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# River Idle Washlands SSSI

Water Level Management Plan

Originally published in December 2006

Reviewed June 2019

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## River Idle Washlands SSSI – Water Level Management Plan

### Foreword

The River Idle covers a catchment area of 842 Km<sup>2</sup> draining parts of North Nottinghamshire, Derbyshire and South Yorkshire into the River Trent at West Stockwith. It has a number of major tributaries, including the rivers, Maun, Meden, Poulter, Ryton and Oldcotes Drain. The area covered by the plan consists of the river corridor, which runs between West Stockwith and the A631 bridge at Bawtry, a length of 17.5 km.

There is a reliance on efficient drainage to support modern day demands on society and infrastructure. In 1980, West Stockwith pumping station was commissioned as part of the River Idle improvement scheme, this allowed the River Idle to be pumped or gravitated into the River Trent at times of high flows in the River Idle and prevented the ingress of high tides and flood water. Within the plan area the river has a very flat gradient flows through typical fen low lying areas, with rich agricultural land, that is supplemented with several land drainage pumping stations operated and controlled by Internal Drainage Boards.

The River Idle Washlands SSSI is made up of four geographically distinct units of washland, all below the high tide level of the River Trent. These sites are at Bawtry, Misson West, Misson East and Idle Stop. They cover an area of 88.6 hectares and were first designated in 1972 in recognition of their wildlife interest. The sites sit alongside major & minor floodbanks that provide 1:50 and 1:3 year protection to the surrounding farmland and communities.

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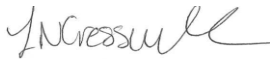

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# River Idle Washlands

## Water Level Management Plan Approval Statement

“I have reviewed this Water Level Management Plan and confirm that I support its recommendations”

Name	Louise Cresswell
Signature	
Date	26 July 2019
Position	Area Director East Midlands
Organisation	Environment Agency
Name	Dave Parker
Signature	
Date	9 <sup>th</sup> August 2019
Position	Area Manager East Midlands
Organisation	Natural England



## Executive summary

### Purpose of the plan

The Government has set a Biodiversity target to bring at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition by 2020.

A Water Level Management Plan (WLMP) provides a means of balancing and integrating the water level requirements for a range of activities within a Site of Special Scientific Interest (SSSI). It comprises a written statement that outlines the objectives for a SSSI and how they may be achieved. The Environment Agency has the primary responsibility, as the operating authority, for bringing 64 SSSI's in England back to favourable condition, by achieving appropriate water level management. The Idle Washlands has been identified as one of these priority sites. This document is the revised WLMP for the site and includes an action plan to implement the WLMP.

### Site details

The length of river corridor is bounded by major 1 in 50 year flood banks and high ground which extends from the town of Bawtry in the west to West Stockwith Pumping Station in the east. Located within the area is the River Idle Washlands SSSI. The SSSI is made up of four distinct blocks of land or units, each a geographically distinct site. These sites are known as Bawtry, Misson West, Misson East and Idle Stop (or North Carr).

### Conservation objectives

Natural England has set conservation objectives to maintain the specific designated habitats in favourable condition. These are outlined in Section 4.3.1

### Current site management

Two of the four SSSI units (1 and 2) are regularly summer-grazed with cattle by a local grazier under a Higher Level Stewardship Agreement with Natural England. The other two units (3 and 4) have a history of livestock grazing but are currently un-grazed. Unit 4 was mechanically mown in 2010 & 2011 and this has reduced the amount of willow scrub and the overall sward height. There are two water control structures on unit 4 and water control structures on Unit 1 adjacent to 'The Ship Inn' public house.

### Hydrological regime

The Idle Washlands are located on the floodplain of the River Idle. The key to improvement in the condition of the habitats is regular inundation and standing water through the winter and a high water table in the superficial deposits throughout the year. These conditions are not maintained under the current management system. High spring and summer water tables and shallow flooding historically maintained the habitat. A complex combination of the impacts of the River Idle Improvement Scheme, land management and water abstractions have been suggested as causes of the unfavourable condition of the SSSI.

A monitoring programme of shallow boreholes and river levels has been in place since 1998 and this has been used to monitor the previous WLMP targets and to inform the conceptual understanding of the hydrology of the SSSI.

The River Idle bounds each unit of the SSSI. The lower reaches of the river has a low gradient and flows through land of which the majority is below the River Trent high tide level. In washland environments the primary control on site wetness is flooding and retention of rainwater. Inundation's (floods) of the washland have become less frequent and prolonged following flood defence works. The aerial extent and duration of the surface soil saturation have both significantly diminished as a result of the flood defence improvements. Water loss is influenced by agricultural drainage. If water levels in adjacent fields are managed below the washlands this can cause water loss to drains external to the site, as well as internally.

Parts of the Idle Washlands lay above the Sherwood Sandstone, which is a major aquifer and is regionally important as a drinkable water supply. The groundwater table shows a decline from the 1960s to the 1990s. This reflects the development of the Sherwood Sandstone aquifer for public water supply. Sites above the Sherwood Sandstone have been predicted to be vulnerable to groundwater abstraction and falls in groundwater level in the aquifer. There is no direct evidence that groundwater historically supported surface water in the washlands. However, a fall in groundwater around the area may reduce surface wetness by promoting recharge of the groundwater store by the input of surface water.

The complex nature of the superficial deposits leads to a variable spatial response to changing conditions, such as flooding or recessions in the washlands. In some areas the superficial clays and low permeability layers will reduce hydraulic conductivity, have a good storage character and impede downward movement. If areas with impeded drainage are targeted to achieve a high shallow water table and standing surface water the achievement of these conditions is more likely. Maintenance of an increased groundwater level in the aquifer may reduce the recession water level in superficial deposits.

### **Conceptual Model**

A conceptual model has been developed from existing information and considers groundwater conditions at the site both before and after the flood alleviation works:

- Prior to the flood alleviation works, water entered the wetland system through rainfall, over bank flooding and year round groundwater flows. The adjacent floodplain probably had a high water table and standing water was removed from the site by overland flow returning to the river.
- The River Idle was deepened as part of the flood alleviation works, reducing the river water level, and reducing the frequency and volume of over bank flooding. The recovery of groundwater levels in surrounding areas affected by the rate of abstraction has not been at the rate anticipated.

Although the conceptual model appeared to be feasible studies over the past years have questioned its validity. It has been shown that the flood alleviation works are not the sole or primary cause of the degradation of the wetlands, and historic climatic factors and groundwater abstractions also need to be considered.

### **Further studies**

The continuation of groundwater and bird species observations.

### **Water level management objectives**

The main objective for the River Idle Washlands SSSI is to provide water levels to bring the site into favourable condition (or unfavourable recovering) by 2020. A series of specific targets to achieve this are outlined in Table 9.1.

# 1 Purpose of the Plan

## 1.1 Water Level Management Plans

A Water Level Management Plan (WLMP) provides a means of balancing and integrating the water level requirements for a range of activities within a Site of Special Scientific Interest (SSSI). These activities include agriculture, flood risk management and conservation.

In particular a WLMP may comprise a written statement that outlines the objectives for a SSSI and how they may be achieved. The plan is endorsed by the Environment Agency (the Operating Authority), Natural England, and as far as possible, by other parties with an interest in the site (see Section 16).

The Study Area of the Plan extends from the SSSI boundary to the limit of the area at risk from flooding as defined by the Environment Agency.

## 1.2 Water Level Management Plan Review

The Government has set a Biodiversity target to bring at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition by 2020.

Natural England is responsible for monitoring the condition of SSSIs, at least once every six years, using a set of common standards. The four SSSI units were assessed in August 2010 and most recently in July 2014. The table below shows the changes in unit condition:

**Table 1.1 SSSI Unit Condition Summary**

SSSI Unit	31/8/2010	2/7/2014
Unit 1 (Bawtry)	unfavourable recovering	unfavourable recovering
Unit 2 (Misson West)	unfavourable recovering	unfavourable recovering
Unit 3 (Misson East)	favourable	unfavourable recovering
Unit 4 (Idle Stop)	unfavourable no change	unfavourable no change

The Environment Agency has the primary responsibility, as the operating authority, for bringing 64 SSSIs in England back to favourable condition, by achieving appropriate water level management.

To achieve the Government target outlined above, the Environment Agency, in consultation with Natural England, will review the existing WLMPs for each of the 64 sites identified. A revised WLMP will be produced for each site with an action plan to implement the WLMP.

The Environment Agency has established a WLMP review process for each of the 64 SSSIs. Figure 1.1 outlines this process.

Favourable condition means the SSSI is being adequately conserved and is meeting its conservation objectives; however, there is scope for enhancement of these sites.

<sup>2</sup> Unfavourable no change means that the special interest of the SSSI unit is not being conserved and will not reach favourable condition unless there are changes to the site management or external pressures. The longer the SSSI unit remains in this poor condition, the more difficult it will be, in general, to achieve recovery.

<sup>3</sup> Unfavourable declining means that the special interest of the SSSI unit is not being conserved and will not reach favourable condition unless there are changes to management or external pressures. The site condition is becoming progressively worse.

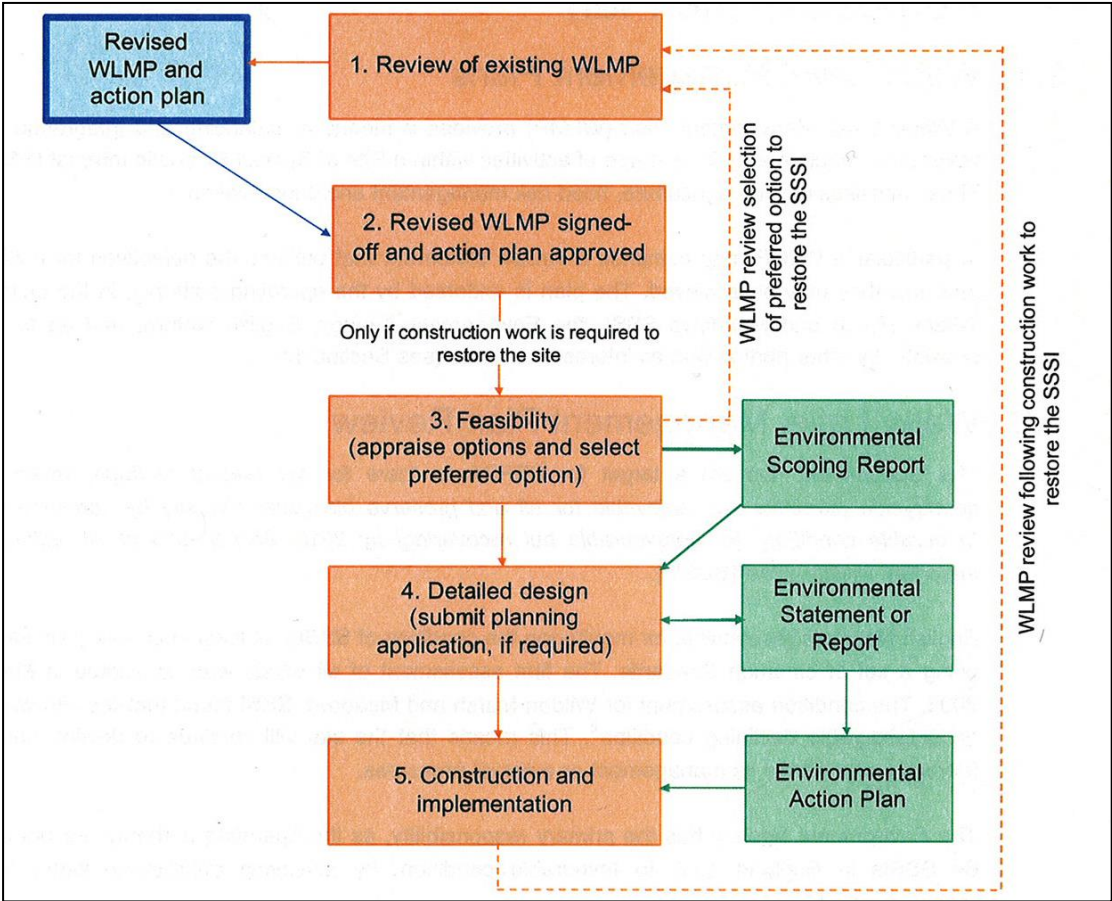
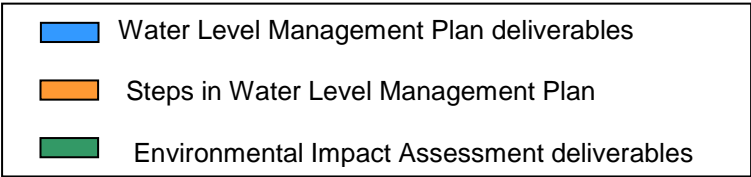


Figure 1.1. Water Level Management Plan review process



### 1.3 Parallel Studies

There are several studies being undertaken in parallel with the WLMP that need to be considered. Each study is described briefly in Table 1.2 below:

**Table 1.2. Parallel Studies**

Study	Details
Tidal Trent Strategy	The Tidal Trent Strategy is completed. There are approximately 250 properties potentially affected by flooding but it is agricultural communities and livelihoods that are at risk.
West Stockwith Pumping Station Strategic Study	West Stockwith Pumping Station pumps water from the River Idle catchment into the Tidal Trent. In the short-term (next 5 years), the pumping station currently requires work to ensure it remains operational. In the longer-term, the Environment Agency will carry out a strategic study to investigate options for the pumping station, and flood risk management and land drainage in the wider catchment.
Isle of Axholme Flood Risk Management Strategy	to provide the most cost effective approach for land drainage and flood risk management; to demonstrate resilience in the face of extreme events and/or future change; to maximise the overall carbon efficiency and sustainability of the options considered; to improve the management of existing biodiversity and incorporate gains where possible; to ensure that the strategy is understood and supported by key partners and the wider community.
Idle and Torne Abstraction Priority Catchment	The project aims to think innovatively to improve access to water within the Idle and Torne catchment. This is to be done through working with existing CaBA groups and a new catchment group that includes abstractors from different sectors. The project will help to steer the Abstraction Licensing Strategy and ensure a catchment based approach is taken to water resources.

## 2 Site Details

**Table 2.1. Site Details**

Site Name	River Idle Washlands SSSIs, Nottinghamshire and South Yorkshire
County	Nottinghamshire and South Yorkshire
Grid Reference	West Stockwith SK 78708 94963 to Bawtry Road Bridge SK 65599 92664
SSSI Area	88.6 ha
Site Status:	SSSI. Full Citation shown in Appendix A
Date Notified (under 1949 Act)	1972
Date Notified (under 1981 Act)	16.11.1983
Operating Authority	Environment Agency
Natural England Team	Peak to Trent Area Team, The Maltings, Wharf Road, Grantham, NG31 6BH
Local Planning Authority	Nottinghamshire County Council South Yorkshire County Council



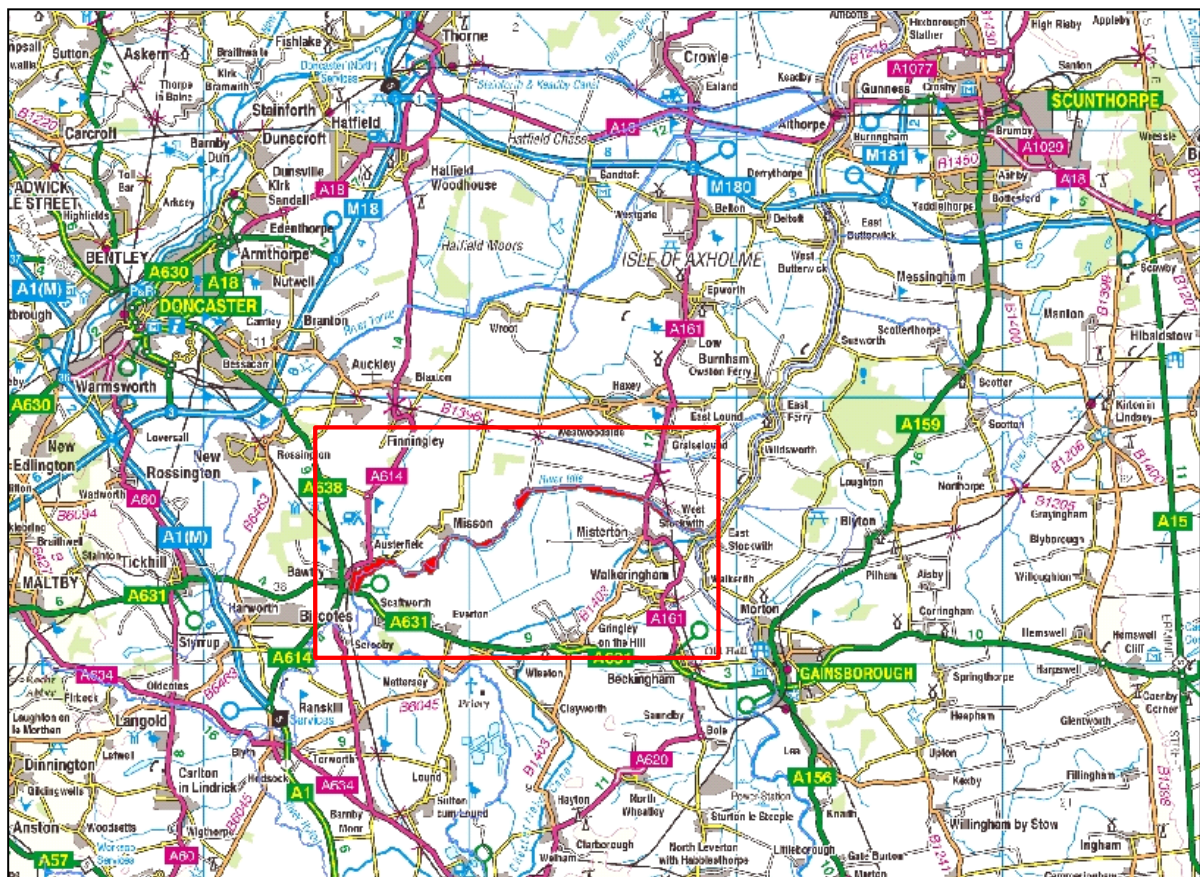
### 3 Site Location

The area covered by the plan consists of the river corridor, which runs between West Stockwith pumping station and Bawtry A631 bridge, a length of 17.5 km, shown on figure 3.1 and 3.2.

The length of river corridor is bounded by major 1:50 year floodbanks and high ground. Located within this area is the River Idle Washlands SSS1. There are four sites known as Bawtry, Misson West, Misson East and Idle Stop.

**Table 3.1. Site Location**

In the District of Bassetlaw	Scale	Map Ref No.
OS Sheets:	1/50,000	111 & 112
OS Sheets:	1/10,000	SK 69 SE
		SK 79 SW, NW, NE, SE



**Figure 3.1. Location Plan**



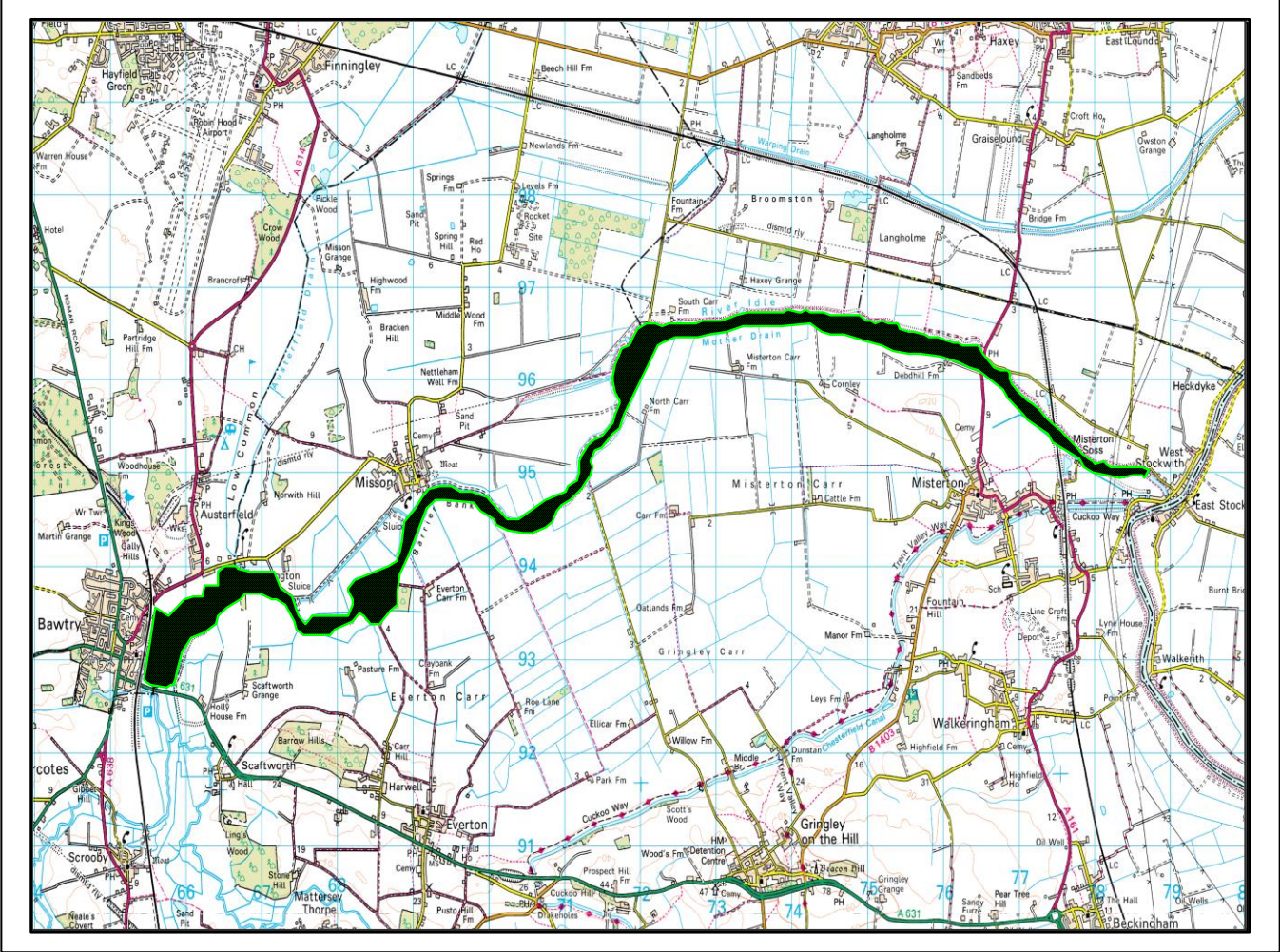


Figure 3.2. Boundary Plan

## 4 Nature Conservation Interests

### 4.1 Notified Habitats and Species

The River Idle Washlands SSSI is split into 4 geographically divided units, the principal habitat of all units being floodplain grazing marsh, which includes areas of dry and wet grassland, open water, swamp and fen.

**Table 4.1 Unit Areas**

Unit	Local Name	Main Habitat	Unit Area (Ha)
1	Bawtry-Newington Washland	Floodplain grazing marsh	50.91
2	Misson West	Floodplain grazing marsh	10.38
3	Misson East	Floodplain grazing marsh	4.58
4	Idle Stop (North Carr)	Floodplain grazing marsh	22.61

The washlands fall into the broad category 'floodplain grazing marsh' in terms of Biodiversity Action Plan (BAP) habitat types, and includes a mosaic of dry grassland, shallow open water, marshy grassland inundation grassland and swamp plant communities. Grazing marsh is generally defined as periodically inundated pasture or meadow, with ditches that maintain the water levels and contain either standing brackish or standing fresh water.

The River Idle Washlands SSSI is specifically notified as a SSSI on account of their lowland wet grassland and swamp plant communities (National Vegetation Classification (NVC) types MG13 and S5).

In addition to the grassland and swamp vegetation communities for which the site is designated, additional features of interest are the breeding and wintering bird assemblages that the habitat supports. These are outlined in Table 4.1a.

**Table 4.1a Designated Special Interest Features**

BAP Habitat Type	Specific Designated Features	Feature Description
Floodplain grazing marsh	Assemblage of breeding birds associated with lowland damp grassland	Breeding populations of birds characteristic of lowland damp grassland.
Floodplain grazing marsh	Assemblage of non-breeding birds	Regionally important numbers of wintering birds.
Floodplain grazing marsh	<p>Grassland and Swamp vegetation communities – <i>Glyceria fluitans</i>, <i>Alopecurus geniculatus</i>, <i>Polygonum amphibium</i>.</p> <p>Interpreted as NVC types MG13 <i>Agrostis stolonifera</i>-<i>Alopecurus geniculatus</i> inundation grassland and S5 <i>Glyceria maxima</i> swamp.</p>	Plant communities' characteristic of damp seasonally inundated and waterlogged grassland.

## 4.2 Historic and Current Nature Conservation Interest

The River Idle washlands were formerly characterised by areas of extensively grazed pasture, a high spring and summer water table and regular, shallow winter flooding.

In post-war years, counts of well over 100 Bewick's swans, flocks in the region of 500 to 900 wigeon, 500 teal, 1,700 pochard, and significant numbers of golden plover, black-tailed, godwit, lapwing, snipe, redshank and curlew were a regular occurrence along the river, on passage or in winter. Birds of prey such as hen harrier, merlin and short-eared owl were also regular in winter, whilst snipe, curlew, lapwing and redshank, bred in reasonable numbers in the spring/summer months. Other wildlife interest associated with the river itself, the washlands and wet ditches, included otters, water voles, dragonflies, damselflies, water beetles and a variety of aquatic plants.

In 1972, 250 ha of these washlands were designated as the River Idle Washlands SSSI in recognition of the nationally important numbers of wintering and passage wildfowl and waders regularly using the area.

In 1982, the River Idle Improvement Scheme, major flood defence and land drainage project, was completed. Since then, much of the washlands has been drained and now no longer receives regular, shallow winter flooding. The landscape has also become increasingly dominated by arable farmland.

Unfortunately, these changes mean that the bird and wildlife interest of the area has diminished. Some bird species, such as Bewick's swans, are now forced to utilise areas nearby, such as Misson Springs, to the north, an area only remaining relatively wet due to former mineral extraction operations and resulting drainage problems.

As a result the Idle Washlands SSSI boundary was reviewed, with the overall area of the SSSI being reduced to a total 88.6 ha in 1983. Unfortunately, since the scheme came into effect, the revised area has also suffered a reduction in interest due, in some places, to inadequate management and increasing disturbance but, most significantly, to the absence of shallow winter floods and a persistently low ground water level within the superficial deposits (not the Sherwood Sandstone).

Historically to evaluate ornithological interest, a three-year monitoring programme was undertaken between 2002 and 2005, which looked at breeding and wintering bird communities on the washlands. The study concluded that the washlands are currently failing to regularly support the target breeding species with small numbers of lapwing and only occasional nesting by snipe and redshank providing the only breeding wader interest. Breeding waterfowl comprises only small numbers of common species. Wintering waterfowl populations retained greater interest, with a good variety of species recorded including wigeon, gadwall, teal, golden plover and redshank. The size of the wintering bird assemblage varied enormously in line with inundation levels, reaching a peak of 10,458 birds but a 3-year mean of 6,215 birds. The individual populations of golden plover and ruff achieved national significance during this period, although populations of wintering swans were very low and occurred in only small numbers.

Wintering birds are monitored as part of the national Wetland Birds Survey (WeBS). Coverage has been a bit patchy over the last few years, but there is now a local birdwatcher doing the surveys. That data is with British Trust for Ornithology (BTO).

The most recent survey was carried out in 2010 by the (BTO), this is a summary of the report: A breeding bird survey was undertaken of the four discreet units that form the River Idle Washlands SSSI during April to June 2010 using standard survey methodologies. Only one species of wader, northern lapwing, was found breeding on the washlands (units 1 and 4). There is a list of 18 target breeding bird species for the washlands and 12 target species were recorded (mute swan, common shelduck, gadwall, shoveler, Eurasian teal, northern lapwing, common snipe, Eurasian curlew, common redshank, yellow wagtail, sedge warbler and reed bunting), of which eight species were recorded as having some level of breeding activity (mute swan, common shelduck, gadwall, shoveler, northern lapwing, yellow wagtail, sedge warbler and reed bunting). Overall the washlands scored a total of 12 for the breeding bird index, which is the minimum score to be within 25% of the threshold score of 16. The washlands are in a poor condition for the suite of target breeding birds, mainly through a combination of lack of water retention, unsuitable sward structure and other negative features. Of all the units, unit 4 performed the best for target species and unit 2 was the worst.

Some adjoining farmland, outside the SSSI, occasionally support some notable numbers of wintering and passage birds, mainly lapwing, golden plover, and Bewick's swans. Very occasionally, curlew and lapwing attempt to breed in these areas

Otherwise, wet ditches and other water bodies in the area manage to support aquatic flora and fauna, though much reduced compared to pre-scheme levels. Two sites, where significant examples of such interest have been retained or have since developed, are the Misson Lane Bank SSSI, a series of flooded borrow pits, and the Mother Drain SSSI, running parallel with the River Idle itself.

A river corridor survey was carried out in 1995 for the River Idle between West Stockwith and Bolham (Lapwings, 1995). This was updated in 2002 and described the river as 'typical of a lowland river that has been modified and engineered for flood defence purposes' EMEC, 2002.

A Phase I and Phase II vegetation survey of the SSSI was carried out in July 2006 (EMEC Ecology). The survey found a range of habitats present including unimproved and semi-improved neutral grassland, swamp and inundation grassland. The most extensive NVC vegetation communities within these habitats were: MG13 (*Agrostis stolonifera* – *Alopecurus geniculatus* grassland), S5a (*Glyceria maxima* swamp, *Glyceria maxima* sub-community) and OV31 (*Rorippa palustris* – *Filaginella ulginosa* community). As is typical of swamp and inundation grassland, the vegetation tended to be fairly species-poor. The survey report found that since a previous survey in 1983 there had been several noticeable changes in the vegetation. The extent of swamp and unimproved neutral grassland had decreased, while improved and semi-improved grassland had increased. The decline in extent of swamp and changes in swamp species also suggests parts of the site may be drier now than at the time of the previous survey.

The following table outlines the water level requirements of each of the designated interest features outlined in Table 4.2. These requirements will determine how water levels should be managed on the SSSI to maintain favourable condition.

**Table 4.2. Special interest features and water level requirements**

BAP Habitat Type	Specific Designated Features	Water Level Requirements
Floodplain grazing marsh	Assemblage of breeding birds associated with lowland damp grassland	surface pools and high subsurface water levels (0-20cms) providing high food availability (abundance of soil, ground-surface and aquatic invertebrates) within large open areas of pasture
Floodplain grazing marsh	Assemblage of non-breeding birds	surface pools with fluctuating water levels (20 -100cms depth) within large open areas of wet, short and weed-free pasture
Floodplain grazing marsh	<p>MG13 creeping bent <i>Agrostis stolonifera</i> - marsh foxtail  <i>Alopecurus geniculatus</i> inundation grassland</p> <p>S5 Reed sweet-grass <i>Glyceria maxima</i> swamp</p>	<p>Occurs within shallow depressions which capture floodwater or rainwater and on damp and occasionally waterlogged soils. Tolerant of regular and sometimes prolonged flooding. Surface water can be between 0-150mm deep by the end of March, with water below surface by May/June</p> <p>Occurs on level ground in slow-moving water or permanently waterlogged conditions where water table is between – 80cms or +40cms</p>

## 4.3 Conservation Aims

### 4.3.1 Natural England Conservation Objectives

Natural England has set a series of conservation objectives. These objectives need to be met in order to for the site to reach favourable condition.

The overall conservation objective for River Idle Washlands SSSI is to maintain the floodplain grazing marsh and the designated species in favourable condition. Maintenance implies restoration if evidence from condition assessment suggests a reduction in extent. Favourable condition requires that:

- The total extent of floodplain grazing marsh (88.6 ha) should be maintained. A loss of 5% or more is unacceptable.
- The total extent of MG13 grassland and S5 swamp vegetation (40.26 ha) should be maintained. A loss of 1% or more is unacceptable.

There are also site-specific standards that apply to the assemblages of breeding and non-breeding birds (see Table 4.3) and grassland and swamp communities (see Appendix C).

**Table 4.3. Site-Specific Definitions of Favourable Condition**

Criteria Feature	Attribute	Measure	Generic Target
Assemblage of non-breeding birds.	Population size.	Counts or Estimates of numbers of individuals for at least 3 years in 6.	Maintain bird assemblage at or above 50% of baseline value of 6215 birds.
Assemblage of breeding birds	Assemblage score (BTO index)	Record presence/absence of breeding species 1 year in every 6.	Maintain diversity of assemblage.  Total score must not fall by 25% or more. Baseline BTO index score is 16 therefore the score must not fall below 12.



### 4.3.2 Biodiversity Action Plan Targets

The UK Post-2010 Biodiversity Framework (published July 2012) superseded the National Biodiversity Action Plan, which comprises a series of plans for priority habitats and species along with targets to maintain and enhance conservation status on a national scale.

Coastal and floodplain grazing marsh is listed as a priority habitat and the targets have been carried forward from the existing Biodiversity Action Plan (UK Biodiversity Group, 1995):

- Maintain the existing habitat extent (300,000ha)
- Maintain the quality of existing habitat (300,000ha)
- Rehabilitate 10,000 ha of grazing marsh habitat which has become too dry, or is intensively managed, by the year 2000.

51.9 hectares of the SSSI lie within the county of Nottinghamshire. The Nottinghamshire Local Biodiversity Action Plan contains action plans for habitats and species of particular local significance. The Lowland Wet Grassland Habitat Action Plan (Nottinghamshire Biodiversity Action Group, updated in 2011) acknowledges the work that the Environment Agency, Natural England and Nottinghamshire Wildlife Trust are undertaking on SSSIs, confirming that the principle aim is to see SSSI's retain wetter condition through a combination of off river structures and in field options.

36.7 hectares lie within the Doncaster district of South Yorkshire. The Doncaster Local Biodiversity Action Plan 2007 identifies several factors for the decline in floodplain grazing marsh:

- Continued improvements in land drainage allow more intensive arable agriculture in many parts of the Humberhead Levels. This agricultural intensification and the use of artificial fertilisers leads to a reduction of diversity in many grasslands;
- There is a lack of traditional management in some sites, leading to reversion to rank grassland (MG1) and scrub. Hay making with aftermath grazing has become much less common, with a transition from hay to silage making results in earlier and more frequent cutting of grasslands, making such grasslands unsuitable for ground nesting birds. It also prevents flowering herbs from setting seed, resulting in their decline and eventual loss from the grassland;
- There is also a trend from mowing management to spring and summer grazing. Plants, which can survive the periodic un-selective cutting, may not survive the selective grazing by animals, coupled with increased trampling and risk of nutrient enrichment;
- Water abstraction from the Sherwood Sandstone aquifer, has lowered ground water levels from 'at the surface' to several metres below ground; and
- Structural flood defence works undertaken in the mid-to-late 1900s has deprived the floodplain grasslands of their natural cycle of flooding, which has exacerbated the effects of historic drainage engineering by Vermuyden in the early 17th Century.

The Doncaster Local Biodiversity Action Plan also acknowledges that pumped drainage systems have the potential to have greater control over water level management, and therefore could be used to the advantage of biodiversity.



### 4.3.3 Conservation Management

The management of river and groundwater levels is key to restoring favourable condition of the River Idle Washlands SSSI. The management of livestock grazing is critically important in order to maintain a desirable sward to support the breeding and non-breeding bird interest. Grazing is important in that it maintains grassland and provides the sward structure required for breeding and wintering birds. Mowing is an acceptable management practise for maintaining a short sward and controlling scrub in the absence of livestock being available. However, mowing does not produce the variety in sward height achieved through grazing and management through livestock is therefore preferable.

**Unit 1** is currently grazed by cattle each year from May to October at levels which encourage over wintering and breeding waders. There is currently a large area of permanent standing water on site which has not receded during the summer months due to high river levels.

**Unit 2** is currently grazed by cattle each year from May to October at levels which encourage over wintering and breeding waders. Standing water and bare ground provide good habitat for waders and breeding pairs have been observed. A number of shallow scrapes are planned to be created by Hanson as part of their minerals plan commitment.

**Unit 3** has not been managed for a number of years and has subsequently declined in condition. Scrub has started to encroach on to the site. The land has been included in a Countryside Stewardship Mid Tier agreement which started in January 2019. New fencing is due to be installed and the land will be grazed.

**Unit 4** was mown in two consecutive years (2010 & 2011). The land has not been managed for a number of years and has subsequently declined in condition. Scrub has started to encroach on to the site. The land has been included in a Countryside Stewardship Mid Tier agreement which started in January 2019.



Figure 4.1. Map showing River Idle SSSI Boundaries



## 5 Other Land Use Close to the Study Area

### 5.1 Archaeology

The River Idle floodplain is known to have Bronze Age, Iron Age and Roman finds. There are important archaeological sites just outside the plan area at Newington and Misson, and there is evidence to suggest a Roman presence at Bawtry village.

During recent Environment Agency enhancement works within the Bawtry unit of the SSSI, some Roman archaeological remains were discovered. The planned scrape creation was amended to avoid further disturbance, and a geophysical survey was undertaken to assess the likely extent of the remains. This concluded that the finds and structural material identified during the watching brief do not appear to be located within a wider area of archaeological activity and that this may have been the site of a single, stand-alone, structure, possibly a shrine. However, in-situ structural features are generally more likely to be identifiable by resistance survey than the magnetometry survey that was undertaken and therefore it may be worth carrying out a small scale, detailed resistance survey to verify this.

Archaeological artefacts, in particular organic remains, are usually best preserved in situ within wet peat layers. Any remains within the plan area would therefore benefit from increased wetting of the washlands. However, the potential archaeological interest will need to be taken into account before any future ground works are carried out at the site.

### 5.2 Recreation

The river is fished on both banks by various fishing clubs downstream of Bawtry. The Environment Agency own the left bank downstream to a point below Idle Stop, and the right bank below Misterton Soss. These banks are currently not leased to any club. A close season for coarse fishing is maintained on the river and at Misson Line Bank SSSI. The close season runs from 15<sup>th</sup> March to the 15<sup>th</sup> June. High and low water levels can affect fishing matches.

There are public rights of way along parts of the river, but these are not continuous. However, the floodbanks are an attractive walk along the river and are used regularly by people exercising their dogs.

The presence of birds, along the river valley, makes bird watching an important recreational activity in the river valley

### 5.3 Navigation

There is an ancient public right of navigation on the River Idle from West Stockwith upstream to Bawtry. There is no navigation authority and the Environment Agency does not have any statutory obligations. The river is used when water levels permit, for boats, however it is only navigable up to

Haxey Gate. There are **no authorised** facilities or moorings provided for boaters along the river. Access into and out of the River Idle for navigation is through the Environment Agency owned pumping station and sluice gates at West Stockwith. Boats only enter the river when there is sufficient depth of water upstream to allow boats to navigate. Boaters must arrange in advance with the Environment Agency passage through its structures at West Stockwith.

The river is also occasionally used by canoeists. There have in the past also been reports of jet skiers using the river.

## 5.4 Fisheries

The River Idle downstream of Bawtry varies in habitat structure but is predominantly composed of deep glides typical of a lowland river. The fish density distribution is not equal across this stretch with Bawtry being the fisheries survey site with the highest fish density and species diversity. The other sites surveyed downstream of Bawtry as part of the Environment Agency's National Monitoring Program are Misson, Haxey Gate and Misterton Soss.

Species confirmed as being present on this stretch in recent years are perch, roach, dace, chub, gudgeon, pike, eel, flounder, and bleak. One adult salmon has been caught at the Bawtry site.

The marginal reaches offer the best fish habitat within the river where macrophytes and overhanging trees provide some structure. However, in-stream fish habitat is generally poor, largely due to the absence of a pool-riffle structure, though submerged macrophytes do provide some additional habitat interest.

The Environment Agency have also had reports of invasive species along this section of the River Idle between West Stockwith and Bawtry and these include the American signal crayfish which has been resident in the catchment for a number of years and also Chinese mitten crab, the first record of this species was in September 2013, with further reports in 2014, it is thought that this species will now be resident within the catchment.

## 5.5 Agriculture

The agricultural land along the plan area is divided into two Internal Drainage Boards (IDBs). These are outlined in Appendix E.

- Isle of Axholme and North Nottinghamshire Water Level Management Board
- Doncaster East Drainage Board.

The area of land receiving flood protection has enjoyed a significant improvement in drainage conditions since the completion of the capital scheme in the 1980s.

With the exception of flooding in 2000 there has been no other flooding except on the SSSI washlands and the drainage status has improved significantly. However it must be noted that the frequency of flooding in the SSSI's has not been taking place, as it should be.

The land use is now intensive on most of the pre 1980's extent of the SSSI with rotations that include winter cereals, oil seed rape, sugar beet, potatoes and field beans. Little of the protected land is down to grass except as a break crop in arable rotations. Most of the grassland in the protected area is not grazed but cut several times a year for forage.

The areas that are not protected from flooding are entirely down to grass and are farmed extensively with typical grazing seasons from April to September/October for beef cattle grazing.

## 5.6 Minerals Extraction

The geology of Nottinghamshire is such that it has become one of the largest mineral producers in Great Britain. Sand and gravel deposits occur extensively in the low lying areas of the River Idle catchment where extraction is carried out on a large scale.

The closest site to the plan area is operated by Hanson Quarry Products Ltd and lies to the west of Misson between Bawtry Road and Slaynes Lane. To enable sand and gravel to be removed dewatering of the working areas takes place and following treatment this water is discharged into the River Idle under the terms of a consent issued by the Environment Agency, the details of which are shown in Table 8.2.

Dewatering may be significant in this area. The quarry is relatively shallow, however, the low lying nature of the adjacent land makes this a potential issue. No dewatering is currently occurring from the quarry and the sluice gates into the Idle have been removed. However, there is a current planning application to extend the quarry to the west of the previous works. If this goes ahead, further pumped dewatering will be required.

Hanson are committed to restoring this site for nature conservation once works are finished. Ongoing discussions with the Environment Agency, Natural England and Nottinghamshire Wildlife Trust have taken place with regard to improving Unit 2 of the River Idle Washlands SSSI as part of the quarry restoration. The principal restoration objectives for the whole site on final restoration are to:

- create 46ha of lowland wet grassland with cattle corrals to enable grazing management;
- create 11ha of reedbed;
- plant or gap-up 4.5km hedgerows to consolidate landscape character and create habitat;
- create eutrophic and mesotrophic standing open water bodies with associated fen, marsh and swamp habitat;
- enable precise control of water levels throughout the year with the use of sluices and channels to allow controlled amounts of water onto the site from the River Idle;

- use of the field to the west of the extraction area at Newington South for storage of water for use as required to maintain levels in the reedbeds and floodplain grassland and to provide further seasonally wet habitat;
- improve the habitat of the Newington North site by supplementing water levels, if needed;
- improve Unit 2 of the existing River Idle Washlands SSSI for wildlife;
- create a public access route on part of the site (Newington West) away from main areas of nature conservation; and
- install a boardwalk, viewing platform and interpretation boards to aid enjoyment of the site by the public. (Hanson; 2016)

## 6 Flood Risk Management

### 6.1 Watercourse

The River Idle has a catchment area of 842 km<sup>2</sup> (325 sq miles) and drains the greater part of North Nottinghamshire together with eastern parts of Derbyshire and South Yorkshire. Upstream of Bawtry the river receives flows from the rivers Maun, Meden, Poulter and Ryton. From Bawtry the river flows in an easterly direction to West Stockwith, north of Gainsborough, where the River Idle joins the River Trent.

The area covered by the Plan consists of the river corridor, which runs between Bawtry Bridge and West Stockwith, a length of 17.5 km. Within this area the river has a very flat gradient and runs through typical fen type areas with rich agricultural land. The majority of the land in the area lies below the Trent high tide level and since the early 1600s, when King Charles I engaged the dutchman Cornelius Vermuyden, works of reclamation and land drainage improvement have been an ongoing process.

Due to the low-lying nature of the land downstream of Bawtry, there is a reliance on efficient drainage to support intensive agriculture. In some instances this has only been achieved by constructing pumping stations which discharge into the River Idle from adjacent Internal Drainage Districts. Because the River Idle discharges into the tidal reach of the River Trent it has been necessary to build structures to prevent high tides and flood flows from the River Trent entering the River Idle (figure 6.1).

In 1938 the River Trent Catchment Board constructed a 12.1m wide x 6.1m high vertical lift sluice gate, which is still in place today. This replaced a stone structure at Misterton Soss, 1.5km from the River Trent that was made up of several culverts with timber pointing doors, together with a lock. Until the pumping station at West Stockwith was completed the sluice gate was regularly opened during periods of low tide to allow water to discharge from the River Idle into the River Trent.

At times when the River Trent was in flood, water could not discharge from the River Idle and consequently the lower reaches of the river, to the confluence with the River Ryton, acted as a receiving pond for water draining from the higher part of the catchment. On such occasions, water levels rose in the River Idle and

hundreds of acres of washlands alongside the river became inundated. The longer the period when discharge to the River Trent was prevented, the higher the level of ponding in the lower reaches of the River Idle.

In order to contain this flooding to washland areas (see Figure 6.2) a system of major floodbanks linking areas of high ground has been constructed along both sides of the river. These floodbanks, located between Bawtry and West Stockwith require regular maintenance to ensure their structural integrity. The construction of the pumping station at West Stockwith allows the ponded water to be evacuated into the River Trent at any stage of the tide.

There has been a long history of flooding of the River Idle and in the past 60 years there have been eight occasions when either the major flood defences failed or when failure was only prevented by emergency action. The main event in this period was the March 1947 flood when over 2,000 hectares of agricultural land in the Everton area were flooded to an average depth of 1.2m and it took 2 months to de-water the flooded land.

The river levels are now controlled by the operation of West Stockwith Pumping Station, which was formally opened in July 1981 and designed as an integral part of the "River Idle Improvement Scheme".

Adjacent to the station there is a gravity channel for the River Idle, controlled by vertical lift sluice gate 9 metres wide and 7 metres high. At the outfall of the River Idle there is the old original sluice which controlled the discharge of the Idle into the River Trent. These two sluices are now linked by sensors located in the River Trent and River Idle and are used to maximise the gravity discharge of the Idle into the Trent. The pumps are brought into use only during adverse conditions.

Current weed control practice within the channel is in accordance with recommendations laid down in the Silsoe College report. As a result of this report the section from Bawtry to West Stockwith is now cut with a weedboat only once a year over approximately 60% of the channel width thereby allowing aquatic marginal plants to thrive on both sides of the riverbank. The system currently used on the River Idle is to allow the cut weeds to float with the current to a weedscreen and boom at Haxey Gate where they are removed by an excavator and taken to the Briar Farm recycling site near Sandtoft. Weeds cut in the River Idle downstream of Haxey Gate are allowed to float to West Stockwith and are removed by an excavator at the pumping station. However, the weed growth downstream of Haxey Gate is by no means as great as that upstream as the deeper water in the downstream length stops prolific weed growth.

Survey and investigation is carried out every 10 to 15 years to determine whether de-silting work is necessary, but this time scale could be modified due to either long periods of low flow or following periods of flooding. These criteria have been established from the following:

- The consultant reports by Dr Sears at the University of Newcastle upon Tyne regarding sediment transport and channel siltation in the River Idle and the Mott MacDonald Hydraulic model tests in the River Idle.
- Historical evidence, which indicates that siltation has always been a problem in this section of river.

In the event of high water the removal of debris from bridges and structures on the watercourse is undertaken.

## 6.2 Structures

### West Stockwith Pumping Station

The river Idle levels are now controlled by the operation of West Stockwith Pumping Station, which was formally opened in July 1981 and designed as an integral part of the “River Idle Improvement Scheme”. The station is capable of pumping  $35.4 \text{ m}^3\text{s}^{-1}$  through four large electrically driven axial flow pumps (2 No at 2.40 metres and 2 No at 1.50 metres diameter).

### Trent Idle Sluice Gate

In 1938 the River Trent Catchment Board constructed a 12.1m wide x 6.1m high vertical lift sluice gate, which is still in place today.

### General River Structures

There are numerous river structures, pipes and outfalls between Bawtry and West Stockwith P.S., which are to be listed in the database of this plan to be created after the consultation period has expired.

## 6.3 Floodbanks

### Floodbank Maintenance

The maintenance of the major floodbanks, is undertaken in accordance with the Flood Risk Management Systems including:

- Impact of Flooding
- Potential Impact on People from System Failure.

The River Idle is embanked across the Trent floodplain. On the North bank of the river, the floodbanks extend from Newington to West Stockwith, apart from gaps where high ground exists. On the South bank the floodbanks extend from Bawtry Bridge to West Stockwith.



**Table 6.1. Lengths of Major and Minor Floodbanks**

LENGTHS OF MAJOR FLOODBANKS	
North Bank	10.50 km
South Bank	17.20 km
LENGTHS OF MINOR FLOODBANKS	
North Bank	6.90 km
South Bank	1.50km

The majority of these floodbanks are mown on average three times a year using an AEBl ride-on mower for riverside berms and floodbank top and a tractor mounted long arm 25s mower for riverside batters and floodbank batters. Inaccessible areas are cut with pedestrian mowers and rough vegetation with motor scythes. Some relatively short lengths between Newington and Misson are grazed and, on average, these require only one annual cut. The section of Major, South embankment from Debdhill Farm at Haxey Gate to opposite Misson is not cut until late August. This provides a valuable undisturbed linear wildlife habitat throughout spring and summer. The bank batters adjacent to SSSI land at Misson West and Misson Line Bank SSSI are also left uncut until late summer to minimise disturbance to the SSSIs. Riverside berms and area of channel side are cut on one occasion in late summer.

Re-seeding of damaged areas of turf on floodbanks and berms is carried out as necessary.

## 6.4 Operational Procedures

### 6.4.1 General

West Stockwith Pumping Station is operated as necessary in accordance with prescribed levels.

- Flood emergency duties are performed as necessary, e.g. patrolling of floodbanks.
- Periodic inspection of the watercourse including flood defences is carried out to identify any necessary work requirement or Environment Agency by-law infringements.
- Pest control and the filling of holes in the floodbanks, caused by rabbits, moles and rodents etc, is normally carried out three times a year or as required.
- To avoid obstructions to flood flows it is necessary to pollard or coppice trees and bushes and to cut vegetation and this is undertaken approximately once every three to four years. This work is pre-programmed with Natural England and the Environment Agency.
- Checking, cleaning, painting, etc. of the flap valves is carried out routinely.

## 6.4.2 Gate operations

As the River Idle discharges into the tidal reach of the Trent, it is necessary to maintain a sluice gate to prevent high tides, flood flows and silt from the Trent entering the River Idle.

The sluice gate automatically opens (normally twice a day) to allow water to discharge from the River Idle into the Trent at low water level. During dry summer periods, to assist with maintaining adequate supplies of water, the gravity gate will not allow the River Idle water level to fall below 1.7 metres AOD through unnecessary discharges into the River Trent. During times of Trent flood conditions the River Trent level does not fall below the River Idle and the gate is unable to operate, consequently the lower reach of the River Idle acts as a receiving pond for waters draining from the higher part of the catchment.

Prior to 1980 and the construction of the pumping station, hundreds of acres of land alongside the river became inundated on such occasions. The longer the period when discharge to the River Trent was prevented the higher the level of ponding in the lower river Idle.

Since 1980, this flooding can now be contained to recognised washland areas by a system of minor and major floodbanks on each side of the river. Some of the designated washland areas are protected from flooding by minor banks, which are likely to be overspilled once every three to five years. However, the washlands situated at Idle Stop and Bawtry Carr are designed to flood more frequently.

The capacity of the pumping station is approximately half the peak flood flow of the River Idle. To cater for the situation where flow in the River Idle is greater than the pumping capacity, balanced storage will be taken up in the washlands by controlled spillage over the side weirs in the minor banks.

The control regime of the pumps at West Stockwith allows all pumps to be operational before any overtopping of the minor banks occurs. The levels at the pumping station normally being held between 2.1 and 1.9 mAOD on duty pumping.

## 6.4.3 Automatic System Overview (Pumping Station and Sluice Gates)

The prime function of the automatic control system is to control the following:

1. The (old) Trent/Idle sluice gate
2. The new sluice gate at the pumping station
3. The pumps
4. The discharge of water from the River Idle to the River Trent with minimum use of the pumps

To perform these functions the system is equipped with remote continuous water level measurement in the River Trent and River Idle at four locations. These levels are transmitted to the pumping station and used to control the operations.

The locations of continuous water level measurement:

1. River Trent, Owston Ferry 7Km downstream of West Stockwith
2. River Trent, downstream of the Trent/Idle sluice gate
3. River Idle, upstream of Trent/Idle sluice gate
4. River Idle, upstream of pumping station

Sluice gate position, pump status, power supply and ancillary equipment are also continuously monitored at the pumping station.

The operation system monitors levels at Owston Ferry to detect a rising tide. When such a tide is detected the Trent/Idle sluice gate is automatically closed, to prevent the tide running from the River Trent to the River Idle. In normal (non-flood) conditions the gate remains shut while the River Trent level tidally rises and falls to below the level of the River Idle at which point the Trent/Idle sluice gate would open and allow gravity discharge.

During periods of heavy rainfall and when the Trent/Idle sluice gate is closed pumping is required. When the water levels upstream reach pre-set levels the pumps are enabled. Pumping takes water from upstream of the pumping station sluice gate to below it.

The automatically controlled sequence of events at commencement of pumping is as follows:

1. Pumping station sluice gate closes. This is accompanied by an announcement on warning signs to river traffic, anglers' etc. that pumping is about to begin.
2. When pumping starts the water level builds up in the discharge bay (the river channel between the two sluice gates)
3. When the water level in the discharge bay is higher than in the River Trent the operating system instructs the Trent/Idle sluice gate to open. This allows the pumped water to discharge to the River Trent.
4. Pumping continues until the River Idle water levels upstream of the pumping station are higher than in the River Trent. The pumps are then disabled and the pumping station sluice gate is opened to allow gravity discharge.

A considerable level of redundancy was built into the measurement and control equipment intending to make it very tolerant. The levels of fault reporting are on the main equipment panel in the pumping station, and an intelligent VDU terminal, which is located at the Gainsborough Office. Selected alarms are also transmitted to the Environment Agency Control Centre at Sapphire East, Solihull by a Delta Technical Services TG10S0 outstation.

Local and remote manual override controls are available for all plant items over which the system can exercise control.

**Table 6.2. West Stockwith Pumping Station Operation**

Stage	Pump Combination	Discharge $m^3s^{-1}$	Start Level mAOD	Stop Level mAOD
1	1	5	2.1	1.9
2	1 + 4	10	2.3	2.0
3	2	12	2.5	2.2
4	2 + 1	17	2.7	2.4
5	2 + 1+ 4	22	2.9	2.7
6	2 + 3	24	3.1	2.9
7	2 + 3 + 1	29	3.3	3.1
8	1+2+3+4	34	3.5	3.3

Note: - During the summer period pump No.1 is switched off thereby increasing the minimum start level by 200mm to 2.3m AOD.

## 6.5 Flood Situations

### 6.5.1 River Idle Conditions Before Starting Additional Pumping or Gravity Operations

The following three river Idle conditions must be realised before any additional pumping or gravity operations, over and above the normal automatic operating levels at West Stockwith Pumping Station, can take place.

- A combined flow rate of 10  $m^3s^{-1}$  or more at Mattersey & Blyth recorders.
- A water level gauge board reading of 2.5 mAOD or above at Bawtry Bridge.
- The SSSI washlands must be flooded at Bawtry.

Pumping or Gravity discharge into the river Trent will not be allowed to be below 1.7mAOD due to abstraction licences along the River Idle.

## 6.5.2 River Idle Conditions Required to Stop Additional Pumping or Gravity Operations

The following river Idle conditions when realised, on falling levels and flows, will trigger the stopping of any additional pumping or gravity operations, over and above the normal automatic operating levels at West Stockwith Pumping Station.

Either of:

- The river Idle water level at Bawtry Bridge falls to 2.0 m A.O.D
- A 5 m<sup>3</sup> per second combined flow rate at Mattersey & Blyth recorders is reached.

## 6.6 Reservoir Act 1975

In the area of the River Idle Washlands WLMP two sites exist under the Act. These are defined as retaining more than 25,000 m<sup>3</sup> of water. One area is to the east of Misson adjacent to Unit 3 and the other to the west of Misson adjacent to Unit 2. The Environment Agency are the operators of the reservoirs and are known as Undertakers and have ultimate responsibility for reservoir safety. The Act is principally designed to be self-regulating with the onus on the Undertaker to keep records, manage the dams and their infrastructure to a specific operating regime and procure all the necessary services and works.

Reservoirs are subject to continual supervision by Supervising Engineers and periodic inspection by Inspecting Engineers appointed by the Secretary of State. Any failure to carry out duties would be reported to the Enforcement Authority. The Environment Agency being the enforcement authority under the Water Act 2003 is keen to demonstrate total compliance and best practice and is subject to regular audits.

## 6.7 Internal Drainage Boards

The locations of the Internal Drainage Boards within the Plan area are outlined in Appendix E.

### 6.7.1 Isle of Axholme and North Nottinghamshire Water Level Management Board

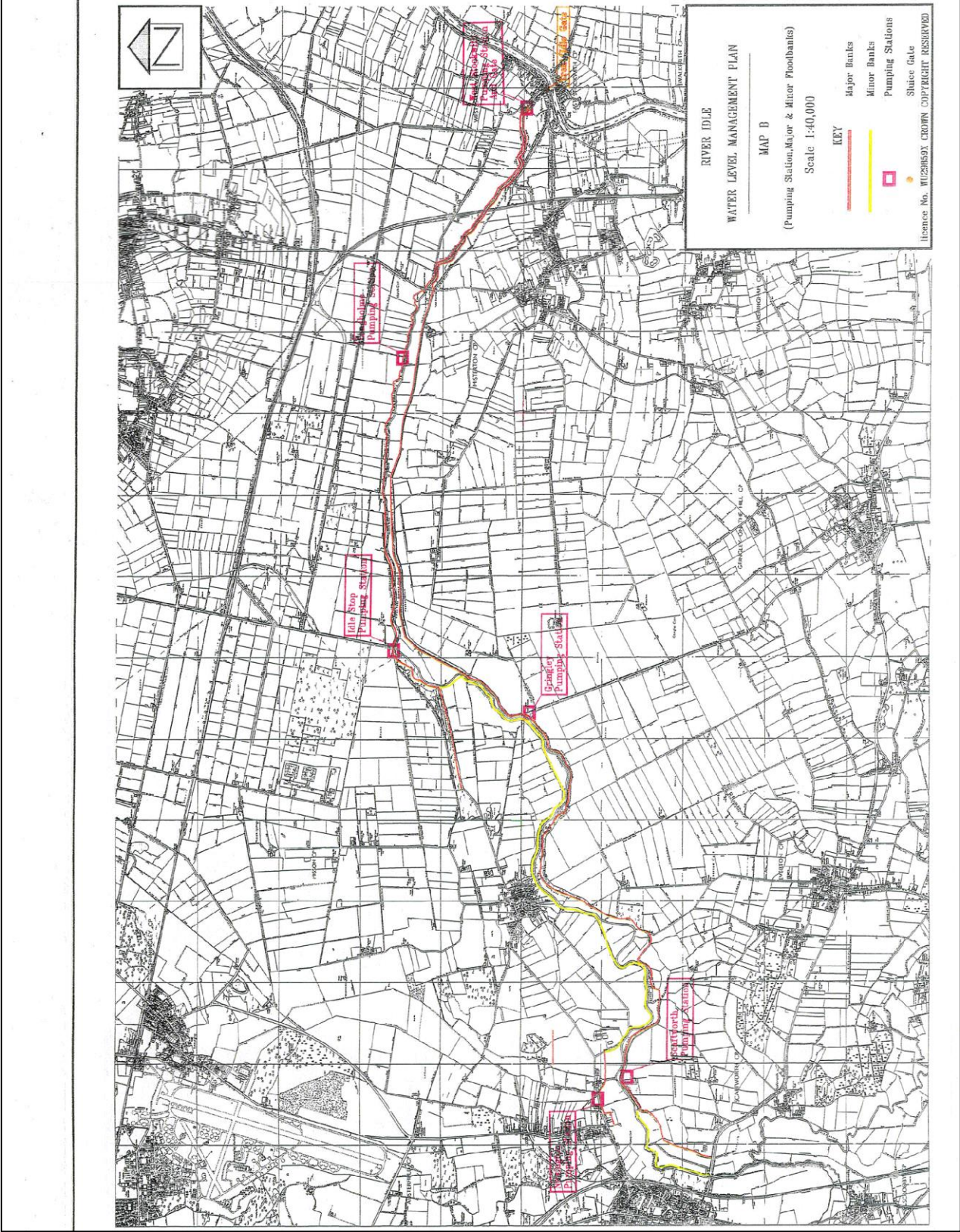
The Isle of Axholme and North Nottinghamshire Water Level Management Board's district is protected by major flood banks on the River Trent and those along the River Idle which runs through the Board's district. The Board's district discharges into the River Idle via pumping stations at Scaftworth, Wiseton and Gringley, the later pumping station is also used to let water into the low lying land north of Everton Carrs in the summer. To the south the Board's district is more directly affected by river water levels because most of the drainage into the river occurs through gravity through flapped outfalls.

## 6.7.2 Doncaster East Internal Drainage Board

The Doncaster East Internal Drainage Board southern boundary is the flood banks along the River Idle. The Board's district drains into the River Idle through three pumping stations at Newington, Idle Stop and Langholme. In all cases the pump outfalls are set back from the river channel with no means of letting water from the River Idle enter the Board's district.



**6.7.3 Figure 6.1 Location Map of Major and Minor Floodbanks on the River Idle**





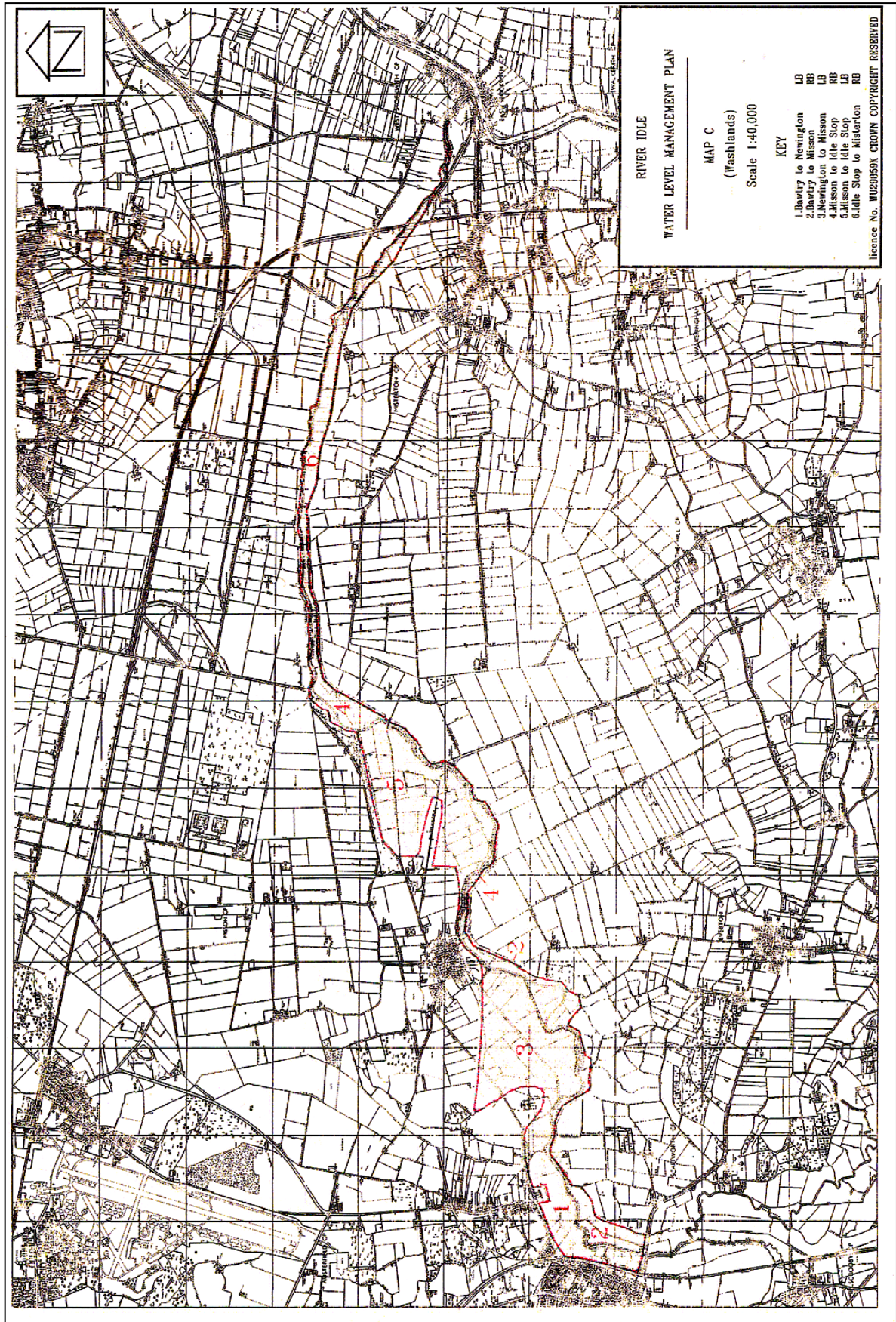


Figure 6.2. Location of Historic Washlands on the River Idle



## 7 Geology, Hydrogeology and Hydrology

The following section describes the geology and soils of the site and the current hydrological and hydrogeological situation is outlined. Gaps in knowledge are highlighted and recommendations for further work are presented.

### 7.1 Geology and Soils

#### 7.1.1 Solid Geology

The solid geology of North Nottinghamshire and South Yorkshire can be characterised as a series of strata dipping gently to the east. This gives a sequence of north-south outcrop comprising (from the west) the Lower Magnesian Limestone, Middle Permian Marl, Sherwood Sandstone and Mercia Mudstone (Triassic).

Units 1, 2 and 3 of the SSSI are underlain by the Nottingham Castle Formation of the Sherwood Sandstone Group, a reddish medium to fine grained sandstone with subordinate clays and silts. The Mercia Mudstone Group consisting of red mudstones with subordinate siltstones and sandstones underlies Unit 4 (Idle Stop). The geological succession in the River Idle catchment is shown in Appendix D1.

#### 7.1.2 Superficial Geology and Soils

Superficial deposits are complex as a result of processes in the last two ice ages and inter-glacial period. The area has undergone several episodes of erosion and deposition. Beneath the washlands the superficial deposits are characteristic of a floodplain environment overlying the solid geology comprising palaeochannels and palaeosurfaces, terrace sands and gravels and floodplain clays.

In 2003 a soil survey was commissioned to investigate soil characteristics and to establish if the surface soil water regime of any of the four washland SSSI units is or has ever been supported by groundwater (Ecology Land and People, 2004). Each unit has a distinct soil profile and spatial distribution of deposits. A description of the observations for each unit is in Appendix D2. A summary of the observations is given below, with reference to the hydrology of the washlands.

- Broadly the superficial deposits consist of sands, clays and peats with a range of depths, permeability and occurrence
- All of the units exhibited no topsoil, indicative of prolonged and regular flooding.
- All of the sites are fed by river flooding and impeded drainage of rainfall. There is no evidence of groundwater support to the sites. However, there is evidence that the groundwater table in the superficial deposits has fallen.

- There is a relatively thin surface layer of saturated soil at all sites, underlain by a dry soil layer and groundwater table at varying depths.
- The groundwater table fluctuates in level but never appears to rise to meet the surface saturated layer.
- There is a (semi) confining layer at some sites between the washland surface and the groundwater, most evident at Misson West and Bawtry.
- Confinement may provide a natural separation of the groundwater and the saturated surface layer; thus the significance of groundwater lowering on surface layers is unclear.
- Unit 4, Idle Stop has significantly different characteristics to the other washlands. There was no confining layer and due to the geology, only the river recharges groundwater and maintains surface wetness. Historically the groundwater was unconfined and high enough to support the surface water table; river improvements have probably broken this connection.

## 7.2 Hydrology and Hydrogeology

The state of the SSSI habitats and species present, thus the condition assessment is dependent upon adequate surface wetness, both within the soil and on the surface. High spring and summer water tables and shallow winter flooding historically controlled this regime (Environment Agency, 2001). The impacts of the River Idle Improvement Scheme, land management and water abstractions have been suggested as causes of the unfavourable condition of the SSSI.

### 7.2.1 Historical Changes to the SSSI

The SSSI was notified in 1972 and re-notified in 1983. To put the current condition and hydrological regime of the site in to context it is necessary to consider historical changes. The area has changed substantially over the last 4 centuries with major flood improvements undertaken in the last 30 years. The effect that these changes have had on the SSSI are hard to quantify in both nature and extent as little baseline data is available.

#### Historical Changes

- Major land drainage and reclamation began in the 1620s as part of large scale works in the Hatfield Chase area. The River Idle originally flowed north at Misson. It was once a tributary of the river Don prior to 1629. The Idle was diverted at Haxey and a new channel to West Stockwith was constructed.
- Due to the low lying nature of the land it relies upon efficient drainage to support high agricultural quality. This has required the construction of pumping stations that can discharge into the River Idle from adjacent drained land.
- As the Idle discharges into the tidal reaches of the Trent sluices are required to stop inflow of high tides or flood flows in the Trent.

- A stone level control structure at Misterton Soss, which comprised culverts with timber pointing doors and a lock, was replaced in 1938. The new structure is a 12.1m wide and 6.4m high vertical lift sluice gate located at the outfall of the Idle at West Stockwith.

## Recent Changes

The River Idle Improvements Scheme was completed in 1982 and comprised a major flood defence and land drainage project. This drained existing washland areas, which are now agricultural land protected against flooding by embankments. When the SSSI was originally notified it was 250ha of washlands area this was reduced to 88ha in 1983 primarily as a result of the flood defence scheme. The remaining SSSI areas were left undefended. The susceptibility to regular flooding has decreased since the 1980s. The water levels in the River Idle are now managed by the operation of West Stockwith pumping station, which was completed in 1979.

### 7.2.2 Observations of the Idle Washland Monitoring Programme

A monitoring programme of shallow boreholes and river levels has been in place since 1998 and this has been used to monitor the previous WLMP targets and to inform the conceptual understanding of the hydrology of the SSSI. Observations are at a limited number of points; thus results have been extrapolated from these points to the wider washlands areas.

Full details of the results of this monitoring can be found within Environment Agency (2001) and Environment Agency (2006). No monitoring was put in place at Unit 3 Misson East. Appendix D3 shows the locations of the monitoring together with the locations of observation boreholes in the Sherwood Sandstone and geological boundaries.

## River Idle

The River Idle bounds each unit of the SSSI. The lower reaches of the river has a low gradient and flows through land of which the majority is below the River Trent high tide level. Measured levels show a very limited change in stage downstream.

Flows are gauged upstream of the washlands at Mattersey on the Idle and at Blyth on the River Ryton. The maximum gauged flow at Mattersey was  $22\text{m}^3\text{s}^{-1}$  and at Blyth  $11.6\text{m}^3\text{s}^{-1}$ . Low flows (Q95%ile) are  $0.818\text{m}^3\text{s}^{-1}$  at Mattersey was and at Blyth  $0.490\text{m}^3\text{s}^{-1}$ .

Levels are measured at points upstream of each SSSI unit as summarised in Table 7.1 below.

**Table 7.1 Levels Upstream of Each SSSI Unit**

(mAOD)	BBawtry	Misson West	Misson East	Idle Stop
<b>mean</b>	2.25	2.11	2.08	2.04
<b>stdev</b>	0.28	0.23	0.21	0.19
<b>min</b>	1.79	1.69	1.70	1.65
<b>max</b>	4.08	3.76	3.59	3.55
<b>range</b>	2.29	2.07	1.89	1.90

- River levels reflect the artificial drainage of the area with slow low frequency responses to rainfall overlain by high frequency fluctuations due to the operation of West Stockwith.
- The high frequency sub-daily fluctuations in water levels are more pronounced at Idle Stop (30cm range) compared to Bawtry (5-10cm range).

#### Unit 1: Bawtry

- Close to the river shallow groundwater levels show a correlation with river levels not rainfall and respond immediately to flooding. In areas further from the river, when not flooded water levels fall rapidly to below 0.75mAOD.
- In summer water levels fall 1m below that of the river and rapidly rise, probably due to local recharge following flooding rather than resaturation of the superficial deposits
- Slow recessions following flooding events may be due to localised ponding of water by low permeability layers.

#### Unit 2: Misson West

- As seen at Bawtry, summer water levels fall below that of the river and rapidly rise, probably due to local recharge following flooding.
- Observed groundwater levels show a correlation with river levels and respond rapidly to flooding events.

#### Unit 3: Idle Stop

- Shallow groundwater levels follow river levels closely and can remain higher than ground level after river levels have fallen.
- When the site is not flooded there is a correlation between shallow levels and rainfall rather than river level.

### 7.2.3 Factors that influence the hydrology of the Idle Washlands

There are a variety of influences that act upon the water level in the SSSI in a complex series of interactions. These vary between and within the units as well as seasonally. Each aspect will have an influence on achieving the improvement of the SSSI condition in relation to water level. The major influences are summarised below.

#### Climate

Washland hydrology is affected by factors such as soil moisture deficit, rainfall and evaporation. These parameters are critical to water movement and interactions within the superficial deposits, including maintaining surface and shallow groundwater levels and wetness. A significant reduction in water can occur by evaporation when water is sitting on or close to the surface. Precipitation can create localised pooling of water and maintain surface wetness after flooding.

Seasonal and inter annual variations are also important in the amount of water available to the SSSI. On a longer time scale the impacts of climate change will play a significant role in affecting the water levels in the washlands. The UK Climate Projections 2018 shows that there has been an increase in annual average rainfall over the UK during the most recent decade (2008-2017), which has been on average 4% wetter than 1981-2010 average. Summers in the UK, for the most recent decade (2008-2017), have been on average 17% wetter than 1981-2010 and 20% wetter than the 1961-1990 average. Mean sea level around the UK has risen by about 16 cm since the start of the 20th century (when corrected for land movement) (UKCP18).

The latest predictions by the Environment Agency Climate Change Planning Tool: East Midlands (2019) suggest that by 2080, there could be as much as a 46% reduction in average summer rainfall from the current average of 188mm with a 47% increase in average winter rainfall for the current average of 205mm. Extreme rainfall event could increase by up to 40%, meaning that peak river levels could increase by 50%, whilst low flows could be 73% lower than currently. Sea level rise in the East Midlands could be up to 1m by 2080.

These climate change predictions could be beneficial to the washlands, with the dryer summers and wetter winters. However, more extreme rainfall events in the summer season could lead to inundation during the bird breeding season.

#### Groundwater

The Sherwood Sandstone is a major aquifer and is regionally important as a potable water supply. It is divided into Groundwater Management Units (GWMU). To the east of the Idle Washlands is the Blyth GWMU and to the north the Hatfield GWMU. It is the latter that has been suggested to influence water levels in the washlands (ESI, 2003). The water table in the aquifer in the area of the washlands shows a pattern of decline from the 1960s to the 1990s that reflects the development of the Sherwood Sandstone aquifer for public water supply. A negotiated reduction in abstraction of a group licence

from 95.72 megalitres per day to 83 megalitres per day in 1994 has helped to halt the decline but groundwater levels are still low.

The Mercia Mudstone is a non-aquifer and a confining layer (aquiclude) that provides a hydraulic separation between superficial deposits and the Sherwood Sandstone. As Unit 4 Idle Stop is located above Mercia Mudstone it is thought that the water level issues in this area are not directly related to groundwater.

Sites above the Sherwood Sandstone have been predicted to be vulnerable to groundwater abstraction and related falls in groundwater level in the aquifer (Brown and Root, 2001). The groundwater in the aquifer is hydraulically connected to the surface via permeable superficial deposits. This leads to the suggestion that groundwater levels impact on the condition of the SSSI (Environment Agency, 2001). There is no direct evidence that groundwater historically supported surface water in the washlands. However, a fall in groundwater around the area may reduce surface wetness by promoting recharge of the groundwater store by the input of surface water.

The observed rate of recession following flooding is relatively rapid. This has led to the conclusion that water levels observed in the washlands and the rate of recession following flooding is controlled by the hydraulic gradient between the river and the aquifer (Environment Agency, 2001). Variations in the superficial deposits, topography and drainage indicate that this may not be uniform across the washlands.

The investigations into the impact of Anglian Water's abstractions and Yorkshire Water's abstractions on the Idle Washlands SSSIs were done in AMP4. The investigation closure report for the investigation into AWS's abstractions states:

With respect to the River Idle Washlands SSSI the calculated drawdown due to the fully licensed scenario, as compared to the historic scenario, has been reviewed to assess the impact on the proportion of the critical periods that conservation targets are met. The impact of abstraction under fully licensed scenarios is minimal when compared to current conditions.

It has therefore been decided that the Licensed abstractions are not causing an impact on the designated SSSIs within the Idle and Poulter catchments and the site will therefore be removed from the RSA programme.

Similarly the Sign off letter to Yorkshire Water says:

The outcome of the investigations has concluded that your consent poses no adverse effect on the integrity of the sites. As such I can confirm that there was no need to proceed with the options identification, appraisal and implementation stage.

## **River Idle**

In washland environments the primary control on site wetness is flooding and retention of rainwater. Inundations (floods) of the washlands have become less frequent and prolonged following flood



defence works (WMC, 1998). The aerial extent and duration of the surface soil saturation have both significantly diminished as a result of the flood defence improvements.

River levels currently vary throughout the year resulting in limited measured inundation events. These events are primarily triggered by variations in the input of flow from upstream. Alterations in the management of level at would enable further flooding of the washlands to take place. Under current conditions shallow groundwater in the washlands observed close to the river shows a response to the changing level in the channel. Thus, increasing levels may also affect the shallow groundwater levels by lateral recharge, even when inundations do not occur. Reductions in river water levels has probably also reduced recharge of the groundwater by leakage of the river.

### **Drainage**

At Idle Stop water levels in the superficial deposits fall below the river. This indicates that there is a sink for shallow water. The reason for this is not completely understood. A possible mechanism for this water loss is the influence of agricultural drainage. If water levels in adjacent fields are managed below the washlands this can cause water loss to drains external to the site, as well as internally. If this process happens at Idle Stop by analogy it could happen at other sites.

A situation as described above has been identified in the work for YWS on the Bawtry unit. Agricultural land to the north of the SSSI is drained with pumps that operate at a set level. The drain water level is managed below the ground level in the SSSI (Mott MacDonald, 2006). Lateral flow from the washland, within the superficial deposits, may preferentially be towards the drain. Water is then discharged without further interactions with the washland.

### **Soils and superficial deposits**

The complex nature of the superficial deposits as described above will lead to a variable spatial response in water level to changing conditions, such as flooding or recessions in the washlands. In some areas the superficial clays and low permeability layers will reduce hydraulic conductivity, have a good storage character and impede downward movement. If areas with impeded drainage are targeted to experience a high shallow water table and standing surface water the achievement of these conditions is more likely.

Observed groundwater levels regularly fall below 20cm from the surface in winter and throughout the summer to more than 1m depth and at some of the borehole locations to more than 2m depth. During these periods however shallow saturated zones in the top of the superficial deposits have been observed. Determination of the conditions within the upper layers is required to assess the real conditions.

In January 2006 a new deeper observation borehole was installed in the Bawtry unit of the washlands. It is intended that this will enable a better understanding of the interactions and flow paths when the upper superficial deposits are dry.

### **Topography**

The Idle Washlands have a varying topography across each unit, a detailed topographic survey was undertaken by Malcom Hihges Land Surveyors at North Carr (aka Idle Stop), Newington, Bawtry and Misson East components of the SSSI. The topography ranges from 1.86 to 7.00 mAOD. The lower

lying areas are those more likely to experience prolonged standing water, especially if situated above a low permeability layer, that impedes downward or lateral movement. The relation of land levels and drain levels, together with the water levels at which the drains are kept will have an influence upon the movement of water away from the washlands.

The need to get water onto the washlands and then to ensure that it remains there, on the surface and at shallow depths, is critical to improving the condition of the SSSI. It is also vital for these conditions to be maintained over a period of time. The factors discussed above relate to either wetting of the washlands or the maintenance of that wetness. All these require consideration in plans to improve the sites.

### 7.3 Hydrological Monitoring Requirements

The existing monitoring has been used to measure the success of targets defined in the existing WLMP. The requirements of monitoring have changed with the review of these targets and the actions developed under this document. Targeting the actions will allow accurate assessment of the implementation of the options discussed in this document to improve condition. Further work will also identify areas that have specific properties that are more likely to achieve a favourable status.

#### **Topographic survey of the SSSI area.**

This is to ensure that the current survey is correct, as there are problems with the accuracy of the existing benchmarks.

#### **Monitoring of Inundations**

Surface water detection in relevant areas i.e. immediate sensing of standing surface water and when this water has receded. This information should be on telemetry so that it is known when a suitable period of inundation has occurred. If no inundation has occurred plans to trigger one can be put in place immediately.

#### **Soil survey**

This is to identify how soils type specifically affects shallow surface water levels and to identify areas that will have more success in achieving adequate surface wetness, both as standing water as shallow water in the superficial deposits.

#### **Monitoring of shallow soil water levels.**

Maintenance of soil water during the period Nov-May at a depth of up to 50cm from the surface. Measurement of this condition should be the specific areas required to have a high water content close to the surface during this period. The observation boreholes do not currently measure levels in the lower superficial deposits >2mAOD or in the upper 0-20cm horizons.

## 7.4 Water Resource Management

Within the area of the Idle Washlands there are a number of licensed abstractions, both from groundwater, surface water drains and the River Idle. The locations of these abstractions, the use of the water and the amount of water that can be abstracted are available by request from the Environment Agency. There are no licensed abstraction points inside the notified SSSI units.

### Current Policy

The current licensing policy for abstraction Idle catchment is that no further consumptive abstraction licences are to be issued. This is due to the catchment being close to new abstractions due to there during the summer and abstractions with a level restriction at West Stockwith. The current ground water licensing policy in the Sherwood Sandstone: is no resources available for the Blyth GWMU and the Hatfield GWMU

The current Abstraction Licensing Strategy states that the Idle Catchment is closed to new consumptive abstraction licences. The main reasons for this is to ensure that the Idle Washlands SSSI is inundated in winter and to protect spate flows, which wash out fines and stop the sedimentation of gravel riverbeds.

The Idle and Torne Sherwood Sandstone groundwater body is classed as in potential serious damage due to over abstraction. Studies confirmed this status as far back as the mid-1980s and there has been a long standing position of not issuing new consumptive licences.

It should be noted that abstractions <20m<sup>3</sup>day can be taken without a licence from the Environment Agency. Additionally the operations of IDBs are not licensable at this time.

### Water Abstraction

There are numerous licences along the River Idle and the Catchment to allow water to be taken under an abstraction licences, mainly for agricultural purposes and for public water supply. These are legally binding licenses and the Environment Agency has to ensure that anything they do does not impact on these licences. West Stockwith Pumping station has levels set to prevent Flooding but to also ensure the water levels do not drop considerably which would prevent these abstractions. There was a trial carried out in 2018 to see if dropping the levels at West Stockwith Pumping Station would reduce the water levels on the SSSI (during May when the water needs to start to drain off). There was little impact to the Units but the levels dropped too low which prevented abstraction. Hence the trial was stopped.

## 8 Water Quality

The main tributaries, which include the rivers Maun, Meden, Poulter, Ryton and Maltby Dyke rise on limestone, sandstone or coal measures strata to the west of the catchment and although the headwaters are of good quality all of the tributaries receive significant discharges of sewage effluent, and this is the single most important factor determining river quality. The principal sewage treatment plants generally perform quite well but the high proportion of sewage effluent, along with diffuse agricultural run-off gives

rise to elevated nutrient levels. Industrial discharges to rivers in the catchment include mine waters which are normally saline and can contain ammoniacal nitrogen and iron, and also include the dewatering activities associated with the mineral extraction of limestone, sandstone and gravel.

The EU Water Framework Directive (WFD) came into force in December 2000. This piece of European legislation set deadlines for improved water quality with the final requirement of 'Good Ecological Status' to be reached by 2027.

Status definitions:

- High status – values correspond with conditions undisturbed by anthropogenic activities
- Good status – conditions deviate only slightly from undisturbed conditions
- Moderate status – conditions shows 'moderate' distortion resulting from human activity and significantly more disturbed than conditions in good status
- Poor status – conditions showing major alterations to those expected in the absence of human activity
- Bad status - conditions showing severe alterations to those expected in the absence of human activity

Waterbodies are used to demarcate areas of rivers into distinct sections in order to assess water quality and determine achievements against WFD targets. The relevant waterbody here is GB104028058110 Idle from Ryton to Trent. The overall status of this waterbody is Moderate.



**Figure 8.1: Outline of Waterbody GB104028058110 Idle from Ryton to Trent**

The failing elements are macrophytes and phosphate. These are indicators of nutrient enrichment. Macrophyte reasons for failure are due to phosphate inputs coming from point source sewage discharge inputs, diffuse agricultural sources arising from poor soil management (arable and livestock) and physical modification due to agricultural land drainage. There is also nutrient input from urban run-off. These nutrient inputs cause algal growth, which causes further concern because algal blooms give rise to elevated pH and the depletion of overnight oxygen levels which can have a

detrimental effect on fish. The River Idle is also designated a Cyprinid fishery, under the EU Fisheries directive, along the whole of its length. Classification results for this waterbody are shown in Table 8.1.

**Table 8.1: Waterbody Status River Idle from Ryton to Trent**

ELEMENT	CLASS			
	2013	2014	2015	2016
Overall status	Moderate	Moderate	Moderate	Moderate
Ecological status	Moderate	Moderate	Moderate	Moderate
Fish	High	High	High	High
Invertebrates	Good	Good	Good	Good
Macrophytes	Poor	Moderate	Moderate	Moderate
Ammonia	High	High	High	High
ANC		High	High	High
DO	Good	High	Good	Good
pH	High	High	High	High
Phosphate	Poor	Poor	Poor	Poor
Temperature	High	High	High	High
Hydrological Regime	DNSG	DNSG	DNSG	DNSG

Note: DNSG = Does Not Support Good

The hydrological Regime does not support good status due to surface and groundwater abstraction impacting flow.

Every five years Ofwat (the economic regulator for the water industry) reviews the prices water companies can charge for supplying drinking water and dealing with sewage during the following five-year period. This is known as the Periodic Review and the resulting investment programme for each water company is known as an Asset Management Plan.

- AMP 6 is the current investment programme and covers the period April 2015 – March 2020.
- AMP 7 is the investment programme for the five-year period April 2020 – March 2025.

The Environment Agency advises, in partnership with Natural England and Natural Resources Wales, on the improvements required to be made to water company assets during the investment period.

The River Idle (including the Rivers Maun, Meden and Ryton) was designated as a Sensitive Area (eutrophic) under the Urban Wastewater Treatment Directive (UWWTD) in 1998 and a number of Sewage Works were subsequently identified as qualifying discharges requiring nutrient removal. Within AMP7 there are currently no schemes proposed in the River Idle from Ryton to Trent catchment.

Raising water levels and holding water back at West Stockwith leads to ponding of water in the lower reach and encourages the conditions, which enable algal blooms to flourish. If this coincides with suitable seasonal weather conditions the formation of algal blooms will have a detrimental effect on water quality in this stretch, which will compromise the effectiveness of the phosphate removal schemes that have been implemented, leading to further failures of WFD. It is important to have a continuous flow of water through this stretch, particularly between February and September, to alleviate these conditions and minimise any detrimental impact and consequent WFD failures.

**TABLE 8.2 Details of Discharge Consents in the area of the Idle Washlands SSSI**

Consent No.	Name & Address	Discharge Point NGR	Maximum Daily Volume	Receiving Watercourse
T/78/07732/O	Severn Trent Water Ltd Wharf Street Sewage Pumping Station	SK6554 9309	Combined Sewer Overflow	River Idle Bypass Channel
T/78/46242/T	Newington Sand & Gravel Quarry, Nr Bawtry (Hanson Quarry Products Europe Ltd)	Between SK6740 9363 and SK6892 9448	6480m <sup>3</sup>	River Idle
T/78/45502/R	Severn Trent Water Ltd Misson Sewage Treatment Works	SK6953 9481	161m <sup>3</sup> Dry weather flow	River Idle

Notes: The above are active sites discharging to the River Idle within the Plan Area indicated in Figure 3.2.

There are a number of discharges within the Idle catchment which have an effect on water quality. Significant discharges are shown in Table 8.2.

The Government set a Public Service Agreement (PSA) target to increase Water Framework Directive compliance in England and Wales. The Water Framework Directive requires that, at least, good ecological and chemical status of waterbodies is reached in Europe by 2027.

River Idle from Ryton to Trent has an overall status of Moderate, meaning that it is currently failing this government target. The main issues why it is failing are the Ecological Status, Macrophyte communities and Phosphates. The River Idle system contains high nutrient levels and this, combined with the low flow conditions leads to eutrophication (algal growth). This in turn has led to failure of the WFD and there is further concern because algal blooms give rise to elevated pH and the depletion of overnight oxygen levels



which can have a detrimental effect on fish. The River Idle is also designated a Cyprinid fishery, under the EC Fisheries directive, along the whole of its length.

## 9 Water Level Management Objectives

Under the previous WLMP, the water level management objectives were not being achieved. This has been demonstrated by the Agency's hydrological monitoring programme and by monitoring of the special nature conservation features. The outcome is that the SSSI remains in an unfavourable condition for wildlife.

There is now a single objective for the River Idle Washlands SSSIs WLMP: **to provide water levels to bring the site into favourable condition (or unfavourable recovering)**. To achieve this objective, a series of specific targets are outlined below.

The current understanding of the legislation is that the objective to achieve the required status for the SSSI's takes precedent over other objectives such as WFD and the key targets and actions have been derived to reflect this. Key targets and actions for water level management are outlined in Table 9.1.

**Table 9.1 Key targets and actions for water level management**

Objective	Target	Action
<p>Provide suitable nesting &amp; feeding conditions for <b>over wintering</b> waders on each of the SSSI units</p>	<p>During the period from <b>1<sup>st</sup> November to 28<sup>th</sup> February</b> each year:</p> <p>Shallow standing water (up to 20 cms in depth) should be visible over 50 - 75% of the grassland.</p> <p>The water table should be within 20 cms of the surface.</p>	<p>Manage &amp; maintain river water, ground water &amp; surface water levels to achieve the targets for this period. (EA)</p> <p>Monitor inundation of the SSSI, borehole and river level data. (EA)</p>
<p>Provide suitable nesting &amp; feeding conditions for <b>breeding</b> waders on each of the SSSI units</p>	<p>During the period from <b>1<sup>st</sup> March to 15<sup>th</sup> July</b> each year:</p> <p>Shallow standing water (up to 20 cms in depth) should be visible over 10 - 30% of the grassland.</p> <p>The water table should be within 30 cms of the surface.</p>	<p>Manage &amp; maintain river water, ground water &amp; surface water levels to achieve the targets for this period. (EA)</p> <p>Monitor inundation of the SSSI, borehole and river level data. (EA)</p>
<p>Provide suitable ground conditions to allow <b>land management</b> activities to be undertaken on each of the SSSI units</p>	<p>During the period from <b>15<sup>th</sup> July to 1<sup>st</sup> November</b> each year :</p> <p>Shallow standing water (up to 20 cms in depth) should be limited to 10% of the grassland.</p> <p>The ground conditions should allow access to all the grassland for livestock grazing, mowing &amp; weed control measures.</p> <p>The water table should be 30 - 40 cms of the surface.</p>	<p>Manage &amp; maintain river water, ground water &amp; surface water levels to achieve the targets for this period. (EA)</p> <p>Monitor inundation of the SSSI, borehole and river level data. (EA)</p> <p>Install water control structures, as required, to prevent inundation during the summer. (EA/NE/IDB/landowners)</p> <p>Manage existing water control structures to prevent inundation during the summer. (EA/NE/IDB/landowners)</p> <p>Undertake pump training operations during the summer to reduce standing water in unit 4. (EA)</p>

Objective	Target	Action
		<p>Investigate the operation of wind pumps to achieve the target for summer. (EA)</p> <p>Undertake regular maintenance of vegetation within and adjacent to the river channel to improve water flow. (EA)</p> <p>Investigate the creation of a shallow channel to improve the flow of water to the downstream sluice on unit 4. (EA, NE)</p>
<p>Increase the area of <b>wet grassland habitat</b> available for wading birds within the Idle Valley</p>	<p>Identify and pursue opportunities to increase the existing area of the SSSI.</p> <p>Explore opportunities to create wet grassland through agri environment schemes and partnership funding</p>	<p>Continue to develop partnership projects &amp; agri environment schemes. (EA/NWT/RSPB/NE)</p>
<p>Maintain the <b>floodplain grazing marsh</b> in favourable condition</p>	<p>Monitor progress for each SSSI unit towards achieving favourable condition</p>	<p>Monitor numbers and species of over wintering and breeding birds. (RSPB/NWT/NE)</p> <p>Assess each SSSI unit for compliance against the Favourable Condition Tables. (NE)</p> <p>Provide reports for the RIMP group on achieving water level targets based upon monitoring &amp; assessment of river level &amp; borehole data. (EA)</p>

## 10 Constraints & Impacts on Adjacent Ground

There are potentially several practical, financial and environmental constraints to implementing this WLMP. The constraints identified below are to be addressed within a feasibility study and Environmental Impact Assessment as part of this WLMP.

### 10.1 Practical and Financial Constraints

#### 10.1.1 Technical and Economic Feasibility

There is an overall constraint as to what is physically possible at the site from an engineering point of view. The Idle Washlands SSSI Project is currently assessing the technical and economic feasibility of options to restore the site considering the following issues:

A sound understanding of the hydrological regime of the SSSI and surrounding land is essential to ensuring that a robust and sustainable solution is developed.

The amount of water available to the SSSI is affected by climate. There is a risk that intervention to raise water levels may be undermined by climate change impacts such as low rainfall and sea level rise.

There is a risk that by increasing the river level within the study area, there could be an increased risk of flooding upstream and downstream of the study area. Ensuring that there is no increase to flood risk presents a practical constraint to restoring the site. This is being addressed through development of a flood model, which will be used to test options. This may result in additional measures being required to manage different areas of flood risk that may arise as a result of changes in water level management.

There is a risk that by increasing the river level within the study area, there could be an effect on the drainage of adjacent land. This affect would manifest itself by a reduction in the ability of the gravity outfalls to discharge adequately. Adjacent land may also be affected by changes in the retained groundwater level. These combined may reduce the viability of the land for root agriculture that has become established in recent times.

The level of maintenance required once a solution is in place may be a practical and financial constraint. A solution requiring least maintenance would be desirable.

Public rights of way must be open and available at all times. If any public rights of way are located in an area that is likely to be flooded the Nottinghamshire County Council Access Team must be contacted prior to the instigation of this kind of water level management.

## 10.1.2 Obtaining planning and other consents

Works to restore the SSSI may require consents. Potential consent requirements are outlined below:

The Local Planning Authorities may require planning consent for some of the works required to restore these sites. An Environmental Statement may be required to accompany the planning application. An EIA Screening Opinion will be sought from the local authorities once the preferred option is selected.

Work proposed in, over, under or adjacent to “Main River” Works that are on or near a ‘Main River’, on or near a flood defence structure, in a flood plain or on or near a sea defence requires a permit for a Flood Risk Activity from the Environment Agency. An environmental risk assessment and management system are required under the Environmental Permitting Regulations 2010. An Environmental Statement may be required under the Land Drainage (Environmental Impact Assessment) Regulations.

Under the Land Drainage Act 1991 Section 23, works which affect a watercourse within an Internal Drainage Board District will require consent from the Internal Drainage Board.

Under the Water Resources Act 1991, an abstraction licence is required from the Environment Agency, by anyone who wishes to take water from a surface or underground source.

Under the Water Resources Act 1991, an impounding licence is required from the Environment Agency for the impounding of any watercourse, ditch or stream, for example by dam or weir.

Under the 1981 Wildlife & Countryside Act as amended by the Countryside and Rights of Way Act 2000 assent from Natural England is required by public bodies – prior to carrying out “operations likely to damage the special interest” of the SSSI during the undertaking of their statutory functions (see Appendix A Citation).

The Doncaster – Robin Hood International Airport opened in April 2005 is situated to the north and west of the SSSI Washlands. In 2005 the total passengers using the airport were 840,000 and the total flights were 10,400.

Because of the risk of aircraft colliding with large and/or flocking birds, the Civil Aviation Authority (CAA) and Town and County Planning Direction (2000) recommend a 13km radius safeguarding zone around civil and military airports. Consultation with airport operators and local planning authorities is required on all developments with the potential to increase bird populations.

## 10.2 Environmental constraints

There is a risk of damaging the habitat for which the River Idle Washlands is designated. Some damage to habitats may occur during construction works and Natural England will need to consider which areas should not be disturbed.

There are some areas of woodland within and adjacent to the site which may be of local nature conservation importance. These habitats may also be important for breeding birds and may be of local landscape importance. Consideration should be given to these areas when assessing options to provide water levels for favourable condition.

There is a risk of increased flooding or waterlogging in surrounding agricultural land. This could affect agricultural land use adjacent to the SSSI's

There are several known features of archaeological interest within the study area, and there is a moderately high potential for the presence of previously undiscovered archaeological remains.

Changes to the groundwater levels within the study area could have impacts on agricultural land use within the study area, particularly winter grazing. Liaison with landowners will be maintained to ensure that agricultural land use is not adversely affected by restoring the SSSI's.



## 11 Alteration to Infrastructure & Procedures

**Table 11.1. Potential options for water level management on the River Idle Washlands SSSI's**

Option	Purpose	Description
Ditch Structures	Short to medium measures for getting water onto the washlands to provide a suitable habitat for wintering wildfowl and breeding waders	Water control mechanisms ( eg adjustable sluices)
Review Pumping Operations	<p>Remove excess surface water run off from site during high rainfall events to prevent flooding of surrounding land.</p> <p>Let back water from drainage system during drier periods</p>	<p>Alter pumping operations to retain more water within the natural river channel but retain the capability for excess water to be removed from the system during high rainfall events.</p> <p>This could lead to water quality problems on both the site and in the river which would require further investigation as part of the feasibility study.</p>

## 12 Other Proposed Action

Table 12.1 outlines a programme of actions agreed amongst the partners and stakeholders of the management board during a workshop held on 28<sup>th</sup> October 2013.

**Table 12.1. Programme of actions required**

Location (SSSI unit)	Current Issues	Actions	Responsibility
<b>Bawtry (1)</b>	Disturbance to ground nesting birds	Look at issue of dog activity off leads. Engage with local walkers, county rights of way team & bird groups to monitor & raise awareness of the importance of the washlands for wading birds.	Natural England
	Invasive weeds (docks & thistles)	Issue consents as required for the control of weeds with herbicides.	Natural England
	Standing water through summer limiting time available for weed control	Lower river level to allow site to dry out in summer	Environment Agency
	Standing water for wading birds in the period November to May is limited to only part of the site.	Re-profile existing ditches into meandering channels & develop shallow scrapes to increase habitat.  Undertake a LiDAR data survey to show low areas & extent of standing water.	Environment Agency Natural England
	Monitor bird populations	Continue to undertake surveys of over wintering & breeding birds	RSPB
	Under-grazing of grassland	Monitor grazing management to ensure that the sward comprises of tall tussocks and short patches	Natural England
	Tall willows assisting predation of nests	Pollard willows along the eastern end (Hagg Lane)	Natural England
	Shooting of birds	Limit the issuing of future consents	Natural England

Location (SSSI unit)	Current Issues	Actions	Responsibility
<b>Misson west (2)</b>	Standing water during November to May is limited to part of the site	Re-profiling of ditches & creation of scrapes in more elevated / drier areas.	Hanson / NWT / Natural England
	Monitor bird populations	Continue to undertake surveys of over wintering & breeding birds	RSPB
<b>Misson east (3)</b>	Encroaching trees & scrub	Work with the landowner to introduce grazing and/or mowing of the grassland and clearance of scrub.	Natural England/Landowner
	Monitor bird populations	Continue to undertake surveys of over wintering & breeding birds	RSPB
<b>Idle stop (4)</b>	Standing water through summer limits opportunities for annual management (grazing/cutting)	Lower river level to allow machinery to cut the sward in summer / allow the re-introduction of grazing	Environment Agency
	Standing water for wading birds in the period November to May is limited to only part of the site	Re-profile ditches & create scrapes to increase habitat suitable for breeding waders. Consider use of wind pumps to maintain the water table at required level during the over wintering & breeding period	Environment Agency / Nottinghamshire Wildlife Trust / Natural England
	Shooting of birds on SSSIs	Limit the issue of consents on River Idle Washlands & Misson Line Bank	Natural England
	Tall willows along river bank act assist predators of nests	Pollard on rotation	Environment Agency / Nottinghamshire Wildlife Trust / Natural England
	Tall sward and encroaching scrub	Work with the landowner to introduce grazing and/or mowing of the grassland and clearance of scrub.	Natural England/Landowners

Location (SSSI unit)	Current Issues	Actions	Responsibility
	Monitor bird populations	Continue to undertake surveys of over wintering & breeding birds	RSPB

## 13 Contingency Measures

A contingency measure deals with an unforeseen event, such as a severe flood or drought, or a change in land ownership or land use surrounding the SSSI. Such events may affect implementation of the WLMP. These risks need to be identified, and control measures put in place should these events occur. Contingency measures should be identified and reviewed periodically.

To reduce risk throughout the life of the WLMP, liaison should be maintained with Natural England and other stakeholders as appropriate.

Landowners and the River Idle Management Partnership were consulted during the preparation of the original River Idle WLMP and further liaison will be required throughout the life of the River Idle Washlands WLMP, particularly in relation to establishing management agreements and the use of Environmental Stewardship Schemes on land adjacent to the SSSI.

## 14 Unresolved and Ongoing issues

### Soil Bank at Idle Stop

A soil bund originating from dredgings taken at the time of the River Idle Improvement Scheme remains along the edge of the Idle Stop Washland. Its removal would create better connectivity between the river and the washland in terms of inundation and water level management and would improve the condition of the washland as it does not contribute to the nature conservation interest of the washland. If the removal of this is to be progressed further discussions with the landowner would be required. It is likely that the cost and method of disposal are issues that may delay the process of its removal.

### Sand and gravel extraction, Newington Quarry

Work has been completed to restore Newington North and South following sand & gravel extraction. These areas have been restored to wet grassland and open water. A new planning application has been submitted to start quarrying at Newington West which is immediately adjacent to unit 2. The restoration plans indicate that this will also be restored to wet grassland and reedbed.

### Whole river system

The management board raised a number of environmental issues which affect the River Idle and the adjacent land. These are not specific to the SSSI so have been captured as a series of separate actions:

**Table 14.1 Issues on the River Idle outside of the SSSI**

Issue	Action to take	Responsibility
Silt entering the river system reduces channel volume and flow	Create grass margins on arable land along river edge to capture sediment run off	Land Owners/ Environment Agency / Nottinghamshire Wildlife Trust / Natural England
Standing water on land at Mattersey creates opportunities for mosquitos which cause problems for local residents	Lower river level to allow water to drain off following flood incidents. Investigate improvements to land drainage	Environment Agency / Internal Drainage Board
Standing water on grassland south of Bawtry becoming stagnant and enriched with nutrients	Lower river level to allow water to drain off following flood incidents	Environment Agency / Internal Drainage Board
Reduced numbers of fish in the river	Create connected pools, backwaters & berms to help improve the habitat for fish as well as invertebrates. Allow the installation of large woody debris	Environment Agency / Nottinghamshire Wildlife Trust
Nutrients (phosphate) entering water	Tackle point (sewage works) and diffuse sources of pollution.	Environment Agency

## **15 Other Matters**

This WLMP is designed to be a live document, and as such, it will be subject to annual review and sections modification as necessary. It is anticipated that the next review will take place when the outcome of the proposed Isle of Axholme Strategy is known.



## 16 2006 Consultees

Department for Environment Food and Rural Affairs

Natural England

Trent & Peak Archaeological Trust

Nottinghamshire County Council

Doncaster Metropolitan Borough Council

Shire Group of IDBs - Finningley Internal Drainage Board

Everton Internal Drainage Board – Clerk Mr J A Walker

Idle & Ryton Internal Drainage Board – Engineer, D F Fullwood

Clerk, Jones & Co. Solicitors

The Isle of Axholme Group of Drainage Authorities - Isle of Axholme Internal Drainage Board

The Royal Society for the Protection of Birds

British Trust for Ornithology

Nottinghamshire Wildlife Trust

National Farmers' Union

Country Land and Business Association

Anglian Water Services

Yorkshire Water Services

## 16.1 River Idle Washlands Management Board

A Project Board has been established and held its first meeting in July 2012.

The board consists of representatives from the Environment Agency, Natural England, Hanson Group, RSPB, local parish councils (Misson, Mattersey & Mattersey Thorpe), local farm businesses (Pollybell farms, Tiln farms, Blaco Hill Farm & John Sutcliffe) & Isle of Axholme and north Nottinghamshire water level management board, Nottinghamshire Wildlife Trust, National Farmers Union & Nottinghamshire County Council.

The board has met quarterly since its formation. The purpose of the Project Board is to meet periodically to make decisions on how the WLMP will be implemented. Recent discussions have focussed upon a DEFRA funded project to survey silt deposition in the river. The aim of the project is to identify the sections where dredging would be most beneficial. The board have discussed the costs and practicalities of dredging the river channel from Bawtry to West Stockwith.

## 17 List of Abbreviations

SSSI	Site of Special Scientific Interest
SPA	Special Protection Area
SAC	Special Area of Conservation
NWT	Nottinghamshire Wildlife Trust
NE	Natural England
BTO	British Trust for Ornithology
AOD	Above Ordnance Datum
IDB	Internal Drainage Board
EU	European Union
RQO	River Quality Objective
pH	Percentage Hydrogen (acidity)
EA	Environment Agency
RIMS	River Information Management System
PS	Pumping Station

## 18 Glossary of Terms

Biodiversity Action Plan (BAP)	An agreed plan for a habitat or species, which forms part of the UK's commitment to biodiversity.
Conservation Objectives	Objectives set by Natural England defining the desired state for a particular SSSI in terms of features for which they may have been designated. When features are being managed in a way which maintains their nature conservation value, then they are said to be in 'favourable condition'.
Environmental Action Plan (EAP)	A stand alone report or section within an Environmental Statement or Report which ensures that constraints, objectives and targets are translated into contract documents and practised on the ground.
Environmental Impact Assessment (EIA)	The process, by which the likely impacts of a project upon the environment are identified, collated, measured and assessed to determine their significance. The analysis of predicted environmental effects different options to be considered, together with identification of the scope for optimising positive effects and mitigating negative effects during the project design.
Environmental Report (ER)	An Environmental Report is produced for projects that do not require an Environmental Statement, including for projects requiring planning permission from a local authority and where the effects of the proposal will not be significant. The ER is similar in content but less detailed than an Environmental Statement.
Favourable Condition	Favourable condition means that the SSSI land is being adequately conserved and is meeting its 'conservation objectives'. However, there is scope for the enhancement of these sites.
General Quality Assessment (GQA)	The Environment Agency assess river quality using a survey called the General Quality Assessment (GQA) scheme. This measures four aspects of river quality – biology, chemistry, nutrients and aesthetic quality. We monitor the quality at about 7,000 sites representing about 40,000km of river and canals in England and Wales.
Groundwater	Water occurring below ground in natural formations (typically rocks, gravels and sands), where the latter is any water below the water table.
Hydrogeology	The study of groundwater and its movements.
Hydrology	The study of water in rivers, streams, lakes, at or below the surface.
Main river	Watercourses defined on a 'Main River Map' designated by DEFRA. The Environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only.

	Responsibility for maintenance, however rests with the riparian owner (the land owner)
National Vegetation Classification (NVC)	The NVC is a system of classifying natural habitat types according to the vegetation they contain. It is based on the presence of particular plant species. Each broad vegetation type (eg woodland) is broken down into communities, designated by a number and name (eg. W6 <i>Alnus glutinosa</i> – <i>Urtica dioica</i> )
Scoping	The process of deciding the scope and level of detail of the study including the environmental effects and options to be considered, assessment methods to be used, and the structure and contents on the resulting Environmental Statement or Report.
Screening	The process of deciding which development requires an EIA to be carried out and at what level of detail.
Site of Special Scientific Interest (SSSI)	Sites protected under the Wildlife and Countryside Act 1981 and Countryside and Rights of Way Act 2000.
Unfavourable declining condition	The special interest of the SSSI unit is not being conserved and will not reach favourable condition unless there are changes to management or external pressures. The site condition is becoming progressively worse.
Water Level Management Plan (WLMP)	A document setting out water level management requirements in a defined floodplain area (usually a SSSI) which is designed to reconcile different requirements for drainage.
Wildlife and Countryside Act	<p>The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. The Wildlife and Countryside Act is divided into four parts:</p> <p>Part 1 is concerned with the protection of wildlife</p> <p>Part 11 relates to the countryside and national parks (and the designation of protected areas)</p> <p>Part 111 covers public rights of way.</p> <p>Part 1V deals with miscellaneous provisions of the Act</p> <p>The designation of protected species is included in Schedules 1, 5 and 8 of the Act, which list protected birds, protected animals and protected plants, respectively.</p>

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## Appendix A. River Idle Washlands SSSI Citation

COUNTY: NOTTINGHAMSHIRE/SOUTH YORKSHIRE

SITE NAME: RIVER IDLE WASHLANDS

DISTRICT: BASSETLAW/DONCASTER

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981.

Local Planning Authority: BASSETLAW DISTRICT COUNCIL, Doncaster Metropolitan Borough Council

National Grid Reference: (Area 1) SK 662 936 (Area 1) 50 (ha.) 123.6 (ac.)

(Area 2) SK 685 937 (Area 2) 10.6 (ha.) 26.2 (ac.)

(Area 3) SK 706 945 (Area 3) 5.1 (ha.) 12.7 (ac.)

(Area 4) SK 720 963 (Area 4) 22.8 (ha.) 56.6 (ac.)

Total – Notts 51.9 (ha.) 128.4 (ac.)

Total – S. Yorks 36.7 (ha.) 90.6 (ac.)

Ordnance Survey Sheet 1:50,000: 111, 112      1:10,000: SK 69 SE, SK 79 SW, SK 79

Date Notified (Under 1949 Act): 1972

Date of Last Revision: 1981

Date Notified (Under 1981 Act): 1983

Date of Last Revision: –

Other Information:

The site boundary has been amended. Parts of the site are managed as nature reserves.

Reasons for Notification:

The site comprises good examples of wet grassland plant communities, and attracts large numbers of wintering and passage waterfowl.

Biology

The site combines the best remaining washland grasslands along the River Idle floodplain. Characteristically the grassland swards are dominated by marsh foxtail *Alopecurus geniculatus* in a community which contains such wet meadow herbs as la smock *Cardamine pratensis* and great burnet *Sanguisorba officinalis*. In wetter areas the vegetation is dominated by stands of reed sweet-grass *Glyceria maxima* which has also colonised the internal drains although, locally, a more varied wetland plant community occurs which

includes such plant species as meadow rue *Thalictrum flavum*. There are occasional stands of common reed *Phragmites australis* notably between an artificial scrape and the River Idle in Area 3.

The washlands are important as feeding and roosting sites for populations of wintering and passage waterfowl including Bewick's, whooper and mute swans, wigeon, teal, pochard, snipe and a variety of other wildfowl and wading birds. Additional interest is provided by the breeding bird community which includes snipe and redshank.

## Appendix B. Operations likely to damage the special interest

Site name: River Idle Washlands

OLD1001749

Ref. No.	Type of Operation
1	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2	The introduction of grazing and changes in the grazing regime, including type of stock or intensity or seasonal pattern of grazing.
3	The introduction of stock feeding and changes in stock feeding practice.
4	The introduction of mowing or other methods of cutting vegetation and changes in the mowing or cutting regime, including changes from hay making to silage.
5	Application of manure, fertilisers and lime.
6	Application of pesticides, including herbicides (weedkillers).
7	Dumping, spreading or discharge of any materials.
8	Burning.
9	The release into the site of any wild, feral or domestic animal*, plant or seed.
10	The killing, removal or displacement of any wild animal*, including waterfowl and breeding birds.
11	The destruction, displacement or removal of any plant, including turf.
12	The introduction of or changes in tree or woodland management+.
13a	Drainage, including the use of mole, tile, tunnel or other artificial drains.
13b	Modification of the structure of watercourses (eg rivers, streams, springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, re-grading and dredging.
13c	Management of aquatic and bank vegetation for drainage purposes.
14	The changing of water levels and tables and water utilisation, including irrigation, storage and abstraction from existing water bodies and through boreholes.
15	Infilling of ditches, dykes, drains, ponds, pools, marshes or pits.

- 16a The introduction of or changes in freshwater fishery production or management, including sporting fishing and angling.
- 20 Extraction of minerals, including peat, shingle, sand and gravel, clay, topsoil or subsoil.
- 21 Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
- 22 Storage of materials.
- 23 Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
- 26 Use of vehicles or craft likely to damage or disturb features of interest.
- 27 Recreational activities likely to damage turf or marsh plant communities or displace wintering or passage waterfowl or disturb breeding birds.
- 28 Introduction of or changes in game and waterfowl management and hunting practice.
- \* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.
- + including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition

## Appendix C. Natural England Conservation Objectives



### CONSERVATION OBJECTIVES and DEFINITIONS OF FAVOURABLE CONDITION for DESIGNATED FEATURES OF INTEREST:

These Conservation Objectives relate to all designated features on the SSSI, whether designated as SSSI, SPA, SAC or Ramsar features.

Name of Site of Special Scientific Interest (SSSI)	
River Idle Washlands Site of Special Scientific Interest, Nottinghamshire	
Names of designated international sites	
Special Area for Conservation (SAC)	n/a
Special Protection Area (SPA)	n/a
Ramsar:	n/a
Relationship between site designations	

Version Control information		
Status of this Version (Draft, Consultation Draft, Final)	Final	
Prepared by:	Brian Dunning	
Date of this version:	27 June 2019	
Date of generic guidance on favourable condition used:		
Other notes/version history :		
Quality Assurance information		
Checked by	Name:	Date:
	Signature	

## **Conservation Objectives and definitions of Favourable Condition: Notes for users**

### **Conservation Objectives**

SSSIs are notified because of specific biological or geological features. Conservation Objectives define the desired state for each site in terms of the features for which they have been designated. When these features are being managed in a way which maintains their nature conservation value, then they are said to be in 'favourable condition'. It is a Government target that 95% of the total area of SSSIs should be in favourable condition by 2010.

### **Definitions of Favourable Condition**

The Conservation Objectives are accompanied by one or more habitat extent and quality definitions for the special interest features at this site. These are subject to periodic reassessment and may be updated to reflect new information or knowledge; they will be used by Natural England and other relevant authorities to determine if a site is in favourable condition. The standards for favourable condition have been developed and are applied throughout the UK.

### **Use under the Habitats Regulations**

The Conservation Objectives and definitions of favourable condition for features on the SSSI may inform the scope and nature of any 'appropriate assessment' under the Habitats Regulations. An appropriate assessment will also require consideration of issues specific to the individual plan or project. The habitat quality definitions do not by themselves provide a comprehensive basis on which to assess plans and projects as required under Regulations 20-21, 24, 48-50 and 54 - 85. The scope and content of an appropriate assessment will depend upon the location, size and significance of the proposed project. Natural England will advise on a case by case basis.

Following an appropriate assessment, competent authorities are required to ascertain the effect on the integrity of the site. The integrity of the site is defined in paragraph 20 of ODPM Circular 06/2005 (DEFRA Circular 01/2005) as the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified. The determination of favourable condition is separate from the judgement of effect upon integrity. For example, there may be a time-lag between a plan or project being initiated and a consequent adverse effect upon integrity becoming manifest in the condition assessment. In such cases, a plan or project may have an adverse effect upon integrity even though the site remains in favourable condition.

The formal Conservation Objectives for European Sites under the Habitats Regulations are in accordance with paragraph 17 of ODPM Circular 06/2005 (DEFRA Circular 01/2005), the reasons for which the European Site was classified or designated. The entry on the Register of European Sites gives the reasons for which a European Site was classified or designated.

### **Explanatory text for Tables 2 and 3**

Tables 2, 2a and 3 set out the measures of condition which we will use to provide evidence to support our assessment of whether features are in favourable condition. They are derived from a set of generic guidance on favourable condition prepared by Natural England specialists, and have been tailored by local staff to reflect the particular characteristics and site-specific circumstances of individual sites. Quality Assurance has ensured that such site-specific tailoring remains within a nationally consistent set of standards. The tables include an audit trail to provide a summary of the reasoning behind any site-specific targets etc. In some cases the requirements of features or designations may conflict; the detailed basis for any reconciliation of conflicts on this site may be recorded elsewhere.



## **Conservation Objectives**

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

### **Habitat Types represented (Biodiversity Action Plan categories)**

- **Floodplain grazing marsh (including associated swamp)**

### **Geological features (Geological SiteType)**

- **N/A**

(\*) or restored to favourable condition if features are judged to be unfavourable.

Standards for favourable condition are defined with particular reference to the specific designated features listed in Table 1, and are based on a selected set of attributes for features which most economically define favourable condition as set out in Table 2, Table 2a and Table 3:

**Table 1: Individual designated interest features**

BAP Broad Habitat type / Geological Site Type	Specific designated features	Explanatory description of the feature for clarification	SSSI designated interest features	SAC designated interest features	SPA bird populations dependency on specific habitats			Ramsar criteria applicable to specific habitats			
					Annex 1 species	Migratory species	Waterfowl assemblage	1a Wetland characteristics	2a Hosting rare species &c	3a 2000 waterfowl	3c 1% of population
Floodplain grazing marsh	Assemblage of breeding birds associated with lowland damp grassland	Breeding populations of birds characteristic of lowland damp grassland habitats	(*)								
	Assemblage of over-wintering birds	Regionally important numbers of wintering birds	(*)								
	Mosaic of wet grassland and swamp vegetation communities (NVC types MG13 <i>Agrostis stolonifera</i> - <i>Alopecurus geniculatus</i> inundation grassland, and S5 <i>Glyceria maxima</i> swamp)	Plant communities characteristic of damp, seasonally inundated and/or waterlogged grassland.	*								

**NB. Features where asterisks are in brackets (\*) indicate habitats which are not notified for specific habitat interest (under the relevant designation) but because they support notified species.**

**Table 2: Habitat extent objectives**

<b>Conservation Objective for habitat extent</b>	To maintain the designated features in favourable condition, which is defined in part in relation to a balance of habitat extents (extent attribute). Favourable condition is defined at this site in terms of the following site-specific standards:
<b>Extent - Dynamic balance</b>	On this site favourable condition requires the maintenance of the extent of each habitat type (either designated habitat or habitat supporting designated species). Maintenance implies restoration if evidence from condition assessment suggests a reduction in extent.

<b>Habitat Feature (BAP Broad Habitat level, or more detailed level if applicable)</b>	<b>Estimated extent (ha) and date of data source/estimate</b>	<b>Site Specific Target range and Measures</b>	<b>Comments</b>
<b>Floodplain grazing marsh (including associated swamp and fen)</b>	<p>Area of entire site = 88.6 ha.</p> <p>Area of vegetation communities of special interest = 40.26 hectares*</p>	<p>Maintain the area of habitats that are used by the features in the site within acceptable limits. A loss of 5% or more of any relevant habitat type is unacceptable.</p> <p>Record extent of habitat types by aerials, mapping of habitat using Phase I or NVC techniques</p> <p>Maintain the extent of wet grassland/swamp vegetation mosaic of special interest (MG13 at 27.86ha and S5at 8.46 ha) at 2006 baseline levels. A loss in cover of 1% or more of either in extent is unacceptable.</p> <p>Record extent of habitat types by aerials, mapping of habitat using Phase I or NVC techniques</p>	<p>Breeding and wintering birds will require a large open areas of a variety of habitat, including shallow open water and improved grassland to wet unimproved pasture, rushy pasture and marsh.</p> <p>Habitat attributes for wintering birds including swans include large open areas of wet, short and weed-free grassland with abundance of soft-leaved plants with many surface pools and fluctuating water levels.</p> <p>Habitat attributes for breeding bird assemblage include a mix of short and long vegetation in an open landscape with many surface pools and fluctuating water levels providing high food availability (abundance of soil, ground-surface and aquatic invertebrates) and with a low livestock density.</p>

<b>Audit Trail</b>
<b>Rationale for habitat extent attribute (Include methods of estimation (measures) and the approximate degree of change which these are capable of detecting).</b>
Current GIS software, habitat surveys and 2000 aerial photographs have been used to estimate the extent of the habitat feature.  * A baseline extent for the vegetation types of special interest has been generated from the 2006 Vegetation Survey (see English Nature Science file).
<b>Rationale for site-specific targets (including any variations from generic guidance)</b>
<b>Other Notes</b>

**Table 2a Species population objectives**

<b>Conservation Objective for species populations</b>	To maintain the designated species in favourable condition, which is defined in part in relation to their population attributes. Favourable condition is defined at this site in terms of the following site-specific standards:
<b>Population balance</b>	On this site favourable condition requires the maintenance of the population of each designated species or assemblage. Maintenance implies restoration if evidence from condition assessment suggests a reduction in size of population or assemblage.

<b>Species Feature (species or assemblage)</b>	<b>List supporting BAP Broad Habitats</b>	<b>Population Attribute (eg presence/absence, population size or assemblage score)</b>	<b>Site Specific Target range and Measures (specify geographical range over which target applies ie site, BAP broad habitat or more specific)</b>	<b>Comments</b>
<b>Assemblage of non-breeding birds</b>	Bird population size	Counts or estimates of numbers of individuals for at least 3 years in 6.	<p>Maintain bird assemblage at or above 50% of that of baseline value of 6215 birds– a reduction of &gt;50% (3017 birds) is unacceptable.</p> <p>Peak counts at many sites fluctuate considerably between years, probably a result of their large turnover during the autumn period and their ability to exploit favourable conditions at sites where they occur. The peak count for swans is generally in January and February followed by a gradual decline through the winter. It is essential that counts are undertaken during this period to obtain an accurate picture of birds visiting the SSSI.</p>	<p>WeBS data is not available for the SSSI.</p> <p>Baseline size of assemblage has been set using the first accurate measure of this feature from 2002-2005 which is a mean of 6,215 birds.</p> <p>The SSSI was first notified in 1972. SSSI Qualifying Criteria Checklist in Notification file dated 1 May 1984 states “<i>The site has nationally important over-wintering numbers of Bewick’s swans.</i>” Data held in the Site Science files indicates peak counts of 82 (1966), 154 (1970) and 174 (1972) and 70 (1979). Post re-notification in 1983, counts of 26 (1984), 50 (1988), 57 (1991) and 65 (1992) using the SSSI areas. From 2002-2005, peak count was 2.</p> <p>Due to the recent decline in numbers of bewick swans in Nottinghamshire, and in consultation with RSPB, the target specific to their numbers has been removed from the FCT.</p>

Species Feature (species or assemblage)	List supporting BAP Broad Habitats	Population Attribute (eg presence/absence , population size or assemblage score)	Site Specific Target range and Measures (specify geographical range over which target applies ie site, BAP broad habitat or more specific)	Comments
<p><b>Assemblage of breeding birds – damp lowland grassland</b></p>	<p>Assemblage score (BTO index)</p>	<p>Record presence/absence of breeding species within the assemblage one year in every 6.</p>	<p>Maintain diversity of assemblage of breeding birds of damp lowland grassland.</p> <p>If the total score calculated for a breeding bird assemblage falls by the equivalent of 25% or more in points then the assemblage is in unfavourable condition. Condition target is therefore an index score of no less than 12 points.</p>	<p>Bird assemblages are defined according to characteristic species that can be found in a particular habitat. Typically they comprise a variety of common and rarer species. However, very rare species may not be present within an assemblage in all years, and to take account of this the targets for assemblages have been set to allow for some natural fluctuations in the number of species present in an assemblage.</p> <p>The thresholds listed in the 1989 Guidelines for the Selection of Biological SSSIs are to be used when calculating assemblages. The baseline qualifying BTO index score for this type of assemblage is 16.</p> <p>Since 1982, inland breeding populations of snipe, lapwing and redshank in England have all declined by 60%, 40% and 20% respectively (BWWM surveys 1982-2002). As a result a target specific to the numbers of snipe and redshank has been removed</p> <p>Breeding must be confirmed as proven or probable according to generic proof of breeding codes. A count of the numbers of breeding pairs/units in a site is not needed. For features that are based on scored assemblages or the number of species within an assemblage surveys will be required in just one year within the 6 year reporting cycle.</p> <p>The species present at designation and each monitoring event do not need to be the same as this is a score-based assessment only.</p> <p>On the basis of presence/absence recalculate the assemblage score using the SSSI Guidelines for the relevant habitat</p> <p>A target specific to the numbers of Snipe and redshank has been removed sure to their declining numbers in nottinghamshire.</p>

<b>Audit Trail</b>
<b>Rationale for species population attributes (Include methods of estimation (measures), and the approximate degree of change which these are capable of detecting).</b>
<b>Rationale for site-specific targets (including any variations from generic guidance)</b>
<b>Other Notes</b>
Monitoring of both bird populations (size or diversity) and the extent of habitats are fundamental to assessing the condition of bird features and are therefore mandatory. Failure of a mandatory attribute means that the site is considered to be in “unfavourable condition”. Detailed monitoring of habitat quality and disturbance have not been included as mandatory needs largely because the influences of each on bird features is poorly understood, so meaningful targets cannot be set. The guidance relies on using an <b>indirect</b> way of assessing habitat condition and disturbance by the direct monitoring of bird population size and diversity; both typically respond relatively quickly to deterioration in habitats or living conditions and so provide an effective means of early detection of problems in a site.



**Table 3 Site-Specific definitions of Favourable Condition**

<b>CONSERVATION OBJECTIVE FOR THIS HABITAT / GEOLOGICAL SITE-TYPE</b>	To maintain the <b>floodplain grazing marsh (including swamp and fen)</b> at <b>River Idle Washlands</b> in favourable condition, with particular reference to relevant specific designated interest features. Favourable condition is defined at this site in terms of the following site-specific standards:
<b>Site-specific details of any geographical variation or limitations (where the favourable condition standards apply)</b>	
<b>For maps showing the location and distribution of MG13, S5 and other wetland communities associated with the floodplain grazing marsh (see 2006 Baseline NVC Survey in SSSI Science File).</b>	

10.2 Site-specific standards defining favourable condition					
Criteria feature	Attribute term in guidance	Measure	Site-specific Targets	Comments	Use for CA?
MG13-related inland wet grassland	Sward structure: bare ground	Record extent of bare ground (not rock) distributed through the sward, visible without disturbing the vegetation, eg from the seasonal effects of flooding. Record in period May - July	No more than 15% in May-early June or no more than 10% in mid-June-July	Outside target indicates problems with stock management eg poaching, supplementary feeding or excessive flooding.	
MG13-related inland wet grassland	Sward structure: average height	Record sward height in period May - July (before hay cut in meadows). Upper target refers to pastures only.	Sward 5 - 15 cm (excluding <i>Juncus</i> spp.)	Sward height above upper target shows that habitat is not being managed sufficiently eg lack of or insufficient grazing or if below lower target, is being overgrazed.	
MG13-related inland wet grassland	Sward composition: positive indicator species	Record the frequency of positive indicator species from the list below to give an overall total of 2 frequent and 2 occasional or locally abundant. Record in period May - July (before hay cut in meadows). <i>Caltha palustris</i> , <i>Cardamine pratensis</i> , <i>Eleocharis</i> spp., <i>Filipendula ulmaria</i> , <i>Galium palustre</i> /G. <i>uliginosum</i> , <i>Juncus acutiflorus</i> /J. <i>articulatus</i> /J. <i>subnodulosus</i> (jointed rushes), , <i>Mentha aquatica</i> , <i>Myosotis laxa cespitosa</i> /M. <i>scorpioides</i> , <i>Oenanthe fistulosa</i> , <i>Pericaria amphibia</i> ,	Overall total of at least 2 species/taxa frequent plus at least 1 species/taxa occasional throughout the sward or locally abundant in more than 10% of the sward	Choice of species related to grassland types, restriction to unimproved grassland and wetness characteristics of habitat, all satisfactory when inside target.	Yes

		<i>Ranunculus flammula, Thalictrum flavum. Potentilla anserine, Senecio aquaticus. Lychnis flos-cuculi.</i>		Choice of species relate to species-poor nature of these community types.	
MG13-related inland wet grassland	Sward composition: negative indicator species	Record the frequency and % cover of negative indicator species. Record in period May - July (before hay cut in meadows). <i>Cirsium arvense, Cirsium vulgare, Rumex crispus, Rumex obtusifolius,, Urtica dioica.</i>	No species more than occasional throughout the sward or singly or together more than 5% cover	Invasive species chosen to indicate problems of eutrophication and disturbance from various sources when outside target eg poaching, stock feeding.	Yes
MG13-related inland wet grassland	Sward composition: negative indicator species – woody species	Record the % cover or frequency of negative indicator species in period May - July (before hay cut in meadows). All tree and scrub species, considered together. NB If scrub/tree species in pastures are more than occasional throughout the sward but less than 5% cover, they are soon likely to become a problem if grazing levels are not sufficient or if scrub control is not being carried out.	No species of trees and shrubs more than occasional throughout the sward.	Invasive species outside target shows that habitat is not being managed sufficiently eg lack of or insufficient grazing/cutting	Yes
Lowland fens: Types S5	Habitat structure litter	Visual estimate of % cover.	Total extent of plant litter across the area of S5 assessed should be no more than 10%.	More than 25% litter cover indicates insufficient removal of biomass by grazing.	NO
Lowland fens: Types S5	Habitat structure Exposed substrate	Visual estimate of % cover.	total extent across the area of S5 assessed should be no more than 10%	A high frequency and cover of exposed substrate will usually be undesirable and may indicate, inter alia, over-grazing, and water scour. Patches of exposed substrate are likely to be more typical/desirable for M10, 13-14, 37, S1-23 and some examples of M1-3 and M6.	YES
Lowland fens: Types S5	Habitat composition	A baseline map showing the boundary of the components should be used to assess any changes in extent. Aerial photographs can offer a convenient means of rapidly assessing extent in some cases.	No loss of swamp type to carr or woodland		YES

Lowland fens: Types S5	Vegetation composition: positive indicators	Visual assessment of cover, using structured walk or transects and recording quadrats.	<i>Glyceria maxima</i> should be constant with at least 2 of the following at least occasional; <i>Phalaris arundinacea</i> , <i>Lemna minor</i> <i>Solanum dulcamara</i> , <i>Alisam plantago-aquatica</i> , <i>Sparganium erectum</i> , <i>Rorippa spp.</i>		YES
Lowland fens: Types S5	Vegetation composition: indicators of negative change - undesirable non-woody species	Visual assessment of cover, using structured walk or transects and recording quadrats	Invasive non-native species should be absent, or no more than rare if present	Invasive aliens within lowland fens may include <i>Crassula helmsii</i> , <i>Acorus calamus</i> , <i>Mimulus spp.</i> , <i>Impatiens glandulifera</i> , <i>Fallopia japonica</i> , <i>Heracleum mantegazzianum</i> .	YES
Lowland fens: Types S5	Vegetation composition: indicators of negative change – undesirable woody species	Visual assessment of cover, using structured walk or transects and recording quadrats	Trees and shrubs should be absent or no more than rare if present.		YES

<b>Audit Trail</b>
<b>Rationale for limiting standards to specified parts of the site</b>
<b>Rationale for site-specific targets (including any variations from generic guidance)</b>
<b>Rationale for selection of measures of condition (features and attributes for use in condition assessment)</b>
(The selected vegetation attributes are those considered to most economically define favourable condition at this site for the broad habitat type and any dependent designated species).
<b>Other Notes</b>

## Appendix D. Hydrology Data

### 1 The geological succession in the River Idle catchment

The geological succession in the River Idle catchment is shown below. This concentrates on the area to the east of Worksop. This has been compiled from British Geological Survey maps.

<b>Stratigraphy</b>	<b>Formation</b>	<b>Lithology</b>
Quaternary	Peat	Decomposed organic material
	Alluvium	Gravel overlain by silt or fine sand
	River terrace	Poorly sorted gravels
	Glacial sands and gravels	Locally deposited sand and gravel
	Glacial till	Clayey, sandy or gravelly clay
Mercia Mudstone Group	Sneinton Formation	Basal unit of the MMD comprising siltstone and fine sandstone
Sherwood Sandstone Group	Nottingham Castle Formation	Fine, medium or coarse pebbly sandstone
	Lenton Sandstone formation	Fine sandstone
Upper Permian Magnesian Limestone	Roxby Formation	Mudstone and siltstone
	Brotherton Formation	Dolomitic limestone
	Edlington Formation	Mudstone and siltstone
	Cadeby Formation	Dolomitic limestone
Lower Permian	Basal Breccia	Dolomitic breccia

A borehole (BGS ref SK 49 NW 29) at SK7000 9542, to the east of Misson shows the following sequence of superficial (drift) deposits overlying a significant thickness of Sherwood Sandstone:

<b>Lithology</b>	<b>Thickness (m)</b>	
Sand and gravel	1.52	Superficial
Sand, gravel and clay	0.42	
Soft sand	0.45	
Sand and gravel	2.44	
Soft sandstone (grey)	3.35	Solid
Red sandstone	2.44	
Grey sandstone	3.05	
Red and grey sandstone	62.48	

Stratigraphy in Misson Observation Borehole

## 2 Summary of the soil properties of Idle Washlands SSSI

**Table 1a. Summary of the soil properties at Bawtry (All measurements at time of observation only)**

Type	Character	Hydraulic conductivity	Details	Groundwater table
Sand 1	Medium rounded sand	High	Only found in riparian area	
Clay 1	Silty clay	Poor	Minimal to 46cm thickness evidence of gleying	
Earthy peat	Dark brown to black peat, possible former land surface	Moderate-poor	Generally dry and structureless-	
Raw peat	Raw mid-brown peat	Good- moderate	Mean thickness 1.25m	
Clay 2	Silty clay thin band	Poor-very low	Found in on the southern edge of the eastern area	Mean water table 86cm from ground surface 2.07mAOD
Woody peat	Raw mid-brown peat extensive woody inclusion	Good		
Sand 2	Medium angular sand on upland or terraces	High	Basal material in the washland	
	Red or grey massive clay	Very low		

**Table 1b. Summary of the soil properties at Misson West (All measurements at time of observation only)**

Type	Character	Hydraulic conductivity	Details	Groundwater table	
Earthy peat 1	Structureless black peat	Moderate	Mean thickness 14.5cm	In low lying areas surface soil layers saturated to 30cm depth	
Clay 1	Silty clay	Poor	Mean thickness 26cm		
Earthy peat 2	Discontinuous layer assumed to be formed land surface	Moderate-poor			
Raw peat	Raw, brown peat	Good-moderate	0.23 to 1.8m thick, 0.77mAOD to 2.56mAOD	Where overlain by clay 1 anoxic conditions are maintained by lateral water movement from the river  Where overlain by earthy peat 1 evidenced of drying and oxidation	May act to confine or partially confine the groundwater table
Woody peat	Frequent woody inclusions	Good	Saturated, possibly indicating former channel system		True groundwater table at 2.00-2.63mAOD
Clay 2	Silty clay	Very low	Permanently saturated		

**Table 1c. Summary of the soil properties at Misson East (All measurements at time of observation only)**

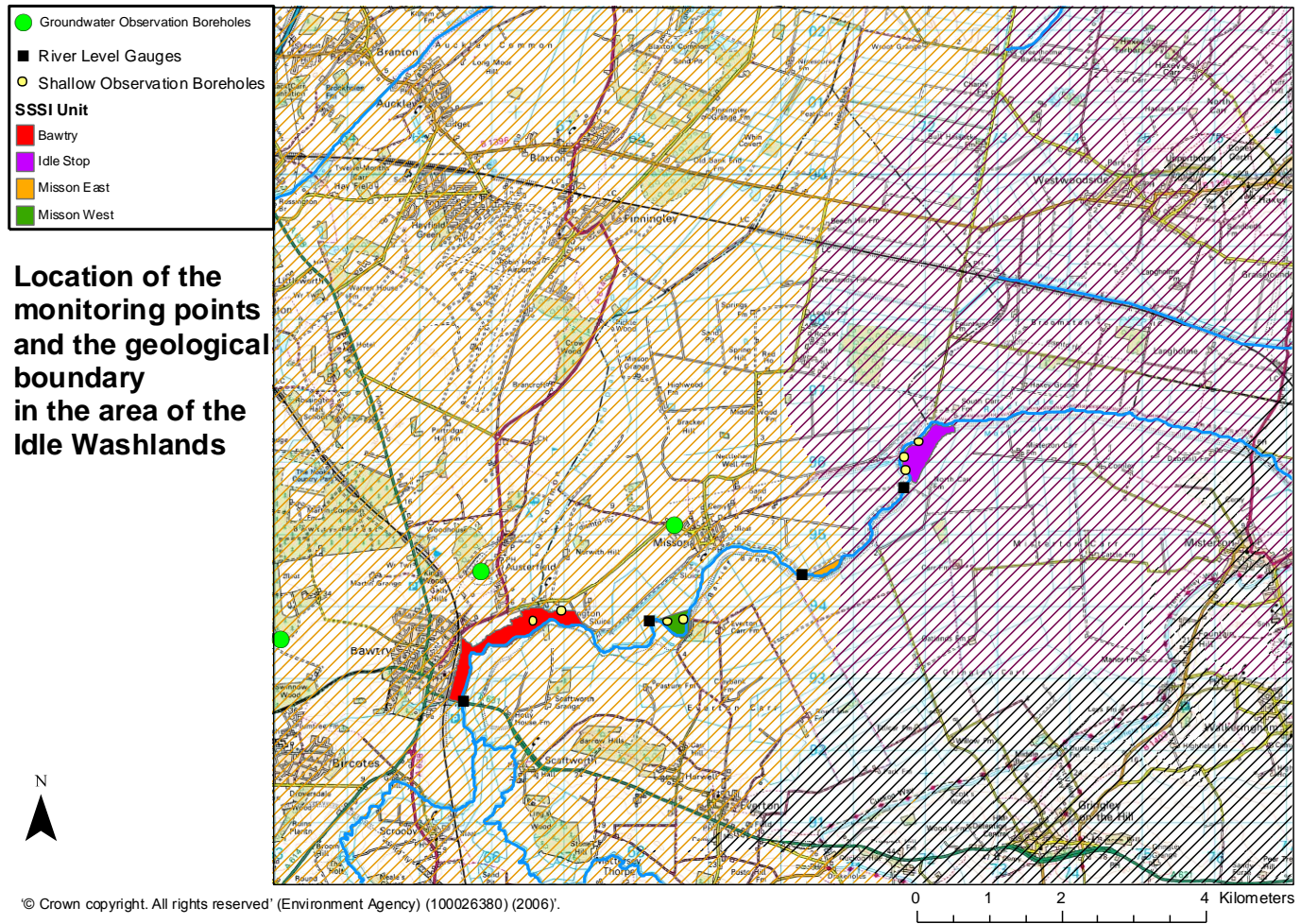
Type	Character	Hydraulic conductivity	Details	Groundwater table
Clay 1	Silty clay	Poor	Saturated, Actively forming modern river effluvium	
Earthy peat	Dark brown to black peat, previous land surface	Good-moderate	Mean thickness 8cm, rewetted by surface water	
Dark grey peat	Gritty peat, silty clay bands	Moderate-poor	Mean thickness 17cm, degraded condition	Variable water table, with the highest level at the river margin and lowest to the north
Raw peat	Fibrous plant remains	Good	Mean thickness 52cm, dry in upper layers, moist at base	
Clay 2	Silty clay bands of sand and peat, former river course	Very low	Mean depth of top 1.20m AOD	Groundwater table tied to upper surface of clay, 105-117cm below the surface (mean depth 1.19m AOD)



**Table 1d. Summary of the soil properties at Idle Stop (All measurements at time of observation only)**

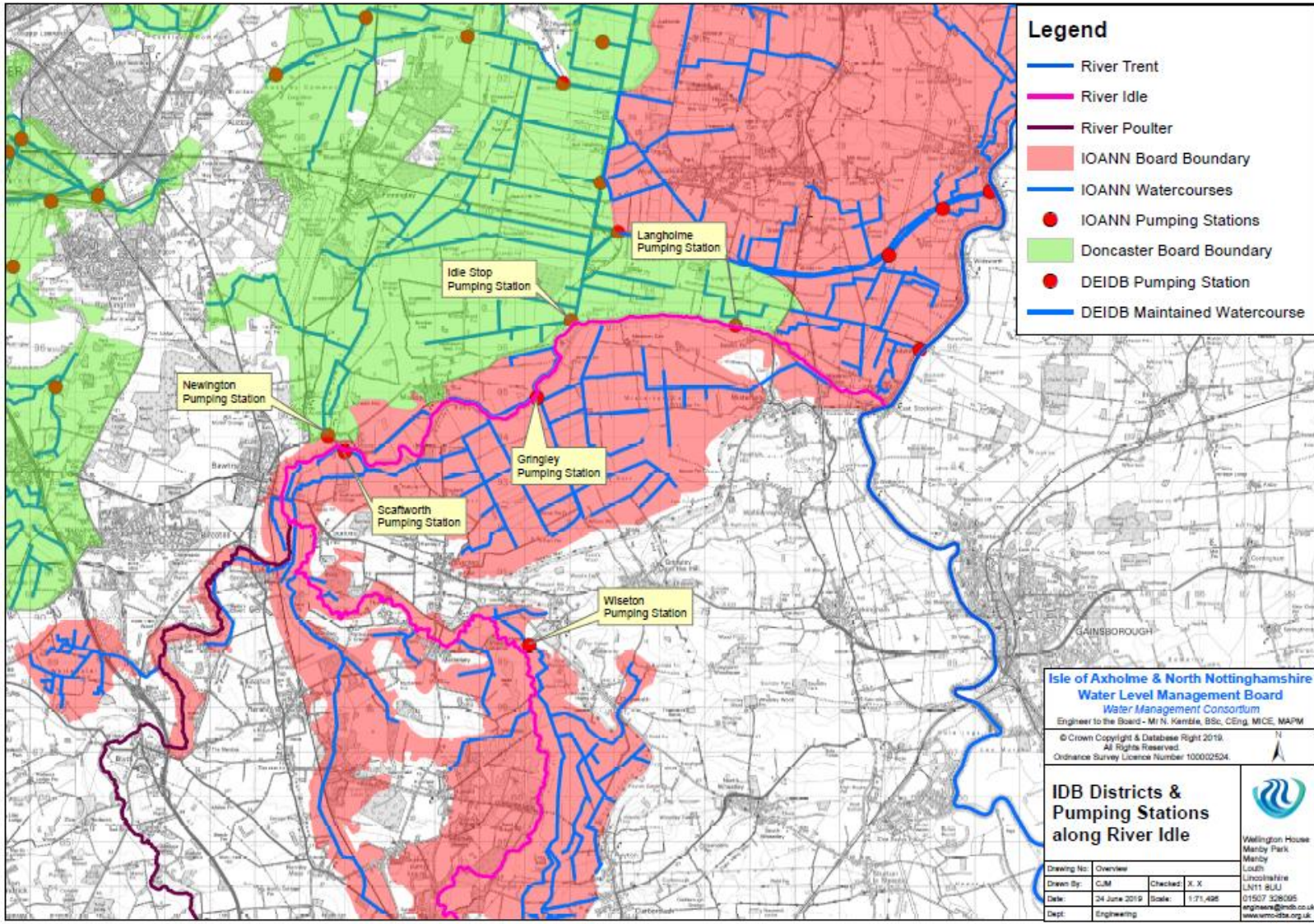
Type	Character	Hydraulic conductivity	Details	Location	Groundwater table
Sand 1	Medium rounded sand with silty clay	High	Only encountered in ~20m band along river bank	Inner meander bend actively forming deposits parallel to the bank	
Clay 1	Silty clay	Poor	Mean thickness 30cm; saturated; shows signs of active gleying	Extends across the site. Woody peat is thickest around the southern edge, thins in the centre and disappears in the north	
Earthy peat	Structureless peat	Moderate-poor			
Raw peat	Raw, mid-brown peat	Good-moderate	Moist in upper parts dry at base		
Woody peat	Extensive woody inclusions	Good			Mean (true) groundwater table depth 107cm below ground surface (0.94-1.31mAOD) in woody peat or Clay 2
Clay 2	Silty clay- former river course	Very low	Top mean depth 1.17mAOD; base below depth of coring	Underlies the northern and central part of the site	
Sand 2	Medium angular sand	High	Top mean depth 0.79mAOD; base below depth of coring	Lies directly below the woody peat in the southern part of the site	

### 3 Location of Monitoring and geological boundaries



### Appendix E. Internal Drainage Board Boundaries





**Legend**

- River Trent
- River Idle
- River Poulter
- IOANN Board Boundary
- IOANN Watercourses
- IOANN Pumping Stations
- Doncaster Board Boundary
- DEIDB Pumping Station
- DEIDB Maintained Watercourse

**Isle of Axholme & North Nottinghamshire  
Water Level Management Board**  
Water Management Consortium

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**IDB Districts &  
Pumping Stations  
along River Idle**



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Manby  
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Drawing No:	Overview		
Drawn By:	CJM	Checked:	X, X
Date:	24 June 2019	Scale:	1:71,496
Dept:	Engineering		

