Extension to Wing Water Treatment Works
Environmental Assessment Report

Anglian Water Services Ltd
August 2005

Halcrow Group Limited

- A version of this report of the Environmental Assessment (EA) of the proposed extension of Wing Water Treatment Works (Halcrow, 1999a);
- a study of the potential effects on Rutland Water as a designated Special Protection Area (SPA) under the EC Council Directive on the Conservation of Wild Birds: The Birds Directive 1979 (Halcrow, 1999b,);
- a hydraulic study of water levels in the Rivers Welland and Nene, assessing the impacts of increased abstraction on the Nene Washes and the Wash (Halcrow, 1999c)

The planning application was not determined, on the basis that the proposals to extend the works and the subsequent effect on the drawdown regime were likely to have an adverse impact on the ecological integrity of Rutland Water SPA (and Ramsar site) and more information was required to assess potential impacts on this site and on the Nene Washes SPA (also designated Special Area of Conservation (SAC) and Ramsar) and the Wash SPA (also SAC and Ramsar)[1]. The report on the impacts on Rutland Water SPA was revised and re-submitted in 2000 (Halcrow, 2000a) and further research on the potential impacts on the designated features of Rutland Water SPA was also carried out (Ecoscope, 2001). A report describing the potential impacts on the birds of the Wash (Halcrow, 2000b) was also submitted. There followed an Appropriate Assessment by the competent authority (Rutland County Council) on Rutland Water SPA, the Nene Washes SPA and the Wash SPA. A letter from Rutland County Council, dated 23rd May 2001 stated:

"...the [appropriate] assessment concludes that the proposed extension to Wing Water Treatment Works...is likely to have an adverse effect upon the integrity of Rutland Water SPA and the Nene Washes SPA which would adversely affect the conservation objectives of these sites. Moreover it is considered that additional information is still required in respect of certain aspects of the impact on the Wash SPA before it can be confident that its integrity will not be adversely affected".

Since then, a significant amount of research has been carried out as part of the Review of Consents process. The final reports are not yet available, but, given that the Anglian Water river licences are not due change, it is understood that continued abstraction from the Nene and Welland when the Wing extension is operational, would not result in a significant effect on either Nene Washes or the Wash SPA (D. Harker, AWS, *pers. comm.*).

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[1] Descriptions of designations are provided in Section 3 and Section 5.6. Citations are included in Appendix H.

As a result of the Appropriate Assessment of the proposed increase in abstraction and its impacts on Rutland Water, mitigation works within the SPA boundary and compensation works in the form of habitat creation were proposed adjacent to Rutland Water SPA. These proposals are subject to Environmental Impact Assessment (EIA) under the Town and Country Planning (EIA) Regulations 1999 and also to Appropriate Assessment under the Habitats Regulations 1994. Halcrow was appointed by Anglian Water to design the habitat creation works and to undertake the EIA for these proposals (Halcrow, 2005a), in addition to updating and re-submitting the planning application and associated documentation for the proposed extension at the Water Treatment Works itself.

This document is the report of the Environmental Assessment (EA) of the proposed extension to Wing WTW, which was carried out originally in 1999-2000, and has been updated as appropriate. The approach used for the environmental assessment described in this report followed best practice at the time of its submission in May 1999. Since then, the approach to EIA has been refined and strengthened and new guidance on EIA methodology was published by the Institute of Environmental Management and Assessment (IEMA) in 2004 (IEMA, 2004). It should be noted that this new guidance has not been adopted in the production of this report because it was agreed with the Local Planning Authority in March 2005 that the original EAR was sufficient and could be re-submitted with little in the way of modification. Therefore, changes to the original assessment have been limited to specific issues, namely landscape and visual impacts and a re-appraisal of the site's ecological interest. The report has also been updated to include more recent legislation and reference has been made to progress in the Review of Consents process. The only other change is that some re-structuring of the original report has taken place.

The reports on the potential impacts on Rutland Water SPA, the flows and levels in the Nene and Welland and the potential impacts on the birds of the Wash SPA have been re-submitted unchanged from the versions previously submitted. An addendum to these reports will also be submitted with this current planning application. The addendum describes the rationale for re-submitting these reports and highlights the sources of more recent research, such as the conclusions emerging from the Review of Consents process.

The purpose of this Environmental Assessment Report is to assess the environmental impact of the proposed extension, with the assessment concentrating on the immediate environs of the development site itself. The

impacts of changes in abstraction and discharge on Rutland Water, the Rivers Welland and Nene and the Wash have been addressed in detail in the separate reports (Halcrow 1999b, Halcrow, 1999c, Halcrow 2000a, Halcrow 2000b) and by subsequent work carried out as part of the Appropriate Assessment and Review of Consents processes.

The structure of this report is as follows:

- **Section Two, The Environmental Assessment** – this section describes the background, rationale and objectives of the approach taken in the assessment of environmental impacts predicted as a result of the proposed extension at Wing WTW.
- **Section Three, Legislative and Policy Context** – this section sets out the legislation and policy relevant to the proposed development and this assessment.
- **Section Four, The Proposed Development** – this section explains the processes, design and layout of the proposed extension and also highlights the need for the scheme and describes the alternatives considered.
- **Section Five, the Existing Environment** – this section describes the current baseline at the site in terms of landscape and visual, geology and soils, hydrology, water quality, ecology and nature conservation, noise, archaeology and recreation.
- **Section Six, Assessment of Impacts** – this section sets out the results of the impact assessment of the proposed development on the environmental receptors. It also describes the mitigation incorporated into the scheme to void, minimise or reduce these impacts.
- **Section Seven** – this section presents the summary and conclusions of the report.

2 The Environmental Assessment

2.1 *Objectives of the Environmental Assessment*

The EA process describes and assesses the likely significant environmental effects, which may arise directly or indirectly as a consequence of, *inter-alia*, the size, location, or nature of the project. This non-statutory EA was carried out generally in accordance with these procedures. The scope of work undertaken for the EA was determined through a consultation process (see section 2.4 and Appendices A and B). The objectives of this Environmental Assessment Report are to:

- carry out and report the results of consultation;
- establish current environmental conditions (environmental baseline);
- describe assessment methodologies employed;
- assess any environmental impact associated with the WTW;
- propose mitigation and enhancement measures; and
- provide details of monitoring required.

2.2 *Assessment of Impact on European Sites*

Potential effects on the following European sites have been considered throughout the EA process for the proposals at Wing:

- Rutland Water SPA and Ramsar Site (Figure 3)
- Nene Washes SPA and SAC (Figure 3)
- The Wash SPA, SAC and Ramsar Site (Figure 3b)

Separate reports have been produced for these sites and were submitted to support the original planning application. These reports are as follows:

- Assessment of Potential Effects on Rutland Water SPA (three volumes, Halcrow, 1999b and a revised version Halcrow, 2000a)
- Impact on Flows and Levels in the Rivers Welland and Nene (one volume, Halcrow, 1999c)
- Impact on Birds of the Wash (one volume, Halcrow 2000b)

Regulation 48 of the Habitats Regulations (see section 3.4.), which implements Article 6(3) of the Habitats Directive, requires the undertaking of an Appropriate Asessment for any plan or project which:

- Either alone or in combination with other plans or projects would be likely to have a significant effect on a European site; and
- Is not directly connected with the management of the site for nature conservation.

European sites include all sites classified as Special Area of Conservation (SAC) or Special Protection Area (SPA) (section 3.4). UK Government Policy is such that Appropriate Assessment is also required for potential SPAs, candidate SACs and Ramsar Sites[2].

This Appropriate Assessment is undertaken by the competent authority (in this case, Rutland County Council) independently of the EA process, although there is overlap between the two processes.

The work presented in the reports listed above formed the basis for the Appropriate Assessment carried out by Rutland County Council. Much of the information contained within the reports has been superseded by work carried out as part of the Appropriate Assessment and the Review of Consents process as required by Regulation 50 of the Habitats Regulations. These reports are being re-submitted as part of the information supporting the planning application, but are supplemented by an Addendum highlighting recent developments and additional data. All these documents are available from Rutland County Council and the main findings are summarised where appropriate in this report.

2.3 Scope of the Environmental Assessment

This environmental assessment focuses on the impacts predicted to arise from the construction and operation of the extension to Wing WTW. Although new pumping plant and pipelines would also be needed, the impacts of this part of the scheme are not addressed by this EA but separately by Anglian Water in accordance with their statutory duties under the Water Industry Act 1991. This

[2] Ramsar sites are designated areas that are wetlands of international importance.

assessment concentrates on the potential impacts on the development site itself, its immediate environs and on Rutland Water SPA, because the Appropriate Assessment for this designated site concluded that there is likely to be a significant adverse effect on the integrity of the site as a result of the proposed extension.

Potential impacts on the other European sites, the Nene Washes and the Wash, were considered as part of the original Environmental Assessment (Halcrow 1999c and Halcrow 2000b) but at this time there was insufficient information to conclude whether or not there would be an effect on these sites as a result of the proposals. The existing consents affecting these sites have since been considered in more detail as part of the Review of Consents process. The Stage 3 Appropriate Assessment for the Nene Washes is not yet available, but the emerging conclusion is that no Anglian Water licences, either in isolation or in combination, are considered to have a significant adverse effect on the Nene Washes. Therefore, since the proposed extension to Wing WTW would operate within Anglian Water's existing abstraction licence, it is not considered that there would be a significant impact on this designated site and the potential effects on the ecology of the Nene Washes are not considered in detail in this assessment.

The potential impacts as a result of changes in the abstraction regime in the Nene and Welland on the Wash were also addressed in some detail since both rivers flow into the Wash. The Stage 3 Appropriate Assessment for the consents affecting this European site are not yet complete (expected March 2006) but a draft report produced to inform the decisions made by the Environment Agency concluded that the value of freshwater flows to birds is likely to be negligible and is not considered to be a major factor in determining the abundance of distribution of SPA qualifying species (Entec (2002). Given also that there are not considered to be significant adverse effects on the Nene Washes SPA- or SAC-qualifying features as a result of the proposed extension to Wing WTW, a significant impact on the Wash seems improbable. Therefore, the possible effects on the ecology of the Wash are not considered in detail in this report.

Much of the existing baseline information required for the EA was collected during the scoping study. As deficiencies in information and sensitive areas were identified, some further data was collected through consultation and site surveys. Desk studies were used to review:

- geology and soils;
- hydrology;

- water quality;
- planning policy and land use;
- traffic and access;
- archaeology and heritage;
- recreation.

Further studies and site visits carried (in 1999 and revisited in 2005) out as part of the EA include:

- Landscape modifications/visual impact assessment
- Ecological surveys
- Noise characterisation survey

Further detail on methodology is provided in Table 2.1.

TABLE 2.1. STUDY PROCEDURES FOR THE ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL FACTOR	DESCRIPTION OF STUDY PROCEDURE
Environmental Assessment	
Landscape	Desk studies of surveys and plans of the proposals, including analysis of plans and cross-sections to assess potential impacts. Site visits made in both 1999 and 2005 to characterise the existing landscape, to identify the visual envelope and assess impacts from selected viewpoints.
Ecology	Initial survey was carried out in 1999, and the site was re-visited in 2005 to check if the baseline had changed in any way. The habitats present at the extension site were described and their nature conservation potential assessed. Sweep netting survey to determine whether or not newts are present (1999 only)
Noise	Subjective description of the principal noise sources discernible at potentially sensitive locations in the vicinity of Wing.

ENVIRONMENTAL FACTOR	DESCRIPTION OF STUDY PROCEDURE
Rutland Water SPA Study	
	Comprehensive data collection and interpretation to identify links between bird populations and environmental factors including water levels and bathymetry, water quality (including phosphate and nitrate concentrations), invertebrates and macrophytes.
Hydraulic Study	
	Correlation of flow data at Wansford with level data at the Nene Washes and estimation of duration of Minimum Residual Flow events (The MRF is the minimum amount of water that must be allowed to pass downstream of the abstraction point) for the Rivers Nene and Welland under the proposed abstraction regime.

2.4 *Consultations*

A comprehensive programme of consultation was undertaken as part of the environmental assessment process in 1998-2000. Both statutory consultees (those consulted by the Planning Authority as part of the planning decision-making process) and non-statutory consultees were included. A list of consultees is provided in Appendix A. It should also be noted, that a separate, extensive consultation exercise has been undertaken specifically in relation to the habitat creation proposals adjacent to Rutland Water SPA.

In August 1998 a Consultation Document for the environmental assessment of the proposed extension to Wing WTW (Anglian Water, 1998, text in Appendix B) was drawn up for issue to the statutory and non-statutory consultees. The responses to the consultation document are outlined in Table 2.2.

The consultation document contained:

- an outline of the need for and description of the scheme;
- a brief description of the key issues for the environmental assessment and Rutland Water SPA study;
- the proposed scope of the environmental assessment and Rutland Water SPA study;
- a preliminary assessment of the types of impact of the scheme;
- a proposed method for environmental assessment and the Rutland Water SPA study.

Consultees, as listed in Appendix A, were invited to respond by providing details of:

- any relevant information which they hold and which may assist in the environmental assessment process;
- any comments on the proposed approach;
- observations or concerns;
- suggestions for mitigation measures and enhancement opportunities.

Additional consultation also took place, including meetings and presentations. These were either specific to this EA or combined the issues of both the EA and the Rutland Water SPA study. The responses arising from the additional consultations that were relevant to this EA are outlined in Table 2.3.

TABLE 2.2. SUMMARY OF CONSULTEES' RESPONSES TO THE SCOPING DOCUMENT

CONSULTEE	COMMENTS AND CONCERNS	HOW CONCERN HAS BEEN ADDRESSED
County Archaeologist	Low archaeological impact so no concerns	
English Nature	Potential impact on Wing SSSI Need to address the impact on Rutland Water SPA	Addressed by desk study The Rutland Water SPA study provides technical evaluation of potential for impact on Rutland Water SPA. The findings are used in the EA report to address the potential impact on the SPA (flora as well as waterfowl)
Environment Agency	Abstraction licence variations not required but new/amended discharge consents may be required Potential impact on Nene Washes and the Wash SPAs Impacts from pipeline construction	Current abstraction and discharge consents are adequate to cover increases in abstraction/discharge due to the extension with the exception of commissioning phase. Temporary discharge consent will be applied for prior to commissioning The Hydraulic Study (Halcrow, 1999c) addresses the potential for impact on the SPAs, with the findings summarised in the EA report Implications of pipeline works have been addressed by Anglian Water through an environmental screening process, which included consultation.
Leicestershire and Rutland Wildlife Trust	No comments or concerns	
Normanton Visitor Centre (inc. Rutland Water Users Panel)	General concern regarding potential impact on recreation	Evaluation of water levels undertaken for the Rutland Water SPA Study and used in this EA report to address recreational impacts
RSPB	Need to address potential impacts on Nene Washes and the Wash SPAs Need to address the impact on Rutland Water SPA	The Hydraulic Study (Halcrow, 1999c) addresses the potential for impact on the SPAs, with the findings summarised in this report The Rutland Water SPA Study provides technical evaluation of potential for impact on Rutland Water SPA. The findings are used in the EA report to address the potential impact on the SSSI

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CONSULTEE	COMMENTS AND CONCERNS	HOW CONCERN HAS BEEN ADDRESSED
Rutland County Council*, meeting on 8 October 1998	Landscape impact, especially distant views from south and east, and local views from Morcott Road Noise from construction (Rutland CC to undertake monitoring prior to commencement of work) Algal blooms at Rutland Water	Landscape and visual impact addressed by landscape assessment (appended to this report), with mitigation including screening mounds, tree planting and selection of appropriate finishes for buildings Noise addressed by characterisation survey, with mitigation to include restrictions on hours of working Potential for development of algal blooms addressed in the Rutland Water SPA Study and findings summarised in this report
Rutland Sailing Club Ltd	Concern regarding impact on water levels.	Evaluation of water levels undertaken for the Rutland Water SPA Study and used in this EA report to address recreational impacts
Wing Parish Council	Noise and traffic to be kept to a minimum Concern over the working hours during construction Visual impact to be kept to a minimum Landscape with care	Noise addressed by characterisation survey, with mitigation to include restrictions on hours of working Traffic impact addressed by consultation and desk study, with mitigation to include routing restrictions Landscape and visual impact addressed by landscape assessment, with mitigation including screening mounds, tree planting and selection of appropriate finishes for buildings

Note: Written responses (copies in Appendix A were received from all consultees other than those marked "*".

TABLE 2.3. SUMMARY OF ADDITIONAL CONSULTEE RESPONSES

CONSULTEES	DATE	CONCERNS ARISING	HOW CONCERNS HAVE BEEN ADDRESSED
English Nature	General Correspondence	Concerns over impacts on badgers – no compensation for loss of foraging habitat needed, but perimeter fence needed to prevent badgers entering the site	Addressed by walkover survey and desk study, with mitigation in the form of fencing to be constructed prior to commencement of works
AWS Recreation Staff Rutland Water Users Panel	Meeting 26th October 1998	Concerns regarding implications for Rutland Water of - algal blooms - foreshore exposure - rezoning	The Rutland Water SPA Study provides technical evaluation of potential for impact on Rutland Water, summarised in this report
Rutland County Council Highways	Meeting 27th October 1998	Concern regarding construction traffic only. No construction traffic should go through Wing, only workers' vehicles Any damage to Morcott Road to be made good Off road parking must be provided Access signs needed Road cleaning/wheel washing required	Addressed by desk study, with mitigation including routing restriction for construction traffic via Morcott, repairs to Morcott Road as needed, parking provided on site, access signs to be erected and road cleaning/wheel washing undertaken as needed. (See chapter 4)

As a result of the consultation process, the major issues relating to the scope of the project were found to be:

- noise disturbance resulting from construction;
- increased traffic from construction on local roads;
- visual impact of the extension buildings;
- landscaping of the extension/existing site;
- effects of the proposed abstraction regime on nature conservation and recreation at Rutland Water SPA and on the River Nene.

In particular, concerns have been raised by consultees regarding the effects of increasing abstraction from the Welland and Nene, including effects of increased abstraction on the natural winter flood levels in the Nene Washes (Figure 3a), low flow levels in the Nene Washes and freshwater flows to the Wash (Figure 3b). The implications of the increased duration of abstraction were considered in section 5 of the original EAR (Halcrow 1999a) and have been researched in detail during the Review of Consents with the result that this concern has now been scoped out of this assessment.

It is proposed to discharge the emergency backwash discharge, and process waste from the extension to Morcott Brook (as is current practice with the existing works). The current consents are adequate to cover the additional discharges from the extension.

However, discharges to Morcott Brook would be required during the commissioning stage, as the water resulting from testing the WTW cannot be put into the supply system. These discharges would be subject to a temporary consent from the Environment Agency under the Water Resources Act 1991.

4.6.2 *Abstraction*

Water abstractions are controlled by abstraction licences, issued by the Environment Agency under the Water Resources Act 1991. An abstraction licence is only issued if there is sufficient water available, the need for the water is justified, all rights of existing users are protected and the water environment, including rivers, springs and wetland sites, are not unacceptably affected.

Licensed abstraction is geared towards meeting the design yield of Rutland Water reservoir. Licence (number 5/31/10/53) authorises abstraction of 120,000 Ml/year. The current average annual abstraction from Rutland Water to Wing is 80,000 Ml/year (220 Ml/day). Until December 1995, the licence for abstraction from the River Nene included a condition requiring a Minimum Residual Flow (the minimum amount of water that must be allowed to pass downstream of the abstraction point.) of 136 Ml/d to be maintained downstream of Orton Sluice (which is over 10km downstream of Wansford). Following a trial period to establish flow equivalence, the MRF has been transferred to the intake at Wansford. The MRF is currently set at 125 Ml/d for the period December to April and 150 Ml/d for the period May to November. The abstraction licence for the Tinwell intake on the River Welland sets an MRF equivalent to 36.3 Ml/d. The water needed for the extension of the WTW can be provided within the abstraction conditions of the existing licences.

The increased capacity of the WTW to process raw water would modify the drawdown and refill regime in the reservoir. The needs of the WTW would be met by increasing abstraction from the supply rivers. The reservoir level would be maintained by continuing abstraction at maximum rate for a longer period than at present. Constraints on abstraction imposed by maintaining MRF would mean that abstraction is likely to continue to utilise all available flows into late autumn or

winter. Water is already preferentially abstracted from the Welland, and Anglian Water plan to continue this pumping regime in the future.

There would be years when there is insufficient water available for abstraction from the Rivers Welland and Nene to meet the total annual demand needs of Wing WTW. In these years the reservoir level would fall and not recover until sufficient water is available in the rivers. The implications of reservoir level fluctuations are examined in Section 6.

4.6.3 *Hazardous Substances*

There are no licences for hazardous substances at the existing works. There is a CIMAH notification (ref. 110-01-R-01) in respect of chlorine, for which the storage capacity of 30 tonnes is adequate for the existing works and extension. Emergency procedures are in place at the WTW in the event of any accidents involving chlorine. Other chemicals used by the existing plant and the extension are Kalic (lime), ferric sulphate, sodium bisulphate, phosphoric acid and ammonia.

4.6.4 *Noise and Nuisance*

The extension would generate noise similar in character to the existing water treatment plant, with the principal source being the micro-strainers.

The operation of the extension would not require any more frequent alarm testing.

4.6.5 *Traffic and Access*

The operation of the extension would require no additional staff and would use the existing site ancillary services. It would not generate a significant number of vehicle movements.

The temporary construction access would be closed once the extension is commissioned, with all vehicles using the existing main access.

4.7 *Mitigation Incorporated into Design*

It is accepted good practice to design mitigation measures to reduce the impact of proposed developments. This process may be undertaken following the completion of the initial scheme design and the assessment of environmental impacts. In this case, consideration was given to environmental issues during the development of the proposals, with the result that many mitigation measures are an integral part of the scheme, particularly with respect to potential impacts at Wing during the construction and operational phases.

4.7.1 *Mitigation Measures in the Construction Phase*

(a) Extension site and environs

- Landscaping – screening mounds, plantings and form and colour of built structures.
- Hours of work – restrictions on working hours, particularly for heavy construction tasks.
- Nuisance control – storage and handling of dusty materials, cleaning road surfaces and vehicles.
- Pollution control – adherence to codes of practice and procedures for working near water courses and storage of fuels and chemicals, control of surface drainage.
- Waste management – reuse of excavated materials on site, reuse of other surplus materials and appropriate disposal procedures for wastes.
- Traffic and access – construction traffic routing, off-road parking and road cleaning.

The effects of these measures have been taken into account in Section 6 in identifying and evaluating the environmental impacts.

4.7.2 *Mitigation Measures in the Operational Phase*

(a) Extension site and environs

- Landscaping – screening mounds, plantings and form and colour of built structures.
- Surface water management – the existing site system would be used.
- Chemical handling and storage – the existing site facilities and procedures would be adopted by the extension.

5 The Existing Environment

5.1 *Introduction*

The description and evaluation of the existing environment is an important part of the EA process, as it establishes a baseline from which impacts can be assessed. The degree of detail and the complexity of the data used to establish that baseline should reflect the sensitivity and importance of the study area as well as the scale and nature of the proposals.

Consultation was undertaken to agree the scope of the environmental assessment, including procedures for the collection of data needed to describe the existing environment. The agreed approach was to collate existing data where available and to conduct surveys to provide more detailed information where necessary. The procedures adopted for the studies are explained in section 2.4.

5.2 *Landscape and Visual*

5.2.1 *Introduction*

A landscape and visual assessment was undertaken as part of the environmental assessment submitted with the planning application in 1999. Although the baseline information gathered during this assessment is still valid, a more detailed assessment of the visual impact from a number of viewpoints has been requested by Rutland County Council. In addition, there have been changes in local planning policy and guidance since the original application was submitted, with the Rutland Landscape Character Assessment and Rutland County Design Guide being approved in May 2003. Therefore, this updated document takes into account these developments.

The original landscape assessment undertaken in 1998 has now been superseded by this more detailed assessment undertaken in March 2005.

5.2.2 *Guidance for Development in the Countryside*

Section 2 of the Supplementary Planning Guidance -Guidance for Development in the Countryside provides detailed information on issues to be taken into consideration when designing buildings. For a design to be acceptable consideration needs to be given to ensuring that it co-ordinates with the objectives and recommendations set out in the guidance.

Selected key issues relevant to the water treatment plant development include the following:-

(a) Siting

- Consideration needs to be given to the impact of immediate and distant views.
- Careful siting to ensure best fit within the landscape to minimise its appearance within the landscape.
- Development should avoid where possible dominating other buildings or landscape features.
- Measures should be taken to minimise the scale and dominance of large scale buildings.

(b) Materials

- Large scale buildings should blend with the colours and textures of the landscape i.e. generally dark green or brown. However, the extension to Wing WTW is on the skyline and would be better in a neutral blue/grey.
- Materials should be in low reflective finish.
- Roofs generally should be darker than the walls.

(c) Landscape

- Landscape treatment should best fit the location and achieve the purpose of screening the development from particular views or to reinforce existing landscape features.

(d) Ground contouring

- Where development is essential on a sloping site, ground modelling may be an effective way to accommodate and minimise the visual impact of a development.

5.2.3 *Landscape Assessment Methodology*

Landscape effects are assessed by describing the components of the existing landscape, its topography, land use, vegetation, settlement patterns and other features, and the way in which they combine to give the area its local flavour. The importance and susceptibility of the components are evaluated, taking into account any pressures which might lead to change in the foreseeable future. The effects which the proposal would have on the landscape are described, together with the mitigation proposed and the residual effects. Finally an assessment can be made of the overall effect which the proposal is predicted to have on the character and value of the landscape.

The extent to which a landscape can absorb change (i.e. landscape sensitivity) varies with (LI and IEMA, 2002):

- the existing land use;
- the pattern and scale of the landscape;
- the visual enclosure and distribution of visual receptors;
- the scope for mitigation which would be in character with the existing landscape;
- and the value placed on the landscape.

Potential impacts on the landscape character relate to changes in landscape elements, features and characteristics. The impacts may relate both to changes in existing features as a result of the proposed development and to the addition of new features. The assessment of landscape character impacts considers how the changes to landscape elements and features interact to change the landscape character. The following criteria for landscape effects are used (LI and IEMA, 2002):

- **Severe adverse**. The proposed scheme would result in effects that are at a complete variance with the landform, scale and pattern of the landscape; would permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and/or their setting; and/or would cause a very high quality landscape to be permanently changed and its quality diminished.
- **Major adverse**. The proposed scheme would result in effects that cannot be fully mitigated and may cumulatively amount to a severe adverse effect; are at a considerable variance to the landscape and degrade the integrity of the landscape; and/or will be substantially damaging to a high quality landscape.
- **Moderate adverse**. The proposed scheme would be out of scale with the landscape or at odds with the local pattern and landform; and/or will leave an adverse impact on a landscape of recognised quality.
- **Minor adverse**. The proposed scheme would not quite fit into the landform and scale of the landscape; and/or affect an area of recognised landscape character.
- **Neutral**. The proposed scheme would complement the scale, landform and pattern of the landscape; and/or maintain existing landscape quality.
- **Minor beneficial**. The proposed scheme has the potential to improve the landscape quality and character; fit in with the scale, landform and pattern of the landscape; and /or enable the restoration of valued characteristic features partially lost through other land uses.

- **Major beneficial**. The proposed scheme would have the potential to fit very well with the landscape character; and/or improve the quality of the landscape through removal of damage caused by existing land uses.

5.2.4 *Visual Assessment Methodology*

Visual impacts relate to changes in views experienced by people in the landscape. To describe the visual baseline, the study identifies the extent and nature of views of the site from representative viewpoints, the nature and characteristics of the visual amenity and potentially sensitive receptors of visual effects. The extent of visibility of the site has also been assessed and takes into account local screening from vegetation, fences or buildings.

After establishing the visual baseline, the impacts of the proposals are assessed. The extent of the impact is assessed objectively according to the sensitivity of the receptor and the magnitude of the visual effects, taking into account any mitigation measures. Viewpoints are assessed in the following order of sensitivity (adapted from LI and IEMA, 2002):

High sensitivity: private dwellings and gardens where viewers are familiar with the overall scene and are likely to experience the views frequently;

Medium-high sensitivity: public rights of way, country parks and other informal recreational facilities where viewers gain a long view due to a slower speed of passage and where the quality of view is part of the purpose of the visit;

Medium-low sensitivity: commercial premises, public facilities and schools where the viewer may be familiar with the scene but holds it in lower regard than viewers from residential properties and the surroundings are secondary to the purpose of the visit;

Low sensitivity: surrounding road and rail networks where the viewer gains brief, transient glimpses of the view at speed.

The magnitude of the visual effect of the proposals is assessed according to the following scale, summarised from *Guidance on the New Approach to Appraisal* (Department for Transport, 1998):

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	1	Draft Environmental Assessment Report	8/04/05	EAA
2	2	Draft Environmental Assessment Report	31/05/05	EAA
3	0	Final Environmental Assessment Report	22/07/05	EAA
3	1	Final Environmental Assessment Report, with minor amendments	10/08/05	EAA

Substantial adverse or beneficial impact: the development would cause a significant deterioration (or improvement) in the existing view;

Moderate adverse or beneficial impact: the development would cause a noticeable deterioration (or improvement) in the existing view;

Slight adverse or beneficial impact: the development would cause a barely perceptible deterioration (or improvement) in the existing view;

Neutral: the development would cause no discernible deterioration or improvement in the existing view.

5.2.5 *Landscape Character Baseline*

(a) General Area

Wing WTW is within the Ridges and Valleys subdivision of the High Rutland Landscape Character Area.

The general character of the area consists of a steep rolling landform with a series of high ridges and valleys running east west. The area is predominantly agricultural, consisting of farmland used for both arable and grazing purposes and has a more open character than the adjoining Leighfield Forest Area. However, woods, spinneys, coppices and hedgerows are important landscape features and there are a small number of plantations and small linear woods particularly following streams in valley bottoms. There are several small villages (Figure 1) interspersed within this landscape, consisting of buildings of stone construction. The majority of the villages are located on the ridges, with Preston, Wing and Pilton being situated on one of these ridges. Glaston and Morcott are situated on the ridge approximately 2km to the south of Wing and Manton, Lyndon and North Luffenham are on the ridge approximately 2km to the north. Although the villages are visible they generally fit well into the landscape. Rutland Water is approximately 3km north of Wing.

Almost all roads in the locality are flanked by hedgerows which allow only glimpses or limited views to the distance.

Views of the area are provided by photographs taken in April 2005 as shown in Figure 12.

(b) Existing Site

The existing WTW plant and offices are located just to the east of the village of Wing on the southern side of the Wing to Morcott road (Figure 1). The building structures are clad in yellow/brown brickwork, pre-cast concrete panels, concrete and colour coated metal cladding. They are set back from the road in a mown grass landscape that has individuals/groups of young and semi-mature deciduous trees distributed within it.

A post and rail fence along the northern boundary is screened by a hedge, except where it passes beneath the canopies of two mature trees and at the main site entrance from the Wing road.

The southern boundary comprises a 1.5m high hedge with several established trees behind it and mounding to both ends. Young, densely planted trees, designed to screen the existing structures from outside views, are present.

The site lies on a ridgeline and so is visible from many of the surrounding lanes and edges of villages. The majority of views are from long distances on other ridges. Hedgerows generally obstruct long views from the roads so that the site is only visible from field entrances. The existing Anglian Water pumping station buildings are most visible from the south-east, where they are viewed against the skyline.

Views of the existing site are provided by photographs in Figure 12.

(c) Extension Site

The proposed extension site is directly east of the existing site, separated by a 1.5m hedgerow, with a few semi-mature trees at intervals. The northern boundary fronts onto the Wing to Morcott road, being separated by a 2m grass verge, a 1.5m high hedgerow and a post and rail fence with gated openings at each end. The east and south boundaries have established hedgerows incorporating individual and small groups of trees.

The north and north-east section of the extension site is generally flat with patchy grassland and unmade tracks. A bunded lagoon, which was dry at the time of the site visit, occupies the central area to the west side of the site.

A mound that extends west into the existing site marks the southern part of the extension site. It was constructed during the last extension to the WTW between 1992 and 1994 and consists of spoil. It has an established rank grass cover. There

are several individuals and small groups of semi-mature trees along the toe of the southern slope.

Views of the extension site are provided by photographs in Figure 12.

5.2.6 *Visual Baseline*

The existing water treatment works is located to the east of the village of Wing. The village and the treatment works are located on an elevated ridge running on an east west axis with the village at an elevation of 120 metres and approximately 5 metres higher than the treatment plant.

The higher elevation of Wing village means that the existing treatment plant and the proposed extension are completely screened when viewed from a westerly direction. The view points selected for this report were selected in consultation with Rutland County Council and generally follow a north – south easterly arc. The zone of visual influence and view points selected are illustrated in Figure 11. The visual impact from these viewpoints is assessed in Section 6.2.2.

5.3 *Geology and Hydrogeology*

5.3.1 *General Area*

The regional geology as mapped by the British Geological Survey (AF Howland Associates, 1998) comprises a solid geology of Jurassic deposits. These comprise the Lower Estuarine Series, which consists of sands, silts and clays with occasional calcareous sandstones and carbonaceous clay. The Northampton Sand of the Inferior Oolite Series, a massive sandstone that is ferruginous in nature, rests upon the Upper Lias Clay, a heavily over-consolidated clay of Upper Jurassic age. On high ground, Boulder Clay, abundant in granular material, overlies these strata.

5.3.2 *Existing Site*

To the east of the WTW access road, within the boundary of the current site, is a Site of Special Scientific Interest (SSSI) covering 1.6ha (grid reference SK 899 027), which is of geological importance (Figure 4). This is a Quaternary site with considerable stratigraphic importance. Sub surface investigations show a sequence of chalky till, lake clays, peats and silts in a steep-sided basin cut into the Jurassic bedrock. The citation for this site is provided in Appendix H.

5.3.3 *Extension Site*

AF Howland Associates undertook a ground investigation at the WTW in 1998. This confirmed the geological sequence to be similar to the regional sequence

identified by the British Geological Survey. Boreholes revealed a layer (between 1.5m and 1.9m below ground level) of typically soft, brown to reddish brown clay that was sandy and silty and contained fine to coarse sandstone gravel. The clay was covered in places with a thin layer of made ground or topsoil. Below the clay a layer of weak to moderately strong brown ferruginous sandstone was present. Inter-bedded within this were bands of orange to reddish brown silty clay. Beneath the sandstone was, in places, uncemented medium dense sands or gravels. These were typically clayey and silty, with a fine to coarse (sandstone) gravel fraction. In other places, the sandstone was underlain by a moderately weak to moderately strong bluish grey calcareous siltstone, with bands or lenses of ferruginous sandstone and sandy silty clay. From between 5.1m and 9.8m below ground level until the limit of the investigation, down to 15m, a dark grey fissured silty clay was found, that was locally laminated and contained local shell debris.

AF Howlands Associates (1998) installed piezometers in five boreholes at the extension site and measured groundwater levels on two occasions. Groundwater levels recorded in two boreholes in the northern part of the extension site varied from 3.94 m to 4.85 m below ground level. The two boreholes installed in the central and eastern parts of the site, to a depth of 15 m below ground level, were dry. Groundwater levels of 8.73-4 m below ground level were recorded in a borehole in the screening mound near the southern boundary of the site.

5.4 Hydrology

5.4.1 General Area

Rutland Water is augmented by water from both the River Nene and River Welland (Figure 3). Surface water inputs also come from the River Gwash. The majority of water is taken from the River Welland at Tinwell, which feeds Rutland Water directly via one pumping station. The remaining water is pumped from the River Nene surface water intake works at Wansford, which feeds Rutland Water via a series of intermediate pumps. The Nene also augments Pitsford reservoir.

The River Welland discharges to the tidal estuary at Marsh Road Sluice in Spalding and further downstream the Glen discharges at Surfleet Sluice. During dry summer periods there is little or no flow to tide, because of the demands of abstraction for spray irrigation in the lower reaches of both the Welland and Glen. Flows are monitored at Tinwell, just downstream of Anglian Water's abstraction point (Figure 3) where the MRF is 36.3 Ml/d. The maximum pumping rate allowed by Abstraction Licence 5/31/95/79 is 545 Ml/d at Tinwell (Table 4.4.), however due to pumping capacity currently only 66% of this licensed quantity can be used.

The River Nene catchment covers an area of 2363km² and flows from above Northampton through Wellingborough, Oundle, Peterborough and Wisbech to the Wash. The river system can be divided, in hydrological terms, into upland and a fenland sections. The upland section of the River Nene has a number of locks, sluices and weirs, which maintain navigation levels and control river flows. The lower section, downstream of Peterborough, is embanked and conveys water through the fens to the sea. The water levels here are controlled by structures. A dense network of artificial drainage channels exists, discharging into the river.

High flows in the River Nene are moderated by the Northampton Washes, which provide flood storage capacity upstream of Peterborough. High flows at Peterborough discharge directly to the tidal River Nene at Dog-in-a-Doublet sluice, except when tide locked. The Nene Washes are inundated when the river levels rise above 3.7m AOD at Stanground sluice at the upstream end of Moreton's Leam, when the sluice is opened automatically.

At the Wansford abstraction point on the River Nene the MRF is 150 Ml/d in summer (May-November) and 125 Ml/d in winter (December–April). Here the maximum pumping rate for abstraction permitted by abstraction licences 5/32/9/5/202B is 763Ml/d (Table 4.4); due to pumping capacity limitations currently only 62% of this licensed quality an be abstracted.

5.4.2 *Abstraction for Rutland Water*

Water for treatment at the WTW is stored in Rutland Water reservoir (Figure 3). The reservoir is maintained at its working level by flows from the River Welland and the River Nene. Pumping capacity is provided as follows:

- Nene at Wansford – 2 variable speed pumps and 3 fixed speed pumps, giving a total capacity of 490 Ml/d. The pumps are controlled automatically, based upon the instantaneous flow at the upstream ultrasonic river gauging station.
- Welland at Tinwell – 2 variable speed pumps and 2 fixed speed pump, giving a total capacity of 360 Ml/d. The pumps are set manually.
- Empingham (raw water inlet to Rutland Water) – 8 pumps, each of capacity 90 Ml/d = 720 Ml/d total capacity

There is also a booster pumping station between Wansford and Empingham, but this does not limit the total abstraction capacity. The total abstraction rate is limited by the capacity of the inlet pumping station at Empingham (720 Ml/d),

into which the Welland and Nene supplies feed. It is more efficient to pump water from the Welland than it is to pump it further from the Nene, so the Welland abstraction is used preferentially. AWS plan to continue this pumping regime in the future and the predictive studies in the hydraulic study (Halcrow, 1999c) therefore assume that all extra water requirements will come from the Welland, with the Nene being utilised only when there are insufficient supplies in the Welland.

5.4.3 *Drainage of Extension Site*

The existing surface drainage system installed at the site discharges into Morcott Brook, via settlement traps. Anglian Water has discharge consents for the discharge of trade effluent from the works and for discharges in an emergency situation, into Morcott Brook. Details of these consents are shown in Table 4.2.

5.4.4 *Rutland Water*

The operating regime at Rutland Water is based on maintaining a target (or control) hydrograph (water level in the reservoir) over a twelve month period. The target hydrograph allows for drawdown during the summer months to approximately 85% of reservoir volume, with refill to 95% full over the winter period. This is an ideal scenario; in reality, extended dry conditions cause drawdown below 85%, from which recovery is not completed in the following wet season.

Figure 5 shows the target and actual hydrographs for Rutland Water since it was commissioned. In the period between 1977 and 1988, the reservoir levels were maintained close to the target hydrograph. However, two extended periods of dry conditions, 1989-91 and 1995-97, resulted in drawdown to approximately 60% in the driest seasons. In addition to the dry conditions, a secondary cause of the drawdown was river water quality. During conditions of poor river water quality, abstraction from the river system is ceased, as explained in Section 5.5.2.

5.4.5 *Nene Washes*

The lower, fenland section of the River Nene is shown in Figure 3a. This part of the catchment is characterised by a dense network of artificial drainage channels, discharging to the main river via pumping stations or by gravity drainage. Most of the river, from Northampton to the tidal limit, is dominated by a large number of locks, sluices and weirs that maintain navigation levels and control river flows.

The Nene Washes, or Whittlesey Washes, form a flood storage reservoir for the City of Peterborough when the River Nene is tide locked at the Dog-in-a-Doublet sluice (Figure 3a). The area consists of a strip of land on the south bank of the River Nene, some 20 km long and varying in width from 0 to 1400 m (total area 1450 ha). The maximum flood storage volume is 15 million cubic metres (Environment Agency 1997a). This area is designated as SPA on account of the bird assemblages it supports (Section 5.6 and Appendix H).

The main watercourse through the Washes is Mortons Leam, a medieval drainage channel which forms the southern boundary of the Nene Washes (the River Nene forms the northern boundary).

A Water Level Management Plan (Environment Agency 1997a) has been produced for the Nene Washes and its main objectives are to):

- maintain adequate water supply for the wellbeing of the Nene Washes, which includes flooding for winter wildfowl and maintenance of ditch levels for wet fencing to control stock;
- maintain the flood storage function;
- maintain water to the Nene Washes during periods of low flow in the River Nene while at the same time allowing water for the North Level and providing for the needs of other users.

However, during exceptionally dry summer months there is insufficient water in the Nene to meet the needs of the Nene Washes and those of abstractors (EA 1997).

5.4.6 *The Wash*

One of the major concerns for the Wash is the impact of low fluvial flows on the build up of sediment in the estuaries. Siltation occurs along the tidal length of the Rivers Welland and Nene, including their outfalls to the Wash (Environment Agency 1997b), particularly during long, dry periods, when the flows are insufficient to keep the tidal channels clear. This build up of material adversely affects both the flood discharge capacity of the tidal river and its navigation (NRA 1995). Various works have been implemented to control siltation on the Welland and Nene estuaries, largely on an ad hoc basis. These include training walls extending into The Wash, revetments (such as stoning) to preserve the alignment of the river and dredging of accumulated silt (NRA, 1995). The issue of siltation is

being addressed as part of the Review of Consents, the output of which is expected in 2006.

5.5 *Water Quality*

5.5.1 *River Nene/Welland*

There are a number of waste water treatment works on the Rivers Nene and Welland. During dry weather periods, treated effluent from these works constitutes a significant proportion of the rivers' flow, resulting in high nutrient levels. The whole of the Nene and Welland catchments are designated as "sensitive waters" under the Urban Waste Water Treatment Directive 91/271. The Welland and Nene catchments are also designated as Nitrates Vulnerable Zones, which acts to control and reduce nitrate loading from agriculture.

The Classification of Estuaries Working Party (CEWP) system classifies estuaries from good to bad. The Welland Estuary was classified as Good in 1995 and 2000. In 1995, the Nene estuary had the lowest water quality of all the riverine inputs to the Wash and was classified as 'bad' by the Classification of Estuaries Working Party (Environment Agency, 1997b), principally a result of low dissolved oxygen concentrations. In 2000 the Nene estuary had improved and is now classified as 'fair'. The spatial extent of poor water quality is limited by rapid dilution in the clean waters of the Wash but a minimum flow of 25Ml/d is required to the tidal Nene in order to maintain water quality in the estuary (Environment Agency, 1998). Low fluvial flows also contribute to the build up of sediment along the tidal lengths of the Welland and Nene, including their outfalls to the Wash (Environment Agency, 1997b). Low freshwater flows may also alter the salinity regime of the estuary, although the critical flows to prevent saline intrusion up the estuary are not known (Environment Agency, 1997b).

5.5.2 *Rutland Water*

High nutrient levels in the Rivers Nene and Welland result in a high input of phosphates and nitrates to Rutland Water. In 1989 the reservoir was identified by the Environment Agency as a site at risk from algal blooms. In the past the risk of eutrophication has been a potential problem affecting the reservoir's value as a water resource and threatening conservation and recreation activities. However, improvements to sewage treatment works discharging to the Welland and Nene have resulted in reduced nutrient loadings in the water abstracted by Anglian Water for Rutland Water. Improvements made to the STWs in the catchment in relation to phosphate removal are presented in Appendix I. The Rutland Water SPA study

(Halcrow, 2000a) addressed this issue of eutrophication in more detail, and an update of this literature review is included as Appendix A in Halcrow (2005b).

In addition, Anglian Water has completed the installation of a "bubble curtain" destratification system, which improves the water layer mixing achieved by the previous helixor system. Water layer mixing reduces stratification and assists in denitrification and is an important measure in reducing the potential for the formation of algal blooms. The existing helixors remain as a back-up system.

The level of nitrates is also important for compliance with the Drinking Water Directive 75/440/EEC (1975) concerning the quality required of surface water Intended for the Abstraction of Drinking Water. The prescribed maximum value of 11.2 mg/l as N for nitrates in drinking water is set by the Drinking Water Regulations (1989). Historically, this concentration has not been reached in Rutland Water, although concentrations as high as 9 mg/l have been recorded under peak winter conditions. During conditions of poor river water quality, abstraction from the river system ceases, to prevent the contamination of Rutland Water.

5.5.3 *The Wash*

The Environment Agency is concerned about nutrient loads entering the Wash and the Nene is one of the main contributors of phosphates and nitrates to the Wash. However, it should be noted that improvements to STWs (Appendix I) under the Urban Waste Water Treatment Directive has significantly reduced the phosphate load in the River Nene and therefore decreased inputs of phosphate to the Wash.

5.6 Ecology and Nature Conservation

5.6.1 *General Area*

The site of the proposed development lies approximately 3km south of Rutland Water within an agricultural landscape, on the crest of a prominent ridge. There are several areas of woodland in the vicinity, one approximately 300m to the east, two small areas to the north east and the largest one approximately 500m to the south.

5.6.2 *Designated Sites*

(a) Rutland Water SSSI, SPA and Ramsar Site

Rutland Water is designated as a Special Protection Area (SPA) under the Birds Directive. It is also designated as a Ramsar site under the Ramsar Convention on Wetlands of International Importance, especially as Waterfowl Habitat and was

designated in 1981 as a SSSI under the Wildlife and Countryside Act 1981, as strengthened by the Countryside and Rights of Way Act, 2000.

Rutland Water qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

- Over winter - Gadwall (*Anas streptera*)
  - Shoveler (*Anas clypeata*)

The area also qualifies under Article 4.2 of the Birds Directive by regularly supporting at least 20,000 waterfowl. .

(b) Nene Washes SSSI, SPA, SAC and Ramsar Site

The Nene Washes SPA (Figure 3) consists of a 2km wide by 20km long strip of land consisting of individual fields separated by ditches (EA, 1997). It is designated as an SPA under the Birds Directive, a Ramsar site under the Ramsar convention and a SSSI under the Wildlife and Countryside Act 1981. The Nene Washes is also designated as SAC under the Habitats Directive because it supports an internationally-important population of spined loach (*Cobitis taenia*), which is listed on Annex II of the Habitats Directive. Part of the Nene Washes is a Nature Reserve of the Royal Society for the Protection of Birds (RSPB).

The site represents one of the country's few remaining washland habitats and supports a mosaic of rough grassland and wet pasture, with a diverse ditch flora. Notable plant species include rare fringed water lily (*Nymphoides peltata)*; hair-like pondweed *(Potomogeton trichoides)* and marsh dock (*Rumex palustris*). The vulnerable aquatic snail *Valvata macrostoma* and waterbeetle *Agabus undulatus* can also be found. The fish population of the River Nene is typical of lowland rivers in Eastern England. Common bream, roach, dace, chub and pike are the dominant species.

The Nene Washes qualifies as an SPA under Article 4.1 of the Birds Directive by supporting populations of European importance of the following species listed on Annex I of the Directive:

- During the breeding season - Ruff (*Philomachus pugnax*)
  - Spotted Crake (*Porzana porzana*)
- Over winter - Bewick's Swan (*Cygnus columbianus bewickii*)

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- Ruff (*Philomachus pugnax*)

This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

- During the breeding season - Black-tailed Godwit (*Limosa limosa limosa*)
- Over winter - Pintail (*Anas acuta*)
  - Shoveler (*Anas clypeata*)

The area also qualifies under Article 4.2 of the Birds Directive by regularly supporting at least 20,000 waterfowl.

The continued international importance of the site is dependant on the maintenance of a winter flooding regime and a high, but controlled, summer water table. Only half the washes are managed specifically to maximise their conservation value.

(c) The Wash SSSI, SPA, Marine cSAC and Ramsar Site

The Wash (Figure 3) is the largest estuarine system in Britain and is internationally important for its nature conservation value. It is designated as a SPA under the Birds Directive, a Ramsar site under the Ramsar Convention and a SSSI and NNR under the Wildlife and Countryside Act 1981. It is also part of the Wash and North Norfolk Coast SAC under the Habitats Directive. The Wash is also recognised for its landscape value, and is designated as an Area of Outstanding Natural Beauty (AONB).

The Wash site qualifies as an SPA under Article 4.1 of the Birds Directive by supporting populations of European importance of the following species listed on Annex I of the Directive:

- During the breeding season
  - Common Tern (*Sterna hirundo*)
  - Little Tern (*Sterna albifrons*)
  - Marsh Harrier (*Circus aeruginosus*)
- Over winter
  - Avocet (*Recurvirostra avosetta*)
  - Bar-tailed Godwit (*Limosa lapponica*)

- Golden Plover (*Pluvialis apricaria*)
- Whooper Swan (*Cygnus Cygnus*)

This site also qualifies under Article 4.2 of the Birds Directive by supporting populations of European importance of the following migratory species:

- On passage
  - Ringed Plover (*Charadrius hiaticula*)
  - Sanderling (*Calidris alba*)
- Over winter
  - Black-tailed Godwit (*Limosa limosa islandica*)
  - Curlew (*Numenius arquata*)
  - Dark-bellied Brent Goose (*Branta bernicla bernicla*)
  - Dunlin (*Calidris alpina alpine*)
  - Grey Plover (*Pluvialis squatarola*)
  - Knot (*Calidris canutus*)
  - Oystercatcher (*Haematopus ostralegus*)
  - Pink-footed Goose (*Anser brachyrhynchus*)
  - Pintail (*Anas acuta*)
  - Redshank (*Tringa tetanus)*
  - Shelduck (*Tadorna tadorna*)
  - Turnstone (*Arenaria interpres*)

The Wash also qualifies under Article 4.2 of the Birds Directive by regularly supporting at least 20,000 waterfowl. In winter it supports an average of 163,000 waders and 51,000 wildfowl.

It is designated as a Ramsar site due to the inter-relationships between its various components including saltmarshes, inter-tidal sand and mudflats and the estuarine waters. The saltmarshes represent one of the most extensive examples of the habitat in Britain, they are also rich in invertebrates. The Wash supports the largest single group of common seals (*Phoca vitulina*) in Europe.

The SAC boundary extends from below the high water mark seaward for 5 miles. It is designated because it contains habitat types which are rare or threatened in a European context. It is considered to be one of the best areas in the UK for sub-tidal sandbanks, Atlantic sea meadow, inter-tidal mudflats and sandflats, shallow inlets and bays and the common seal.

Parts of the Wash are managed as nature reserves by voluntary conservation bodies. For example, there are three RSPB Reserves – Freiston Shore, Frampton Marsh and Snettisham.

5.6.3 *Surrounding Area*

The proposed site for the extension of the WTW (Figure 2) is generally surrounded by agricultural land. Glaston Wood lies approximately 1km to the south and there a few scattered copses in the vicinity of the site. The course of Morcott Brook is situated to the south of the site. This watercourse and some associated habitats are recognised for their nature conservation interest on a parish level (records obtained from Leicestershire County Council, Environmental Resources Centre). A stream and marsh approximately 180m to the south-east of the site have been noted as being of district importance for nature conservation (grid reference SK902 022).

5.6.4 *Extension Site*

(a) General

The site of the proposed WTW extension itself comprises a field, which formerly may have been improved grassland, but has not been managed for agricultural purposes since 1971. The field is surrounded on all four sides by a well established hedgerow and along the western boundary there is additional tree planting, which contributes to the landscaping.

A short distance inside the northern field boundary, parallel with the boundary hedge, is a hard standing access along the length of the field. There are areas of bare earth and areas of tipped building material such as bricks and concrete, particularly in the eastern section. This area was very disturbed when visited in March 2005 and the hard standing access was covered in open heaps of spoil and freshwater mussel shells. Freshwater mussels have been discovered in high numbers in the pipes feeding Wing WTW and have clearly been removed from the pipes and discarded here. There is a dry lagoon a short distance inside the western boundary.

There is a muddy access track along the western boundary from the gate at the north-west corner to the lagoon. There is a large grassed earth bund in the southern part of the site.

(b) Main Field and Boundary Hedgerow

(i) Flora

The field comprises old, unmanaged grassland, which is dominated by coarse grasses and ruderals characteristic of disturbed ground. Scrub is beginning to colonise in parts of the main field. Grasses include false oat-grass *(Arrhenatherum elatius),* cock's-foot *(Dactylis glomerata),* fescues *(Festuca* species*),* and rye grass *(Lolium perenne).* Ruderals (often referred to as weed species) include common sorrel (*Rumex acetosa*), spear thistle (*Cirsium vulgare*), creeping thistle (*C. arvense*), rosebay willowherb (*Chamenerion angustifolium*), fat hen (*Chenopodium album*), and knotweed species (*Polygonum sp.*). Other plant species include weld (*Reseda luteola*), wild carrot (*Daucus carota*), mugwort (*Artemisia vulgaris*), white campion (*Silene alba*), and trefoil species (*Trifolium* spp.).

There is a difference between the main field and the southern landscape bund. The main field is more disturbed with a higher dominance of tall ruderals. There is also a limited area which is only inhabited by mosses, with no higher plants present. In contrast, the bund is dominated by grasses with a limited abundance of herbaceous plants.

In the south west corner of the field there are several bushes and some larger trees, running parallel to the southern hedgerow. These include a reasonable size sycamore (*Acer pseudoplatanus*) and a cherry (*Prunus avium*), both of which may be at least 20 years old. Younger trees and shrubs include poplar (*Populus sp.*), hawthorn (*Crataegus monogyna*), ash (*Fraxinus excelsior),* rowan (*Sorbus aucuparia*), elder (*Sambucus nigra),* silver birch (*Betula pendula*), dog rose (*Rosa canina*), bramble (*Rubus fruticosus*) and beech (*Fagus sylvatica*).

The boundary hedgerow is well established and constitutes a good hedgerow habitat, likely to support typical bird and small mammal species. The western section of the hedge is 1 to 1.5m high and dominated by hawthorn, with blackthorn *(Prunus spinosa),* bramble and elder, together with standards of oak (*Quercus* sp.) and elm (*Ulmus* sp.). Recent landscape planting of field maple (*Acer campestre*) and ash *(Fraxinus excelsior)* have supplemented it. The northern section is around 2m high and is dominated by hawthorn with bramble, elder and ash. The eastern section of the hedge is around 3 to 4m high and dominated by hawthorn. There is also abundant blackthorn, as well as bramble, ash and cherry standards. The southern section is around 5 to 6m high and dominated by hawthorn with ash, sycamore, elder and bramble.

(ii) Fauna

The grassland is likely to support a limited invertebrate fauna, characteristic of neglected/disturbed grasslands. Peacock (*Inachis io*) and common blue (*Polyommatus icarus*) butterflies were observed during the first survey in 1999 and are expected to be typical of the invertebrate interest, which also included occasional anthills in the longer grass.

There is evidence of rabbits (*Oryctolagus cuniculus*) and brown hare (*Lepus europaeus*) using the field. Several rabbit warrens and abundant droppings were seen during the site visit in March 2005. Mouse droppings were also noted and a brown hare was observed. Brown hare has declined across the UK in recent decades due to changes in agricultural practices, and is listed on the UK BAP. However, there is no action plan for this species on the Leicester, Leicestershire and Rutland Local Biodiversity Action Plan.

There is also evidence of visiting badgers (*Meles meles*), including pathways from the surrounding arable fields and entering the site from mainly the eastern and southern boundaries; however pathways were observed along the whole boundary area. They occasionally come through the main vehicular entrance, as reported by security staff at the WTW, but mainly they enter from the woodland due east, where they are thought to reside. Badger setts have been recorded in Glaston Wood, approximately 1km to the south of the site boundary. An obvious pathway of either badger or rabbit usage noted during the March 2005 site visit was in the north-east corner of the lagoon area and along the southern boundary hedge line. Uprooting of vegetation and interference with a wasp's nest, both thought to be due to badger activity, were observed during the 1999 survey. No badger latrines or setts were found on either site visit and it is concluded that badgers visit the site to feed on invertebrates, anthills and possibly within the dry lagoon. Use of the site by badger is of importance with respect to the proposed development because this species is legally protected under the Protection of Badgers Act 1992.

In the south-east corner, piles of rubble and any south-facing banks could potentially support reptile populations. Leicestershire County Council hold records of common lizard (*Lacerta vivipara*) and grass snake (*Natrix natrix*) from close to the site. Given that these species, as well as adder (*Viperus berus*) and slow-worm (*Anguis fragilis*) are protected by the Wildlife and Countryside Act, it is recommended that a survey is carried out in the spring/summer preceding the commencement of development, such that appropriate mitigation can be instigated during construction..

The site is likely to support a variety of common bird species, such as robin (*Erithacus rubecula*), blackbird (*Turdus merula*), etc. which may be nesting in the hedgerows, scrub and trees. Barn owl (*Tyto alba*) have been recorded from the surrounding area.

Pipistrelle bats (*Pipistrellus pipistrellus*) and brown long-eared bats (*Plecotus auritus*) have been recorded around Wing, but within the site there are no trees considered to be suitable for use by roosting bats and it is not proposed to demolish any buildings that may support bats.

(c) Lagoon

(i) Flora

The lagoon was constructed by Anglian Water *circa* 1976, as an emergency temporary holding facility for organic sludge from the WTW thickeners. It was constructed by earth excavation, which formed the surrounding bunds. It is still used as an emergency temporary storage of sludge, but was dry at the time of the survey in March 2005.

At the time of the 1999 survey, much of the lagoon base was open mud and supported a limited diversity of wetland plants and ruderals. There was a small area of open water , behind which there was a dense stand (approximately 20 by 15m) of reedmace (*Typha latifolia*). Wetland plant species included goat willow *(Salix caprea*), sedge (*Carex* spp.), purple loosestrife (*Lythrum salicaria*), soft rush (*Juncus effusus*) and hard rush (*J. inflexus*). At the time of the 2005 survey the lagoon was completely dry and there appeared to be a loss of some of the wetland plants, in particular the rushes. The lagoon now supports mainly willow (*Salix* spp) and reed sweet-grass (*Glyceria maxima*), with pockets of vegetation coverage, concentrated within the south-eastern part of the lagoon area. The western boundary supports some remnant marginal aquatic vegetation and frequent willow.

The bunds surrounding the lagoon are dominated by coarse grasses and ruderals and are therefore of low botanical interest. Plant species include creeping thistle, spear thistle, pineapple weed (*Matricaria matricarioides*), hogweed (*Hercleum sphondylium*), ox-eye daisy (*Leucanthemum vulgare*), ribwort plantain (*Plantago lanceolata*) and coltsfoot (*Tussilago farfara*).

(ii) Fauna

At the time of the 1999 survey, the substrate of the lagoon was rich in decomposing organic matter producing hydrogen sulphide. These highly organic

and anoxic conditions were restricting the wildlife interest considerably. A survey revealed no amphibian interest but three-spined stickleback (*Gasterostreus aculeatus)* and tubifex worms (*Tubifex tubifex*) were observed. These species were not present during the 2005 survey as the lagoon was completely dry. There is no potential for breeding amphibians, such as great crested newt (*Tritarus cristatus*). The lagoon supported a limited bird population at the time of the 1999 survey, with species associated with wetlands present (coot, moorhen and one snipe were observed during the survey). These species were not observed during the 2005 survey.

A high level of activity by rabbits was noted on the bunds during the 2005 survey, as indicated by presence of rabbit warrens and droppings. The southern bund contains an old rabbit burrow, which was occupied by nesting wasps during the 1999 survey. Although not occupied by wasps at the time of the 2005 survey, the burrow was still present, and therefore could be again occupied by wasps. It is also considered that the bunds could provide habitat for reptiles.

5.7 Human Environment

5.7.1 Planning Policy

The site of Wing WTW itself is classified in the Local Plan as a Special Policy Area (policy SP1, Appendix C). In such areas proposals which are contrary to general planning policies may need to be accepted. Planning applications for development at Wing WTW must be submitted to the County Council, but would be determined in the light of specific government guidance.

If a project at the WTW departs from general planning policy, there must be regard for:

(a) the extent of departure and whether the proposal is essential for operational requirements;

(b) the scope for minimising the impacts of the proposal, through for example:

- careful siting and design
- provision of landscaping
- limitation of operating hours
- limitation of traffic flows
- noise and pollution control.

5.7.2 *Land Use*

(a) The Extension Site

The extension site currently is disused. Formerly improved grassland, it is overgrown and tall ruderal species are abundant. It contains a large grassed mound comprising excavated material from former construction works and a dry lagoon.

(b) The Surrounding Area

Rutland Water reservoir is used for multiple purposes. Its prime use is for the abstraction of water but it is also used for recreation purposes and is of international nature conservation value. Excluding Rutland Water, the main land use in the area is farming, both arable and grazing. There are a number of settlements in the area, mostly small villages.

Land use in the Nene Washes includes:

- arable farming in areas bunded to provide flood protection;
- grazing in fields, which are surrounded by ditches used as wet fences and for stock watering;
- nature conservation (286 ha RSPB reserve); and
- wildfowling.

5.7.3 *Settlements*

There are several small villages within the surrounding area including; Wing, Pilton, Morcott, South Luffenham, North Luffenham, Lyndon, Glaston, Preston and Manton. The village of Wing is located immediately adjacent to the WTW and is classified under the Rutland Local Plan as a conservation area. Conservation areas are areas of special archaeological or historic interest whose character or appearance should be enhanced or preserved.

5.7.4 *Transport*

The village of Wing is served by single carriageway rural roads, many less than 4m wide, providing links to adjacent villages and the main road network.

The A47(T) trunk road passes approximately 2km south of Wing and the A6003 passes approximately 2km to the west. The weekday average traffic flow on the A47(T) at Glaston is 10,360 (5054 eastbound and 5306 westbound) (RCC Highways, *pers. comm.*).

The access to the WTW is from the Wing to Morcott B road (C8392). The C8392 generally is more than 4m wide.

5.7.5 *Noise*

The area in the vicinity of Wing WTW is characterised generally by low background noise typical of a rural environment, such as passing light vehicles or tractors working. Wing WTW itself has few external noise sources, as the majority of the plant is enclosed in concrete and steel structures. The micro-strainers, which are in operation continuously, are not enclosed and generate a constant noise of falling water and the hum of equipment.

A noise characterisation survey, to identify and describe the principal noise sources in the vicinity of Wing WTW, was undertaken on 4 February and 22 March 1999. This survey was repeated in March 2005 for the purposes of updating this report; and it is the results of this survey that are presented here.

The results are presented in Table 5.1 and the noise survey locations are shown on Figure 4.

TABLE 5.1. NOISE CHARACTERISATION SURVEY

LOCATION	DESCRIPTION OF NOISE CHARACTER
A. Glaston (car park at rear of public house, north of A47)	Almost constant intrusive traffic noise from the A47. Constant noise of farm machinery operating to west of Wing Road.
B. Glaston-Wing Road – brow of hill overlooking Wing WTW	Constant distant hum of traffic from A47. Noise from aircraft. No discernible noise from Wing WTW.
C. Mill Close/Glaston Road junction, **Wing**	Tractor operating in fields to west. Discernible hum from A47. Birdsong. Aircraft passing overhead. No discernible noise from Wing WTW.
D. Morcott Road, **Wing**, NE corner of Wing WTW	Hum from micro-strainers at Wing WTW. Aircraft and bird noise. Vehicle passing on Morcott Road.

E. Morcott Road, **Wing,** NE corner of extension site	Hum from micro-strainers at Wing WTW. Birdsong. Shotguns firing repeatedly to south of extension site.		
F. Junction of Wing Road, **Morcott**	Distant traffic noise from A47. Tractor noise from the south. Hammering from building works. Several cars passing.		
Date: 22 March 1999	**Time: 1600-1730**	**Wind: Gentle to moderate westerly breeze**	**Cloud: High, thin cloud cover**

Generally, the noise character was confirmed as being typical of a rural location, with traffic noise from the A47 trunk road influencing the noise character. At Wing, the noise from the micro-strainers was discernible at the northern and eastern boundaries of the existing WTW, but not to the west. It is likely that noise from Wing WTW would be discernible at the western boundary under different wind conditions.

5.7.6 *Sites of Archaeological Importance*

The Wing Maze (grid reference SK895027) is a Scheduled Monument which must be preserved *in situ* (Figure 4). The maze is sited on the west side of the narrow Wing to Glaston road, on the eastern edge of Wing village. It is thought to date from medieval times and to have been used by religious penitents.

5.7.7 *Recreation and Navigation*

(a) General Area

There are rights of way, both bridleways and footpaths, in the area surrounding the WTW, which are used by walkers, cyclists and horse riders. There are no rights of way through the extension site.

(b) Rutland Water

Rutland Water attracts many visitors, estimated by Anglian Water at approximately one million a year, and offers a wide range of facilities. These facilities include a visitor/tourist information centre, Normanton church museum, fishing lodge, water sports centre and a butterfly and aquatic centre. There are several car parks

Contents

located around the reservoir providing access to these facilities. Several activities (with estimated participation by visitors in brackets) are available including:

- cycle hire (9%);
- bank and boat fishing (4%);
- watersports including canoe and rowing boat hire and day sailing/windsurfing (2%);
- a sailing club (2%);
- birdwatching/visits to nature reserve (5%); and
- Rutland Belle passenger cruiser trips (3%).

The majority of visits are for informal recreation. (Anglian Water, *pers. comm.*).

The conservation value of the reservoir is promoted through the provision of a nature trail, drought garden and a nature reserve (comprising Lyndon and Egleton reserves) which covers 450 acres and incorporates a bird watching centre and information centre. There are 21 bird hides located around the reservoir. Permits are required to access the hides. The provision of hides overlooking an attractive landscape and undisturbed waters has increased the overall interest in wildlife at the reservoir. The British Birdwatching Fair is held by the RSPB and Leicestershire and Rutland Wildlife Trust every year for three days in August on the grass fields to the north of the bird watching centre. This is the biggest visitor attraction at the reservoir, attracting an estimated additional 12,000 visitors a year.

Rutland Water is popular with walkers, cyclists and for horse-riding. A designated recreation path is located along the north shore of the reservoir and there is a 25 mile circuit around the whole reservoir or a 19 mile route omitting the Hambleton Peninsula. The Rutland Cycle Way is located on roads and paths surrounding the reservoir.

The reservoir is presently zoned into sections for different activities, such as sailing, fishing and conservation. Limits and restricted areas for activities are designated by an English Nature permit for operations at Rutland Water SSSI (Figure 6). Certain activities, such as fishing are restricted to specific seasons. (Table 5.2) Other restrictions on recreation may be imposed in the event of substantial drawdown of the reservoir.

TABLE 5.2. SEASONAL RESTRICTIONS ON RECREATION ACTIVITIES AT RUTLAND WATER

ACTIVITY	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Bank Fishing (1)				→	→	→	→	→	→	→	⇢	→
Boat Fishing (2)				→	→	→	→	→	→	→	⇢	→
Sailing (3)	⇢	⇢	→	→	→	→	→	→	→	→	→	→
Canoeing (4)	⇢	⇢	→	→	→	→	→	→	→	→	⇢	⇢
Bird Fair (5)								→				
Rutland Belle (6)				→	→	→	→	→	→	→		

→ Period of Activity (see notes)

⇢ Period Activity with additional restrictions or reduction in activity (see notes)

Notes:

(1) Bank fishing not allowed in Nature Reserve.

Permits are required for parking on peninsula

Additional Areas restricted from 1st of November, access to park on peninsula shut from 1st November

(2) Boat fishing allowed past limits of sailing but must not be within 50m of shore and not within Manton Bay

Permits are required

From 1st of November restricted to within limits of sailing

(3) Sailing restricted to limits of sailing

From 1st of December to 31st of March most sailing activity is from the sailing club

(4) Canoeing restricted to limits of sailing

From 1st of October to 31st March only 25 craft from Canoe club allowed, these must be within 50m of the shore, between Whitwell creek and the limits of sailing at Lodge inlet

(5) Bird Fair takes place for 3 days over August (largest visitor attraction)

(6) Must operate no closer than 50m to shore except at landing points at Whitwell and Normanton

(c) River Nene

The River Nene is also an important recreational resource. Within the Nene catchment there is a wide range of different water based activities. An estimated 180 million day visits were attributed to freshwater recreation in 1996, consisting mostly of walking, angling and water sports (Environment Agency, 1998). Pleasure boating is the main water sports activity, particularly during summer. Canoeing also occurs. The Nene is navigable between Northampton and the Wash, giving access to the Grand Union Canal and Middle Level Systems. During periods of low flow, navigation of the river can become difficult and more sediment is deposited due to reduced velocities, which further restrict the channel (Environment Agency, 1998).

Between Northampton and Peterborough the Nene is used both for pleasure and match fishing purposes, with many habitat types ranging from rapid shallow moving backwaters to broad deep meandering reaches. The Nene Way footpath follows the river upstream of Northampton down to Wansford attracting walkers, cyclists and horse riders.

6 Mitigation Incorporated and Assessment of Impacts of the Scheme

6.1 *Introduction*

This section describes and assesses the impacts likely to occur as a result of the scheme. Comprehensive mitigation measures to avoid, reduce or minimise the scale of the potential impacts have been integrated in the design, as discussed in Section 4. Where such mitigation is proposed, the details of the mitigation measures are provided and the relevant impact assessed on the basis that the mitigation measures have been implemented.

In describing the predicted impacts, the following general approach has been adopted for each environmental factor:

- Identification and description of the potential impact;
- Where relevant, estimation of the likelihood that the impact will occur;
- Estimation or calculation of the magnitude or severity of the impact (negligible, minor, moderate, major);
- Estimation of the probable duration of the impact.

The precise manner in which this process is applied to each environmental factor varies according to the type of background data collected and the assessment or analytical methodologies used. The criteria used to assign significance are described in Appendix J. A summary of impacts is tabulated in Section 8.

Impacts during both construction and operation have been considered for the site itself and the surrounding area. However, impacts on the nature conservation interests of the European sites, Rutland Water, Nene Washes and the Wash have not been assessed in detail in this document because the potential impacts on these sites have been discussed in separate reports (Halcrow 1999b, Halcrow 1999c, Halcrow 2000a and Halcrow 2000b) produced at the time of the original planning application and have since been taken forward in terms of Appropriate Assessment and the Review of Consents.

The following environmental factors have been addressed in this EA:

- Landscape Character and Visual Impact
- Geology and Soils
- Hydrology
- Water Quality
- Ecology and Nature Conservation
- Human Environment
    - Settlements
    - Transport and Access
    - Noise and Nuisance
    - Archaeology
    - Recreation

6.2 *Landscape and Visual*

6.2.1 *Impact on Landscape Character*

The screen planting proposed as mitigation for the visual impact of the extension would be a predominantly ash woodland, with oak and field maple as subsidiary trees, together with a native shrub edge, consisting of hazel, hawthorn, blackthorn, native privet, elder and dogwood. The proposed landscaping and planting is shown on Figure 8 and the list of species is included as Appendix E. To ensure establishment of the woodland, a 3 year maintenance and defects liability period should be included in the landscape contract. The planting will also require management and maintenance in the longer term, in keeping with ongoing maintenance of existing planting on the site.

Although the Ridges and Valleys Character Area is more open than the adjoining Leighfield Forest Character Area, there are still woodlands and coppices prominent within the landscape. The site itself is not in an open landscape setting and forms an extension to the existing pumping station which adjoins the village of Wing. The surrounding mature trees form a good screen for the existing buildings and would assist in the long term integration of the extension into the landscape.

Taking into account the mitigation measures proposed, the overall impact on the landscape character would be ***Minor Adverse*** during construction and immediately after completion. In the long term, once the new planting proposed had become established, it would be reduced to ***Neutral.***

6.2.2 *Visual Impact*

(a) Construction Phase

During construction, the following activities would be visible:

(i) Presence of construction plant and vehicles at and in the vicinity of the site;

(ii) Works to re-profile the existing screening mound and construct new mounds; and

(iii) Erection of built structures (impact of partially completed structures).

These impacts are of a temporary nature and would cease when construction was complete. The visual impact of construction activity would be minimised by constructing the landscaping bunds as early in the construction programme as possible. The existing plantation and bunding along the southern boundary of the site provides screening from the south and the main part of these would be retained. The loss of density as a result of the removal of part of the planting would increase the visibility to the south but as the nearest receptors are travellers on roads at a distance of about 2km the change is not judged to be significant.

Elsewhere, views during construction have been judged to be the same as views immediately after completion as the location of the site on the crest of a ridge, and the surrounding hedges prevents most ground level views where clutter normally raises visual intrusion during construction.

(b) Operational Phase

The visual impact of the proposed development during the operational phase has been assessed from a number of viewpoints, as shown in Figure 11. Assessment of the impact was assisted by the flying of large coloured balloons positioned to reflect the siting and height of the proposed building. The visual impact of the scheme at each viewpoint is assessed below.

(i) Wing Village / Morcott Road.

Although from within Wing village there would not be any significant visual impact, there would be views for travellers leaving Wing and heading along the minor road towards Morcott. From a contained visual corridor heading out of the village the view opens out into a more open rural aspect. Given that this road is also used by walkers, cyclists and horse-riders, its sensitivity as a receptor is considered to be higher than most roads. Although the building would be set back from the highway by approximately 80 metres its scale and height mean that there would initially be some impact on the immediate approach to Wing (Figure 14). However, as the landscape planting matures and the boundary hedgerow is allowed to grow up to 3m in height, the trees and shrubs will largely obscure the building

(Figure 14a). The tree planting proposed as mitigation adjoining the highway would help reduce the long term visual impact of the building.

Sensitivity: high to medium

Impact: Temporary moderate adverse– but with mitigation treatment proposed would be reduced over time to slight adverse-neutral.

(ii) Lyndon.

To the north of Wing is the small hamlet of Lyndon with historic Lyndon Hall. The Hall looks directly south over the River Chater valley at an elevation of approximately 90 metres. This is a distant view; the top of the proposed building would be visible, although the amount of surrounding vegetation and the distance of the view (1.6km) means that the impact would be insignificant initially and it would eventually be screened by the proposed woodland screen planting. Given that this road is also used by walkers and horse-riders, its sensitivity as a receptor is considered to be higher than most roads.

Sensitivity high to medium

Impact: Neutral

(iii) Junction of Morcott Road with Pilton Road.

The view from which the proposed development could be most prominent is the view obtained by travellers approaching from Morcott on the Morcott Road. The road runs almost directly towards the proposed building for a distance of approximately 2.2km. The road is however bounded by mature hedgerows which do provide an immediate visual barrier, although there would be some glimpses through gaps in the hedge and through field gateways. The view point selected is the junction of Pilton Road with Morcott Road and is approximately 500 metres from a long elevation of the proposed building. However, it is proposed to in-fill gaps in hedgerows where necessary and to allow the hedgerow to grow up to 3m in height. A photomontage depicting the proposed extension from this viewpoint is shown in Figure 15 (winter view) and Figure 15a (summer view, including depiction of when the landscape planting is mature).

Sensitivity: medium to low (although this is a highway, it is also a lane used by walkers)

Impact: Moderate adverse immediately after construction reducing to slight adverse-neutral after approximately 12 to 15 years growth.

(iv) A47 between Glaston and Morcott

The A47 runs on a ridge at a slightly higher level than the ridge on which the Wing Water Treatment Plant is located. Heading east from Glaston towards Morcott there are elevated views across the surrounding landscape. The view of the proposed building extension would be obscured by mature woodland until Glaston Lodge is reached. This is a distant view and the impact would be low; screening would be assisted by a maturing mixed native plantation. Travelling west from Morcott there are distant views for a short period, until the view is obscured behind woodland. Adjoining the A47 at Morcott is a Motel where there would be distant views of the building but the impact is expected to be low, due to the distance (2km) and the complexity of the landscape.

Sensitivity: the sensitivity of the road user is assessed as low.

Impact: slight adverse to neutral

(v) A47 to Wing Burrows Lane.

There are glimpses of the existing WTW when approaching the A47 (Glaston Road) from Uppingham, although the views are secondary within the overall complexity of the landscape at the junction.

However, a clear panoramic view of the landscape, which includes the existing water treatment plant buildings, is available when travelling along the lane to the north of the A47, heading towards Wing Burrows.

From this location the proposed new pumping station building would be visible until woodland screen planting established. It is also a distant view of approximately 2km which further reduces its impact within the overall landscape.

Sensitivity: the sensitivity has been assessed as low to medium allowing for occasional walkers

Impact: slight adverse.

6.3 *Landscape / Visual Impact Mitigation*

6.3.1 *Retention of existing vegetation*

The retention of significant vegetation is important to minimise the impact of the proposed development. The majority of the surrounding hedgerows and trees would not be affected; however there is a significant plantation on the south west corner of the proposed pumping station, which would be slightly reduced in size during the construction of a proposed chlorine contact and final water storage tank. This plantation is approximately 12 years old and the trees have now reached a height of approximately 5 metres. The remaining part of the plantation and the proposed new planting would form an initial partial screen and a long term effective screen in views from the south.

6.3.2 *Landform and screen planting*

The field where the new pumping station building is proposed varies in height from 116.5 metres A.O.D. in south eastern corner to 119.5 metres A.O.D. in the north western corner. Running parallel with the southern boundary and extending into the site by 80 metres is a grassed earth bund which rises to the height of 120.5 metres. The footprint of the proposed chlorine contact and final water storage tank has been reduced to allow the retention of most of this bund, helping to minimise the overall scale of the main building and reduce its impact when viewed from the south.

Native forestry scale planting is proposed to minimise views of the proposed development and allow the mitigation to fit appropriately within the landscape.

6.3.3 *Colour*

The selection of an appropriate colour within the landscape is essential if the impact of the proposed buildings is to be minimised. The buildings are to be constructed from profiled sheet steel painted in a neutral blue-grey colour. Given that the new buildings, which are 15m high, would at certain elevations stand out against the skyline and therefore this colour has been selected to minimise visual impact.

6.4 *Summary*

Despite the building being constructed on a ridge it is only visible from certain directions. In summary this as follows:-

From the north – the general topography, tree cover and distance of the development from the edge of the ridge means that there is no impact from the north.

From the east – the top of the building would be visible until the screen planting became established after approximately 10 – 15 years.

From the west- the topography, the existing treatment plant and Wing village ensures that there would generally be no impact from the west. Wing village, the closest settlement to the development, would be affected only minimally due to the existing treatment plant buildings providing screening and the proposed building being located well away from the highway. There would be distant views from the south west however in the area around Granby Lodge, adjoining the A47. To minimise this impact earth bunding and new screen planting is proposed.

From the south – There are some distant views particularly from the A47 and the lanes approaching Wing from the Glaston direction, although the view from Glaston is blocked by a wood immediately to the north of the village. Earth bunding and new screen planting is essential to minimise the visual impact. Once the planting matures then the visual impact after 10 to 15 years would be minimal.

As far as the landscape character is concerned the development is within the Ridges and Valleys landscape Character Area and although it is generally of an open nature there are some significant linear woodlands. The development of new screen woodland around the proposed development is not seen as inappropriate in the overall landscape setting.

6.5 Geology and Soils

6.5.1 Construction Phase

The construction works at Wing would involve the excavation and reuse in landscaping of soils from an area of overgrown and disused, probably previously improved, grassland. Therefore, there is a **negligible impact** on soils and geology within the extension site.

Provided the construction works are undertaken in accordance with the contractors' standard procedures for pollution control and water management, the risk of soil contamination would be minimised. None-the-less, there is potential for accidental spillage or other incident to cause a localised **minor impact** on soils.

TABLES

FIGURES

The construction works would not penetrate the geological SSSI at the existing site, although it may be used for storage during the construction period. However, given that the geology of the site is important for its sub-surface stratigraphic sequence and does not support any exposed rock, no impacts are predicted. On the basis of the groundwater levels reported by AF Howlands Associates (1998) of more than 3.94 m below ground level, the contractors do not envisage that the excavations for foundations and buried structures would require dewatering, other than for rainwater. Consequently, there would be no groundwater drawdown and a **negligible impact** on the geological SSSI.

6.5.2 *Operational Phase*

The geological SSSI would not be affected by the operation of the extension.

The management and control procedures at the existing works would be applied to the extension, to minimise the risk of seepage or spillage of chemicals. The risk of accidental spillage or other incident would not be significantly greater than at present, resulting in a **negligible impact**.

6.6 Hydrology

6.6.1 *Construction Phase*

(a) The extension site

Discharges to Morcott Brook would be required during the commissioning stage, as the water resulting from testing the WTW cannot be put into the supply system. These discharges would be subject to a temporary consent from the Environment Agency under the Water Resources Act 1991. Similar discharges have been made in the past during commissioning work, with **negligible impacts.**

6.6.2 *Operational Phase*

(a) The extension site

Discharges of surface water from the existing site to Morcott Brook are subject to consent under the Water Resources Act 1991, which are issued by the Environment Agency. The current consents (Table 4.2) are adequate for the increased discharges arising from the extension, with **negligible impact**.

(b) Rutland Water

A simulation of reservoir yield has been developed by Anglian Water. It establishes the drawdown of Rutland Water based on river flow data for the period from 1920 to 2002(Figure 10). The simulation shows the levels of the reservoir (expressed as percentage full) for two scenarios:

- abstraction from Rutland Water at 2004 average rates (outputs = 230 Ml/d, reservoir yield = 290 Ml/d). These current rates include transfers to Saltersford WTW; and
- maximum possible average abstraction from Rutland Water needed whilst operating the existing plant and the extension (proposed) at their full output.

The maximum possible average abstraction figure (usually called 'reservoir design yield') is obtained from the simulation. It is obtained by gradually increasing abstraction over the complete 1920-2002 period until the reservoir touches the emergency storage level (approximately 7% full for Rutland). In the simulation maximum possible output is maintained throughout the period 1920-1996, with emergency storage being reached in December 1945.

The simulation has some limitations for the current purpose. It assumes that the reservoir is managed to completely fill the reservoir, by abstracting all the water allowed under the abstraction licences, subject to the limitations of the pumps. However, in reality, operational factors have constrained reservoir fill and pumping. Since 1977 reservoir refill has been geared to achieving a target hydrograph which fluctuates seasonally. There have been periods when it has been necessary to suspend refill pumping due to poor river water quality, maintenance or mechanical failure. In addition, Anglian Water has operated pumps at variable rates during the main refill period to take advantage of cheaper electricity. For these reasons, the simulation of reservoir level (% full) for the current rate (Figure 10) does not match the actual level (% full) shown in Figure 5.

However, the simulation demonstrates certain trends. It shows that in the majority of years, water levels in the reservoir are close to maximum in both scenarios. In periods of successive dry years, when there is insufficient water available to refill the reservoir, the water level is drawn down more under the scenario for the full use of the existing and proposed extension to Wing WTW.

The simulation identified the critical drought events that would have resulted in substantial drawdown (below 60% full). Events of this magnitude are predicted to have occurred on five occasions, as shown in Table 6.1.

TABLE 6.1 OCCURRENCE OF SUBSTANTIAL DRAWDOWN EVENTS AT RUTLAND WATER

Event	Reservoir % Full (lowest during event)	
	2004 Average Abstraction (Current) 230 Ml/d	Potential Full Yield of Reservoir [290 Ml/d]
1934-36	52.8	24.8
1943-46	30.5	5.2
1948	72.7	45.8
1964-65	74.4	49.6
1976	63.5	51.4

Excluding the 1990s, for which the simulated levels are different from actual levels, two events in the preceding 80 years was identified as causing drawdown to 60 % full for the current abstraction rate. The effect of the proposals using the reservoir to its full yield was demonstrated to result in drawdown below 60% on five occasions in that period (and in one case to emergency storage level). However, it must be remembered that the simulation uses past data to compare different scenarios and does not provide a prediction of future events. The simulation demonstrates that the proposals potentially would have a **moderate to major impact** on the hydrology of Rutland Water.

The resultant implications of the increased rates of drawdown for water quality, ecology and recreation and discussed in sections 6.7, 6.8 and 6.9.7 respectively.

(c) Rivers Nene and Welland

The rate of abstraction from the rivers Welland and Nene would not be increased. The extra water required in Rutland Water would be provided by increasing the length of time water is abstracted at maximum rate from the two rivers, when flows are sufficient. It should be noted that the amount of water taken from the river each day is determined by the availability of water in the rivers in excess of the Minimum Residual Flow (MRF).

The proposed increased abstractions from the Rivers Welland and Nene potentially have implications for the hydrology of the rivers, the Nene Washes (fed by the River Nene) and the Wash, to which both rivers flow.

The hydraulic study (Halcrow, 1999c) examined the effects of increased abstraction on water flows and levels in the Rivers Nene and Welland. Increased abstraction would be from the Welland preferentially, as the most efficiently operated source of water.

This study showed that, in four to five years out of ten, additional water would be needed from both the Welland and the Nene. The increased abstraction would lead to longer periods of flows in the Welland and Nene at or close to the MRF (36.3 Ml/d at Tinwell; 150Ml/d in summer and 125Ml/d in winter at Wansford). This may result in increased stagnation in some back channels. In wet years, three to four out of ten, increased abstraction only from the Welland would be sufficient to meet the increased output from Wing. In these years, flows in the Welland would be reduced to the MRF for longer than at present.

The hydraulic study concluded that the additional abstraction and resultant longer periods of MRF in the Welland and Nene would lead to conflicts of interest between water users. However, the MRF is usually only ever reached in the winter months, thus limiting the impacts on summer spray irrigation and navigation by leisure boats. Therefore this is considered a **minor impact**.

The reduction in flows to the estuaries during dry periods has the potential to modify the salinity gradient in the estuaries of the Welland and Nene. This is a potentially **moderate impact.**

(d) Nene Washes and the Wash

The hydraulic study concluded that increasing abstraction:

- is not expected to affect natural flood levels in the Nene Washes; and
- may not affect water levels in the Nene Washes during periods of low flow, but potentially at the expense of providing sufficient flow to prevent stagnation in some channels.

The hydraulic study (Halcrow, 1999c) concluded that freshwater flows to the Wash would be reduced during periods of low flow. Reduction in the frequency of high flows to the Wash has the potential to modify the natural movement of sandbanks

in the Wash and, potentially, to block the estuary mouth. If blockage becomes sufficient to affect navigation then increased dredging may be required. At the time of writing the original version of this report (Halcrow, 1999a), there was insufficient information on the effects of freshwater flows on channel siltation to predict impacts on the Wash (Environment Agency 1997b). The Review of Consents process will provide further information, but these reports are not expected until 2006. However, monitoring carried out by Essex and Suffolk Water over the period 2000-2005 has shown that the predominant impact on siltation in the Wash is the occurrence of flood flows large enough to move volumes of silt and the influence of abstraction on low flows is minor in relation to both the deposition and removal of silt. Therefore, it is considered that modified abstraction regime would have **negligible impacts** on siltation in the Wash.

6.7 ***Water Quality***

6.7.1 *Construction Phase*

(a) The extension site

Wing WTW has an existing surface drainage discharge to Morcott Brook. Construction activities in close proximity to water present a potential risk to water quality, primarily as a result of spillage of fuel and the discharge of suspended solids. Provided the construction works are undertaken in accordance with the contractors' standard procedures, which would follow Environment Agency Pollution Prevention Guidelines for pollution control and water management, the risk of water contamination would be minimised. Nonetheless, there is potential for accidental spillage or other incident to cause a localised **minor impact.**

(b) Rutland Water

There would be no impacts on the water quality of Rutland Water during the construction phase.

(c) The Rivers Nene and Welland, Nene Washes and the Wash

There would be no impacts on the water quality of the rivers Nene and Welland, the Nene Washes SPA or the Wash SPA during the construction phase.

6.7.2 *Operational Phase*

(a) Extension Site

There would be no impacts on the water quality in the extension site and immediate vicinity during the operational phase.

(b) Rutland Water

The critical contaminant in Rutland Water, under the Drinking Water Directive, is nitrate, which must not exceed a 95 percentile concentration of 11.3 mg/l of nitrate, measured as nitrogen (N). The Rutland Water SPA study (Halcrow, 2000a) showed that nitrate concentrations in Rutland Water have historically been at or below 8 mg/l N. The predictions in the modelling study carried out as part of the Rutland SPA research (P Daldorph, App. E, Halcrow, 2000a) suggest that, if the reservoir is drawn to 40% of its capacity, there is a risk that nitrate concentrations may approach the drinking water standard limit. However, since the time of this study there have been improvements to water quality as a result of implementation of the Nitrates Directive and Habitats Directive. For example, re-designation of Nitrate Vulnerable Zones (NVZs) in 2002 has led to a decrease in nitrate export into Rutland Water.

The hydrographs show that a reservoir level of less than 40% would have occurred under the proposed abstraction regime on five occasions since 1920 (1934, 1935, 1944, 1945 and 1946). The 2004 average abstraction rate would not result in the reservoir being drawn down to 40% full at any time. Although there remains an increased risk of the nitrate concentration approaching the drinking water standard limit and constraining the abstractions form the rivers and the reservoir, the fact that significant improvements to water quality have been made since 1999 and the results of the modelling carried out for the 1999 report can be regarded as a 'worst case scenario', the moderate impact predicted in the Environmental Assessment Report submitted in 1999 is considered to be reduced now to a **minor impact**.

Phosphate concentration is a factor in controlling eutrophication and algal blooms. Work undertaken by P Daldoph for the Rutland Water SPA study (Appendix E, Halcrow, 2000a) demonstrated that, as a result of recently implemented improvements to wastewater treatment works, as required by the Urban Waste Water Treatment Directive (UWWTD), increases in phosphate concentrations in the reservoir as a result of the proposals would be off-set by improvements made as a result of the UWWTD. However, English Nature considers that the maintenance of nutrient loadings at the present levels is undesirable (Halcrow, 1999a). There is concern that any increase in phosphate concentration in Rutland Water could tip the balance from macrophyte-dominated to algal-dominated because the reservoir is already at risk of the effects of eutrophication. Any further nutrient enrichment could damage the feeding value of the site for waterfowl and hence might affect the SPA-qualifying features of the site. Potential eutrophication and an increased risk of algal dominance is considered to be a potentially

moderate to major impact. However, it should be noted that the existing water quality of Rutland Water has been adequate to sustain SPA status.

(c) The Rivers Nene and Welland, Nene Washes and the Wash

The hydraulic study (Halcrow, 1999c) examined the effects of increased abstraction on water flows and levels in the Rivers Nene and Welland. With regard to water quality issues it concluded that prolonged periods of low flow may cause the salinity gradient in the estuary to change as freshwater flushing decreases on the ebb tide. There is no information on the critical flows required to prevent saline intrusion. However, salinity changes are most apparent at low states of tide, when the ratio of fresh to saline water is highest and the entrainment of ebb flows by training walls, particularly at the later stages of the ebb tide, would restrict the impact of any changes in salinity to within the river channel. The impacts of these potential changes are being addressed through the Review of Consents process, and the results are not yet available.

The Environment Agency (1997c) has identified that periods of low flow may cause deterioration in dissolved oxygen concentrations of the water in the rivers Welland and Nene. Prolonging the period at which the rivers are at MRF potentially would exacerbate this problem. Deterioration in dissolved oxygen may lead to a decrease in GQA score and subsequently failure to meet River Quality Objectives. This would result in a **moderate impact** on Water Quality for the Rivers Nene and Welland.

6.8 Ecology and Conservation

6.8.1 Construction Phase

(a) Extension Site

(i) Main Field and Boundary Hedgerow

The majority of the site comprises coarse grassland of low wildlife interest. The loss of this habitat is considered to be a **minor impact**.

The perimeter hedge is well established and as such constitutes a typical hedgerow habitat that is likely to support small birds and mammals. It is therefore of local interest. The hedge would remain intact, apart from small breaches required for essential access. Any works to the hedgerows would be carried out between the months of October-February, thus avoiding disturbance of breeding birds. Any loss of nesting habitat for birds due to permanent loss of hedgerow would be mitigated in the longer term by the maturing trees planted as part of the

landscaping plans. As a result of this mitigation, there would be a **minor impact** on the wildlife interest of the hedgerows during construction..

(ii) Badgers

Badgers are using the site for foraging but no setts were discovered during the surveys in 1999 or 2005. Given the absence of badger setts in both survey periods and the limited extent of suitable habitat within the extension site for locating setts (badgers tend to excavate their setts in scrub and woodland and use naturally-occurring banks), it is unlikely that badgers would move into the site and build new setts prior to construction. However, the possibility cannot be ruled out, and the fact that badgers are legally protected means that setts can only be disturbed by otherwise lawful activities under licence from English Nature. Appropriate mitigation to avoid damage and disturbance would need to be demonstrated in order to obtain a licence. It is not considered worthwhile to exclude badgers from the site by erecting fencing because badger-proof fencing is expensive and rarely effective. Therefore it is proposed to carry out a further badger survey approximately two months prior to construction commencing to allow time for a licence application to be lodged with English Nature and appropriate mitigation to be put in place.

The proposals would result in the loss of badger foraging habitat, but there is plentiful alternative foraging habitat in terms of agricultural land and grassland in the immediate locality. As a result of mitigation, there would be a **negligible impact** on badgers.

(iii) Lagoon

The function of the lagoon as a wetland area has been lost as a result of the lagoon not being used on a regular basis. Therefore this part of the site is of very limited nature conservation value and the impact of it loss on the nature conservation value of the site is considered to be **negligible**.

(b) Designated Sites

Construction operations do not modify the hydraulic or abstraction regimes and therefore would have no impact on any of the three designated sites (Rutland Water, the Nene Washes or the Wash).

6.8.2 *Operational Phase*

(a) Extension Site

Operations would have a **negligible impact** on ecology and nature conservation.

(b) Designated Sites

(i) Rutland Water

The studies of potential effects on Rutland Water SPA (Halcrow, 1999b, revised in 2000 (Halcrow, 2000a)) considered a wide range of factors which can influence bird numbers, including changes in water levels and quality, availability of algae, macrophytes, invertebrates and fish and the availability of habitats. Further research was carried out by Ecoscope (2001) and a summary of the findings of both studies are presented here.

The extension of Wing WTW could increase the extent, duration and frequency of draw down events. The rate of refill following draw down would remain unchanged, although the time required to refill the reservoir may be greater depending on the extent of the draw down. In most years, water levels would return to normal operating levels by the end of the winter. However, unusually low rainfall over a year could prevent restoration of normal operating levels before the following summer and increase the duration of draw down. This could result in a successive decrease in reservoir levels, until levels were fully restored during a wet winter. Halcrow (2000a) concluded that an increase in the extent, duration and frequency of draw down events during drought years could cause the loss of large areas of shallow waters, between 0.0m and 0.35m in depth, particularly at the western end of the reservoir.

The ecological functioning of Rutland Water reservoir is dependent on the presence of healthy populations of aquatic macrophytes (rooted water weeds) and invertebrates, which the birds feed on (Halcrow, 2000a). The littoral zone (i.e. the area of shallow water at the reservoir margins) is the zone of maximum macrophyte growth and also supports abundant invertebrates. It is also the area most affected by changes in water levels.

Macrophytes and Algae

The critical water quality parameter for plant growth in Rutland Water is phosphate concentration. However, concentrations in Rutland Water are currently above the concentration which is thought to limit plant growth (0.75 – 1.0 mgP/l). Work undertaken by P Daldoph for the Rutland Water SPA study (Halcrow, 2000a) demonstrated that the proposed development is likely to cause an increase in phosphate concentrations in the reservoir, but that this would be offset by the improvements made under the Urban Waste Water Treatment Directive (UWWTD). However, English Nature considers that the maintenance of nutrient

loadings, including phosphates, at the present levels is undesirable (Halcrow, 1999a). This is because there is concern that any increase in phosphate concentration in Rutland Water could tip the balance from macrophyte-dominated to algal-dominated and this is considered to be a potentially **moderate to major impact.** However, it should be noted that the existing water quality of Rutland Water has been adequate to sustain SPA status.

Changes in water levels can affect macrophytes. The findings of the study inferred that drawdown of up to 3-4m would not have a permanent effect on macrophytes in Rutland Water. Under these conditions, the reservoir would continue to support sufficient macrophyte communities to provide a base for recolonisation. Drawdown by 3m to 4m corresponds to a reservoir level of between 74% and 66% full (Table 6.2).

TABLE 6.2. CORRELATION OF RESERVOIR FILL WITH WATER LEVELS AND WATER SURFACE AREAS AT RUTLAND WATER

Reservoir Percentage Full	Surface Water Level (mAOD)	Height Difference Between Surface Water Level and Maximum (m)	Water Surface Area (sq. km.)
100	83.82	**0**	11.61
95	83.31	0.5	11.16
90.41	82.82	**1**	10.81
90	82.78	1.1	10.79
85	82.23	1.6	10.40
81.43	81.82	**2**	10.12
80	81.65	2.3	10.00
75	81.06	2.9	9.63
73.03	80.82	**3**	9.47
70	80.45	3.5	9.23
65.19	79..82	**4**	8.82
65	79.80	4.2	8.80
61.47	79.32	**4.5**	8.49
60	79.12	4.9	8.35

APPENDICES

The simulation demonstrates that events of this magnitude would be expected in 1929, 1942, 1947, 1949, 1954, 1959, 1990, 1995 and 1996. Nine occurrences in a period of 80 years is equivalent to a frequency of once in every eight or nine years. This results in a temporary **minor impact**.

However, drawdown of 5-8m may reduce severely the base community and recovery of the macrophyte community could be compromised by a lack of mature plants for recolonisation. The simulation demonstrates that the frequency of drawdown events to significantly less than 66% full would be eight times in 76 years, or approximately once in every nine to ten years. Figure 10 shows that drawdown to below 66% full under the proposed abstraction regime would have occurred in 1934, 1935, 1944, 1945, 1946, 1948, 1965 and 1976. This represents a **moderate impact**.

Fish and Invertebrates

The most important habitat for macro-invertebrates is the zone of macrophyte growth, at depths of up to 4-5m. The previous section suggests that drawdown of up to 3-4m would not have a permanent effect on macrophytes in Rutland Water, and refuges would remain for retreating macro-invertebrates and fish fry. Draw down of 5-8m may expose most of the existing macrophyte beds and leave invertebrates and fish fry short of food and exposed to predation. A decline in numbers of some species would be expected, although it is possible that certain taxa, such as fly larvae, chironomids, leeches and oligochaetes, may continue to thrive, because their need for shelter and food supply are independent of macrophyte growth. Invertebrate eggs laid on macrophytes or stones may become stranded by declining water levels. As many invertebrate species lay eggs in spring, recruitment may be affected by rapid declines in level during this time of year. In addition, subsequent rises in water level, particularly following a prolonged period of drawdown, may impact upon invertebrates.

Despite the lack of clear relationships, the data indicate that, in terms of food availability to birds in areas that remain inundated, macro-invertebrates have remained abundant during periods of falling and rising levels. For this reason, the relationship between fish and invertebrate numbers and specific reservoir levels cannot be quantified. Nonetheless, substantial drawdown events are likely to have a **minor to moderate impact**.

Birds

The conclusions of the original version of the Rutland SPA study (Halcrow, 1999b) were presented in the original version of this Environmental Assessment Report. However, subsequent research on the impacts of the proposals of the birds using Rutland Water (especially the species that constitute SPA-qualifying features), has refined these findings and the conclusions of the report produced by Ecoscope (2001) are therefore incorporated here.

- Based on the range of draw down events (and mean % full values) experienced in the 10 years 1987 - 97, maximum numbers of total waterfowl, dabblers, Gadwall and Shoveler, are affected by draw down. At the far western end of the reservoir, higher water levels generally result in higher maximum bird numbers.
- Gadwall, dabblers and total waterfowl numbers operate differently in relation to draw down in the different count zones.
- Often, maximum numbers in the North Arm are positively correlated with maximum numbers in the South Arm count zones.
- Variation in numbers of waterfowl, dabblers, Gadwall and Shoveler, in general within the western count zones, influences total waterfowl numbers at Rutland, ie. most of the birds are concentrated in these areas. This is as a result of (a) shallower water and accessibility to food supplies, (b) refuge value and general lack of disturbance.
- The vast majority of Rutland Water's waterfowl populations occurs in the western part of the reservoir, notably the fish ponds, North Arm 1, lagoons, South Arms 1, *2* and 3. In terms of %'s of maximum populations over the past 10 years, 69% of total waterfowl are located in these areas, 82% of dabblers, 78% of divers, 90% of Gadwall and 98% of Shoveler.
- As a result of the above, any changes in area of water in these zones would be expected to affect these population concentrations.
- Greater fluctuations in water levels between 100% and 60% full may be beneficial for some waterfowl some of the time as long as the lower water levels are not prolonged. The exception to this could be the way in which the lagoons and fish pond areas dry out.
- There is doubt as to the magnitude and duration of draw down and its effect on macrophytes and hence invertebrates and birds. It is acknowledged that there is an increased risk of impact from draw down during long return-period droughts once the Wing WTW extension is operational.

- Analysis of the mean peak counts in the different count zones, coupled with the predicted change in area of these count zones from a scenario of 85% full to one of 60% full, supports the application of the 'precautionary principle.' This analysis shows that reduction to 60% full could result in the potential loss of total waterfowl of 49%, of dabblers 58%, of divers 53%, of Gadwall 70% and of Shoveler 76%. The actual losses would depend on a) extent of any redistribution, b) ability to redistribute in the face of constraints from recreation, c) duration and extent of draw down and whether levels below 60% become more frequent.

The Appropriate Assessment, as carried out by the Rutland County Council as the competent authority, determined that the proposals would have a significant adverse impact on the integrity of the SPA. Therefore, in the absence of mitigation, the impact on bird populations is considered to be **major adverse**. This determination is the driver behind the habitat creation works now proposed adjacent to Rutland Water SPA (Halcrow, 2005a).

(ii) Nene Washes

The hydraulic study (Halcrow, 1999c) concluded that increased abstraction regime was not expected to affect winter flooding or summer water levels in the Nene Washes, with no resultant affects on ecology. Therefore, it is considered that there would be a **negligible impact** on the nature conservation interest of the Nene Washes. It was the responsibility of the competent authority (Rutland County Council) to determine whether or not there is potential for adverse impact on the SPA, SAC and Ramsar designations of the Nene Washes and the response of 23rd May 2001 (Rutland County Council) determined that there was a likely adverse effect on the integrity of the Nene Washes. However, further research since then, as part of the Review of Consents process suggests that there is not likely to be a significant effect on the qualifying features of the Nene Washes as a result of changes in abstraction regimes.

(iii) The Wash

The hydraulic study (Halcrow, 1999c) concluded that there could be movement of sandbanks in the Wash, potentially affecting the mouths of the Welland and Nene estuaries. Any remedial works to maintain navigation would have the potential to cause a **minor impact** on the local wildlife.

Research on the potential impacts on birds of the Wash (Halcrow, 2000b) concluded that the predicted reduction in freshwater flows entering the Wash from

the Nene and the Welland would not directly affect bird numbers and distribution around the outfalls. However, it was acknowledged that there is a small probability of indirect effects as a result of possible changes in invertebrate populations, sediment distribution or water quality. Ongoing monitoring would highlight any trends and seek to identify causation. Overall, there is predicted to be a **negligible impact** on the qualifying features of the Wash and its designation as SPA, SAC and Ramsar.

6.9 *Human Environment*

6.9.1 *National Planning Policy*

The proposed extension to Wing does not conflict with any aspects of the National Planning Policy, as set out in section 3.

6.9.2 *Local Planning Policy*

Relevant Rutland Local Plan policies are listed in Appendix C. The proposed extension, including mitigation measures, can satisfy the requirements of the policies.

However, Wing WTW is in a Special Policy Area (policy SP1) in which the Planning Authority may "*refuse to oppose the development*", in which case it would seek to minimise any adverse effects on local amenity, the environment generally and any highway considerations.

The proposal is in accordance with SP1 as it is essential for the operational requirements of Anglian Water, as reflected in their assessment of increased demand. This EA report, recommends measures for mitigation that should be implemented bringing the proposal in line with the policy, including as stated in the policy:

- careful siting and design;
- provision of landscaping;
- limitation of operating hours;
- limitation of traffic flows;
- noise and pollution controls.

6.9.3 *Settlements*

Construction Phase

Impacts from noise and traffic and effects on landscape are addressed in the relevant sections.

Operational Phase

The extension of Wing WTW within a Special Policy Area on the edge of the village would not change facilities or population of the village or modify the character of the locality.

6.9.4 *Transport and Access*

(a) Wing and Environs

Construction Phase

During construction there would be an increase in the number of vehicles on the road network in the vicinity of the site. The increase would be due to construction traffic and construction workers' vehicles.

Currently on the A47 (T) at Glaston there is an average weekday flow of 10,360 vehicles. The number of construction workers would vary from 35 to 150 over the construction period. On the basis that car sharing and use of minibuses reduces the number of vehicles needed by a factor of three, a maximum of 50 construction workers' vehicles could be expected to travel daily to and from the WTW. At this stage an accurate level of construction traffic cannot be calculated. On the assumption that there would be a maximum of 50 daily construction vehicle trips to Wing WTW, the total maximum number of vehicle round trips (construction vehicles and workers transport) would be 100, equivalent to 200 one way journeys. This is equivalent to an increase in the weekday average of slightly less than 2% and is considered no more than a **minor impact**.

The construction traffic on the Wing to Morcott Road would have a **moderate impact**, due to the increase in the volume of traffic and the disturbance to the western part of Morcott. In addition, large loads that are directed through the village of Morcott would cause additional disturbance. However, these impacts would be of a temporary nature.

In addition, there are other issues that would arise from the increased traffic load on the Wing to Morcott road (identified by Rutland CC Highways and Transportation, pers. comm.):

- the footpath on the section of the Morcott road from the A47 may be over ridden and broken up by construction lorries;
- the bend and junction at Morcott can be difficult. Cars park on the bank, forcing wide loads to over-ride the opposite verge;
- brick kerbs have been installed in the village of Morcott. They would not withstand heavy loads;
- sections of the road from Morcott (immediately outside the village and up the hill to Wing) are beginning to break up, and this would be exacerbated by heavy traffic; and
- inadequate site access signs and parking can cause problems in the vicinity of the site.

These are potentially **moderate impacts.**

There are no public rights of way across the site and so no footpath diversions would be needed.

Operational Phase

During operation there would be a small increase in traffic above the present levels, due to the number of chemical tank movements increasing from 4 to 5 per month (25% increase) resulting in a **moderate impact.**

6.9.5 *Noise and Nuisance*

(a) Wing and Environs

Construction Phase

There would be an increase in noise during construction, both from the construction work on site and from the additional road traffic generated. Both activities have the potential to generate high peak noise levels in addition to lower continuous noise levels. As the area only has low levels of general background noise typical of a rural environment, the increase in noise levels at Wing and the western edge of Morcott has the potential to cause a **moderate impact**.

Despite the application of dust control measures, there is potential for a **moderate impact** resulting from dust emissions from the construction work on the site and from deposition of mud on the local roads by construction traffic.

Operational Phase

The operating extension plant would generate noise of a similar character to the existing treatment plant. However, the level of noise generated by the extension would be lower, owing to the smaller size of the extension plant. This factor, combined with the greater distance from the extension plant to the village of Wing, should prevent the noise from the extension being discernible at Wing village, with a resultant **negligible impact.**

The noise generated by the extension would be discernible from the Morcott Road to the north and east of the site, potentially resulting in a marginally higher noise level than at present. This is no more than a **minor impact**.

The periodic increased exposure at Rutland Water of sediments/mudflats may result in increased odours. The odour is a natural phenomenon associated with water bodies. However, the potential for an increase in the frequency of occurrence and strength of the odour has the potential to cause an increased nuisance. On the basis that this temporary effect does not discourage recreational activities, there would be a **minor impact**.

6.9.6 *Archaeology*

(a) Wing and Environs

Construction Phase

The only Scheduled Monument or archaeological site in the area is the Wells maze. There would be a **no impact** due to the proposed development as there would be no construction activities and traffic in the immediate vicinity of the maze.

Operational Phase

Operations have no implications for archaeology.

6.9.7 *Recreation*

(a) Wing and Environs

Construction Phase

Disturbance due to construction operations and traffic would have a detrimental effect on activities such as walking, riding and cycling in the vicinity of Wing. Visitors to the area would be able to use alternative paths and roads for these

activities, and so would experience little disturbance. However, local people accustomed or needing to use the routes affected by the increased noise and traffic, would experience temporary disturbance. This is a **minor impact.**

Operational Phase

There would be **negligible impact** on recreation in the vicinity of Wing on completion of construction.

(b) Rutland Water

Construction Phase

Construction works at Wing, provided construction traffic is routed towards the A47, would have a **negligible impact** on recreation at Rutland Water.

Operational Phase

Rutland Water is an important recreational and tourism resource, with facilities for sailing, fishing, bird-watching, cycling and general recreation of at least regional importance. Changes in water levels and surface area of water available due to increased extraction for Wing WTW would affect these recreational activities in different ways. Table 6.2 shows the relationships between the volume of water in the reservoir (as % full), surface water level and the area of water available. These were calculated using the Surfer software package (contour and 3-D surface mapping software).

The hydrographs (Figure 10) show the reservoir volumes (as % full) for both current and proposed abstraction rates. Using Table 6.2 to identify reservoir volumes for critical water levels or areas, a comparison can be made between the frequency of occurrence of these events using Figure 10. This approach is used to assess the significance of changes in reservoir volume for the principal recreational activities.

Sailing

Reservoir volumes of below 65-70% full present problems for launching, due to low water levels. Under the current abstraction regime, these conditions occurred in 1990, 1991, 1995 and 1996 (see Figure 5), when the reservoir was between 60 and 70% full. As discussed in section 5.4, the extent of the drawdown was

exacerbated by a number of operational factors. On the basis that the reservoir is managed carefully to maximise refill, the extent of the drawdown would be less. Provided that the reservoir is managed to maximise refill, the simulation demonstrates that the frequency of drawdown events to below 70% full would be 15 times in 76 years, or approximately once in every five years. Figure 10 shows that drawdown to below 70% full would occur in 1921, 1934, 1935, 1944, 1945, 1946, 1947, 1948, 1949, 1953, 1959, 1965, 1976, 1990 and 1996.

Sailing, together with all water-related activities, is restricted to certain areas by the Rutland Water SSSI permit issued by English Nature. The objective of the consent is to limit the areas used for recreation, both spatially and temporally, to minimise impacts on protected birds. If low reservoir levels present a threat to birds, English Nature can review and modify the permit, for example by further restricting the area available for sailing. This could be triggered if the shallow western areas zoned for birds dry up, with the result that the birds move further east on the reservoir. If restrictions are put in place more frequently as a result of the increased frequency of drawdown, there would be a **moderate impact** on recreational sailing.

Fishing

Boat fishing is adversely affected when water levels are more than 4.5m below maximum (D Moore, Anglian Water, *pers. comm.*), at which point boats cannot be launched from the fishing lodge harbour on the south shore. Instead, the boats are launched from Whitwell on the north shore, a considerable distance from the facilities for fishermen on the south shore. This occurred during the drought in 1996 (reservoir 62.5% full). The simulation demonstrates that the frequency of drawdown events to approximately 60% full would be nine times in 76 years, or approximately once in every eight or nine years. (Figure 10 shows that drawdown to approximately 60% full would occur in 1921, 1934, 1935, 1944, 1945, 1946, 1948, 1965 and 1976). Provided alternative access is available from Whitwell, this is a **minor impact**.

The impacts on shore–based fishing are not directly related to water levels. Many fishermen favour levels 1-2 m below top level, as this provides easier access to the water (D Moore, Anglian Water, *pers. comm.*). More substantial drawdown may have an adverse impact if it hinders access to the water. Access is impeded if substantial quantities of weed or wet mud are exposed. However, exposed stones or dry sediment do not have the same adverse effect on access to the water (D Moore,

Anglian Water, *pers. comm.*). The rate of drawdown and the nature of the shoreline would influence the prevalence of these conditions, and so it is not possible to predict accurately the frequency or extent of occurrence of impediments to access or enjoyment resulting in **minor to moderate impacts**.

However, under the English Nature permit, there is potential for imposing restrictions on shore fishing activity to avoid disturbing birds during times of low water levels. If restrictions are put in place more frequently as a result of the increased frequency of drawdown, there would be a **moderate impact** on recreational shore-based fishing

Bird Watching

Bird watching during drought conditions at Rutland Water potentially can be adversely affected by declining bird numbers and variety of species, by birds moving away from hides to the shrinking area of surface water and by any restrictions imposed on bird watching activities in order to minimise disturbance to stressed birds. Conversely, the exposed muds resulting from lower water levels provide an attraction for many bird species by making available specific feeding areas. Consequently, it may be concluded that a certain degree of drawdown would not have a significant adverse impact on recreational bird watching.

Cycling and General Recreation

Cycling, horse-riding and general shore-based recreational activities are not directly affected by changing water levels. There is no evidence that low water levels in the reservoir cause visitor numbers to decline. However, unlike other reservoirs where drawdown has caused the emergence of submerged villages, Rutland Water has not experienced increases in visitor numbers during drawdown events. Weather conditions are the main factor influencing visitor numbers (D Moore, Anglian Water, *pers. comm*).

The presence of considerable expanses of mud when water levels are low may detract from visitors' enjoyment of Rutland Water. However, based on the continuity of visitor numbers during substantial drawdown events, it can be inferred that enjoyment is not curtailed significantly, and there would be no more than a **minor impact.**

The growth of algal blooms can result in recreational waters being closed to the public, to minimise the risk of exposure to toxic algae. The Rutland Water SPA study (Halcrow 2000a) demonstrated that the proposals, together with improvements in water quality of the feed to the reservoir (as required by the UWWTD), would not increase the potential for algal blooms. However, English Nature considers that the maintenance of nutrient loadings, including phosphates, at the present levels is undesirable (Halcrow, 1999a). This is because a risk remains that the reservoir may be vulnerable to eutrophication, and the proposals would nullify the predicted improvement in water quality resulting from the UWWTD works and the installation of the bubble curtain destratification system. This is a potentially **moderate to major impact.**

(c) River Nene

The hydraulic study (Halcrow, 1999c) reported that the Environment Agency is concerned that low flows in the River Nene result in conflicts of interest between the various users of the water and that prolonged low flow conditions may result increased channel siltation. The build up of sediment can constrain the channel (Environment Agency, 1998), with potentially a **moderate impact** on recreational navigation.

7 Summary and Conclusions

An extension to Wing WTW is needed to safeguard potable water supplies by utilising the design yield of Rutland Water pumped storage reservoir. The additional water would be obtained from the existing abstraction points on the Rivers Nene and Welland at rates within the limits of existing abstraction licences.

The site for the extension at Wing is adjacent to the existing WTW and is within a Special Policy Area of the Rutland Local Plan, which recognises the need for development that may be contrary to general planning policies for the area.

The extension has potential to cause adverse impacts on the local environment at Wing and its environs and, as a result of increased abstraction to meet the requirements of the extension, on the hydrology of the region. The mitigation measures identified would be implemented to minimise the potential impacts, primarily during construction, at Wing and its environs. Table 8.1 below provides a summary of the Environmental Impact Assessment that has been undertaken within this report.

The construction of the proposed extension to Wing WTW would take place over a period of approximately 25 months, during which time Wing and its environs would experience temporary disturbance due primarily to noise and construction traffic. Works would be managed to reduce these impacts wherever possible.

In the long term, the maturing of mitigation planting would minimise the visual impact and effects on landscape character. The extension would not significantly increase the amount of traffic and noise generated currently.

The operation of the extension would have the capacity to treat an average of 50Ml/d and a maximum of 90Ml/d of raw water from Rutland Water reservoir, which would be refilled by additional abstraction from the River Welland preferentially and the River Nene. The hydraulic study (Halcrow, 1999c) demonstrated that the increased abstraction from the rivers to meet the requirements of the extension would increase the duration of river flows at MRF and would increase the potential conflict between water users during periods of

low flow. It may have some effects on river water quality, including the possible upstream migration of the salinity gradient and possible increased siltation at the estuary mouths. However, the significance of these impacts can not be reliably predicted until the outcome of work ongoing as part of the Review of Consents process is complete for the European designations of the Nene Washes and the Wash.

The modified abstraction regime would affect the frequency and rates of drawdown and refill of Rutland Water. This has the potential for major impacts on the hydrology and ecology of the reservoir and also has implications for recreation. The impacts on the qualifying features of Rutland Water SPA have been assessed as part of the Appropriate Assessment carried out by the competent authority and subsequent work has been undertaken to address these issues.

The outcome of the Appropriate Assessment:- that there would be a significant impact on the integrity of Rutland Water SPA as a result of the proposed extension to Wing WTW has resulted in proposals for habitat creation works by way of mitigation and compensation. The environmental impact of these proposals has been assessed, the results of which are presented in an Environmental Statement submitted as part of the package of documents accompanying the planning application for the extension to Wing.

Table 8.1 ENVIRONMENTAL IMPACT MATRIX FOR EXTENSION OF WING WTW[1]

ENVIRONMENTAL FACTOR	CONSTRUCTION IMPACT (unless additional mitigation is provided)[2]				OPERATIONAL IMPACT (unless additional mitigation is provided)[2]			
	Major	Moderate	Minor	Negligible	Major	Moderate	Minor	Negligible
Landscape Character and Visual Impact								
Wing and environs							λ	
Geology and Soils								
Wing[3]			λ	λ				λ
Hydrology								
Wing and environs				λ				λ
Rivers Nene and Welland							λ	
Nene Washes and the Wash								λ
Rutland Water[4]					ω	ω		
Water Quality								
Wing				λ				
Rivers Nene and Welland						λ		
Nene Washes and the Wash						λ		
Rutland Water					ω	ω	λ	
Ecology and Conservation								
Wing (Extension)			λ	λ				λ
Nene Washes								λ
The Wash							λ	
Rutland Water					ω λ[5]	ω λ ω[5]	ω λ[5]	
Transport and Access								
Wing and environs		λ	λ			λ		
Noise and Nuisance								
Wing and environs		λ					λ	λ
Archaeology								
Wing and environs								
Recreation								

	CONSTRUCTION IMPACT (unless additional mitigation is provided)[2]				OPERATIONAL IMPACT (unless additional mitigation is provided)[2]			
Wing and environs			λ					λ
River Nene						λ		
Rutland Water				λ	ω	ω λ ω λ	λ ω λ	λ

Notes:
1. No entry indicates no impact
2. The impacts gradings allocated in this table are based on the assessment described in chapter 5, taking account of the mitigation incorporated in the proposals, as described in chapter 4.
3. For any environmental factor and location there may be more than one category of impact described in the text. For example at Wing, there are a number of potential impacts on geology and soils, including loss of soil due to construction (negligible impact) and potential contamination due to spillage (minor impact). To illustrate this in the table, the symbol "λ" is used in both the negligible and minor impact boxes.
4. Where an impact in the text is described as being, for example, "minor to moderate", the symbol "ω" is shown in both the minor and moderate impact boxes in the table.
5. It should be noted that these impacts do not relate to the bird populations for which Rutland Water is designated as a SPA. Under the Appropriate Assessment procedures, the competent authority will decide whether or not there is potential for a significant impact on the bird population and whether or not mitigation is needed.

8 References

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1 Introduction

Anglian Water Services Ltd (Anglian Water) proposes to extend the water treatment plant at Wing, Rutland (Figure 1), to meet a projected increase in demand for potable water. Additional water would be supplied to Wing Water Treatment Works from Rutland Water, a pumped storage supply reservoir, in accordance with an existing abstraction licence.

The proposed extension would involve the construction of a new building to house the new pumping plant, as well as ancillary structures such as tanks and a new settlement lagoon. The proposed extension would have the capacity to treat an additional 90 Ml/d.

The proposed extension to Wing Water Treatment Works is not a development permitted by the Welland and Nene (Empingham Reservoir) and Mid-Northamptonshire Act 1970. Therefore Rutland County Council, the unitary planning authority, requires an application for planning permission, under the Town and Country Planning Act, 1990.

A planning application for the extension of Wing Water Treatment Works was originally submitted in May 1999. A screening direction from the Government Office of the East Midland (on behalf of the Secretary of State) was sought for the proposed development in August 1999, which was received in March 2000, stating that the development is not considered to be EIA development under the Town and Country Planning (Environmental Impact Assessment) Regulations 1999. Prior to re-submission of the planning application and the supporting information, the validity of this screening direction was confirmed by Rutland County Council in March 2005.

Although a formal EIA is not required for the proposed extension to Wing WTW, Rutland County Council considers that the application of EIA methods would be beneficial to the planning process. In addition, Anglian Water policy dictates that all substantial developments should be subject to environmental assessment.

The documentation provided to support the original planning application, as submitted in May 1999, included: