
The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

6.3 Environmental Statement Non-Technical Summary

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009


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This document is submitted in relation to the application for a proposed development by Norfolk County Council to the Planning Inspectorate, under the Planning Act 2008.

The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west-east between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.

This document comprises part of the application documents and relates to Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

NDR Environmental Statement Non-Technical Summary

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January | 2014

Norwich Northern Distributor Road

Introduction

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Environmental Assessment...

An Environmental Statement has been prepared by Mott MacDonald on behalf of Norfolk County Council (NCC), in support of an application, by NCC, for a Development Consent Order to construct a dual carriageway all-purpose strategic distributor road. This road will link the A1067 Fakenham Road, near Attlebridge to the A47 Trunk Road (T) at Postwick and is known as the Norwich Northern Distributor Road or NDR.

This document provides a Non-Technical Summary of the Environmental Statement and contains information necessary to understand and report the effects of the NDR on the environment and provides a background to the evolution of the Scheme.

Specialisms have been divided into topic specific chapters, and assessments have been made for each topic during the construction phase, at opening year (year 1, 2017), and at the design year (year 15, 2032).



Queuing on Drayton High Road

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The Scheme

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Scheme Description and Mitigation...

From west to east, the Scheme will start with the realignment of the A1067 Fakenham Road and provision of a new roundabout. The NDR will continue eastwards to its new roundabout with the C262 Fir Covert Road. From this roundabout, the NDR will then cross Marriott's Way which will be taken across the Scheme via a new bridge, then on to a new roundabout with the C261 Reepham Road.

The NDR will then continue south eastwards, crossing Bell Farm Track which will be taken over the NDR via a new bridge before connecting with a roundabout west of the C282 Drayton Lane. From here, the NDR will continue south eastwards to a new junction with the A140 Cromer Road, located north west of Norwich International Airport.

East of the A140, the NDR will continue north eastwards around the northern boundary of the airport to a further new roundabout at the northern tip of the airport. From this roundabout, the NDR will continue south eastwards, before turning eastwards and passing under the new highway for the C246 Buxton Road. The route of the NDR will then continue eastwards through the north of Beeston Park. It will then connect with the B1150 North Walsham

Road and the A1151 Wroxham Road via new roundabouts, before turning south eastwards and entering the north eastern section of Rackheath Park.

The NDR will then continue south eastwards, passing under a new bridleway and access bridge across the NDR south west of the junction of Newman Road (U57490). The NDR will then connect with the C283 Salhouse Road via a new roundabout, then crosses both the Norwich to Cromer & Sheringham rail line and the C874 Plumstead Road on individual bridges, prior to a new roundabout on the NDR, which will connect it via a new link road to a further roundabout on the C874 Plumstead Road.

The NDR route will then continue southwards, crossing under the C442 Middle Road which will be raised to pass over the NDR via a new bridge before connecting with a new roundabout known as the Business Park Roundabout. A single carriageway will then link to the existing C829/C830 Broadland Way/C831 Peachman Way roundabout and includes a roundabout on the link road to the proposed Broadland Gate Business Park.

From the Business Park roundabout the NDR will proceed southwards to a new Postwick north east roundabout immediately north of the A47(T)

Norwich Southern Bypass. This roundabout will have links from a new A47(T) eastbound slip road and a new A47(T) eastbound merge slip road. The NDR will continue over the A47(T) on a new bridge and will terminate at its southernmost point at a signalised junction, which will replace the existing Park and Ride roundabout with the A1042 Yarmouth Road.

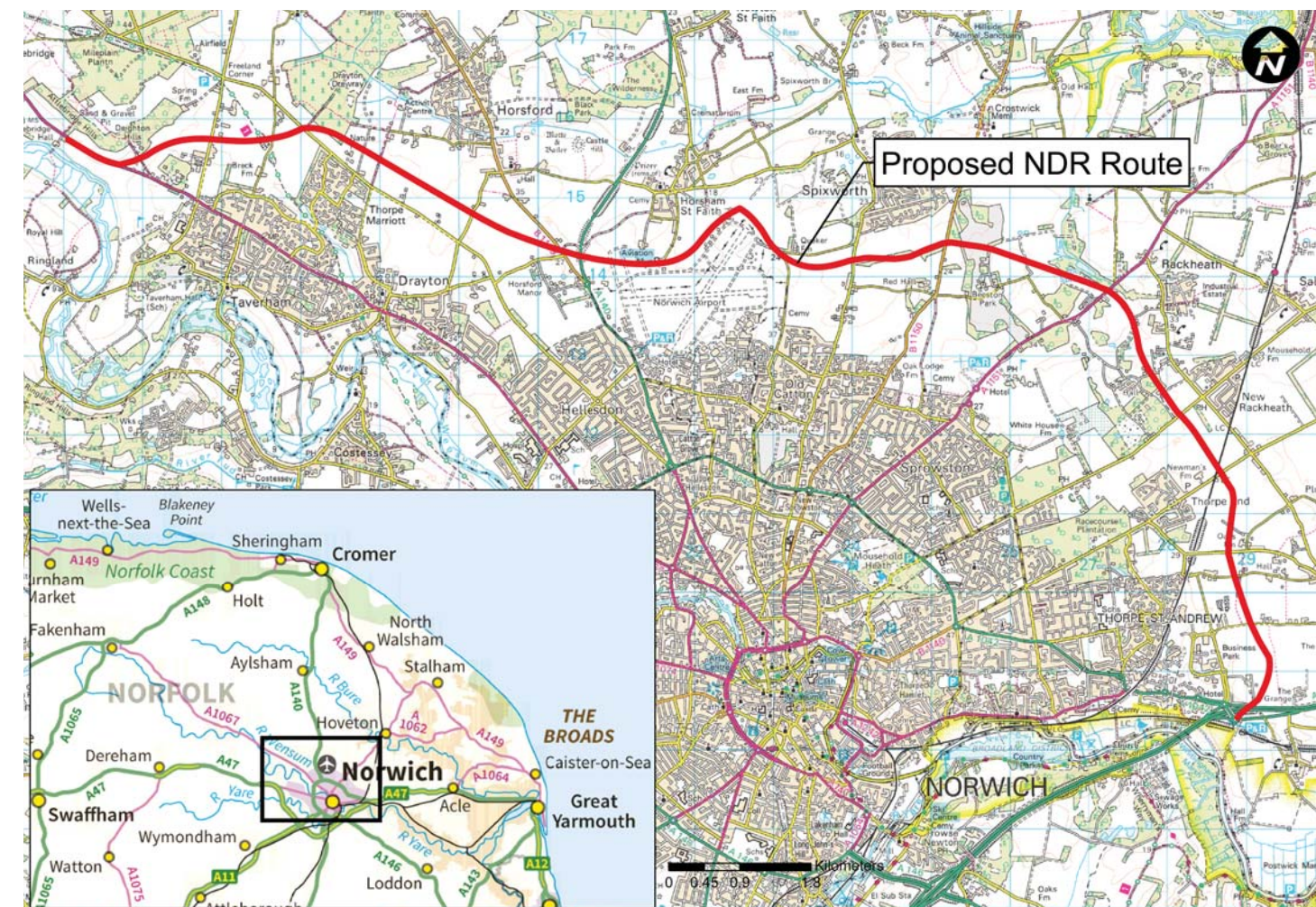
Mitigation

The Scheme has been designed with a host of mitigation measures incorporated, to reduce or minimise impacts on people and the environment. Designing the road in cutting, with adjacent bunding, will reduce the visual impact and traffic noise. The extensive landscaping scheme will, once established, allow the proposed Scheme to become incorporated within the existing landscape, with habitats that marry up with those surrounding areas. The landscaping scheme has been formulated in conjunction with Ecologists, to ensure that the proposals benefit protected and other species that exist locally.

Where major corridors of movement of protected species will be affected, measures will be installed to reduce the impacts. For

The Scheme

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example Marriott's Way bridge will be a 'green bridge', with hedgerows up to and over the bridge itself, to allow bats and other animals to continue to use this route. Other measures to achieve similar results include wire gantries, adapted highway bridges and an underpass, each to allow bats to continue to navigate along their existing routes. Other new habitats and ponds will be created to rehome newts.

The drainage of the proposed Scheme will use Sustainable Drainage Systems for the majority of locations, where

conditions allow. This will mitigate for any potential impact on water quality and flooding issues, to ensure that flood risk is minimised and that the quality of discharged water to watercourses and groundwater will match or improve on the existing quality.

Construction Environmental Management Plan (CEMP)

The CEMP is the document that brings together all the construction phase mitigation measures proposed for the Scheme. It covers the management of a Contractor's

activities and those of any Sub-Contractor, and defines the minimum requirements that have to be met. It identifies the procedures required to minimise the impact of noise, vibration, dust and waste disposal resulting from the construction phase of the Scheme. It includes details of measures to be employed to ensure that no pollution incidents occur, that impacts on protected species are minimised as far as possible, that archaeological features are identified and recorded, and that impacts on nearby residents are kept to an absolute minimum.

The Best Solution...



Queuing on Riverside Road

The NDR is needed to improve connectivity and accessibility across both the northern part of the Norwich urban area and areas of the county in an arc from the north west to the east of this main urban area. Such improvement will ease the relative disadvantage of the peripheral location of these areas and provide the basis of the transport infrastructure required to address existing and future problems and achieve the growth objectives which have been identified for Norwich and its surrounding area.

The requirement to improve connectivity and accessibility arises out of the analysis that

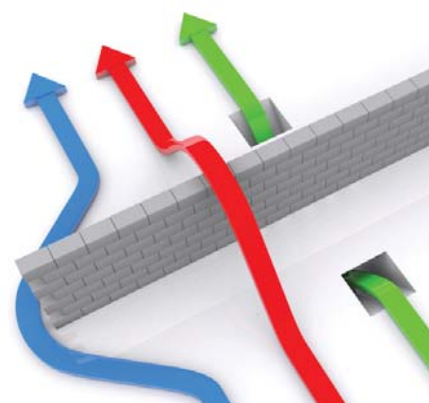
led to the production of the Norwich Area Transportation Strategy (NATS) and the conclusions reached. This strategy sets out NCC's and Norwich City Council's agreed approach to the delivery of sustainable transport in and around Norwich.

The overall strategy set out in NATS is that a package of transport improvements, interventions and measures, which includes the NDR Scheme, needs to be implemented. Together these improvements, interventions and measures will (amongst other things) deliver a reliable, efficient and long-term sustainable transport network which will improve accessibility and connectivity and which will support the continued economic and physical growth of the Norwich area. In setting out the Authority's approach to current and future needs, NATS seeks to improve the overall economic competitiveness of Norwich as a focus for inward investment, create conditions in which sustainable forms of transport can be promoted and improve the quality of life.

The possibility that the need could be met in some other way, for example by a different standard NDR, by an NDR following a different route, or without road construction has been addressed in principle and detail over a lengthy period. The

necessary environmental, traffic and economic studies and analyses have been progressed as a central component of the development of NATS in the context of the evolution of planning and economic policies for Norwich and the surrounding area.

The studies confirm that the NDR is an essential component of the NATS package of measures to address existing and likely future issues of congestion, connectivity and economic and urban growth. Analysis of other approaches have confirmed that it is not possible to meet the need without the NDR and that the role of the NDR cannot be replicated by improving the existing road network or public transport. Examination of alternative standards and alignments has confirmed that the application proposals are the most appropriate response to the need, taking account of the results of the Environmental Impact Assessment (EIA).



Assessment of alternative routes

The Scheme has the potential to cause air quality effects during the construction and operational phases. During the construction phase, the Scheme will introduce new emission sources in the form of traffic and plant at some locations, and involve potentially dust generating activities. A qualitative assessment of potential construction phase effects has been undertaken. Mitigation measures have been identified for incorporation within the CEMP, commensurate with the risk of dust effects identified and in line with best practice. Potential impacts are concluded to be negligible to slight adverse, at worst, and therefore not significant.

Operation of the proposed Scheme in the opening year will change traffic flows within Norwich and could affect



ambient air quality. The opening operational phase effects have been assessed using an advanced dispersion model. Concentrations of key traffic related pollutants have been predicted at sensitive human health and ecological receptors and the change as a result of the Scheme has been quantified. Existing concentra-

tions of nitrogen dioxide (NO₂) are of concern in Norwich, particularly in the city where an Air Quality Management Area (AQMA) has been declared. The Scheme is predicted to cause a Slight Beneficial effect on NO₂ concentrations, including within the AQMA, and Negligible effects on fine particulate concentrations overall. Operational phase air quality effects are concluded to be not significant.

In conclusion, effects on air quality during construction are considered to be **negligible to slight adverse** and not significant. Effects at the opening year are also considered not to be significant. The opening year of the proposed Scheme is expected to present the worst case within the first 15 years of opening and therefore, no other future year has been assessed.



Carbon

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The changes in carbon emissions during the construction and operation of the proposed Scheme have been calculated. These changes are expressed as emissions of carbon dioxide over a given time period.

During the construction phase, the proposed Scheme will lead to emissions of carbon from construction traffic and plant, as well as from carbon embodied in the materials that will be used to construct the Scheme. These emissions have been calculated to be 52ktCO₂. This includes mitigation measures included in the design which reduce the impact by 14ktCO₂. There are also measures in the CEMP which aim to make the construction process as efficient as possible.

Traffic flows will change during the operational phase affecting distances travelled,

and congestion across the network. These changes will affect emissions of carbon. The overall effect of the Scheme will be to increase emissions by around 13ktCO₂ in 2017, due largely to an increase in vehicle kilometers travelled.



This increase is around 0.6% compared to all emissions in the local authority areas around the Scheme. In 2032, the increase will be 18ktCO₂ representing 1.1% of all emissions in the local authority areas. The assessment has not considered the wider influence of the package of measures within the NATS of which the Scheme forms part.

There are currently no local or regional emission reduction targets in place for carbon reductions. At the national level, the increase in emissions associated with the Scheme is unlikely to materially affect the ability of local authorities to contribute to national level emission reduction targets.

Cultural Heritage

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The cultural heritage assessment draws upon information gained from desk-based sources, a search of archaeological records from the Norfolk Historic Environment Record (NHER) database, site inspections and archaeological field surveys, including fieldwalking, metal detecting, geophysical surveys and trial trenching. A diverse range of heritage features have been identified, including prehistoric archaeological remains, deserted medieval villages, historic buildings and parklands. The Scheme will also pass between two areas of ancient woodland.

The majority of significant cultural heritage effects will occur during construction. These will comprise the removal of archaeological remains, including a possible Neolithic mortuary enclosure, Bronze Age and Iron Age settlements at the western end of the route; elements of two deserted medieval villages at Rackheath; and further prehistoric enclosures around the Postwick Hub at the eastern end of the Scheme. Additionally a number of un-designated WWII structures at Rackheath will be demolished during construction, and there will be changes to the setting of several historic buildings including Horsford Hall, Rackheath Hall and the bridge at Rackheath, all of

which are Grade II listed. Two locally important parklands will be crossed by the Scheme, namely Beeston Park, where the northern third of the park will be severed, and Rackheath Park where the eastern boundary will be removed. No impact is predicted for the Grade II* listed Catton Hall Park, located 2km to the south of the Scheme.

Measures incorporated into the Scheme to mitigate impacts include the use of appropriate construction methods to avoid or limit damage to heritage assets; and landscape bunding and planting to integrate the proposed Scheme into the historic landscape and screen historic buildings. An archaeological mitigation strategy will be produced and will set out the detailed requirements for recording below-ground archaeological deposits which will be impacted by the Scheme. This will record the locally important archaeological sites, which have been

identified during fieldwalking, geophysical survey and trial trenching. A photographic survey of historic buildings and important elements of the historic landscape is also proposed.

Significant cultural heritage effects during operation will be through visual and noise impacts on Listed Buildings, including Horsford Hall, Rackheath Hall and the bridge at Rackheath. Beeston Park and Rackheath Park will also experience significant effects during operation. However, these effects will lessen as planting matures over time.

In conclusion, the overall effects upon cultural heritage are considered to be **moderate adverse** during construction. Effects during operation will be **slight adverse** during both the opening year (2017) and the design year (2032), although effects will reduce to some degree as mitigation planting matures.



Extant remains of Horsham St Faith Priory

Landscape and Visual Effects

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The route of the NDR will pass through a predominantly arable landscape of largely rural character, but with some urban fringe influences such as housing development, Norwich Airport and the Broadland Business Park. The landscape generally comprises fairly commonplace rural farmland along much of the route, but with a higher quality area centred around the former parklands of Beeston and Rackheath Halls where the landscape is characterised by a larger woodland component on more undulating topography.

The route of the NDR has been optimised to avoid impacts on property and the wider landscape as far as possible. With this in mind, the design of the Scheme includes the following measures:

- The creation of 'naturalistic' landforms associated with embankments, cutting slopes and other areas of topography;
- Extensive new planting to

screen views of the road from houses and to develop habitat links between the NDR planting and the surrounding woodland and hedges; and,

- Ensuring that the landscape planting is in keeping with that which is found in the local area.

The following is a summary of the overall landscape and visual effects along the route that will occur for the construction period, for opening year and for design year. Night time effects will only be slight adverse throughout the Scheme (arising from vehicle headlights) since, with the exception of the Postwick Hub which is already well lit, the Scheme will not be lit.

Between the A1067 and Reepham Road landscape effects are regarded as being moderate adverse for construction and the opening year (2017) over this stretch of the route on account of the relatively high quality of the

landscape, particularly at the western end of the Scheme, combined with the addition of new infrastructure elements (such as the Marriott's Way bridge) into the landscape. However, by the design year (2032) these effects will have reduced to slight adverse due to the screening effect of the mitigation planting. There are relatively few properties in the vicinity of the route, although a number will experience moderate adverse visual impacts in design year, even after mitigation planting has matured.

Between Reepham Road and A140 the route will clip the south west corner of the existing Drayton Drewray woodland, resulting in the loss of a small part of a coniferous plantation. Higher quality woodland further north will, however, be avoided. The route will then traverse a wide open landscape close to, and roughly parallel with, the existing Reepham Road. Over this section of the Scheme, landscape effects

will be slight adverse during construction and in the opening and design years. Only relatively few properties lie in the vicinity of this section of the Scheme, a number of which will experience moderate adverse visual effects at the design year due to their close proximity to the new road.

Between the A140 and the B1150, the route will cross an area of low landscape quality adjacent to the airport, before passing through an area of higher quality to the south of Spixworth. Opportunities for linking mounding and mitigation planting into an existing shelter-belt near Spixworth have been taken. The landscape effects in this section of the Scheme are likely to be moderate adverse for construction and the opening year, reducing to slight adverse by the design year. A fairly large number of properties will be affected by visual impacts, particularly on the edges of Horsham St. Faith and Spixworth. Visual effects on

properties in Spixworth will reduce from moderate adverse during construction and the opening year to slight adverse by the design year as mitigation planting matures. However, visual effects on some properties in Horsham St. Faith will remain moderate adverse in the design year as the close proximity to the airport precludes extensive mitigation planting.

Between the B1150 and Salhouse Road this section of the route will pass through an area of high landscape value centred on the remains of historic parklands. Mitigation, using a combination of mounding and planting to tie into existing woodland blocks and blend the new road into the landscape, will help to reduce overall landscape effects to slight adverse along this section by the design year. A relatively large number of properties will be affected by visual impacts as the route will pass close to the southern boundary of Rackheath. However, the

majority of these will only experience slight adverse effects by the design year once the NDR planting has matured, helped by the screening effects of existing intervening vegetation.

Between Salhouse Road and the A47, the route will rise to cross the Norwich to Sheringham railway line, resulting in moderate adverse landscape and visual effects. These effects will remain in the design year at this location due to the prominence of this structure in this flat landscape, before passing through a more wooded arable landscape through to the southern end of the Scheme. Beyond the railway crossing the mitigation planting will be effective, reducing landscape effects to slight adverse by the design year as the mitigation planting matures.

In conclusion, the overall balance of landscape effects will be **moderate adverse** as a result of the Scheme during the construction period and in the opening year, reducing to **slight adverse** by the design year as mitigation planting matures. For visual effects, the balance will lie between **large and moderate adverse** during construction and in the opening year, reducing to **moderate to slight adverse** by the design year as the planting scheme matures.



Photomontage looking North East from Low Road towards the proposed Middle Road Overbridge at opening year (2017)

Landscape and Visual Effects

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Nature Conservation

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The proposed Scheme has the potential to cause nature conservation effects during the construction and operational phases.

Desk-based studies into Statutory Designated Sites and protected areas have been carried out alongside extensive field surveys of species and habitats, most of which are protected by UK and EU laws. These surveys have taken place over several seasons in many cases, and have enabled a detailed understanding of the populations within the Zone of Influence (the area in which the proposed Scheme could potentially impact on ecological features).

The assessment of ecological effects in the Environmental



Statement considers those ecological receptors that are of sufficient conservation value and potentially vulnerable to significant effects arising from the proposed Scheme. These are termed Valued Ecological Receptors.

Valued Ecological Receptors that have been assessed include Statutory Designated Sites such as Special Areas for Conservation (SAC) and Sites of Special Scientific Interest (SSSI), and other Designated Sites such as County Wildlife Sites (CWS) and Roadside Nature Reserves (RNR). Some of these sites will be directly affected, some indirectly affected, and some unaffected by the Scheme.

Several species of bat are known to use areas likely to be affected by the proposed Scheme, such as roosts in buildings and trees. Bats and

their roosts are protected by UK and EU law. Great crested newts are known to exist at three locations, although just one breeding pond will be directly affected by the Scheme. Great crested newts are also protected under UK and EU law.

A number of badger populations are known to exist around the proposed Scheme. Breeding bird populations are ubiquitous throughout the local landscape, their population densities and mixes varying with habitat type and quality. Barn owls, a particularly sensitive bird species are also found within the study area. Aquatic invertebrates exist at Ladies Wood, Church Carr & Springs CWS.

Mitigation measures have been incorporated into the proposed Scheme design to eliminate or reduce impacts on Valued Ecological Resources as far as

Nature Conservation

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possible. A landscaping scheme has been designed to provide as much benefit to Valued Ecological Receptors as possible, in terms of species mix, form and layout, and timing of planting. A number of crossings for bats are proposed comprising wire gantries across the carriageway, two bridges that will incorporate hedgerows, an underpass, and modified standard bridge designs to include dark corridors to encourage use by bats.

New bat roosts will be provided where existing roosts will be lost. Great crested newts that use the one pond to be lost to the proposed Scheme will be relocated to new ponds nearby, and temporary fencing will be erected to ensure that they do not re-enter the construction area.

Badger fencing will be installed where necessary, to ensure that badgers do not enter onto the carriageway. All habitat clearance will be carried out at such a time, and in such a manner as to ensure that impacts upon breeding birds and other species are minimised.

Assessments of the overall effects on Valued Ecological Receptors have been carried out for the construction phase, and for the operational phase, which includes the opening year and the design year of the

Scheme. Construction phase impacts will include permanent and temporary habitat loss and severance, and disturbance due to the presence of plant machinery, people, and construction activity. Operational phase impacts will include the presence of traffic using the Scheme, with the associated disturbance in terms of noise.

During the Construction phase, the Scheme is predicted to have **significant adverse** effects on:

- Fakenham Road RNR;
- Important Hedgerows (under the Hedgerow Regulations 1997);
- Bats, and more specifically directly affected roosts in buildings and trees, and

important flight paths and areas of activity; and,

- Breeding bird species of both high and medium conservation value.

During the operational phase of the Scheme, the adverse nature conservation effects will lessen. At the opening year **significant adverse** effects are predicted to remain in place only for the bats using the important flight paths along Marriott's Way. By the design year the effects on this flight path will no longer be significant. No other significant adverse effects are predicted by the design year. However, **significant beneficial** effects are predicted for terrestrial invertebrate habitats at the Springs.



Proposed Bat House at Gazebo Farm



The Scheme has the potential to affect the geology and the soils along the route and as a result constraints could be imposed on the construction of the Scheme due to the existing ground conditions.

The construction phase will involve shallow excavation works, earthworks, potential piling, rock-cutting and retaining walls, and general construction works involving the movement of soil materials and storage of hazardous chemicals. All have the potential to impact on the geology and soils underlying the Scheme.

Appropriate mitigation measures that have been identified include the implementation of a Materials Management Plan and Construction Environmental Management Plan and use of appropriate guidelines, including the DEFRA 2009

Code of Practice for Sustainable Use of Soils and best practice guidance on the prevention and control of pollution on site.

With the implementation of these mitigation measures, it is considered that there will be no significant effects relating to geology and soils during



the construction phase of the Scheme.

Impacts during the operational phase of the Scheme will be limited to those associated with surface water runoff from hard surfaces and the potential continued consolidation of soils over time. However, the highways drainage scheme, and associated pollution control measures, coupled with the implementation of the Materials Management Plan and geotechnical design for the Scheme during the construction phase will mitigate against these longer term effects.

In conclusion, there will be **no significant** effects relating to geology and soils as a result of the Scheme during the construction phase and at the opening and design years.

The materials assessment quantifies the resources required for the construction of the Scheme. Through this process the waste and surplus materials likely to be produced by the Scheme have been identified, leading to the assessment of material re-use on site, recycling and disposal of waste off site. This assessment was achieved using National and Local planning and legislative framework as guidance and studying the baseline conditions for Norfolk, with regards to mineral availability and waste disposal availability and capacity.

The potential main environmental impacts associated with construction of the Scheme are the extraction and transportation of minerals and aggregates, and the manufacturing and transport of new materials for construction. The potential main environmental impacts associated with waste arising from the Scheme are likely to be a surplus of materials from excavation, and materials brought onto site that were not available for use due to damage, off-cuts and surplus. Further impact from waste will be associated with its movement, transport, processing and eventual disposal.

The assessment of materials to be used in the Scheme was carried out with reference to

the Bill of Quantities drawn up for the Scheme. Materials from this schedule were assessed on their initial recycled/re-used content, their source of origin and their potential for recycling upon decommission. The anticipated waste arisings of the Scheme were assessed based on the excavations programmed to take place.

Quantities of material excavated, less materials calculated to be re-used in earthworks of the Scheme, will result in close to a cut and fill balance. However, an estimated 10,599m³ of excavated material will remain for disposal off-site upon completion of the Scheme. The earthworks strategy will mean that the Scheme will be self-sufficient with regards to soils and aggregate, reducing the impact of extracting and then transporting minerals from

another external site.

Other mitigation measures include; maximisation of the usage of materials sourced within the Scheme footprint; maximisation of the recycled content of materials sourced from outside the Scheme boundary; segregation of waste within the Scheme to maximise recycling; sourcing of materials locally and disposal in available disposal sites in close proximity to the Scheme. These measures will be achieved by constantly evolving the Schemes Materials Management Plan and Site Waste Management Plan.

In conclusion the Scheme will not have a **significant adverse** effect in relation to the use of materials and production of waste during construction and operation.

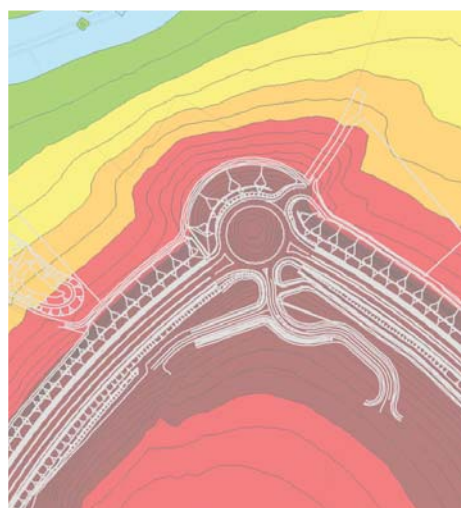


A noise and vibration assessment has been undertaken to establish significant effects associated with construction and operation of the proposed Scheme.

Two phases of the development have been considered: temporary impacts resulting from the construction activities and permanent impacts due to noise and vibration from road traffic using the Scheme and the local highway network.

The methodology adopted for traffic noise and vibration was the Highways Agency's Design Manual for Roads and Bridges. For construction, the noise and vibration methodology was BS 5228 'Code of practice for noise and vibration control on construction and open sites'. In both cases, the approach was:

- Identification of potential sources and prediction of noise and vibration impacts likely to be received at



Typical noise contours at Norwich International Airport

nearby sensitive receptors including dwellings;

- Comparison of the predicted impacts with the baseline conditions;
- Evaluation of the receptor sensitivity and the significance of effects; and,
- The consideration of noise mitigation measures incorporated within the design and an assessment of any remaining effects.

Prior to the assessment, baseline noise monitoring was undertaken across the area.

Noise levels from construction activities have been predicted at the façades of representative sensitive receptors along the NDR route. Various operations have been considered, such as; whole route linear works, including earthworks, drainage and paving; bridge construction sites; construction traffic; and construction compounds. Significant effects are predicted at the nearest receptors to the Scheme which will be mitigated through the formal consent process, whereby working methods, durations and operating times are agreed with the Local Authority prior to works commencing. Construction mitigation measures will include enclosure of plant; temporary noise barriers; restrictions on delivery times; and appropriate location of

ingress and egress points. Temporary barriers will be required during construction at some locations.

Construction noise has been predicted to generate temporary significant effects at some locations. Further construction noise calculations will be undertaken as sufficient construction-related information becomes available, and the Contractor will apply for Section 61 consent under the Control of Pollution Act 1974. Following mitigation, it is anticipated that construction noise effects will not be significant.

Mitigation measures incorporated into the design of the Scheme include a thin surface course for the carriageway, three lengths of acoustic barrier and extensive bunding and false cuttings. Noise levels during operation will have a significant adverse effect at 2393 residential and 17 non-residential receptors on opening. By the design year, significant adverse effects are predicted to occur at 1936 residential and 14 non-residential receptors.

In conclusion, noise effects are considered to be **slight adverse** during construction. During operation, **moderate or large adverse** effects are predicted on opening, although the number of receptors affected will reduce by the design year.

The assessment of the effects of the Scheme for All Travellers addresses the impact on vehicle travellers in terms of the change in the view from the road, and the impact of the Scheme on Driver Stress. The assessment also addresses the impacts for non-motorised users (NMUs), which includes pedestrians, equestrians and cyclists, as a result of changes to the network of Public Rights of Way (PRoW) and minor roads. It also considers changes in journey length and times, the provision of amenities such as PRoW, and connectivity between communities and community facilities.

Overall, it is expected that there will be a temporary adverse impact during construction on the view from the road for motorised users passing along routes that intersect with the NDR, as a result of changes from a rural, high quality outlook to that of a temporary construction site. This will result in a temporary slight adverse impact for views from the road for vehicle travellers. The need to travel through road-works for some motorised users, particularly at these intersections, is also likely to result in temporary short-term delays which could lead to some level of driver frustration. However, measures to minimise impacts, such as the phasing of works, will be included in the construction programme, and



the majority of the route will be constructed off-line. Impacts are therefore not considered to be significant.

Once the Scheme is operational, it is anticipated that where the existing routes will intersect with the NDR, the view from the road for motorised users is likely to be restricted, changing from a rural setting to one of a dual carriageway corridor with associated landscape planting. Once screening vegetation that is included as part of the landscape design and mitigation for the Scheme has matured, it is considered that views from the road will be neutral for those travelling on affected routes within the zone of visual influence, and for those travelling on the proposed NDR itself. Driver stress is generally considered to reduce as a result of the NDR, due to reduced congestion and improved journey time reliability for radial and secondary routes where traffic will transfer to the Scheme. As a result, a long term significant beneficial effect on driver stress for users of those radial and secondary routes is anticipated.

For NMUs, the construction stage is predicted to result in short term slight adverse impacts as a result of the temporary closure or diversion of Public Rights of Way, resulting in an increase in journey times for some NMUs in a small number of locations. In addition, some NMUs may be deterred from making certain journeys during construction due to the presence of construction plant and increased traffic on alternative routes due to diversions. However, once the Scheme is open, the NDR will provide additional amenities for NMUs such as approximately 25km of bridleways, cycle tracks and footpaths, and all PRoW will be maintained or reinstated. Changes to traffic levels on routes currently used by NMUs will also result in a positive benefit on the whole for communities. This is because it is expected that there will be a decrease in traffic on a number of radial roads within the parishes that will be affected by the NDR, resulting in some relief from existing community severance for NMUs accessing key services. A long term significant beneficial effect for NMUs is therefore predicted.

In conclusion, the effects on all travellers are considered to be **slight adverse** during the construction phase and **moderate beneficial** at the opening and design year.

Community and Private Assets

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The community and private assets assessment identifies impacts associated with the demolition of property, the loss of land used by the community, and impacts on development and agricultural land. The assessment also examines the impacts the Scheme will have on the social and economic environment of Norwich.

One residential property will be demolished to accommodate the Scheme. This property is currently derelict, and other outbuildings attached to another property which are also dilapidated will be demolished. Fifteen properties will lose some land to the Scheme, however development land will not be adversely effected. In order to maintain the amenity and ecological value of Marriott's Way, a green bridge will be constructed. The small amount of land that will be taken at Great Plumstead Fuel allotments will be replaced with a larger adjacent allotment area.

The Scheme will result in the permanent loss of 307.57ha of agricultural land, however 45.64ha will be returned to agricultural use after construction. During construction, access to farmland and water supplies to fields will be maintained where possible. Where this is not possible, compensation for loss of revenue will be provided to the farm owner.



Irrigation systems will be maintained during operation and farms will be compensated for permanent land loss.

The socio-economic impacts on the local community from construction will be short-term job creation and an increase in local economic activity. There will also be temporary disruption to economic activity and land-take during the construction phase.

The effects on soils as a national resource are considered significant adverse. However, this must be considered within the context of agricultural activity in Norfolk and current agricultural practice generally. It is considered that the increasing efficiency of agricultural producers and changes in agricultural policy mean that retaining as much

land as possible in agricultural use is no longer a top priority. In addition farmers will be compensated for loss of revenue.

Upon completion of the Scheme, socio-economic effects will be major beneficial resulting from improved access to employment and tourist areas, job creation, housing and development growth.

In conclusion, the effects on community and private assets are considered to be **slight adverse** during construction. Following completion of the Scheme, effects during the opening year will be **slight beneficial** rising to **moderate to large beneficial** and significant by the design year.

Road Drainage and Water Environment

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The water environment encompasses surface water in rivers, streams and ponds, and groundwater within underground strata. The government is committed to maintaining and improving the quality of surface water and groundwater environments, and the drinking water supplies they support.

Historically, roads have not been considered a major source of pollution and rainfall has been allowed to run off and discharge with little or no treatment. In recent years, diffuse pollution from road drainage has been identified, in some circumstances, as contributing to poor water quality. Pollution can arise from a variety of sources including accidents, general vehicle and road degradation, and vehicle related fuel leaks. Mitigation techniques are now used to control this pollution and the impact on the natural environment.

Groundwater levels within 50m of the proposed Scheme have been monitored intermittently since 2006 and range between approximately 2m and 20m below ground level. The proposed Scheme is not foreseen to intersect the chalk water table at any point. There is one principal area of groundwater discharge along the proposed route located at 'The Springs' County Wildlife Site (CWS). Dobb's Beck and Spixworth Beck pass within 'The Springs'



CWS and form a tributary of the River Bure. The proposed Scheme crosses the catchment of Dobb's Beck. Water quality monitoring has been carried out intermittently at 'The Springs' since September 2006 and has shown moderate to good biological water quality.

Drainage discharge into 'The Springs' is proposed from Lagoons 17 and 18 as part of the proposed Scheme. The drainage design incorporates Sustainable Drainage Systems (SuDS) surface water treatment mechanisms and is planned to include reed bed treatment. The reed bed treatment will ensure that a higher level of water quality is discharged into 'The Springs' than is currently found in the area.

For the first few hundred metres at the western end the route will pass within 300m of the River Wensum Special Area of Con-

servation (SAC), at Attlebridge. At the eastern end of the proposed Scheme the route will pass within 600m of the River Yare.

The underlying chalk is a major aquifer used to supply much of the drinking water to the Norwich area. There is one licensed public water supply within the study area, located approximately 500m south-east of the Scheme, near Postwick. The Environment Agency (EA) has advised that a temporary 750m radius source protection zone, SPZ1 should be allowed for surrounding the supply. The SPZ1 represents the area that is most sensitive and requires the highest level of protection around a public or private potable abstraction. The route will pass through the more extensive total contributing catchment SPZ3, associated with groundwater supplies, in some areas. However, the Scheme will not represent a significant concern regarding impacts to the groundwater in the SPZ3.

A Flood Risk Assessment (FRA) has been carried out for the Scheme. The FRA shows the Scheme is located in Flood Zone 1 where there is little or no likelihood of fluvial or tidal flooding. However, the road alignment will cross the catchment of Dobb's Beck near Rackheath where available surface water mapping indicates some flood risk from rainfall runoff (over-

land flow). The depth, extent and duration of any flooding in this area is currently minimal, and the road will be built above the maximum flood levels and therefore removed from flood risk. In compliance with best practice, the highway drainage for the Scheme has been designed in line with SuDS principles to restrict runoff to greenfield discharge rates. Therefore flood risk due to surface water runoff will be mitigated to acceptable levels.

The overall effect of the Scheme on flood risk is predicted to be neutral to slight beneficial. The Scheme will provide a new flow path between the new road and Dobb's Beck, along the dry valley, to convey flood flows. With the mitigation measures in place, no increase in flood risk is predicted.

The drainage design has been subject to risk assessments required under best practice guidance, to inform the Scheme design and identify any embedded mitigation measures required. These embedded mitigation measures increase beneficial effects, or prevent or reduce negative effects.

During construction, the overall effect of the Scheme on surface water quality is predicted to have no significant adverse effects.

During operation the overall

effect on surface water quality is considered to be neutral to slight beneficial. A slight beneficial effect will result from the improvement of treatment to existing runoff from the A1151, which currently discharges into the CWS without any form of treatment.

The Scheme will cross areas of high leaching potential soils and unconfined principal aquifers, and is in reasonably close proximity to some private abstraction sites and a public water supply source. There may be a slight adverse effect on groundwater quality for some private water supplies which are located down-gradient of infiltration ponds. However, all infiltration ponds are outside the default 50m radius SPZ1 under EA guidance, applied to all potable groundwater abstraction sites (unlicensed). Otherwise, during construction and operation, the overall effect of the Scheme on groundwater quality and flow is predicted to be neutral.

Mitigation for construction and operation (including maintenance works) has been embedded in the Scheme design to reduce the overall effect of the Scheme. This mitigation will be incorporated into the CEMP and Norfolk's Transport Asset Management Plan, with the Scheme being maintained by NCC.



With the appropriate mitigation measures for construction and operation, the Scheme will result in a limited number of slight adverse and slight beneficial effects. All other effects are considered neutral.

In conclusion, the road drainage and water effects of the Scheme will **not be significant** during construction. Similarly, effects at the opening and design years are also considered to be **not significant**.

The assessment of combined and cumulative effects of the Scheme bring together the principal findings of each of the previous topics of the Environmental Statement in order to identify and assess the combined effects of the Scheme and the cumulative effects of the Scheme in association with other existing or future significant development projects within the study area.

Combined effects can be defined as effects which can result from multiple actions on receptors and resources over time and are generally additive or interactive in nature.

The assessment methodology for combined effects involves the identification of impact interactions associated with the Scheme upon separate environmental resources or receptors. The significance of construction and operational phase environmental impacts are taken from the preceding chapters of the Environmental Statement into matrices providing a clear summary of potential impacts. The significance of combined effects upon each environmental resource is then made based upon the balance of significance scores.

Cumulative impacts can also be considered as impacts resulting from incremental

changes caused by other past developments that are reasonably foreseeable as occurring at a similar time to the construction of the Scheme.

The assessment of cumulative effects is not intended to provide a detailed assessment of the effects of future developments. In many instances the layout and design of future projects have not been developed to the same level of detail as that for the Scheme, they may be phased in over years and their construction timetable as yet unconfirmed. As such, assessments have been undertaken at a relatively high level in the context of broad development parameters sufficient to provide an understanding of the likely environmental effects of future developments and to enable adequate consideration of cumulative effects.

The Scheme will have an overall moderate adverse and significant environmental effect during the construction phase. The adverse effects come from construction noise and visual intrusion from the lighting of construction compounds and after dark construction activities in the winter. These combined noise and visual effects will adversely impact on bats and birds but these effects will be temporary.

There are significant benefits to

non-motorised and motorised users from the NDR during operation with reduced severance and increased connectivity. There are environmental benefits to residents from the removal of vehicles from unsuitable suburban roads. However there will be adverse impacts to wildlife due to land-take, traffic noise and tree removal.

There are anticipated to be **significant adverse** cumulative impacts during the construction phase. These effects will mostly impact on road users and biodiversity, however it is unlikely that construction will occur simultaneously so this represents a worst case scenario.

During the first year of operation impacts on protected species are **moderate adverse** due to land-take and severance, however maintaining commuting and foraging routes for bats during construction reduces some of the effects that may occur during the first years of operation.

By design year all the adverse impacts will have reduced in significance and the benefits to motorised and motorised users will still be **significantly beneficial** as the other development phases in. The adverse impacts on biodiversity will reduce as the landscaping and habitat creation matures.

Summary of Effects

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Specialism	Effects during Construction	Effects at Opening Year	Effects at Design Year	Mitigation
Air Quality	Slight Adverse to Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Best practice mitigation measures contained in the Construction Environmental Management Plan
Cultural Heritage	Moderate Adverse	Slight Adverse	Slight Adverse	<ul style="list-style-type: none"> Archeological Mitigation Strategy during construction Landscaping bunding and planting to integrate into historic landscape
Landscape	Moderate Adverse	Moderate Adverse	Slight Adverse	<ul style="list-style-type: none"> Creation of naturalistic landforms associated with embankments and cutting slopes Extensive planting to help integrate the scheme into the receiving landscape
Visual Effects	Large to Moderate Adverse	Large to Moderate Adverse	Moderate to Slight Adverse	<ul style="list-style-type: none"> Extensive new planting to help screen the road and associated traffic Lighting provided at the Postwick junction end of the Scheme only
Nature Conservation	Large to Moderate Adverse at some locations	Large to Moderate Adverse at some locations	Neutral	<ul style="list-style-type: none"> New roosts for Bats and ponds for Great Crested Newts Badger fencing Landscaping scheme incorporating habitat creation.
Geology and Soils	Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Implementation of Materials Management Plan Implementation of Construction Environmental Management Plan
Materials	Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Maximise use of materials sourced from the Scheme footprint Maximise recycled content of materials through Materials Management Plan Implementation of Site Waste Management Plan
Noise	Slight Adverse	Large to Moderate Adverse	Large to Moderate Adverse	<ul style="list-style-type: none"> Thin surface course for the proposed carriageway Acoustic barrier at appropriate locations Extensive bunding and false cuttings
Effects on All Travellers	Slight Adverse	Moderate Beneficial	Moderate Beneficial	<ul style="list-style-type: none"> Phasing of works to minimise disruption upon non-motorised users and vehicular travellers 25km of bridleways, cycle tracks and footpaths
Community and Private Assets	Slight Adverse	Slight Beneficial	Large to Moderate Beneficial	<ul style="list-style-type: none"> Restoration of temporary agricultural landtake Compensation for the loss of agricultural land and decrease in farm viability
Road Drainage and Water Environment	Neutral	Neutral	Neutral	<ul style="list-style-type: none"> Pollution control measures within the Construction Environmental Management Plan Use of Sustainable Drainage Systems (SuDS) Attenuation features to mitigate against flooding

Viewing the Full Environmental Statement

The full Environmental Statement can be viewed at:

The Archive Centre
County Hall
Martineau Lane
Norwich
Norfolk
NR1 2DH

The full Environmental Statement can also be viewed on the County Council's web site:

www.norfolk.gov.uk/transportfornorwich

Free internet is available at all libraries.

If you need to view the documents in another format, please call 0344 800 8020

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