

Site Management Plan

2019 – 2023

Church Lane Flood Meadow Local Nature Reserve



Epping Forest
Countrycare

a service provided by Epping Forest District Council

1.0 General Information

Section 1.1	Location	1
Section 1.2	Introduction	1
Section 1.3	Site Description	1
Section 1.4	Owners	2
Section 1.5	Rights of Access	2
Section 1.6	Boundaries	2
Section 1.7	Photographic Coverage	2

2.0 Environmental Information

Section 2.1	Abiotic Factors	2
Section 2.2	Biotic Factors	4

3.0 Cultural Information

Section 3.1	Archaeological	4
Section 3.2	Land Use	4
Section 3.3	Past Management	4
Section 3.4	Public Interest	5

4.0 Management Aims and Operations

Section 4.1	Management Aims	5
Section 4.2	Management Operations	5
Section 4.2.1	Maintain the sites function as a flood alleviation scheme/ water collection area	5
Section 4.2.2	Maintain and enhance grassland habitat	6
Section 4.2.3	Maintain and enhance the developing woodland habitat	6
Section 4.2.4	Maintain and enhance the biodiversity of wetland habitats	7
Section 4.2.5	Maintain access for all the community	8

5.0 Work Schedule

Section 5.1	Key	9
Section 5.2	Work Programme: Five year period	9

Section 6.0 APPENDIX I - MAP COVERAGE

Section 6.1	Location and Site Boundary	17
Section 6.2	Access and Rights of Way	18
Section 6.3	Scrub compartment map	19
Section 6.4	Example cutting map	20
Section 6.5	North Weald Flood Alleviation Scheme (F.A.S) General Plan	21
Section 6.6	North Weald F.A.S Operating Information Sheet	23

Section 7.0 APPENDIX II – Other Information

Section 7.1	Past Management	25
Section 7.2	Seed Mix Suppliers	26
Section 7.3	Tree Species and Suppliers	27
Section 7.4	Repair Works	28
Section 7.5	Drainage Maintenance Plan	31

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Church Lane Flood Meadow Local Nature Reserve

1.0 General Information

1.1 Location

Name: Church Lane Flood Meadow LNR	Area: 3.4 Hectares
Grid Reference: TL 496 046	County: Essex
District: Epping Forest	Parish: North Weald Bassett
Local Planning Authority:	Epping Forest District Council (EDFC)
Conservation Status:	Statutory Local Nature Reserve declared 13/05/02. Essex Wildlife Trust, Wildlife Site EP118 Epping Forest District Local Plan January 1998.
Nature of legal interest:	The land is owned freehold by EFDC.
OS Maps: 1.10 000 TL 40 SE	

1.2 Introduction

This management plan outlines a set of proposals for the maintenance of Church Lane Flood Meadow LNR that will run for 5 years.

The plan will cover a description of the site, some details of previous management, the aims of the management for the future and the operations necessary to enable this.

Countryside and Environmental Protection and Drainage (EPD) will work in partnership to successfully implement these plans.

1.3 Site Description

The creation of Church Lane Flood Meadow - part of the North Weald Flood Alleviation Scheme (see Appendix I – 6.5 & 6.6) - in 1989 was a major engineering project that was able to incorporate a significant habitat creation project. Within the confines of the reservoir bowl is a large stream fed pond and wet grassland meadow, created using wild flower seed. Many new hedgerows were also planted on the site's boundaries and areas of native deciduous trees have been planted at the toes of the slopes, which are now developing into small woodland strips. See Appendix II – 7.2 Seed Mix Suppliers and 7.3 Tree Species and Suppliers.

Church Lane is managed both as a flood alleviation site and a Nature Reserve. In June 1999, the meadow was designated as a Local Wildlife Site by the Essex Wildlife Trust and in May 2002 it was declared a statutory Local Nature Reserve. Significant plant species recorded on site include Devil's-bit Scabious (*Succisa pratensis*), Greater Bird's-foot-trefoil (*Lotus pedunculatus*) and a population of Common Spotted Orchids (*Dactylorhiza fuchsii*).

1.4 Owners

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Contacts:

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www.eppingforestdc.gov.uk/countrycare

1.5 Rights of Access

There is free and open public access across the site. In addition, there are two public footpaths that cross the site, both running in a north/south direction. Footpath 43 runs parallel with the western boundary, while footpath 41 runs along the North Weald Brook on the eastern boundary. Both paths connect the village of North Weald to St Andrew's Church.

Vehicular access to the site is via a field gate in the North West corner from an access track that leads in from Church Lane. The council has a right-of-way over the track and it is also shared with Thames Water and the landowner of the field adjacent. There is also a right of access for the adjacent landowner through the site to gain access to the field to the south west overlooking the meadow.

See Appendix I - 6.2 Access

1.6 Boundaries

The eastern boundary of the site is fully formed by the North Weald Brook. The western boundary is a mature hedgerow that borders Church Lane, with a newly planted hedge that separates the site from arable farmland. The northern boundary hedgerow runs parallel with the vehicle access track and includes a field gate and kissing gate for footpath no. 41 & 43. The southern boundary of the meadow is a ditch and hedgerow, with a kissing gate for footpath no. 43. Both the northern, southern and a majority of the western boundaries adjoin arable farmland. See Appendix I - 6.1 Location and Site Boundary

1.7 Photographic Coverage

E.F.D.C. Planning Department holds aerial photographs of the North Weald area including the meadow for the following years - 1965, 1976, 1985, 1990, 1999, 2001, 2004, 2007, 2010, 2013 and 2018. There is also a catalogue of photos of Church Lane from its initial construction phase in 1989 through to present day. These images are held by Countrycare.

2.0 Environmental Information

2.1 Abiotic Factors

Topography

North Weald is located on the Epping Forest ridge which at its highest point is 100m Above Ordnance Datum (AOD). The meadow stands at 72.1 metres AOD with adjacent farm land rising to 80 metres AOD to the south east. The maximum altitude of the site is 78 metres AOD.

The bowl shape of the meadow means it has multiple aspects. The slopes have a gradient of maximum 1:5 and drop approximately 3 metres from the bank top to the basin floor.

Climate

Hampstead is the nearest Met Office climate station to North Weald. The averages in the table below are for the climate period: 1981-2010

Month	Max. temp (°C)	Min. temp (°C)	Days of air frost (days)	Sunshine (hours)	Rainfall (mm)	Days of rainfall >= 1 mm (days)
Jan	7.1	2.0	8.6	57.5	64.7	12.0
Feb	7.4	1.7	9.5	76.4	46.6	9.7
Mar	10.5	3.5	4.0	107.1	48.9	10.2
Apr	13.3	5.0	1.5	151.6	51.5	9.9
May	16.8	8.0	0.1	192.2	58.0	9.5
Jun	19.9	10.9	0.0	191.0	54.2	9.0
Jul	22.4	13.2	0.0	199.9	50.4	8.5
Aug	22.0	13.1	0.0	193.0	64.4	8.9
Sep	18.8	11.0	0.0	140.8	56.9	8.8
Oct	14.6	8.1	0.3	109.9	77.7	11.0
Nov	10.3	4.8	2.9	69.4	68.3	11.4
Dec	7.4	2.5	7.7	51.6	62.9	11.4
Annual	14.3	7.0	34.6	1540.4	704.5	120.1

<http://www.metoffice.gov.uk/public/weather/climate/u10j9t4ur>

Geology and Soils

Geological records indicate that the site is underlain by Glacial Boulder Clay and Head Deposits. These in turn overlay London Clay of the Eocene Period.

Prior to excavation, the site was underlain to a depth of 1.60m by clay fill. This in turn was overlying Boulder Clay and Head Deposits, which were proved down to a depth of 3.5m.

Hydrology

The meadow lies within an area of clay based geology which very much influences the river network, with small and numerous tributaries feeding into the main river system. The meadow is situated within the catchments of the River Roding and the North Weald Brook (a tributary of the Cripsey Brook that flows in a natural open channel on the meadow's eastern boundary).

The flood scheme has been developed to counteract the rapid response of the area to intense rainfall events. Historically, severe storms on the catchment areas have resulted in rapid surface run-off and flooding problems were experienced in the village of North Weald in 1985, 1987 and 1989.

The scheme, of which the flood storage area is part, consists of a side spill weir and by-pass pipe commencing some 850m upstream of the site. Water channelled via the bypass is conveyed through a 1500mm diameter pipe to the site where a further bypass exists for diverting excessive flow to the storage area when the outfall to the brook is at capacity. Water is released from the basin by way of 300mm diameter outfall at the northern end of the site.

Since the construction of the scheme in 1989 a severe storm occurred again in June 1993, which diverted the flows from the Brook and flooded the meadow to capacity. Unfortunately, flooding was still experienced in North Weald Village due to the unprotected Thornhill catchment. As a result of the June 1993 event a scheme for the Thornhill catchment was initiated and completed in 1996.

See also Appendix I – 6.5 North Weald Flood Alleviation Scheme (F.A.S) General Plan

2.2 Biotic Factors

Flora

The grassland sward was created using a combination of green hay bales and wildflower seed mixes. The resulting wet grassland community has proved highly successful. The key important species are Ragged Robin (*Lychnis flos-cuculi*), Devil's Bit Scabious (*Succisa pratensis*), Bugle (*Ajuga reptans*) Marsh Cinquefoil (*Potentilla palustris*) and Sulphur Clover (*Trifolium ochroleucum*). The pond edge community contains species such as Purple Loosestrife (*Lythrum salicaria*), Yellow flag (*Iris pseudacorus*), Water Crowsfoot (*Ranunculus glacialis*) and Common Reed Mace (*Typha latifolia*). In wet summers areas of the meadow can remain saturated all year round and are developing as small marsh areas dominated by Soft Rush (*Juncus effuses*). There has been considerable planting of native deciduous trees on the western edges to create small woodland areas and shrubs to create additional boundary hedgerows. See Appendix II - 7.2 Seed Mix and Supplier and 7.3 Tree Species and Supplier for further information.

Fauna

Six mammals have been historically recorded on the meadow including Water Vole (*Arvicola terrestris*) and Weasel (*Mustela nivalis*). Amphibians are represented by the Common Frog (*Rana temporaria*), Toad (*Bufo bufo*) and the Smooth Newt (*Triturus vulgaris*).

There have been encouraging numbers of invertebrates recorded with a good representation of dragonflies and butterflies. In all, nine species of dragonfly have been recorded including the Black Tailed Skimmer (*Orthetrum cancellatum*) and the Brown Hawker (*Aeshna grandis*). Countrycare has carried out weekly UKBMS Butterfly surveys since 2015 and to date 23 Butterfly species have been recorded which include the Common Blue (*Polyommatus icarus*), Marbled White (*Melanargia galathea*) and Clouded Yellow (*Colias croceus*).

Over 50 birds species have been observed on the meadow since its use as a flood alleviation site. Species of note historically include Snipe (*Galinago gallinago*), Jack Snipe (*Gallinago media*), Hobby (*Falco subbuteo*), and the Green Sandpiper (*Tringa ochropus*).

3.0 Cultural Information

3.1 Archaeological

Due to the fact that this has been a creation project there are no significant historical features associated with the meadow. However, adjacent to the meadow to the west is the former RAF Airfield, North Weald. Associated with the airfield are many pillboxes and one of these exists just off the site's south western boundary. Features such as these could possibly be adapted as roosts for bats, which have been recorded using the meadow.

3.2 Land Use

The meadow's primary function is flood defence and a water storage area. However, since its conception it has always been intended to integrate this function with public access and nature conservation. This was recognised with its declaration as a LNR in 2002.

3.3 Past Management

The meadow was created in 1989 on farmland to the north of the village of North Weald on land, which had formerly been in arable production, since at least 1939. The scheme incorporated two new habitat features i) a permanent stream fed pond and ii) wet hay meadow. Since establishment the site has been managed jointly by the Council's Engineering, Drainage and Water Team and Countrycare. A list of Countrycare's management of the site for the past four years can be found in Appendix II – Section 7.1 Past Management

Minor repairs were carried out to the flood storage area in March 2008; full details of these can be found in Appendix II – 7.4 Repair Works

3.4 Public interest

Due to the site's location away from the village and the fact there is no onsite car-parking, usage of the site is limited. All visits are by foot with the main users being dog walkers. However, the site is also used for nature conservation activities such as bird watching, wildflower walks and volunteer tasks.

Volunteers working with staff undertake the management works and so there is strong public ownership of the site. Regular volunteer tasks are held on the meadow through the year and these are always strongly supported.

4.0 Management Aims and Operations

4.1 Management Aims

- 4.1.1 Maintain the site's function as a flood alleviation scheme/water collection area.
- 4.1.2 Maintain and enhance the grassland habitat.
- 4.1.3 Maintain and enhance the developing woodland and scrub habitats.
- 4.1.4 Maintain and enhance the biodiversity of wetland habitats.
- 4.1.5 Maintain access for all the community.

4.2 Management Operations

Please refer to Appendix I – 6.3 Compartment Map

4.2.1 Maintain the site's function as a flood alleviation scheme/water collection area.

Environmental Protection and Drainage (EPD) are responsible for the structures and their function related to the sites primary role as a flood defence. Priority is placed on this role but with input from Countrycare to minimise any possible negative effects to the now established habitats. See also Appendix II Section 7.5 Drainage Maintenance Plan.

4.2.1.1 To maintain accessibility for monitoring and maintenance Countrycare will keep the vegetation low around the structures along the brook and around the inlet and outlet to the pond.

4.2.1.2 To monitor the integrity of the man-made embankments, especially above the original ground level, the grass areas will be mown lower and more frequently than the rest of the site.

4.2.1.3 To achieve the above, compartment C1, which is entirely situated on man-made banks, will be coppiced on a shorter rotation in consultation with EPD. This area can be divided into three main sections (A-C). Area A has now been coppiced and the vegetation will be kept low by Grounds Maintenance on an annual basis. Area B and then Area C will also be coppiced by Countrycare in the coming years. Once Grounds Maintenance has carried out their first cut of area A in 2019, it will be reassessed in order to plan long term management. As Dogwood spreads vegetatively when coppiced, it is likely that this will need to be dug out. Countrycare to investigate options of mulching/stump grinding entire area.

4.2.1.4 Annually coppice the willow within 3-5 m of the sweetening channel inlet and pond outlet. The eastern bank of the sweetening channel (part of compartment C5) will also be coppiced.

4.2.1.5 Remove reeds around pond inlet and outlet to a distance of two to three metres. This will help slow the build up of organic material and reduce the need for frequent desilting, also allowing easy access for these structures to be monitored.

4.2.1.6 Coppice willow in larger block sections around the pond perimeter to create access points at the water's edge for dredging. This will be agreed in discussion with EPD prior to planned dredging works every 1-3 years. Where possible the coppiced stools will be cut very low using a chainsaw to permit this access

without uprooting the willow and thereby creating diverse habitats for wildlife.

4.2.2 Maintain and enhance the grassland habitat.

4.2.2.1 Maintain the flower rich meadow by mowing. Our intention is to cut the site twice a year; timings may vary due to weather and ground conditions. A traditional late summer hay cut in August in the bowl allows the now established herb rich wet meadow to seed naturally but means this area is likely to still be dry. The banks will be mown later, in the autumn, to allow late flowering plants such as Devil's-Bit Scabious (*Succisa pratensis*) to seed. The banks are raked to remove the thatch. Uncut strips will be left for mammals and invertebrate refuge and rotated on a yearly basis. Records of these strips will be kept by Countrycare. See example map Appendix I- 6.4 Cutting map.

4.2.2.2 Control invasive weed species as required. There is currently a problem with Goats-rue (*Galega officinalis*) on site, pulling the plant just as it begins to flower helps reduce the spread. In addition there is also a small patch of Spurge spp, (potentially Leafy spurge (*Euphorbia esula*), a native to Southern Europe) which could potentially spread and effect the meadow biodiversity. It germinates vegetatively and through explosive seed dispersal, so will be controlled using a combination of strimming and spraying.

4.2.2.3 Survey grassland to monitoring the effects of the previous and current management regimes. The objective is to monitor that the grassland is being enhanced (4.1.2). This can be achieved by assessing species present. The survey method needs to be easy and relatively quick to carry out and inform future management plans. A rapid assessment method is therefore proposed, surveying random 1x1m quadrats and assessing percentage cover of negative and positive indicator species against desirable thresholds. The survey will take around half a day and need to be carried out in June or July every 3 years.
([http://www.magnificentmeadows.org.uk/assets/pdfs/How to design undertake and analyse rapid assessment.pdf](http://www.magnificentmeadows.org.uk/assets/pdfs/How_to_design_undertake_and_analyse_rapid_assessment.pdf))

UKBMS butterfly surveys further supplement monitoring of this objective.

4.2.2.4 Informally survey grassland area below C1(c) more regularly. This area is used as a firesite and to dry dredged silt. It is also compacted from heavy machinery. It will need to potentially be reseeded if the desirable species do not recover and the percentage of rank vegetation is high.

4.2.2.5 Investigate possibility of livestock aftermath grazing to enhance the meadow. Livestock breakup thatch more effectively than raking and aids seed germination by pushing seeds into the soil. Further benefits depend on livestock selected, for example, sheep will graze at a very low level allowing more light in. Additionally studies have shown that grazing can minimize impact of *Crassula helmsii*.
[https://freshwaterhabitats.org.uk/wp-content/uploads/2014/06/RINSE Partner Annex report by-FHT-and-HWT.pdf](https://freshwaterhabitats.org.uk/wp-content/uploads/2014/06/RINSE_Partner_Annex_report_by-FHT-and-HWT.pdf) All factors for best livestock choice will have to be fully investigated and considered, particularly in view of the possibility of sudden flood events.

4.2.2.6 Investigate cutting being carried out by local farmer in exchange for hay. With the introduction of ragwort hand pulling, the meadow would produce desirable high quality hay for animal feed. This may save money.

4.2.3 Maintain and enhance the developing woodland and scrub habitats.

4.2.3.1 Coppice willow and hazel in compartments C2, C3 and C4 in rotation. This will initially be carried out by staff using chainsaws and processed by volunteers. This could be a good community youth activity.

4.2.3.2 Manage laid hedgerows by cutting in a three year rotation. With the hedges containing a large proportion of fast growing Field Maple it is advisable to monitor and selectively trim back to keep it at a manageable size when it comes to trimming the hedges in their rotation.

4.2.3.3 Lay remaining hedgerow (approximately 15 metres) on the western boundary adjacent to field.

4.2.3.4 Plant area of scrub to replace habitat removed by significantly reducing C1. To include Elm species (Wych (*Ulmus glabra*), English (*U. procera*) and Small-leaved (*U. minor*) as there have been sightings of White-letter Hairstreak near the Thames Water plant. This would provide additional habitat.

4.2.3.5 Reduce size of gorse gradually to create different ages within stand and prevent it becoming too leggy.

4.2.3.6 Trim dogrose and mixed scrub hedge screening around the railing of the flood water outlet pipe every 3 years. This should continue to be managed by EPD.

4.2.4 Maintain and enhance the biodiversity of wetland habitats

4.2.4.1 Monitor and control the amount of reed cover in and around the pond. Marginal habitat is the most important part in the structure of a pond therefore it should not be allowed to be dominated by dense reed cover. At least two thirds of the pond should also be kept as open water, which is suited to birds such as housemartins and swifts, yet leaving cover for nesting wildfowl. This is currently being carried out by EPD as part of dredging operations.

4.2.4.2 Coppice yearly, one third of the willow around the perimeter of the pond - compartment C5 - this will provide valuable coppice habitat. Leaving sections uncut will ensure there is habitat for warblers.

4.2.4.3 Coppice yearly, one third of the willow along the sweetening channel - compartment C6 - this will provide valuable coppice habitat.

4.2.4.4 Undertake survey of pond and wet meadow. This can be achieved through a combination of survey methods: Dragonfly, freshwater invertebrates and WeBS. Dragonfly surveys should be carried out between May and September and during 3 visits. Further dragonfly survey guidelines can be found at: <https://british-dragonflies.org.uk/wp-content/uploads/2019/03/Survey-guidance.pdf>. Invertebrate surveys should be carried out in June, July or August. Due to the presence of *Crassula helmsii*, it will be imperative to use separate pond dipping equipment and disinfect it. Further freshwater invertebrate survey guidelines can be found at: <https://freshwaterhabitats.org.uk/wp-content/uploads/2015/03/INVERTEBRATE-SAMPLING-METHODS.pdf> WeBs is carried out once a month. Further information can be found on the BTO website.

4.2.4.5 Leave area within bowl uncut by ground maintenance- see map Appendix I- 6.4 Cutting map. This area will be cut selectively using strimmers to leave tussocks of soft rush (*Juncus effusus*) and longer grass, creating a varied structure which is good habitat and cover for waders such as green sandpiper and snipe in wetter years. It will be important to manage and monitor this to ensure that scrub does not become established and encroach the meadow.

4.2.4.6 Control invasive weed species as required. There is currently a problem with *Crassula helmsii* in the pond, which has spread to areas where silt was stacked to dry over winter 2018/2019. Efforts will be made to restrict the weed to the pond area. A net has been installed at the outflow to prevent *Crassula* leaving the site. This should be monitored and kept in good repair. *Crassula* growing on the water and at the pond edge to be sprayed after dredging. Spraying can reduce cover but the effect is not lasting. It is proposed that the area will be cordoned off as signage alone has not stopped the public from allowing dogs to run or swim in infected areas. Signage visibility will be increased. Contractors should be informed before any work is carried out in the water and consulted on best practice. Staff to follow good biosecurity practices, including, minimising need to enter area, changing route of butterfly survey, cleaning footwear on leaving site and if relevant, pond dipping survey equipment to be kept separately and disinfected. https://freshwaterhabitats.org.uk/wp-content/uploads/2014/06/RINSE_Partner_Annex_report_by-FHT-and-HWT.pdf Dredging has also been shown to be an effective method; costings and feasibility plans are currently being carried out. Staff to keep up to date on developments on current control methods. Himalayan Balsam (*Impatiens glandulifera*) is present in the brook and where possible this will be pulled to reduce its spread.

4.2.4.7 Research and resubmit previously developed proposals for shallow pond network to EPD.

4.2.5 Maintain access for all the community.

4.2.5.1 Patrol on a weekly basis. While on site, litter should be removed. Fly tipping has been a problem at the vehicle access gate, legal action should be pursued if sufficient evidence can be obtained.

4.2.5.2 Inspect all countryside furniture i.e. pathways, gates and fencing when patrolling site or at least four times a year.

4.2.5.3 Continue to compile photographic records; these could also be used in presentations and promotional material.

4.2.5.4 Continue to distribute 'Local Nature Reserves of Epping Forest District' to local libraries/schools and youth centres.

5.0 Work Schedule

5.1 Key

1	Jan, Feb, Mar	S	Staff
2	Apr, May, Jun	V	Volunteers
3	Jul, Aug, Sep	C	Contractors
4	Oct, Nov, Dec	G	Grounds maintenance

5.2 Work Programme: Five Year Period

5.2.1 Maintain the site's function as a flood alleviation scheme/water collection area.

Project	2019				2020				2021				2022				2023				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
4.2.1.1	Mow structures		S	S			S	S			S	S			S	S			S	S	
4.2.1.2	Mow bank		C/G				C/G				C/G				C/G				C/G		
4.2.1.3	Stump removal or reduction C1A				S/V	S/V			S/V	S/V											
4.2.1.3	Coppice half C1B				S/V	S/V			S/V	S/V											
4.2.1.3	Coppice half C1C											S/V	S/V			S/V	S/V				
4.2.1.4	Coppice willow at inlet/outlet				S/V	S/V			S/V	S/V			S/V	S/V		S/V	S/V				S/V
4.2.1.5	Remove reeds around inlet/outlet				S/V	S/V			S/V	S/V			S/V	S/V		S/V	S/V				S/V
4.2.1.6	Coppice C5 sections for dredging	As discussed with EPD approx. every 1-3 years.																			

5.2.2 Maintain and enhance the grassland

Project	2019				2020				2021				2022				2023				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
4.2.2.1	Annual mowing			C/G	C/G			C/G	C/G			C/G	C/G			C/G	C/G			C/G	C/G
4.2.2.2	Control invasive weeds		S/V	S/V			S/V	S/V			S/V	S/V			S/V	S/V			S/V	S/V	
4.2.2.3	Survey grassland						S/V	S/V											S/V	S/V	
4.2.2.3	UKBMS butterfly surveys		S/V	S/V			S/V	S/V			S/V	S/V			S/V	S/V			S/V	S/V	
4.2.2.4	Reseed dredging area			S				S													
4.2.2.5	Investigate livestock grazing						S														
4.2.2.6	Investigate hay as product										S										

5.2.3 Maintain and enhance the developing woodland and scrub habitat.

Project	2019				2020				2021				2022				2023			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4.2.3.1 Coppice C2				S/V	S/V												S/V	S/V		
4.2.3.1 Coppice C3								S/V	S/V											
4.2.3.1 Coppice C4												S/V	S/V							
4.2.3.2 Cut Northern Hedge	S/G												S/G							
4.2.3.2 Cut Southern Hedge					S/G												S/G			
4.2.3.3 Lay section Western Hedge								S/V	S/V											
4.2.3.4 Plant area of scrub to replace C1												S/V	S/V							
4.2.3.5 Reduce gorse				S/V	S/V							S/V	S/V							
4.2.3.6 Trim dogrose at flood water outlet									G											

5.2.4 Maintain and enhance the biodiversity of wetland habitats

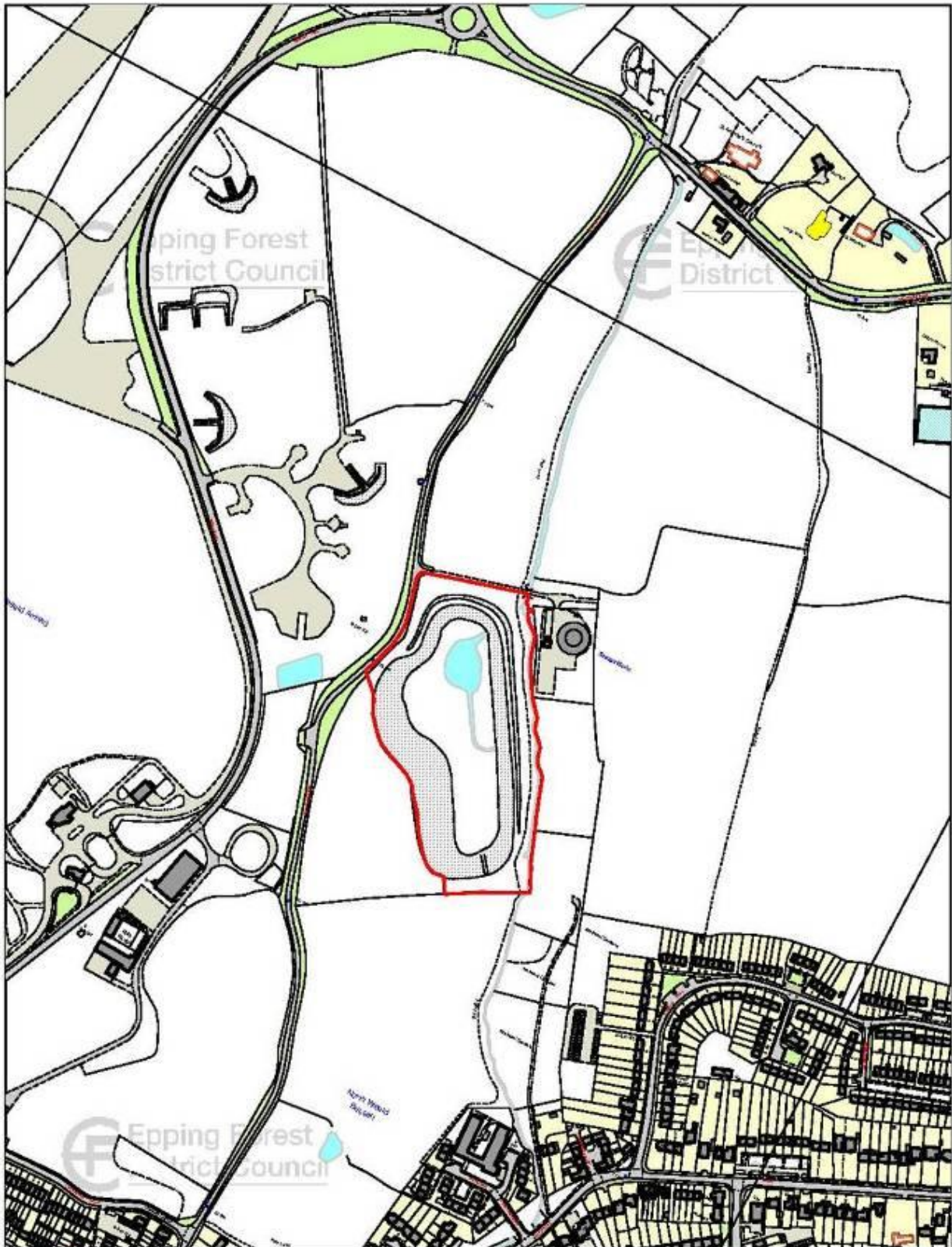
Project	2019				2020				2021				2022				2023			
	1	3	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4.2.4.1 Remove reeds from pond				S/C				S/C				S/C				S/C				S/C
4.2.4.2 Coppice willow C5				S/V				S/V				S/V				S/V				S/V
4.2.4.3 Coppice willow C6				S/V				S/V				S/V				S/V				S/V
4.2.4.4 Monthly WeBs survey	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Dragonfly survey x3		S/V	S/V			S/V	S/V			S/V	S/V			S/V	S/V			S/V	S/V	
Invert. pond survey							S/V								S/V					
4.2.4.5 Strim Juncus tussocks				S				S				S				S				S
4.2.4.6 Control invasive weeds	STAFF AND CONTRACTORS ONGOING																			
4.2.4.7 Research shallow pond network									S											

5.2.5 Maintain access for all the community and promote the site for educational use.

		2014				2015				2016				2017				2018			
Project		1	3	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
4.2.5.1	Patrol on a weekly basis	STAFF ONGOING																			
4.2.5.2	Inspect all countryside furniture	STAFF ONGOING																			
4.2.5.3	Continue to compile photographic records	STAFF ONGOING																			
4.2.5.4	Distribute LNR leaflets to local libraries, schools and youth centres	STAFF ONGOING																			

6.0 Appendix I - Map Coverage

Section 6.1	Location and Site Boundary
Section 6.2	Access and Rights of Way
Section 6.3	Scrub compartment map
Section 6.4	Example cutting map
Section 6.5	North Weald Flood Alleviation Scheme (F.A.S) General Plan
Section 6.6	North Weald F.A.S Operating Information Sheet



Epping Forest District Council
 Planning Services
 Civic Offices
 High Street
 Epping CM16 4BZ

6.1 Location and Site Boundary




Centre X: 549574.736
 Centre Y: 204616.754
 Width : 868.680
 Angle : 28.000

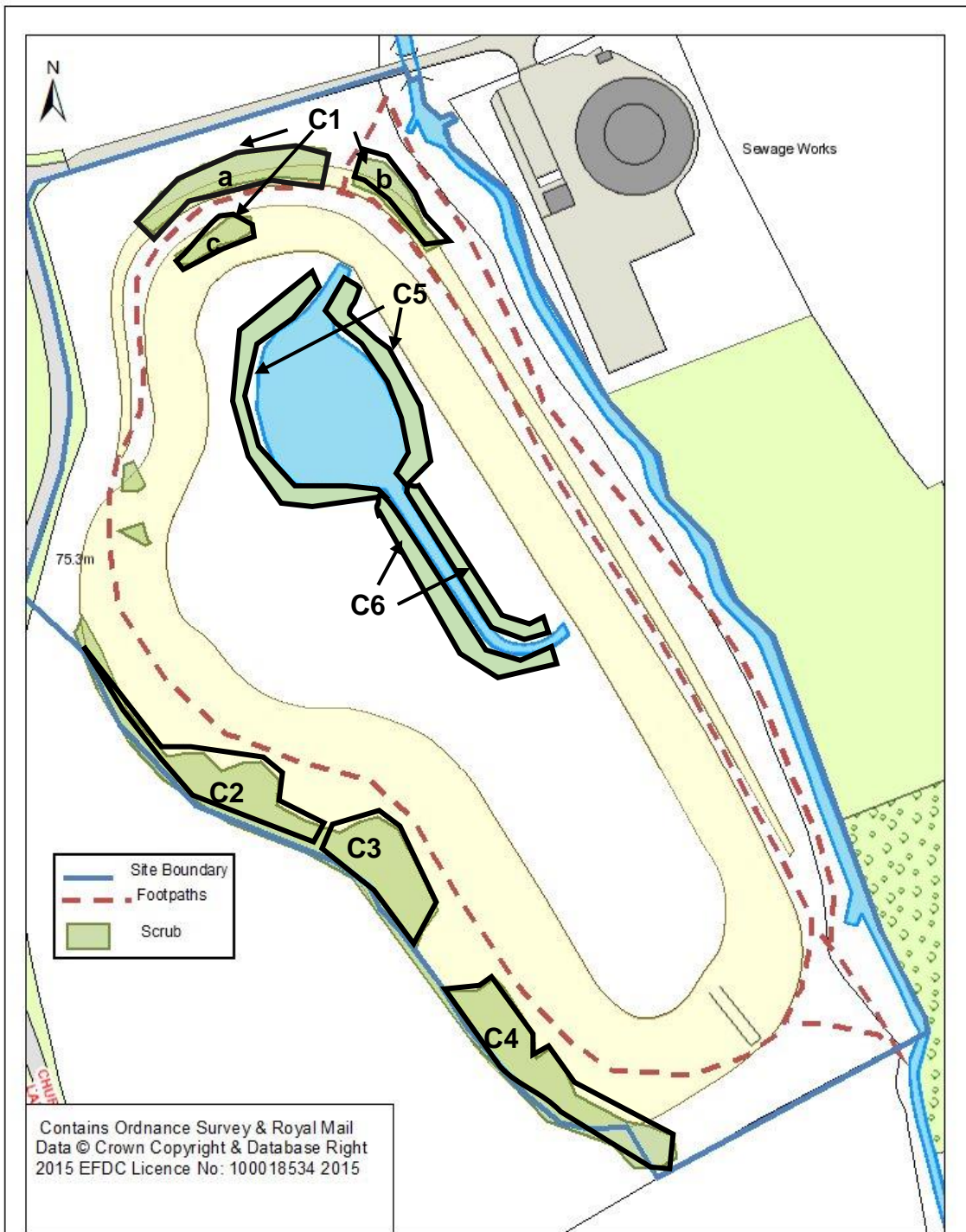
Scale : 1:4826 Date : 19 Feb 2013 Time : 10:37:13 AM

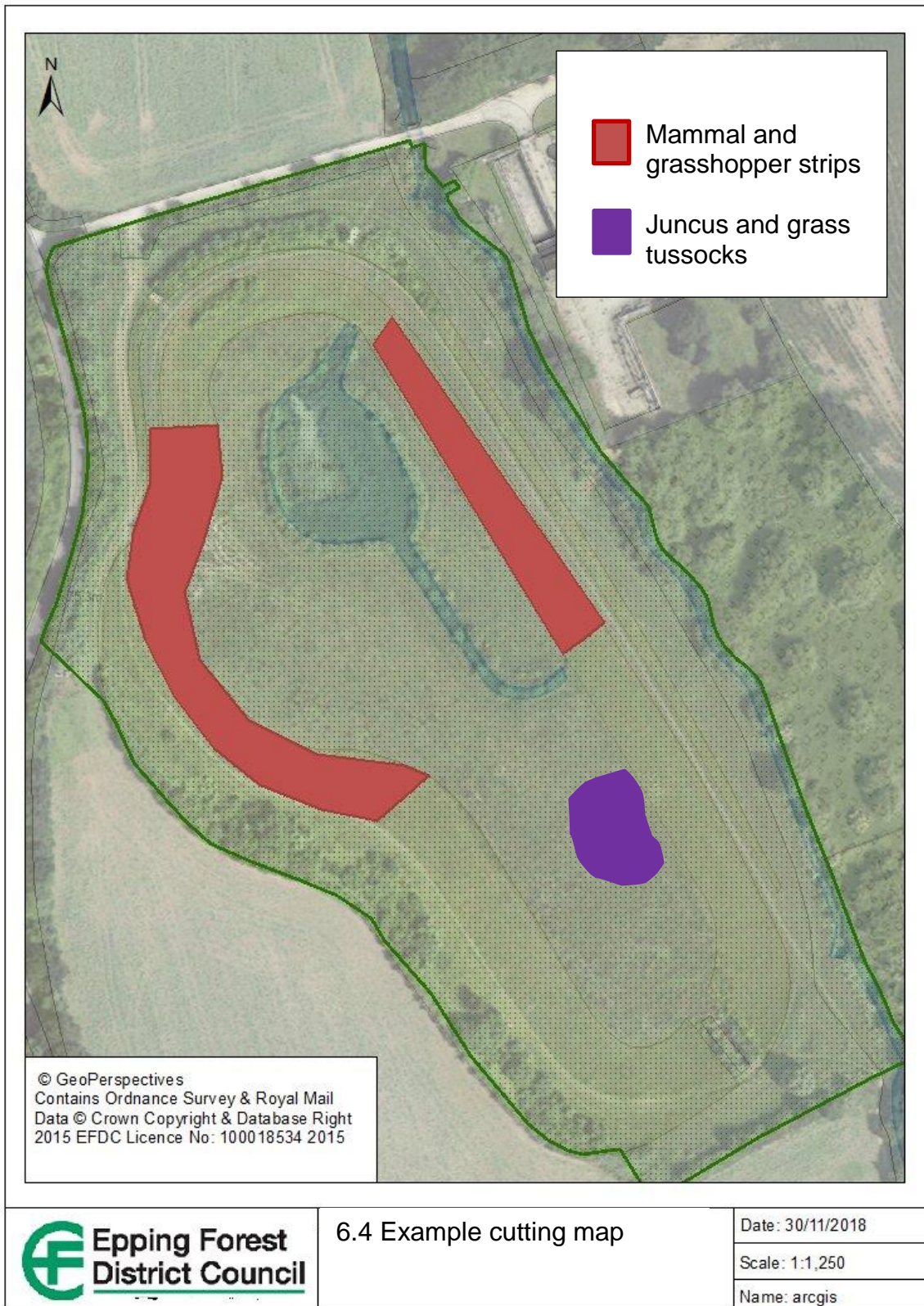
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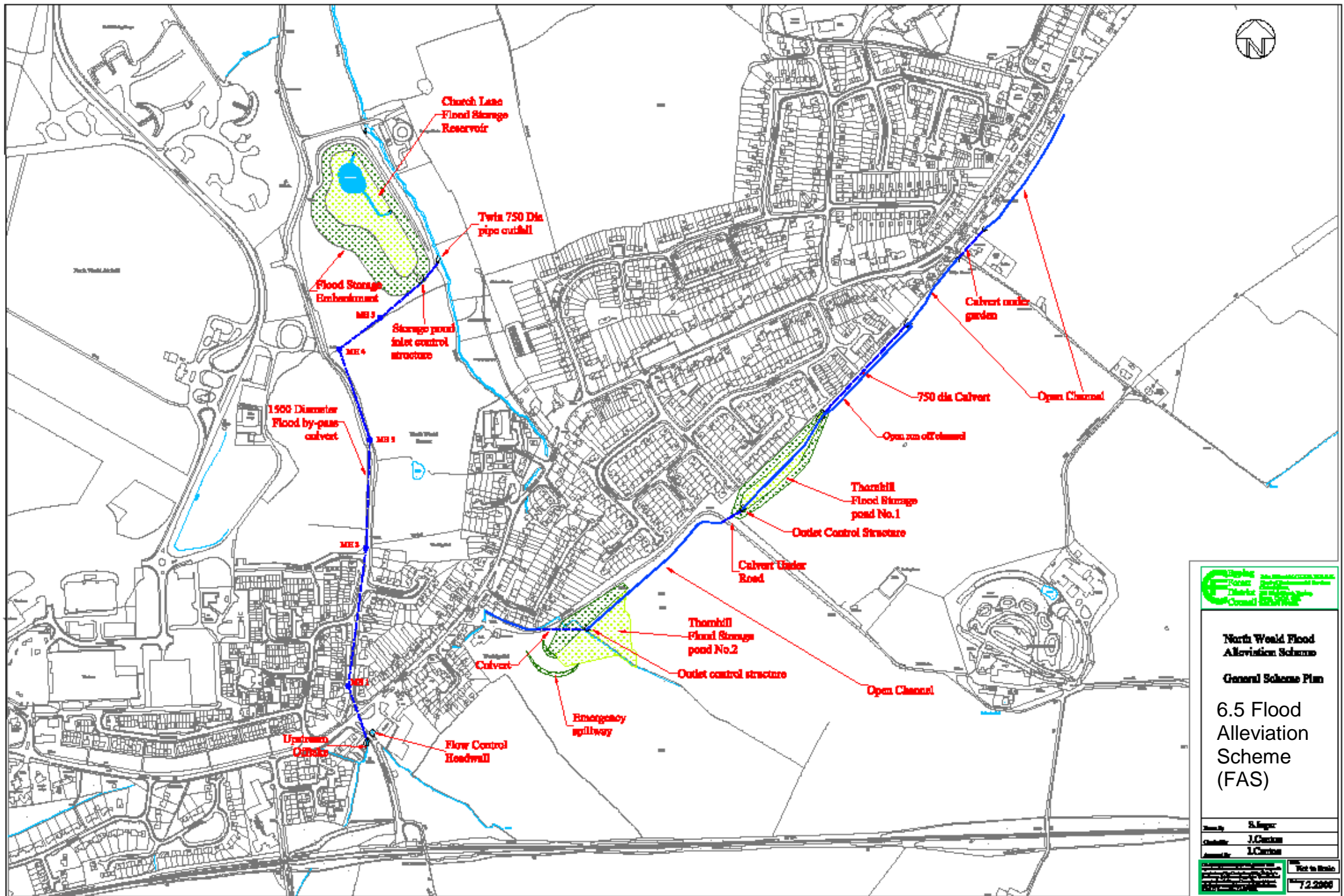




 <p>Epping Forest District Council Planning Services Civic Offices High Street Epping CM16 4BZ</p>	6.2 Access and Rights of Way  - Public Footpath  - Vehicle Access		Centre X: 549575 528 Centre Y: 204584 609 Width : 249.000 Angle : 28.000
	Scale : 1:1350	Reproduced from the Ordnance Survey Mapping with the permission of the controller of Her Majesty's Stationary Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecutions or civil proceedings. Epping Forest District Council - Licence 100018534	







North Weald Flood Alleviation Scheme
General Scheme Plan
6.5 Flood Alleviation Scheme (FAS)

Drawn by	S. Singer
Checked by	J. Curran
Approved by	L. Curran
Project No.	72.2006

North Weald Flood Alleviation Scheme (F.A.S.)

Description of the scheme

The North Weald Flood Alleviation Scheme was constructed in two distinct phases. The phase at North Weald was carried out in 1990 with a further addition carried out at Thornhill in 1995. The schemes comprised the construction of a large diameter by-pass culvert with Flood Storage Ponds with culverts, pipes, ditches, inlet & outlet structures. The two phases of the scheme are detailed below.

The works executed under the North Weald FAS in 1990 comprised:

Flood flow diverted away from the High Road, via an offtake structure at Station Road into a 1.5m diameter pipeline approximately 820m long. A sweetening flow is maintained at all times along the existing watercourse. Gravity pipe diversion, running along Church Lane and discharging into the watercourse downstream of the village with a side-spill weir into the Church Lane Flood Storage Reservoir (FSR). This Reservoir was constructed to maintain the interests of downstream riparian owners and others subject to flooding and stores 38,000 m³ of floodwater (The pipeline itself varies from approximately 4m to 8m in depth below ground level.). At the inlet control structure to the storage pond, a proportion of the flow continues by twin pipeline to the brook, but under heavy flows excess water will enter the storage reservoir, where its passage downstream will be delayed until flows in the brook subside. Work was also carried out on the existing North Weald Brook as part of this Contract. The work involved excavation, embankment raising, landscaping and the placement of Gabion baskets. The Scheme was designed to cater for a 1 in 50 year storm (probability of 0.02), if this is exceeded then the FSR will discharge via a spillway to the adjoining North Weald Brook.

The works executed under the Thornhill FAS in 1995 comprised:

Improvements to existing ditches, excavation of new ditches and culverts and the construction of 2 flood storage ponds to alleviate flooding in Thornhill, Emberson Way and the High Road (which was caused by run-off from approximately 60 hectares of arable farmland).

New ditches and culverts were constructed to intercept run-off at the boundary between the farmland and the housing estate, collecting run-off from approximately one third of the catchment and draining in to Pond 1. This run-off is attenuated by the penstock at the outlet to the pond. A new ditch then carries the attenuated flow to a confluence with an existing ditch, which collects run-off from the other two thirds of the catchment. A small permanent pond was formed at the confluence, and an earthfill dam with a penstock to control outflow was constructed to attenuate the combined flows (Pond 2). The outlet pipe from Pond 2 discharges into an existing concrete channel which itself discharges into the main North Weald Brook.

The two flood storage ponds (Ponds 1 and 2) are capable of storing a total of approximately 6300m³ of surface water run-off during periods of heavy rainfall (2250m³ in pond 1 and 3920m³ in Pond 2). Included in the construction of these was a 450mm-diameter outlet pipe to each pond with inlet and outlet headwalls and a flow control penstock chamber. The outlet pipe to Pond 1 is approximately 38m long, that to Pond 2 approximately 64m long. Pond 1 was formed mainly by excavation and Pond 2 by construction of an embankment.

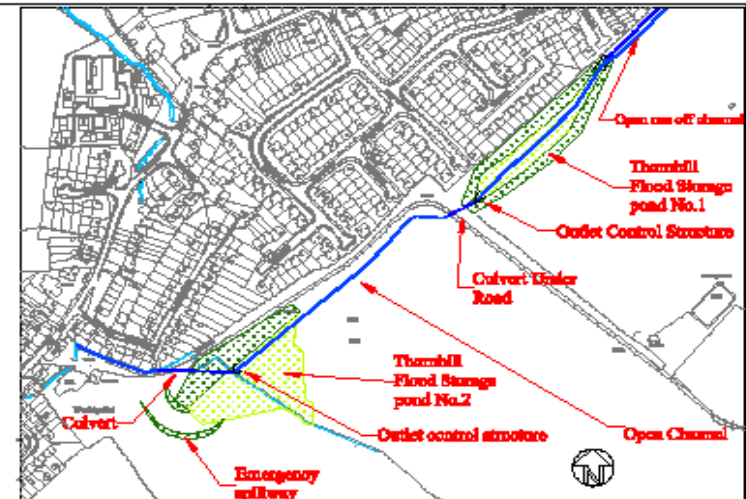
The Scheme was designed to cater for a 1 in 75 year storm (probability of 0.013) and if this is exceeded then the ponds discharge via a spillway either to Pond 2 (for Pond 1) or to the culvert channel leading to the North Weald Brook for Pond 2.

Telemetry to warn the Councils Land Drainage Section of either blockage to the outlet grille or very high water levels in Pond 2 was installed in March 2002. This would enable either emergency screen clearance or warning to residents to be issued, should overtopping appear to be imminent.

Thornhill Phase

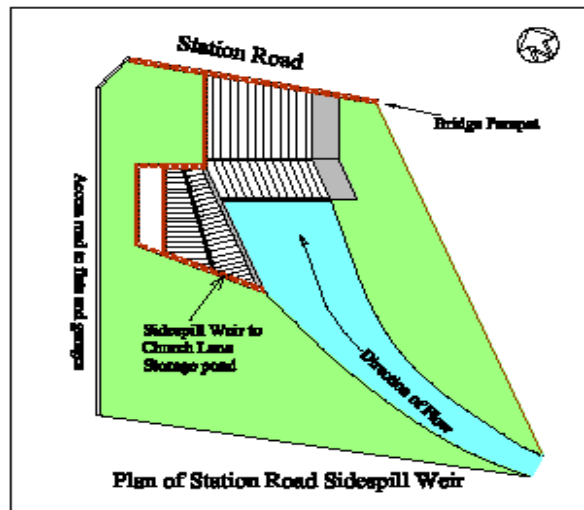
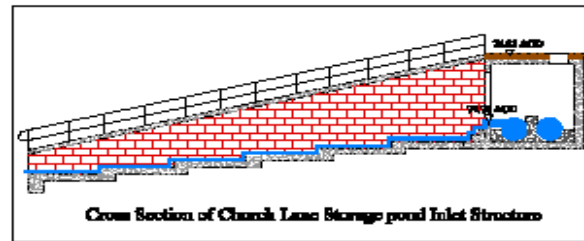
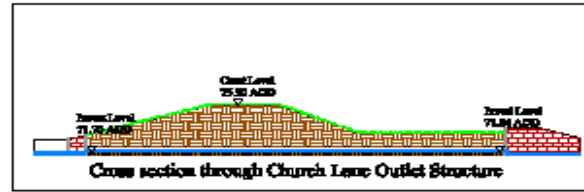
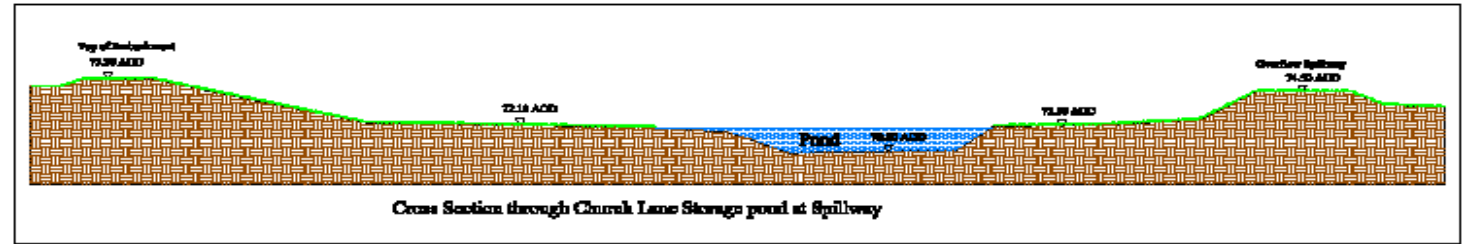
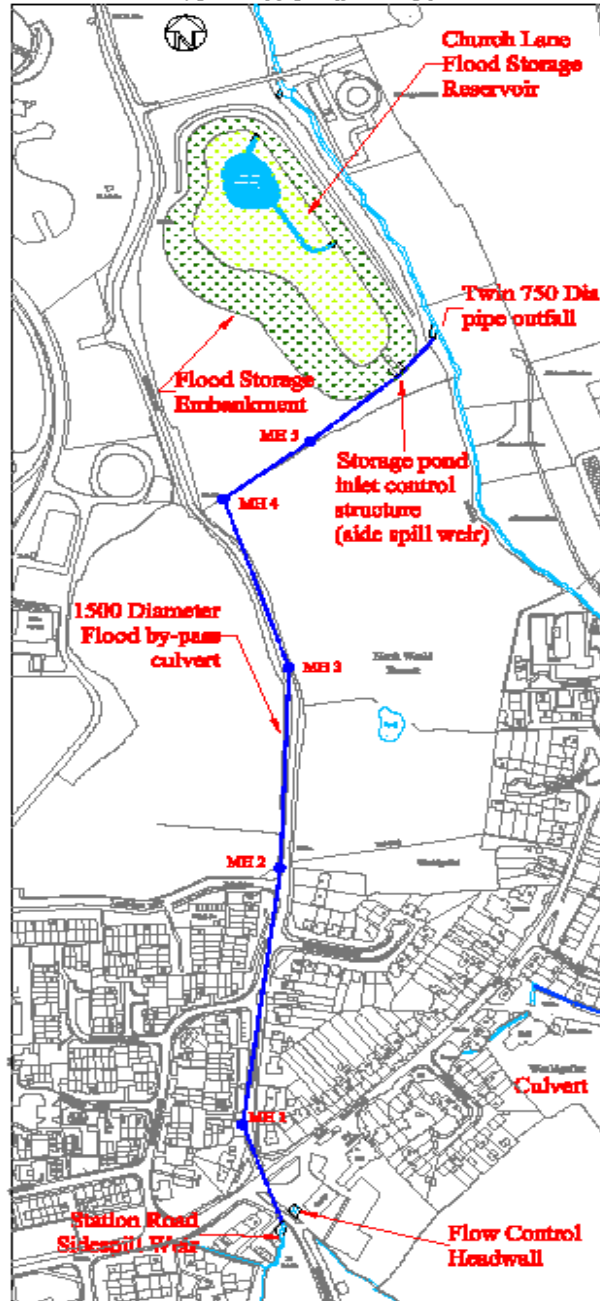


Section through Outlet Structure, Storage Pond 1

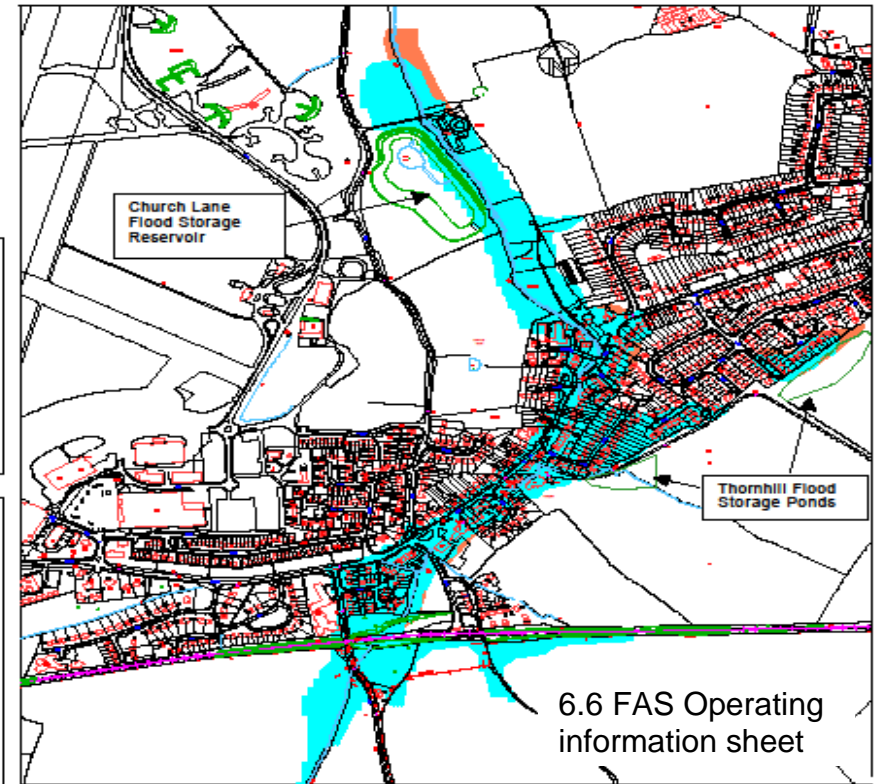


Section through Outlet Structure, Storage Pond 2

North Weald Phase



Flood Envelope and Properties at risk



6.6 FAS Operating information sheet



North Weald Flood Alleviation Scheme Operating information sheet

Drawn by
S. Ingar
Prepared by
J. Canton

Checked by
J. Canton
Date
May 2001

Not to Scale

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Section 7.0 APPENDIX II – Other Information

Section 7.1	Past Management	25
Section 7.2	Seed Mix Suppliers	26
Section 7.3	Tree Species and Suppliers	27
Section 7.4	Repair Works	28
Section 7.5	Drainage Maintenance Plan	31

7.0 Appendix II - Other Information

7.1 Past Management 2013 – 2019

For older records please refer to previous management plans

Date	Tasks	Staff hours	Volunteer hours
2013			
May	Coppicing hedge	12	84
November	Hedgelaying 40m FSC course	12	60
December	Bonfire and clearing up from hedgelaying	12	24
2014			
February	Tree planting	3	
March	Tree planting	4	
August	Strim steps and pull ragwort	2	
October	Pull reeds	6	
2015			
June	Removing tree guards	12	18
November	Hedgelaying 52 yards	12	36
2016			
January	Hedgelaying	12	18
March	Raking, planting & burning	12	96
November	Willow coppicing	12	78
2017			
May	Strim clover, spurge, dig up goats rue	6	
July	Strim clover, goats rue and steps	2	
November	Hedgelaying	12	48
	Bonfire and clearing up from hedgelaying	10	
	Hedgelaying	12	30
	Bonfire and clearing up from hedgelaying	6	
2018			
August	Raking, willow and spurge removal	12	84
October	Raking the banks	12	78
November	Coppicing 1/3 C1, coppicing section of C5	12	90
2019			
January	Hedgecutting (grounds)		
May	Cut hawthorn in mammal strips	3	
	Strim steps, path at top and spurge	4	
July	Pull goats rue	1	
	Cut and rake spurge	1	
August	Remove Himalayan balsam	6	
October	Raking the banks- 2 days	24	162

7.2 Seed Mix Suppliers

To initially establish the wet grassland meadow, seed mix was purchased from Suffolk Herbs. The mixes used were the Pond Edge Mixture F8 and grassland mix watermeadow/wetland/pond edge G3.

Pond edge Mixture F8

The mix would have contained a minimum of 10 species from the list below;

Hemp-Agrimony	<i>Eupatorium cannabinum</i>
Wild Angelica	<i>Angelica sylvestris</i>
Water Avens	<i>Geum rivale</i>
Greater Birds' Foot Trefoil	<i>Lotus uliginosus</i>
Meadow Buttercup	<i>Ranunculus acris</i>
Cuckoo Flower	<i>Cardamine pratensis</i>
Gipsywort	<i>Lycopus europaeus</i>
Yellow Iris	<i>Iris pseudacorus</i>
Purple Loosetrife	<i>Lythrum salicaria</i>
Meadowsweet	<i>Filipendula ulmaria</i>
Ragged Robin	<i>Lychnis flos-cuculi</i>
Devil's Bit Scabious	<i>Succisa pratensis</i>
St John's Wort	<i>H. terapterum</i>
Teasle	<i>Dipsacus fullonum</i>
Valarian	<i>Valeriana officinalis</i>
Selfheal	<i>Prunella vulgaris</i>
Marsh Woundwort	<i>Stachys palustris</i>

Water meadow/Wetland/Pond Edge G3

Slender Creeping Red Fescue

Chewings Fescue

Hard Fescue

Brown Top Bent

Dwarf Timothy

*Tufted Hair Grass * Native grass as available.

Address: SUFFOLK HERBS
Monks Farm
Coggeshall Road,
Kelvedon, Essex. Tel: (0376) 572 456

Nb. Suffolk Herbs went out of business at its first address which was at Sawyers Farm, Little Cornard, Sudbury, Suffolk. The mix was applied at 15% wildflower seed content.

7.3 Tree species and Suppliers

Trees were supplied by Spains Hall Nursery 1991 - 1993 and King & Co 1997 onwards.

Spains Hall Nursery	King & Co
Spains Hall Farmhouse	Woodstock
Finchingfield	Pods Lane
ESSEX	Dunmow Road
CM7 4NJ	Rayne, nr Braintree
	CM7 8SA

Tree Planting Season 1991/92

Point 1: Hedgerow south of meadow

Species	Size	Number	Notes
Hawthorn	45-60cm	25	12m entrance to the field to be left.
Dogwood	45-60cm	15	
Ash	60-90cm	4	

Total: 44

Point 2 : North bank of the bund - outside

Species	Size	Number	Notes
Oak	60-90cm	6	Not planted on the path around the bowl. Planting only on the sloping section of bowl not on trackside.
Field Maple	45-60cm	15	
Hazel	45-60cm	22	Planted at 1m spaced rows, 2m apart in staggered pattern. Crack Willow from Woodbine Pond, Waltham Abbey.
Hawthorn	45-60cm	44	
Dogwood	45-60cm	22	
Ash	60-90cm	11	
Crack Willow	Cuttings	22	

Total: 132

Point 3: North bank of the bund - inside

Species	Size	Number	Notes
Dogwood	45-60cm	15	Not to planted more than 1.5m from the lip. Path around to remain unplanted.
Hawthorn	45-60cm	30	
Guelder Rose	45-60cm	10	
Crack Willow	Cuttings	10	

Total: 65

Point 4 : West bank above the contour path and below arable field

Species	Size	Number	Notes
Ash	60-90cm	27	Trees and shrubs to be planted in groups on the bank with spacing of up to 10m between groups. Groups to be planted at 2m centres.
Oak	60-90cm	27	
Hazel	45-60cm	131	
Hawthorn	45-60cm	210	
Alder	45-60cm	27	
Guelder Rose	45-60cm	53	No planting to take place within 3m of path and 1m of field edge.
Grey Willow	45-60cm	55	
Goat Willow	Cuttings	50	
Crack Willow	Cuttings	50	

Total: 630

Tree planting season 1992/93

Point 5: Around flood water inlet

Species	Size	Number
Dogrose	45-60cm	47

Total: 47

Tree planting season 1993/94

Point 6: Hedgerow creation alongside access track

Species	Size	Notes
Oak	45-60cm	Double staggered row with 6 trees per metre.
Field Maple	60-90cm	
Hazel	40-60cm	
Hawthorn	45-60cm	
Dogwood	45-60cm	
Dogrose	45-60cm	

Total: Approx. 540

Tree planting season 1996/97

Point 7: Hedgerow gapping up alongside Church Lane

50 Hawthorn, Hazel, Dogwood and Field Maple were planted 40 - 60 cm

Tree planting season 1997/98

Point 8: Continued hedgerow gapping up alongside Church Lane

18 Hawthorn, Hazel, Dogwood and Field Maple were planted 40 - 60 cm

Tree planting season 1997/98

Point 9: Creation of a hedgerow on the southern boundary.

232 Hawthorn, Hazel, Dogwood, Field Maple and Oak were planted 40 - 60 cm

Tree planting season 1998/99

Point 10: Continued hedgerow gapping up alongside Church Lane.

35 Hazel planted 40 - 60 cm

7.4 Repair Works

Conducted March 2008

Introduction

The need for minor repairs to the flood storage area were identified in the summer of 2007 when an inspection by Epping Forest District Council engineering staff observed a depression at the toe of the spillway and a slip failure to a short section of the adjacent watercourse located approximately 10m downstream of and parallel to the spillway.

Design of repairs was completed over the autumn and winter and the repairs took place between 11 and 14 March 2007 by Pearl Ltd, ground works contractors with supervised by independent consultant Neil Harding

Description of the Repair Works

River Bank Repairs.

The failed river bank was cut-back beyond the failed surface to solid ground, a distance of approximately 1m. Tanalised timber piles were driven in a line along the toe of the bank with approximately 100mm of each pile being left above the river invert.

Imported clay was placed and compacted to form a new section of bank.

A 100mm diameter clay land drain was discovered during the excavation work and this was re-formed using twin walled plastic perforated pipe, the end of the pipe being extended beyond the finished earthworks by approximately 100mm. The new section of land drain exits the bank just above the line of timber piles.

Enkamat geotextile material was placed and lapped under the original existing geotextile - that is located under the grass from the crest of the FSA spillway to a point approximately half way down the river bank. The new Enkamat was fixed in place by being embedded into an anchor trench along the top of the river bank for the full width of the repair.

A 25mm layer of imported top soil with grass seed applied was placed over the entire repair area.

Spillway Toe Repair

The top soil was removed from the Enkamat geotextile along the full length of the spillway (apprx 25m) from the toe of the embankment over a width of 2m.

A longitudinal cut was made in the Enkamat and both halves of the material were peeled back and the original holding down pins were removed for re-use.

It was observed that the Enkamat was buried to a depth of at least 100mm and in places more than 150mm and that no grass roots had penetrated through the material reducing its efficiency to protect against scour damage during overspill conditions.

Imported clay was placed over the exposed area to a revised profile such that former depression along the toe of the embankment was replaced by a profile that gently sloped from the toe to wards lower ground downstream of the toe.

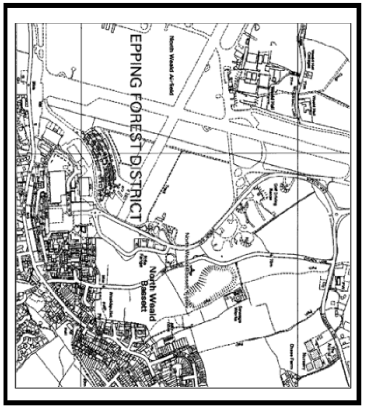
New Enkamat was lapped under the existing Enkamat along the toe and over that downstream of the toe and holding down pins were installed to firmly fix the geotextiles in place.

Imported top soil was placed and raked over the re-worked area and grass seed applied.

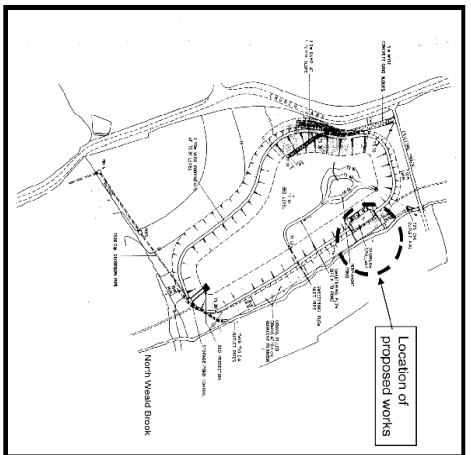
As-Built Details

All works (except the land drain encountered during repair of the river bank, were completed as per the drawing reference:

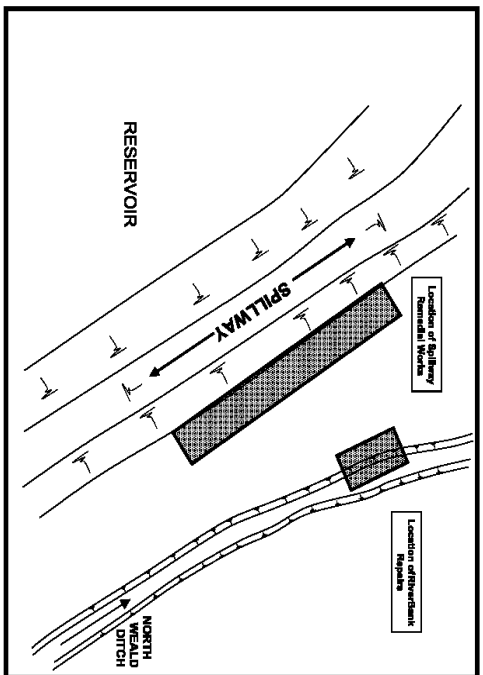
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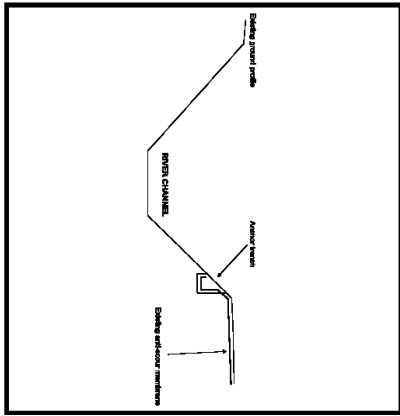
**LOCATION PLAN
SCALE 1:10000**



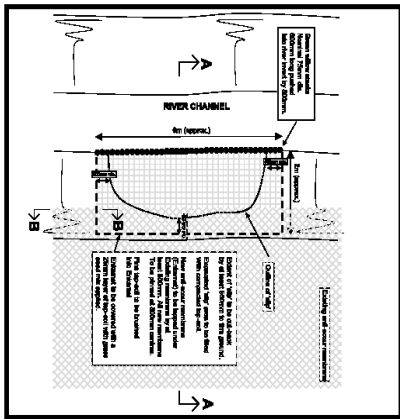
SITE PLAN (NTS)



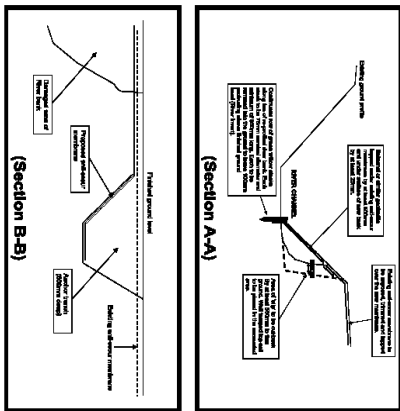
GENERAL LAYOUT (NTS)



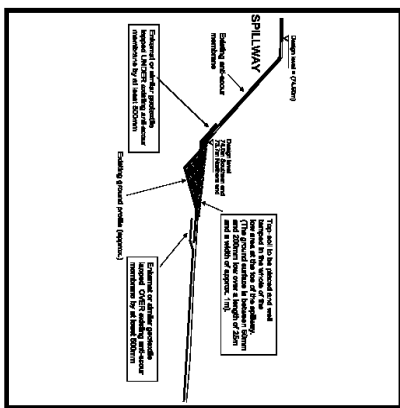
**ORIGINAL CONSTRUCTION DETAIL
RIVER BANK (Section)**



**PROPOSED DETAILS
RIVER BANK (Plan)**



**PROPOSED DETAILS
RIVER BANK (Section)**



**PROPOSED DETAILS
SPILLWAY (Section)**

Drawing Number
EFDC-001-01
REV:

**CHURCH LANE FLOOD STORAGE AREA
REMEDIAL WORKS TO RIVER BANK AND SPILLWAY**

Date : August 2007
Scale : As Shown

Neil Harding
Drainage Consultant
16 Jane Close
Aylesbury
Buckinghamshire
HP21 9YG
Tel: 01296 488219
Fax: 01296 488219
M.O.D. 0790 442 7397
email: neil.harding2@btinternet.com

7.5 Drainage Maintenance Plan

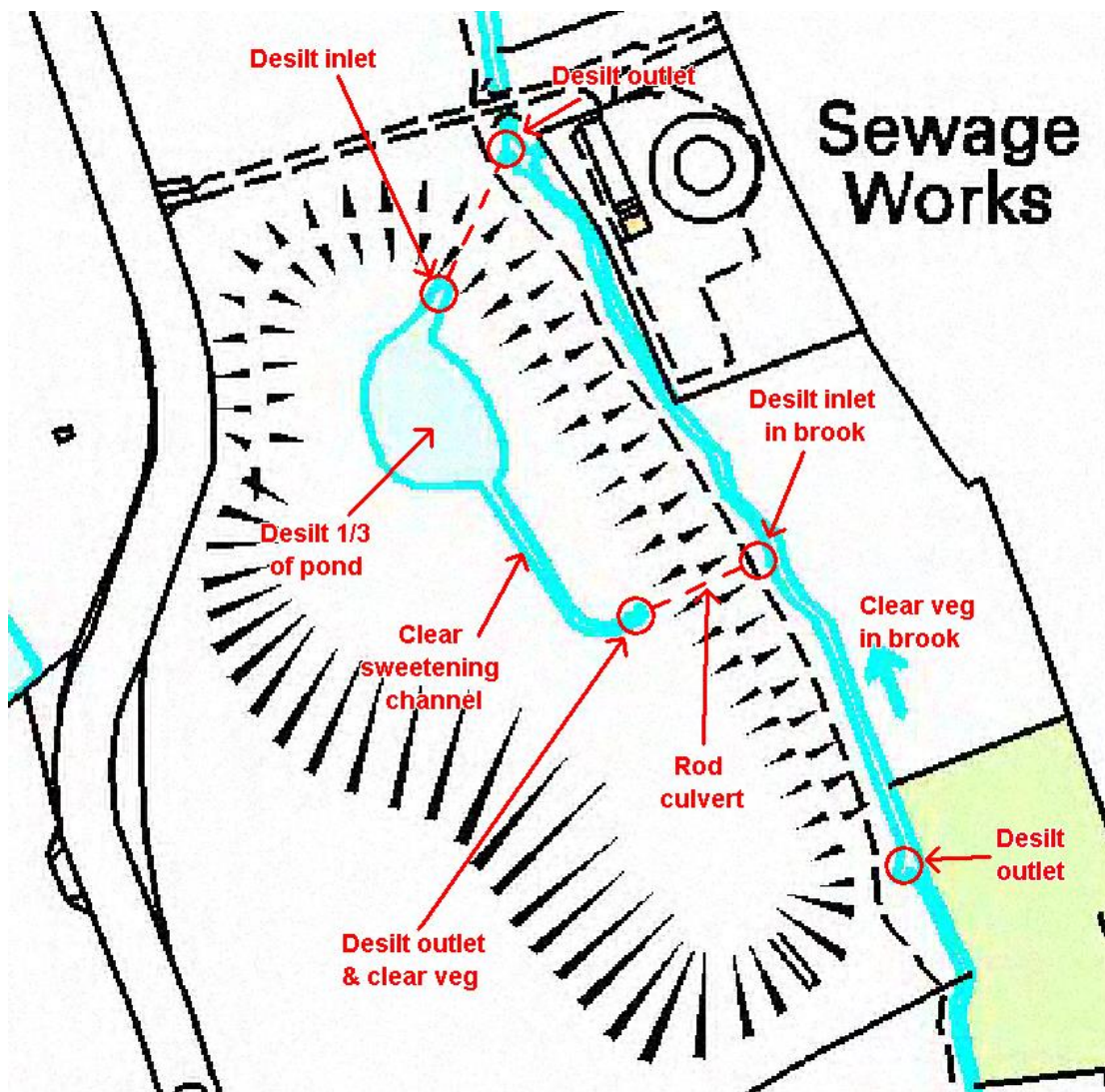
Drainage maintenance is arranged by Environmental Protection and Drainage.

Drainage works are reactive but will often consist of a combination of the following routine works in September each year:

- Desilt of culvert inlets and outlets
- Vegetation clearance around culvert inlets and outlets
- Rodding of culverts
- Vegetation clearance along banks of the brook
- Grass cut of the whole site
- Short grass cut of the spillway section
- Desilt of 1/3 of the pond (infrequent)
- Clearance of silt and vegetation in the sweetening channel
- Health and safety repairs to structures and life buoy.

Urgent works may be required such as repairs to inlet/outlets, clearance of culvert blockages, strimming, desilting etc.

Drainage works:



Any queries regarding drainage work to be directed to the Team Manager at Environmental Protection and Drainage.