposed.

3.1.6 *Archaeology*

From the First Edition, archaeological features along the LNR include:

- The Monk's Way
- Potter's Bridge (has a preservation Order)
- Swancar Bridge (has a preservation Order)
- Bridges
- Remains of swing bridges and barges

No further information is currently available; however it is believed that the Nottinghamshire Biological and Geological Record Centre hold further information.

3.1.7 *Diversity*

The site provides a diverse range of vegetation structures and habitat opportunities, including open water, reed, scrub (including hedgerows), trees, tall ruderal and grassland (including seasonally wet areas). The site also provides habitat for a variety of fauna, including many characteristic birds, mammals, reptiles and amphibians. With further recording it is possible that more faunal species would be recorded.

A full botany survey has not been conducted as part of this report, however the species recorded in 2011 are provided in Appendix 3 (separated between the Northern Section and the Southern Section), and the habitats are shown on Figures 2, 3a & 3b, in Appendix 1. With additional surveys it is likely that further floral species would be recorded.

3.1.8 *Naturalness*

The site and its habitats are modified in composition. The canal structure is man-made, however the principle material is local coal measure soft clay. The site has also been subject to a man-made towpath comprising of hardstanding paving.

The site has since been colonised naturally by floral and faunal communities, however the previous management has controlled the succession of some habitats.

The open water habitat can become impacted by pollution. Monitoring and removal of this pollution can create a more natural environment.

The area leased by the Awsworth Angling Club is stocked with fish.

Areas of woodland have been planted where the canal has been filled in (Trowell section). These areas previously comprised of non-native species such as sycamore (First and Second Edition), however these species were not noted during the survey.

3.1.9 *Fragility*

The principle amenity and wildlife value is dependent on the maintenance of the quality and quantity of open water. The open water habitat (and species associated with it) are inherently fragile due to the succession of water to emerging vegetation and the loss of water through leakage. Open water habitats are also fragile against being over dredged to ensure species-rich sections retain a diverse range of species.

Pollution can impact on the water quality within the LNR; those areas totally isolated from the remaining water system (i.e. the ponds) are more vulnerable to pollution and acts of vandalism. The vulnerability of pollution comes from road-run off, however this is reduced by buffering of reed beds and marginal habitat.

Many species including floral and faunal species are highly susceptible to human disturbance. For example areas of open water stocked with fish can impact on species populations (fish species can prey on small amphibians, juvenile fish, insects and other invertebrates). Fish can also impact on the amount of prey available to other species. Therefore management must reflect this impact.

Another threat comes from misuse of the site from the local community, although no major issues other than fly tipping and damage of benches are currently apparent. It is proposed that further engagement of the community within the LNR will allow for the community to participate and feel ownership of the local resource.

3.1.10 *Typicallness*

The floral and faunal species are typical of dis-used canals and open water habitat, however uncommon on the urban fringe of Nottingham. The high species richness of the canal is however unusual within the Erewash Valley.

3.1.11 *Recorded History*

The canal was originally built to transport coal to Nottingham and was opened in 1796. It was abandoned for navigation in 1937, it however remained in water until 1971. Since the cessation of use by the British Waterways in 1976, the Nottingham Canal was purchased by Broxtowe Borough Council in 1977. A small section (approximately 200m) is now

owned by the Trowell Garden Centre and was filled in. Part of the Nottingham Canal in Awsworth has been renovated and is managed as a fishery, leased by the Awsworth Angling Cub.

The section located between Newmanleys Road and the Bernnerley viaduct at Awsworth was filled in as a result of opencast coal mining dividing the canal into a Northern Section and Southern Section (as shown on Figure 1, in Appendix 1).

In 1993 the Nottingham Canal was designated as a LNR.

The Nottingham Canal features in 'The Rainbow' by DH Lawrence.

Vegetation Clearance
Information including the clearing of aquatic vegetation states that between Newton's Road and Coronation Road is an area that was cleared of aquatic vegetation in 1984. Between Coronation Road and Robbinettes Arm an area was also cleared in parts in 1990. BTCV also carry out regular reed pulling along several stretches of the LNR, including the Robinettes Arm of the canal.

Restoration
Former reporting (First Edition) has shown that by Anchor Lane a field (see Target Note 1, on Figure 2, in Appendix 1) was restored after opencast mining. It has also been stated that 'Bailey Bridge Marsh' had the top soil stripped only and was not restored after open cast mining . The area of the canal that remains intact but is only seasonally wet is represented by the area of grassland and reed (see Target Note 3, on Figure 2 in Appendix 1) within the northern section.

Recorded Management
The management history of the Nottingham Canal LNR is not fully known, other than the objectives of the two previous Management Plans. Members of the Broxtowe Borough Council and other agencies may be aware of detailed work that has been carried out, however no documentation has been provided as part of this Management Plan.

3.1.12 *Position in an Ecological Unit*
Although the site has individual value and ecological potential, it is included within the Erewash Valley Trail and the value of this 'wildlife corridor' in its entirety is extremely high.

The Nottingham Canal provides an excellent wildlife corridor due to its narrow, long, nature. It provides a link for many communities to access wider terrestrial habitats along the route including habitats such as Robbinettes SSSI. It is linked with several other water courses that feed the canal (ditches and streams), as well as being close to the Erewash Canal and the River Erewash along its route.

The site is directly surrounded by several other areas of open space within the Erewash Valley and also Robbinettes SSSI. These areas provide direct routes along which terrestrial species can commute and faunal and floral species to re-distribute. The site is also likely to be used by highly mobile species (e.g. birds and bats).

3.1.13 *Potential Value*

The LNR currently provides high ecological and recreational value for the surrounding community. With appropriate management there is the potential to maintain and enhance the site's ecological value through protecting the open water habitat, semi-improved grassland, hedgerows, reed bed and woodland habitats. The site has the potential to support mammal species such as water vole, reptile species including grass snake and amphibians, bird, bat and a range of invertebrate species.

The ponds within the southern section of the site could be improved due to the current ponds being generally sparse with limited vegetation and being dominated by shade and nutrient enriched from leaf litter.

3.1.14 *Intrinsic Appeal*

The site has a high intrinsic appeal; including the large areas of open water combined with a variety of other habitats including woodland, scrub and reed habitat. The maintenance of habitats and the appropriate management of the habitats present would help to retain a mosaic of habitats for the local community to explore and enjoy. The intrinsic appeal of the site is reflected with regular use by the public, including walking, horse riding, fishing and wildlife watching. Intrinsic appeal could be improved through the improving and replacing of benches.

As the canal is part of Nottingham's history, the canal has further intrinsic appeal by retaining original features.

3.1.15 *Identification of Important Features*

No rare habitats or species are present within the LNR and no habitats are considered to be Habitats of Principal Biological Importance on Section 41 of the NERC Act 2006.

Several habitats are listed on the UK BAP including 'Ponds', 'Eutrophic Standing Waters', 'Hedgerows' and 'Reedbeds' (UK BAP 2007). The Nottinghamshire BAP also includes 'Canals', 'Eutrophic and Mesotrophic Standing Water' (including ponds) and 'Reedbed' (Nottinghamshire BAG 1998). These habitats are detailed on Table 3.1 overleaf. These habitats are important habitats that are of restricted occurrence within the urban fringe and Broxtowe Borough.

Table 3.1: Habitats of Importance within the LNR recorded 2011

Habitat	UK BAP	Nottinghamshire BAP
Open water habitat – canal	●	●
Open water habitat – ponds	●	●
Reedbed	●	●
Hedgerows	●	

Previous surveys suggest there is greater pond-sedge (First and Second Edition) in the Northern section of the LNR, however this was not noted on this survey (carried out in April whilst the plant is not in flower). This species is not listed on either the UK or the Nottinghamshire BAP.

Bluebell (native) and nipplewort are both located within the LNR and are included within the Nottinghamshire BAP. These species are all listed as a Species of Conservation Concern on the Nottinghamshire BAP (Nottinghamshire BAG 1998). To qualify for this status, species must be either: (i) on the UK long list of species of conservation concern (UK BAP 2007), (ii) recorded in nine or fewer localities in Nottinghamshire since 1980 or (iii) identified by consultation as being particularly characteristic of Nottinghamshire or popular with local people. As these species do not occur in nine or fewer localities in Nottinghamshire, it is likely that they fall into the third group (iii above).

Species previously recorded within the LNR and considered important features are shown on Table 3.2 overleaf (Second Edition) and their current status on the local and UK BAP is also indicated. No survey was carried out as part of this report to suggest presence / absence of these species within the LNR currently.

Table 3.2: Species of Importance within the LNR

Common Name	Scientific Name	UK BAP	Nottinghamshire BAP
Floral species			
Bluebell	*Hyacinthoides non-scripta*		● (SCC)
Nipplewort	*Lapsana communis*		● (SCC)
Faunal Species (Vertebrates)			
Great crested newts	*Triturus vulgaris*	●	●(SCC)
Grass snake	*Natrix natrix*	●	● (SCC)
Kingfisher	*Alcedeo atthis*		
Little Grebe	*Tachybaptus ruficollis*		
Water rail	*Rallus aquaticus*		
Water shrew	*Neomys fodiens*		● (SCC)

Prepared by EMEC Ecology
Tel. 0115 964 4828

Common Name	Scientific Name	UK BAP	Nottinghamshire BAP
Water vole	*Arvicola terrestris*	●	●
Faunal species (invertebrates)			
Water scavenger beetles	*Cercyon convexiusculus*		●(SCC)

SCC= Species of Conservation Concern

3.2 Factors Influencing Management

3.2.1 *Natural Trends*

Without management, scrub and tall ruderal vegetation will spread into the grassland habitat and reduce the botanical diversity within the site. The open water habitat within the canal will eventually succeed to emerging vegetation due to the lack of flow and shallow waters allowing vegetation to overtake the habitat. There is also the potential for a loss of water through leakage to create a dryer habitat and eventually the area will become dominated by scrub species if left unmanaged.

It is also considered likely that without specific treatment the non-native species' (Japanese knotweed and Himalayan balsam) that are present within the site are likely to spread and cause disruption within the site if they are not managed effectively, including structural damage to bridges etc.

3.2.2 *External Factors*

The site is part of the Erewash Valley Trail and subsequently linked to many surrounding areas for wildlife. This increases the potential for new terrestrial species to colonise, as well as the potential for the site to be further colonised by bird and bat species.

The site is also located on the urban fringe and is surrounded by many main roads including the A610 and the M1, creating a vulnerability of the site from road-run off. Due to the surrounding arable and pasture fields there is also the potential for the site to be impacted by farming practices such as the use of fertilisers; however the reed bed and marginal vegetation will reduce any impacts.

3.2.3 *Site Objectives*

As a LNR the designation status should protect and enhance the wildlife habitats with the aid of the Management Plan. On the urban fringe the site provides a fantastic opportunity to involve the local community to learn about / participate in the conservation of the site and enjoy the site for recreational activities.

4. MANAGEMENT OPERATIONS

4.1 Management Objectives

A list of management objectives which are achievable within a 5 year time frame of this Management Plan, are listed below. The aim is to maintain and where possible enhance the habitats currently present within the site. The rationale for the objectives is detailed in Section 4.2 and the management operations and plan of works is provided in Section 4.3.

The management objectives are:

1) Grassland – to maintain and enhance the grassland areas;

2) Hedgerow – to maintain and enhance the hedgerow habitat;

3) Woodland – to maintain and enhance the plantation woodlands by thinning;

4) Open water – to maintain and enhance the open water habitat, including both the canal and the ponds;

5) Monitoring – to monitor species within the LNR;

6) Invasive species – removal of invasive species;

7) Litter, waste and vandalism – to ensure the site is free of litter, waste and vandalism;

8) Site access and interpretation – to ensure the site is accessible, its amenity value is maintained and provision is made for interpretation;

9) Legal Obligations – to fulfil all legal obligations.

4.2 Management Rationale

4.2.1 Objective 1 – Grassland

To maintain and enhance the grassland areas.

Rationale

Grassland is an area that can serve as habitat for a range of faunal species such as invertebrates, amphibians, bird and mammal species. There are two distinctive grassland habitats within the site; the first grassland is generally species-poor and includes common species (identified by poor semi-improved grassland), specifically around the towpaths and regularly disturbed areas. There are several habitat patches however within the LNR where the grassland habitat appears to comprise of less common species and the habitat was considered semi-improved grassland (as shown by Target Notes 2, 7 & 13, on Figures 2 & 3, in Appendix 1).

All of the grassland within the LNR appears to be managed with mowing, however some areas may also be grazed by rabbits. Most of the infill grassland habitat is currently mown annually and the arisings are removed (funded by the Erewash Valley Trail Funding).

Some areas are however more regularly mown (i.e. directly adjacent to the towpaths) and have become dominated by common grassland species.

The management regime should include areas of 'grassland meadow' to maintain and increase the diversity of species within the site, as well as the paths still being managed to retain amenity value for the community. The grassland meadow habitat, identified by Figures 5 & 6, in Appendix 1, should be maintained and enhanced as part of the sites improvements. Therefore there should be two management techniques used on the site:

1) *Regularly Used Areas*
It is considered that the areas where the public regularly travel through the site, specifically beside the towpath (both tall ruderal and grassland habitat) should continue to be regularly mown to avoid areas looking untidy (amenity value) and becoming un-commutable. At least 30cm (or preferably 1m) from any open water habitat should ideally not be mown, to ensure that terrestrial faunal species (e.g. water vole and water fowl) retain areas of shelter and cover, whilst indicating to the public that management is being carried out in the area.

2) *Species-rich Areas*
The remaining grassland areas (as identified by Figure 5, 6a & 6b, in Appendix 1) should be managed as a grassland meadow (as already is taking place within several areas of the LNR). This would attempt to

create further foraging opportunities for species which may commute into the site from the surrounding areas as well as increasing / retaining floral species diversity. These areas should be mown once annually, ideally in September with all cuttings removed to reduce nutrient enrichment. The cuttings can either be removed from the site or used to create 'habitat piles'. These can provide a valuable habitat in its own right, e.g. by providing hibernation sites for amphibians and shelter and egg laying sites for grass snake (known to inhabit the LNR).

It could also be considered that bulbs could be planted to increase the intrinsic appeal to visitors. The bulbs could be planted in small sections along the sides of the towpath, where disturbance from pedestrians will be low. A potential species list of bulbs is included in Appendix 4. It is advised that bulb planting could also be carried out by the local community groups.

To increase diversity within the canal the site it is intended that within the northern section a part of the existing grassland is intended to be wildflower / bird food area (as shown on Figure 5, in Appendix 1).

4.2.2 Objective 2 – Hedgerow

To maintain and enhance the hedgerow habitat.

Rationale

Hedgerows are also a valuable habitat for small terrestrial mammals, feeding and nesting birds, bats and invertebrates. Hedgerows are located throughout the LNR, primarily running parallel to the towpath. The hedgerows include both managed hedgerows of up to 1.5m and several high hedgerows that overhang above the towpath. The species present within the hedgerows are dominated by hawthorn and elder. Less common species within the hedgerows include dog rose, blackthorn, field maple, wild privet and saplings of ash and cherry.

BCTV have been undertaking hedge laying on the canal for 20 years and this continued management technique should be encouraged. Approximately 400m a year of hedgerow is targeted and should continue to be carried out where resources allow. A note of where and when should collated and sent to the BBC at regular intervals.

No hedgerows within the site were considered to be species-rich; a habitat recognised within the Nottinghamshire BAP (Nottinghamshire BAG 1998), which lists hedgerows as habitats of conservation concern. Therefore it is considered that maintenance and enhancement of the hedgerows would benefit the site. Possible ways of achieving this include the following:

- It is considered that one benefit to the site would be to create a species-rich hedgerow(s) within the LNR to provide a range of floral

diversity, as well as providing a range of sheltering and foraging habitat for faunal species. It is recommended that to avoid a major disturbance to the LNR this could be focused in an area where disturbance is already apparent. No specific locations have been identified as this is not a key objective of the Management Plan, however it should be considered if an opportunity or location arises for further planting. A list of potential hedgerow species to plant if required is included within Appendix 3.

- It is considered that the regular management for the hedgerows within the LNR should include trimming every year due to the restricted width of the towpath. Cutting in February is carried out to leave berries over the winter, and this management should be continued unless health and safety / access requires early intervention. Hedgerows should be maintained at heights between 4m and 1.2m, as previously suggested in the First Edition.

- It is also considered that hedgerows (where feasible) should continue to be managed for wildlife by laying where possible on a rotational basis by BTCV. This provides structure, enhancing the hedgerow's ecological value.

- Vegetation on the site has the potential to provide bird nesting habitat. **Therefore any management or removal of vegetation should be timed to avoid the bird breeding season, which runs from March to September (inclusive).**

- Any standard trees within the hedgerows should be allowed to grow with no intervention, unless general cutting back or health and safety reasons requires removal.

4.2.3 Objective 3 – Woodland

To maintain and enhance the plantation woodlands by thinning.

Rationale

Diverse woodland habitats are extremely valuable for wildlife, and provide shelter, feeding and breeding sites for a variety of animals including small mammals, birds and a range of invertebrates such as butterflies.

The existing mixed plantation woodland, 'Bailey Grove', at the north of the Northern Section has been unattended in recent years in a management technique to attempt to keep people / vandals out of the area. At present the plantation woodland is young (less than 20 years old), and the closely planted trees are competing with one another and are growing unmonitored. Ground layers are being shaded out and species are subsequently limited. Therefore it is recommended that within some areas, although attempting to avoid attracting unwanted

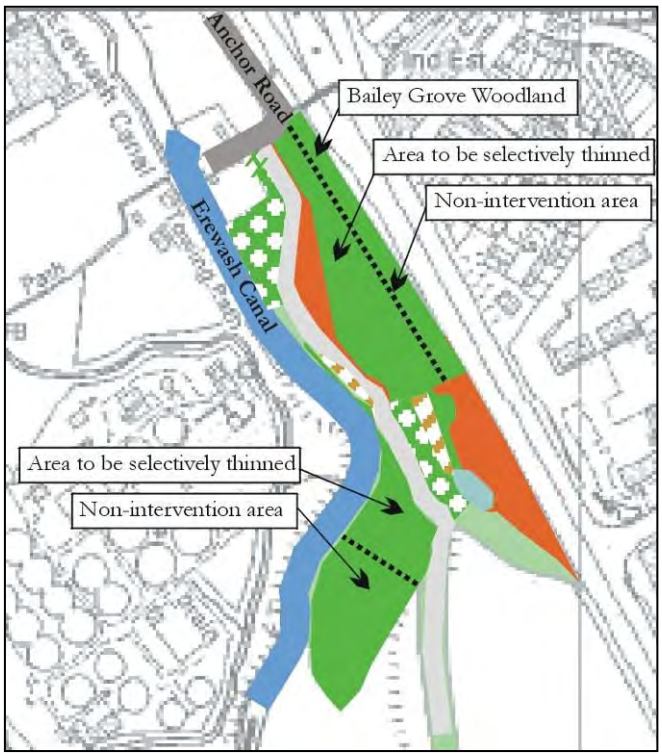
behaviour in the area, thinning could be carried out. Care will need to be taken to ensure that the area does not become too open to dog walkers, as currently the area provides ideal bird nesting habitat. It is therefore recommended that an agreed plan should be drawn up before any works take place. This would however be carried out as and when resources become available and the information below is for guidance only.

Management should be aimed at increasing habitat diversity, however as Bailey Grove acts as a buffer to the A610, it is recommended that selective thinning is carried out on the west side of the woodland. An example is provided overleaf.

- Woodland edges would be maintained more or less intact (some scrub control can be carried out).
- Areas to be thinned should used the basic principle of removing approximately 25% of the trees (i.e. removal of one tree in four to encourage the growth of the remaining trees), however this will be at the discretion of the on site manager.

The woodland to the south west of Bailey Grove has also been unattended in recent years. Thick scrub layers are developing where there is sufficient light for vigorous growth and have created an area where no access is possible, which in itself provides a valuable habitat for wildlife.

Dense scrub at the woodland edges provides valuable nesting, cover and feeding opportunities for birds, mammals and invertebrates. However it will prevent the development of ground flora and will compete vigorously with surrounding trees. It is advised that an area of this habitat as retained as a non-intervention area to allow the bird, mammal and invertebrate populations to flourish. However the area at the front of this woodland habitat should also be managed with selective thinning and scrub removal to allow certain trees to flourish and for the woodland to appear ‘tidy’ for amenity value for the users of the LNR. An example is provided.



It is advised that any wooden logs / brash collected during the creation of the thinning management to allow selected trees to grow to maturity, should be collected to form habitat piles within the woodlands. Sometimes in management of woodlands there is the over emphasis to 'tidy' the woodland, however plies of dead wood would create a further habitat for invertebrates and refuge for amphibian and reptile species. Due to former incidents of vandalism (including Bailey Bridge Marsh) wood piles should be avoided in obvious areas to the public due to the risk of fire.

It is proposed that a further enhancement of the woodland habitat / scattered trees would be to install bat boxes. The provision of bat boxes on semi-mature to mature trees would provide additional roosting features for bats and may encourage their use of the site. Although bat boxes do not have to be placed within the woodland habitat, the woodland may be the preferred habitat to avoid obvious detection in case of vandalism, due to the LNR location of being on the urban fringe. The species likely to be in the vicinity of the LNR include common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistellus pygmaues*) and Daubenton's bat, and therefore a mixture of different bat boxes would be appropriate.

Bat boxes suitable are shown in Appendix 6 and they should ideally be sited at least 3m high, with three boxes per tree, in order to ensure that the boxes have different aspects. It would also be ideal if one bird box could also be installed on the same trees as the bat boxes, as often birds will attempt to nest within these boxes otherwise stopping the use by bats. This method has proved successful in deterring birds from using the bat boxes. Nottinghamshire Bat Group should ideally be contacted prior to erecting these bat boxes for them to consider if they

would like to be part of a monitoring scheme on the site (as this scheme could require a licensed bat worker).

Vegetation on the site has the potential to provide bird nesting habitat. Therefore any management or removal of vegetation should be timed to avoid the bird breeding season, which runs from March to September (inclusive).

4.2.4 Objective 4 – Open Water

To maintain and enhance the open water habitat, including both the canal and the ponds.

Open water habitat provides breeding, feeding and winter roosting areas for a large number of species (including amphibians, bats such as Daubenton's and reptiles such as grass snake). The marginal vegetation can also provide important habitat for aquatic invertebrates, as well dragonflies and water beetles. The open water habitat within the Nottingham Canal LNR includes both the original canal (including the reed areas) and the ponds.

Open Water - Canal
Canals are included within the UK BAP under 'Eutrophic Standing Waters' and was also added to the Nottinghamshire BAP in 2004 (Nottinghamshire BAG 1998). Differing from running water by having slow to still water flows and a uniform, shallow profile, this habitat provides an important wildlife corridor in Nottinghamshire, for both floral and faunal communities. The Nottingham Canal was separated from its original supply of water, the Langley Mill Basin. Due to the importance of maintaining wetland habitat, Broxtowe Borough Council have therefore over the years been seeking potential water supplies and connecting them into the canal to maintain the wetland habitat. One method currently adopted by the Broxtowe Borough Council (BBC) is the 'pump and abstraction license' which allows in periods of dry or very wet conditions the BBC to control the canal's water level. One of the most important objectives would be to monitor the water levels to identify the point at which the pump and abstraction license should be used effectively. It is recommended that a water level board be placed in a clear location where water levels could be monitored on a regular basis; a potential location has been suggested on Figure 6a, in Appendix 1. One person should be appointed responsible to monitor the water level as required. It would be hoped that any future management plans may be able to use the data to provide the maximum and minimum water levels before action could be taken.

With regards to the flooding of the canal, bunds are located along the canal to ensure that if the canal floods, the habitats in the vicinity will habve minimal damage occur. According to the previous First Edition Management Plan a bund is located close to Bramcote within the Southern Section, as shown on Figure 3b, in Appendix 1. Another bund

is located close to the M1 to protect a residential property from flooding, as located on Figure 3b, in Appendix 1. A key objective of the management plan should be to monitor water levels to reduce the risk of flooding.

Areas alongside the canal and in the filled in areas also provide important wildlife habitat including grassland and hedgerows.

In the absence of fast flow and the periodic scouring which occurs in rivers, silt continually accumulates on the bottom of a canal and without management, silt accumulation combined with plant succession can lead to reed bed development. This will eventually lead to the formation of a terrestrial habitat. This process has already occurred in parts of the Nottingham Canal, as shown by Figure 4, in Appendix 1 (Nottinghamshire BAG 1998). Dredging is difficult to carryout within the site due to the expense, time consuming and also difficult to organise due to the narrow towpath and adjacent land ownership.

Reed beds are included within the UK BAP and also within the Nottinghamshire BAP and provide an important habitat for a range of floral and faunal species, such as water vole and grass snake. As part of the current management at the Nottingham Canal, BCTV carry out reed pulling by hand to ensure areas of open water are retained as well as sufficient reed bed habitat. This is a valid management technique and ideally would be carried out in autumn. However BTCV is volunteer based and the majority of volunteers are provided during the summer months. Due to the importance of this cost effective resource for the management of the canal, some adaptations to the optimal time of year are considered suitable. Reed pulling is therefore carried out predominantly in the summer months. Due to the time of the year that the reed pulling is carried out, some basic principles must be followed to ensure both legal compliance and maintaining conservation goals.

- Before any works to the reed bed habitat begins it is recommended that survey work to establish presence / absence of water vole is carried out during their breeding season (March to October, inclusive), see below. It is considered that it may be worth holding a water vole training day for the BTCV staff as has been held by the councils previously. This will allow BTCV staff to recognise signs of water voles presence.

- Before any works take place within the open water / reed bed habitat, a survey for bird nests must be carried out. As well as being due to conservation, it would be illegal to destroy or damage a nest of any wild bird while it is being built or in use, even if was un-intentional.

  If a bird nest is found then the nest will need to be avoided whilst it is in use and ideally a buffer zone should be put in place to avoid disturbing nesting birds. It is therefore recommended that a buffer

zone is adopted around any active bird nest with a minimum of a 10m buffer.

- Broxtowe Borough Council should continue to seek and connect further potential water supplies to maintain the wetland habitat.

- For all works to the Nottingham Canal, including general maintenance and dredging, liaison with the Environment Agency is advised prior to works commencing.

Dredging areas of the canal has been undertaken previously and should be carried out as and when the resources become available. Although ideally not all these areas will be dredged at the same time to ensure heterogeneous open water habitats, depending on time and cost restraints this may be necessary. Ideally in these situations no more than 25% should be dredged in one season to prevent removal of too many invertebrates in the substrate.

- A large factor in deciding when and where the canal can be dredged will be land owner agreement. Although the canal is owned by the Broxtowe Borough Council, due to the narrow towpath, the adjacent land will often be required to place the large dredging machinery. This may cause large delays or in fact determine that some areas are unable to be dredged at all. A further consideration would be the depositing of the waste material created from dredging, which can prove to be difficult and often very expensive. Dredging should be at the discretion of the working team when resources become available. However some areas that may be worth considering when resources are available are shown on Figures 5, 6a and 6b, in Appendix 1. The areas dredged should be identified and retained for information towards future Management Plans.

- Prior to any dredging of the canal taking place it should be fully known if any lining of the canal is present in these areas, as this will directly affect how to dredge the area.

- After Mill Lane a small area of canal liner material is currently exposed (see Target Note 11, on Figure 3a, in Appendix 1), therefore ideally this would be covered up, potentially with large gravel.

- Any potential dredging should be carried out in autumn / winter.

As a result of high turbidity and low flow, water quality in canals is often perceived as poor. This can be due to the existence of algae blooms due to the slow water movement in warmer weather combined with low oxygen levels. This is also apparent in low levels within the open water habitat (as identified on Figure 4, in Appendix 1). There is no evidence to suggest that this has been an issue within the canal over the past 20

years, however it is suggested that it should be monitored to identify if algae blooms impact the canals water quality in the future.

Water Vole
Water voles have been recorded within the Cossall section of the Nottingham Canal. Between Newton's Lane and the car park south of Cossall, several areas identified a large number of water vole field survey signs and other areas presented no field signs likely to be due to the overgrown vegetation (2011 surveys).

Enhancements for the existing population should therefore be a key management objective and works throughout the whole of the Nottingham Canal should be sympathetic to water vole. However the water vole is fully protected under Schedule 5, Section 9 of the WCA 1981 (as amended), which makes it illegal to:

- Intentionally kill, injure or take (capture) a water vole;
- Possess or control a live or dead water vole, or any part of a water vole;
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection or disturb water voles while they are using such a place; and
- Sell, offer for sale or advertise for live or dead water voles.

This legislation therefore restricts the works that can be carried out in 'any place which water voles use for shelter or protection', which potentially includes the areas of reed bed / marginal vegetation or banks of the canal. Therefore prior to any works being carried out in these areas, a suitably experienced surveyor (this could include volunteers or staff familiar with Water vole field signs) should identify if any evidence is present, including burrows, latrines, feeding remains, runs in the vegetation, grazed 'lawns' and actual sightings. This presence / absence survey should ideally be carried out during the water vole breeding season which runs from late March – October. Whilst water voles are breeding they are highly active and mark their territory with conspicuous piles of droppings, called latrines. If any evidence of water vole is recorded then a buffer zone should be put in place to avoid recklessly damaging, or destroying any structure or place which water voles use for shelter or protection, or disturbing water voles whilst they are using such a place. It is therefore recommended that the same buffer zone as recommended with breeding birds is adopted and a minimum of a 10m buffer is retained from any potential resting / sheltering place. It is imperative that an area be thoroughly searched before any works take place.

In the event that works are required within an area where water vole are known to be using for shelter etc then a suitably experienced ecologist should be consulted for further advice on mitigation, timings and the potential requirement for a Natural England license.

It is also recommended that further monitoring should be carried out in the following years to ensure the continued success of the water vole population (see Objective 5). However this is likely to be based on available funds or local volunteer groups.

Open Water – Ponds

'Ponds' are listed as a Priority Habitat on the UK BAP and 'Standing Water' (including ponds) was added as a Priority Habitat in 1999 to the Nottinghamshire BAP (Nottinghamshire BAG 1998). One issue facing the ponds within the LNR is nutrient enrichment from the surrounding trees and the silting up of the beds. Ponds 4, 3 and 1 in particular have a poorer quality due to the fallen leaf litter from the surrounding trees and woodland. Resulting in the water course becoming clogged with silt and nutrient enriched. Some debris and other items were also noted as being thrown into the ponds and this looks untidy and can problems with polluting the ponds also (depending on what is put in the ponds). It is noted however that the ponds are not a critical issue due to the ongoing potential for misuse by the surrounding residential populations. Therefore an objective of the Management Plan is to improve the existing ponds, however it is not currently considered critical and will be carried out only when resources become available:

- Removing items from the pond that have been fly tipped, including items such as wheelbarrows, chairs and rubbish.

- If dredging of the canal takes place the ponds should be dredged at the same time. Due to the location of the ponds it is hoped that there will be no surrounding land owner issues and this could take place as necessary. This should follow the Environment Agency best practice guidelines.

- It is recommended that the surrounding trees are cut back to minimise the leaf litter and open the water body up to allow some further light through. After the canopy has been opened the banks should be allowed to naturally colonise with marginal vegetation. It is understood however that this may be difficult as the surrounding trees are on land outside of BBC's ownership.

- The minimum depth should ideally be at least 60cm to ensure that during the winter the pond will not freeze in its entirety and the edges should remain partially graded to allow species such as breeding amphibians to enter and exit the pond.

  It is advised that at least one pond (recommended to be Pond 1) is however retained as shallower that 60cm deep. This is because ponds that are also seasonally dry play an important role for species, specifically amphibians. As the dry habitat will periodically kill of fish in dry weather, a known predator of amphibian efts and larvae, this will help populations within the vicinity.

- Any proposed dredging should be carried out in autumn / winter.

- Due to the small size of the ponds, they should be maintained by keeping a balance between aquatic / marginal vegetation and open water areas. Although there is no exact science to the ideal ratios of habitats within a pond, the marginal plants should not dominate the pond. Therefore marginal vegetation should be maintained at below approximately 50% of the total pond cover, to ensure areas where submerged plants can thrive and open water areas are retained. Surplus plants should be removed if necessary, and allowed to remain at the pond's edge to dry, to allow pond invertebrates to crawl back into the water. Only after the plants have completely dried out should they be composted.

4.2.5 Objective 5 – Monitoring

To monitor species diversity within the LNR.

Species Monitoring
Many faunal species have been recorded throughout the site and there are no available records as to what is currently present within the LNR.

For example water vole have been recorded within a section of the canal but it is not known if they are throughout the whole of the LNR. Great crested newts have also been recorded within the LNR (First Edition), however recent records from 2011 (from Ponds 1, 3, 4, 5 and Ditch 1) suggest no great crested newts being currently present.

It has also been noted that there are several non-native species present along the canal including faunal species such as terrapins, goldfish and white rat, all likely to have been released as former pets. There are also records of rabbit, another common species, although non-native. Floral species include Japanese knotweed, Himalayan balsam and water fern (*Azolla filiculoides*)

Keeping an updated record of the species within the LNR is important for knowing how to manage the area effectively for the different species present as well as the habitats. This is also important to ensure that the legal restrictions for working within specific habitats and areas are adhered to. For example great crested newts and their habitat are afforded full protection under European directives and UK legislation, including the WCA 1981 (as amended), the CroW Act 2000 and the Conservation (Natural habitats) Regulations 2010 (as ammneded). This makes it is an offence to kill, injure or disturb great crested newts and to destroy any place used for rest or shelter by a newt. Therefore restrictions will be put in place if great crested newts are recorded along the LNR, including general maintenance works that are carried out within this area.

It is also important to keep a record of the species (faunal and floral) present to understand if any long term impacts are taking place (including climate change), such as succession of a habitat. This will include the identification and removal of invasive species.

Therefore it is recommended that the following areas could be monitored in the LNR over the subsequent years to update the baseline data of species present within the LNR.

- Amphibian records of all ponds and throughout sections of the canal habitat should be monitored for species and population size. Surveying techniques may require a license to be held by the surveyor and for species identification it is also advised that experienced surveyors are used.

  One suggestion would be to contact the Nottinghamshire Amphibian and Reptile Group (NARG), who have recently surveyed some of the ponds in the vicinity. Due to the former records being from the Eastwood area this would be an important area to survey in the future.

- Grass snakes have been recorded within the Cossall area (First Edition). However it is not sure when the most recent reptile has been recorded on site. This information could be gathered as easily as speaking to the local community or wildlife groups. One method would be to put up posters asking people to detail their local wildlife knowledge.

- Local mammal records, including water vole, bank vole, water shrew, otter, hedgehog, brown hare, bats and badger could also be collected by the general public and recorded in a central area.

- A full detailed botanical list should be carried out as regularly as possible (potentially every 3 years). This could also be carried out by local volunteers, community groups or the local university students.

- All species records should be compiled in one central area and held on file for this information to be collated and used to determine future management objectives.

One key objective for the future management of the Nottingham Canal LNR would be to compile all of the historic records of all management that has been carried out within the LNR. For example no detailed information on areas of the canal that have been lined is accessible. Previous objectives of the Management Plan have been to monitor leaks and this may have been a result of one of these objectives. However this may be beneficial information for future Management

Plans that suggest dredging theses areas, as other methods may be more suitable.

Therefore it is recommended that one person should be in charge of collating all of the data of management works carried out as well as species recorded, known as the Biodiversity Champion. This will help to create more succinct data and effective management objectives for the future.

Water Quality

One of the key objectives of the LNR is to monitor the water quality of the canal, due to the potential establishment of opencast mining near the LNR, which could affect the quality of the water flowing into the reserve. An aquatic macroinvertebrate re-survey was carried out in December (EMEC Ecology 2011) using the Biological Monitoring Working Party (BMWP) classification system. This was originally set up for the use in rivers, however it is possible to use the score for the water quality of standing water bodies. This method looks at aquatic macro-invertebrates at family level to determine water quality. It provides a score of 'points' associated with each family recorded within a 3 minute sweep net of the different habitats present (i.e. tree roots, open water or marginal vegetation). For full survey details please see EMEC Ecology's previous report (EMEC Ecology 2011).

A key objective of the Management Plan is to carry out further survey work in spring 2012, when a *species level* assessment will be carried out. Work at this time of year, combined with the 2011 survey will produce a much fuller picture of the structure and quality of the macroinvertebrate communities present. Following on from the spring survey baseline data for current water quality within this section of the canal will be provided.

4.2.6 Objective 6 – Invasive Species

Floral Species

Removal of invasive species.

Japanese knotweed and Himalayan balsam have been recorded within the LNR and are regarded as some of the most invasive species in Britain. Japanese knotweed spreads extremely quickly, preventing native vegetation from growing; it can also expose weaknesses in buildings, foundations, concrete and tarmac. Himalayan balsam is commonly found along the banks of water courses and will also spread extremely quickly, out-competing native species in the vicinity. Both species are listed on Schedule 9 of the Wildlife and Countryside Act 1981, which makes it an offence under Schedule 14(2) if any person plants or otherwise causes to grow in the wild any plant listed on Schedule 9. Due to their invasive nature it should be noted that they

could easily spread further within the LNR without monitoring and treatment.

Himalayan Balsam
There are several methods of removing this species including one very effective method of chemical control, however this will remove all plants and grasses within the area and specifically within a LNR it could have devastating impacts on the wildlife and amenity value.

To avoid chemical control, the most effective method of removal within the LNR is considered to be hand pulling. This has previously been carried out by BTCV and will continue. This should ideally be carried out before the end of June to ensure that the plant does not flower. Pulling too early could also result in the formation of further flower heads later in the season. The amount of Himalayan balsam is considerable in some areas therefore it is recommend that in June BTCV carry out a week of balsam pulling to ensure the maximum removal. This should be continued at the same point each year to ensure eradication of the species.

It will be important to consider before the pulling takes place, the adjacent land; as in some areas the adjacent land supports a large amount of balsam, specifically in the surrounding woodlands. It is therefore recommended that a walk of the route is carried out prior to the pulling and a note made of all of the surrounding habitats that contain Himalayan balsam. It is recommended that land owner permission is granted where possible to carry out pulling on adjacent land also.

The Himalayan balsam should be removed for either composing or burning. The area should be allowed to remain fallow for the next 1 / 2 years. This will allows seeds already present in the ground to germinate and be removed in the same manner in the flowing year. This would need to be carried out every June until the plant is no longer apparent.

Japanese Knotweed
Broxtowe Borough Council should attempt to ensure that there is no further spread of Japanese knotweed either within or outside of the LNR. The areas where invasive species occur should be clearly identified by a suitably experienced person. This person should oversee the project of removal and ensure that it is continued through the years.

There are several methods of controlling Japanese knotweed and these are detailed below. **We do not recommend that stems be pulled, due to the size of the areas infected and as this method tends to move the highly infectious crown material with the stem.**

It is recommended that the species is treated via chemical control. The most important element is an early application of an appropriate herbicide, most effective from May to October (or until the first frosts cause leaf fall). Spring treatment is acceptable, but less effective. However, it is advisable to apply herbicide to the plants in early May initially to restrict the growth, thus making the plants more manageable for control in the later months. If regrowth occurs in the same season herbicide should be reapplied, although only when the plant reaches around 1m tall. Herbicides are not effective during the winter dormant stage. Chemical control usually takes a minimum of three years to totally eradicate the species. Therefore, Japanese knotweed must still be regarded as infective within that three year period, or whilst regrowth still occurs during spring. Treatment with an appropriate herbicide can reduce the vigour of knotweed material, even if it were only treated a few weeks prior to disturbance.

Wherever there is a risk of contamination to a water course (including the LNR), choice of herbicide is limited to formulations of Glyphosate and 2,4-D Amine that are approved for use in or near water. **The use of any herbicides in or near water requires permission from the Environment Agency.**

For individual plants herbicides may be applied using a weedwiper, whilst for extensive stands, the application by a knapsack sprayer is likely to be the most effective. Protective clothing should be worn when treating these species.

It will be necessary to treat the remaining material in a manner that avoids further infestation. It is recommended that, wherever possible, this approach be adopted, even when a chemical control programme has been completed. Controlled burning of stem and crown material may be used as part of the control programme. Such burning must take into account any local by-laws and take account of the potential for nuisance or pollution that may occur as a result of the activity.

4.2.7 Objective 7 – Litter, Waste and Vandalism

To ensure the site is free of litter, waste and vandalism.

Rationale

Since the site is situated on the urban fringe the site is prone to littering, the dumping of waste and also vandalism (as shown by Target Notes 8, 10, 17 & 18 on Figures 3a & 3b, in Appendix 1). These activities reduce the sites intrinsic appeal and amenity value and could also have a negative impact on the sites ecological value, for example, dumping waste in the open water could impact the water quality and the introduction of non-native plant species from garden waste (such as the spread of Himalayan balsam and Japanese knotweed).

It was noted whilst on site that some local residents and community group members carry out regular litter picking along the Nottingham Canal. These voluntary acts by the members of public show the feeling of ownership with the local community and the LNR and these relationships should be actively encouraged.

To aid the local community with general litter clearance, annual litter picking is carried out within the LNR in late winter, before the bird breeding season. General hotspots are also carried out as necessary from site inspections. This should continue within the LNR to retain the amenity value of the site.

4.2.8 Objective 8 – Site Access and Interpretation

To ensure the site is accessible, its amenity value is maintained and provision is made for interpretation.

Rationale

Site Access
Retention of the public footpaths (including the towpaths and footbridges) is a statutory requirement and they should be regularly maintained. The towpaths are all in good condition and are not in any need to be repaired. The hedgerows overhanging the towpaths will need to be regularly maintained as they are currently beginning to obstruct the pathway (see Photograph 4, in Appendix 2).

Several benches within the site have been removed or are considered worn. These are identified by Target Notes 17, 18, 19 & 20, on Figures 3a & 3b, in Appendix 1. Although not urgent, these should be replaced or re-painted, as and when the resources become available.

Interpretation
The public already use the LNR for informal recreation such as walking, cycling, exercising dogs and also for horse riding. The area that is leased to the Awsworth Angling Club is used for fishing; however no fishing is permitted elsewhere within the LNR.

There are already several signs erected throughout the site that provide sufficient awareness of the conservation value of the site and the importance of nature conservation in general. They are of sturdy construction and considered to not require modification presently.

Community Involvement
It is apparent from local community members carrying out general litter picking and making use of the site that there is a feeling of ownership from the public. There is scope for making visitors more aware of the importance of the site for nature conservation as well as amenity value.

A key part of a LNR being located on the urban fringe should be to support the development of a local friends group to ensure the long term success of the site. It is hoped that the community could help with carrying out practical management of tasks on the site as well as monitoring the site in the future years (see Objective 5, Monitoring).

4.2.9 Objective 9 – Legal Obligations

To fulfil all legal obligations.

Rationale

Broxtowe Borough Council has a duty of care to abide by any legislation relating to the land they own, in respect to nature conservation, environmental protection or aspects of public health and safety. Also management or access agreements should also be abided by.

The Broxtowe Borough Council currently inspect the full length of the canal once a year and look for specific issues that may need addressing. More regular visits are also carried out during the very wet months due to potential leakage issues caused when the clay lining may dry out and during high and low water levels where pumping may be required.

4.3 Management Operations: Plan of Work

The following is an ideal plan of work. Although every effort should be made to implement the actions listed, this will be governed by certain constraining factors including resource availability.

4.3.1 Objective 1 – Grassland

To maintain and enhance the grassland areas.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
1/1	Species-rich areas (as identified on Figures 5, 6a & 6b, in Appendix 1) should be mown and / or strimmed once annually, as is already carried out. Cutting should be carried out in September to allow plants to set seed. See Objective 1/5 for the removal and use of cuttings on site.	**BBC (funded by the EVT)**	◆ September	◆ September	◆ September	◆ September	◆ September
1/2	The grassland should be monitored for undesirable species (i.e. ruderals). Undesirable species could be cut or individually 'weed-wiped' with herbicide.	**BBC** Site maintenance	◆	◆	◆	◆	◆
1/3	Wildflower bulbs could be planted along areas of the towpath in late August / September, before any frosts. This could potentially be carried out by a local community group at areas identified by Figures 5 and 6b in Appendix 1.	**BBC**	**As resources become available** autumn / winter				
1/4	Within the northern section a part of the existing grassland is intended to be wildflower / bird food area (as shown on Figure 5, in Appendix 1).	**BBC**	**As resources become available** autumn / winter				
1/5	Regularly used areas (i.e. areas along the bank of the towpath and not the grassland meadows), should be cut once or twice a year as required. A final cut in autumn including shrub removal from the water's edge and embankments should also be carried out.	**BBC** Site maintenance	◆	◆	◆	◆	◆

1/6	Any cuttings from the grassland should be used to form 'habitat piles' that are maintained. One person should be in charge of designating these at the site's margins or within compost heaps and retaining the piles year-on-year.	**BBC** Site maintenance	◆	◆	◆	◆	◆
1/7	Pesticides should not be used within the site and herbicides should only be used where specified.	**BBC**	◆	◆	◆	◆	◆

BBC – Broxtowe Borough Council
EVT – Erewash Valley Trail Project

4.3.2 Objective 2 – Hedgerow Habitat

To maintain and enhance the hedgerow habitat.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
2/1	Ensure that scrub or sections of hedgerow do not overhang or obstruct adjacent pathways (towpaths).	**BBC** Site maintenance	◆ February	◆ February	◆ February	◆ February	◆ February
2/2	The hedgerows should be trimmed every year and should be maintained at heights between 4m and 1.2m.	**BBC** Site maintenance	◆ February	◆ February	◆ February	◆ February	◆ February
2/3	Although not a key objective if an opportunity or location arises for further planting of hedgerows, a species-rich hedgerow should be planted.	**BBC** Site maintenance	**As opportunities, location or resources become available**				
2/4	Hedgerows should ideally be laid every 15 years on a rotational basis. BCTV carry out the hedge laying on site and approximately 400m a year is targeted. Details of the areas where laying has been carried out should be collated and sent to the BBC / Nottingham Canal LNR Biodiversity Champion.	**BCTV / BBC**	◆ winter	◆ winter	◆ winter	◆ winter	◆ winter

4.3.3 Objective 3 – Woodland Habitat

To maintain and enhance the plantation woodland by thinning.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
3/1	Selective thinning of 25% of trees could be carried out within Bailey Grove and within the other woodland habitat in the northern section, as and when resources become available. A buffer to the A610 and by the Erewash Canal should be retained. Woodland edges should be maintained more or less intact. This will be at the discretion of the site manager and it is recommended that an agreed plan should be drawn up before any works take place.	**BBC / BTCV**	**As resources become available** winter				
3/2	Ensure that individual or woodland trees do not overhang or obstruct adjacent pathways. Trees that overhang habitats should be removed or pruned.	**BBC / BTCV**	◆ winter	◆ winter	◆ winter	◆ winter	◆ winter
3/3	Any large trees to be felled either to facilitate the thinning, or trees that are dying or falling, must be carried out by a trained arboriculturist.	**BCTV**	◆ winter				
3/4	All works to the woodland should be carried outside the breeding bird season (March to September, inclusively).	**BBC / BTCV**	◆ October-February inclusively				
3/5	Deadwood removed during any work operations should be kept in habitat piles to enhance the sites invertebrate interest. These piles should be placed at the edge of woodland habitats or within the woodland, in the same spot every year. The location of the habitat piles should ensure due regard to potential risk from vandals.	**BBC / BTCV** Site maintenance	◆ winter				
3/6	Scrub species within the woodland should be monitored to ensure that species do not inhibit ground flora.	**BBC / BTCV**			◆ winter		◆ winter

Prepared by EMEC Ecology
Tel. 0115 964 4828

3/7	Install bat / bird boxes throughout the site. It may be useful to inform South Nottinghamshire Bat Group of this installation so that they could regularly monitor the boxes for use.	**BBC / BTCV**	**As resources become available**

4.3.4 Objective 4 – Open water

To maintain and enhance the open water habitat, including both the canal and the ponds.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
4/1	The 'pump and abstraction license' allows the BBC to control the canals water level as required. It is considered a method of monitoring the water levels would be required. It is recommended that a water level board be placed in a clear location where water levels could be monitored on a regular basis; a potential location has been suggested on Figure 6a, in Appendix 1.	**BBC** Steve Fisher	◆	◆ Monitor water level	◆ Monitor water level	◆ Monitor water level	◆ Monitor water level
4/2	Bunds are located along the canal to ensure that if the canal floods, homes in close proximity will not be flooded. These bunds should be checked regularly to ensure they are fit for purpose and the residential properties in close proximity will not flood.	**BBC** Steve Fisher	◆	◆	◆	◆	◆
4/3	Prior to all potential works to the Nottingham Canal, including general maintenance and dredging, liaison with the Environment Agency is advised.	**BBC**	◆	◆	◆	◆	◆
4/4	Continue to seek and connect potential water supplies to maintain the wetland habitat.	**BBC**	◆	◆	◆	◆	◆

4/5	Before any reed pulling is carried out it is recommended that an experienced surveyor (see Objective 4/6) searches for the potential presence of water vole or bird nests. If any bird nest or a place of shelter used by water vole is found a minimum of **a 10m buffer should be avoided by all workers**. In the event that works are required within an area where water vole are known to be using for shelter then a suitably experienced ecologist should be consulted for further advice.	**All Site Workers -including BTCV**	◆ Ideally late March - October	◆ Ideally late March - October	◆ Ideally late March - October	◆ Ideally late March - October	◆ Ideally late March - October
4/6	As part of the works carried out it is recommended that the BTCV staff could take part in a water vole training day to be able to identify for signs of water vole.	**BBC / BTCV**	**Volunteers should be enrolled on training days appropriate**				
4/7	Dredging should be carried as and when resources become available. Areas as identified on Figures 5, 6a & 6b, in Appendix 1, suggest potential areas to focus on should resources become available. Depending on resources this could all be carried out within one year (this may be a cheaper alternative), however ideally this would be carried out over several years. Prior to any dredging of the canal taking place it should be fully known if any lining of the canal is present in these areas, as this will directly affect how to dredge the area.	**BBC**	**As funding becomes available** autumn / winter				
4/8	After Mill Lane a small area of canal liner material is currently exposed (see Target Note 11, on Figure 3a, in Appendix 1), therefore ideally this would be covered up, potentially with large gravel.	**BTCV**	**As funding / resources become available**				
4/9	Monitoring of the open water habitat, including areas susceptible to leakage, water levels, algae blooms and reed bed encroachment.	**BBC**	◆	◆	◆	◆	◆
4/10	Remove fly tipped items from the ponds.	**BBC**	◆	◆	◆	◆	◆

4/11	The trees surrounding the ponds could be cut back to minimise the leaf litter and open the water body up to allow some further light through. This will only be possible with surrounding land owner agreement and as funding potentially becomes available.	**BBC**	**As funding becomes available** winter				
4/12	Partially removing silt from the Ponds 1, 3 & 4 at the same time as the dredging of the canal is taking place would be ideal. This should follow the Environment Agency best practice guidelines. The minimum depth should ideally be at least 60cm, however at least one pond (ideally Pond 1) should be retained as shallower than 60cm deep.	**BBC**	**As funding becomes available** autumn / winter				
4/13	The ponds should be monitored and maintained by keeping a balance between vegetation and open water areas. It is recommended that marginal vegetation should be maintained at below 50% of the total pond cover. Surplus plants should be removed and allowed to remain at the pond's edge to dry, to allow pond invertebrates to crawl back into the water.	**BBC BTCV**	◆	◆	◆	◆	◆

4.3.5 Objective 5 – Monitoring

To monitor species within the LNR.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
5/1	A Nottingham Canal LNR Biodiversity Champion should be appointed as the person in charge of collating all of the data of management works carried out, as well as species recorded on site.	**Steve Fisher - BBC**	◆ As appropriate /time available				

Prepared by EMEC Ecology
Tel. 0115 964 4828

5/2	Amphibian surveys of the ponds and throughout sections of the canal habitat could be carried out for species and population size. Surveying techniques may require a license to be held by the surveyor and for species identification it is also advised that experienced surveyors are used. One suggestion would be to contact the Nottinghamshire Amphibian and Reptile Group, who have recently surveyed some of the ponds in the vicinity. Due to the former records being from the Eastwood area this would be an important area to survey.	**BBC**	**As funding / resources become available** spring				
5/3	Contact local community or wildlife groups through methods such as posters and contacting people directly asking them to detail their local wildlife knowledge. This information should be passed to the Biodiversity Champion.	**BBC**	◆	◆	◆	◆	◆
5/4	A detailed botanical list could be carried out as regularly as possible (ideally every 3 years). This could also be carried out by local volunteers, community groups or local university students.	**BBC**	**As funding / resources become available** summer				
5/5	A further survey to identify species level will be carried out by EMEC Ecology. This will produce a much fuller picture of the structure and quality of the macroinvertebrate communities present. Following on from the spring survey further details will be provided and a baseline data for current water quality within this section of the canal will be identified for future monitoring.	**BBC / EMEC Ecology**	◆ spring				

4.3.6 Objective 6 – Invasive species

Removal of invasive species.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
6/1	A program of eradication of Himalayan balsam should be put in place, ideally consisting of pulling up the plants (including the entire root).	**BTCV**	◆ Early June	◆ Early June	◆ Early June	◆ Early June	◆ Early June
6/2	Prior to any works on or near the areas identified, all areas of Japanese knotweed should be noted and sectioned off (by a suitably experienced person), to show to the public that management is occurring in these areas.	**BBC**	◆ ASAP				
6/3	There are several methods of controlling Japanese knotweed. Chemical control is recommended to be carried out. The most effective time to apply herbicide is from May to October. Ideally the plants should have herbicide applied in early May initially to restrict the growth, thus making the plants more manageable for control in June/July. Chemical control usually takes a minimum of three years to totally eradicate the species. Therefore, Japanese knotweed must still be regarded as infective within that three year period.	**BBC**	◆ Manage as required	◆ Manage as required	◆ Manage as required	◆ Manage as required	◆ Manage as required
6/4	Invasive plants should be monitored regularly and treatment should continue as necessary until all species are removed. The river will be a likely source of further invasive species in the future and this area should be focused on for future monitoring.	**BBC**	◆	◆	◆	◆	◆

4.3.7 Objective 7 – Litter, Waste and Vandalism

To ensure the site is free of litter, waste and vandalism.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
7/1	Carry out annual litter-picking once annually to ensure the site is free of litter. Litter should be removed from the site and disposed of appropriately. Any vandalism / fly tipping should be appropriately dealt with / removed, as and when required.	**BBC**	◆ Once annually Jan to Feb	◆ Once annually Jan to Feb	◆ Once annually Jan to Feb	◆ Once annually Jan to Feb	◆ Once annually Jan to Feb

4.3.8 Objective 8 – Site Access and Interpretation

To ensure the site is accessible, its amenity value is maintained and provision is made for interpretation.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
8/1	Ensure that all pathways are in good condition and suitable for public access. Monitor and maintain as appropriate.	**BBC**	◆	◆	◆	◆	◆
8/2	Several benches require painting or replacing to increase the intrinsic appeal of the LNR. These benches should be of a sturdy construction and secured to the ground.	**BBC**	**As funding become available**				
8/3	Promotion of the site to the local community should be continued to ensure that the community continue to be involved. This could include local interest groups as well as schools and the surrounding residents.	**BBC**	◆		◆		◆

4.3.9 Objective 9 – Legal Obligations

To fulfil all legal obligations.

Obj.	Action	Responsibility	2012	2013	2014	2015	2016
9/1	Fulfil all obligations under the Environmental Protection Act (1990), Wildlife and Countryside Act (WCA) 1981 (as amended), CroW Act 2000 and the Conservation (Natural habitats &c.) Regulations 2010 (as amended). Occupiers Liability Act (1957, 1984) and the relevant health and safety legislation including Health and Safety at Work Act (1974).	**BBC**	◆	◆	◆	◆	◆
9/2	Annual inspections of the entire canal route should be carried out to look any specific issues with the site. More regular monitoring will be required during particularly dry / wet seasons due to leakage and pumping needs.	**Steve Fisher - BBC**	◆	◆	◆	◆	◆

REFERENCES

Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans and Gregory RD (2009): *Birds of Conservation Concern 3: The Populations Status of Birds in the United Kingdom, Channel Islands and the Isle Man.* British Birds 102, pp296-341.

EMEC Ecology 1993 *Management Plan for the Nottinghamshire Canal.* A report under the contract of Broxstowe Borough Council.

EMEC Ecology 2011 *Nottingham Canal LNR: Interim Aquatic Macroinvertebrate Survey*. A report under the contract of Broxstowe Borough Council.

Environment Agency 1994 *Guidance for the Control of Invasive Plants Near Water courses*. Environment Agency, Bristol.

HMSO 1995 *Biodiversity: The UK Steering Group Report, Volume 2: Action Plans.* HMSO, London.

Holditch, D. M. 1999 *Nottingham Canal LNR – Aquatic Macroinvertebrate Survey 1998/99.* A report under contract to Broxtowe Borough Council.

Institute of Ecology and Environmental Management 2006 *Guidelines for Ecological Impact Assessment*. IEEM.

JNCC 2003 *Handbook for Phase 1 Habitat Survey: a technique for environmental audit.* JNCC, Peterborough.

Nottinghamshire BAG 1998 *Local Biodiversity Action Plan for Nottinghamshire.* Nottinghamshire County Council.

Nottinghamshire Wildlife Trust (1999) *Nottingham Canal Local Nature Reserve: Management Plan – 2nd Edition.* A report under contract to the Broxtowe Borough Council.

Preston, C. D., Pearman, D. A. & Dines, T. D. 2002 *New Atlas of the British and Irish Flora*. University Press, Oxford.

Ratcliffe, D.A. (ed) 1977 *A Nature Conservation Review.* Cambridge University Press.

Stace, C. 1997 *New Flora of the British Isles*. University Press, Cambridge.

Strachan R. and Jefferies D. 1996 *Otter Survey of England 1991-4.* Vincent Wildlife Trust, London.

Strachan, R. and Moorhouse, T. 2006 *Water Vole Conservation Handbook*. Wildlife Conservation Research Unit, Oxford.

WEBSITES

Flora Locale Available at: http://www.floralocale.org

MAGIC Site Check Report Available: www.magic.gov.uk

Mammal Society Available: http://www.mammal.org.uk/

National Biodiversity Network (*nbn*) Available: www.nbn.org.uk

Nottinghamshire Online Maps and Data (NOMAD) Available at: www.nottinghamcity.gov.uk/nomad

Ordnance Survey (OS) Available: www.ordnancesurvey.co.uk
Old Maps Available: www.old-maps.co.uk

UK BAP 2007 Available: www.ukbap.org.uk

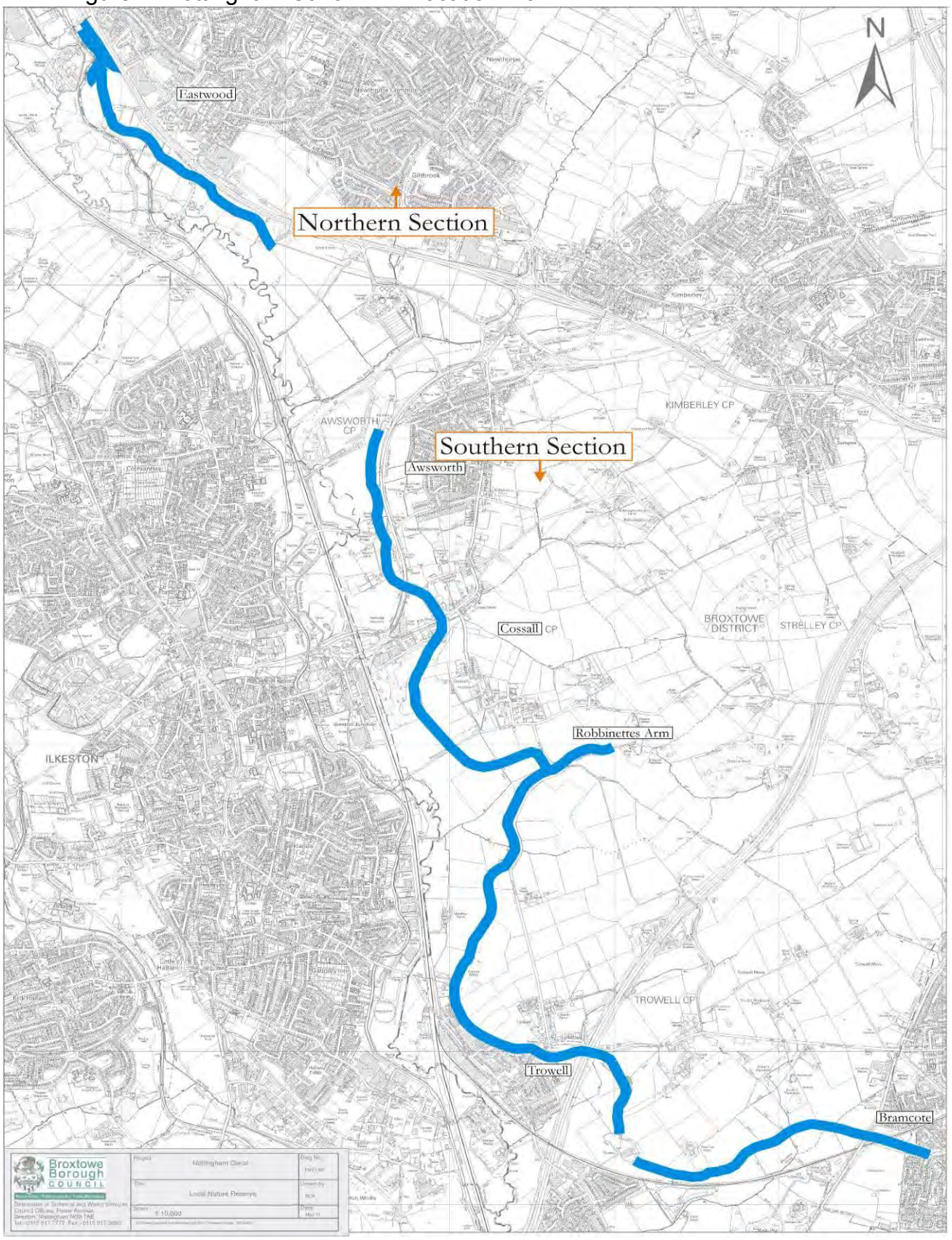
UK Biodiversity Action Plan Available: http://www.ukbap.org.uk/NewPriorityList.aspx

LOCAL CO MMUNITY GROUPS

NARG 2011 Recent survey results from Ben Driver.

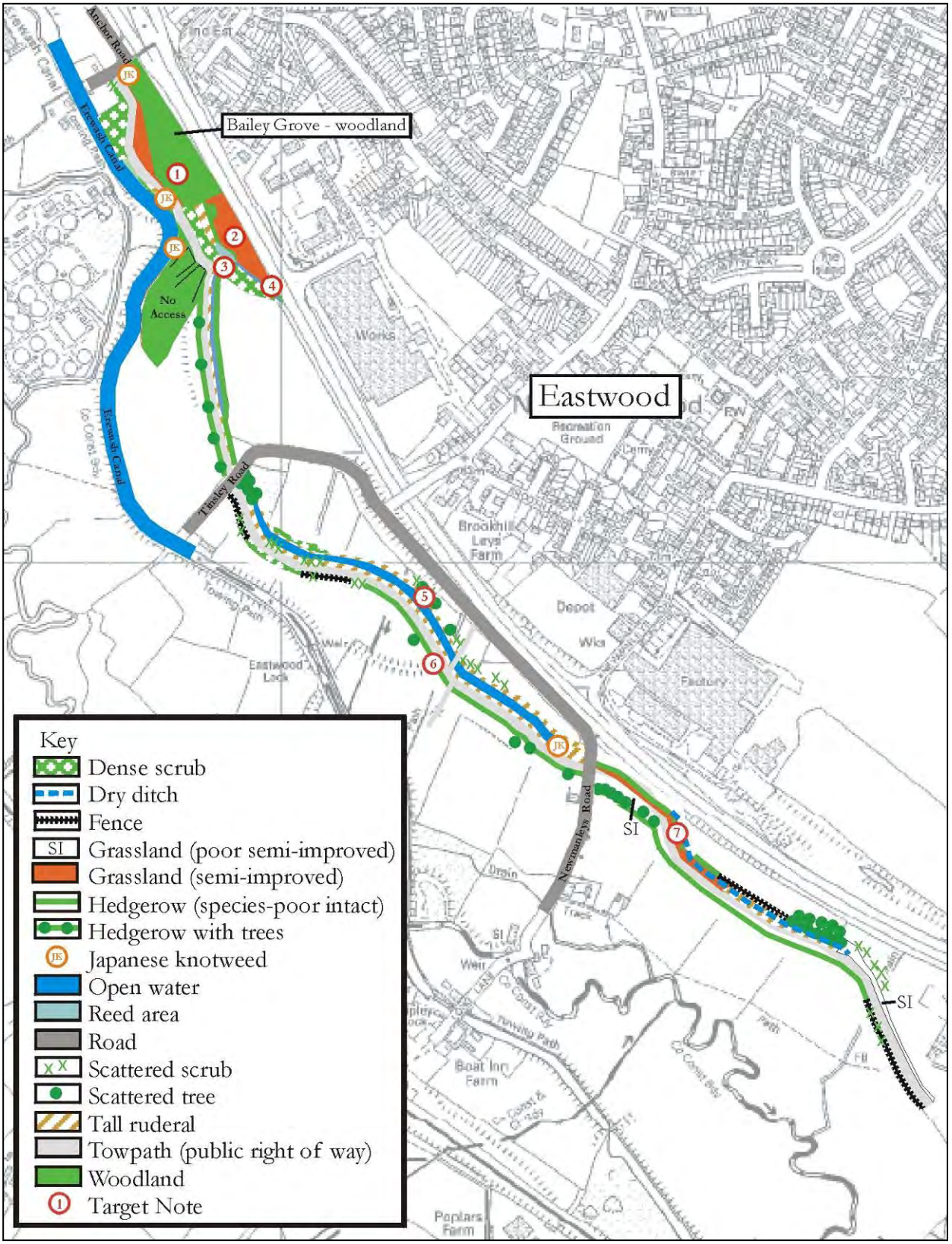
APPENDIX 1: FIGURES

Figure 1: Nottingham Canal LNR Location Plan



Prepared by EMEC Ecology
Tel. 0115 964 4828

Figure 2: Nottingham Canal LNR, Northern Section - Site Details



Prepared by EMEC Ecology
Tel. 0115 964 4828

This page has been left intentionally blank.

Prepared by EMEC Ecology
Tel. 0115 964 4828

Figure 3a: Nottingham Canal LNR, Southern Section - Site Details

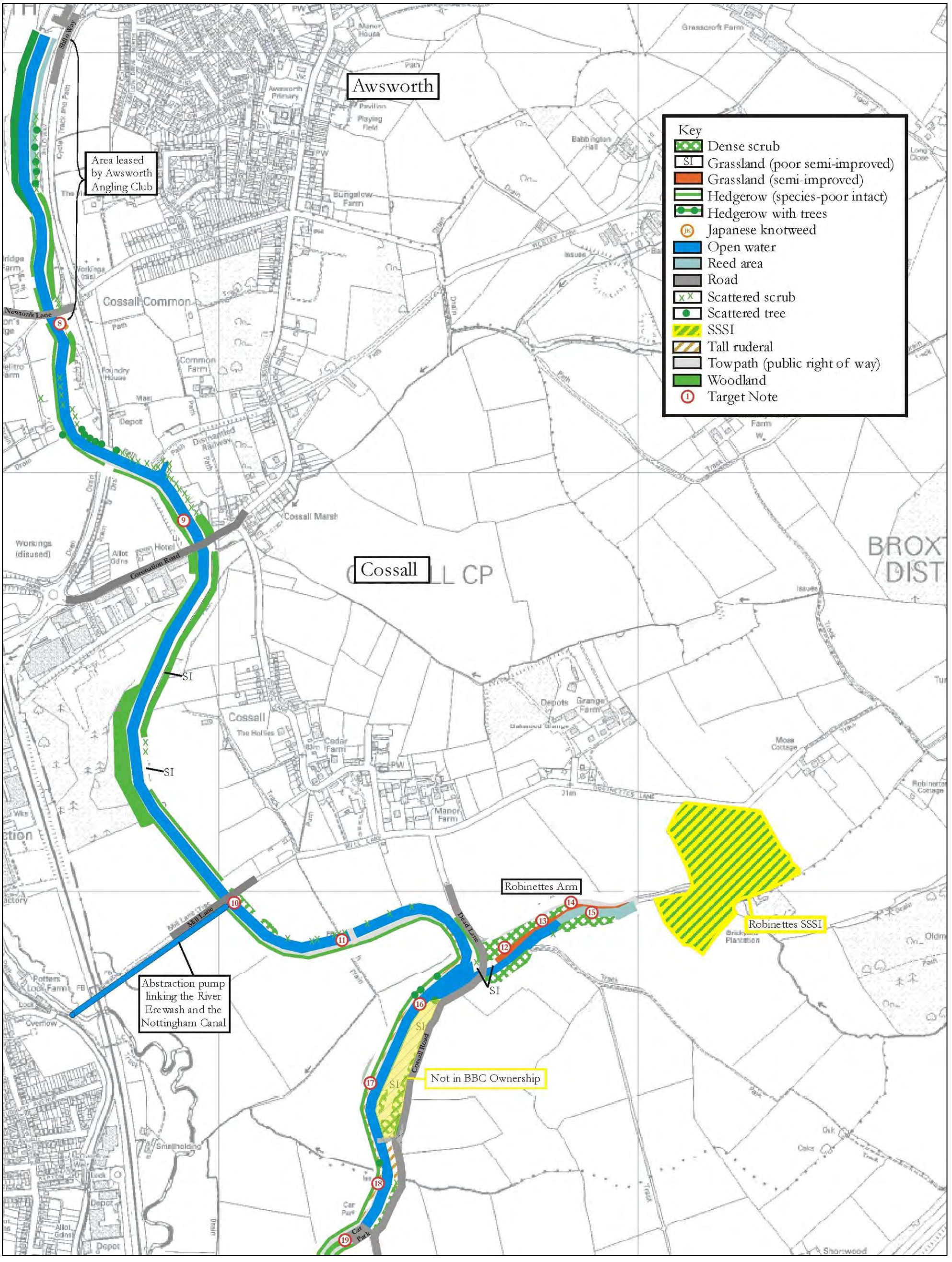


Figure 3b: Nottingham Canal LNR, Southern Section - Site Details

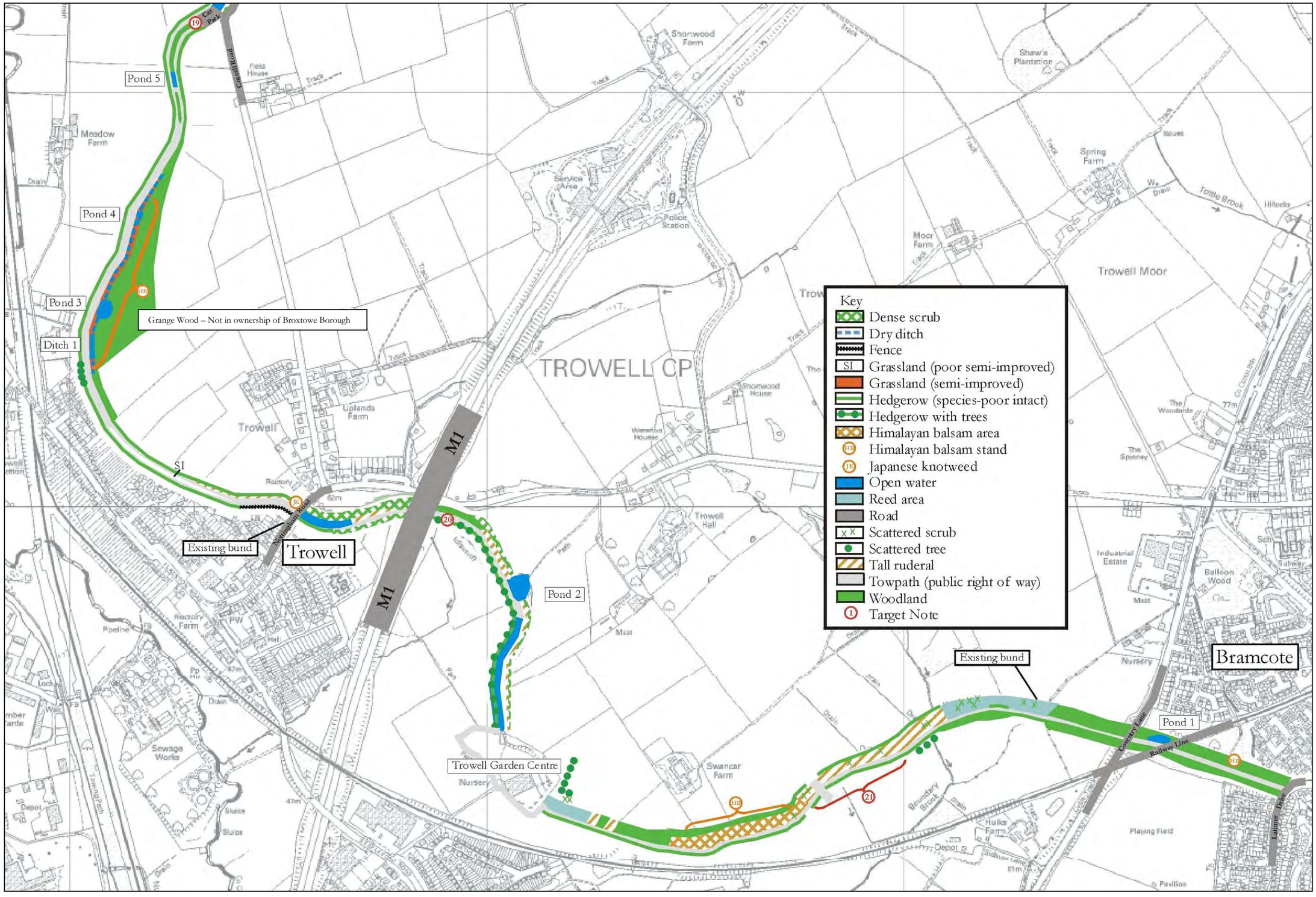
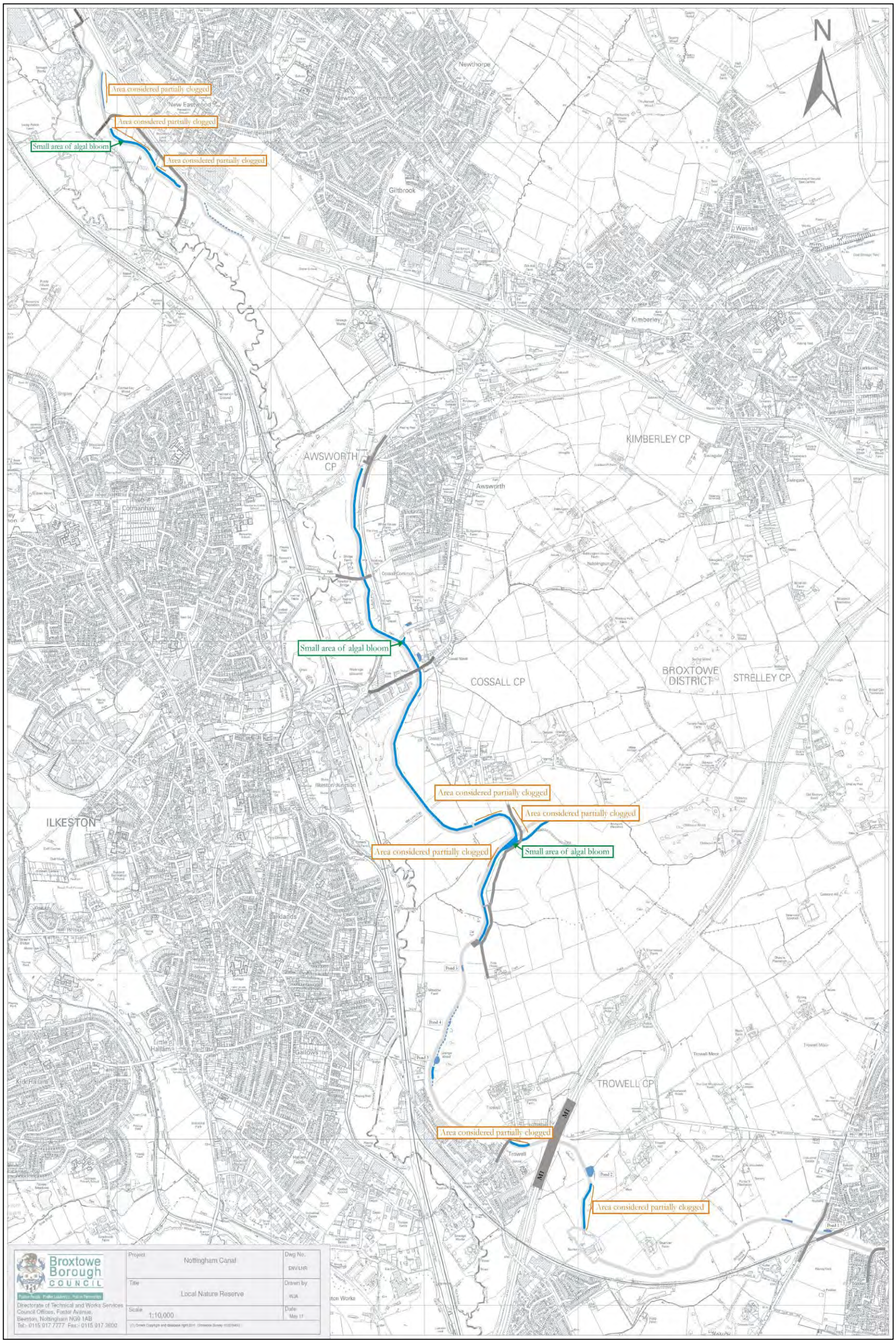
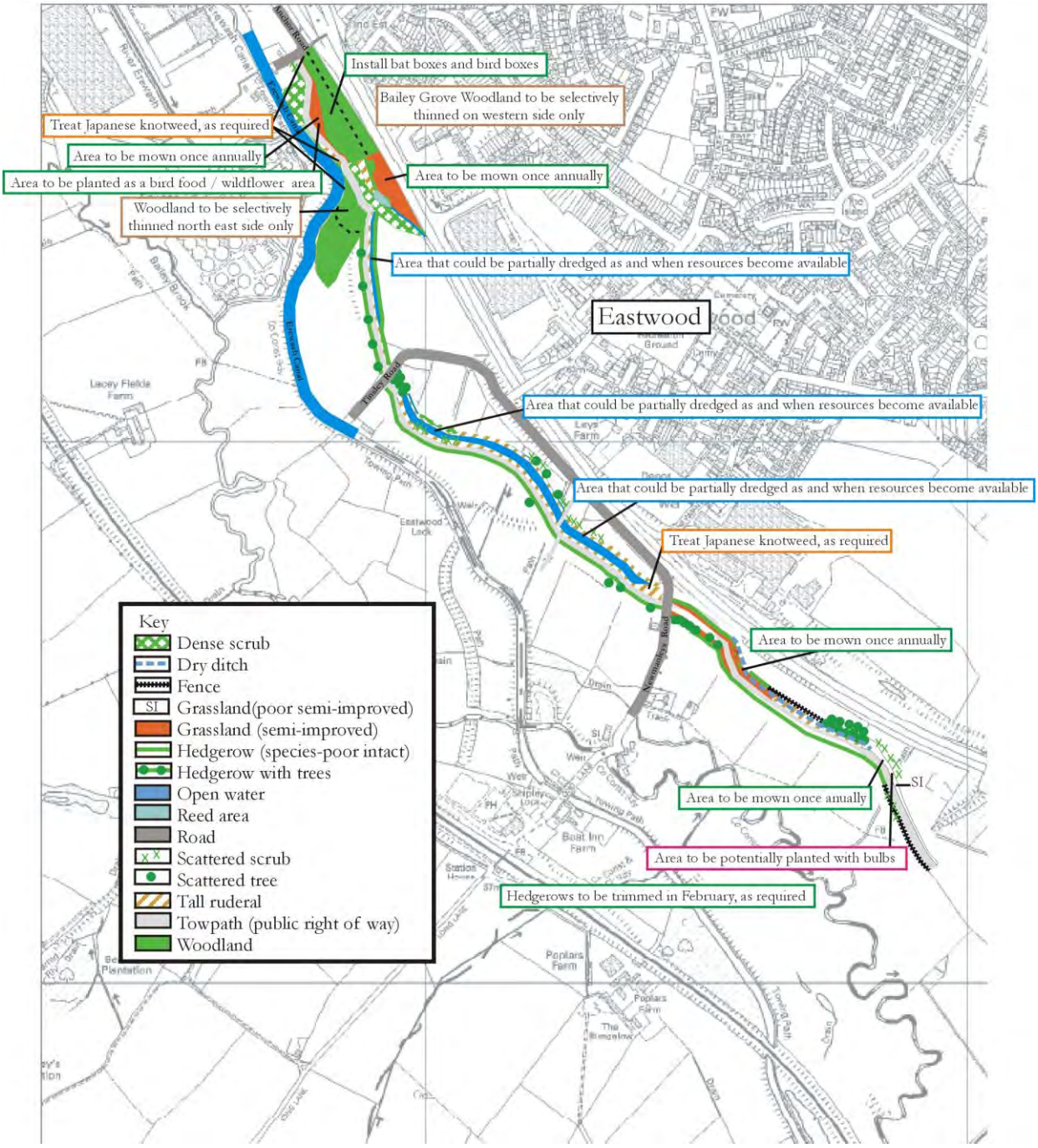


Figure 4: Nottingham Canal LNR, Open Water Habitat Management Areas



This page has been left intentionally blank.

Figure 5: Proposed Nottingham Canal LNR, Northern Section



Prepared by EMEC Ecology
Tel. 0115 964 4828

This page has been left intentionally blank.

Prepared by EMEC Ecology
Tel. 0115 964 4828

Figure 6a: Proposed Nottingham Canal LNR, Southern Section

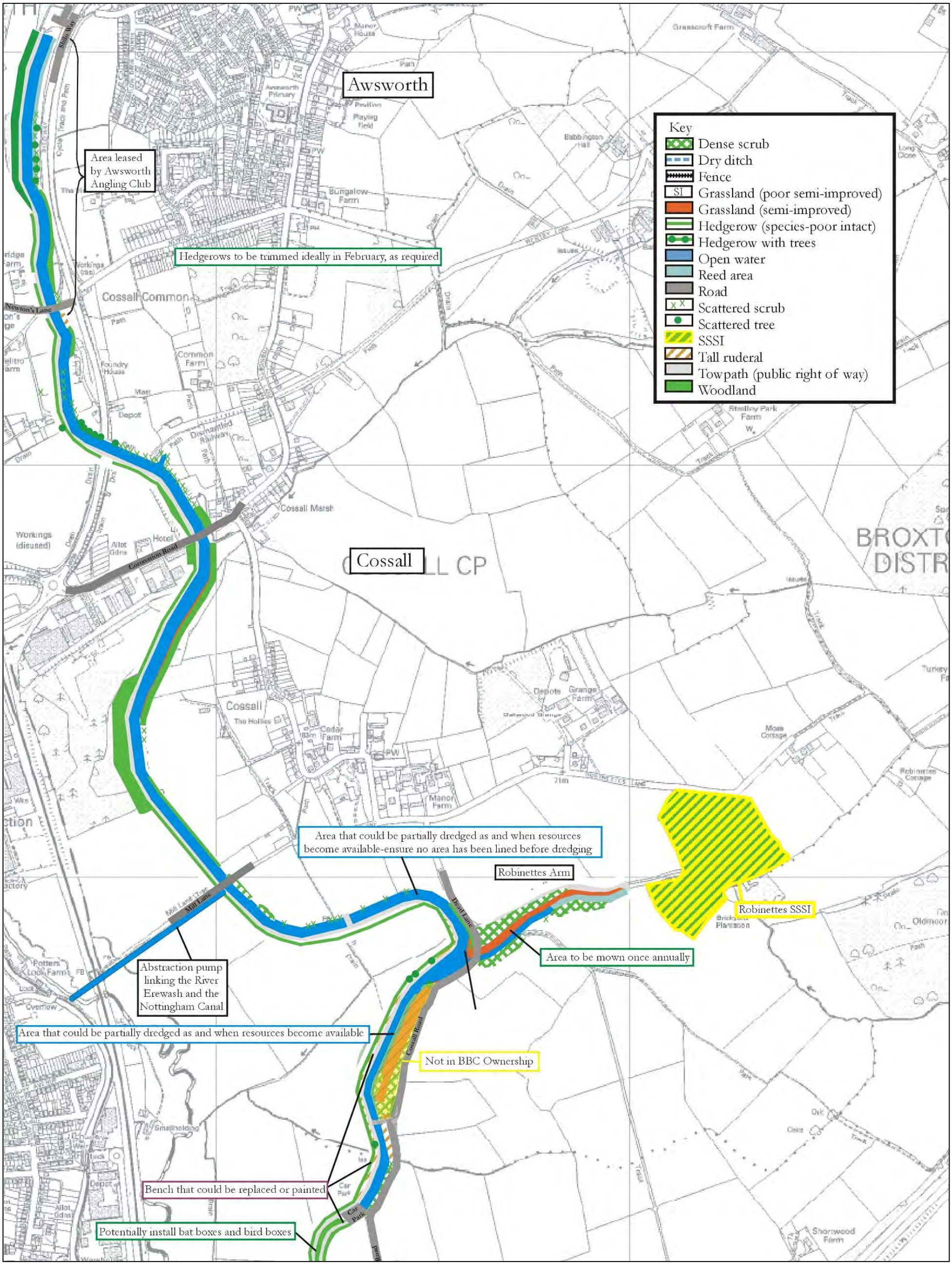
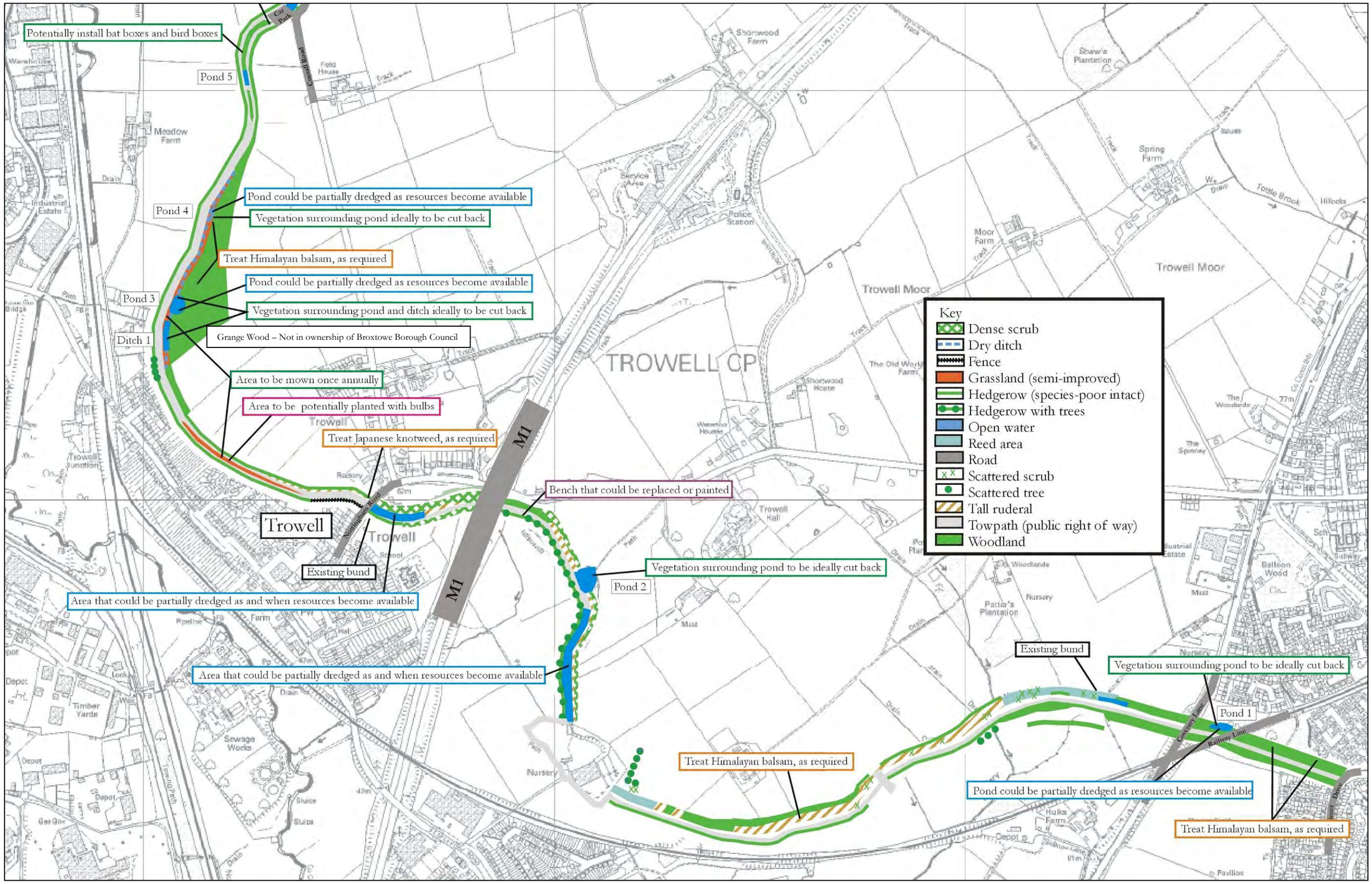


Figure 6b: Proposed Nottingham Canal LNR, Southern Section



APPENDIX 2: SITE PHOTOGRAPHS

Northern Section

Photograph 1: *Area of open water from the footbridge chocked with vegetation*

Photograph 2: *Water*

Photograph 3: *Area of open water overhanging the towpath*

Photograph 4: *Hedgerow*

Photograph 5: *Reed Area to the north of a small stream improved grassland habitat TN2*

Photograph 6: *Semi-*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Southern Section

Photograph 7: *Area leased by Awsworth Angling Club and overhanging scrub*

Photograph 8: *Open water*

Photograph 9: *Towpath with dense vegetation either side Robbinettes Arm*

Photograph 10:

Photograph 11: *Reeds beginning to dominate and water is shallow Bench within reeds TN 18*

Photograph 12:

Prepared by EMEC Ecology
Tel. 0115 964 4828

Photograph 13: *Grassland and woodland habitat area at the southern end*

Photograph 14: *Reed / marshy*

Photograph 15: *Area dominated by Himalayan balsam surrounding vegetation*

Photograph 16: *Towpath and*

Photograph 17: *Woodland surrounding*

Photograph 18: *Grassland and*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Photograph 19: *Pond 1*

Photograph 20: *Pond 2*

Photograph 21: *Pond 3*

Photograph 22: *Pond 4*

Photograph 23: *Pond 5*

APPENDIX 3: SPECIES LISTS

Botanical Species List

Northern Section

Dense scrub

Trees & Shrubs	
Alder	*Alnus glutinosa*
Apple	*Malus sp.*
Ash	*Fraxinus excelsior*
Blackthorn	*Prunus spinosa*
Bramble	*Rubus fruiticosus*
Cock's-foot grass	*Dactylis glomerata*
Dog rose	*Rosa canina* agg.
Elder	*Sambucus nigra*
Field maple	*Acer campestre*
Hawthorn	*Crataegus monogyna*
Holly	*Ilex aquifolium*
Horse-radish	*Armoracia rusticana*

Hedgerow

Trees & Understorey	
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*
Blackthorn	*Prunus spinosa*
Bramble	*Rubus fruticosus agg.*
Cherry	*Prunus sp.*
Common nettle	*Urtica dioica*
Dog rose	*Rosa canina agg.*
Elder	*Sambucus nigra*
Field maple	*Acer campestre*
Garlic mustard	*Alliaria petiolata*
Hawthorn	*Crataegus monogyna*
Honeysuckle	*Lonicera periclymenum*
Horse-chestnut	*Aesculus hippocastanum*
Ivy	*Hedera helix*
Lime	*Tilia sp.*
Oak	*Quercus sp.*
Sycamore	*Acer pseudoplatanus*
Wild privet	*Ligustrum vulgare*
Willow	*Salix sp.*

Grassland

Grasses	
Annual meadow-grass	*Poa annua*
Cock's-foot	*Dactylis glomerata*
Common bent	*Agrostis capillaris*
False oat-grass	*Arrhenatherum elatius*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Meadow foxtail	*Alopecurus pratensis*
Perennial rye-grass	*Lolium perenne*
Soft rush	*Juncus effusus*
Timothy	*Phleum pratense sens.lat.*
Yorkshire fog	*Holcus lanatus*
Herbs	
Black knapweed	*Centaurea nigra*
Black medick	*Medicago lupulina*
Broad-leaved dock	*Rumex obtusifolius*
Broom	*Cytisus scoparius*
Bugle	*Ajuga reptans*
Bulbous buttercup	*Ranunculus bulbosus*
Bush vetch	*Vicia sepium*
Cleavers	*Galium aparine*
Colt's-foot	*Tussilago farfara*
Common Bird's-foot-trefoil	*Lotus corniculatus*
Common cat's-ear	*Hypochaeris radicata*
Creeping buttercup	*Ajuga reptans*
Creeping cinquefoil	*Potentilla reptans*
Dandelion	*Taraxacum officinale agg.*
Dove's-foot crane's-bill	*Geranium molle*
Field forget-me-not	*Myosotis arvensis*
Herb-Robert	*Geranium robertianum*
Horse-radish	*Armoracia rusticana*
Meadow buttercup	*Ranunculus acris*
Mouse-ear-hawkweed	*Pilosella officinarum*
Oxeye daisy	*Leucanthemum vulgare*
Red clover	*Trifolium pratense*
Ribwort plantain	*Plantago lanceolata*
Sedge	*Carex* sp.
Soft rush	*Juncus effusus*
Spear thistle	*Cirsium vulgare*
Tansy	*Tanacetum vulgare*
White dead-nettle	*Lamium album*
Yarrow	*Achillea millefolium*

Open Water and Margins

Marginal Species	
Brooklime	*Veronica beccabunga*
Bulrush	*Typha latifolia*
Reed sweet-grass	*Glyceria maxima*

Plantation Woodland

Trees & Shrubs	
Ash	*Fraxinus excelsior*
Alder	*Alnus glutinosa*
Apple	*Malus sp.*
Beech	*Fagus sylvatica*
Cherry	*Prunus* sp.
Dogwood	*Cornus sanguinea*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Elder	*Sambucus nigra*
Hazel	*Corylus avellana*
Lime	*Tilia sp.*
Oak	*Quercus* sp.
Rowan	*Sorbus aucuparia*
Scots pine	*Pinus sylvestris*
Silver birch	*Betula pendula*
Whitebeam	*Sorbus anglica*
Willow	*Salix* sp.
Yew	*Taxus baccata*
Understory and Ground flora	
Cleavers	*Galium aparine*
Hawthorn	*Crataegus monogyna*
Hogweed	*Heracleum sphondylium*
Reed canary-grass	*Phalaris arundinacea*
Tufted hair-grass	*Deschampsia caespitosa*
Wild Teasel	*Dipsacus fullonum*

Reed / Marshy Area

Marginal vegetation	
Broad-leaved willowherb	*Epilobium montanum*
Bulrush	*Typha latifolia*
Meadowsweet	*Filipendula ulmaria*
Reed sweet-grass	*Glyceria maxima*
Water dock	*Rumex hydrolapathum*

Scattered Trees

Trees & Shrubs	
Apple	*Malus sylvestris*
Alder	*Alnus glutinosa*
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*
Cherry	*Prunus sp.*
Crack willow	*Salix fragilis*
Dog rose	*Rosa canina agg.*
Elder	*Sambucus nigra*
Greater stitchwort	*Stellaria holostea*
Hazel	*Corylus avellana*
Hawthorn	*Crataegus monogyna*
Horse-chestnut	*Aesculus hippocastanum*
Lime	*Tilia sp.*
Oak	*Quercus sp.*
Willow	*Salix* sp.
Rowan	*Sorbus aucuparia*
Silver birch	*Betula pendula*
Yew	*Taxus baccata*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Scattered Scrub

Trees & Shrubs	
Dog rose	*Rosa canina agg.*
Elder	*Sambucus nigra*
Field maple	*Acer campestre*
Hawthorn	*Crataegus monogyna*
Willow	*Salix caprea* ssp.

Tall Ruderal

Herbs	
Bindweed	*Calystegia sp.*
Bramble	*Rubus fruticosus agg.*
Broad-leaved dock	*Rumex obtusifolius*
Broad-leaved willowherb	*Epilobium montanum*
Cleavers	*Galium aparine*
Common bent	*Agrostis capillaris*
Common nettle	*Urtica dioica*
Cow parsley	*Anthriscus sylvestris*
Creeping buttercup	*Ranunculus repens*
Creeping cinquefoil	*Potentilla reptans*
Cuckoo-flower	*Cardamine pratensis*
Dandelion	*Taraxacum officinale agg.*
False-oat grass	*Arrhenatherum elatius*
Field horsetail	*Equisetum arvense*
Garlic mustard	*Alliaria petiolata*
Green alkanet	*Pentaglottis sempervirens*
Herb-Robert	*Geranium robertianum*
Hogweed	*Heracleum sphondylium*
Horsetail	*Equisetum sp.*
Horse-radish	*Armoracia rusticana*
Japanese knotweed	*Fallopia japonica*
Lord's-and-ladies	*Arum maculatum*
Meadow buttercup	*Ranunculus acris*
Oxeye daisy	*Leucanthemum vulgare*
Rosebay willowherb	*Chamerion angustifolium*
Silverweed	*Potentilla anserina*
White dead-nettle	*Lamium album*
Wood avens	*Geum urbanum*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Southern Section

Dense scrub

Trees & Shrubs	
Ash	*Fraxinus excelsior*
Bramble	*Rubus fruiticosus*
Crack willow	*Salix fragilis*
Dog rose	*Rosa canina agg.*
Elder	*Sambucus nigra*
Hawthorn	*Crataegus monogyna*
Willow	*Salix* sp.

Hedgerow

Shrubs and Understorey (and trees)	
Apple	*Malus* sp.
Blackthorn	*Prunus spinosa*
Bittersweet	*Solanum dulcamara*
Black bryony	*Tamus communis*
Common nettle	*Urtica dioica*
Cleavers	*Galium aparine*
Cow parley	*Anthriscus sylvestris*
Dandelion	*Taraxacum officinale* agg.
Dog rose	*Rosa canina* agg.
Dog's mercury	*Mercurialis perennis*
Elder	*Sambucus nigra*
English elm	*Ulmus procera*
Field maple	*Acer campestre*
Garlic mustard	*Alliaria petiolata*
Goldenrod	*Solidago virgaurea*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Hedge woundwort	*Stachys sylvatica*
Herb-Robert	*Geranium robertianum*
Horse-radish	*Armoracia rusticana*
Lords-and-ladies	*Arum maculatum*
Nipplewort	*Lapsana communis*
Oak	*Quercus* sp.
Red campion	*Silene dioica*
Rosebay willowherb	*Chamerion angustifolium*
Rowan	*Sorbus aucuparia*
Bryonia dioica	*Bryonia dioica*
Wild privet	*Ligustrum vulgare*
Willow	*Salix* sp.
Wood avens	*Geum urbanum*
Wood forget-me-not	*Myosotis sylvatica*

Reed Area

Marginal Species	
Bulrush	*Typha latifolia*

Meadowsweet	*Filipendula ulmaria*
Reed sweet-grass	*Glyceria maxima*
Rosebay willowherb	*Chamerion angustifolium*
Silver weed	*Potentilla anserina*
Willow	*Salix* sp.

Open Water and Margins

Marginal Species	
Amphibious bistort	*Persicaria amphibia*
Arrowhead	*Sagittaria sagittifolia*
Bulrush	*Typha latifolia*
Branched bur-reed	*Sparganium erectum*
Broad-leaved pondweed	*Potamogeton natans*
Creeping buttercup	*Ranunculus repens*
Common Reed	*Phragmites australis*
Cuckoo-flower	*Cardamine pratensis*
Curled pond weed	*Potamogeton crispus*
Gypsywort	*Lycopus europaeus*
Horsetail	*Equisetum* sp.
Lesser celandine	*Ranunculus ficaria*
Lesser pond-sedge	*Carex acutiformis*
Marsh marigold	*Caltha palustris*
Meadowsweet	*Filipendula ulmaria*
Purple-loosestrife	*Lythrum salicaria*
Reed sweet-grass	*Glyceria maxima*
Ribwort plantain	*Plantago lanceolata*
Skullcap	*Scutellaria glericulata*
Soft rush	*Juncus effusus*
Starwort	*Callitriche stangnalis*
Water dock	*Rumex hydrolapathum*
Water figwort	*Scrophularia auriculata*
Water forget-me-not	*Myosotis scorpioides*
Water lily (Cultivated)	*Nymphaea* spp.
Water mint	*Mentha aquatica*
Water-plantain	*Alisma plantago-aquatica*
White Water-lily	*Nymphaea alba*
Yellow iris	*Iris pseudacorus*
Yellow water-lily	*Nuphar lutea*

Plantation Broad-leaved Woodland

Trees & Shrubs	
Ash	*Fraxinus excelsior*
Alder	*Alnus glutinosa*
Apple	*Malus sp.*
Bastard service tree	*Sorbus thuringiaca*
Beech	*Fagus sylvatica*
Blackthorn	*Prunus spinosa*
Buckthorn	*Rhamnus cathartica*
Cherry	*Prunus sp.*
Crack willow	*Salix fragilis*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Dogwood	*Cornus sanguinea*
Dog rose	*Rosa canina agg.*
Elder	*Sambucus nigra*
Elm	*Ulmus sp.*
Feverfew	*Tanacetum parthenium*
Field maple	*Acer campestre*
Garden privet	*Ligustrum ovalifolium*
Goat willow	*Salix caprea*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Holly	*Ilex aquifolium*
Larch	*Larix decidua*
lime	*Tilia sp.*
Norway maple	*Acer platanoides*
Oak	*Quercus* sp.
Rowan	*Sorbus aucuparia*
Scots pine	*Pinus sylvestris*
Silver birch	*Betula pendula*
Sycamore	*Acer pseudoplatanus*
Swedish Whitebeam	*Sorbus intermedia*
Sweet Chestnut	*Castanea sativa*
Wayfaring-tree	*Viburnum lantana*
White beam	*Sorbus anglica*
White Willow	*Salix alba*
Willow	*Salix* sp.
Wych elm	*Ulmus glabra*
Yew	*Taxus baccata*
Understory and Ground flora	
Bluebell	*Hyacinthoides non-scripta*
Bindweed	*Convolvulus*
Bramble	*Rubus fruiticosus*
Bush vetch	*Vicia sepium*
Cleavers	*Galium aparine*
Cock's-foot grass	*Dactylis glomerata*
Common nettle	*Urtica dioica*
Common ragwort	*Senecio jacobaea*
Common sorrel	*Rumex acetosa*
Cow parsley	*Anthriscus sylvestris*
Dandelion	*Taraxacum officinale* agg.
Dog's mercury	*Mercurialis perennis*
Forsythia	*Forsythia suspensa*
Garlic mustard	*Alliaria petiolata*
Greater plantain	*Plantago major*
Greater stitchwort	*Stellaria holostea*
Hawthorn	*Crataegus monogyna*
Herb-Robert	*Geranium robertianum*
Hogweed	*Heracleum sphondylium*
Honey suckle	*Lonicera periclymenum*
Horsetail	*Equisetum* sp.
Ivy	*Hedera helix*
Purple toadflax	*Linaria purpurea*
Primrose	*Primula* sp.
Red campion	*Silene dioica*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Redshank	*Persicaria maculosa*
Rose	*Rosa* spp.
Rosebay willowherb	*Chamerion angustifolium*
Tufted hair grass	*Deschampsia caespitosa*
White dead-nettle	*Lamium album*
Wild privet	*Ligustrum vulgare*
Wood avens	*Geum urbanum*
Yarrow	*Achillea millefolium*
Yorkshire-fog	*Holcus lanatus*

Grassland

Grasses	
Annual meadow-grass	*Poa annua*
Cock's-foot	*Dactylis glomerata*
Common bent	*Agrostis capillaris*
Common couch	*Elytrigia repens*
Perennial rye-grass	*Lolium perenne*
False oat-grass	*Arrhenatherum elatius*
Yorkshire fog	*Holcus lanatus*
Herbs	
Agrimony	*Agrimonia eupatoria*
Black medick	*Medicago lupulina*
Black knapweed	*Centaurea nigra*
blackthorn	*Prunus spinosa*
Bluebell	*Hyacinthoides non-scripta*
Bugle	*Ajuga reptans*
Bracken	*Pteridium aquilinum*
Bramble	*Rubus fruticosus* agg.
Broad-leaved dock	*Rumex obtusifolius*
Bush vetch	*Vicia sepium*
Canadian flea-bane	*Conyza canadensis*
Common chickweed	*Stellaria media*
Common comfrey	*Symphytum officinale*
Daisy	*Bellis perennis*
Common field-speedwell	*Veronica persica*
Common nettle	*Urtica dioica*
Common mouse-ear	*Cerastium fontanum ssp. vulgare*
Common toadflax	*Linaria vulgaris*
Cow parsley	*Anthriscus sylvestris*
Creeping buttercup	*Ranunculus repens*
Creeping cinquefoil	*Potentilla reptans*
Cuckoo-flower	*Cardamine pratensis*
Curled dock	*Rumex crispus*
Dandelion	*Taraxacum officinale* agg.
Dog rose	*Rosa canina* agg.
Field forget-me-not	*Myosotis arvensis*
Field horsetail	*Equisetum arvense*
Garlic mustard	*Alliaria petiolata*
Germander speedwell	*Veronica chamaedrys*
Goat's rue	*Galega officinalis*
Greater stitchwort	*Stellaria holostea*

Prepared by EMEC Ecology
Tel. 0115 964 4828

Great burnet	*Sanguisorba officinalis*
Ground-elder	*Aegopodium podagraria*
Herb-Robert	*Geranium robertianum*
Hogweed	*Heracleum sphondylium*
Horse radish	*Armoracia rusticana*
Meadowsweet	*Filipendula ulmaria*
Meadow vetchling	*Lathyrus pratensis*
Oxeye daisy	*Leucanthemum vulgare*
Pineapple weed	*Matricaria discoidea*
Ragged robin	*Lychnis flos-cuculi*
Common ragwort	*Senecio jacobaea*
Red campion	*Silene dioica*
Red clover	*Trifolium pratense*
Ribwort plantain	*Plantago lanceolata*
Scentless Mayweed	*Tripleurospermum inodorum*
Selfheal	*Prunella vulgaris*
Soft-brome	*Bromus hordeaceus*
Soft rush	*Juncus effusus*
Spear-leaved willowherb	*Epilobium lanceolatum*
Spear thistle	*Cirsium vulgare*
St Johns wort	*Hypericum* spp.
Tansy	*Tanacetum vulgare*
Timothy	*Phleum pratense sens.lat.*
Tormentil	*Potentilla erecta*
Tufted vetch	*Vicia cracca*
Upright hedge-parsley	*Torilis japonica*
White clover	*Trifolium repens*
White dead-nettle	*Lamium album*
Wild angelica	*Angelica sylvestris*
Wild mignonette	*Reseda lutea*
Wild oarsnip	*Pastinaca sativa*
Wild strawberry	*Fragaria vesca*
Wood avens	*Geum urbanum*
Yarrow	*Achillea millefolium*

Scattered Broad-leaved Tree

Trees & Shrubs	
Alder	*Alnus glutinosa*
Ash	*Fraxinus excelsior*
Cherry	*Prunus* sp.
Lime	*Tilia* sp.
Oak	*Quercus* sp.
Small-leaved Lime	*Tilia cordata*
Sycamore	*Acer pseudoplatanus*
Willow	*Salix* sp.

Scattered Scrub

Trees & Shrubs	
Beech	*Fagus sylvatica*
Blackthorn	*Prunus spinosa*
Butterfly-bush	*Buddleja davidii*
Dog rose	*Rosa canina* agg.
Dog wood	*Cornus sanguinea*
Elder	*Sambucus nigra*
Field maple	*Acer campestre*
Goat willow	*Salix caprea*
Guelder-rose	*Viburnum opulus*
Hawthorn	*Crataegus monogyna*
Prickly lettuce	*Lactuca serriola*
Willow	*Salix* sp.

Tall Ruderal

Herbs	
Black knapweed	*Centaurea nigra*
Bramble	*Rubus fruticosus* agg.
Broad-leaved willowherb	*Epilobium montanum*
Bush vetch	*Vicia sepium*
Bracken	*Pteridium aquilinum*
Common nettle	*Urtica dioica*
Cow parsley	*Anthriscus sylvestris*
Crack willow	*Salix fragilis*
Creeping buttercup	*Ranunculus repens*
Creeping cinquefoil	*Potentilla reptans*
Dandelion	*Taraxacum officinale* agg.
Elder	*Sambucus nigra*
Garlic mustard	*Alliaria petiolata*
Greater plantain	*Plantago major*
Ground-ivy	*Glechoma hederacea*
Groundsel	*Senecio vulgaris*
Himalayan balsam	*Impatiens glandulifera*
Hogweed	*Heracleum sphondylium*
Horsetail	*Equisetum* sp.
Male fern	*Dryopteris filix-mas* agg.
Meadowsweet	*Filipendula ulmaria*
Musk-mallow	*Malva moschata*
Orache	*Atriplex* sp.
Red campion	*Silene dioica*
Reed sweet-grass	*Glyceria maxima*
Ribwort plantain	*Plantago lanceolata*
Rosebay willowherb	*Chamerion angustifolium*
Sedge	*Carex* sp.
Smooth hawk's-beard	*Crepis capillaris*
Smooth sow-thistle	*Sonchus oleraceus*
White dead-nettle	*Lamium album*
Willow	*Salix* sp.

APPENDIX 4: RECOMMENDED SPECIES FOR PLANTING

Wildflower Bulbs for the Towpath Edges

Wild Flower Bulbs	
Daffodil (native)	*Narcissus pseudonarcissus*
Snowdrop	*Galanthus nivalis*
Lesser celandine	*Ranunculus ficaria*

Further Hedgerow Species

Shrub Edge	
Buckthorn	*Rhamnus cathartica*
Crab apple	*Malus sylvestris*
Dogwood	*Cornus sanguinea*
Guelder rose	*Viburnum opulus*
Hazel	*Corylus avellana*
Holly	*Ilex aquifolium*
Honeysuckle	*Lonicera periclymenum*
Spindle	*Euonymus europaeus*
Wild privet	*Ligustrum vulgare*

Prepared by EMEC Ecology
Tel. 0115 964 4828

APPENDIX 5: PROTECTED SPECIES LEGISLATION

Plants
All wild plants are protected against unauthorised removal or uprooting under Section 13 of the Wildlife and Countryside Act (WCA) 1981 (as amended). Plants listed on Schedule 8 of the Act (e.g. triangular club rush and Deptford Pink) are afforded additional protection against picking, uprooting, destruction and sale.

Amphibians (Common Species)
Common amphibian species (i.e. common frog, common toad, smooth newt and palmate newt) are afforded partial legal protection under UK legislation, i.e. Schedule 5, Section 9 (5) of the WCA 1981 (as amended) and the Countryside and Rights of Way (CRoW) Act 2000. This legislation prohibits:

- Sale;
- Transportation; and
- Advertising for sale.

Badger
Badger is a widespread and generally common species. However, they are legally protected under The Protection of Badgers Act 1992, which is based primarily on the need to protect badgers from baiting and deliberate harm or injury. Under this legislation it is illegal to:

- Wilfully kill, injure, take, or cruelly ill-treat a badger, or attempt to do so;
- Possess any dead badger or any part of, or anything derived from, a dead badger; and
- Intentionally or recklessly interfere with a sett by disturbing badgers whilst they are occupying a sett, damaging or destroying a sett, causing a dog to enter a sett, or obstructing access to it.

A badger sett is defined in the legislation as “any structure or place, which displays signs indicating current use by a badger”.

Bats
All bat species are afforded full protection under UK and European legislation, including the WCA 1981 (as amended), the CRoW Act 2000 and the Conservation (Natural habitats &c.) Regulations 2010 (as amended). Together, this legislation makes it illegal to:

- Intentionally or deliberately take, kill or injure a bat;
- Damage, destroy or obstruct access to bat roosts; and
- Deliberately disturb bats.

A bat roost is defined in the legislation as “any structure or place which a bat uses for shelter or protection”. Roosts are protected whether or not bats are

present at the time. If a development activity is likely to result in disturbance or killing of a bat, damage to its habitat or any of the other activities listed above, then a licence will usually be required from Natural England.

Birds
The bird breeding season generally lasts from early March to September for most species. All birds are protected under the WCA 1981 (as amended) and the CRoW Act 2000. This legislation makes it illegal, both intentionally and recklessly to:

- Kill, injure or take any wild bird;
- Take, damage or destroy the nest of any wild bird while it is being built or in use;
- Take or destroy the eggs of any wild bird; and
- Possess or control any wild bird or egg unless obtained legally.

Birds listed under Schedule 1 of the WCA 1981 (as amended) are afforded additional protection, which makes it an offence to disturb a bird while it is nest building, or at a nest containing eggs or young, or disturb the dependent young of such a bird.

Great crested newt
Great crested newts and their habitat are afforded full protection under UK and European legislation, including the WCA 1981 (as amended), the CRoW Act 2000 and the Conservation (Natural habitats &c.) Regulations 2010 (as amended). This makes it is an offence to kill, injure or disturb great crested newts and to destroy any place used for rest or shelter by a newt. The great crested newt is also listed on Annexes II and IV of the EC Habitats Directive and Appendix II of the Bern Convention. If a development activity is likely to result in disturbance or killing of a great crested newt, damage to its habitat etc, then a licence will usually be required from Natural England.

Otter
Otters are fully protected under the WCA 1981 (as amended), the CroW Act 2000 and are classified as a European protected species under The Conservation (Natural Habitats, &c.) Regulations 2010 (as amended). This makes it offence to intentionally or recklessly:

- To kill, injure or take an otter from the wild;
- To damage or obstruct a holt; and
- To disturb an otter in its resting place.

Reptiles
There are six native species of reptiles in the UK, including slow-worm, common lizard, grass snake and adder, smooth snake and sand lizard, which are afforded varying degrees of protection under UK and European legislation.

Slow-worm, viviparous/common lizard, adder and grass snake are protected under Schedule 5, Section 9 (1 and 5) of the WCA 1981 (as amended) and the CroW Act 2000 against deliberate or reckless killing and injuring and sale.

Water vole
The water vole is fully protected under Schedule 5, Section 9 of the WCA 1981 (as amended), which makes it illegal to:

- Intentionally kill, injure or take (capture) a water vole;
- Possess or control a live or dead water vole, or any part of a water vole;
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection or disturb water voles while they are using such a place; and
- Sell, offer for sale or advertise for live or dead water voles.

White-clawed crayfish
White-clawed crayfish are partially protected under the WCA 1981 (as amended). This legislation makes it illegal to:

- Intentionally take white-clawed crayfish
- Sell, barter or exchange white-clawed crayfish

They are also listed on Annex II of the EC Habitats and Species Directive and are classed as “endangered” by IUCN.

APPENDIX 6: POTENTIAL SITE ENHANCEMENTS

Examples of bat boxes that could potentially be installed within the site. Available from online stores such as Alana Ecology. Available at: www.alanaecology.com

1FF bat box – attract pipistrelle and noctule bats

2 F bat box – attracts bats such as pipistrelle and Daubenton's

2FN bat box – primarily attracts noctule bats

Examples of bird boxes that could potentially be installed within the site. Boxes should be sited near to cover, such as on mature trees away from residential properties (where there is minimal disturbance), to encourage birds to feel safe while approaching the boxes. Bird boxes should be sited at a suitable height to deter predators (such as domestic cats) and interference by humans.

A variety of bird boxes are widely available (for example at www.alana.ecology.com) to meet the specific needs of different species found on, or close to the site.

CedarPlus Triple Sparrow House

Schwegler 1B Bird Box – popular bird box for a range of species

1N Deep Nest Box - ideal for robins, spotted flycatchers, pied wagtails, tits and sparrows

Prepared by EMEC Ecology
Tel. 0115 964 4828

Prepared by EMEC Ecology
Tel. 0115 964 4828

QUALITY ASSURANCE

TITLE: The Nottingham Canal Local Nature Reserve Management Plan – Third Edition 2012-2016

SUBMITTED TO: Broxtowe Borough Council

ISSUE AND REVISION RECORD:

Report Reference: 11/2894/AS/03

Revision Number: 3

Description: Final Report

Date: 23rd March 2012

THE BRITISH ASSESSMENT BUREAU ISO9001 UKAS MANAGEMENT SYSTEMS 4307

AUTHOR

Name: Alison Sharkey MSc **Signed:**

INTERNAL REVIEWER

Name: Steve Ralph MSc MIEEM **Signed:**

Name: Sean Gallagher MSc MIEEM **Signed:**

Prepared by EMEC Ecology
Tel. 0115 964 4828