Nottingham Trent Left Bank FAS Environmental Statement

APPENDIX A - SAWLEY & TRENT MEADOWS

OCTOBER 2008

Reference number IMMI000642

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME ENVIRONMENTAL STATEMENT

APPENDIX A
SAWLEY & TRENT MEADOWS

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A list of abbreviations, a glossary and a list of references are included in *Sections 14 to 16, Volume 1*.

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A1. INTRODUCTION

A1.1 Background to the Project

Nottingham is located on the banks of the River Trent and currently some 16,000 properties are at risk of flooding. The city has a long history of flooding with notable events occurring in 1795, 1875 and 1947. The latter prompted construction of the current defences during the 1950s. The most recent flood event was in November 2000, which was classified as an event with a 3%[1] (1 in 33) annual probability of occurrence. The summer of 2007 saw significant flood events elsewhere in England, while on the River Trent through Nottingham flooding was not more than a 50% (1 in 2) annual probability of occurrence.

An appraisal of the flood risk in Nottingham was published by the Environment Agency in 2005. The study, known as the Fluvial River Trent Flood Risk Management Strategy (the Fluvial Trent Strategy), included inspections of the existing defences, topographic surveys, ground investigations, computer modelling of the river, economic analyses and a review of options. The work confirmed that the standard of protection of the existing defences is low in places and that some of the defences are approaching the end of their useful life. A business case has been approved by the Environment Agency's Board to undertake works to improve the defences and increase the standard of protection to protect against a flood event with a 1% annual probability of occurrence.

Works to improve the defences on the left bank of the River Trent through Nottingham are being proposed as part of the Nottingham Trent Left Bank Flood Alleviation Scheme (FAS). The scheme will involve raising existing flood defences and constructing new ones where required. The whole of the left bank of the River Trent through Nottingham is a single 'flood cell'. By this term we mean that a breach at the defences at any location could, in theory, flood the whole cell. The cell extends a distance of 27km from the M1 at Sawley to the Radcliffe Railway Viaduct; refer to *Figure 1.1, Volume 1*. Only upon completion of the entire works will the whole flood cell be protected.

The works span the boundaries of four local planning authorities. As a result, *Volume 1* of the Environmental Statement (ES) is a 'front end' overarching summary document. It outlines the approach and scope of the Environmental Impact Assessment (EIA), and presents the overall results. It contains all background legislation and policy, survey methodology, any generic mitigation, the glossary, abbreviations and references. It also summarises the consultation undertaken, the proposed environmental enhancements and the Health Impact Assessment (HIA).

There are four separate appendices, each of which relates to the specific works within each planning authority. This is illustrated in Table A1.1.

[1] Floods are categorised by the likelihood they will occur in any given year. This is expressed as a '% annual probability'. Therefore a flood event that has a 1% annual probability of occurrence will have a probability of 1 in 100 of occurring in any given year.

Table A1.1 Scheme Area and Local Planning Authorities

Appendix	Scheme Area	Local Planning Authority
A	*Sawley and Trent Meadows*	Erewash Borough Council
B	Attenborough, Erewash and Rylands	Broxtowe Borough Council
C	Meadows and Colwick Country Park	Nottingham City Council
D	Colwick	Gedling Borough Council

This is *Appendix A* and it describes the EIA for works within Erewash Borough Council's jurisdiction; the area is referred to in this appendix as 'Sawley and Trent Meadows'. This appendix contains a description of the baseline conditions, the proposed works, their associated impacts and the proposed mitigation measures for the Sawley and Trent Meadows scheme area. It should be read in conjunction with *Volume 1*.

A1.2 Environmental Statement April 2007: Changes to the Outline Design

In April 2007 we published our proposals for the original scheme and produced an Environmental Statement.

In October 2007 as part of the Nottingham Strategic Flood Risk Assessment a remodelling exercise was completed using a revised modelling technique. The new model has improved the accuracy of our flood predictions and led to changes in the original outline design detailed in April 2007. Other changes have resulted from consultations during the development of the scheme to improve the landscape and recreational value of the flood defence. The most significant changes to the Sawley and Trent Meadows scheme areas are as follows:

- The area of high ground around Church Farm that the embankment tied into in the previous design is no longer considered sufficiently high to offer adequate standard of flood risk management. Therefore the flood defence needs extending. Due to the presence of a Local Wildlife Site (LWS), and the need to avoid the cemetery of St. Mary's Church, the simplest option identified was to construct a wall 0.8m high around the perimeter of the garden, tying into high ground behind the double garage at Church Farm.
- Works are no longer required around Grounds Farm.
- Embankment heights have changed slightly throughout the scheme area to accommodate for climate change impacts. All sections of the works are discussed in greater detail in Table A2.1.

Therefore, we have re-assessed the scheme and produced this Environmental Statement for our revised proposals.

Planning permission was received for the proposed works in the Sawley and Trent Meadows scheme area in 2007, which had been submitted with the previous Environmental Statement in April 2007. Erewash Borough Council have confirmed that new planning permission is not required for the revised scheme.

A1.3 The Study Area

The study area is defined by the area of the left bank of the River Trent with a 1% annual probability of flooding. The study area is within the boundaries of Erewash Borough Council, between the M1 crossing of the River Trent at Sawley and the Erewash Borough and Derbyshire County boundary demarcated by the River Erewash; refer to Figure A1.1.

A1.4 Description of the Scheme Area

The FAS proposes development to provide flood protection to the left bank of the River Trent through Nottingham against floods with a 1% annual probability of occurrence. This includes the Sawley and Trent Meadows scheme area. For the purposes of our work, these areas are split into a number of reaches, which are characterised by the types of works which are proposed. The scheme area is divided into 12 reaches as shown in Plates A1.1. to A1.8 and Figures AA3.1 and AA3.2 in *Annex 3.*

- Reach 1: Wilne Road to Harrington Arms
- Reach 2: Harrington Arms Public House to Church Farm
- Reach 3: Church Farm to Sawley Viaduct
- Reach 4: Grounds Farm
- Reach 5: Sheetstores Flood Gates
- Reach 6: Trent Farm
- Reach 7: Trent Lane to Newbery Avenue
- Reach 8: Newbery Avenue to Owen Avenue
- Reach 9: Owen Avenue to Home Farm
- Reach 10 Trent Meadows Picnic Area to Barton Pool Local Wildlife Site (LWS)
- Reach 11: Barton Pool LWS to River Erewash
- Reach 12: Golden Brook

The description of the scheme area considers the following factors:

- the characteristics and land use;
- the presence or absence of existing flood defence;
- the standard of protection that the existing flood defence provides.

A1.4.1 Sawley

The Sawley section of the scheme area is located to the south west of Nottingham. There are existing flood defences, which primarily consist of earth embankments set back from the River Trent. The existing defences through Sawley typically provide protection against a flood event with a 4% (1 in 25) annual probability of occurrence. As well as the residential areas, there are some former industrial areas around the Erewash Canal that are at risk. Despite such developments, the land use immediately surrounding the defences is predominantly agricultural.

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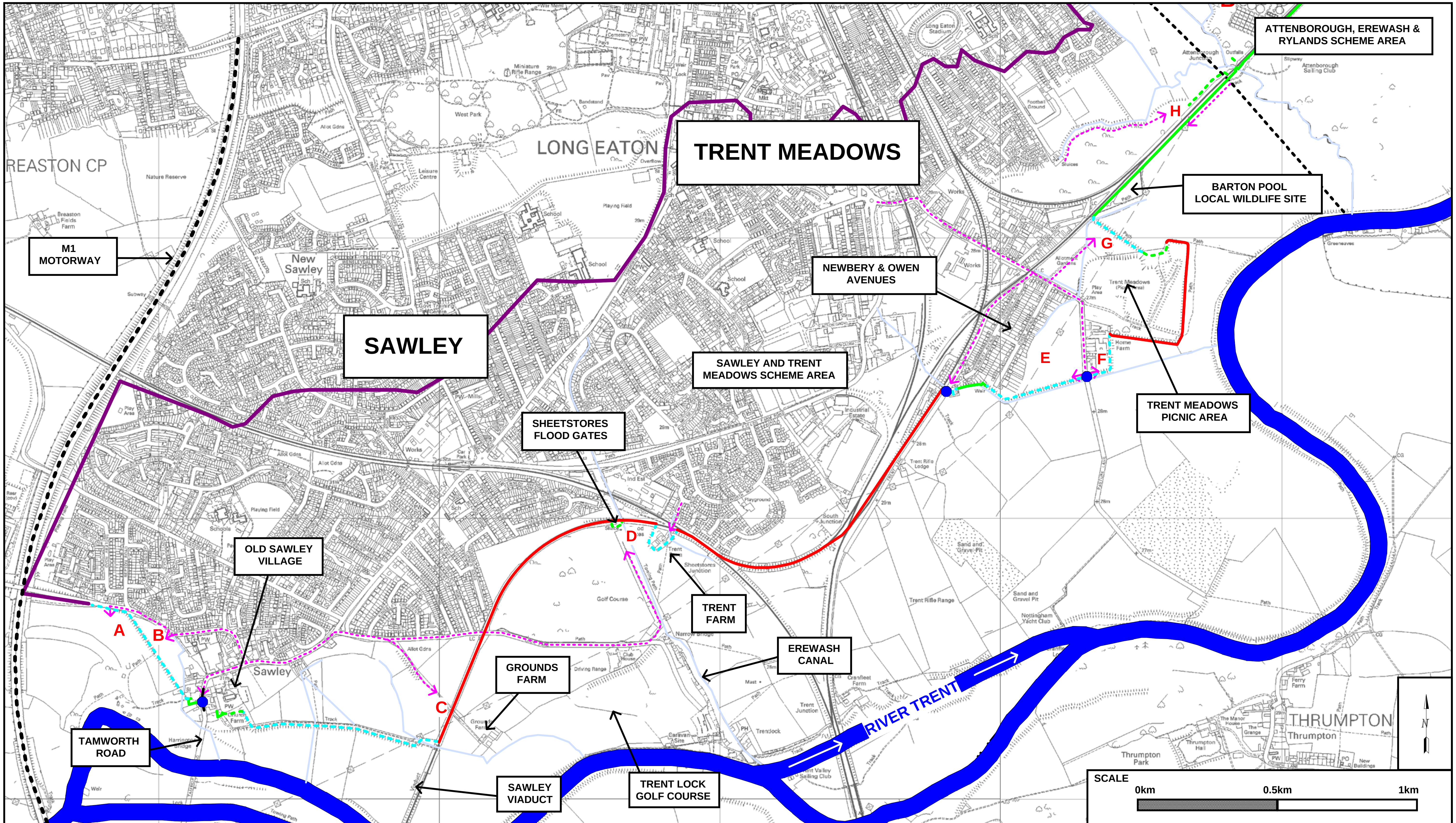

Key

PROPOSED DEFENCES

- New Wall
- Raise Existing Wall
- New Embankment
- Raise Existing Embankment
- High Ground / No Works Required
- Raise Road
- A Site Compounds & Storage Areas
- Access Route
- River Trent
- Other Watercourses
- Study Area (floodplain with a 1% annual probability of flooding)
- Scheme Area Limits

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Sawley & Trent Meadows Study Area

Environment Agency

Scale 1 : 13,000 @ A3

Figure A1.1

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Reach 1: Wilne Road to Harrington Arms contains an existing flood defence embankment which crosses a grazed pasture. The existing defence ties into high ground at Wilne Road and the Harrington Arms Public House (PH). A section of the existing embankment was raised in November 2007 to trial the suitability of materials.

Reach 2: Harrington Arms PH to Church Farm does not currently have a formal flood defence.

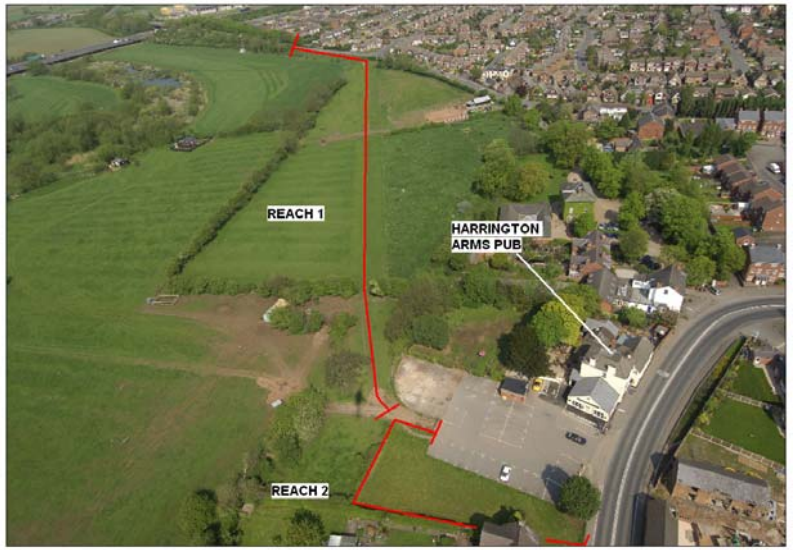

Plate A1.1 Sawley Reaches 1 & 2

Reach 3: Church Farm to Sawley Viaduct is farmed land between Sawley village and the service railway line embankment at Sawley viaduct. The existing flood embankment commences at the boundary of All Saints Parish Church, and runs in front of Roman earthworks, which are a Scheduled Monument. It extends to and ties in with the railway embankment, which is an impermeable barrier acting as a flood defence. A further low level embankment runs parallel with the Trent through this reach and provides some protection to the adjacent land and the Trent Lock Golf Club.

Plate A1.2 Sawley Reaches 1, 2 & 3

Reach 4: Grounds Farm is a flood defence embankment around the railway underpass at the access to Grounds Farm.

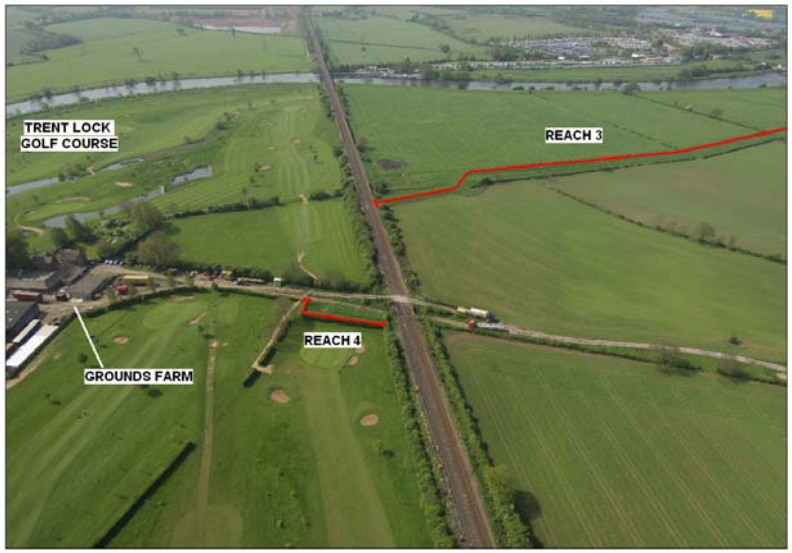

Plate A1.3 Sawley Reaches 3 & 4

Reach 5: Sheetstores Flood Gates are located on the Erewash Canal, where it flows beneath the railway embankment. The gates are closed to prevent flooding along the canal during an extreme event in the River Trent.

Reach 6: Trent Farm follows the alignment of a flood defence ring bank that encloses Trent Farm. It ties into the railway embankment at both ends. The flood embankment is in close proximity to the farmhouse and its grassed slopes are well maintained and form a garden lawn.

Plate A1.4 Sawley Reaches 5 & 6

A1.4.2 Trent Meadows

The Trent Meadows section of the scheme area is downstream (eastwards) from Sawley. It comprises a mixture of agricultural, recreational, residential and former industrial areas. The existing flood defences are set back from the River Trent around the developed fringe of the area. The existing defences through Trent Meadows typically provide protection against a flood event with a 4% annual probability of occurrence. The scheme area is divided into the six separate reaches, with the numbering system continuing on from Sawley.

Reach 7: Trent Lane to Newbery Avenue starts at the toe of the railway embankment. The defence line crosses Trent Lane, where there is a ramp in the road. The defence is formed by raised kerbs, high ground and headwalls for the flood control structures associated with New Sawley Brook Pumping Station.

Reach 8: Newbery Avenue to Owen Avenue is an existing flood embankment, which passes through the gardens of Numbers 71 to 81 Newbery Avenue.

Reach 9: Owen Avenue to Home Farm. An existing flood embankment passes through open ground parallel to the New Sawley Brook as far as Pasture Lane. At this point the road is raised to maintain the defence line. The embankment continues to Home Farm, where it ties into the high ground of a redundant landfill site, adjacent to Trent Meadows Picnic Area. The defence through certain stretches of this reach is flanked by trees and shrubs on the riverward side.

Plate A1.5 Trent Meadows Reaches 7, 8 & 9

Plate A1.6 Trent Meadows Reach 9

Reach 10: Trent Meadows Picnic Area to Barton Pool Local Wildlife Site (LWS) is uncultivated open land on the edge of an in-filled former gravel pit and is part of the Trent Meadows potential LWS (pLWS). The current flood embankment extends from the high ground on the northern side of the Trent Meadows Picnic Area and ties into the railway embankment.

Reach 11: Barton Pool LWS to River Erewash. The site contains the Barton Pool LWS and extends up to the Local Authority and County boundary at the River Erewash. There are no formal flood defences. Continuity of the defence line is provided by the railway embankment.

Reach 12: Golden Brook, north of the railway line. This area of grazing land does not have any formal flood defences. It is part of the Attenborough Junction Tip LWS and was identified as an area of high botanical interest from the detailed botanical surveys undertaken; refer to *Section A4*.

Plate A1.7 Trent Meadows Reaches 10 & 11

Plate A1.8 Trent Meadows Reaches 11 & 12

A1.4.3 Future Status of Sawley and Trent Meadows

Should the proposed flood defence improvements not proceed, there will be long-term effects on Sawley and Trent Meadows. The standard of protection currently provided by the existing flood defences is less than that recommended by the Department of Environment, Farming and Rural Affairs (Defra). Some of the defences are approaching the end of their design life and there is an increasing risk of failure. Over time, the existing defences would continue to deteriorate and the risk of flooding would increase for the whole scheme area. This would be compounded by the effects of climate change. Should the defences fail, 16,000 properties on the left bank of the River Trent in Nottingham would be at risk from a flood event with a 1% annual probability of occurrence and subject to an increased frequency in flood risk in the future.

As most of the land in front of the defences is either designated as greenbelt or is in the floodplain, it is unlikely that any further future development would be permitted in these areas[2]. However, without improvements to the flood risk management through Sawley and Trent Meadows most development on the land behind the defences is unlikely to be permitted under Planning Policy Statement 25 (PPS25), which sets out Government policy on development and flood risk, as the area would be at risk from a flood event with a greater than 1% annual probability of occurrence.

[2] It is Environment Agency policy not to agree to any new floodplain development as it reduces flood storage capacity and can increase flood risk.

A2. PROJECT PROCESSES, RESIDUES AND EMISSIONS

A2.1 Physical Characteristics

Eighteen flood risk management options were considered during the scoping stage of the Fluvial Trent Strategy (Environment Agency, 2005). During the development of the FAS other alternative options have also been considered following consultations with landowners and statutory bodies. Section A2.5 describes the alternative options considered for Sawley and Trent Meadows.

A summary of the proposed construction works is shown on the General Arrangement Figures AA3.3 to AA3.8 in *Annex A3* of this appendix.

A2.1.1 Works at Sawley and Trent Meadows

The proposed works at Sawley and Trent Meadows comprise the following:

- raising 2.3km of existing embankments through Reaches 1, 3, 6, 9 and 10;
- constructing 975m of new walls through Reaches 2, 3, 8 and 11;
- constructing 650m of new embankment through Reaches 3, 5, 10, 11 and 12;
- local road raising through Reaches 2, 7 and 9;
- replacement of the Sheetstores Flood Gates in Reach 5.

An outline of the works in each reach is provided in Table A2.1.

Table A2.1 Proposed Works at Sawley and Trent Meadows

Reach	Work Summary	Description	Length/ Area	Site Access	Alternative Alignments considered
SAWLEY					
1 - Wilne Road to Harrington Arms Public House (PH)	Raise lay-by	Existing lay-by to be raised to include the flood defence level.	-	Two separate gated entrances off Wilne Road.	None considered during outline design.[3]
	Raise existing embankment	The existing embankment is to be raised by approximately 0.5m.	450m		
	Re-instated gated access	New embankment to incorporate ramped access to fields, for farm use.	-		
	Ditch realignment	Existing ditch to be realigned with culvert underneath the ramped access.	-		
	Culvert and ditch realignment	Extend culvert and replace headwalls and flap valve. Existing ditch to be realigned with culvert underneath ramped access.	-		
2 – Harrington Arms PH to Church Farm	Construct new wall	A new wall with a visible height between 0.4 and 1.3m high (dependent on ground level) is to be built at a 1.5m offset from the boundary of No. 396 Tamworth Road and the Harrington Arms PH. This will link the raised road with the raised embankment in Reach 1.	40m		Three different alignments; refer to *Section A2.5.1*

Reach	Work Summary	Description	Length/ Area	Site Access	Alternative Alignments considered
	Raise existing road	The existing crest level of the raised section of the B6540 Tamworth Road close to the Harrington Arms PH is to be raised in levels by 300mm. The position of the crest will move a few metres to minimise disruption to adjacent properties.	12m road width		
3 – Church Farm to Sawley Viaduct	Construct new floodwall	A floodwall up to 0.8m will be constructed around the garden of 6 River View.	45m	Temporary haul road from Grounds Farm access lane.	None considered during outline design.[3]
	Construct new embankment	A new 1.4m high embankment is to be built to extend the existing embankment to high ground at Church Farm.	60m		
	Raise existing embankment	The existing embankment is to be raised by approximately 0.5m.	820m		
4 – Grounds Farm	No work	The existing embankment meets the required standard of protection.			
5 – Sheetstores Flood Gates	Replace flood gates	A new flood gate structure will replace the existing flood gates on the Erewash Canal.	500m^2	Temporary haul road from Lock Lane running parallel to the Erewash Canal, with an additional access point via Trent Farm.	None considered during outline design.[3]
	Construct new embankment	Construct new embankments, 0.45m to 1.1m high between the flood gates and the railway embankment.	75m		

Reach	Work Summary	Description	Length/ Area	Site Access	Alternative Alignments considered
6 – Trent Farm	Raise existing embankment	The existing embankment is to be raised by approximately 0.4m.	200m		None considered during outline design.[3]
TRENT MEADOWS					
7 – Trent Lane to Newbery Avenue	Construct new embankment	Construct new embankment.	12m	From Trent Lane, via a temporary haul road around the pumping station.	None considered during outline design.[3]
	Raise existing road	The existing 6m long raised section of Trent Lane, adjacent to the New Sawley Pumping Station, is to be raised by up to 500mm.	6m		
	Raise kerb line	Kerb line up to New Sawley Pumping Station to be raised	-		
8 – Newbery Avenue to Owen Avenue	Replace existing embankment with a wall	Replace the existing embankment with a new wall up to 1.5m high along the rear boundary of the six properties from 71 to 81 Newbery Avenue, inclusive.	150m	From Pasture Lane which is off Meadow Lane.	None considered during outline design.[3]
9 – Owen Avenue to Home Farm	Raise existing embankment	The existing embankment is to be raised by up to 0.6m.	600m		
	Raise existing road	Raise Pasture Lane by 0.55m.	12m		
	Raise farm entrance	The access track over the embankment to Home Farm will be raised by 0.35m.	-		
10 – Trent Meadows Picnic Area to Barton Pool LWS	Construct new embankment	A new 1.8m high embankment is to be built at the upstream end of the existing embankment.	65m	From a temporary haul road off Meadow Lane and through the allotment site.	Construct new embankment on alternative alignment. Refer *Section A2.5.2*.

Reach	Work Summary	Description	Length/ Area	Site Access	Alternative Alignments considered
	Raise existing embankment	The existing embankment is to be widened to 4m at the crest, with minimal raising works.	200m		
11 - Barton Pool LWS to River Erewash	Construct new stud wall upon length of embankment	A new wall up to 1.8m high is to be built at a 1m offset from the railway boundary fence, parallel to the railway embankment. The wall will pass along the boundary of Barton Pool LWS on a new 240m long embankment 2.5m high and Trent Meadows pLWS to the west of the River Erewash.	740m	From Barton Lane.	Construct new embankment on alternative alignment. Refer *Section A2.5.2.*
12 – Golden Brook, north of railway line	Construct new embankment	A new 1.5m high flood embankment is to be built on the northern side of the railway embankment. It commences at the confluence of the River Erewash and Golden Brook, which is within the Attenborough Junction Tip LWS.	190m	From the Golden Brook Sluice to the south west of the site, along the left bank of the watercourse via a temporary haul road.	None considered during outline design. [3]

[3] Refer to *Volume 1* where the 18 flood management options considered in the Fluvial Trent Strategy are described and the options taken forward to the scoping stage identified.

A2.2 During Construction

A2.2.1 Timing and Sequence of Works

The works at Sawley and Trent Meadows are programmed to take seventeen months to complete. The level of flood protection will not be complete until this scheme area and all of the construction work on the Nottingham Trent Left Bank FAS is completed. An indicative construction programme is summarised in Table A2.2 and shows the likely duration of the works within each reach.

The current proposed start date is May 2009, with some areas of site clearance beginning in early 2009. However, the start date, duration and phasing of the works in each reach are indicative. Programming changes could result from access restrictions or the working methods, or to realise efficiencies in the sourcing of materials. The programme should therefore be treated as indicative only.

Construction of the new defences through Reach 11 (Barton Pool LWS to the River Erewash) and the new embankment at Reach 12 (Golden Brook, north of the railway line), will be carried out at the same time as the works proposed for Attenborough; refer to *Appendix B.*

A2.2.2 General Working Arrangements

Working Hours

Normal working hours will be from 7.30am to 6.00pm, Monday to Friday. Construction activities outside of these hours, on weekends or public holidays will be avoided as much as possible. Any changes to the working hours will be agreed in advance with the Local Authority.

The works on the B6540 Tamworth Road (Reach 2) and Sheetstores Flood Gates (Reach 5) are likely to be affected by restrictions imposed by Derbyshire County Council (Highways), British Waterways or Network Rail. Such restrictions could necessitate some out of normal hours working, potentially meaning that some of the works may be conducted overnight.

Site Compounds and Delineation of Working Areas

Eight site compounds and a storage area are required for the works; refer to Table A2.3 for details. Only Compounds B and E will be in use for the duration of the works and will act as the main compounds for the works in Sawley and Trent Meadows respectively.

The site compounds, working areas and temporary haul roads will be secured using appropriate fencing. Two metre high ‘Heras’ steel mesh construction site fencing will be used around all areas which interface with the public.

The welfare provisions in the compounds will mirror the best practice in the Health and Safety Executive’s Construction Information Sheets No. 18 and 46.

Table A2.2 Outline Construction Programme for Sawley and Trent Meadows

Reach	2009									2010							
	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September
Reaches 7, 8, 9	■	■	■	■													
Reaches 1, 3	■	■	■	■	■												
Reach 10		■	■	■													
Reach 6					■	■	■										
Reach 2					■	■	■	■									
Reach 5								■	■	■	■						
Reaches 11 & 12									■	■	■	■	■	■	■	■	■

Table A2.3 Details of Proposed Site Compounds and Storage Areas

Compound Reference	Description	Figure Number (Ref to Annex 3)
A	A 70m x 75m area at the north end of Reach 1. This site will be used as an emergency stock pile area. Access is via Wilne Road. This compound will be used for the works at Reaches 1, 2 and 3.	Figure AA3.3
B	A 55m x 100m compound is to be established in the field to the north of the stables off Wilne Road. As well as being used for storage of plant and equipment, it will house site offices and car parking for approximately 10 staff and visitors to the site. This compound will be used for the duration of the Sawley works.	Figure AA3.3
C	A satellite compound, approximately 40m x 70m, is to be established at the eastern end of Reach 3, to the south of Lock Lane. This will be used for the storage of plant, equipment and fuel during the works at Reaches 3 and 4. There will also be staff welfare facilities and a small office.	Figure AA3.4
D	A storage area for plant and equipment is to be established on the land either side of the Erewash Canal for the works in Reach 5 – Sheetstores Flood Gates and Reach 6 – Trent Farm.	Figure AA3.5
E	A 100m x 150m area is to be established in the field to the west of Pasture Lane. This will be used for plant, equipment and construction materials for the duration of the works at Reaches 7, 8 and 9. It will also house site offices and car parking. This area may also be used to dry topsoil and embankment fill.	Figure AA3.6
F	An area approx 30m x 40m near Home Farm in Reach 9, will be used as storage for drying topsoil and embankment fill on a section of grassland	Figure AA3.6
G	A compound, approximately 25m x 40m, is to be established adjacent to the embankment works at Reach 10. Access is via Meadow Lane.	Figure AA3.7
H	An area to the south of the embankment is to be used as a storage area for plant and equipment during the works at Reach 12. Access is via the Golden Brook Pumping Station.	Figure AA3.8

Haul roads will be wide enough to cope with the traffic expected along them and, if space is available, will allow for the safe passage of plant and machinery in two directions. There are to be designated turning points and a segregated pedestrian access route, where required. Where space is restricted, appropriate measures are to be taken to ensure that plant and pedestrian movements do not conflict.

All soft ground under site compounds, working areas and temporary haul roads will have a 0.15m layer of topsoil removed and then a temporary hard surface will be placed on the ground to protect it. The top soil will be stockpiled and used to reinstate the land to its former condition following the works. The temporary hard surface will be used for subsequent areas of the works.

Works within Residential Boundaries

Where flood walls are to be constructed within residential boundaries, extensive consultation will be undertaken with the affected resident to ensure that the works are completed sensitively. A public liaison officer will be appointed to discuss the works with the affected residents and maintain a high level of communication. Monitoring of noise and vibration levels and pre-construction structural surveys of buildings will be conducted.

A2.2.3 Outline Construction Methodology

The works in each reach will comprise site establishment and reinstatement at completion, together with one or more of the following activities, as outlined in Table 2.4:

- raise existing embankment
- replace existing embankment with a wall
- construct new wall
- construct new embankment
- raise existing road
- replace flood gates.

The construction methodologies for these activities are outlined in *Section 3.4, Volume 1*. Table A2.4, below, summarises the work activities within each reach at Sawley and Trent Meadows.

Table A2.4 Type of Works per Reach

Type of Works	Reach											
	1	2	3	4	5	6	7	8	9	10	11	12
Raise existing embankment	✓		✓			✓			✓	✓		
Replace embankment with a wall								✓				
Construct new wall		✓	✓							✓	✓	
Construct new embankment			✓		✓		✓			✓	✓	✓
Raise existing road		✓					✓		✓			
Replace flood gates					✓							

The estimated quantities of the principal materials in the above works are:

- 1,395m^3 of concrete for new walls;
- 26,930m^3 of imported fill for the earth embankments;

- 2,940m^3 of other materials (including waste).

Section A13 details the types of materials to be used in the works.

A2.3 When Operational

The scheme is designed to be low maintenance. Planned inspections of the walls and embankments will be undertaken annually. An access easement of between 1 – 5m will be maintained alongside all walls for maintenance and inspection purposes. The crests of the raised and new embankments will be a minimum of 3m wide to facilitate maintenance and inspection activities.

Grass embankments will be mown regularly and the Sheetstores Flood Gates will be inspected and maintained in accordance with Environment Agency procedures and the manufacturer's recommendations.

A2.4 Residues and Emissions

This section deals with discharges to water, emissions to air and noise and vibration from the proposed construction activities. The discharges and emissions from the operation and maintenance of the defences will be negligible.

A2.4.1 Discharges to Water

The main areas of works where the risk of discharges to water is higher are:

- ditch realignment work in Reach 1;
- raising the existing embankment where it crosses the rising main from Severn Trent Water's Long Eaton Pumping Station in Reach 3;
- the replacement of the Sheetstores Flood Gates on the Erewash Canal in Reach 5;
- the construction of a new wall through the rear gardens of the properties in Newbery Avenue, adjacent to New Sawley Brook in Reach 8. The former Sawley Brook may need realigning through the garden of 71 Owen Avenue;
- the construction of new defences along the railway embankment at Barton Pool LWS and up to the River Erewash in Reach 11;
- construction of the embankment with a wall tie-in to the railway bridge next to Golden Brook in Reach 12.

Other potential discharges to surface waters could arise from construction near to other watercourses. This would include Reach 3 (near the railway line tie in), Reach 6 (Trent Farm), Reach 8 (New Sawley Brook) and Reach 10 (adjacent to the Railway embankment and for haul route).

In Reach 5, as part of the temporary works for the replacement of the flood gates, there could be some disturbance and mobilisation of silt in the canal from the pumping out of water from the temporary works.

For all other sections, there should be no need to work in the river channel and, as a result, the risk of discharges to water is greatly reduced.

Section A8 sets out the assessment of the impacts on surface water quality and the required mitigation.

A2.4.2 Emissions to Air

The main types of emissions will be those resulting from construction vehicles travelling to, from and on the site, and the dust generated by construction activities.

Section A6 assesses the impacts of these on the local air quality.

A2.4.3 Noise and Vibration

During construction, there will be some disturbance to the local environment by delivery vehicles accessing/exiting the site, and plant operating on the site. Concrete piling is required through the gardens at Newbery Avenue (Reach 8), to position the wall as close as possible to the property boundaries.

Section A5 assesses the noise and vibration impacts from the construction activities and the required mitigation.

A2.4.4 Light

Works will be carried out from 7.30am to 6pm during daylight hours, although in the winter temporary lights may be needed when the days are shorter or for urgent/emergency works or works during rail possessions in non-daylight hours. Lights will be positioned so as to minimise any disturbance to neighbouring properties. These will be carefully positioned and shielded to illuminate the worksite, without causing disturbance to the surrounding properties or wildlife.

A2.5 Alternative Alignment Options Considered

Section 2, Volume 1 describes the 18 flood risk management options considered as part of the Fluvial Trent Strategy. It explains the rationale behind the selection of the preferred option to raise existing and build new defences to protect against a flood event with a 1% annual probability of occurrence.

The Nottingham Trent Left Bank Scoping Report (Environment Agency 2005) presented a number of alternative defence alignments. These are described below. Refer also to *Annex A2.*

A2.5.1 Alignment Options Considered for Reach 2 – Harrington Arms PH to Church Farm

The following alternative alignments were considered:

- A defence between the Harrington Arms PH and 396 Tamworth Road (Alignment A for Reach S3)
- A new defence around the properties of Numbers 396 and 398 Tamworth Road, to include those within the defended area. This was presented in the Scoping Report as ‘Alignment Choice B for Reach S3’.
- A new defence around the properties of Numbers 396 and 398 Tamworth Road, which ties into Harrington Road Bridge. This was presented in the Scoping Report as ‘Alignment Choice C for Reach S3’.

These alignments are shown in Figure A2.1.

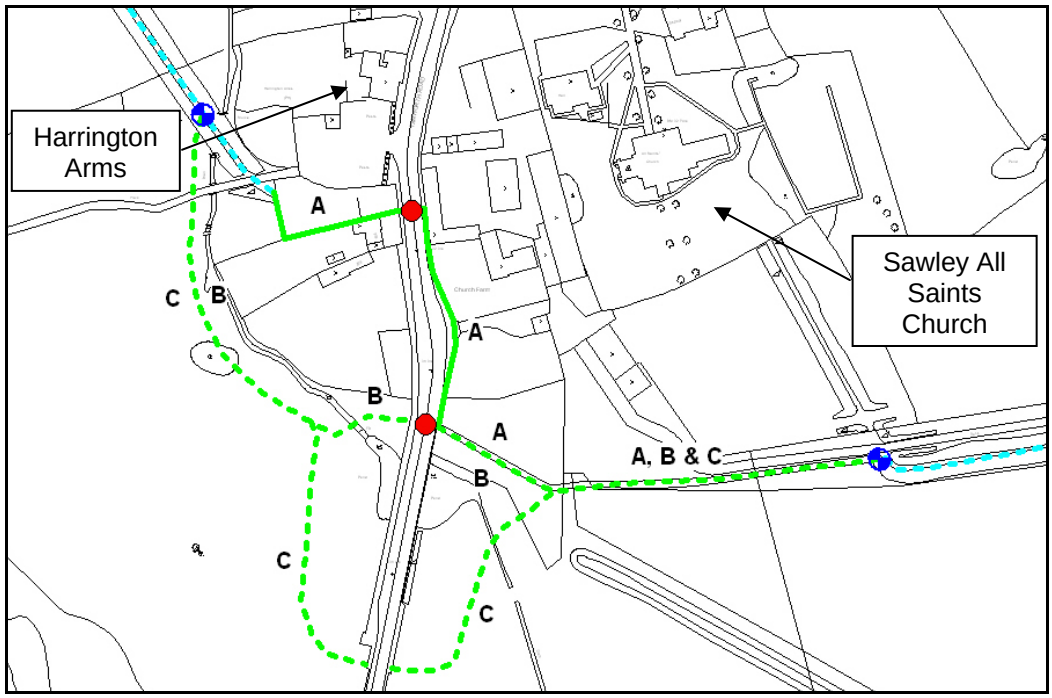

Figure A2.1 Alternative Alignments for Harrington Arms PH to Church Farm

Alignments B and C were discounted for the following reasons:

- the thresholds of Numbers 396 and 398 Tamworth Road are above the level of a flood with a 1% annual probability of occurrence and, therefore, do not require protection as part of this scheme;
- the channel conveyance would be reduced through Harrington Bridge, resulting in raised upstream water levels;
- to avoid disturbance to Harrington Bridge, which is a Listed Structure.

Alignment A was recommended for further consideration. Subsequent surveys and inspections revealed that Sawley All Saints Church is on high ground. Therefore, to reduce the impact on the floodplain, extending the existing flood embankment with a new 60m reach along the southern boundary of the church was preferred. This will tie into the church's high ground.

A2.5.2 Alignment Options for Reach 11 Barton Pool LWS

The following alternative alignment options were considered:

- An embankment through the LWS. This was presented in the Scoping Report as 'Alignment Choice A for Reach T6'.
- A new defence around the perimeter of the LWS. This was presented in the Scoping Report as 'Alignment Choice B for Reach T6'.
- A new defence from the Trent Meadows picnic area to the eastern edge of the LWS. This was presented in the Scoping Report as 'Alignment Choice C for Reach T6'.

These alignments are shown in Figure A2.2.

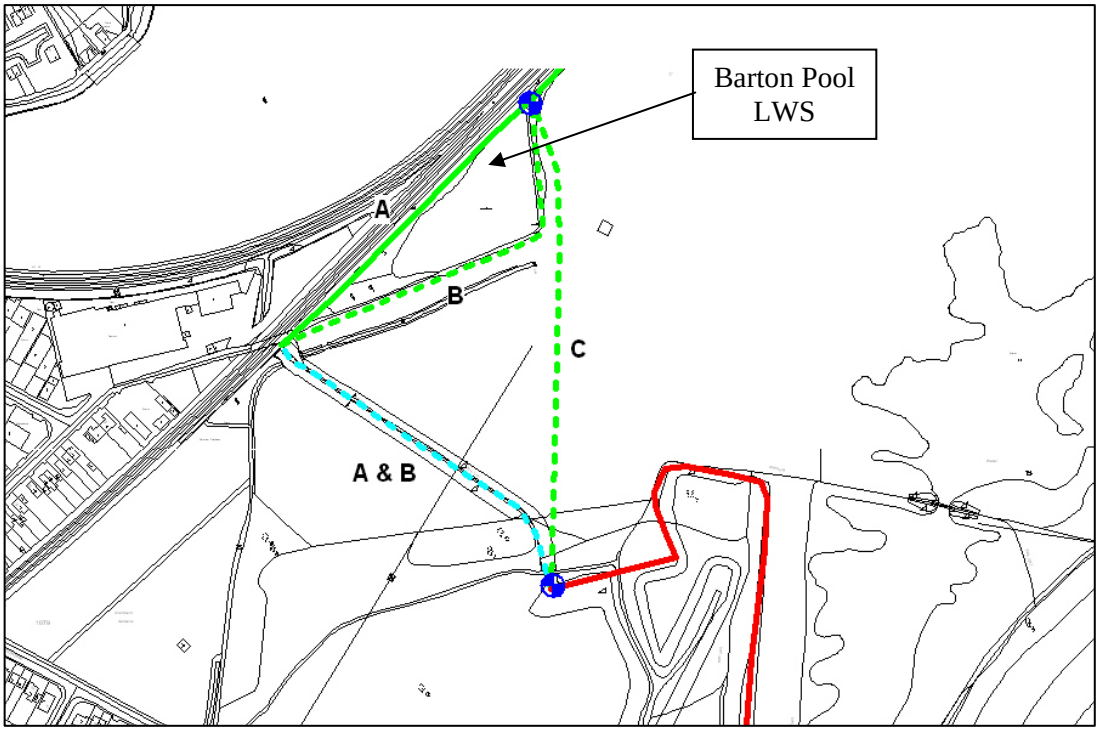

Figure A2.2 Alternative Alignments for Barton Pool LWS

The alignments were discounted because neither was preferred by Derbyshire Wildlife Trust (DWT) or Natural England. Both alignments would isolate Barton Pool LWS from the adjacent Trent Meadows pLWS and the Attenborough Gravel Pits SSSI and the natural floodplain. This would have an adverse impact on the ecological value of the area. The alignments would also reduce the natural floodplain storage.

Alignment A was taken forward as the preferred option.

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A3. HUMAN POPULATION

This section addresses the impacts on the local population, the recreational resources and the key local businesses and commerce. The visual impacts of the scheme and the disturbance effects on the human population, arising from noise and vibration, air quality and traffic and transport are considered in separate sections of this appendix, namely *Sections A5, A6* and *A9* respectively.

The results of the Health Impact Assessment (HIA) are presented in *Section 7.4, Volume 1*.

A3.1 Method of Assessment

Information on the local community was collected through a number of site visits, consultation with the local authority and landowners, and a review of the data in the Erewash Borough Council (EBC) Development Plan. A qualitative evaluation of the impacts on the human population during construction and operation was undertaken using constraints mapping.

We define the 'local community' as that which would be directly affected by the construction works and who live within 200m of the works. This area of influence has also been considered for noise and vibration impacts. The 'local population' is defined as that which falls within the scheme area; refer to *Section A1.3.*

A3.2 Baseline Conditions

A3.2.1 Local Population

The urban communities of Sawley and Long Eaton form much of the scheme area. These comprise principally residential properties with several industrial/ commercial/business parks along the southern edge of the urban area. The number of residential and business properties in Sawley and Trent Meadows at risk of flooding from a flood event with a 1% annual probability of occurrence is 4,555 and 2,768 respectively.

Table A3.1 shows the number and type of properties within 200m of the proposed scheme. There are 601 residential properties within 200m of the proposed works. Assuming that each contains an average of 2.36 people, the estimated local population affected by the works is approximately 1,418.

Table A3.1 Human Receptors within 200m of the Proposed Defences

Distance from proposed flood defence (m)	Building Type (No. of buildings)						Total of all types
	Residential	Retail	Schools & Offices	Industrial	Leisure	Misc.	
Sawley Reaches 1 to 6							
<50	27	-	-	-	1	-	**28**
50 – 100	83	-	1	4	1	2	**91**
100 – 150	177	-	-	14	2	-	**194**
150 – 200	225	1	1	4	1	-	**231**
Total	**512**	**1**	**2**	**22**	**5**	**2**	**544**
Trent Meadows Reaches 7 to 12							
<50	16	-	-	-	-	-	**16**
50 – 100	26	-	-	-	-	-	**26**
100 – 150	24	-	-	2	2	-	**28**
150 – 200	23	-	-	-	3	-	**26**
Total	**89**	**-**	**-**	**2**	**5**	**-**	**96**

A3.2.2 Key local businesses and employment

The key local businesses potentially directly affected by the works are the Harrington Arms PH and Grounds Farm, from which an active haulage business is in operation. The Sheetstores Industrial Estate is located upstream of the Sheetstores Flood Gates in Reach 5 and the Acton Road Industrial Estate is on the eastern side of the railway line through Reaches 7 to 9.

A3.2.3 Local farming and commerce

There are two farms in close proximity to the works: Trent Farm and Home Farm; the scheme will directly affect pasture land on these properties. There is a riding stable off Wilne Road, adjacent to Reach 1.

Grounds Farm (Reach 4) is located in close proximity, but on the opposite side of the railway embankment, of a proposed site compound in Reach 3.

Cranfleet Farm is located at the end of Trent Lane and access to the farm may be affected by the works at Reach 7.

A3.2.4 Sensitive Sites

There are two churches close to the works, namely Sawley Baptist Church (Reach 1) and Sawley All Saints Church (Reach 3). The latter also acts as a meeting place for the Long Eaton and District Heritage Society and the Sawley History Society, and it has active Girl Guide and Brownie groups. It also holds an annual three day flower festival around the August Bank Holiday. There are no schools within 200m of the works.

There is an allotment site off Meadow Lane in Trent Meadows. The existing access track through the allotment will be used as the temporary haul road into Reach 10; refer to Figure AA3.7.

A3.2.5 Recreation

Important recreational interests include walking, angling, boating and golf. Local residents also have access to a number of public amenity and nature conservation sites associated with the River Trent and its floodplain.

The land near the river to the south of Sawley and Long Eaton is crossed by a network of formal and informal footpaths, which are regularly used by the local community. The Trent Meadows Picnic Area and Cranfleet Canal both provide public amenity areas. The Trent Lock Golf Club is also an important recreational resource. These areas are connected to the River Trent via the network of footpaths. The formal public rights of way (PRoW) are shown on Figures AA3.1 and AA3.2 in *Annex A3.*

The River Trent at this location is partially navigable and a significant number of leisure craft join it from the Erewash and Trent and Mersey canals. Table A3.2 details the type of craft moored along the Erewash Canal, between Trent Lock and the Sheetstores Flood Gates.

Table A3.2 Types of Craft Moored on the Erewash Canal

Organisation	Total No. of Craft	Type of Craft		
		Static Houseboat	Residential Boat	Other
Davisons	12	1	0	11
Mills	14	1	3	10
British Waterways	8	5	3	0
Dry Dock	1	0	1	0

In addition, there are six ’24 hour’ visitor moorings, four of which become winter moorings between 1 October and 31 March. These have the same status as residential moorings during this time period.

Sawley Marina is located to the south of the river along Sawley Cut, and the Trent Valley Sailing Club is located on the right bank, upstream of the confluence with the River Soar. There are moorings along the right bank from Sawley Marina to the Sawley Viaduct railway crossing. Local canoeists and kayakers use the whole length of the River Trent and the Erewash Canal. The designated water sports area of the River Trent is from Sawley Viaduct to just downstream of its confluence with the River Soar (River Trent Angling Guide, Environment Agency, 2003).

A review of Natural England’s Open Access maps indicates that there is no common land or open access countryside.

A3.2.6 Critical Infrastructure

There is no critical infrastructure within the scheme area.

A3.3 Impact Assessment

The methodology used in the assessment for 'Human Population' is detailed in *Section 7.3, Volume 1*.

A3.3.1 Construction Impacts

The following construction phase elements have the potential to temporarily affect the local population:

- establishment of the site working areas and accesses, site clearance and associated construction activities;
- closure of the local footpaths;
- closure of the Erewash Canal (Reach 5).

Impact on Local Properties and Key Businesses as a Result of Construction Activities Occurring in Close Proximity (less than 50m)

- Reach 2: Direct disturbance to No. 396 and 683 Tamworth Road due to construction works adjacent or within their boundaries. Disturbance to the Harrington Arms PH due to construction works, including users of the beer garden to the rear. Disruption of access to the pub car park and also possible loss of two parking spaces for approximately 16 weeks. Disturbance and disruption to No. 396 Tamworth Road, the Harrington Arms PH and users of Tamworth Road from temporary two week road closure. Disturbance to residents of 6 River View due to construction of the new floodwall within their boundary.
- Reach 3: Disruption to the movement of haulage vehicles operating from Grounds Farm, due to the construction and works traffic accessing Compound C (Reach 3).
- Reach 6: Direct disturbance to the garden of Trent Farm.
- Reach 8: Disturbance to seven properties in Newbery Avenue and one on Owen Avenue due to construction works within their boundaries. Loss of important willow tree from No 73 Newbery Avenue. General disturbance to 15 properties further along Newbery Avenue and Owen Avenue, which are less than 50m from the construction works.

All individual properties and local businesses are considered to have low sensitivity but the impact on individual properties will vary from medium to high magnitude. All businesses will be able to continue to operate during construction; refer also to *Section A5*.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor adverse** (for general disturbance) to **moderate adverse** (works within residential boundaries) and **short-term**.

Impact on Local Farming and Commerce as a Result of Construction Activities

- Reaches 1 and 3: Disturbance to the grazing fields to the west of Tamworth Road (Reach 1) and the fields to the south and east of Church Farm (Reach 3) due to temporary loss of land during construction. However, the remainder of the land will continue to be used for agricultural purposes

without any severance issues and, therefore, the overall viability of the two farms should not be significantly affected.

- Reaches 1, 6 and 9: Disturbance to the riding stables off Wilne Road (Reach 1) and a reduction in grazing land due to the location of the site compounds and working areas. Disturbance to Trent Farm (Reach 6) and Home Farm (Reach 9), and the potential disruption to access.

All farmland in the area is considered to have low sensitivity. As they will be able to continue to operate, the magnitude of the impact is considered to be medium.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor adverse** and **short-term**.

Impact on Canal Moorings as a Result of Construction Activities in Close Proximity

- Sixteen week closure of the Erewash Canal affecting some four moorings (Reach 5).

The moorings have a low sensitivity but as their access will be closed the impact is considered to be high.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate adverse** and **short-term**.

Impact on sensitive sites as a result of construction activities occurring in close proximity (less than 50m)

- Disturbance to users of Sawley All Saints Church.
- Disturbance to Meadow Lane allotment holders and those plots adjacent to the access road to Reach 10. Land use impacts are discussed in *Section A12*.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **none** (where there is general disturbance) to **moderate adverse** (where there is direct disturbance to allotments) and **short-term**.

Impact on Local Recreational Resources as a Result of Construction Activities

- Temporary closure and diversion of seven PRoWs, resulting in disturbance to regular users of these paths; PRoWs Nos 46, 26, 28, 33, 36, 49 and 7; refer to Figures AA3.3 to AA3.8. The maximum duration of a diversion/closure will be six months.
- There will be a need to permanently divert four of these PRoWs; Nos 28, 36, 49 and 7. However, these diversions would be very minor in nature. They are necessary to allow the paths to run along the raised crests of the embankments.
- Reach 5: Disruption to canal traffic using Sawley Lock as a result of closure of the lock for up to 16 weeks. Indirect disturbance to the boats using moorings on the canal.

- Restriction of access to Pride of Derby Angling Club's huts upstream of Harrington Bridge.
- Minor disturbance to Trent Lock Golf Club.
- Disruption of access to Trent Pistol and Rifle Club.
- Disruption of access to Cranfleet Farm.

All the local recreational resources have low sensitivity and will be able to continue to operate during the works. Only local footpaths and the Erewash Canal (medium sensitivity) will require closure which is a high impact.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate** (where there is local disruption) to **major adverse** (closure of the canal) and **short-term**.

A3.3.2 Operational Impacts

Impact on Local Population as a Result of Reduction in Flood Risk

The risk of flooding will be reduced for approximately 4,555 and 2,768 properties, in Sawley and Trent Meadows respectively. This has additional benefits in respect of property values.

The *significance* of the *operational impact* has been assessed as being **moderate beneficial** and **permanent**. No mitigation required.

Impact on Villages Outside the Scheme Area

The impact of increased flood risk to villages further downstream is discussed in *Section 8, Volume 1*.

The *significance* of the *operational impact* has been assessed *prior to mitigation* as being **moderate adverse** and **permanent**.

A3.4 Mitigation Measures and Monitoring

A public liaison officer will be appointed for the duration of the construction works to inform those affected by the scheme on progress and resolve any disputes or concerns.

Mitigation measures to address the impacts related to landscape and visual amenity, local traffic and noise and vibration are addressed in *Sections A5, A7 and A9* of this appendix. Other mitigation measures for the potential impacts on the human population are listed in Table A3.3 and include scheduling of works to avoid important local events and prior notification of nature and programme of the construction.

An Environmental Clerk of Works will be appointed to monitor the environmental impacts.

A3.5 Residual Impacts

Table A3.3 summarises the above impacts on the human population. The majority of the short-term impacts identified above can be managed during construction and as such there are few residual impacts.

The **adverse** impacts to local residents and businesses caused by construction related activities will be **short-term.** Direct impacts on property cannot be avoided but although we will take measures to minimise these impacts they will remain as **moderate adverse**. However, the magnitude indirect impacts will be reduced to **minor adverse** significance through the proposed mitigation. The duration of disturbance will be dependent on location; refer also to *Section A5 Noise and Vibration.*

On completion, the reduction in the flood risk to the properties and businesses and the intangible benefits, such as a reduction in stress of the residents, is considered to be **moderate beneficial** and **permanent**.

Table A3.3 Summary of Impacts on Human Population

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Impact on local properties and businesses as a result of construction activities in close proximity	Minor to moderate adverse and short-term	• Ongoing liaison with residents and local businesses. • Notification of restricted parking at the Harrington Arms PH. • Minimise working areas in private properties. • Retain and re-pollard willow tree at 73 Newbery Avenue. • Full reinstatement of the gardens.	Minor to moderate adverse and short-term
Impact on local farming and commerce as a result of construction activities	Minor adverse and short-term	• Ongoing liaison with affected landowners. • Time works to ensure minimal effect on commercial use of land. • Ensure access to Grounds Farm is not disrupted by works traffic in Reach 3. • Ensure access to Cranfleet Farm is not disrupted by works traffic in Reach 7. • Standard Environment Agency compensation agreements for loss of crops and grazing will be negotiated.	Minor adverse and short-term
Impact on canal moorings as a result of construction activities in close proximity	Moderate adverse and short-term	• Provide alternative canal moorings. • Widely publicised notification of closure. • Carry out works to flood gates during low season (Oct to Jan) with a break in the works over the Christmas holidays to minimize impact on canal users.	Moderate adverse and short-term

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
Impact on sensitive sites as a result of construction activities in close proximity	None to moderate adverse and short-term	• No construction activities during Sawley All Saints Annual Flower Festival and other key services. • Liaise with Meadow Lane allotment holders adjacent to haul road for Reach 10, and provide adequate advance notification of works. • Ongoing liaison with the churches and their users.	None to minor adverse and short-term
Impacts on local recreational resources as a result of construction activities	Moderate to major adverse and short-term	• Formal closure and temporary diversion, where possible, of footpaths with clear signage. • Carry out of the works to the Sheetstores Flood Gates during low-season (October to January) with a break in the works over the Christmas holidays.	Minor to moderate adverse and short-term, except where a permanent diversion of a PRoW is required
OPERATIONAL IMPACTS			
Impacts on local population as a result of the reduction in flood risk	Moderate beneficial and permanent	No mitigation required	Moderate beneficial and permanent
Impact on villages outside of scheme area	Moderate adverse and permanent	Refer to *Section 8, Volume 1*	

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A4. FLORA AND FAUNA

This section considers the impacts on local flora and fauna of the site and the surrounding area.

A4.1 Method of Assessment

The impacts are assessed using the Institute of Ecology and Environmental Management's (IEEM) Ecological Impact Assessment (EcIA) methodology (IEEM, 2006), which is outlined in *Annex 2, Volume 1*. The baseline was established through a desk study, which took as its search area a distance of 2km from the proposed works. Nature conservation organisations have been consulted and a number of field surveys were undertaken, which are listed in *Section 7.1, Volume 1*. Field surveys were carried out in 2006 and updated in 2008.

A4.2 Baseline Conditions

A4.2.1 Statutory Sites of Nature Conservation Interest

Sites of Special Scientific Interest (SSSI)

Lockington Marshes SSSI lies to the south of the River Trent and at its nearest point is 700m south of the proposed defence. The site comprises one of the largest remaining areas of willow carr woodland in Leicestershire and a diverse complex of wetland habitat supports important invertebrate fauna with many nationally scarce species.

Attenborough Gravel Pits SSSI is adjacent to the eastern boundary of Trent Meadows. The site provides a valuable refuge for overwintering waterfowl and sustains an important breeding bird community. The proposed defences continue through the SSSI and, therefore, the site is discussed in further detail in *Appendix B.*

Local Nature Reserves (LNR)

Forbes Hole LNR is located to the west of Reach 7 in Trent Meadows on the other side of the main railway line approximately 200m from the proposed works. The site comprises six main habitats including a large pond, willow carr, woodland, grassland and tall herb, scrub and hedges. It also supports a number of Derbyshire Red Data Book species and some locally scarce plants.

A4.2.2 Non-statutory Nature Conservation Designations

Twenty-nine designated non-statutory Local Wildlife Sites (LWS) lie within 2km of the works. Seven LWS have the potential to be affected by the proposed defences; refer to Table A4.1. The locations of these are shown on Figures AA3.1 and AA3.2.

Botanical surveys were undertaken in 2006 of those LWS potentially affected by the scheme. The results are summarised in Table A4.1 and maps included in *Annex A1*.

Table A4.1 Derbyshire LWS Potentially Affected by Proposed Flood Defences

LWS Name	Area	Site Description
Trent Lock Margins (potential) (Figure AA3.1)	2.5ha	**General site description/reason for notification** Floodplain grassland and marginal habitat associated with the River Trent. **Results of specialist surveys (2006)** *Invertebrates*: The wetland area is of most significance but it is very limited in extent and the expectation of discovering a rare species is low. Overall importance for invertebrates: Local *Botany*: The site contains a wetland area beneath Harrington Bridge, which comprises a S14a branched bur-reed *Sparganium erectum* swamp and a *Sparganium erectum* sub-community. This supports a good range of species, including flowering-rush *Butomus umbellatus*, arrowhead *Sagittaria sagittifolia*, greater duckweed *Spirodela schleiden* and sweet-flag *Acorus calamus*. The latter appears to be locally frequent in the River Trent and Attenborough Gravel Pits SSSI (National Vegetation Classification (NVC) community S15 *Acorus calamus* swamp). Swamp habitats are present south east of Harrington Bridge along the margins of the River Trent. These comprise reed sweet-grass *Glyceria maxima* swamp, branched bur-reed *Sparganium erectum* swamp and reed canary-grass *Phalaris arundinacea* swamp.
Sawley Carr (Figure AA3.1)	7.51ha	**General site description/reason for notification** Consists of a large cut-off oxbow of the River Trent. Some substantial areas of open water remain but much of the site is composed of tall swamp, mainly bulrush, reed sweet-grass and branched bur-reed and areas of crack willow carr. The site supports a great diversity of aquatic invertebrates. A number of nationally scarce water beetles *Ochthebius poweri* have been recorded, some at their only known location in Derbyshire, as well as a total of 11 species of dragonfly/damselfly, including the ruddy darter. *No specialist surveys undertaken.*
Lock Lane (Figure AA3.1)	3.94ha	**General site description/reason for notification** Comprises a variety of habitats that have naturally colonised a former ash tip. Habitats range from areas which are still quite open and colonised by a wide variety of ruderal plants, many quite localised in the county, including the rare tower mustard, to more established grassland. Typical grassland species including field scabious *Knautia arvensis*, agrimony *Agrimonia eupatoria* and sneezewort *Achillea ptarmica*. There are also wetter areas with plants such as skullcap *Scutellaria galerculata*, celery-leaved buttercup *Ranunculus sceleratus*, hemp agrimony *Eupatorium cannabinum* and the Derbyshire Red Data Book species wood small-reed *Calamagrostis epigejos*. Much of the site has now colonised with bramble *Rubus fruticosus* and mixed species scrub, which provides nesting habitat for a range of birds including reed bunting *Emberiza schoeniclus*, bullfinch *Purrhula pyrrhula* and reed warbler *Acrocephalus scirpaceus*. The site also supports a wide range of invertebrates including a number of species of moth that have not been recorded elsewhere in the county. *No specialist surveys undertaken.*

LWS Name	Area	Site Description
Erewash Canal, Trent Lock to Sawley (Figure AA3.1)	4.1ha	**General site description/reason for notification** Open water and marginal habitats with associated fauna. The canal passes through the residential area of Long Eaton and joins the navigable reach of the River Trent at Trent Lock. *No specialist surveys undertaken.*
Barton Pool (Figure AA3.2)	0.84ha	**General site description/reason for notification** Willow carr with crack willow *Salix fragilis* and grey willow *S. cinerea*. The waterbodies in the wet woodland are surrounded by swamp habitat with common club-rush *Schoenoplectus lacustris* and bulrush *Typha latifolia*, with lesser pond-sedge *Carex acutiformis* and amphibious bistort *Polygonum amphibium.* **Results of specialist surveys (2006)** *Invertebrates:* Has a diverse fauna and supports unusual wetland fauna and habitat features not encountered elsewhere along the scheme. It is considered that further survey may yield rare species. Overall importance for invertebrates: District. *Botany:* An area of W6b willow carr. This is a relatively mature area of woodland and the swamp patches (S6 *Carex riparia* and S12 *Typha latifolia* swamp) in it increases its overall diversity, although they are not intrinsically species rich; refer to Figure AA1.1 in *Annex A1*.
Trent Meadows (potential) (Figure AA3.2)	22.5ha	**General site description/reason for notification** Designated for its open water and ornithological interest. **Results of specialist surveys (2006)** *Botany:* Extensive mosaics of poor grassland and tall herb vegetation. The MG7 grassland in the paddock to the west of the defence at Trent Meadows is also species poor; refer to Figures AA1.1 and AA1.2 in *Annex A1*.
Attenborough Junction Tip (Figure AA3.2)	12.3ha	**General site description/reason for notification** This site consists of vegetation that has naturally colonised an old landfill site. Most of the area is now composed of scrub dominated by hawthorn *Crataegus monogyna* but it also includes willow, elder *Sambucus nigra*, dog rose *Rosa canina* and bramble. The unmanaged rough grassland between the scrub has a range of species from early colonisers to those typical of neutral soils. Species include wild mignonette *Reseda lutea*, melilot *Melilotus*, common toadflax *Linaria vulgaris*, mugwort *Artemisia vulgaris*, wild carrot *Daucus carota*, perforate St. John's-wort *Hypericum perforatum*, spiny restharrow *Ononis spinosa*, common bird's-foot-trefoil *Lotus corniculatus* and meadow vetchling *Lathyrus pratensis*. A range of common birds and butterflies have also been recorded. A small watercourse, Golden Brook, forms the northern boundary of the site and water voles have been recorded here. **Results of specialist surveys (2006)** *Botany:* Small area of MG5b near railway, which although degraded by trampling and scrub encroachment, has high species diversity and a larger area that is a transition between MG4 and MG1 grassland. The latter is gaining dominance without traditional meadow management. Both areas of grasslands are of moderate intrinsic botanical value, but are limited in extent. *Note* – only the area next to Golden Brook, where works are proposed, was surveyed; refer to Figure AA1.2 in *Annex A1*.

A4.2.3 Habitats

National and Lowland Derbyshire Biodiversity Action Plan (BAP) habitats are listed in *Table 4.3, Volume 1*.

The Phase 1 Habitat Survey data is shown on the General Arrangement Drawings for Sawley and Trent Meadows, namely Figures AA3.3 to AA3.8.

Terrestrial habitat

Outside of the designated nature conservation sites, the fields are mainly improved and species poor semi-improved grassland with some areas used for arable crops.

Field boundaries are a mixture of fences and hedgerows. The majority of hedgerows are species poor, with species generally including hawthorn *Crateagus monogyna*, blackthorn *Prunus spinosa*, dog rose *Rosa canina* and elder *Sambucus nigra*. Ivy *Hedera helix* and bramble *Rubus fruticosus* agg. are often present. They consist of a mixture of in-tact and defunct overgrown hedges, some of which have mature trees within the hedge line. Where present, tree species include oak *Quercus sp* and ash *Fraxinus excelsior*. The management of hedgerows is variable throughout the survey area, with some left unmanaged and others, particularly alongside roads and tracks, that appear to be regularly trimmed.

There are lines of trees, mostly associated with boundaries. There are also a number of tree belts and landscape planting concentrated in the Trent Lock Golf Course. Trees are further discussed in *Section A7*.

Watercourses

The margins of the River Trent, between the M1 Bridge and Harrington Bridge, have some areas of shingle adjacent to the banks and in the river. The banks are a friable, sandy substrate up to 2m high in places. A number of bank side areas are cattle poached. The river is shallower beneath Harrington Bridge with shingle deposits. There are some lengths of the river with mature and immature bank side trees, mainly willow. Between Harrington Bridge and Trent Lock, there are some scattered mature trees with immature willow and alder *Alnus glutinosa* saplings along the banks. This part of the River Trent has steep bank sides and vegetated banks with mainly long grass and ruderal vegetation. ‘Rivers and Streams’ are a Lowland Derbyshire BAP habitat.

In Sawley, the majority of field ditches are dry and probably only carry water in times of high rainfall. There are a number of drains across Trent Lock Golf Course, some of which have formed ponded areas of water. These are classed as ponds and are described in Table A4.2.

In Trent Meadows, there are a number of drains, including New Sawley Brook, which lie along the heel of the flood defence between Trent Lane and Pasture Lane.

Golden Brook is currently a muddy channel in a deep ditch less than 1m wide with very sluggish flow and no aquatic macrophytes. The brook is fringed by great willow herb *Epilobium hirsutum*.

The Erewash Canal is designated as a LWS; refer to Table A4.1. Canals are included in the Lowland Derbyshire BAP under 'Standing Open Water'.

Ponds

A number of ponds are located throughout the Sawley and Trent Meadows scheme area and are described in Table A4.2. Their locations are shown on *Figures V2.1 and V2.2, Volume 1*.

Table A4.2 Ponds Surveyed for Great Crested Newts (2006)

Pond Ref.	Description of pond/waterbody	Peak counts of amphibians GCN: Great crested newt SN: Smooth newt	Distance from working area (approx.)
Pond 1	Linear ponds in the golf course.	0 GCN 0 SN	360m
Pond 2		0 GCN 0 SN	
Pond 3		0 GCN 0 SN	
Pond 3a		0 GCN 6 SN	
Pond 4	Large pond with adjoining ditch in the golf course.	0 GCN 2 SN	160m
Pond 5	Large pond in the golf course.	0 GCN 1 SN	110m
Pond 6	A pond in the corner of a cattle grazed field surrounded by marshy grassland. Appears to have been deliberately excavated in the past with a mound of rubble adjacent to it. This pond is heavily poached. The pond is over shaded by adjacent hedgerow trees with aquatic vegetation limited to soft rush *Juncus effusus* and flote-grass.	0 GCN 0 SN	250m
Pond 7	Area of swampy ground beneath Harrington Bridge. Deemed unsafe to set traps but a torch survey was carried out from the bridge.	0 GCN, 0 SN	100m
Pond 8	Area of standing water in Barton Pool LWS.	0 GCN 8 SN	less than 10m
Pond 9	A ditch starting near to the south east corner of the Barton Pool LWS. The ditch has vertical sides and low water levels, so only torch surveys were carried out.	0 GCN 4 SN	100m

A number of waterbodies are identified on the Ordnance Survey (OS) maps at Sawley and Trent Meadows but which no longer exist.

A4.2.4 Protected Species

Legislation in relation to the protected species described below is detailed in *Annex 2, Volume 1*. National and Derbyshire Lowland BAP species relevant to the floodplain are listed in *Table 4.4, Volume 1*.

Birds

No desk study data was received on bird interest for the Sawley and Trent Meadows scheme area. The woodland, trees and scrub will provide habitat for a range of passerine birds and waders, and wildfowl may nest or feed on the agricultural fields. A kingfisher *Alcedo atthis* was seen flying along the River Trent, west of Harrington Bridge in 2006. Sand martin *Riparia riparia* burrows were seen in the river bank, west of Harrington Bridge.

A breeding bird survey of Barton Pool LWS, Trent Meadows pLWS and Attenborough Junction Tip LWS was carried out in 2006, along the proposed defence alignment. The survey area and methodology are detailed in *Annex 2, Volume 1*. The results are provided in Table A4.3.

Table A4.3 Results of 2006 Breeding Bird Survey: Sawley & Trent Meadows

Site	Species	Estimated Pairs	RSPB Listed
Barton Pool LWS	Single territory of song thrush *Turdus philomelus.*	1	Red
Attenborough Junction Tip LWS	Bullfinch *Pyrrhula pyrrhula* pair in scrub adjacent to the railway embankment.	1	Red
	Two willow warbler *Phyllosocopus trochilus* in vegetation along the railway line.	2	Amber
Trent Meadows pLWS	Two reeling grasshopper warbler *Locustella naevia* males seen on 11 June, both several hundred metres from the railway line.	0	Red
	At least one skylark *Alauda arvensis* territory, although several hundred metres away from the railway line.	0	Red

Rail side hedgerows and scrub were found to support small numbers of Royal Society for the Protection of Birds (RSPB)-listed (RSPB *et al*., 2002) willow warbler *Phylloscopus trochilus* and bullfinch *Pyrrhula pyrrhula*. These species remain common and widespread in both a local and national context. The open grassland of Trent Meadows pLWS supports Red-listed skylark *Alauda arvensis* and grasshopper warbler *Locustella naevia*, although both are well removed from the railway corridor. Despite a significant national decline in population, skylark remains a generally common species locally and nationally. Grasshopper warbler, however, is locally notable.

One or two short-eared owls *Asio flammeo* were recorded quartering Trent Meadows pLWS during a wintering bird survey (2006) and were evidently present in this area through winter.

Bats

Bat detector surveys were undertaken in July/August 2006 and August 2007; refer to *Annex 2, Volume 1* for further details of the methodology.

In 2006 emergence watches were carried out on trees in Sawley considered to have potential as bat roosts but no definite observations were made of bats emerging from any of them. However, possible emergence of common pipistrelles *Pipistrellus pipistrellus* was noted from a horse-chestnut *Aesculus hippocastanum* (T38) in the grounds of Sawley All Saints Church. Much activity was recorded around an alder tree (T40), southwest of Harrington Arms PH, with the possibility of a common pipistrelle emerging from it. In the 2007 re-survey of T40, there was no evidence of bats emerging from the tree, although activity in the vicinity of the tree was recorded. A re-inspection was conducted in 2008 although no further evidence was found.

No bats were seen to emerge from Sawley Viaduct during the 2006 survey but during the emergence survey there was sustained feeding activity around this area by at least two common pipistrelles.

Other species recorded during the emergence watches, as incidental records, were soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula*, brown long-eared bat *Plecotus auritus* and a possible Leisler's bat *Nyctalus leisleri*. Not all species were recorded at every location. When walking transects these species were also recorded both feeding and commuting.

An emergence watch was carried out at Barton Pool LWS in 2006 and 2007. Given the nature of the habitat of this area, with many mature trees having suitable features for bats, it was difficult to determine which trees the bats were emerging from. Three species, common and soprano pipistrelles and a *Myotis* species, were recorded during transects around this section. All bats recorded both from the emergence watch and transects were commuting, except for single common pipistrelle and brown long-eared bats, which were feeding away from the main area. A transect survey through Trent Meadows pLWS recorded only a single pass by a commuting common pipistrelle. Derbyshire Wildlife Trust (DWT) have advised that they are to undertake bat surveys on trees they are due to pollard as part of ongoing management at Barton Pool LWS and they will pass these results to the Environment Agency.

A cluster of trees adjacent to the lay-by by Wilne Road (Reach 1, T5 and T7) were highlighted as potential bat roosts and were inspected in June 2008 by a bat ecologist. The trees were considered to be of low roosting potential and did not require further survey.

No trees at Newbery Avenue are considered to have potential as bat roosts, although the area does provide a feeding corridor.

The mosaic of habitat in the Sawley and Trent Meadows scheme area, including waterways, waterbodies, wet woodlands, hedgerows and fields, provides a wide variety of suitable foraging habitat for bats. The tree lined sections of the railway, Erewash Canal and the River Trent and its backwaters provide particularly good flight lines/feeding corridors.

Badgers

South Derbyshire Badger Group has no known records of badgers *Meles meles* in this area. No badger setts or other field signs were recorded during the field survey.

Otter

There are desk study records of otter *Lutra lutra* along the River Trent. During the 2006 surveys, otter footprints and spraints were also recorded along the River Trent, between Sawley Viaduct and Harrington Bridge. No holts or lying up places were found. It is considered that this stretch of the River Trent does not have sufficient riverside mature trees and is too disturbed by dogs to be suitable for holts and resting places.

Water Vole

Water vole *Arvicola terrestris* field signs, including footprints and latrines, were found during the 2006 survey along the River Trent, between Harrington Bridge and Sawley Viaduct. There are water vole records for Golden Brook, but no field signs were found during the 2006 and 2008 surveys.

Local residents advise that water voles used to be present in Trent Lock Golf Course but none have been seen in recent years. They consider that this is due to the intensive management of the area.

Amphibians (including Great Crested Newts)

No great crested newts (GCN) *Triturus cristatus* were found during the 2006 surveys, and known populations in the suburbs of Long Eaton are considered too distant to be impacted by the scheme. These ponds are approximately 350m from the proposed scheme and are separated from the scheme by a major road, the A6005, and two railway lines. Information from landowners suggests that the watercourses and ponds within the golf course are subject to intensive management to their margins, plus nutrient and possibly herbicide loading. This may have reduced their potential for GCN and water voles.

A number of the surveyed waterbodies supported smooth newts *Triturus vulgaris*; refer to Table A4.2.

A4.2.5 Other Fauna

Invertebrates

The areas of Trent Lock Margins pLWS and Barton Pool LWS were assessed by an entomologist as the areas of greatest invertebrate potential along the alignment of the flood defence; refer to *Figures V2.1 and V2.2, Volume 1* for exact survey locations.

Trent Lock Margins pLWS (Sawley) – the area surveyed comprises a small *Glyceria* dominated pond with adjacent tall grassland and rough herbage. There are a number of typical wetland species associated with the pond including the hoverfly (Syrphidae) *Anasimyia contracta* and spiders such as *Pachygnatha clerki*. The fauna of the dry grassland includes species more typically associated with open habitats, such as spider *Pardosa amentata*. The aquatic fauna includes typical insects and

snails, and the snail *Aplexa hypnorum*, which is typical of swampy habitats that may be susceptible to drying out; refer also to Table A4.1.

Barton Pool LWS (Trent Meadows) – the survey area comprises an area of scrub and woodland around a small pond. The pond contained open water at the time of survey but had an extensive fringe of bare mud. The fauna was diverse, including a mixture of species of scrubby habitats, such as oak bush cricket *Meconema thalassinum* and species of open habitat, such as groundhoppers *Tetrix* spp. The fauna is dominated by species of wetland areas, such as the ground beetle *Pterostichus niger* and spider *Pirata latitans*, but includes dry grassland species at the margins, such as the robberfly *Leptogaster cylindrical*; refer also to Table A4.1.

Mammals

Other than the protected species discussed above, there are desk study records of small mammals in the area, including common shrew *Sorex araneus*, pygmy shrew *Sorex minutus*, water shrew *Neomys fodiens*, brown hare *Lepus europaeus*, bank vole *Clethrionomys glareolus*, field vole *Microtus agrestis*, wood mouse *Apodemus sylvaticus* and harvest mouse *Micromys minutus*. Most of these records are from the area in the vicinity of Golden Brook. Brown hare is a Lowland Derbyshire BAP species.

Invasive Species

There are stands of Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandulifera* and giant hogweed *Heracleum mantegazzianum* in the study area; refer to Figures AA3.1, AA3.2 and AA3.7.

Invasive species are located within or adjacent to working areas at three locations. Japanese knotweed is present in scrub by the lay-by at Sawley (Reach 1), adjacent to the working area for Reach 10 within the Trent Margins pLWS and along the railway embankment at Trent Meadows (Reach 11).

A4.3 Summary of Ecological Interest

The flood defences pass through a predominantly agricultural landscape with low biodiversity. The fields, however, are located in the floodplain of the Trent, with the area to the north dominated by the suburban area of Long Eaton. As a result, the agricultural landscape has a higher local value than it would have in a rural location. The main biodiversity interest is associated with the numerous LWS, the River Trent and trees and hedgerows associated with field boundaries. The following ecological receptors are present and are considered during the following ecological impact assessment (EcIA):

- Lockington Marshes SSSI
- LWS, seven of which may be potentially affected by the scheme
- trees (woodland and standard trees)
- hedgerows
- breeding birds
- bats
- otters
- water voles

- invertebrates
- other mammals

Invasive species are also discussed.

Each of these ecological resources is valued on a geographical scale. The definition of these values is given in *Table V2.3* in *Annex 2, Volume 1*. The evaluation method for invertebrates is also given in *Annex 2, Volume 1*.

A4.4 Impact Assessment

Table A4.6, at the end of the section, summarises the impact, mitigation and significance for all the ecological receptors. The assessment of significance in brackets moderates the EcIA assessment to the standard determination of Impact Assessment (see *Table 6.1, Volume 1*) for comparative purposes across all the environmental receptors.

A4.4.1 Construction Impacts

Impact on Designated Nature Conservation Sites from Construction Works

Lockington Marshes SSSI – This site is on the opposite side of the River Trent and would not be subject to any disturbance.

The *impact* has been assessed *prior to mitigation* as being **none** at the **National** level. **(None)**

Local Wildlife Sites (LWS)- The flood defences run directly through the following five LWS:

- Lock Lane
- Barton Pool
- Trent Meadows
- Attenborough Junction Tip
- Erewash Canal (works to Sheetstores Flood Gates).

Land take within the LWS will result from four different elements of the scheme. These are illustrated in Figure A4.1, Figure A4.2 and Table A4.4, and are listed below.

Permanent loss (land) – This is the footprint of the defence. The land is designated as being 'permanently lost' regardless of the existing habitat type.

Permanent loss (usage) – It is accepted that the defence will effectively form a new boundary for the affected LWS. The permanent loss (usage) is the portion of land lost by the creation of this new boundary. The land is designated as being 'permanently lost' regardless of the existing habitat type.

Restricted loss (usage) – This is the portion of land adjacent to a wall where the Environment Agency restricts its future usage for access for inspection and maintenance.

Whether these restricted areas are designated as 'temporary' or 'permanent' loss is dependent on the existing habitat type. Grassland is assumed to be a 'temporary' loss because this will be allowed to re-establish. All other habitat types are assumed to be a 'permanent' loss e.g. woodland/scrub.

Temporary working area – This is the additional portion of land required to construct the defence. The area is needed to provide access for construction activities and to store materials. All temporary working areas will be reinstated to their existing habitat type and, therefore, the impact is generally considered as temporary. The exception is woodland habitat. The woodland would be reinstated in situ, either by planting or natural re-colonisation, as advised by DWT. Compensatory habitat is proposed; refer to Table A4.4. However, the impact is considered permanent in EIA terms as the woodland will not re-establish in less than 10 years; refer to *Table 6.2, Volume 1*

Land take of the LWS that will be disturbed by the scheme is presented in Table A4.5. Land take, including the required easement, is illustrated in Plates A4.1 to A4.4.

Of most significance is the permanent loss of 2,060m^2 of wet woodland in Barton Pool, and the permanent loss of approximately 150m^2 of MG4 transition grassland in Attenborough Junction Tip LWS. Works to the Erewash Canal LWS are limited to the existing lock gates and no marginal habitat would be affected.

Two additional LWS, namely Trent Lock Margins (potential) and Sawley Carr, may be subject to impacts from construction related pollution, such as dust, run-off, etc. An assessment of the impacts on all LWS is presented in Table A4.6.

The *impact* has been assessed *prior to mitigation* as being **significant adverse** and **medium term to permanent** at a **County** Level. **(Moderate adverse)**

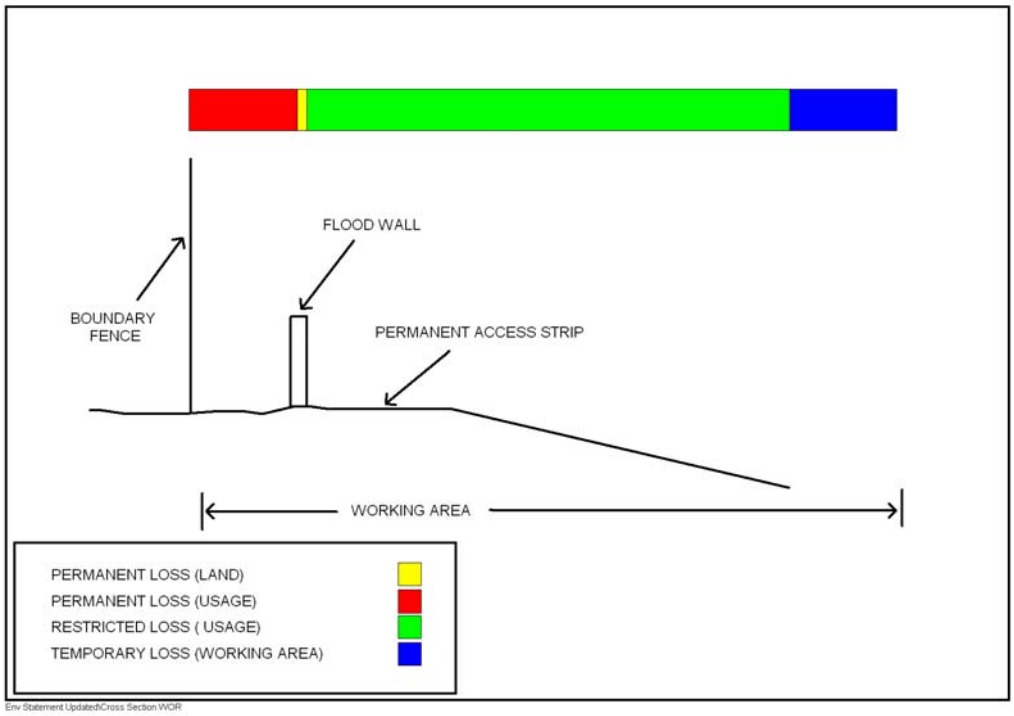

Figure A4.1 Working Areas and Land Take within LWS (Wall)

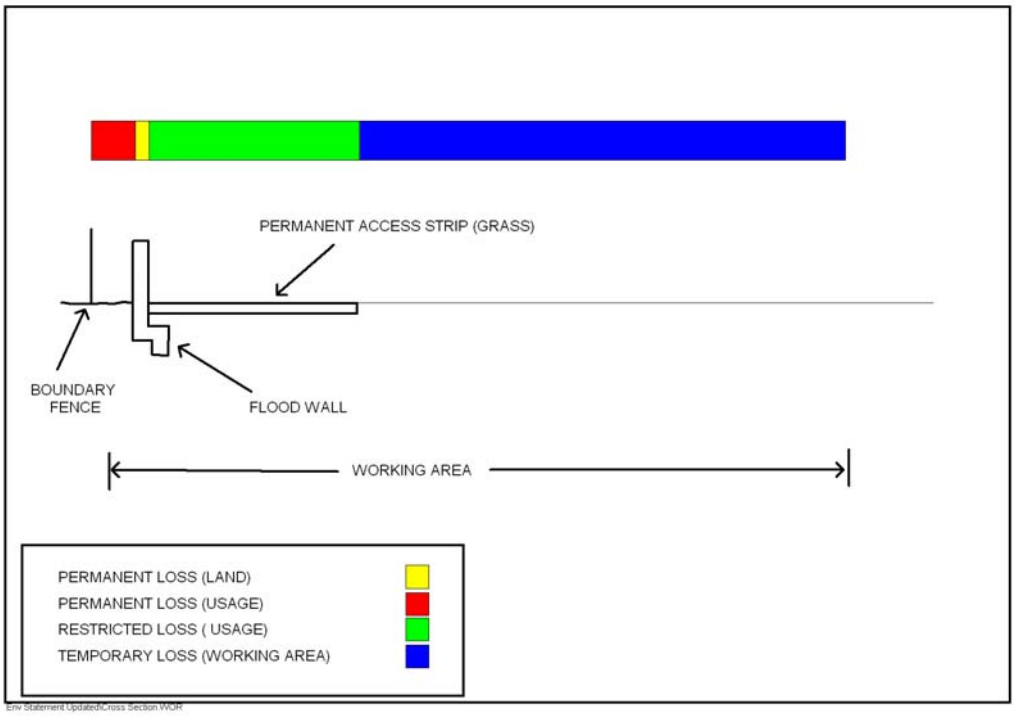

Figure A4.2 Working Areas and Land Take within Barton Pool (LWS)

Table A4.4 Impact Classification for Land Take within LWS

Habitat Type	Impact classification; refer to Figure A4.1	Change to site for habitat	Timescale of impact	Action
Woodland (broadleaved or wet)	Permanent loss (land) – land take for defence	Irreversible	Permanent	compensatory habitat will be created
	Permanent loss (usage) – behind barrier	Irreversible	Permanent	compensatory habitat will be created
	Restricted loss (usage) – easement	Irreversible	Permanent	compensatory habitat will be created
	Temporary loss (working area)	Reversible	Permanent	habitat will be reinstated following works
Grassland	Permanent loss (land) – land take for defence	Irreversible	Permanent	compensatory habitat will be created
	Permanent loss (usage) – behind barrier	Irreversible	Permanent	compensatory habitat will be created
	Restricted loss (usage) – easement	Reversible	Temporary	habitat will be reinstated following works
	Temporary loss (working area)	Reversible	Temporary	habitat will be reinstated following works
Swamp	Permanent loss (land) – land take for defence	Irreversible	Permanent	compensatory habitat will be created
	Permanent loss (usage) – behind barrier	Irreversible	Permanent	compensatory habitat will be created
	Restricted loss (usage) – easement	Irreversible	Permanent	compensatory habitat will be created
	Temporary loss (working area)	Reversible	Temporary	habitat will be reinstated following works
Scrub	Permanent loss (land) – land take for defence	Irreversible	Permanent	compensatory habitat will be created
	Permanent loss (usage) – behind barrier	Irreversible	Permanent	compensatory habitat will be created
	Restricted loss (usage) – easement	Irreversible	Permanent	compensatory habitat will be created
	Temporary loss (working area)	Reversible	Temporary	habitat will be reinstated following works

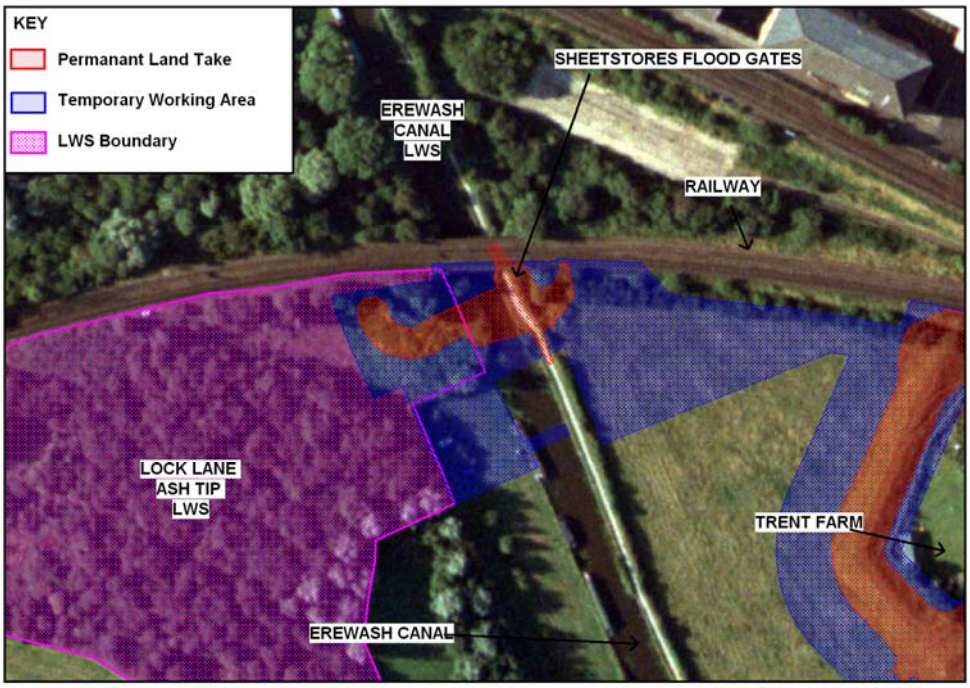

Plate A4.1 Land take at Lock Lane LWS

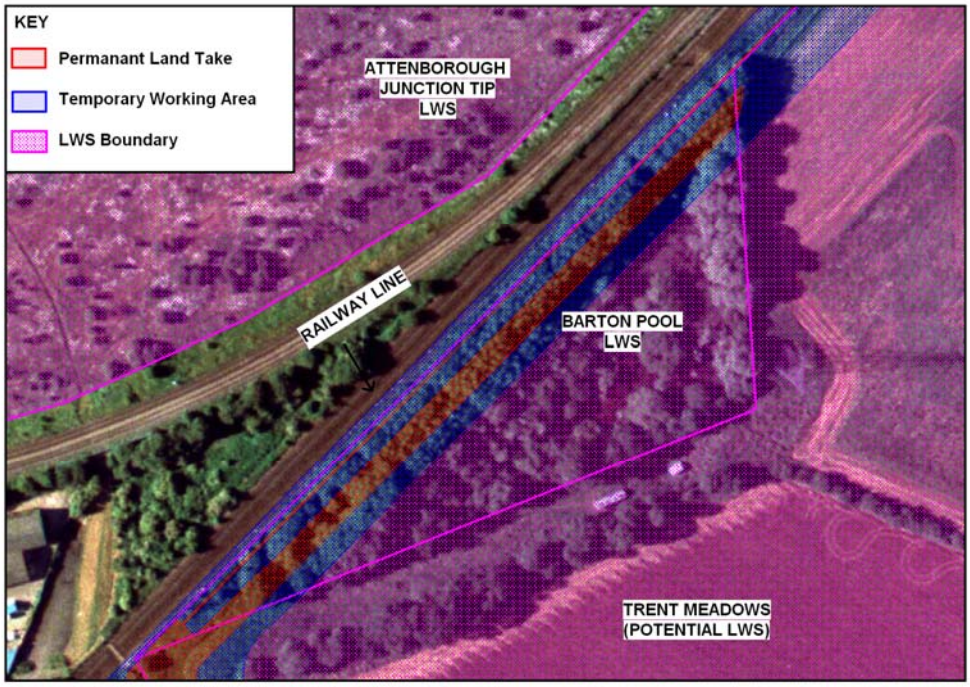

Plate A4.2 Land take at Barton Pool LWS

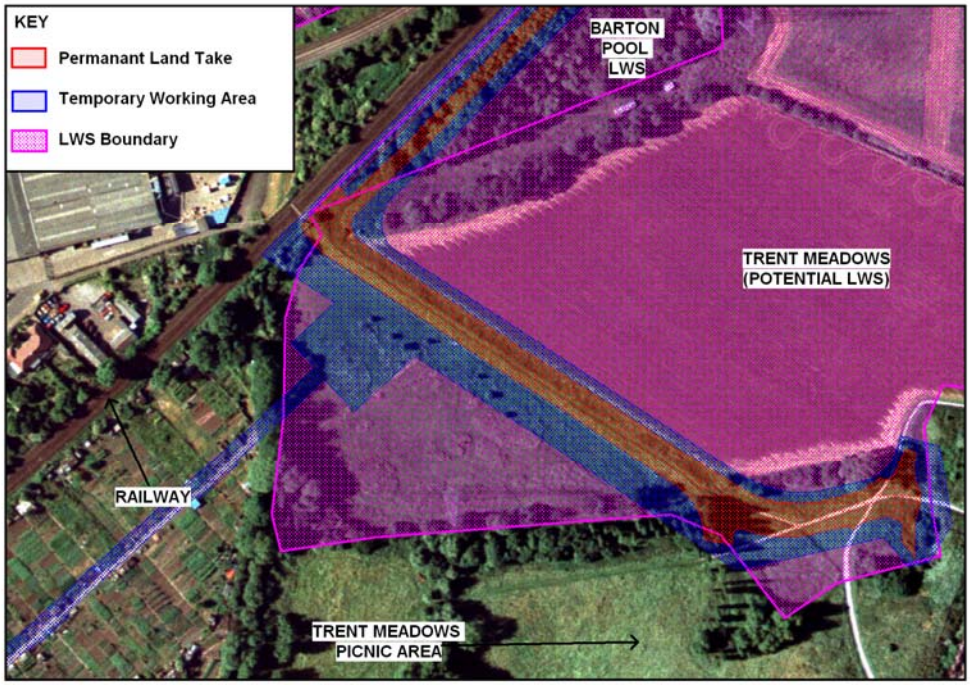

Plate A4.3 Land take at Trent Meadows pLWS

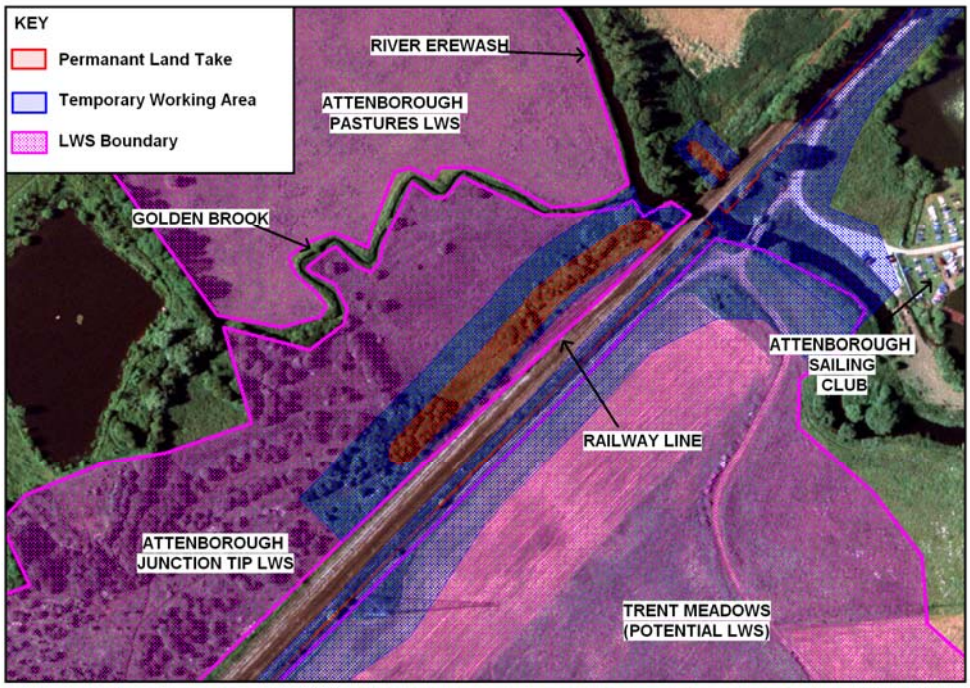

Plate A4.4 Land take at Attenborough Junction Tip pLWS and Trent Meadows pLWS

Table A4.5 Land Take at Lock Lane, Barton Pool, Trent Meadows and Attenborough Junction Tip LWS

LWS	Land Take (m^2)		
	Permanent	Temporary (1)	Total
Lock Lane LWS	253	532	785
Barton Pool LWS (2)	1,512	2,752	4,264
Trent Meadows pLWS	4,756	19,980	24,736
Attenborough Junction Tip LWS	2,714	5,417	8,131
OVERALL TOTAL FOR ALL LWS	**9,235**	**28,681**	**37,916**

(1) Working area during construction

(2) Land take figure includes 2000m^2 of wet woodland.

Impact on Habitats from Construction Works

Woodlands and Trees

Trees to be lost are shown on Figures AA3.3 to AA3.8, with a red circle around the tree reference number. A total of 60 trees groups would be removed and some 40 groups of trees are potentially at risk of loss or damage due to their proximity to the works. In addition the land take figures in Table A4.5 include approximately 2000m^2 of wet woodland that will be permanently lost from Barton Pool LWS due to permanent and temporary land take. This is considered a permanent impact in EIA terms, as while the woodland in temporary working areas can be re-instated it would take more than 10 years to establish.

The *impact* has been assessed *prior to mitigation* as being **significant adverse** and **permanent** at a **Local** level. **(Minor adverse)**

Hedgerows

Eight hedgerows will be crossed by the defence. In total approximately 150m will be lost, of which 85m will be permanently lost under the footprint of the new defence. However, this will not impact on their overall connectivity. All the affected hedgerows are species poor.

The *impact* has been assessed *prior to mitigation* as being **not significant** and **permanent** at a **Local** level. **(None)**

Impact on Species from Construction Works

Birds

The working area is extremely narrow for much of its length, and hence, breeding birds in this area are relatively few in both number and species. However, construction works would cause disturbance to birds nesting in the vicinity, as a result of both land take and noise disturbance. The greatest impact would occur during the breeding season of mid-March to September.

The impact on local breeding bird populations is likely to be minimal. The location that would experience the greatest impact would be the area along the railway line next to Barton Pool LWS. However, species likely to be affected are largely abundant and widespread both locally and nationally. The more notable species of skylark and grasshopper warbler in the Trent Meadows pLWS are sufficiently removed from the working areas as to be unaffected.

The only Schedule 1 bird identified in the ecological baseline was a kingfisher, along the River Trent, which will be undisturbed by the works.

The *impact* has been assessed *prior to mitigation* as being **significant adverse** and **short-term** at a **Local** level. **(Minor adverse)**

Bats

The loss of potential bat trees at Sawley (T5, T7 and T40, Reach 1) would have an impact of minor significance on the local bat population. The tree group in the churchyard, including T38 in Reach 3, would be retained and protected.

At Newbery Avenue (Reach 8) there is a potential impact on bats from the temporary loss of a feeding corridor (T52 – T57). This impact is considered to be of minor to negligible significance at the District level, given the areas of suitable feeding around this section.

At Barton Pool LWS, the works could cause the loss of potential roosts and disturbance to good feeding habitat. The loss of the trees along the railway line on this section would certainly affect bats. It was not possible to determine the potential extent of use by bats during the surveys and this could be of minor to moderate District significance. The retention of the tree lined track adjacent to Barton Pool will, to some extent, reduce this impact as this constitutes excellent feeding habitat for bats.

The *impact* has been assessed *prior to mitigation* as being **significant adverse** and **long-term (temporary working areas) to permanent (if roost affected)** at a **District** level. **(Minor to Moderate adverse)**

Otter

At their closest point, the proposed defences and working areas are located approximately 100m from the River Trent (Reach 2). It is possible that otters could use the fields along the Trent but their passage would not be impeded and construction activities will be limited to daylight hours. No optimum otter habitat would be affected.

The *impact* has been assessed *prior to mitigation* as being **not significant** at a **Regional** level. **(None)**

Water Voles

No water voles were recorded in the survey area during 2006 and 2008. Currently the habitat in Golden Brook is not optimum, but there are desk records for the area. Due to the likely time delay between the EIA and construction, further survey of all waterbodies will be carried out prior to site clearance.

The *impact* has been assessed *prior to mitigation* as being **not significant** and **short-term** at a **County** level. **(None)**

Invertebrates
Barton Pool LWS was identified as being of District importance to invertebrates. The site will be extensively disturbed during construction and there is the potential for some species/populations to be lost.

The *impact* has been assessed *prior to mitigation* as being **significant adverse** and **medium-term** at a **District** level. **(Moderate adverse)**

Other mammals
All mammals are protected under the Wild Mammals (Protection) Act 1996, primarily to prevent cruelty. Impacts to semi-natural habitat are mainly restricted to the LWS. However, due to the linear nature of the scheme, large areas will remain unaffected and populations of brown hare and other small mammals should not be significantly impacted. Sections of the new wall will provide a barrier to movement.

The *impact* has been assessed *prior to mitigation* as being **not significant** and **short-term (temporary working areas) to permanent** at a **Local** level. **(None)**

A4.4.2 Operational Impacts

Impacts of Maintenance

It is expected that operational activities on the flood defences, either embankments or walls, will not have a residual long-term adverse impact on protected species or habitats. There will be requirements for regular grass cutting and the removal of scrub vegetation in order to maintain the integrity of the flood defence structures and access. Land take impacts for access are included in construction impacts.

Impact of Raised Flood Defences on Sites of Nature Conservation Interest

During a flood event, the improved standard of protection will mean that areas in the existing floodplain will be subject to a very minor increase in water levels. This increase will be up to 0.07m during a flood event with a 1% annual probability of occurrence and will affect all areas in front of the defence and the unprotected areas on the opposite bank, including Lockington Marshes SSSI. It is not considered that this will have an adverse impact on the nature conservation interest of the area, as all species and habitat are already subject to periodic flooding. Attenborough Junction Tip and Attenborough Pastures LWS will still be subject to flooding from Golden Brook and the River Erewash.

Twenty-four other LWS and Forbes Hole LNR will now be protected to a 1% annual probability of occurrence standard of protection. Previously, flooding would commence during a flood event with a 4% annual probability of occurrence and so their nature conservation interest is not dependent on regular flooding From the River Trent. Therefore, there will be no significant impact on their nature conservation interest due to a decrease in flooding from the River Trent.

The *operational impact* has been assessed as being **not significant.** No mitigation required.

A4.4.3 Mitigation Measures and Monitoring

Designated Nature Conservation Sites

Indirect effects on all LWS during construction will be minimised by good working practice to control dust/noise, and implementing pollution control measures. Details of construction practice are given in *Section 3.4, Volume 1*.

Mitigation for individual sites directly affected is given in Table A4.6. Compensatory habitat will be created to at least the area permanently lost; refer to Table A4.4. This habitat is likely to be within the Attenborough area and Attenborough West Gravel Pits LWS; refer to *Appendix F*.

Prior to site clearance, a detailed mitigation method statement will be agreed with DWT and the landowner. This should include information on:

- site clearance
- access
- pollution control
- reinstatement
- habitat creation/restoration proposals (mitigation and compensatory habitat); refer to *Appendix F*
- protected species mitigation.

The flood defence proposals have been discussed in advance with DWT and the mitigation proposals presented in Table A4.6 are agreed in principle. DWT have confirmed that none of the grassland habitats affected are likely to be of such importance that topsoil translocation is required.

Woodlands and Trees

Detailed design will ensure that as many trees as possible are retained. Retained trees will be protected in accordance with best practice, such as BS 5837:2005 Trees in Relation to Construction; refer to *Volume 1* for details. Sufficient replanting of lost trees will be undertaken to ensure the ecological value of the site is retained and there is no net loss of trees. All species will be native and appropriate to the local area. Refer to *Section A7* for details of the landscape proposals.

Hedgerows

Working widths will be limited, wherever practical, to minimise the impact on hedgerows. Hedgerows in the temporary working areas would be reinstated using locally native species. As compensation for sections permanently lost, new sections of hedgerow would be planted to at least the equivalent length lost; refer to *Figure V4.1, Volume 1*. The existing hedge gaps will be closed up as a compensation measure. Approximately 85m of hedgerow will be planted along the embankment in Reach 4 to compensate for those removed.

Breeding Birds

Removal of potential nesting habitat will not be carried out during the breeding season, unless a nesting bird survey proves that there are no nests present that my be disturbed. All wild birds are protected under the Wildlife and Countryside Act 1981 whilst actively nesting.

Bats

Trees in Sawley (T5, T7 and T40) and trees in Barton Pool LWS were identified as potential bat roosts, and will be lost. Use by bats was not confirmed and further surveys will be undertaken at least eight weeks prior to site clearance and any clearance carried out using reasonable avoidance measures, for example, soft felling. Where appropriate, safe and economically viable, any tree roosts found that are to be felled, will be cut/pollarded and the section of tree wired to an adjacent tree. If bats are found, a licence under the Habitats Regulations will be obtained, which will require detailed mitigation to be agreed with Natural England. Compensatory habitat measures will include replacement planting and a bat box strategy.

Otters

A pre-construction survey will be carried out and if resting places or holts are found a licence will be obtained from Natural England.

Water Voles

If water voles are found during pre-construction surveys, a mitigation strategy will be agreed with Natural England. Mitigation will be based on recommendations in the Water Vole Handbook (Strachan, 2006).

Invertebrates

In general, for most invertebrates, there is little that can be done in terms of mitigation as species are always present as some life-stage on a work site. Undertaking work at a time when some species are adults and can fly is of limited value at a population level, as any suitable habitat nearby is likely to be occupied and such immigration may have density dependent impact. It is not thought that working at specific times of year would reduce the impact of the work.

The general mitigation/compensatory habitat measures proposed within the LWSs would be valuable for invertebrates.

Other Mammals

All habitats in the temporary working areas will be reinstated and compensatory habitat creation/restoration undertaken for all semi-natural habitats that are permanently lost. The flood defence wall will have a rough finish to help small mammals climb it to escape a flood event.

Invasive Species

Any Japanese knotweed, or soils within 7m of a plant, within the construction easement will be treated in accordance with Environment Agency's best practice guidelines. It will not be possible to control Japanese knotweed within Network Rail's land due to the safety restrictions.

A4.5 Residual Impacts

With the ecological mitigation measures described above, adverse impacts of the scheme upon the majority of habitats and species will be avoided or reduced to an acceptable level (see Table A4.6).

The residual impact of the proposed defence works at Barton Pool LWS will have a **significant adverse** impact in the **medium-term** reducing to **not significant** effect in the **long-term** with reinstatement and compensatory habitat. It will not be possible to replace the entire area of wet woodland habitat lost in situ and compensatory habitat will be sought off-site (refer to *Appendix F*).

As a consequence of this loss of habitat within Barton Pool LWS, there may be a **significant adverse short-term** residual impact on the local bat population whilst vegetation re-establishes.

In Reach 12, the construction of the new embankment in Attenborough Junction Tip LWS will result in a change in elevation of the existing ground level. Therefore, any grassland re-instatement is not considered as like-for-like replacement of the MG4 transition grassland habitat permanently lost. Compensatory habitat creation or restoration will be carried out to compensate for this loss (refer to *Appendix F)* to ensure **no significant** residual impact on the LWS in the **medium term**.

Table A4.6 Summary of Impacts on Flora and Fauna

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
CONSTRUCTION IMPACTS					
Trent Lock Margins (County)	Site clearance and construction and adjacent road raising.	There would be no direct impact to this LWS. Works are required around the boundary of Church Farm. There is, therefore, a small risk of pollution from construction activities.	Adverse effect on conservation status: unlikely. Therefore, no significant adverse impact at County level: probable. **(Minor adverse)**	Good working practice and pollution control.	Certain adverse effect at the County level; not significant. **(None)**
Sawley Carr (County)	Site clearance and construction	There would be no direct impact or impacts on hydrology as the existing defence is only to be raised at this location. This site is 50m from the proposed working area. There is, therefore, a small risk of pollution from construction activities.	Adverse effect on conservation status: extremely unlikely. Therefore, no significant adverse impact at County level: certain. **(Minor adverse)**	Good working practice and pollution control.	Certain effect at the County level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Lock Lane (County)	Construction of new embankment	As well as works to the Sheetstores Flood Gates, a new embankment will be constructed. This will result in a total of 941m^2 of permanent and temporary land take. This is 2.4% of the total area of the LWS. The habitats affected are species poor grassland and scrub. No sheet piling and therefore no impacts on hydrology.	Adverse effect on conservation status: unlikely. Therefore, no significant adverse impact at the County level: probable. **(Minor adverse)**	Mitigation method statement to be agreed in advance with DWT and landowner. Likely to include: • Stripping of topsoil in working areas and either re-sowing with locally harvested seed or allowing natural re-generation of grassland. • Compensatory habitat creation; refer to *Appendix F*. • Working area minimised.	Probable adverse effect at the County level in the medium term; not significant. **(Minor adverse)** Certain adverse effect at the County level in the long-term with mitigation and compensatory habitat; not significant. **(None)**
Erewash Canal (County)	Replacement of lock gates	Works to Sheetstores Flood Gates will involve replacing the gates and altering the existing concrete structure. Dewatering of the canal for a couple of months is likely through the lock. However, as it is an active lock, there are no marginal and aquatic plants. Disturbance of sediments or a pollution incident has the potential to affect the wider LWS.	Adverse effect on conservation status: unlikely. Therefore, no significant impact at the County level: probable. **(Minor adverse)**	Pollution control/good working practice. Works timed for winter when species/ plants less active/ dormant.	Certain adverse effect in the short term at County level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Barton Pool (County)	Site clearance and construction	The alignment of the defence was chosen in preference to going around the outside of the reserve so as to retain the connectivity to the floodplain and Trent Meadows pLWS. Construction of the defence will, however, result in the loss of approximately 2000m^2 of woodland due to both the permanent footprint and clearance required for working areas. In total approx. 2455m^2 of the LWS will be permanently lost and 1390m^2 temporarily disturbed. Overall, this is 48% of the total area of the LWS subject to some direct disturbance. There is no requirement for a sheet pile cut off and the wall foundations would not have an effect on groundwater.	Adverse effect on conservation status; certain. Therefore, significant adverse impact at the County level: certain. **(Moderate adverse)**	Detailed reinstatement plan and mitigation method statement to be agreed in advance of works with DWT/ landowner. Trees to be removed to be cleared in winter and pumping of water in pool to be carried out in late summer. Permanent access along maintenance track to be restricted to permitted use only. Areas of temporary works to be replanted. Remaining area of LWS may benefit from active management as a compensatory measure and could include tree management and de-silting of the existing pond. DWT have some tree management planned and have identified an important willow located in the works area which will be retained as requested. However it will be subject to local ground raising. Additional compensatory habitat will be created to at least the equivalent area permanently lost. *Appendix F* details the proposed compensatory habitat and also possible enhancement opportunities.	Certain adverse effect at the County level in the medium term; significant. **(Moderate adverse)** Probable effect at the County level in the long-term; not significant. **(Minor adverse)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
	Construction of defence	The wall is only 0.5m high and will provide only a minor physical barrier to the movement of species to the north, both generally and during a flood event. However, it is unlikely to affect intrinsic value of the reserve, given the remaining connectivity to extensive semi-natural floodplain.	Adverse effect on conservation status; extremely unlikely. Therefore, no significant adverse impact at the County level: certain. **(None)**	Wall facing to be 'rough' to allow small mammals to climb over and escape floods. Access for fauna also possible over embankment to the west.	Certain adverse effect at the County level; not significant. **(None)**
	Overall significance of effect		Adverse effect at the County level significant. **(Moderate adverse)**		Adverse effect in the short-medium term at the County level; significant.(**Moderate adverse)** Adverse effect in the long-term, at the County level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Trent Meadows (County)	Site clearance and construction	Within Trent Meadows, the existing embankment is to be raised and a new wall constructed along the railway line to the River Erewash (Reaches 10 and 11). This will result in a total of approx. 20,922m^2 of permanent and temporary land take. This is 9.8% of the total area of the pLWS, of which 1.5% will be permanently lost. Grassland affected is of low botanical interest. No sheet piling, therefore, no impacts on hydrology.	Adverse effect on conservation status; unlikely. Therefore, no significant impact at the County level: probable. **(None)**	Mitigation/compensatory habitat method statement to be agreed in advance with DWT and landowner. Likely to include: • Stripping of topsoil in working areas and either re-sowing with locally harvested seed or allowing natural re-generation of grassland. • Compensatory habitat creation; refer to *Appendix F*. • Working area minimised. • Control of Japanese knotweed found in working easement.	Probable adverse effect at the County level in the short-term; not significant. **(None)** Certain no adverse effect at the County level in the medium term; not significant. **(None)**
	Construction of wall	The wall runs at the back of the reserve, adjacent to the railway, with urban areas beyond this. Therefore, although the wall will provide some physical barrier to the movement of species, it is unlikely to affect the intrinsic value of the reserve, given the remaining connectivity to the rest of the floodplain, which is extensive at this location.	Adverse effect on the conservation status: extremely unlikely. Therefore, no significant adverse impact at the County level certain. **(None)**	Access for fauna is possible over embankment to the west.	Certain adverse effect at the County level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Trent Meadows (County)	Overall significance of effect		Adverse effect on the conservation status: unlikely. Therefore, no significant adverse impact at the County level: probable. **(None)**		Adverse effect in the medium-term at the County level; not significant. **(None)**
Attenborough Junction Tip (County)	Site clearance and construction	Approximately 7% of the LWS will be disturbed, including 2% that will be permanently lost. No sheet piling, therefore, no impacts on hydrology.	Adverse effect on conservation status: unlikely. Therefore, significant impact at the County level: unlikely. **(Minor adverse)**	Mitigation/compensatory habitat method statement to be agreed in advance with DWT and landowner. Likely to include: • Stripping of topsoil in working areas and either re-sowing with locally harvested seed or allowing natural re-generation of grassland. • Compensatory habitat creation; refer to *Appendix F*. • Site access to follow existing access track and bridge.	Certain adverse effect at the County level in the medium-term; not significant. **(None)**
Trees - woodland and standard trees (Local)	Site clearance and construction	**5 trees/groups** groups of trees will be lost with a further 34 groups at risk due to proximity to working area. This includes the tree loss within Barton Pool LWS but significance of impact on LWS assessed above.	Adverse effect on conservation status; probable. Therefore, significant adverse impact at the Local level: probable. **(Minor adverse)**	Detailed design to retain as many trees as possible. Working width to be reduced where practical to retain trees. Retained trees to be fenced off: No works within tree canopy. BS5837 to be followed. Replacement and supplementary planting to ensure no loss of habitat value.	Probable adverse effect at the Local level in the long-term; not significant. Certain permanent adverse effect at the Local level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Hedgerows (Local)	Site clearance and construction	7 hedgerows affected, with 150m of hedgerows to be removed during works and 85m of this length permanently lost under the increased footprint of the defences. Therefore 65m to be replanted in existing location and 85m planted elsewhere as compensatory habitat. Connectivity, however, not affected as losses at fringes of existing hedgerows.	Adverse effect on conservation status; extremely unlikely. Therefore, no significant impact at the Local level; certain. **(None)**	Working width to be reduced where practical to reduce length of hedgerows affected. Hedges reinstated with mix of locally native species. Hedges generally species poor so compensatory measure to gap-up existing hedges would be beneficial.	Certain no adverse effect at the Local level in the long-term; not significant. **(None)**
Birds (Local)	Site clearance and construction	Clearance of hedgerow/trees and disturbance to working area and wider zone will cause an overall loss of potential breeding bird habitat. No Schedule 1 birds highlighted in baseline/surveys in working area.	Adverse effect on conservation status; probable. Significant adverse impact at the Local level: probable. **(Minor adverse)**	Vegetation clearance to be undertaken outside of the breeding bird season. All vegetation in the temporary working areas to be reinstated. Gapping up of hedges and supplementary planting would provide additional habitat in the medium to long-term.	Probable adverse effect at the Local level in the short-term; not significant. **(None)** Certain adverse effect in the medium term; not significant. **(None)**
Bats (District)	Site clearance and construction disturbance	Loss of potential tree roosts in Sawley (T5, T7 and T40) and possibly more at Barton Pool. Reduction in feeding areas/corridors.	Adverse effect on conservation status: probable. Therefore, significant adverse impact at the District level: probable. **(Minor to moderate adverse)**	Further pre-construction surveys and use of reasonable avoidance measures e.g. soft felling. Exchange of bat survey data with DWT at Barton Pool. If bats confirmed, licence to be obtained and a mitigation strategy agreed with Natural England. Compensatory habitat and enhancement to include replacement planting and erection of bat boxes.	Probable adverse effect at the District level in short-term; significant. **(Minor adverse)** Certain permanent adverse effect at the District level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Otters (Regional)	Construction disturbance	River Trent is known to be used by otters. No holts or resting places in survey area. Disturbance possible to otters moving through area.	Adverse effect on conservation status extremely unlikely. Therefore, no significant impact at Regional level: certain. **(None)**	Pre-construction surveys to ensure no holts or resting places have been established in the interim period which could be disturbed by the works.	Certain adverse effect at Regional level; not significant. **(None)**
Water Voles (County)	Site clearance and construction disturbance	Construction activity close to the river banks could disturb water voles if present. None recorded during 2006 and 2008 surveys.	Adverse effect on conservation status extremely unlikely. Therefore, no significant impact at County level: certain. **(None)**	Pre-construction surveys will be carried out and if water voles found a mitigation strategy agreed with Natural England.	Certain adverse effect at County level; not significant. **(None)**
Other Mammals (Local)	Site clearance and construction disturbance	Only linear area to be cleared.	Adverse effect on conservation status extremely unlikely. Therefore, no significant impact at Local level: certain. **(None)**		Certain adverse effect at Local level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
Invertebrates (District)	Site clearance and construction disturbance	Two areas were considered good potential invertebrate habitat. Trent Lock Margins pLWS will be unaffected by the scheme. Barton Pool LWS is considered of District importance. The impact on Barton Pool LWS is described above but will include disturbance of 60% of the site.	Adverse effect on conservation status: probable. Therefore, significant adverse impact at the District level: probable. **(Moderate adverse)**	Areas of temporary works to be replanted. Remaining area of Barton Pool LWS would benefit from active management, so compensatory habitat measures could include tree management and de-silting of pond. Detailed mitigation method statement to be agreed in advance of works with DWT and landowner.	Probable adverse effect at the District level in the short to medium term; significant. **(Moderate adverse)** Certain adverse effect at the District level in the long-term; not significant. **(None)**
OPERATIONAL IMPACTS					
Lockington Marsh SSSI (National)	Flood protection to Left Bank	Very slight increase in the depth and duration of flooding. The site is already in floodplain and will not have adverse impact.	No significant effect on the conservation status at the National level: certain. Therefore, no significant impact at the National level: certain. **(None)**	None required.	Certain adverse effect at the National level; not significant. **(None)**
All LWS on left bank floodplain (County)	Flood protection to Left Bank	Very slight increase in the depth and duration of flooding. The site is already in the floodplain will not have adverse impact.	Adverse effect on conservation status: extremely unlikely. Therefore, significant adverse impact at the county level: extremely unlikely. **(None)**	None required.	Certain adverse effect at the County level; not significant. **(None)**

Ecological Receptor & Value (in brackets)	Proposed Activity	Characterisation of Unmitigated Impact	Significance without Mitigation	Mitigation & Compensatory Habitat	Residual Significance & Confidence
	Maintenance of an easement/access adjacent to the defence	Restriction on the growth of woody species on defence or easement.	Impacts are incorporated into construction impacts for each site above.	None required.	Certain adverse effect at the County level; not significant. **(None)**
	Overall significance of effect		Adverse at the County level: not significant. **(None)**		Certain adverse impact at the County level; not significant. **(None)**

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A5. NOISE AND VIBRATION

This section considers the noise and vibration impacts arising from construction, operation and associated traffic movements.

A5.1 Method of Assessment

The evaluation of the impacts considered the effects of noise and vibration from construction and operation activities on sensitive receptors. In accordance with the guidance set out in BS 5228, this assessment applies to the properties within 200m of the works, where the noise and vibration impact will be the most significant. *Section 7.6.2, Volume 1* sets out the methodology in more detail.

A5.2 Baseline conditions

Generally, the semi-rural/suburban setting of the scheme area is relatively undisturbed by noise. However, properties near to the B6540, Tamworth Road, in Sawley and the railway line in Trent Meadows are subject to higher levels of background noise and vibration, as a result of road traffic and trains respectively. The only other significant source of noise is the M1 motorway to the west of Sawley.

The number of buildings within 200m of the defence is illustrated in Table A3.1.

In addition to human receptors, there are a number of protected species and other fauna that were identified along the route of the defence. Details of the impacts on protected species from noise can be found in *Section A4*.

A5.3 Impact assessment

A5.3.1 Construction Impacts

Impacts from Construction Site Noise

The typical plant that will be used on site is likely to consist of dumper trucks, lorries, excavators, compactors and rolling plant.

Using the methodology outlined in *Section 7.6.2, Volume 1,* Table A3.1 shows that **44** residential and industrial properties are within 50m of the works and at risk of a high level of noise disturbance. There are a further **117** properties within 50 to 100m and a further **222** within 100 to 150m of the working area. These may experience a medium to low level of noise disturbance.

These predictions do not take account of variables, such as the screening of fences and other buildings, and the presence of existing ambient noise influences. Also, the temporary and daytime nature of the works, coupled with advance notification and ongoing liaison on any noisy activities, should reduce the sensitivity of a receptor's subjective response.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate adverse (for properties 50-200m from works) to major adverse (properties within 50m of the works)** and **short-term**.

Impacts from Construction Traffic Noise

Construction of the defences requires the movement of labour, plant and materials that will generate extra traffic and increase the proportion of heavy vehicles on the public highways. This impact is discussed in more detail in *Section A9*.

Impacts from Construction Vibrations

An assessment of the potential to cause vibrations indicates that the overall risk will be minor because no significant ground shaking activities, such as driving sheet piles, are to be used.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor adverse** and **short-term**.

A5.3.2 Operational Impacts

No significant impacts were identified.

A5.4 Mitigation Measures and Monitoring

Construction Site Noise and Vibrations

There is a range of generic measures that can be employed to limit the generation and control the emission of noise from the works; refer to *Section 7.6.5, Volume 1*. Their application will depend on local circumstances and the methods of working detailed in the Environmental Action Plan (EAP); refer to *Section 13, Volume 1*.

Specific measures relevant to Sawley and Trent Meadows are:

- Any temporary fixed plant, such as generators, are to be positioned as far as practically possible away from residential properties and screened to further reduce noise emissions.
- The contractor will use plant as small as practically possible, in particular alongside 396 Tamworth Road, Church Farm and the properties in Newbery Avenue.
- In addition to specific measures, adequate warning and written notice of construction works will be provided to all affected landowners. Health and Safety issues will be addressed through the Contractor's Health and Safety Plan.
- Pre-condition structural surveys of properties thought to be affected.
- An Environmental Clerk of Works will be on site to monitor noise.

A5.5 Residual Impacts

Assuming the Contractor implements every reasonable precaution to minimise noise at all times, the majority of properties will continue to experience **minor adverse** noise impacts. However, properties within 50m of the works may

experience **moderate adverse** impacts from construction noise and vibration. These impacts are **short-term** and there would be no noise impacts after construction.

Table A5.1 summarises the above impacts from noise and vibration following the implementation of the identified mitigation measures.

Table A5.1 Summary of Impacts from Noise and Vibration

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Construction site noise	Moderate to major adverse and short-term	• Temporary fixed plant to be positioned as far as practically possible away from residential properties and screened to reduce noise emissions. • Liaison with residents and local businesses. • The contractor will use as small plant as practically possible, in particular alongside residential properties in Reaches 2, 3 and 8. • Use of an Environmental Clerk of Works to monitor mitigation.	Minor to moderate adverse and short-term
Construction traffic noise	Refer to *Section A9*		
Construction vibrations	Minor adverse and short-term	• The contractor will use plant as small as possible, in particular alongside residential properties in Reaches 2, 3 and 8.	None
OPERATIONAL IMPACTS			
No significant impacts identified			

A6. AIR QUALITY

This section addresses the impact on the local air quality arising from construction activities and associated traffic movements.

A6.1 Method of Assessment

Identification of the ambient conditions was undertaken through a desk study of Erewash Borough Council's air quality website. No specialist investigations were undertaken.

For the purposes of the assessment, it is assumed that all plant and equipment will comply with the relevant legislation and standards relating to air emissions. For example, the Road Vehicles (Construction and Use) Regulations 1986, as amended, set strict exhaust standards for the release of pollutants, such as carbon monoxide, hydrocarbons, nitrogen oxides, carbon dioxide and particulates.

The potential for the generation of dust is considered to be largely related to the hardness of the materials being handled. For example, soft friable materials, such as soil, break easily and produce a greater number of dust particles. Conversely, concrete and the other wall materials, such as bricks, are less likely to break and will generate less dust particles. It is assumed that once generated, dust will be dispersed predominantly by the wind and its deposition is determined to an extent by particle size. The potential for severe impacts is greatest within 100m of such activities (ODPM, 2000) and in most circumstances 70% of dust emissions deposit within 200m of the source (Various, 1994).

A6.2 Baseline Conditions

Generally, good air quality is to be expected in the typical semi-rural/suburban setting of the scheme area. The open nature of the site means that prevailing winds are likely to disperse any emissions and reduce the potential impact on air quality. On this basis, it is likely that the scheme area has a relatively good air quality.

Erewash Borough Council has two Air Quality Management Areas (AQMA). These encompass the residential properties close to the eastern carriageway of the M1 at Sandiacre, and at Long Eaton, north and south of the M1 Junction 25 respectively.

A6.3 Impact Assessment

A6.3.1 Construction Impacts

Impact on the Local Environment from Dust Generating Activities

Dust emissions will arise from the day to day operation of machinery/vehicles over dry ground and from construction activities. These include the removal of the existing sections of embankment in Reach 8, the embankment raising works in Reaches 1, 3 to 6, 9 and 10 and the new embankments in Reaches 3, 10, 11 and 12. The period of time required for each of these sections of works is approximately 3 to 4 months refer to Table A2.2

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate adverse** and **short-term**.

Impact on the Local Environment from Construction Plant and Vehicle Emissions

Construction plant and vehicles affect the quality of air with petrol and diesel engines emitting a wide variety of pollutants, such as carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOCs) and particulates (PM_{10}).

The lorry movements on site will mainly be associated with the transport of material to and from the storage areas. Operatives will travel to and from the site each day in a number of vehicles. In addition, there will be a range of construction plant on the site, such as excavators, bulldozers and generators. The plant will emit exhaust gases but the open environment means that these emissions will mix and disperse.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor adverse** and **short-term**.

A6.3.2 Operational Impacts

Maintenance activities, such as grass mowing, will be undertaken on a regular basis. It is considered that, in relation to the current background dust and other air pollutants, there will be no significant impacts on local residents and properties from the maintenance plant and vehicles.

The *significance* of the *operational impact* has been assessed as being **not significant**. No mitigation required.

A6.4 Mitigation Measures and Monitoring

There are a range of generic measures that can be employed to limit the generation and control the emission of dust and key air pollutants from the works, as outlined in the CIRIA publication (2005) '*Environmental Good Practice on Site*'. These measures are outlined in *Section 7.7.5, Volume 1* but their application will depend on local circumstances and the methods of working detailed in the EAP; refer to *Section 13, Volume 1*.

Use will be made of alternative products, systems, or materials where practicable, such as mains electricity in preference to a diesel generator and pre-mixed materials rather than mixing on site. Where this is not possible, the principle will be to reduce the likelihood of the emission of dust and key pollutants and, where emissions arise, to contain or control them. With respect to dust, the latter involves the control of aspects, such as the surface area, moisture content, particle size and exposure of the material to meteorological conditions.

An Environmental Clerk of Works (ECW) will be present on site during construction to monitor air quality.

A6.5 Residual Impacts

Table A6.1 summarises the impacts of the scheme on air quality. A quantitative assessment of the effects of the mitigation measures and, therefore, identification of the residual impacts is not possible due to the variability of influencing factors, especially those relating to local conditions at the time of the works. However, given the likely nature of impacts an assessment does not appear warranted.

A qualitative assessment of the residual impacts suggests that with the application of good practice on site and effective public relations, the impact of dust generation and vehicle exhaust emissions from the construction works will be of **minor** to **no significance**.

Table A6.1 Summary of Impacts on Air Quality

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Impact on the local environment from dust generating activities	Moderate adverse and short-term	• Use of an Environmental Clerk of Works to monitor mitigation. • Adhere to the CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.7.5, Volume 1*. • Refer to *Section A9.*	Minor adverse and short-term
Impact on the local environment from construction plant and vehicle emissions	Minor adverse and short-term	As above plus: • Use of alternative products, systems, or materials where practicable, such as mains electricity in preference to a diesel generator and pre-mixed materials rather than mixing on site.	None
OPERATIONAL IMPACTS			
No significant impacts identified			

A7. LANDSCAPE AND VISUAL AMENITY

This section addresses the impacts on the local landscape and visual amenity of the Sawley and Trent Meadows scheme areas.

A7.1 Method of Assessment

The landscape and visual amenity impact assessment of the proposed works at Sawley and Trent Meadows is based on the second edition of the 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) published by the Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) in March 2002. Application of the guidelines in this assessment and the methodology is summarised in more detail in *Annex 3, Volume 1.* Impacts given in brackets moderate the assessment of significance to standard terminology used for other receptors for comparative purposes: refer to *Table 6.1, Volume 1*.

A7.2 Baseline Conditions

The River Trent and its floodplain are an important environmental corridor through the centre of Nottingham. These open areas provide an important ecological and recreational resource. The Sawley and Trent Meadows scheme area is within the Derbyshire 'Trent Valley Riverside Meadows' landscape character type; refer to *Section 7.8 Volume 1*. This character type is defined by broad meandering rivers and pasture fields with hedgerows and scattered hedgerow trees.

The Sawley and Trent Meadows areas are characterised by suburban residential housing that lie on the outskirts of Nottingham and border the open fields of the River Trent's floodplain. The area of Sawley Village (Reach 2) is designated as a Conservation Area and the open fields to the south of the existing flood defences and main railway line are designated as Green Belt in Erewash Borough Council's Local Plan.

Through Sawley and Trent Meadows the existing flood defences consist of grassed embankments linking up areas of higher ground. The railway embankment that traverses the area also performs a flood defence function; refer to *Section A1.4*.

The location of Plates A7.1 – A7.16, which show existing landscape conditions and 'photosketch' visualisations, can be found in Figure A7.1.

The flood embankments in Reaches 1, 3, 9 and 10 form a significant linear feature in the local landscape. However, they are not considered visually intrusive due to their relatively low height and grass cover which blends them into the surrounding fields; refer to Plates A7.1, A7.2, A7.6 and A7.7.

Existing flood embankments surround the Trent Farm farmhouse in Reach 6 and pass through the gardens of seven properties in Newbery Avenue in Reach 8. These embankments are well maintained by the local residents and form part of the property's garden; Refer to Plates A7.4 and A7.5.

The Sheetstores flood gates across the Erewash Canal (Reach 5) are set against the backdrop of the railway bridge over the canal; refer to Plate A7.3.

Barton Pool LWS (Reach 11) is an area of woodland around a small pond. It is located between a footpath leading to the Attenborough SSSI and the railway line; refer to Plate A7.8. The remaining part of Reach 11 is characterised by a footpath running between the railway line and open grassland of Trent Meadows potential LWS.

Attenborough Junction Tip LWS (Reach 12) is an area of open grassland between the railway and Golden Brook. There are several mature trees on the opposite bank of the brook; refer to Plate A7.9.

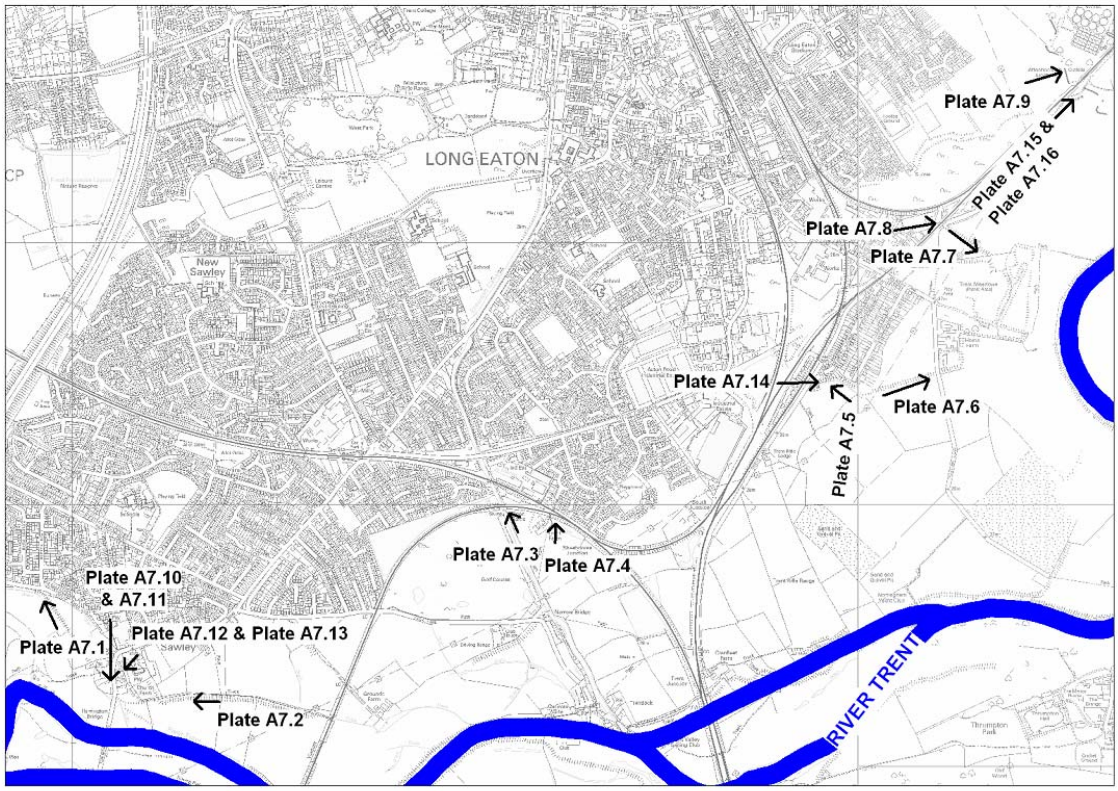

Figure A7.1 Location of Plates and Visualisations

Plate A7.1 Existing Embankment in Reach 1, West of Sawley Village

Plate A7.2 Existing Embankment in Reach 3, East of Sawley Village

Plate A7.3 Existing Sheetstores flood gates in Reach 5

Plate A7.4 Existing Embankment around Grounds Farm in Reach 6

Plate A7.5 Existing Embankment in Reach 8 at Newbery Avenue

Plate A7.6 Reach 9 adjacent to New Sawley Brook

Plate A7.7 Existing Embankment in Reach 10, Looking towards Trent Meadows Picnic Area

Plate A7.8 Looking east towards Barton Pool Local Wildlife Site in Reach 11

Plate A7.9 Attenborough Junction Tip in Reach 12

A7.3 Impact Assessment

A7.3.1 Construction Impacts

The impacts and their significance on local landscape and visual amenity are presented in Tables A7.2 and A7.3 and summarised below.

Impacts of Construction Works on Local Landscape and Visual Amenity

During the construction period machinery, storage of materials and site compounds will be intrusive new elements in the landscape and evident in existing views for localised visual receptors. This visual impact will be the greatest for the residents of the seven properties in Newbery Avenue and residents close to the works in Reaches 2 and 3.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **slight (minor) adverse** and **short-term**.

Impact of New and Raised Defences on Local Landscape and Visual Amenity

The impact of the new and raised defences will be:

- The increased height and crest width of the existing embankments in Reaches 1, 3, 6, 9 and 10 will have a **slight/moderate adverse** impact on the landscape character of the area.
- The increased height and crest width of the existing embankments in Reaches 1 and 3 will have a **slight adverse** impact on views from the adjacent residential areas of Sawley village.
- The new embankments in Reaches 3, 10 and 12 will have a **slight/moderate adverse** impact on the landscape character and visual amenity of the area.
- The construction of the new wall adjacent to No.396 Tamworth Road in Reach 2 will segregate a 1.5m strip of land from the remainder of the grassed area to the edge of the Harrington Arms Public House car park. As this area is within a Conservation Area the design of the wall has incorporated cladding to minimise the visual impact. This will have a **slight/moderate adverse** impact on the landscape character of the area. This is illustrated in Plates A7.10 and A7.11.
- The new 0.8m high wall along part of the garden boundary of 6 River View will have a **moderate adverse** impact on views from the garden of the property. This section is within a Conservation Area, therefore the design of the wall has incorporated cladding to minimise the visual impact to visitors to the area and to the residents.
- The construction of the road ramp in Tamworth Road (Reach 2) will have a **negligible** visual impact that will not be discernable to the casual observer, as illustrated by Plates A7.12 and A7.13.
- In Reach 5 the new embankment will have a **moderate adverse** impact upon the landscape character of the existing canal towpath and access to the adjacent field; refer to Plate A7.3.
- In Reach 6 the increased height of the embankment around Trent Farm will have a **moderate adverse** impact on views from the ground floor of the

farmhouse. There will be no impact on the views from the upper storey of the farmhouse.

- The construction of the road ramp in Trent Lane and the installation of a higher kerb line to the existing access track to the New Sawley Pumping Station (Reach 7) will have a **negligible** visual impact that will not be discernable to the casual observer.
- The replacement of the existing flood embankment with a wall in Reach 8 will result in a **significant** change to the character of the gardens of the seven properties in Newbery Avenue. However the residents will benefit from an increased area of levelled garden. Furthermore the wall will be of a similar height to the existing flood embankment, and as such will have a **neutral impact** on existing views. Refer to Plate A7.14.
- The raising of the existing embankments in Reaches 9 and 10 will have a **slight adverse** impact on views from the adjacent residential areas and Home Farm; refer to Plates A7.6 and A7.7.

Plate A7.10 A view of the existing Harrington Arms Car Park and No 396 Tamworth Road

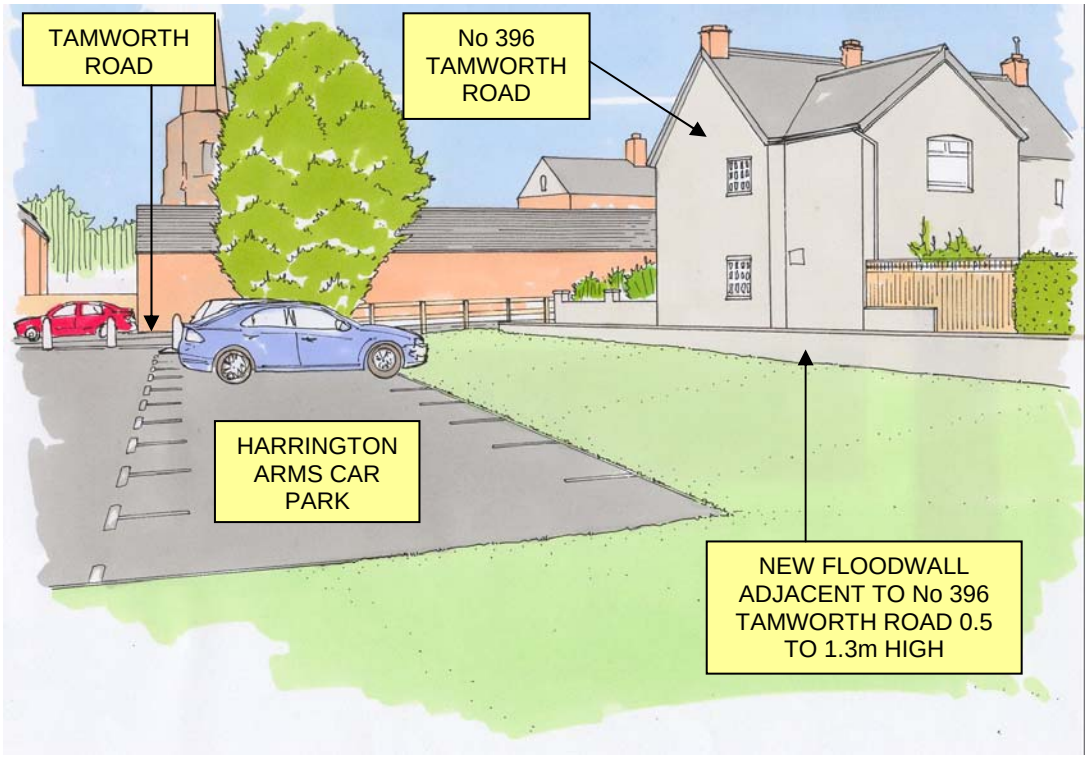

Plate A7.11 Visualisation of New Floodwall in Reach 2 viewed from Harrington Arms Public House car-park

Plate A7.12 View of Tamworth Road; refer to Plate A7.13

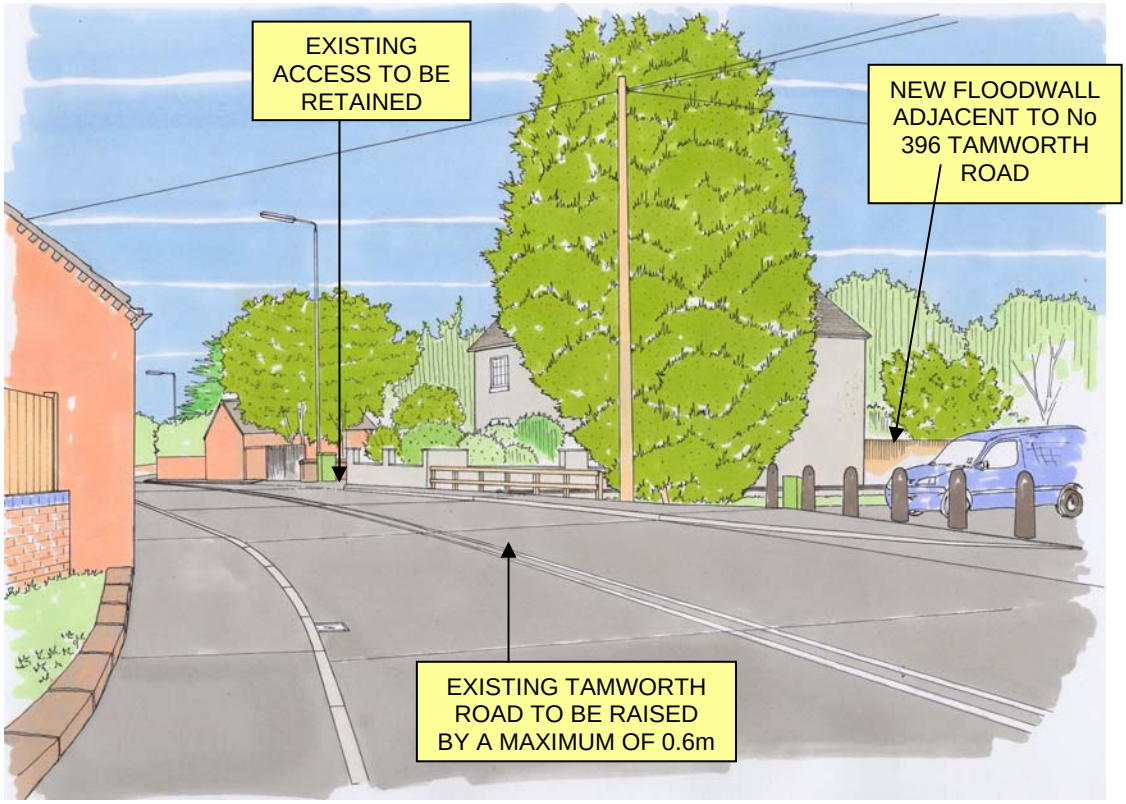

Plate A7.13 Visualisation of Raised Road and New Flood Wall at Tamworth Road in Reach 2.

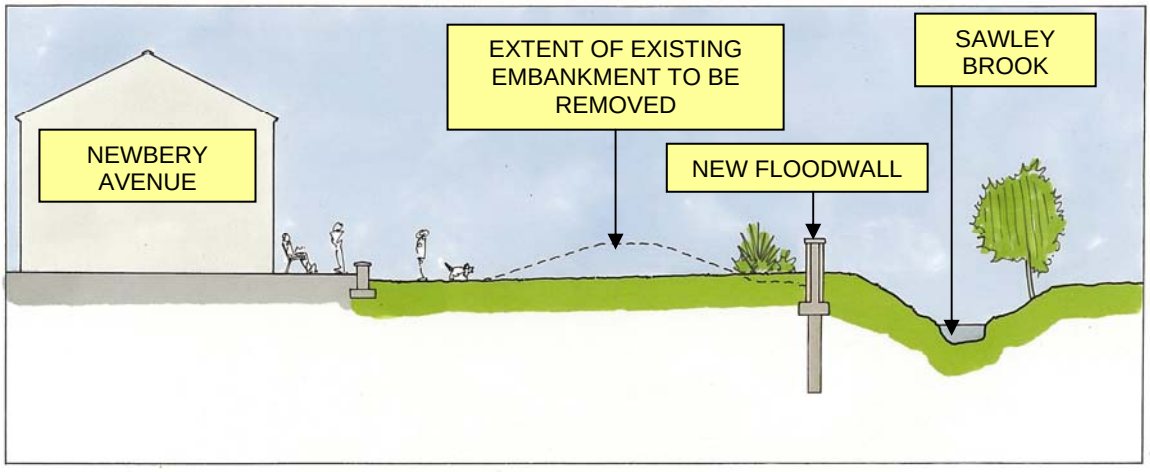

Plate A7.14 Cross-section showing New Flood Defence Wall at Newbery Avenue

- The proposed wall and embankment through Barton Pool and Trent Meadows Local Wildlife Sites (LWS) in Reach 11 will have a **moderate adverse** landscape and visual impact. Due to the removal of a mature copse of trees between the pond and the railway line views of the proposed floodwall will be experienced by visitors to the LWS and also to railway passengers. Refer to Plates A7.8, A7.15 and A7.16.

- The railway passengers will experience the floodwall and embankment as a small-scale element within the wider landscape.
- Views of the proposed floodwall from the adjacent residential areas are screened by the main railway line and the existing vegetation that is to be retained.
- We believe timber cladding is the most visually suitable material for this naturalistic landscape. Brick, stone, render and concrete are inappropriate for the setting.
- Barton Pool LWS is currently visually inaccessible from the footpath during the spring and summer months due to leaf and vegetation cover.
- Any tree removal that is necessary could be offset by tree planting of similar species within the local area, but not on the new embankments. The railway will become more evident to site users over a 100m stretch where trees are felled.
- The encroachment of the embankment into the Pool is unavoidable given the proximity of the railway; it is not possible to extend the pond in this location to mitigate this loss.
- The new embankment in Reach 12 will have a slight/moderate adverse impact on the landscape character, and will be visible to rail passengers.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **slight (minor)** to **moderate adverse** and **permanent.**

Plate A7.15 Visualisation of the New Flood Wall through Reach 11, adjacent to the Nottingham/Derby Railway line, view towards Barton Pool Local Wildlife Site.

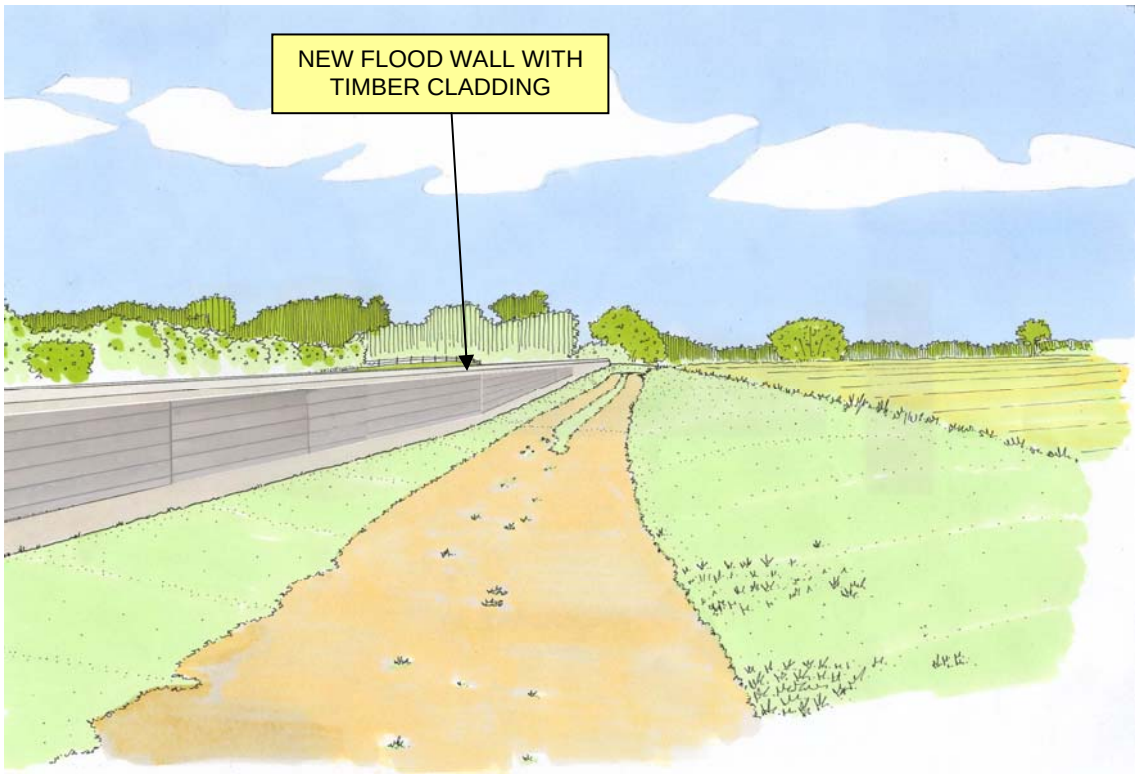

Plate A7.16 Visualisation of New Flood Wall through Reach 11 adjacent to the Nottingham/Derby Railway Line.

A7.3.2 Operational Impacts

No significant impacts were identified.

A7.4 Mitigation Measures and Monitoring

In sensitive landscape areas such as the Sawley Conservation Area the flood walls will be appropriately clad in accordance with the requirements of the Erewash Borough Council Conservation Officer. Appropriate cladding of flood walls, to match a surrounding area, is adopted as good practice and part of the baseline design and such wall finishes are not considered as a mitigation measure.

Similarly, re-seeding of embankments is considered as part of the engineering design and will be completed as standard for all areas and is not considered as mitigation. Refer to Advice Note F3 Landscape and Environmental Design Guidance, April 2007.

The following mitigation measures in Table A7.1 are to be incorporated into the design of the scheme to reduce or avoid visual intrusion caused by the construction works and to aid integration of the raised and new defences into their surrounding landscape.

Table A7.1 Mitigation Measures and Wall Treatments

Impact of Proposed Works	Mitigation Measures and Wall Treatments
Visual appearance of new floodwalls	• Cladding in materials that are characteristic to the area. • Reach 11 - timber cladding will be used to be in keeping with the natural character of the area; refer to Plate A7.15 and A7.16. • Reach 2 – Appropriate cladding of floodwall within Sawley Conservation Area considered as part of baseline design.
Foreshortening of views	• No mitigation possible.
Impacts on existing mature trees	• Where proposed works are in close proximity to trees of high landscape value ensure the construction process minimises any potential damage to root systems. • Where loss of significant trees or groups of trees takes place, where appropriate replacement and new planting should occur.
Raised road levels	• Grade road ramps so that a smooth road surface is achieved to maintain existing vehicle movements through Sawley Village and along Trent Lane and Pasture Lane.
Visual impact of raised embankments	• Ensure embankments blend into their landscape setting through landform design. Where it does not compromise operational requirements appropriate planting may be utilised to reduce the visual impact.
Temporary adverse visual impact of construction activities and site compounds.	• Where possible locate construction compounds and storage areas away from sensitive residential receptors and adjacent to suitable vehicle access points. • Reinstate all areas affected by the works to their former land use.
Impact on residential properties	• All affected areas of gardens within residential properties to be reinstated in agreement with the individual property owners.

The proposed flood defences and the mitigation and enhancements are shown in the Overview Plans in *Volume 1*; refer to Figures V4.1 to V4.12.

A7.5 Residual Impacts

Residual impacts are those impacts which remain after all practicable mitigation and reinstatement proposals have successfully established. For many of the landscape and visual impacts the mitigation and reinstatement proposals will not significantly reduce the residual impact. This is due to the very nature of the proposed works; for example if an existing view out over open countryside is interrupted, reinstatement planting will not bring back this view.

Summary Tables A7.2 and A7.3 outline the residual impacts.

For the residents of 6 River View in Reach 3 the proposed wall will have a **moderate adverse (not significant)** residual impact on the character of the landscape and on the open views towards the LWS.

The Sheetstores flood gates and new embankments in Reach 5 will have a **slight/moderate adverse (not significant)** residual impact on the landscape character and visual amenity of the area. The towpath is to be re-graded which will ensure the continued use of the path for cyclists and pedestrians. Once the replacement tree planting is successfully established the visual impact will be reduced.

The raising of the embankment around Trent Farm in Reach 6 will have a **moderate adverse (not significant)** impact on views from the ground floor of the property; however views will not be affected from the first floor. Users of the PRoW adjacent to the embankment will experience **slight (minor) adverse (not significant)** impact on their views towards Trent Farm.

For the residents of Newbery Avenue (Reach 8) there will be a **moderate/substantial (significant)** impact on the landscape character of their gardens. Any adverse landscape and visual impacts associated with the new wall will be mitigated by the improved character of individual gardens following the levelling of the existing flood embankment and full-reinstatement of the gardens. Existing views will not be interrupted due to the similar height of the proposed wall and existing embankment.

The widening of the existing embankment in Reach 10 will have a **negligible** impact on the landscape character once the re-seeding of the embankment has established, and the footpath is reinstated.

The proposed wall and embankment at Barton Pool LWS (Reach 11) will have a **moderate/substantial adverse (significant)** impact on the landscape character of the site. Suitable cladding materials to the wall will reduce the visual impacts for passing railway passengers. Potential ecological enhancements may offset any impact on its existing landscape character.

A7.6 Summary

There are two main areas for which the scheme will have a **significant** residual impact on the landscape character and visual amenity in the Sawley and Trent Meadows area. These are as follows:

- The proposed wall in the gardens of seven properties in Newbery Avenue;
- The proposed wall and embankment at Barton Pool LWS.

The mitigation and reinstatement measures proposed attempt to reduce the residual impacts of the flood protection measures. However due to the sensitive nature of these areas the residual impact, even though reduced, will remain significant.

Table A7.2 Summary of Landscape Impacts[3]

SUMMARY OF LANDSCAPE IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Landscape Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Landscape Impact / Residual Significance**	**Comments**
SAWLEY							
Reach 1 Wilne Road to Harrington Arms PH Raise existing embankment	Medium	Negligible	Slight/ Negligible / Not Significant	• None possible	N/A	Slight/ Negligible / Not Significant	
Reach 2 Harrington Arms PH to Church Farm Construct new wall	Medium	Low	Slight/ Moderate / Not Significant	• Full reinstatement of surrounding grass verge. • Cladding to be in keeping with existing character of Conservation Area.	Low	Slight/ Moderate / Not Significant	12 – 18 months for establishment of grass seeding.
Raise road level	Medium	Negligible	Slight/ Negligible / Not Significant	• Full re-grading works to ensure a smooth surface is provided over the road and its associated pavements. • Full reinstatement of existing accesses to adjacent properties. • Full reinstatement of the front garden wall to No. 396 Tamworth Road if adversely affected by the works.	Negligible	Slight/ Negligible / Not Significant	Care must be taken to reduce the temporary construction impacts on both the local residents and road users.

[3] Unless otherwise stated the residual impacts are adverse. The duration of the effects unless otherwise stated is permanent.

SUMMARY OF LANDSCAPE IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Landscape Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Landscape Impact / Residual Significance**	**Comments**
Reach 3 **Church Farm to Sawley Viaduct** Construct 0.8m high wall around the perimeter of the garden of 6 River View	High	Low	Moderate / Not Significant	• Reinstatement of fencing on top of wall, to be agreed with landowner. • Reinstatement of garden to be agreed with landowner. • Liaison with Conservation Officer to agree suitable cladding material.	Low	Moderate / Not Significant	3 – 5 years for establishment of ornamental planting, 10+ years for tree planting. Existing garden recently planted and not well established
Construct new embankment 1.4m high	Medium	Low	Slight/ Moderate / Not significant	• Reinstatement of field boundaries and appropriate replacement planting.	Negligible	Slight/ Negligible / Not significant	10+ years for establishment of planting.
Raise existing embankment	Medium	Negligible	Slight/ Negligible / Not Significant	• Full reinstatement of field boundaries and appropriate replacement planting. • Permanent diversion of a PRoW onto the crest of the embankment enhancement.	Negligible	Slight/ Negligible / Not significant	
Reach 4 **Grounds Farm**	No Works Required in this Reach.						

SUMMARY OF LANDSCAPE IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Landscape Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Landscape Impact / Residual Significance**	**Comments**
Reach 5 **Sheet Stores Flood Gates** Replace existing floodgates and construct new embankments	Medium	Medium	Moderate / Not Significant	• Replacement planting. • Re-grading works to the raised towpath to ensure the continued use of the area by pedestrians and cyclists. • Replacement canal flood gates in accordance with Environment Agency Guidelines	Low	Slight/Moderate / Not Significant	10+ years for establishment of planting.
Reach 6 **Trent Farm** Raise existing embankment at Trent Farm.	Medium	Low	Slight/ Moderate / Not Significant	• Re -instatement of field boundaries and appropriate replacement planting.	Low	Slight/Moderate / Not Significant	
TRENT MEADOWS							
Reach 7 **Trent Lane to Newbery Avenue** Raise road level	Low	Negligible	Negligible / Not Significant	• Full re-grading works to ensure a smooth surface is provided over the Trent Lane ramp.	Negligible	Negligible / Not Significant	
Install higher kerb	Low	Negligible	Negligible / Not Significant	• Reinstatement of existing road surface where disturbed by the proposed works.	Negligible	Negligible / Not Significant	

SUMMARY OF LANDSCAPE IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Landscape Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Landscape Impact / Residual Significance**	**Comments**
Reach 8 **Newbery Avenue to Owen Avenue** Replace existing embankment with a wall	High	High	Substantial / Significant	• Suitable cladding of the proposed Newbery Avenue floodwall. • Levelling of the existing embankment to provide a level surface to the gardens.	Medium	Moderate/ Substantial / Significant	Although still significant after mitigation, the property owners will benefit from a larger area of levelled garden.
Reach 9 **Owen Avenue to Home Farm** Raise existing embankment	High	Low	Slight/ Moderate / Not Significant	• Reinstatement of field boundaries.	Negligible	Slight/ Moderate / Not Significant	7 – 9 years for establishment of planting.
Farm access track to be raised by 350mm	Medium	Low	Slight/ Moderate / Not Significant	• Full re-grading works to ensure a smooth surface across the access.	Negligible	Slight/ Negligible / Not Significant	
New turning area for inspection vehicles.	Medium	Negligible	Slight/ Negligible / Not Significant	• Reinstatement of field boundaries.	Negligible	Slight/ Negligible / Not Significant	

SUMMARY OF LANDSCAPE IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Landscape Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Landscape Impact / Residual Significance**	**Comments**
Reach 10 **Home Farm to Barton Pool LWS** Widening of existing embankment	High	Low	Moderate / Not Significant	• Match existing footpath surface.	Negligible	Slight (minor) / Not Significant	
New embankment 1.8m high with footpath on crest	Medium	Low	Slight/ Moderate / Not Significant	• Reinstatement of footpath which crosses the new embankment – to achieve a 1 in 12 slope. • Replanting of trees and scrub over temporary access route but not embankment.	Low	Slight/Moderate / Not Significant	10+ years for establishment of planting.
Turning area where the embankment ties into higher ground	Medium	Low	Slight/ Moderate / Not Significant	No mitigation possible.	Low	Slight/ Moderate / Not Significant	
Reach 11 **Barton Pool LWS** Construct new wall on top of new embankment.	High	Medium	Moderate/ Substantial / Significant	• Suitable cladding materials to ameliorate the visual impact of the wall. • Ecological management/mitigation may also help to offset landscape impacts.	Medium	Moderate/ Substantial / Significant	Requires suitable replacement planting to offset the loss of landscape character created by felling of existing trees for the proposed wall alignment.

SUMMARY OF LANDSCAPE IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Landscape Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Landscape Impact / Residual Significance**	**Comments**
Construct new wall 0.7m to 1.8m high, off-set 1.0m from railway fence	Medium	Medium	Moderate / Not Significant	No mitigation possible.	N/A	Moderate / Not Significant	
Reach 12 Golden Brook, North of the railway line Construct new embankment	Medium	Medium	Slight/ Moderate / Not Significant	No mitigation possible.	N/A	Slight/ Moderate / Not Significant	

Table A7.3 Summary of Visual Impacts [4]

SUMMARY OF VISUAL IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Visual Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Visual Impact / Residual Significance**	**Comments**
SAWLEY							
Reaches 1 – 3 Wilne Road to Sawley Viaduct Residents of Old Sawley village and nearby Residential Districts	High	Negligible	Slight / Not Significant	• Full reinstatement of Harrington Arms car park, the road and pavement surfaces of Tamworth Road.	Negligible	Slight / Not Significant	
Reach 2 Harrington Arms PH to Church Farm Road users of Tamworth Road	Low	Negligible	Negligible / Not Significant	• Reinstatement of smooth surface to Tamworth Road and adjacent pavements.	Negligible	Negligible / Not Significant	
Residents of 396 Tamworth Road and 6 River View	High	Medium	Moderate / Not Significant	• Full replacement of garden where disturbed by works. • Close and full liaison with property owner and Conservation Officer at Erewash Borough Council required regarding appropriate cladding.	Low	Slight (minor)/ Moderate / Not Significant	3 – 5 years for establishment of ornamental planting, 10+ years for tree planting.

[4] Unless otherwise stated the residual impacts are adverse. The duration of effects unless otherwise stated is permanent.

SUMMARY OF VISUAL IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Visual Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Visual Impact / Residual Significance**	**Comments**
Reach 3 **Church Farm to Sawley viaduct** Walkers using the existing Public Rights of Way adjacent to Sawley All Saints' Church	Medium	Low	Slight/ Moderate / Not Significant	• Tree planting where appropriate. • Potential diversion of the PRoW onto the crest of the embankment. • Reinstatement of field boundaries.	Low	Slight / Moderate / Not Significant	10+ years for establishment of planting.
Reach 4 **Grounds Farm**	No works being undertaken						
Reach 5 **Sheetstores Flood gates** Walkers and cyclists using the Erewash Canal tow path	Medium	Low	Slight/ Moderate / Not Significant	• Replacement planting.	Negligible	Slight (minor) / Not Significant	10+ years for establishment of planting.
Reach 6 **Trent Farm** Residents of Trent Farm	High	Low	Moderate / Not Significant	• Provision for farm owners to continue maintenance of grass slopes as garden.	Low	Moderate / Not Significant	

SUMMARY OF VISUAL IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Visual Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Visual Impact / Residual Significance**	**Comments**
Walkers using the PRoW alongside Trent Farm	Medium	Low	Slight/ Moderate / Not Significant	• Reinstatement of existing footpath access over the raised embankment.	Negligible	Slight (minor) / Not Significant	
Reaches 5 and 6 Sheetstores Flood gates to Trent Farm Rail passengers on the main railway line	Low	Negligible	Negligible / Not Significant	• New planting where appropriate • Reinstatement of field boundaries.	N/A	Negligible / Not Significant	10+ years for establishment of planting.
Reach 7 Trent Lane to Newbery Avenue Users of Trent Lane	Low	Negligible	Negligible / Not Significant	No mitigation possible.	N/A	Negligible / Not Significant	
Workers visiting New Sawley Brook Pumping Station	Low	Negligible	Negligible / Not Significant	No mitigation possible.	N/A	Negligible / Not Significant	

SUMMARY OF VISUAL IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Visual Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Visual Impact / Residual Significance**	**Comments**
Reach 8 Newbery Avenue to Owen Avenue Residents of Newbery Avenue	High	High	Substantial / Significant	• Removal of the existing embankment to provide a level surface to the end of the gardens.	Medium	Moderate/ Substantial (major) / Significant	Positive benefit for residents.
Reaches 8 and 9 Newbery Avenue to Home Farm Residents of Trent Meadows Residential District	High	Negligible	Slight / Not Significant	No mitigation possible.	N/A	Slight / Not Significant	
Residents of Home Farm	High	Negligible	Slight / Not Significant	No mitigation possible.	N/A	Slight / Not Significant	During site survey (May 2008) this farm did not appear inhabited. LVIA has been completed as though it is inhabited.
Walkers using the PRoW adjacent to Home Farm	Medium	Negligible	Slight/ Negligible / Not Significant	No mitigation possible.	N/A	Slight / Negligible / Not Significant	

SUMMARY OF VISUAL IMPACTS							
Prior to Mitigation Works				**Post Mitigation Works**			
Identified Area of Works	**Sensitivity**	**Magnitude of Change prior to mitigation**	**Level of Potential Visual Effect / Potential Significance**	**Mitigation and Reinstatement Measures**	**Magnitude of Change with Mitigation**	**Level of Residual Visual Impact / Residual Significance**	**Comments**
Reaches 10 and 11 Trent Meadows Picnic Area to River Erewash Recreational users of the Trent Meadows Picnic Area and Meadow Lane Allotment Site	Medium	Low	Slight / Moderate / Not Significant	• Re- instatement of field boundaries.	Low	Slight / Moderate / Not Significant	7 – 9 years for establishment of planting.
Users of Barton Pool Local Wildlife Site	High	Medium	Moderate/ Substantial / Significant	• New tree planting. • Thinning vegetation over pond area. • Introduction of marginal planting if agreed with DWT.	Medium	Moderate/ Substantial / Significant	Potential environmental enhancement opportunities. 10+ years for establishment of planting.
Reaches 11 and 12 Barton Pool to Golden Brook People travelling on the main railway line	Low	Low	Slight (minor) / Not Significant	• Re- instatement of field boundaries.	Low	Slight (minor) / Not Significant	Improved view into Barton Pool LWS.

A8. WATER

This section addresses the impacts on local surface waters and water quality. Impact on flooding regime is also considered. The impacts on groundwater in the form of aquifers are assessed in *Section A11*.

A8.1 Method of Assessment

An assessment of the potential impacts on waterbodies is based on the methodology outlined in *Section 7.9, Volume 1*. The sensitivity of a waterbody is based on factors such as the size and importance of the feature; water quality; use for abstraction, navigation or recreational purposes; and proximity to the proposed works. The magnitude of the impact is based on the length of time the construction activity will be present and the type of pollution that might occur.

A8.2 Baseline Conditions

A8.2.1 Surface waterbodies

The two main rivers in the scheme area are the River Trent, which flows from west to east, and the River Erewash, which is at the eastern extent of the scheme area and flows from north to south. The proposed works are remote from the River Trent, typically some 100 to 750m from the river banks.

There are other waterbodies that are close to the work, namely:

- ditch realignment works in Reach 1;
- the Erewash Canal in Reach 5;
- New Sawley Brook that runs alongside the works in Reaches 7, 8 and 9;
- the water filled former gravels pits which lie 20m to the south of the working area for Reach 9;
- the watercourse near the access road for the works at Reach 10;
- the pond at Barton Pool LWS in Reach 11;
- Golden Brook watercourse in Reach 12.

A8.2.2 Water quality

The Environment Agency measures the chemical and biological quality of rivers using the General Quality Assessment (GQA) system, which is described in *Section 7.9.3, Volume 1*.

There are two GQA sampling points within the Sawley and Trent Meadows scheme area, namely Trent Lock on the Erewash Canal and one further downstream at the confluence of the Rivers Erewash and Trent; refer to Table A8.1 for the results.

Table A8.1 Water Quality and GQA Grades

Watercourse Stretch	GQA Chemistry Grade	GQA Biology Grade
Erewash Canal – Trent Lock	B (Good) 2003 - 05	*not sampled*
River Erewash – River Trent confluence	B (Good) 2003 - 05	C (Fairly Good) 2003 - 05

A8.3 Impact Assessment

A8.3.1 Construction Impacts

Impact on Watercourses and Waterbodies due to Pollution from Construction Activities

Construction activities have the potential to cause pollution in the local watercourses. This may arise from the movement of construction plant and material or run-off from the site.

Construction activities in the scheme area are remote from the River Trent and there is only a small risk that pollutants could reach the watercourse. The potential impacts on the River Erewash are discussed in *Appendix B.*

During the replacement of the flood gates in Reach 5, there is the potential to disturb silt deposits in the Erewash Canal during the pumping of water from the temporary works. In Reaches 11 and 12, there is the risk of spillages into Golden Brook and the River Erewash from poor handling and transportation or storage of construction materials, such as fuel.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate to major (depending on the magnitude of the pollution incident) adverse** and **short-term**.

A8.3.2 Operational Impacts

Impact on River Trent and its Floodplain

The impact on the River Trent and its floodplain is a maximum increase by up to 0.07m during a flood event which has a 1% annual probability of occurrence.

The *operational impact* has been assessed as being **not significant**. No mitigation required.

Impacts from Maintenance of New and Raised Flood Defences and Structures

Maintenance activities are unlikely to result in any adverse impacts on water quality.

The *operational impact* has been assessed as being **not significant**. No mitigation required.

Impacts on Local Surface Water Drainage

A number of open drainage ditches and minor watercourses discharge into the River Trent; these drain highly urban catchments. They become "locked" by flap valves at their downstream end during periods of high flow in the River Trent to avoid water backing up. When the flap valves are closed, water is unable to drain from the ditches and minor watercourses. However due to the urban nature of the catchment, the peak flows in them are likely to occur before the corresponding peak in the River Trent. Consequently, the flood defence works will not increase the flood risk from such watercourses.

The *operational impact* has been assessed as being **not significant**. No mitigation required.

Impact on the River Erewash

The River Erewash discharges into the Trent at the downstream end of the study area and historic records show that flooding can occur simultaneously in both the River Erewash and the River Trent. Therefore, flood defences are proposed along the left bank of the Erewash to protect the scheme's flood cell from the River Trent. These works fall within Broxtowe Borough Council's jurisdiction and are, therefore, discussed in *Appendix B.*

The *operational impact* has been assessed as being **not significant**. No mitigation required.

Impact on Villages outside the Scheme Area

The impact of increased flood risk to villages further downstream is discussed in *Section 8, Volume 1*.

The *significance* of the *operational impact* has been assessed *prior to mitigation* as being **moderate adverse** and **permanent**.

A8.4 Mitigation Measures and Monitoring

Considerable guidance is available on how to minimise the risk of water pollution from construction activities. For example, the Environment Agency has produced Pollution Prevention Guidelines (PPG) and these and other mitigation measures are set out in more detail in *Section 7.9.5, Volume 1*.

Appropriate method statements will be prepared for works to ensure water quality is not affected especially at Sheetstores Flood Gates (Reach 5), in New Sawley Brook (Reaches 7 to 9), in Golden Brook and in the River Erewash (Reach 12).

During construction, care will be taken to ensure that equipment and storage facilities are protected by secure fences and locked where possible. Spill kits and trained personnel will be available. Unnecessary transportation of fuels and potentially polluting chemicals will be minimised and all vehicles, including the fuel bowser, will carry emergency spill kits. Refuelling within 30m of any watercourse will be avoided, wherever possible, and refuelling will not take place within 10m of a watercourse. To deal with the runoff from exposed ground and

stockpiles, silt fences, 'dip and lip' earth banks or sandbags, may be used to divert it away from watercourses. Measures will be taken to ensure that site roads and access/exit roads from the works will minimise dust and mud generation.

A8.5 Residual Impacts

Table A8.2 summarises the impacts on water. During construction, there is the potential that construction activities may pollute watercourses and waterbodies near the works. However, through the adoption of appropriate mitigation measures, the **adverse** residual impacts will be of **no significance**.

The new and raised flood defences are likely to have a residual impact on the surrounding villages. This is discussed in more detail in *Section 8, Volume 1*.

Table A8.2 Summary of Impacts on Water

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Impact on watercourses and waterbodies due to pollution from construction activities	Moderate to major adverse and short-term	• Adhere to the Environment Agency's PPG's. • Appropriate method statements for works at Sheetstores Flood Gates, works next to Golden Brook, New Sawley Brook and River Erewash.	None
OPERATIONAL IMPACTS			
Impact on the River Trent and its floodplain	No significant impact	None required.	None
Impact from maintenance of new and raised embankments	No significant impact	None required.	None
Impact on local surface water drainage	No significant impact	None required.	None
Impact on the River Erewash	No significant impact	Refer to *Appendix B.*	
Impact on villages outside of the scheme area	Moderate adverse and permanent	Refer to *Section 8, Volume 1*.	

A9. TRAFFIC AND TRANSPORT

This section addresses the impact on local traffic and transport within the scheme area.

A9.1 Method of Assessment

The assessment of the potential impacts on local traffic and transportation uses the methodology outlined in *Section 7.10.2, Volume 1*. The impacts on navigation in the Erewash Canal are discussed in *Section A3*.

A9.2 Baseline Conditions

The River Trent has influenced the development of the road network in the study area and throughout Nottingham. At Sawley, there are just two river crossings namely the M1 at the upstream limit of the scheme and the B6540, Tamworth Road, which is the main route into Sawley from the south via Harrington Bridge. Sawley is also crossed by a number of railway lines and several sections of the railway embankment act as informal flood defences.

In Trent Meadows, there are few main commuter roads in the area immediately surrounding the defences. The railway embankment to the west of Newbery Avenue and Barton Pool LWS performs a flood defence function.

A9.3 Impact Assessment

A9.3.1 Construction Impacts

Impact on Local Roads Due to Local Road Raising Operations and Construction Activities Requiring Road Closures

- Single lane road closures will be required on Trent Lane and Pasture Lane which are likely to cause delays during peak periods. Lane closures likely to be required for 2 – 3 weeks.
- Full lane closure of Tamworth Lane will be required for 2 - 3 weeks to raise the road. The road must be fully closed for Health and Safety purposes.
- Increase in heavy vehicle movements in residential areas adjacent to works, specifically Wilne Road, Lock Lane, Fields Farm Road, Meadow Lane and Trent Lane.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **major adverse** and **short-term**.

Impact on Local Roads due to Construction Traffic

The location of the proposed access points are shown on Figures AA3.3 to AA3.8. In addition, material will be transported along the haul routes adjacent to the defences. The estimated lorry movements are shown in Table A9.1 but may change as the detailed design progresses.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate adverse** and **short-term**.

Table A9.1 Estimated Lorry Movements

Reach	Volume of Earthworks (m^3)	Volume of temporary fill (m^3)	Volume of Concrete (m^3)	Other Materials and exportation of waste (m^3)[5]	Total Number of lorry movements [6]
Sawley					
Reaches 1 - 4	550	0	0	85	160
Reaches 5 & 6	200	0	10	30	60
Trent Meadows					
Reach 7	7	0	1,480	220	550
Reaches 8 - 10	1,050	0	0	160	300
Reach 11	400	3,100	140	80	940
Reach 12	400	0	0	60	120
Totals	**2,600**	**3,100**	**1,630**	**635**	**2,130**

[5] Other building materials include sheet piles, stone and timber cladding among other construction materials. The volume of these materials and the volume of waste produced are hard to assume at outline design stage so it has been calculated that other building materials are 15% of the total volume of permanent earthworks and concrete required for the scheme.

[6] Calculation of number of lorry movements is based on the assumption that a lorry will carry an average load of 8 m^3 of earthworks (or other building materials/waste) or 6 m^3 of concrete on each trip. Calculations are shown for delivering the fill/concrete and returning.

Impact on Operation of Railway Network due to Construction Works Adjacent to Railway Line

In Reach 11 the construction of the new wall is within 10m of the main railway line.

The necessary approvals and consents will be agreed in advance with Network Rail to achieve these railway possessions. As well as the above possessions, all works within 5m of Network Rail property will require their approval and supervision of works on site.

The *significance* of the *impact* been assessed *prior to mitigation* as being **moderate adverse** and **short-term**.

A9.3.2 Operational Impacts

Impact of New and Raised Defences on Local Transport Infrastructure

Reduced risk of flooding of B6540 Tamworth Road, the local road network and the main railway line behind the new and raised flood defences.

The *operational impact* has been assessed as being **moderate beneficial** and **permanent**. No mitigation required.

A9.4 Mitigation Measures and Monitoring

The traffic and transport impacts will be controlled/minimised by implementation of a Traffic Management Plan (TMP); refer to *Section 7.10.5, Volume 1*. This will be agreed with the Local Highway Authority and the Highways Agency prior to the works.

Specific considerations are to:

- Avoid increasing traffic flows on the main roads during peak periods - time the deliveries of materials to the main compounds to be between 9am and 4:30pm.
- Minimise the disturbance to sensitive residential areas - avoid using Tenter Close access to Grounds Farm during the school holidays.
- Avoid conflicts with parked cars - install additional signage along Meadow Lane, near to Trent Meadows Picnic Area car park, to ensure access maintained into Pasture Lane for wide/heavy loads.
- Minimise impacts to the users of Tamworth Road by undertaking works during the school holidays and working at the weekends, when practicable.

A9.5 Residual Impacts

With the proposed mitigation measures, it is considered that there will generally remain a **minor adverse** and **short-term** impact on traffic and transport during the construction period (Table A9.2). This results from the need to transport equipment, workers and material to and from the site.

The exception will be the closure of Tamworth Road which is a major route across the River Trent into Nottingham. The closure will be timed where practical to minimise impacts but full closure will still have a **major adverse** impact on traffic, although this will only be **short-term** (two weeks).

However, there will be permanent beneficial impacts through the increased standard of flood protection to traffic infrastructure once the whole FAS is completed.

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Table A9.2 Summary of Impacts on Traffic and Transport

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Impact on local roads due to construction traffic	Moderate adverse and short-term	• Develop a TMP; refer to *Section 7.10.5, Volume 1*. • Time the deliveries of materials to the main site compounds for between 9am and 4.30pm. • Avoid using the Tenter Close access to Grounds Farm during school holidays. • Install additional signage along Meadow Lane near to Trent Meadows Picnic Area car park, to ensure access to Pasture Lane for wide/heavy loads.	Minor adverse and short-term.
Impact on local roads due to local road raising and construction	Major adverse and short-term	• Develop a TMP; refer to *Section 7.10.5, Volume 1*. • Timing of full closure of Tamworth Road to be restricted to school holidays and weekends where possible.	Moderate to major adverse and short-term.
Impact on operation of railway network due to construction works adjacent to railway line.	Moderate adverse and short-term	All approvals obtained from Network Rail. Possessions appropriately timed to minimise impact on rail network.	Minor adverse and short-term
OPERATIONAL IMPACTS			
Impact of new and raised defences on local transport infrastructure	Moderate beneficial and permanent	No mitigation required.	Moderate beneficial and permanent.

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A10. CULTURAL HERITAGE AND ARCHAEOLOGY

This section addresses the impact on the local historic and archaeological environment.

A10.1 Method of Assessment

The archaeological value of the area was assessed through desk studies and field evaluation, as described in *Section 7.11, Volume 1*.

A10.2 Baseline Conditions

A10.2.1 Archaeology

Desk Study

From the desk study, a number of sites of archaeological and palaeo-environmental interest potentially affected by the scheme were identified. The features are discussed below and their locations are marked by the letters A to J; refer to Figure A10.1.

Cropmarks and palaeochannel (A) - The fields to the west of the defences in Reaches 1 and 2 contain cropmarks, which may be prehistoric and it is possible that the surrounding area may contain archaeological remains. In addition, the flood defences cross a palaeochannel twice.

Sawley medieval village (B) - This area is thought to be of medieval or perhaps even earlier date. This is based on evidence provided by excavations, maps, aerial photographs and the architecture of the church. A fishpond and a possible rectangular earthwork may also be medieval. The area was originally surrounded on the west and south by ridge and furrow field systems of medieval date. Overall, this area could be of regional significance for archaeology.

Earthwork, Scheduled Monument (C) - The flood defences run adjacent to a Scheduled Monument, which may be of Roman or medieval date. The scheduled area covers the whole of the field in which the monument is located. Legislation and planning controls protect the Scheduled Monument and its setting.

Cropmarks and palaeochannel south of Scheduled Monument (D) - Cropmark features lie to the south west and south east of the Scheduled Monument. These are undated but may relate to the medieval village. A palaeochannel is also apparent to the south east of the Scheduled Monument.

Ridge and furrow and palaeochannel near Harrington Bridge (E) - There is evidence that there was ridge and furrow to the west and east of Harrington Bridge. These could provide protection for medieval or earlier remains. There are also two palaeochannels.

Ridge and furrow around Grounds Farm (F) and Trent Farm (G) - There are areas of ridge and furrow around Grounds Farm and Trent Farm. These are

recorded on aerial photographs and can be seen on the ground at Trent Farm. These areas, therefore, could have some archaeological interest.

Palaeochannel (H) - A palaeochannel lies close to the railway and is crossed by the existing flood defences.

Ridge and furrow and cropmarks at Home Farm (I) - The area to the east of Home Farm shows evidence of ridge and furrow and of possible cropmarks.

Cropmarks and palaeochannels near the River Erewash confluence (J) - Two palaeochannels lie to the south of the proposed defence.

Results from Ground Investigations

In Sawley, seven 30 x 1.6m evaluation trenches were excavated to the north of the River Trent; refer to Figure A10.1. Six of these (S1 and S3 to S7) were located in areas immediately south of the existing embankment in Reaches 1 and 3. The other (S2) was excavated in the gardens of the Harrington Arms PH in Reach 2.

In the Trent Meadows area, five trenches were excavated to the east of the River Trent; refer to Figure A10.1. Four of these (TM1 – TM4) were located in Reaches 8 and 9 and the fifth (TM5) was excavated to the south of the existing embankment in Reach 10.

The results are summarised in Table A.10.1.

Table A10.1 Results of Archaeological Ground Investigations

Trench	Results
S1	Evidence of ridge and furrow earthworks, of presumed medieval date, overlying strata of natural alluvium.
S2	This trench was excavated within the core of the medieval settlement in the grounds of the Harrington Arms PH and revealed extensive remains of post-medieval date. At the eastern end of the trench, a deposit (S2136) containing medieval to early post-medieval pottery, including Cistercian ware of late fifteenth to seventeenth century date, was cut by the brick foundations of a cottage, shown on mid to late nineteenth century Ordnance Survey maps. Other features proved to be undated, post-medieval or recent, although the fill of one (S2139) contained possible Cistercian ware.
S3 to S7	*No archaeological remains were identified*
TM1 to TM5	

A10.2.2 Listed Structures

The remains of the south section of Harrington Bridge and All Saints Church are Grade II Listed. Refer to Figure AA3.1 for locations.

A10.2.3 Conservation Areas

Sawley Village is a Conservation Area. Refer to Figure AA3.1 for location.

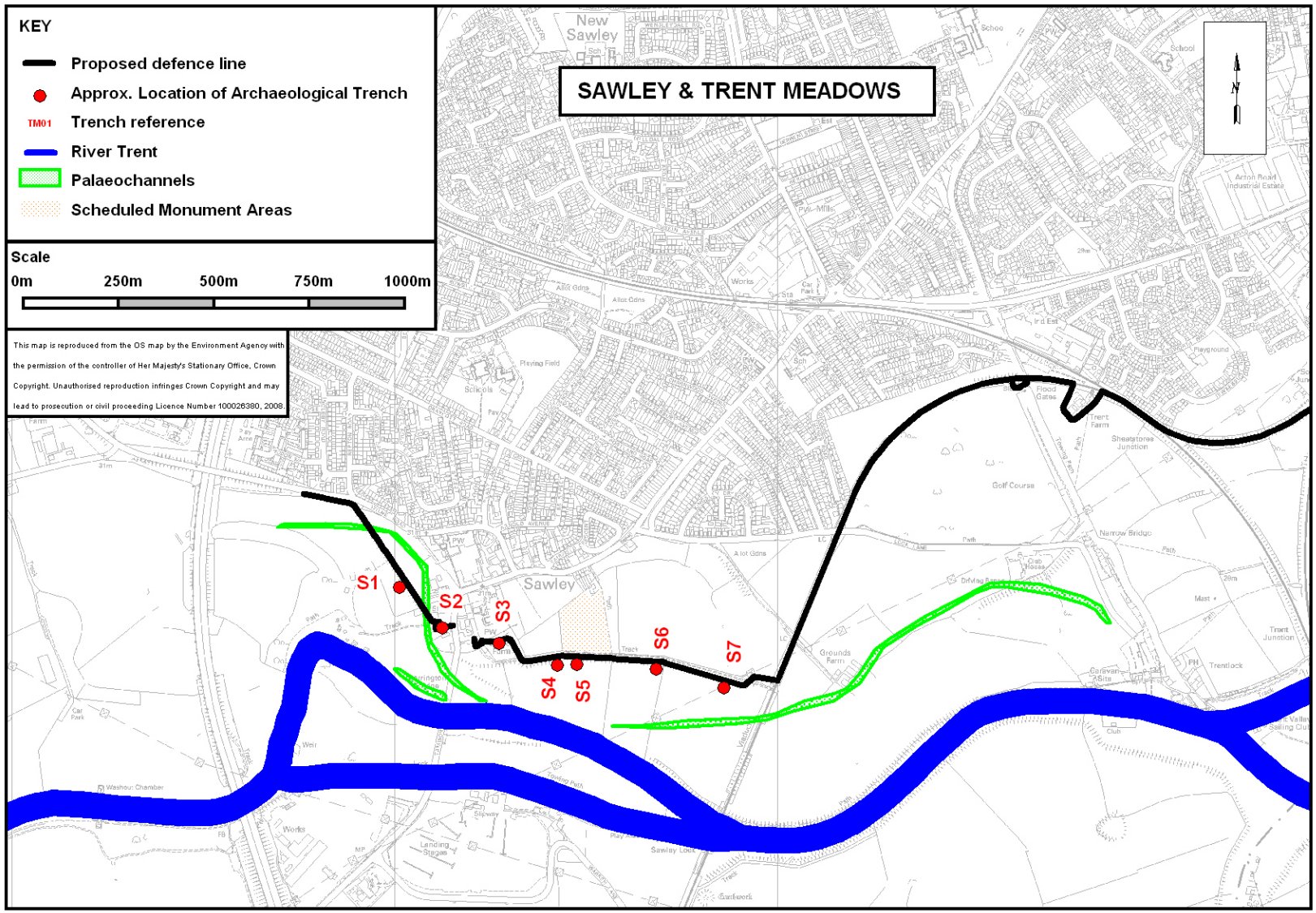

Figure A10.1 Map of Archaeological Features of Interest & Locations of Ground Investigation Trenches

A10.3 Impact Assessment

A10.3.1 Construction Impacts

There are archaeological impacts associated with the raising of existing or the construction of new defences. Construction activities that could damage archaeological remains include fencing off the works areas, stripping topsoil and subsoil from the compound areas and temporary haul roads, and excavations. Table A10.2 summarises the level of impact on the known archaeological features due to these activities.

No Listed Buildings or Structures will be directly affected by the proposed works. However the impact on their setting and Sawley Village Conservation area is discussed in *Section A7*.

Table A10.2 Level of Archaeological Impact from Construction Works

Archaeological Site	**Construction Activity**				
	Fencing of Working Area	**Compound Stripping**	**Access Track Stripping**	**General Plant Movement**	**Topsoil and subsoil stripping and excavation**
Cropmarks and palaeochannel (A)	None	Minor	Minor	None	Minor
Sawley medieval village (B)	Minor	Moderate	Minor	None	Moderate
Earthwork, Scheduled Monument (C)	None	None	None	None	None
Cropmarks and palaeochannel south of Scheduled Monument (D)	None	None	Minor	None	Minor
Ridge and furrow and palaeochannel near Harrington Bridge (E)	None	Moderate	Moderate	None	None
Ridge and furrow around Grounds Farm (F)	None	Moderate	Minor	None	None
Ridge and furrow around Trent Farm (G)	None	Moderate	Moderate	None	Minor
Palaeochannel (H)	None	None	None	None	Moderate
Ridge and furrow and cropmarks at Home Farm (I)	None	None	None	None	Minor
Cropmarks and palaeochannels near the River Erewash confluence (J)	None	None	None	None	None

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor to moderate adverse** and **permanent**.

A10.3.2 Operational Impacts

There will be a reduction in the flood risk to a number of Listed Structures.

The *significance* of the *operational impact* has been assessed as being **minor beneficial** and **permanent**. No mitigation required.

A10.4 Mitigation Measures and Monitoring

There are a range of generic mitigation measures to reduce the general disturbances and risks relating to construction activities on archaeological sites. For example, the CIRIA (2005) publication 'Environmental Good Practice on Site'. These are described in more detail in *Section 7.9.5, Volume 1*.

A detailed mitigation strategy will be prepared in agreement with the archaeological officers and English Heritage. Specific mitigation measures for the known archaeological sites include:

- Reach 1 – Footpath diversion will be treated sensitively, no signage will be erected within the area of ridge and furrow features
- Reach 3 - Avoidance of any plant movement or works in the areas designated as a Scheduled Monument (C).
- Reaches 3, 4, 6 and 9 - Record ridge and furrow earthworks in advance of construction, and their reinstatement where practicable (E, F, G and I).
- All reaches - The archaeological observation of ground breaking activities in areas of demonstrably significant archaeological potential, followed by recording of any deposits (A to J).
- All reaches - Regular archaeological monitoring of ground breaking operations in areas of archaeological potential to identify any previously unknown archaeological sites
- Reaches 1, 3, 8, 9 and 11 - A programme of geo-archaeological assessment of known palaeochannel deposits, disturbed during construction (A, D, E, H and J). Place the results of this archaeological work in the public domain in a format agreed by the archaeological officers and English Heritage.

A10.5 Residual Impacts

Table A10.3 summarises the above impacts on the local historic and archaeological environment following the implementation of the identified mitigation measures.

With proposed mitigation in place, residual impacts are limited to the visual impact of the defences on the historic environment, including Scheduled Monuments and Listed Structures; refer to *Section A7*.

The **long-term** residual impacts after mitigation are of **no significance**.

Table A10.3 Summary of Impacts on Cultural Heritage and Archaeology

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Impact on archaeology due to construction activities	Minor to moderate adverse and permanent	• A detailed mitigation strategy agreed with archaeological officers and English Heritage. • Adhere to CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.9.5, Volume 1*.	None
OPERATIONAL IMPACTS			
Impact on the historic environment as a result of the reduction in flood risk	Minor beneficial and permanent	No mitigation required.	Minor beneficial and permanent.

A11. SOIL, GEOLOGY AND HYDROGEOLOGY

This section addresses the impact on the soils, geology and hydrogeology of the scheme area.

A11.1 Method of Assessment

Desk study, walkover surveys and intrusive ground investigations were carried out to determine the ground conditions at the site. Ground investigations were undertaken in November 2004 and September 2005. These included cable percussion boreholes, window sampling, trial pits, groundwater monitoring and associated laboratory work. Details of the investigations are contained in the Factual Reports (FES 2004 and 2005).

A11.2 Baseline Conditions

A11.2.1 Geology

The solid geology of the area comprises rocks of the Mercia Mudstone and Sherwood Sandstone Groups of Triassic Age. These include the Nottingham Castle Sandstone Formation with mudstones of the Sneighton and Gunthorpe Formation. The Triassic rocks are underlain by Coal Measures strata of Carboniferous Age.

The rocks are traversed by a number of faults, the majority with an east-southeast to west-northwest strike. Although some, such as the Dunkirk Fault near Clifton Bridge, have a stronger north south alignment. The general bedding dip is towards the east.

Overlying the rocks, are superficial deposits of Pleistocene and Recent Age. These include glacial till on the flanks of the Trent valley. The deposits of the valley itself are mainly alluvium, with terrace gravels giving way to head deposits on some of the side slopes. The alluvium of the broad floodplain of the River Trent is mainly clays, silts and sands with some organic clay. With the extensive urban and commercial development on the left bank of the River Trent, deposits of man-made filled ground are widespread.

The ground investigation has generally confirmed the underlying geology of variable deposits of made ground overlying alluvium with shallow depth to bedrock of mudstone.

A11.2.2 Soils

Made ground is typically present as a mixed soil of clays, silts and sands that has been placed as fill to flood and railway embankments, and gravel pits.

The alluvium consists of cohesive deposits of clays and silts overlying granular deposits of sand and gravel. The bedrock is a weathered mudstone recovered in boreholes as sandy clay.

During the ground investigation, attempts were made to identify sources of borrow material in the floodplain. Removal of the cohesive deposits from this

area would reduce the length of the seepage path under flood defences and result in an adverse impact. The use of material from this location is considered inappropriate and alternative sources of material should be sought.

Soils in relation to agriculture are described in *Section A12*.

A11.2.3 Hydrogeology

The Sherwood Sandstone is a recognised aquifer. The Trent gravels may also be locally important as an aquifer and are likely to be in hydraulic continuity with the river. The alluvium is variable and is not important as an aquifer for water resource purposes.

The properties and the thickness of the above hydrogeological layers indicate that seepage through or under the existing defences will not be a concern for Sawley and Trent Meadows.

A11.2.4 Contaminated Land

The chemical contamination of the made ground was assessed by undertaking a suite of tests on the borehole samples. Comparing the results to the available guidelines, such as Soil Guideline Values, shows that contamination is low.

Samples of made ground in one borehole BH4 recorded levels of contaminants considerably higher than elsewhere. The borehole is located in a former landfill site, which was not registered to receive toxic and hazardous waste. It was typically registered for domestic and inert industrial waste only. The landfill is a former gravel pit and is within Trent Lock Golf Course; it is outside the proposed area of the works.

At Trent Meadows, the proposed works pass close to former landfill sites, none of which were registered to receive toxic and hazardous waste. In the area of proposed works, the levels of all contaminants is low and do not exceed the guidelines.

A11.3 Impact Assessment

A11.3.1 Construction Impacts

Impact of Soil Compaction in Working Areas

Compaction by heavy machinery can damage the macrostructure of a soil. The waterlogged nature of some areas makes them particularly prone to compaction and structural damage, because the slippage of machinery on the wet ground has a very damaging effect on the soil structure.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor adverse** and **medium-term**.

Impact of Contamination of Soil and Groundwater by Fuels and Other Hazardous Materials

The works required to raise the embankments in Reaches 3 and 10 will be minimal. The maximum excavation depth will be approximately 0.5m below ground. No new routes to the aquifer will be formed by these excavations.

The excavations will also be minimal along the proposed walls in Reaches 2, 8 and 11. The anticipated excavation will not extend more than 1m below ground level. The impacts to the immediate surrounding environment should be minimal. The works will include drainage systems to facilitate the discharge of surface water.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **minor adverse** and **short-term**.

A11.3.2 Operational Impacts

No significant impacts were identified.

A11.4 Mitigation Measures and Monitoring

The general mitigation measures outlined for the protection of surface waters will inherently protect groundwater; refer to *Section 7.9.5, Volume 1*. However, the work will be undertaken in accordance with the Environment Agency's 'Policy and Practice for the Protection of Groundwater'. General mitigation measures to reduce the impact of soil compaction in working areas include:

- good site practice when working next to watercourses;
- restoration of ground conditions following completion of works. This would involve rotovating and stripping the topsoil in advance of the works, careful storage of it during the works and reinstatement on completion;
- reseeding/replanting to ensure that soils are not washed away during flood events.

Mitigation measures to minimise the risk of contamination of soils and groundwater are as follows:

- contractor will be adopting industry standard working methods, including a controlled working area, stock piling of excavated materials, the use of drip trays for machinery, the control of invasive weeds etc.;
- provision of an environmental clerk of works who will ensure compliance with the agreed SWMP and EAP.

Other measures for soils are detailed in *Section 7.12.5, Volume 1*.

A11.5 Residual Impacts

Table A11.1 summarises the above impacts on soils, geology and hydrogeology following the implantation of the identified mitigation measures.

Residual impacts are limited to soil compaction and potential for contamination from the construction works.

The residual impacts after mitigation are of **no significance.**

Table A11.1 Summary of Impacts on Soil, Geology and Hydrogeology

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Compaction of soil structure due to construction activities	Minor adverse and medium-term	• Restoration of ground conditions following completion of works e.g. rotovating and stripping the topsoil in advance of the works, careful storage during the works and reinstatement on completion. • Adhere to the CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.12.5, Volume 1*.	None
Contamination of soil and groundwater due to construction	Minor adverse and short-term	• Follow Environment Agency's 'Policy and Practice for the Protection of Groundwater. • Adhere to the CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.9.5, Volume 1*.	None
OPERATIONAL IMPACTS			
No significant impacts were identified			

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A12. LAND USE

This section addresses the impact on local land uses in the scheme area.

A12.1 Method of Assessment

Agricultural land classification grades were sourced from Defra's provisional classifications on the Multi-Agency Geographic and Information for the Countryside (MAGIC) website. Land use was identified through walkover surveys.

A12.2 Baseline Conditions

Agriculture is the major land use in the study area and the majority of the agricultural land is provisionally classed as Grade 3 or 4. Drainage of agricultural land is discussed in *Section A8*. There are no Environmentally Sensitive Areas, Countryside Stewardship or Environmental Stewardship agreements in place.

The remainder of the land affected by the works is mainly private residential property, refer to *Section A3*, or managed for nature conservation; refer to *Section A4*.

A12.3 Impact Assessment

A12.3.1 Construction Impacts

Impact of Loss of Land and Associated Productivity

The flood defence crosses some Grade 3 agricultural land and there is a potential impact on farming operations. The majority of the impacts will be short-term and last for approximately three months. They are as follows:

- temporary sterilisation of productive land taken up by the working width;
- possible restriction of access, causing sterilisation of land outside the working width;
- there will be some disruption of access to the land across the construction area;
- temporary loss or severance of field boundaries;
- damage to the soils during the construction process.

There will be some permanent loss of land as a result of an increased footprint of raised flood embankments and footprint of new embankments. Temporary and permanent land take due to the proposed works are listed in Table A12.1.

Table A12.1 Existing and Increased Footprints of New and Raised Defences

Reach	Existing Footprint (m^2)	Increased/New Footprint (m^2)	
	Permanent[1]	Temporary [7]	Permanent [8]
Sawley			
1	5,753	28,240	8,478
2	*No existing flood defence*	672	36
3	8,051	34,510	12,600
4	299	-	-
5	633	4,587	725
6	2,901	8,134	3,517
Trent Meadows			
7	*No existing flood defence*	784	N/A
8	1,073	1,955	510
9	5,148	35,650	7,394
10	2,777	12,940	4,600
11	*No existing flood defence*	24,130	1,917
12		4,280	2,422
Total	**26,635**	**155,882**	**42,199**

[7] Flood defence footprint
[8] Working area during construction

The total area of temporary loss of agricultural land during the construction works is approximately 15 ha.

Following reinstatement, the potential impacts to agriculture are as follows:

- Permanent land-value loss due to increased footprint;
- It will take one full growing season for grassland to re-establish. Topsoil will take time to recover after reinstatement, with some possible implications for crop productivity;
- A permanent easement of between 1m - 5m will be created, along which the Environment Agency will have access to carry out maintenance and monitoring operations. Land use along the easement will be restricted to protect the defence but this should not affect normal agricultural practices;
- If compaction occurs, this could adversely impact on the fertility of the land; refer to *Section A11*.

The *significance* of the *impact* has been assessed *prior to mitigation* as being **moderate adverse** and **short-term to permanent**.

Construction work may also generate dust that could impact on agricultural land beyond the physical boundaries of the site; this issue is dealt with in *Section A6*. Impacts on access rights are dealt with in *Section A3*. Particular attention will also be paid to the field drains; this issue is dealt with in *Section A8*.

A12.3.2 Operational Impacts

Impacts of Decrease in Available Floodplain

The proposed works will reduce the natural floodplain during an extreme event. The consequence of this is an increase in peak river levels in the surrounding area. The maximum increase will be 0.07m during a flood event with a 1% annual probability of occurrence. *Section 8, Volume 1* describes this impact of the scheme.

A12.4 Mitigation Measures and Monitoring

The majority of the potential agricultural impacts will occur during the construction stage. These will be minimised by careful planning, detailed consultation with the landowners/occupiers and close attention to detail during construction and reinstatement of the land.

The construction methodology which includes a number of mitigation measures is described in *Section A2*. As well as these general mitigation methods, other specific methods relating to agricultural impacts are summarised in *Section 7.13.5, Volume 1*. The key points are:

- A detailed record of the field drains will be made. It will be ensured that drainage systems outside the working areas function properly during construction. Details of the post construction drainage schemes will be agreed with the landowners/occupiers.
- Precautions will be taken to prevent livestock straying onto the working areas and possibly making contact with livestock in other fields. The working areas will be fenced with stock-proof fencing and access will be agreed with the farmers to ensure parcels of land are not isolated. All gates will be closed and all unnecessary damage to fences, hedges, walls, ditches and drainage outfalls will be avoided.
- Disturbed farm structures such as fences, hedges, ditches, culverts and water-troughs, will be reinstated as soon as possible after construction.

A12.5 Residual Impacts

Table A12.2 summarises the impacts on land use. The majority of the potential agricultural impacts will occur at the construction and reinstatement stages. The **adverse** impacts after mitigation are predominantly **short-term** and **minor** or **not significant**. The only permanent impact is the loss of agricultural land under the new/increased footprint of the defence (0.32 ha) and the creation of an easement upto 5m (0.12ha) wide. Although the land use along the easement will be restricted to protect the defences, the current agricultural practices will be able to continue.

Table A12.2 Summary of Impacts on Land Use

Effect	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
CONSTRUCTION IMPACTS			
Impact of loss of land and associated productivity	Moderate adverse and short-term to permanent	• A detailed record of the field drains will be made. Details of the post construction drainage schemes will be agreed with the landowners/occupiers. • The working areas will be fenced with stock-proof fencing and access will be agreed with the farmers to ensure parcels of land are not isolated. • Disturbed farm structures such as fences, hedges, ditches, culverts and water-troughs, will be reinstated as soon as possible after construction.	Minor adverse to not significant in short-term. Permanent loss of land under the new flood defence footprint; not significant.
OPERATIONAL IMPACTS			
Impact of decrease in available floodplain	*Refer to Section 8, Volume 1.*		

A13. USE OF NATURAL RESOURCES AND WASTE GENERATION

A13.1 Main Materials Used and Sources

A13.1.1 Fill material for embankments

During construction, the clay on the side slopes of an existing embankment would be excavated and the existing clay core benched to receive the fill material. The fill will be built up in layers using suitable fill.

Potential local sources of secondary fill have been identified for the embankment raising works. 2,600 m^3 of fill material will be required for the embankments. Discussions are ongoing to determine the volumes and availability of sources of the material.

A13.1.2 Fill material for working areas in Barton Pool

3,100 m^2 fill material is required for the temporary working areas on the edge of Barton Pool (Reach 11). It will be sourced locally from a suitable secondary source upon agreement with DWT to ensure no adverse impacts on water quality and nature conservation.

A13.1.3 Ready mixed concrete

Approximately 1,630m^3 of concrete is required for the construction of the new flood walls and foundations in Reaches 2, 3, 8 and 11.

It is difficult to source ready mixed concrete containing recycled aggregates within the Trent Valley. This is largely due to the abundance of natural aggregates. Cement replacement materials and a degree of recycled material can be incorporated into the specified design mixes. The mixes will be specified to optimise the recycled content but few suppliers are willing to offer full recycled and accredited mixes. It may be possible to source some fully recycled non-structural concrete mixes and all efforts will be made to incorporate these.

A13.1.4 Steel

The contractor currently sources most of their steel reinforcement from suppliers who produces their steel from entirely recycled materials using Electric Arc Furnaces. No sheet piles are required within this scheme area.

A13.1.5 Other materials

Primary sources of materials will be avoided, wherever possible, and all efforts will be made that any imported materials will be from recycled or secondary sources following the Environment Agency Sustainable and Ethical Procurement Objectives. Any timber will be Forestry Stewardship certified. Temporary haul road, site access and site compound materials will be reused in subsequent phases of the works to ensure that haulage journeys are reduced.

A13.1.6 Waste generation and management

There is very little waste anticipated from the proposed works and the principal waste items are listed below:

- wood, brash and root from the plantation clearance;
- general construction waste including packaging and concreting formwork;
- general waste from site offices/compounds.

All site waste is to be segregated into separate assigned skips. Where possible, it will be reused on site or recycled. For example, the broken up sections of existing walls will be used in construction of the new walls. Where this is not possible, the material will be transported off site to the nearest waste transfer site.

The Environment Agency sets specific waste targets for construction works; this is discussed in more detail in *Section 3.6, Volume 1*.

All topsoil and subsoil will be stripped prior to the works and stockpiled on site. At the end of construction, it will be replaced and, thus, none will be removed from the site.

A13.1.7 Site Waste Management Plans (SWMP)

A SWMP was completed during the outline design of the works. Waste issues will continue to be considered during the detailed design phase and fed into the specifications for implementation by the contractor. Through this, effort will continue to be made to:

- minimise the materials used;
- reduce the waste in construction;
- re-use surplus materials;
- re-cycle waste.

A14. IMPACTS IN-COMBINATION WITH OTHER KNOWN PLANS OR PROJECTS

The Sawley and Trent Meadows scheme area forms part of the wider Nottingham Trent Left Bank Scheme. The cumulative impacts of the entire scheme are described in *Section 8, Volume 1*, and include the impacts of increased peak river levels in outlying villages.

The following projects may impact on the scheme in the Sawley and Trent Meadows scheme area:

Severn Trent Pipeline

Works by Severn Trent Water to install a 12km length of water mains pipeline began in August 2006. The route of the pipeline commences at Church Wilne Water Treatment Works on the west side of the M1 and runs to the south of the proposed flood defences following the left bank of the River Trent where it crosses the river downstream of Thrumpton. It then continues along the right bank until it connects to the existing trunk main north east of Clifton.

The construction works for the pipeline will have been completed by the time works are due to commence at Sawley and Trent Meadows. A significant cumulative impact from construction activities for the two projects is, therefore unlikely. However the alignment of the pipeline and the depth to which it is installed has implications for several sites considered for habitat enhancements; refer to *Appendix F* for more details.

Widening works to A453 road

The Highways Agency is proposing widening works to the A453. A 10km section from Junction 24 of the M1 to the Crusader Roundabout in Clifton is being upgraded from single to dual carriageway by construction of a second carriageway along the south of the existing road.

The construction phase of the project is scheduled to commence in spring 2010 and to be completed in the winter of 2012 and 2013, depending on funding. A mandatory EIA will also be produced.

The A453 is the main route into south Nottingham from the M1 and there are likely to be traffic management systems in place. This may increase the number of vehicles taking an alternative route into Nottingham by going via Sawley on the B6540.

If the start date for the works for Sawley and Trent Meadows is delayed then there could be a **minor adverse** *cumulative impact* on local traffic and transport as a result of this widening project and the construction works at Sawley and Trent Meadows.

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A15. ENVIRONMENTAL ENHANCEMENTS

One of the primary objectives of the Nottingham Trent Left Bank FAS is to protect and enhance the local environment wherever possible. The following environmental enhancement opportunities will be progressed in the Sawley and Trent Meadows scheme area:

- habitat creation/restoration in and around Trent Margins pLWS;
- install otter holts along the River Trent and improvements to fisheries habitat;
- plant new hedging to improve biodiversity and provide screening to a local pumping station;
- move the footpath to the crest of the raised embankment downstream of Harrington Bridge;
- install interpretation boards at Trent Margins pLWS to highlight the areas of biodiversity interest;
- local habitat enhancement to Lock Lane Nature Reserve LWS (specifically Japanese knotweed removal);
- planting on flood embankment in Barton Pool and connection of Barton Pool to the ditch network in Trent Meadows pLWS;
- provide seating for recreational users in Trent Meadows Picnic Area;
- a new footpath adjacent to the wall through Trent Meadows pLWS;
- enhancements to Sawley Carr LWS.

These opportunities are shown in *Appendix F* and summarised on *Figures V4.1 to V4.12 in Annex 4, Volume 1*. All opportunities are subject to landowner permission and may require planning permission to be obtained.

Other Enhancements

As well as the above enhancements planned within the Sawley and Trent Meadows scheme area, there are proposals for additional ecological and recreational improvements within the River Trent floodplain; refer to *Appendix F*.

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A16. SUMMARY AND CONCLUSIONS

The Nottingham Trent Left Bank FAS will raise existing defences and, where required, construct new defences to protect approximately 16,000 homes and businesses against a flood with a 1% annual probability of occurrence.

Planning permission was received for the proposed works in the Sawley and Trent Meadows scheme area in 2007, which had been submitted with the previous ES in April 2007. Erewash BC have confirmed that new planning permission is not required for the revised scheme.

A large number of external parties have been consulted about the scheme through the Fluvial Trent Strategy, the Masterplan and Constraints Plan and the Scoping Report in 2005; the Scheme Alignment Leaflet in 2006; the original ES in April 2007. We have also held various public and private meetings with affected parties.

We plan to commence construction in the Sawley and Trent Meadows scheme area in 2009 and it is likely that the works will be completed in 2010. However, this programme is indicative only and may change during the detailed planning of the scheme.

The overriding human impact of the scheme is the permanent beneficial reduction in flood risk to over 16,000 properties, including over 7,000 in the Sawley and Trent Meadows scheme area, and some critical infrastructure. This will have a positive impact on people's health in the event of a flood. However, properties in surrounding villages could experience a maximum increase in flood levels of 0.07m during a flood event with a 1% annual probability of occurrence. There will also be 69 extra properties that will now have a 1% annual probability of flooding. Separate studies have been undertaken in the locations affected by increased flood risk and works have started to reduce flood risk in Barton in Fabis and Burton Joyce. These schemes will provide protection from a flood event with a 1% annual probability of occurrence including all 48 properties in Burton Joyce. This work is expected to be complete in 2009. Measures to protect individual properties in Gunthorpe, Bleasby and Gibsmere were undertaken in 2008. In addition further work is proposed in Hoveringham, Gunthorpe and Radcliffe on Trent. In Stoke Bardolph work is on-going to determine whether individual property protection measures can be used. All of this work will reduce the impact of the Nottingham Trent Left Bank FAS on the surrounding flood levels.

The majority of adverse impacts from the scheme will occur during this construction period and will therefore be temporary and short-term. This will include significant disturbance to the local human population during the construction period. This is a result of noise, increased traffic, road closures and reduced access to footpaths and recreational areas. This will include the full closure of Tamworth Road for a short period and the closure of the Erewash Canal. The impacts will be of most significance in the 44 properties/businesses within 50m of the proposed works in the Sawley and Trent Meadows scheme area. These include several sensitive sites such as allotments and churches. Various mitigation measures will be implemented to reduce and manage these

adverse impacts. These will include timing the works to avoid major public events, the appointment of a public liaison officer, minimising working areas, clear signage of necessary diversions and careful programming of the works.

New structures will be introduced in some locations and existing defences raised. Consequently, this will have a landscape and visual impact. The main areas subject to an adverse landscape and visual amenity impact in the Sawley and Trent Meadows scheme area are:

- The wall in the gardens at Newbery Avenue in Trent Meadows.
- A new defence through Barton Pool in Trent Meadows.

The impacts will be minimised through sensitive detailed design and by the use of appropriate cladding and planting. Where the works impact on private properties the gardens will be fully reinstated.

The main impacts on flora and fauna will result from the approximately 4ha of temporary and permanent land take in five LWS. The habitats will be reinstated and improved where possible. Locations for compensatory habitat and further enhancement measures to be delivered by the project are being agreed with DWT to ensure that there is no loss of nature conservation interest.

There are no significant residual impacts on air quality, water, land use and cultural heritage and archaeology. The impacts and the corresponding mitigation measures are summarised in more detail in Table A16.1 and set out in the EAP in *Section 13, Volume 1*. One of the Environment Agency's Framework Contractors will be used to construct the works. All such contractors have worked on a number of the Environment Agency's projects and are experienced in the construction of flood defences. They will follow the mitigation measures proposed in this ES. Therefore, overall construction impacts are considered to be minor to moderate adverse and short-term.

In line with our statutory duty to protect and enhance the local environment, several environmental enhancement opportunities have been identified in each area. The exact scope will be confirmed during detailed design and through ongoing consultation with landowners/managers and local communities. In the Sawley and Trent Meadows scheme area we aim to:

- upgrade existing footpaths and creating new footpaths along the crest of the flood embankments;
- provide additional seating in Trent Meadows Picnic Area;
- create and restore habitat within the River Trent floodplain.

The project will bring significant reduction to the flood risk in Nottingham. The impacts of the project have been assessed, which are mainly due to construction activities, and the mitigation and enhancements proposed will reduce the adverse impacts associated with the scheme. Opportunities will be taken, as far as is possible within the framework of the scheme, to enhance the natural environment and the amenity for local people.

Table A16.1 Summary of Environmental Impacts for Sawley and Trent Meadows

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
HUMAN POPULATION	**CONSTRUCTION IMPACTS**			
	Impact on local properties and businesses as a result of construction activities in close proximity	Minor to moderate adverse and short-term	• Liaise with residents and local businesses. • Notification of restricted parking at the Harrington Arms PH. • Minimise working areas in private properties. • Full reinstatement of the gardens.	Minor to moderate adverse and short-term
	Impact on local farming and commerce as a result of construction activities	Minor adverse and short-term	• Liaise with affected landowners. • Time works to ensure minimal effect on commercial use of land. • Ensure access to Grounds Farm is not disrupted by works in Reach 3. • Standard Environment Agency compensation negotiations for loss of crops and grazing will be provided.	Minor adverse and short-term
	Impact on canal moorings as a result of construction activities in close proximity	Moderate adverse and short-term	• Provide alternative canal moorings. • Widely publicised notification of closure.	Moderate adverse and short-term
	Impact on sensitive sites as a result of construction activities in close proximity	None to moderate adverse and short-term	• Liaise with the churches and their users. • No construction activities during Sawley All Saints Annual Flower Festival and other key services. • Liaise with Meadow Lane allotment holders adjacent to haul road for Reach 10, and adequate advance notification of works.	None to minor adverse and short-term

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
HUMAN POPULATION	Impacts on local recreational resources as a result of construction activities	Moderate to major adverse and short-term	• Formal closure and temporary diversion, where possible, of footpaths with clear signage. • Carry out works to the Sheetstores Flood Gates during low-season (October to January) with a break in works over the Christmas holidays.	Minor to moderate adverse and short-term, except where a permanent diversion of a PRoW is required
	OPERATIONAL IMPACTS			
	Impacts on local population as a result of the reduction in flood risk	Moderate beneficial and permanent	No mitigation required.	Moderate beneficial and permanent
	Impact of villages outside of scheme area	Moderate adverse and permanent	Refer to *Section 8, Volume 1*.	
FLORA AND FAUNA	**CONSTRUCTION IMPACTS**			
	Lock Lane LWS - Construction of new embankment.	Minor adverse and short-term to permanent	Detailed mitigation method statement to be agreed with DWT and landowner. Likely to include: • Stripping of topsoil in working areas and either re-sowing with locally harvested seed or allowing natural re-generation of grassland. • Compensatory habitat creation; refer to *Appendix F*. • Working area minimised.	Minor adverse in short-term None in the long-term
	Erewash Canal LWS - Replacement of lock gates	Minor adverse and short-term	Pollution control/good working practice. Works timed for winter when species/ plants less active/ dormant.	None

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
FLORA AND FAUNA	*Barton Pool LWS* - Site clearance and construction of wall creating barrier to faunal movement	Moderate adverse and medium-term to permanent	Detailed mitigation method statement to be agreed with DWT and landowner. Likely to include: • Areas of temporary works to be replanted • Appropriate seasonal timing of work elements • Remaining area of LWS may benefit from active management so compensatory habitat measures could include tree management and de-silting of pond.	Moderate adverse in medium-term None in long-term
	Trent Meadows pLWS - Site clearance and construction of wall creating barrier to faunal movement	No significant impact	Detailed mitigation method statement to be agreed in advance with DWT and landowner. Likely to include: • Stripping of topsoil in working areas and either re-sowing with locally harvested seed or allowing natural re-generation of grassland. • Compensatory habitat creation; refer to *Appendix F*. • Working area minimised. • Control of Japanese knotweed found in working easement. • Wall facing to be 'rough' to allow small mammals to climb over and escape floods. Access for fauna also possible over embankment to the west.	None
	Attenborough Junction Tip LWS - Site clearance and construction of new embankment	Minor adverse and short-term to permanent	Detailed mitigation method statement to be agreed in advance with DWT and landowner. Likely to include: • Stripping of topsoil in working areas and either re-sowing with locally harvested seed or allowing natural re-generation of grassland. • Compensatory habitat creation; refer to *Appendix F*.	None

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
FLORA AND FAUNA	*Trees: Woodland and standard trees* - Site clearance and construction	Minor adverse and permanent	Detailed design to retain as many trees as possible. Working width to be reduced where practical to retain trees. Retained trees to be fenced off: No works within tree canopy. BS5837 to be followed. Replacement and supplementary planting.	Minor adverse in the long-term
	Hedgerows - Site clearance and construction	No significant impact	Working width to be reduced where practical to reduce length of hedgerows affected. Hedges reinstated with mix of locally native species. Hedges generally species poor so compensatory measure to gap-up existing hedges would be beneficial.	None
	Birds - Site clearance and construction	Minor to moderate adverse and short term	Vegetation clearance to be undertaken outside of the breeding bird season. All vegetation in the temporary working areas to be reinstated. Gapping up of hedges and supplementary planting would provide additional habitat in the medium to long-term.	None
	Bats - Site clearance and construction	Minor to moderate adverse and long-term to permanent	Further survey prior to construction phase. If bats confirmed, licence to be obtained and mitigation strategy agreed with Natural England. Compensatory habitat and enhancement to include replacement planting and erection of bat boxes in local area.	Minor adverse in short-term. None in medium-term
	Otters - Construction disturbance	No significant impact	Currently no otters affected by proposed works. Pre-construction surveys to ensure no holts or resting places have been established in the interim period which could be disturbed by the works.	None
	Water voles - Construction disturbance to habitat	No significant impact	Currently no water voles present. Pre-construction surveys and if found a mitigation strategy to be agreed with Natural England.	None

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
FLORA AND FAUNA	*Invertebrates* - Site clearance and construction disturbance	Moderate adverse and medium-term	Detailed mitigation method statement to be agreed in advance with DWT and landowner. Likely to include: • Areas of temporary works to be replanted. • Pumping of Barton Pool in late summer • Remaining area of LWS would benefit from active management, so compensatory habitat measures will include tree management and de-silting of pond.	Moderate adverse in the short to medium-term None in the long-term
	OPERATIONAL IMPACTS			
	Lockington SSSI - Flood protection to the Left Bank	No significant impact	None required.	None
	Local Wildlife Sites (LWS) - Flood protection to Left Bank	No significant impact	None required.	None
	Maintenance of an easement/access adjacent to the defence.	Impacts are incorporated into construction impacts for each site above	None required.	None
NOISE AND VIBRATION	**CONSTRUCTION IMPACTS**			
	Construction site noise	Moderate to major adverse and short-term	• Temporary fixed plant to be positioned as far as practically possible away from residential properties and screened to reduce noise emissions. • Liaison with residents and local businesses. • Provision of an Environmental Clerk of Works to monitor the mitigation.	Minor to moderate adverse and short-term
	Construction traffic noise	Refer to *Section A9 Traffic & Transport*		

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
NOISE AND VIBRATION	Construction vibrations	Minor adverse and short-term	• The contractor will use plant as small as possible, in particular alongside residential properties in Reaches 2 and 8.	None
	OPERATIONAL IMPACTS			
	No significant impacts identified			
AIR QUALITY	**CONSTRUCTION IMPACTS**			
	Impact on the local environment from dust generating activities	Moderate adverse and short-term	• Provision of an Environmental Clerk of Works to monitor the mitigation. • Adhere to the CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.5.5 Volume 1*. • Refer to *Section A9.*	Minor to none and short-term
	Impact on the local environment from construction plant and vehicle emissions	Minor adverse and short-term	As above plus: • Use of alternative products, systems, or materials where practicable, such as mains electricity in preference to a diesel generator and pre-mixed materials rather than mixing on site.	None
	OPERATIONAL IMPACTS			
	No significant impacts identified			
LANDSCAPE AND VISUAL AMENITY	**CONSTRUCTION IMPACTS**			
	The introduction of new small-scale elements within the existing landscape	Moderate/Major adverse	• Cladding in materials that are characteristic to the area. • Where no cladding is proposed ensure a good concrete finish. • Planting to screen new floodwalls where appropriate.	Minor/ Moderate adverse

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
LANDSCAPE AND VISUAL AMENITY	**OPERATIONAL IMPACTS**			
	An increase in the height and overall footprint of existing embankments	Minor/Moderate adverse	Ensure raised embankments blend into their landscape setting through landform design and reinstatement grass seeding. Where it does not compromise operational requirements appropriate planting may be utilised to reduce the visual impact.	Minor/ Negligible adverse
	Foreshortening of views over existing defences to be raised and/or over new defences	Minor/Negligible adverse	No mitigation realistically possible.	Minor/ Negligible adverse
	Increased road and footpath levels that must be graded into the surrounding pavement surfaces	Minor/Moderate adverse	• Grade ramps so that a smooth road surface is achieved. • Ensure all existing access points are maintained. • Minimise disruption to existing vehicular and pedestrian movements during the construction phase.	Minor/ Negligible adverse
	Impact on existing mature trees	Moderate adverse	• Where proposed works are in close proximity to trees of high landscape value ensure the construction process minimises any damage to the root system. • Where loss of significant trees or groups of trees takes place, appropriate replacement and new planting should occur.	Moderate adverse
	Temporary diversion of existing footpaths/cycleways during construction activities	Minor adverse	• Following the completion of construction activities all Public Rights of Way to be reinstated to their former or an enhanced condition. • Where possible incorporate new footpaths alongside proposed defences that may be linked to the wider footpath network.	Minor beneficial
	Impacts on residential properties	Moderate/Major adverse	All affected areas of residential properties to be reinstated in agreement with the individual property owners.	Minor adverse
	Disturbance as a result of temporary construction activities	Moderate/Major adverse	• Where possible locate construction compounds and storage areas away from sensitive residential receptors and adjacent to suitable vehicle access points. Reinstate all areas affected by the works to their former land use.	Negligible

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
WATER	**CONSTRUCTION IMPACTS**			
	Impact on watercourses and water bodies due to pollution from construction activities	Moderate to major adverse and short-term	Adhere to the Environment Agency's Pollution Prevention Guidelines.	None
	OPERATIONAL IMPACTS			
	Impact on villages outside of the scheme area	Moderate adverse and permanent	*Refer to Section 8, Volume 1.*	
	Impact on River Trent and its floodplain	No significant impact.	None required.	None
	Impact on surface water drainage	No significant impact	None required.	None
	Impacts of maintenance activities.	No significant impact	None required.	None
	Impact on the River Erewash	No significant Impact.	None required.	None
TRAFFIC AND TRANSPORT	**CONSTRUCTION IMPACTS**			
	Impact on local roads due to construction activities.	Moderate adverse and short-term	• Develop a TMP; refer to *Section 7.10.5, Volume 1*. • Time the deliveries of materials to the main site compounds for after 09:00 and before 16:30. • Avoid using the Tenter Close access to Grounds Farm during school holidays. • Install additional signage along Meadow Lane near to Trent Meadows Amenity Area car park, to ensure access to Pasture Lane for wide/heavy loads.	Minor adverse and short-term
	Impact on local roads due to local road raising and construction.	Major adverse and short-term.	• Develop a TMP; refer to *Section 7.10.5, Volume 1*. • Timing of closure of Tamworth Road to be restricted to the school holidays and weekends where possible.	Moderate to major adverse and short-term

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
	Impact on operation of railway network due to construction works adjacent to railway line.	Moderate adverse and short-term	• All approvals obtained from Network Rail. Possessions appropriately timed to minimise impact on rail network.	Minor adverse and short-term
	OPERATIONAL IMPACTS			
	Impact of new and raised defences on local transport infrastructure	Moderate beneficial and permanent.	None required.	Moderate beneficial and permanent
CULTURAL HERITAGE AND ARCHAEOLOGY	**CONSTRUCTION IMPACTS**			
	Impact on archaeology due to construction activities	Minor to moderate adverse and permanent	• A detailed mitigation strategy agreed with archaeological officers and English Heritage. • Adhere to CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.11.5, Volume 1.*	None
	OPERATIONAL IMPACTS			
	Impact on the historic environment as a result of the reduction in flood risk	Minor beneficial and permanent	No mitigation required.	Minor beneficial and permanent
SOIL, GEOLOGY AND HYDROGEOLOGY	**CONSTRUCTION IMPACTS**			
	Compaction of soil structure due to construction activities	Minor adverse and medium-term	• Restoration of ground conditions following completion of works e.g. rotovating and stripping the topsoil in advance of the works, careful storage during the works and reinstatement on completion. • Adhere to the CIRIA Guidelines 'Environmental Good Practice on Site'(2005); refer to *Section 7.12.5, Volume 1.*	None

Receptor	Impact Description	Magnitude and Significance of Impact before Mitigation	Mitigation Measures	Residual Impact
	Contamination of soil and groundwater due to construction	Minor adverse and short-term	• Follow Environment Agency's 'Policy and Practice for the Protection of Groundwater. • Adhere to the CIRIA Guidelines 'Environmental Good Practice on Site' (2005); refer to *Section 7.9.5, Volume 1*.	None
	OPERATIONAL IMPACTS			
	No significant impacts identified			
LAND USE	**CONSTRUCTION IMPACTS**			
	Impact of loss of land and associated productivity	Moderate adverse and short-term to permanent	• A detailed record of the drains in a field will be made. Details of the post construction drainage schemes will be agreed with the landowners/occupiers. • The working areas will be fenced with stock-proof fencing and access will be agreed with the farmers to ensure parcels of land are not isolated. • Disturbed farm structures such as fences, hedges, ditches, culverts and water-troughs, will be reinstated as soon as possible after construction.	Minor adverse to none in short-term None in long-term
	OPERATIONAL IMPACTS			
	Impact of decrease in available floodplain	*Refer to Section 8, Volume 1 and Human Population.*		

ANNEX A1
Botanical Survey Maps

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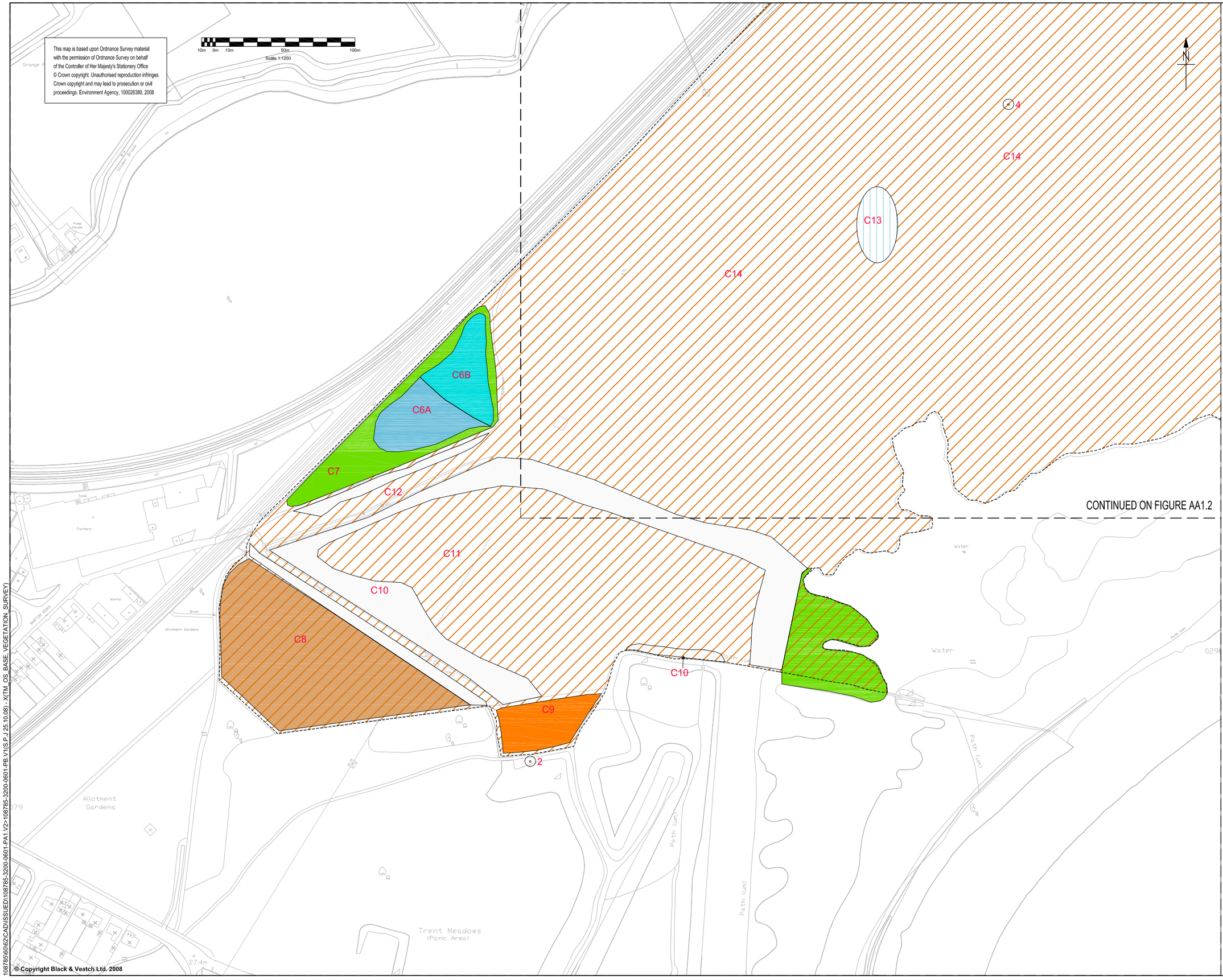

Drawing No. 108785-3200-0601 | Cad Ref | Rev. PB

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

KEY TO VEGETATION COMMUNITIES

- A2 Lemna minor community
- MG1 Arrhenatherum elatius grassland
- MG1a Arrhenatherum elatius grassland
- MG1b Arrhenatherum elatius grassland
- MG1 Arrhenatheum elatius grassland / MG4 Alopecurus pratensis grassland transition
- MG5 Cynosurus cristatus - Centaurea nigra grassland
- MG6b Lolium perenne - Cynosurus cristatus grassland
- MG7a Lolium perenne -Trifolium repens leys
- MG7e Lolium perenne - Plantago lanceolata grassland
- MG9 Holcus lanatus - Deschampsia cespitosa grassland
- OV24 Urtica dioica - Galium aparine community
- OV26 Epilobium hirsutum community
- OV26c Epilobium hirsutum community
- S4 Phragmites australis swamp and reed-beds
- S5 Glyceria maxima swamp
- S5a Glyceria maxima swamp
- S6 Carex riparia swamp
- S12 Typha latifolia swamp
- S12a Typha latifolia swamp
- S14 Sparganium erectum swamp
- S14 Sparganium erectum swamp / S15 Acorus calamus swamp transition
- S28 Phalaris arundinacea swamp
- W2 Salix cinerea - Betula pubescens - Phragmites australis woodland
- W6 Alnus glutinosa- Urtica dioica woodland
- W6b Alnus glutinosa- Urtica dioica woodland
- W21a Crataegus monogyna- Hedera helix scrub
- W24 Rubus fruticosus-Holcus lanatus underscrub
- W24a Rubus fruticosus- Holcus lanatus underscrub
- Dense scrub (other)
- Grassland - tall herb mosaic
- Tall herb vegetation
- Tall ruderal-grassland-scrub mosaic

C1 SAMPLE CODE

SURVEY BOUNDARY

1 TARGET NOTE

Rev	Drawn	Checked	Reviewed	Date	Description
PB	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	CJa	Date:	FEB.07
Drawn by:	SPJ	Date:	FEB.07
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

Environment Agency

Client drawing No. | Revision

BLACK & VEATCH
Black & Veatch Limited
38 City Road, Chester, CH1 3AE. United Kingdom
Tel: +44(0)1244 304100 E-mail: bvcs@bv.com

Project
NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title
FIGURE AA1.1
TRENT MEADOWS
BOTANICAL SURVEY - SHEET 1 OF 2

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:1250	Sheet size:	A1

Drawing No. 108785 — 3200 — 0601 | Revision PB

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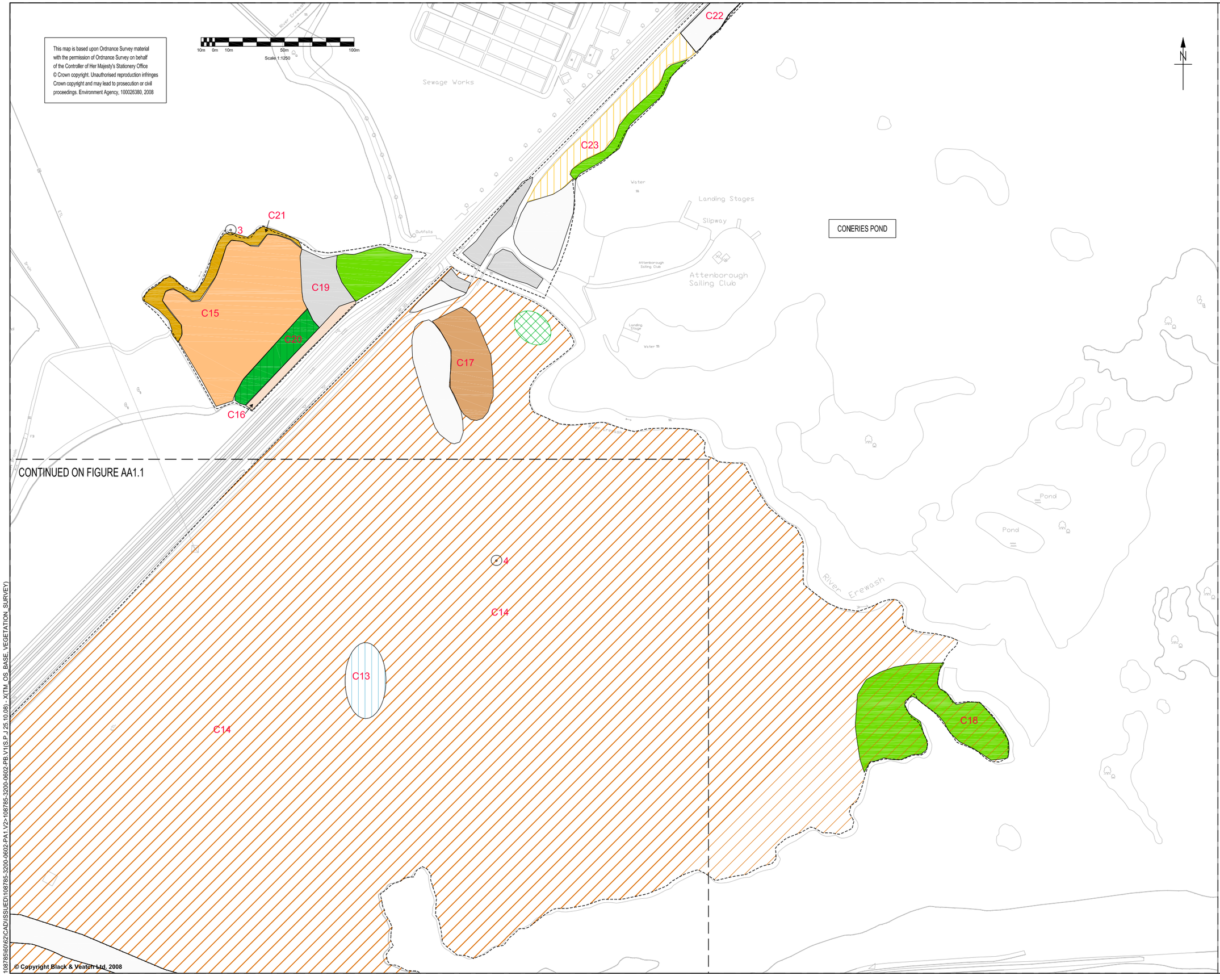

Drawing No.	Cad Ref	Rev.
108785-3200-0602		PB

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

KEY TO VEGETATION COMMUNITIES

- A2 Lemna minor community
- MG1 Arrhenatherum elatius grassland
- MG1a Arrhenatherum elatius grassland
- MG1b Arrhenatherum elatius grassland
- MG1 Arrhenatheum elatius grassland / MG4 Alopecurus pratensis grassland transition
- MG5 Cynosurus cristatus - Centaurea nigra grassland
- MG6b Lolium perenne - Cynosurus cristatus grassland
- MG7a Lolium perenne -Trifolium repens leys
- MG7e Lolium perenne - Plantago lanceolata grassland
- MG9 Holcus lanatus - Deschampsia cespitosa grassland
- OV24 Urtica dioica - Galium aparine community
- OV26 Epilobium hirsutum community
- OV26c Epilobium hirsutum community
- S4 Phragmites australis swamp and reed-beds
- S5 Glyceria maxima swamp
- S5a Glyceria maxima swamp
- S6 Carex riparia swamp
- S12 Typha latifolia swamp
- S12a Typha latifolia swamp
- S14 Sparganium erectum swamp
- S14 Sparganium erectum swamp / S15 Acorus calamus swamp transition
- S28 Phalaris arundinacea swamp
- W2 Salix cinerea - Betula pubescens - Phragmites australis woodland
- W6 Alnus glutinosa- Urtica dioica woodland
- W6b Alnus glutinosa- Urtica dioica woodland
- W21a Crataegus monogyna- Hedera helix scrub
- W24 Rubus fruticosus-Holcus lanatus underscrub
- W24a Rubus fruticosus- Holcus lanatus underscrub
- Dense scrub (other)
- Grassland - tall herb mosaic
- Tall herb vegetation
- Tall ruderal-grassland-scrub mosaic

C1 SAMPLE CODE

SURVEY BOUNDARY

1 TARGET NOTE

Rev	Drawn	Checked	Reviewed	Date	Description
PB	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	CJa	Date:	FEB.07
Drawn by:	SPJ	Date:	FEB.07
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

Environment Agency

Client drawing No. | Revision

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Project

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title

FIGURE AA1.2
TRENT MEADOWS
BOTANICAL SURVEY - SHEET 2 OF 2

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:1250	Sheet size:	A1

Drawing No. 108785 — 3200 — 0602 | Revision PB

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ANNEX A2
Options Assessment

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Annex 2 –Alignment Options Matrix for Sawley and Trent Meadows

Matrix 1 – Flood Defence Alignments considered at Scoping Stage

FLOOD ALLEVIATION ALIGNMENT	IMPACTS ON RECEPTORS																		
	TECHNICAL			LANDSCAPE		HUMAN POPULATION			TRAFFIC & TRANSPORT		ARCHAEOLOGY & CULTURAL HERITAGE		FLORA & FAUINA	WATER		OTHER CONSIDERATIONS			
	RAISING/ REFURBISHMENT OF EXISTING DEFENCE?	REQUIREMENT FOR FLOODGATES/ DEMOUNTABLE ACCESS?	IMPACT ON EXISTING SERVICES	ADVERSE IMPACT ON EXISTING TREES	IMPACTS ON LANDSCAPE	DISTURBANCE TO RESIDENTIAL/ COMMERCIAL PROPERTIES	DISRUPTION TO RECREATION/ PUBLIC AMENITY AREAS	IMPACT ON EXISTING PUBLIC RIGHTS OF WAY	IMPACT ON EXISTING HIGHWAYS	IMPACTS ON TRAFFIC/ TRANSPORT	DISTURBANCE TO ARCHAEOLOGICAL INTEREST, SCHEDULED MONUMENTS	IMPACT TO CULTURAL HERITAGE, INCLUDING LISTED BUILDINGS, CONSERVATION AREAS	IMPACT ON ECOLOGICAL SITES (SSSI, LWSS) AND PROTECTED SPECIES	POLLUTION RISK TO WATER BODIES DURING CONSTRUCTION	INCREASE IN AVAILABLE FLOODPLAIN	OPPORTUNITY OF ENVIRONMENTAL ENHANCEMENT	IMPACT ON EXISTING STRUCTURES	USE OF NATURAL RESOURCES	OPTION TAKEN FORWARD
Sawley Tamworth Road Area (Reach 2)																			
Option A – Defence between Harrington Arms and 396 Tamworth Road	No	No	✖✖	✖	✖	✖✖	N/S	✖	✖✖✖	✖✖✖	N/S	N/S	✖	✖	N/S	N/S	✖	✖	Y
Option B – Defence around 396 and 398 Tamworth Road	No	No	✖	✖	✖✖	✖	N/S	✖	✖✖	✖✖	N/S	N/S	✖	✖	✓✓	N/S	✖	✖✖	N
Option C – Defence to tie into Harrington Bridge	No	No	✖	✖	✖✖✖	✖	N/S	✖	N/S	N/S	✖✖✖	✖✖✖	✖✖	✖	✓✓✓	N/S	✖✖	✖✖✖	N
Trent Meadows to Barton Pool LWS (Reaches 10 and 11)																			
Option B *(Raise existing, embankment around reserve perimeter)*	Yes	No	✓✓	✓✓	N/S	N/S	✖	✖	N/S	N/S	N/S	✖✖	✖✖✖	✖✖	✖	✓	N/S	✖	N
Option C *(Straight embankment from Trent Meadows to railway embankment)*	No	No	✖✖	✓✓	N/S	N/S	✖	✖	N/S	N/S	N/S	✖✖	✖✖✖	✖	✖✖	✓	N/S	✖	N
Option A *(Embankment through LWS)*	Yes	No	✓✓	✖✖	N/S	N/S	✖	✖	N/S	N/S	N/S	✖	✖✖	✖✖	✖	✓	N/S	✖	Y

Notes

1. For further details of the Scoping Report and alignments refer to Section A2.5.
2. This Matrix is by no means exhaustive and should be used as a comparative summary of the alignments considered during the early phases of the Project.

Key

Significant of Impact

✓	Minor Positive	✓✓	Moderate Positive	✓✓✓	Major Positive	**N/S**	No Significant Impact
✖	Minor Negative	✖✖	Moderate Negative	✖✖✖	Major Negative		

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ANNEX A3
Figures

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ENVIRONMENTAL CONSTRAINTS LEGEND

- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- LOCAL WILDLIFE SITE (LWS) / SITE OF INTEREST FOR NATURE CONSERVATION (SINC)
- LOCAL NATURE RESERVE
- ER037 LWS REFERENCE NUMBER AND NAME
- CONSERVATION AREA
- REGISTERED / HISTORIC PARKS AND GARDENS
- TREE PRESERVATION ORDER
- SMR / ARCHAEOLOGICAL CONSTRAINT *
- SMR / ARCHAEOLOGICAL CONSTRAINT AREA *
- SCHEDULED MONUMENT AREA
- PUBLIC RIGHT OF WAY
- 4 PUBLIC RIGHT OF WAY REFERENCE NUMBER
- CYCLE PATH
- LISTED BUILDING
- WATER VOLE BURROW (DESK STUDY RECORD)
- OTTER (DESK STUDY RECORD)
- GREAT CRESTED NEWT (DESK STUDY)
- BAT RECORD (DESK STUDY)
- COUNTY RARE PLANT SPECIES (DESK STUDY RECORD)
- COUNTY SCARCE PLANT SPECIES (DESK STUDY RECORD)
- JAPANESE KNOTWEED
- HIMALAYAN BALSAM
- GIANT HOGWEED
- NEW FOOTPATH

* ONLY SITES POTENTIALLY AFFECTED BY THE SCHEME SHOWN

PHASE 1 HABITAT SURVEY LEGEND

BOUNDARIES

- FENCE
- INTACT HEDGE (NATIVE SPECIES-RICH)
- INTACT HEDGE (SPECIES-POOR)
- HEDGE AND TREES (NATIVE SPECIES-RICH)
- DRY DITCH

OPEN WATER

- STANDING WATER
- RUNNING WATER

WOODLAND AND SCRUB

- CONTINUOUS SCRUB
- SCATTERED SCRUB
- SEMI-NATURAL BROADLEAVED WOODLAND

TALL HERB AND FERN

- TALL RUDERAL

MISCELLANEOUS

- A ARABLE

GRASSLAND AND MARSH

- UNIMPROVED ACID GRASSLAND
- SI SEMI-IMPROVED ACID GRASSLAND
- UNIMPROVED NEUTRAL GRASSLAND
- SI SEMI-IMPROVED NEUTRAL GRASSLAND
- I IMPROVED GRASSLAND
- MARSHY GRASSLAND
- SI SPECIES POOR SEMI-IMPROVED GRASSLAND

ENGINEERING LEGEND

- WALL
- SHEET PILING
- EMBANKMENT
- DRAINAGE
- LINE OF HIGH GROUND
- TEMPORARY EASEMENT / WORKING AREA
- ACCESS ROUTE
- CROSS SECTION

TREE SURVEY LEGEND

- T1 TREE SURVEY REFERENCE
- G1 TREE SURVEY REFERENCE (GROUP OF TREES)
- T2 TREE TO BE LOST
- G2 GROUP OF TREES TO BE LOST
- H2 SECTION OF HEDGE TO BE LOST
- T INDIVIDUAL OR SMALL GROUP OF TREES
- G GROUP OF TREES

NOTES

1. THE AMOUNT THAT EXISTING DEFENCES NEED TO BE RAISED IN mm, IN A PARTICULAR AREA IS DENOTED BY THE CLEAR BOXED NUMBER, e.g. 150 . THE EXISTING AVERAGED HEIGHT OF THE DEFENCE (IN mm) IS DENOTED BY THE BLACK BOXED NUMBER, e.g. 1700 .
2. EXACT LOCATION OF SITE COMPOUNDS TO BE AGREED.

Environment Agency

							Name	Date
PE	UPDATED ENVIRONMENTAL STATEMENT	SPJ	EAS	SGB	OCT.08	Drawn:	SPJ	SEP.06
PD	UPDATED ENVIRONMENTAL STATEMENT	SPJ	CJe	EAS	AUG.08	Checked:	EAS	MAR.07
Rev.	Nature of revision	Drawn	Check	Review	Date	Reviewed:	PSm	MAR.07

NOTTINGHAM TRENT LEFT BANK FAS

ENVIRONMENTAL STATEMENT

BLACK & VEATCH Black & Veatch Limited

Drawing no. 108785-3000-0001-PE

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DERBYSHIRE COUNTY / EREWASH BOROUGH

SHEETSTORES FLOOD GATES

TRENT FARM

REACH 5 & 6

ER905

ER061 Lock Lane Nature Reserve

ER150 Erewash Canal

ER082

ER083

ER081

ER080

ER062

ER159

ER063

REACH 1

OLD SAWLEY VILLAGE

ROMAN FORT SCHEDULED MONUMENT

DR228

REACH 2

REACH 3

REACH 4

ER037 Sawley Carr

ER056

M1

WATER VOLES (SITE VISIT 2006)

ER056 Trent Lock Margins (Candidate)

TRENT LOCK

HARRINGTON BRIDGE

SAWLEY VIADUCT

Lockington Marshes SSSI

Church Wlne Reservoir

Drawing No. 108785-3100-0002 | Cad Ref | Rev. PD

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

LEGEND

- FLOOD DEFENCE LINE
- EXTENT OF REACH
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- LOCAL WILDLIFE SITE (LWS)
- LOCAL NATURE RESERVE
- ER037 LWS REFERENCE NUMBER AND NAME
- PUBLIC RIGHT OF WAY
- 4 PUBLIC RIGHT OF WAY REFERENCE NUMBER
- CYCLE PATH
- CONSERVATION AREA
- LISTED BUILDING
- SCHEDULED MONUMENT AREA
- MAIN RIVER
- WATER VOLE BURROW (DESK STUDY RECORD)
- OTTER (DESK STUDY RECORD)
- GREAT CRESTED NEWT SITE (DESK STUDY RECORD)
- BAT SITE (DESK STUDY RECORD)
- COUNTY RARE PLANT SPECIES (DESK STUDY RECORD)
- COUNTY SCARCE PLANT SPECIES (DESK STUDY RECORD)
- JAPANESE KNOTWEED
- HIMALAYAN BALSAM
- GIANT HOGWEED
- STUDY AREA (FLOOD PLAIN WITH 1% ANNUAL FLOODING PROBABILITY)

* ONLY SITES POTENTIALLY AFFECTED BY THE SCHEME SHOWN

Scale 1:5000 (100m 0m 100m 200m 300m)

Rev	Drawn	Checked	Reviewed	Date	Description
PD	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	AUG.06
Drawn by:	SPJ	Date:	AUG.06
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client: Environment Agency

Client drawing No. | Revision

BLACK & VEATCH
Black & Veatch Limited
38 City Road, Chester, CH1 3AE. United Kingdom
Tel: +44(0)1244 304100 E-mail: bvcs@bv.com

Project: NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title: FIGURE AA3.1 SAWLEY AND TRENT MEADOWS OVERVIEW - SHEET 1 OF 2

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:5000	Sheet size:	A1

Drawing No. 108785 — 3100 — 0002 | Revision PD

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EAST OF RIVER EREWASH IS ATTENBOROUGH, EREWASH AND RYLANDS SCHEME AREA

NOTTINGHAMSHIRE COUNTY / BROXTOWE BOROUGH

DERBYSHIRE COUNTY / EREWASH BOROUGH

ER198 Attenborough Pastures

Attenborough SSSI

RIVER EREWASH (FORMS COUNTY BOUNDARY)

GOLDEN BROOK

ER076 Attenborough Junction Tip

ERR6559 Trent Meadows (Potential)

ER075 Barton Pool

ER076 Attenborough West Gravel Pits

REACH 12

REACH 11

REACH 10

REACHES 7, 8 & 9

ER133

HOME FARM

ER134 Forbes Hole LNR

NEWBERY AVENUE

RIVER TRENT

ER082

ER083

ER150 Erewash Canal

ER081

ER077

29922

N

LEGEND

- FLOOD DEFENCE LINE
- EXTENT OF REACH
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- LOCAL WILDLIFE SITE (LWS)
- LOCAL NATURE RESERVE
- ER037 LWS REFERENCE NUMBER AND NAME
- PUBLIC RIGHT OF WAY
- 4 PUBLIC RIGHT OF WAY REFERENCE NUMBER
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- BAT SITE (DESK STUDY RECORD)
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- COUNTY SCARCE PLANT SPECIES (DESK STUDY RECORD)
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- GIANT HOGWEED
- STUDY AREA (FLOOD PLAIN WITH 1% ANNUAL FLOODING PROBABILITY)

* ONLY SITES POTENTIALLY AFFECTED BY THE SCHEME SHOWN

100m 0m 100m 200m 300m

Scale 1:5000

Rev	Drawn	Checked	Reviewed	Date	Description
PD	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	AUG.06
Drawn by:	SPJ	Date:	SEP.06
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

Environment Agency

Client drawing No. | Revision

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Project

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title

FIGURE AA3.2
SAWLEY AND TRENT MEADOWS
OVERVIEW - SHEET 2 OF 2

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:5000	Sheet size:	A1

Drawing No. 108785 — 3200 — 0002 | Revision PD

Drawing No. 108785-3200-0002 | Cad Ref | Rev. PD

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

108785\60\622\CAD\ISSUED\108785-3200-0002-PC1.V2>108785-3200-0002-PD.V1(S.P.J 24.10.08)

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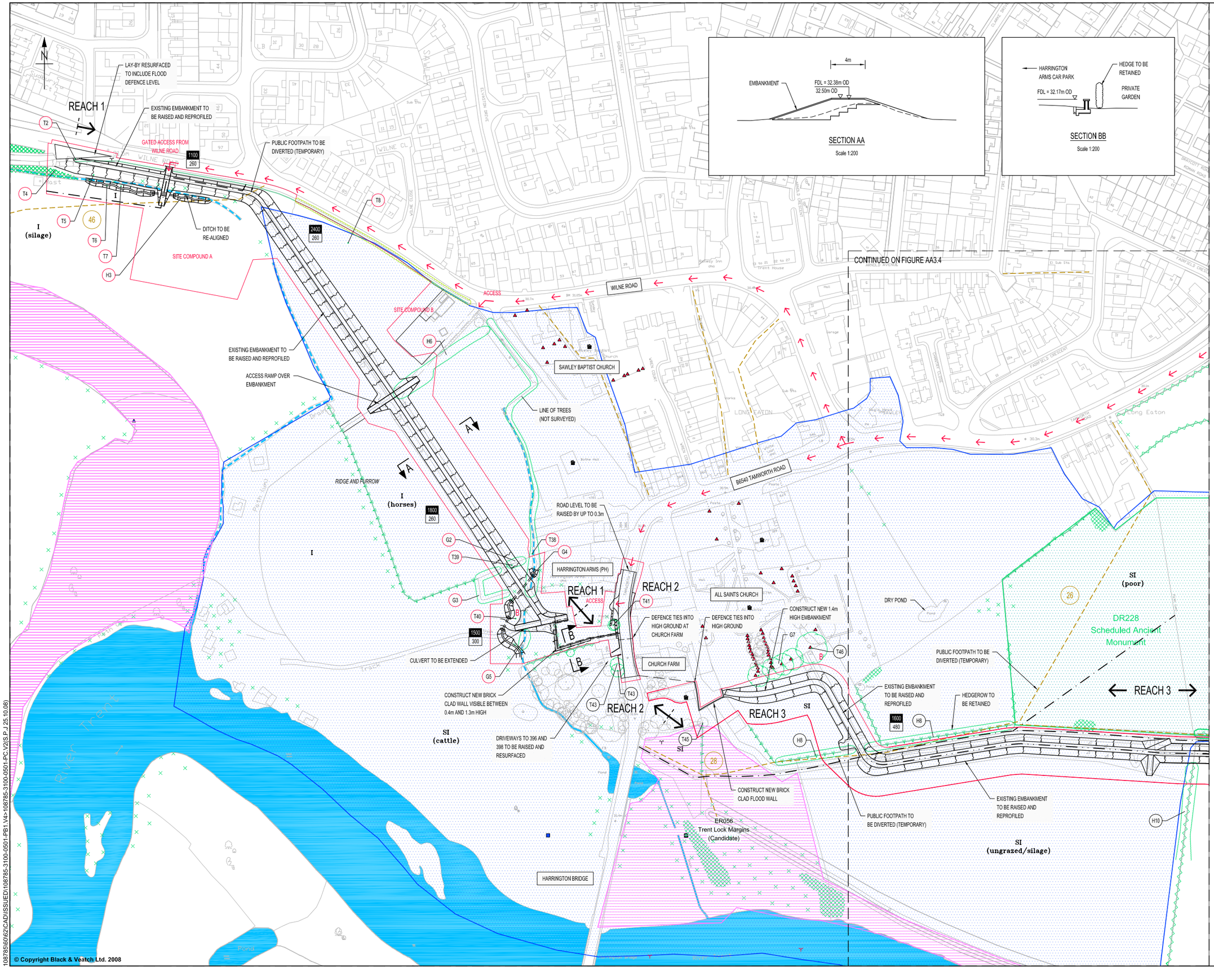

SECTION AA

Scale 1:200

SECTION BB

Scale 1:200

NOTE

1. REFER TO Drg. No. 108785-3000-0001 FOR LEGEND.

Scale 1:200

Scale 1:1250

Rev	Drawn	Checked	Reviewed	Date	Description
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	JAN.07
Drawn by:	SPJ	Date:	JAN.07
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

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Project

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title

FIGURE AA3.3
SAWLEY
GENERAL ARRANGEMENT - SHEET 1 OF 3

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:200 1:1250	Sheet size:	A1

Drawing No. 108785 — 3100 — 0501 | Revision PC

Drawing No. 108785-3100-0501 | Cad Ref | Rev. PC

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

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Drawing No.	Cad Ref	Rev.
108785-3100-0502		PC

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

NOTE

1. REFER TO Drg. No. 108785-3000-0001 FOR LEGEND.

SI (ungrazed)

SI (cattle)

SI (poor)

SI (ungrazed/silage)

SI (ungrazed/silage)

SI (ungrazed)

SI (cattle)

DR228 Scheduled Ancient Monument

REACH 3

REACH 4 (GROUNDS FARM)

LOCK LANE

TRACK TO BE RESURFACED AND HAVE PASSING PLACES ADDED

ACCESS

TRENT LOCK GOLF COURSE

SITE COMPOUND C

DRY POND

PUBLIC FOOTPATH TO BE DIVERTED (TEMPORARY)

EXISTING EMBANKMENT TO BE RAISED AND REPROFILED

HEDGEROW TO BE RETAINED

FOOTPATH TO BE DIVERTED (TEMPORARY)

VEHICULAR ACCESS TO BE RETAINED

CULVERT TO BE REPLACED

DEFENCE TIES INTO RAILWAY EMBANKMENT

SAWLEY VIADUCT

GROUNDS FARM

GOLF COURSE

CONTINUED FIGURE AA3.3

4m

EMBANKMENT

FDL = 31.61m OD

31.71m OD

SECTION CC

Scale 1:200

Scale 1:200

Scale 1:1250

Rev	Drawn	Checked	Reviewed	Date	Description
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	JAN.07
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Project

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title

FIGURE AA3.4
SAWLEY
GENERAL ARRANGEMENT - SHEET 2 OF 3

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:200 1:1250	Sheet size:	A1

Drawing No. 108785 — 3100 — 0502 | Revision PC

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ER150
Erewash Canal

REFURBISH / REPLACE
EXISTING GATES

CONSTRUCT NEW 0.7m
HIGH EMBANKMENT TO TIE
INTO RAILWAY EMBANKMENT

REACH 5 (SHEETSTORES FLOOD GATES)

CONSTRUCT NEW 1.1m
HIGH EMBANKMENT

REACH 6 (TRENT FARM)

G11
T54
G13
G10
T55

SITE COMPOUND D

SITE
COMPOUND D

TRENT FARM

ER061
Lock Lane
Nature Reserve

TEMPORARY CROSSING
OF EREWASH CANAL
REQUIRED FOR ACCESS

MOORINGS

33

1500
230

CULVERT TO
BE EXTENDED

PUBLIC FOOTPATH TO BE
DIVERTED (PERMANENTLY)

EXISTING EMBANKMENT
TO BE RAISED AND
REPROFILED

ACCESS RAMP TO
BE RETAINED

36

PUBLIC FOOTPATH
TO BE DIVERTED
(TEMPORARY)

ACCESS FROM
LOCK LANE

SI
(ungrazed/silage)

SI
(ungrazed/silage)

SI
(ungrazed/silage)

SI
(ungrazed)

ER150
Erewash Canal

LOCK LANE

54

38

39

Golf Course

Pond

Gantry

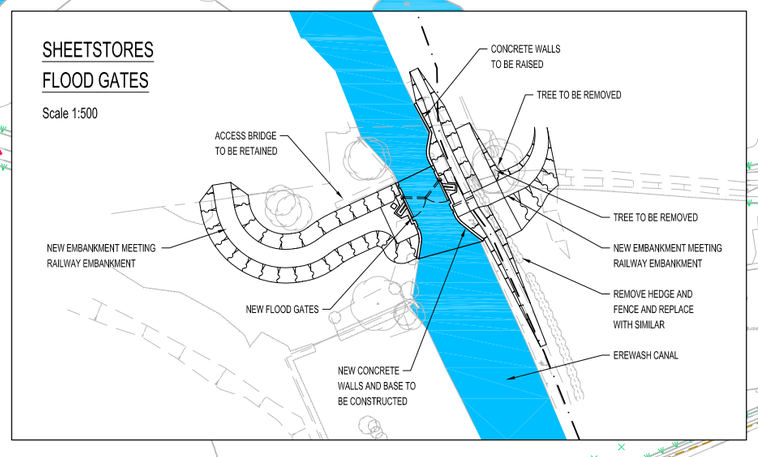
LONG EATON

MP .25

SPS

SHEETSTORES FLOOD GATES

Scale 1:500



NOTE

1. REFER TO Drg. No. 108785-3000-0001 FOR LEGEND.

10m 0m 10m 20m 30m
Scale 1:500

10m 0m 10m 50m 100m
Scale 1:1250

Rev	Drawn	Checked	Reviewed	Date	Description
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

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38 City Road, Chester, CH1 3AE. United Kingdom
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Project
NOTTINGHAM TRENT LEFT BANK
FLOOD ALLEVIATION SCHEME

Drawing title
FIGURE AA3.5
SAWLEY
GENERAL ARRANGEMENT - SHEET 3 OF 3

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:500 1:1250	Sheet size:	A1

Drawing No. 108785 — 3100 — 0503 | Revision PC

Cad Ref

Drawing No. 108785-3100-0503 | Rev. PC

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

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ACCESS TO REACH 10 VIA ALLOTMENT SITE

MEADOW LANE

TRENT MEADOWS PICNIC AREA

ER133

CONTINUED ON FIGURE AA3.7

TRENT LANE

NEWBERY AVENUE

OWEN AVENUE

JUNCTION ROAD

ACCESS FROM TRENT LANE

REACH 7

REACH 8

REACH 8

REACH 9

REACH 9

PASTURE LANE

HOME FARM

TURNING AREA FOR INSPECTION VEHICLES

DEFENCE TIES INTO HIGH GROUND

PUBLIC FOOTPATH TO BE DIVERTED (TEMPORARY)

FLOOD DEFENCE LINE (HIGH GROUND)

EXISTING EMBANKMENT TO BE RAISED

EXISTING EMBANKMENT TO BE RAISED. SIDE SLOPES TO BE RETAINED

SITE COMPOUND F

SITE COMPOUND E

ACCESS

CONSTRUCT NEW 1.0m HIGH EMBANKMENT ACROSS DITCH

ACCESS

RAILWAY EMBANKMENT ACTS AS FLOOD DEFENCE

ROAD LEVEL TO BE RAISED BY 0.1m

'NEW SAWLEY BROOK' PUMPING STATION

EXISTING EMBANKMENT TO BE REMOVED AND REPLACED WITH NEW 1.5m HIGH FLOOD WALL

EXISTING EMBANKMENT TO BE RAISED AND REPROFILED

NEW SAWLEY BROOK

EXISTING EMBANKMENT TO BE RAISED AND REPROFILED. SIDE SLOPES TO BE RETAINED

EXISTING EMBANKMENT TO BE RAISED. SIDE SLOPES TO BE RETAINED

ROAD LEVEL TO BE RAISED BY 0.04m

I (unmanaged)

I (grazed)

I (grazed)

SI

SI

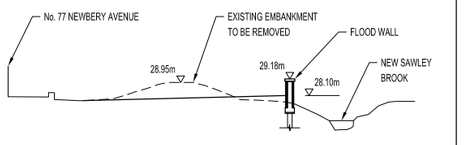
I

I

I

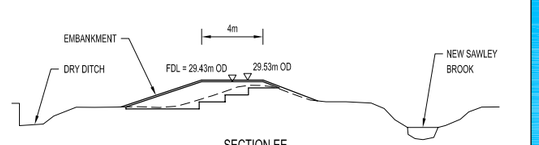
SECTION DD

Scale 1:200



SECTION EE

Scale 1:200



Drawing No.	Cad Ref	Rev.
108785-3200-0501		PC

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

NOTE

1. REFER TO Drg. No. 108785-3000-0001 FOR LEGEND.

5m 0m 5m 10m

Scale 1:200

10m 0m 10m 50m 100m

Scale 1:1250

Rev	Drawn	Checked	Reviewed	Date	Description
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	JAN.07
Drawn by:	SPJ	Date:	JAN.07
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

Environment Agency

Client drawing No.	Revision

BLACK & VEATCH
Black & Veatch Limited
38 City Road, Chester, CH1 3AE. United Kingdom
Tel: +44(0)1244 304100 E-mail: bvcs@bv.com

Project

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title

FIGURE AA3.6
TRENT MEADOWS
GENERAL ARRANGEMENT - SHEET 1 OF 3

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:200 1:1250	Sheet size:	A1

Drawing No.	Revision
108785 — 3200 — 0501	PC

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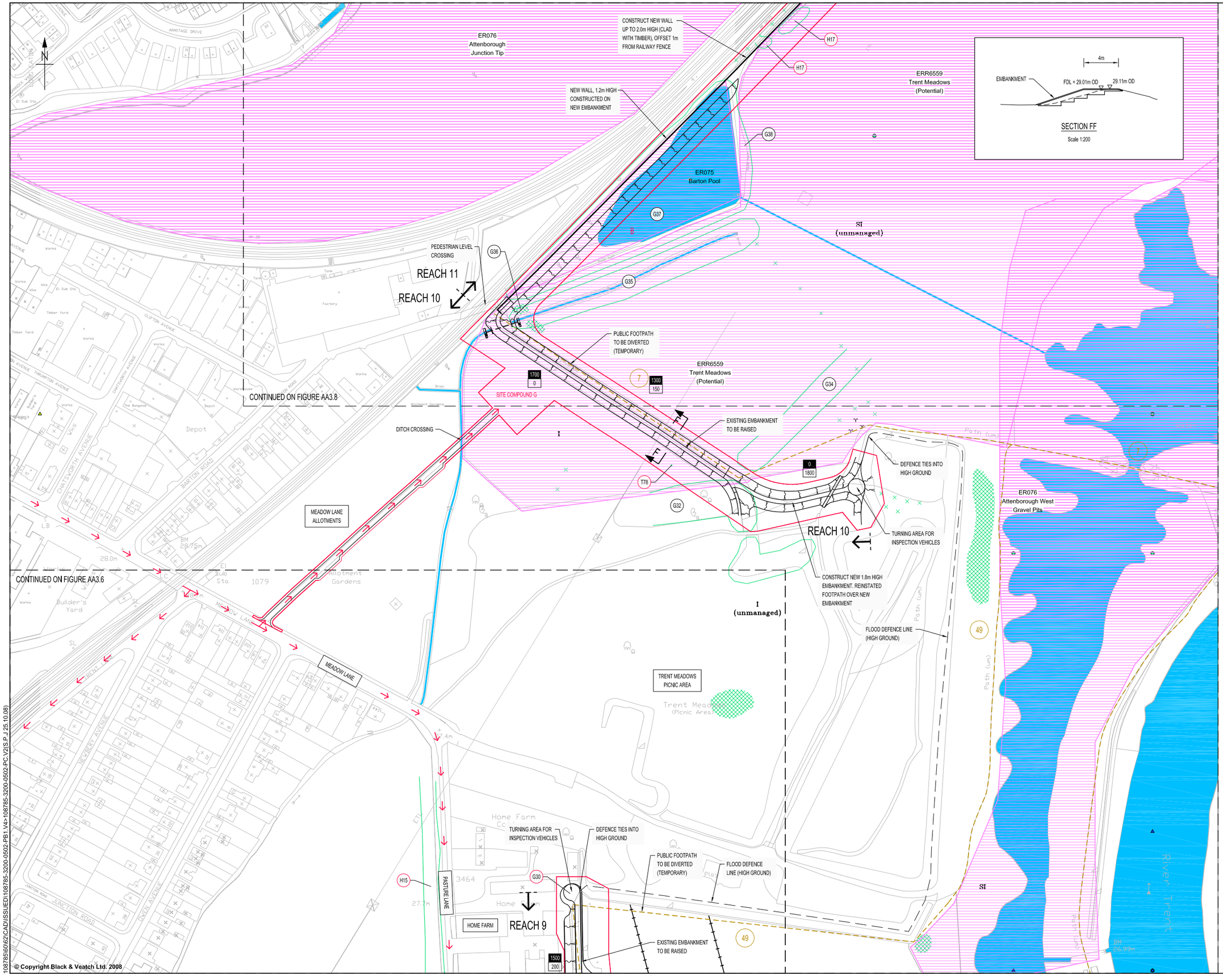

Drawing No. 108785-3200-0502 | Cad Ref | Rev. PC

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

NOTE

1. REFER TO Drg. No. 108785-3000-0001 FOR LEGEND.

Scale 1:200

Scale 1:1250

Rev	Drawn	Checked	Reviewed	Date	Description
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	JAN.07
Drawn by:	SPJ	Date:	JAN.07
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

Environment Agency

Client drawing No. | Revision

BLACK & VEATCH
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Project
NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title
FIGURE AA3.7
TRENT MEADOWS
GENERAL ARRANGEMENT - SHEET 2 OF 3

Approved by:	EAST	Date:	OCT.08
Drawing scale:	1:200 1:1250	Sheet size:	A1

Drawing No. 108785 — 3200 — 0502 | Revision PC

I:\108785\60\62\CAD\ISSUED\108785-3200-0502-PB1.V4>108785-3200-0502-PC.V2(S.P.J 25.10.08)

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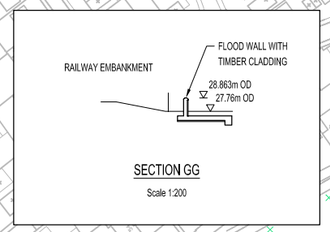

SECTION GG

Scale 1:200

I
(ungrazed)

GOLDEN BROOK

ER076
Attenborough Pastures

FLOOD WALL TIES INTO BRIDGE ABUTMENT

NEW FLOOD EMBANKMENT TIES INTO EXISTING RAILWAY EMBANKMENT

REACH 12

REACH 11

NEW FLOOD EMBANKMENT TIES INTO EXISTING HIGH GROUND

ACCESS FROM GOLDEN BROOK PUMPING STATION

STORAGE AREA H

CONSTRUCT NEW EMBANKMENT UP TO 1.7m HIGH, WITH 4m CREST

CONSTRUCT NEW WALL UP TO 2.0m HIGH (CLAD WITH TIMBER), OFFSET 1m FROM RAILWAY FENCE

COUNTY BOUNDARY

RIVER EREWASH

ER076
Attenborough West

ER076
Attenborough
Junction Tip

ERR6559
Trent Meadows
(Potential)

CONSTRUCT NEW WALL UP TO 2.0m HIGH (CLAD WITH TIMBER), OFFSET 1m FROM RAILWAY FENCE

NEW WALL, 1.5m HIGH CONSTRUCTED ON NEW EMBANKMENT

ER075
Barton Pool

St
(unmanaged)

LEVEL CROSSING

REACH 11

REACH 10

PUBLIC FOOTPATH TO BE DIVERTED (TEMPORARY)

SITE COMPOUND G

CONTINUED ON FIGURE AA3.7

10785\60\62\CAD\ISSUED\108785-3200-0503-PC1.V2>108785-3200-0503-PD.V1(S.P.J 25.10.08)

Drawing No. 108785-3200-0503 | Cad Ref | Rev. PD

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

NOTE

1. REFER TO Drg. No. 108785-3000-0001 FOR LEGEND.

5m 0m 5m 10m

Scale 1:200

10m 0m 10m 50m 100m

Scale 1:1250

Rev	Drawn	Checked	Reviewed	Date	Description
PD	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT
PC	SPJ	EAS	SGB	OCT.08	UPDATED ENVIRONMENTAL STATEMENT

Designed by:	LBo	Date:	JAN.07
Drawn by:	SPJ	Date:	JAN.07
Checked by:	EAS	Date:	MAR.07
Reviewed by:	PSm	Date:	MAR.07

Client

Environment Agency

Client drawing No. | Revision

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Project

NOTTINGHAM TRENT LEFT BANK FLOOD ALLEVIATION SCHEME

Drawing title

FIGURE AA3.8
TRENT MEADOWS
GENERAL ARRANGEMENT - SHEET 3 OF 3

Approved by:	EAST	Date:	.08
Drawing scale:	1:200 1:1250	Sheet size:	A1

Drawing No. 108785 — 3200 — 0503 | Revision PD

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