

A1 Coal House to Metro Centre Gateshead

Detailed Design



PROJECT DESCRIPTION

Economic regeneration in the Tyneside area has led to increasing traffic congestion on the road network between Coal House and Metro Centre.

As part of the region's Strategic Economic Plan, a 6.2km long section of the A1 has been widened to increase the road capacity by 30% and improve journey reliability, which is vital for the continued prosperity of the region.

LOCATION

Gateshead, Tyneside, UK

CLIENT

Balfour Beatty for Highways England

PROJECT VALUE

£44 million

STATUS

Construction completed 2016

Client Brief/Project Challenges

WSP in a 50/50 JV with Arup were responsible for delivering the detailed designs for the following scheme elements:

- 6.2km of online widening of the A1 to increase the capacity from 2 lanes to 3 lanes in each direction
- Reconfiguration of existing merge and diverge arrangements.
- Proposed mine working and grouting works.
- Significant earthworks including rock cutting over a length of approximately 340m. The height of the rock cutting increased from north to south from 1m to 8m over the 340m excavated length. WSP developed a range of solutions for different rock mass quality, from a high tensile steel flexible facing with rock nails to reinforced steel, shotcrete and a range of drainage measures.
- Through their presence on site the WSP team maintained a 'Live' geological model which enabled effective transfer of as built information into the project health and safety file.
- 3D modelling was used to communicate the spatial distribution of the geological hazards such as the mining voids and faults.
- A 62m long footbridge spanning eight lanes over the A1.

Our Approach

- Project Management



- Detailed Design Services
- Highway Design
- Structures design (new footbridge)
- Geotechnical Design including rock slope widening
- Design of grouting for shallow mining works
- Drainage Design including SuDS
- Pavement Design
- Designer site representative including supervision of the rock cutting stabilisation works
- Principal Designer
- Stakeholder Management

Outcome/Client Benefits

WSP in joint venture with Arup delivered the detailed design for the online widening of this 6.2km long section of the A1 trunk road near Gateshead. The widening works involved major earthworks which included the excavation of a 340m long, 8m high rock cut. The multi-million pound A1 widening scheme opened on time in Summer 2016, offering hugely improved safety and journey reliability benefits. Other works included:

- Highways online widening
- Drainage design
- Pavement design
- Road Restrain System Design
- Geotechnical design including the 340m long rock cutting
- Designs of grouting for shallow mining works
- Production of drawings and specification
- Production of Geotechnical Feedback Report

A19/A1058 Coast Road Junction Improvement, North Tyneside

Design and Construction



PROJECT DESCRIPTION

The primary objective of the Scheme is to improve congestion at the Junction by realigning the A19 to pass under the existing grade separated junction.

New slip roads connecting the roundabout to the realigned A19 and A1058 Coast Road will improve capacity and safety for all users and facilitate development in North Tyneside.

Amenities for NMUs users will be enhanced throughout the Scheme as an integral part of the works

LOCATION

North Tyneside, UK

CLIENT

Highways England

PROJECT VALUE

£94.2 million

STATUS

Currently in construction. Expected open date March 2019

Client Brief/Project Challenges

WSP were responsible for delivering the project through design, construction and statutory phases of the Project. Key features of the scheme are:

- A 1.9km realignment of the A19 mainline carriageway to facilitate passage under the existing A19 Roundabout.
- Provision of slip roads to facilitate an all movement junction
- Construction of three new integral bridges and two new footbridges.
- Widening of an existing underbridge to accommodate the A19 north facing slip roads.
- Extensive earthworks engineering including bulk dig for A19 mainline and engineered slope solutions.
- Significant drainage works to accommodate climate change within existing discharge rates
- Design of 1.5km of contiguous bored and sheet pile retaining walls to reduce the impact of land take to the surrounding area.
- Replacement of existing technology including gantries and interface with Tyne Tunnel Operations.
- The provision of over 2km of new and improved combined pedestrian and cycling facilities.

Our Approach



- Project Management
- Highway Design
- Structures design
- Geotechnical Design
- Drainage Design
- Pavement Design
- Management of Statutory Undertakers
- NEC3 Project Manager for Advanced Works
- Production of Contract Documents
- Site Assurance and Design Support throughout the Construction phase.
- Stakeholder Management
- Taking the scheme through the Development Consent Order application process.

Outcome/Client Benefits

During PCF Stage 3 WSP worked collaboratively with Highways England to develop a revised design, producing an overall reduction in the estimated scheme cost by £33.3M (25%) to £104.2M (July 2014). This resulted in an updated benefit to cost ratio of 2.9 and robust strategic case for the project. The A19/A1058 Scheme was adjudged the winner of the 2014 Highways England Supplier Recognition Award in the category of Managing Down Cost. Other works delivered by WSP are:

- A comprehensive Environment Statement
- Delivery of a successful Development Consent Order Application
- A set of tender documents to allow procurement of a Contractor
- PRINCE2 aligned documents delivered within Highways England Project Control Framework
- A package of design documents to allow determination of Target Cost within NEC3 Option C Contract.

A21 Tonbridge to Pembury Dualling

Design through a Design and Build Tender



PROJECT DESCRIPTION

This commission comprises the design of the on-line dualling of the existing A21 Tonbridge to Pembury in Kent. The scheme starts at the southern end of the existing A21 Tonbridge Bypass, and extends some 4.2km to the south. The proposed alternates between the east and west sides of the existing road, and realigns the vertical alignment of the existing road.

The existing A21 / Longfield Road roundabout junction will be replaced with the provision of a new grade separated dumb-bell junction. The scheme is located in close proximity to a range of environmental designations including the Kent special landscape area, Area of Outstanding Natural Beauty and Royal Society for the Protection of Birds (RSPB) Nature Reserve.

LOCATION

Tonbridge, Kent UK

CLIENT

Balfour Beatty for Highways England

PROJECT VALUE

£69.7 million

STATUS

Scheme opened Sep 2017

Client Brief/Project Challenges

WSP were commissioned to design and tender, through to completion, the A21 dualling scheme in Kent. The scheme to be delivered via a Design and Build Contract. Key features are:

- 4.2km of single carriageway upgraded to dual carriageway
- New junctions at Fairthorne and Longfield Road
- Two new integral underbridges with reinforced earth abutments
- One new overbridge
- One new footbridge
- Drainage detention ponds
- Soil nailed cuttings up to 8m deep passing through soliflucted soils with very low shear strength
- Reinforced earth retaining wall
- Reinforced earth embankments
- Lighting
- Environmental mitigation measures comprising:
 - the creation of 18.1ha of new woodland through the translocation of ancient woodland soils and coppice stools;
 - Collection of seed from ancient woodland trees and propagation from a local nursery



- Creation of a 2.4ha of heathland within an arable field adjacent to Tudley Woods RSPB Reserve

Our Approach

- Highway detailed design
- Drainage design including SuDS
- Bridge design
- Geotechnical design and certification
- Contaminated land advice
- Archaeological services
- Environmental services
- Construction Phase site monitoring

Outcome/Client Benefits

WSP were appointed by Balfour Beatty as the designer for the project at the tender stage in 2014. The early phases of the project involved WSP in sourcing additional ground investigations which identified significant ground risk. This has then been accommodated within the detailed design. The WSP team developed value engineering proposals that reduced the impact of the works. Other services provided by WSP include:

- Project Management
- Pre-construction surveys
- Highway Detailed Design
- Geotechnical Design
- Drainage & Flooding Design
- Structural Design
- Environmental Design
- Road Lighting Design
- Pavement Design
- Road restraint System Design
- Principal Designer
- Stakeholder Management
- BIM Level 2 compliant system enabled the development of a Federated Design model for the sharing of design data.

A30 Temple to Higher Carblake Improvement Scheme

Development Consent Order (DCO)



PROJECT DESCRIPTION

The A30 is the main highway route linking Cornwall to the regional and national strategic road networks and connecting the county to the rest of the UK.

The A30 is of dual carriageway standard between the M5 at Exeter and Carland Cross near Truro, with the exception of the 4.5km single carriageway section between Temple and Higher Carblake.

Under the Planning Act 2008, Cornwall Council were required to submit a Development Consent Order (DCO) to the Planning Inspectorate.

LOCATION

Temple, 8km North of Bodmin, Cornwall, UK

CLIENT

Cornwall Council

PROJECT VALUE

GBP (Optional)

STATUS

The DCO was approved on 5th February 2015.

Client Brief/Project Challenges

WSP were hired to support the DCO application to the Planning Inspectorate for a 4.5km section of road dualling through part of the environmentally sensitive Bodmin Moor, South Cornwall. The scheme involves many challenges including

- Dualling of an existing, live main road artery with high traffic flows and fast through speeds, with substantially high seasonal traffic flows
- The scheme is sited within a Site of Special Scientific Interest and an Area of Outstanding Natural Beauty
- The scheme seeks to rationalise the existing junction arrangements and private accesses, whilst still providing for all required vehicle movements
- Three new compact grade separated junctions, located at Cardinham Downs, Preeze Cross and Temple Tor were proposed to improve junction safety
- Air quality, noise and visual environmental concerns required particular consideration due to the locality of the scheme

Our Approach

- WSP carried out a full Environmental Impact Assessment (EIA) and put together a business case to support this road scheme in order to secure central Government funding. As part of the DCO process, WSP also acted as an Expert Witness as part of the Examination in Public.
- WSP successfully identified the most pertinent issues and challenges relating to this DCO. The scheme crosses an Area of Outstanding Natural Beauty and Site of Special Scientific Interest which required



significant mitigation and areas of compensation land. Moreover, protected species in the vicinity required mitigation, including obtaining a Dormouse European Protected Species licence.

- WSP also provided additional services to the client,
- carrying out the transport assessment
- undertaking ecological surveys
- 3D visualisations
- managing the public consultation process
- acting as a one stop shop for the client on environment and related services.
- acting as an Expert Witness as part of the Examination in Public.

Outcome/Client Benefits

WSP's prior knowledge of the area and experience of EIA on other linear highways schemes provided the client with the confidence, local knowledge and contacts required for a successful outcome with a Development Consent Order issued in February 2015.

- The scheme progressed to detailed design, and on-site construction works were completed in late 2017
- The Trunk Road network between the M5 Exeter and near Truro is now fully dualled, improving journey times, road safety and increasing the potential for economic growth and development for Southern Cornwall.

A487 Caernarfon and Bontnewydd Bypass

EARLY CONTRACTOR INVOLVEMENT (ECI) SCHEME



VISUALISATION OF VIADUCT SPANNING AFON SEIONT AND GLAN GWNA HOLIDAY PARK

PROJECT DESCRIPTION

The A487 Caernarfon to Bontnewydd Scheme involves the delivery of a primarily rural new highway, which is to be constructed off-line through a gently graded open landscape, largely characterised by scattered farms with associated field patterns and hedge boundaries. There are two significant river crossings over the Afon Gwyrfai and Afon Seiont. The area also contains a number of designated sites of international, national and local biodiversity value. Of particular relevance are the Glynllifon Bats Special Area of Conservation (SAC) and Afon Gwyrfai SAC both of which have implications for structure design and provision.

WSP's role on the ECI Scheme was to work closely with the main contractors to develop tender designs through to Key Stage 2 (Option Selection) and early parts of Key Stage 3 (Preliminary Design). Significant consideration was given to the geographical setting to avoid impacts on the surrounding landscape, construction methodology, comparative capital cost for construction, comparative whole life cost and different structural forms and materials to account for available skills and materials.

LOCATION

Caernarfon, Gwynedd, Wales, UK

CLIENT

Welsh Government

PROJECT VALUE

GBP 140,000 (Initial Fees)

STATUS

June 2015
Preliminary Design – Completed

January 2018
Detailed Design – Start

Client Brief/Project Challenges

The proposals include a new route of approximately 9.7km around the south west and east of Caernarfon. This route is made up of three sections of WS2+1 standard carriageway. All the proposed alignment will be offline from the existing A499/A487 Goat Roundabout to the existing A487 Plas Menai Roundabout. Key features are:

- There are two significant river crossings over the Afon Gwyrfai and Afon Seiont.
- There are 29 structures, including 11 bridges and 18 culverts. The most significant structure is the Afon Gwyrfai Viaduct which is a 300m long 8 span steel composite structure over a river designated with Special Area of Conservation (SAC) status.
- There are a variety of cuttings and embankments up to 7m deep/high. Road drainage would generally be provided by grass lined swales discharging into pipes and attenuation ponds along the Scheme.

- New or diverted Public Rights of Way and Private Means of Access would be provided where necessary to replace those affected by the Scheme.
- Road drainage is provided by grass lined swales passing into pipes which discharge into attenuation ponds along the Scheme. These ponds attenuate and treat the collected surface water prior to discharge into existing watercourses.
- Road drainage to both the Afan Gwyrfai and Afan Seiont is via combined kerb and drainage bridge-deck compatible units.

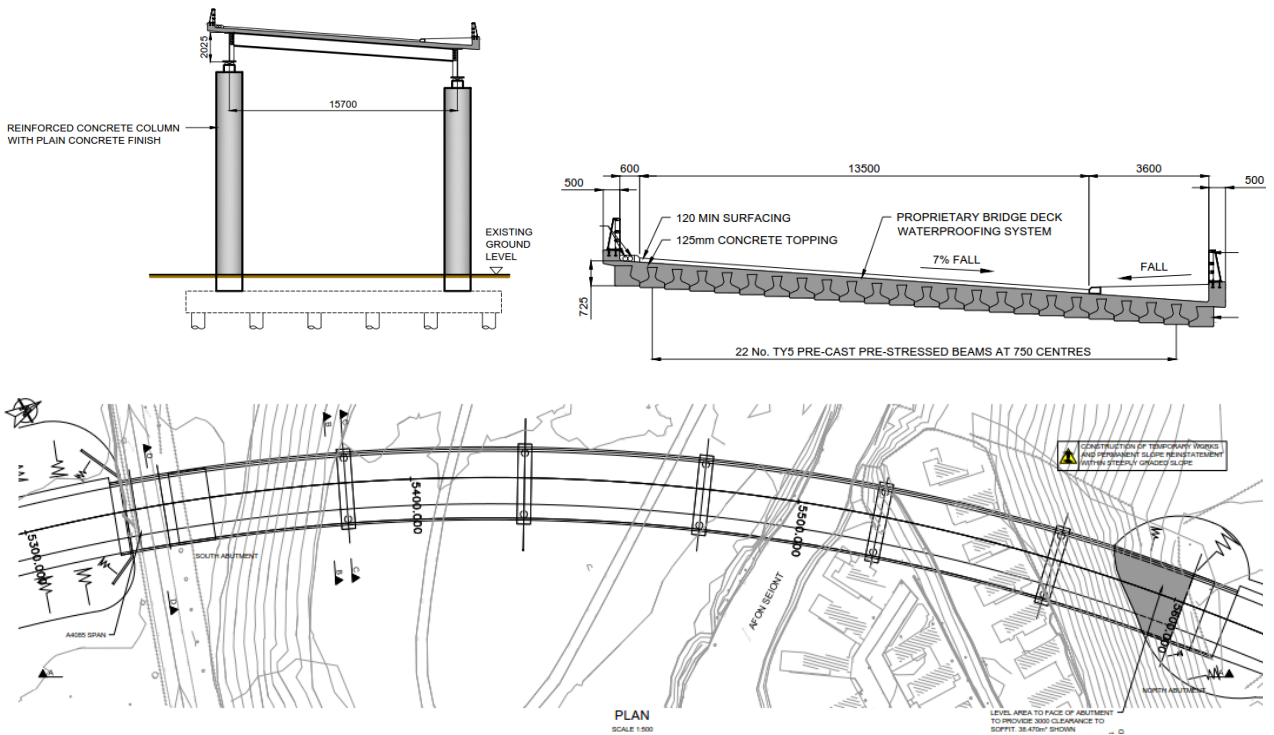
Our Approach

- ECI was utilised to enhance planning and develop options based on availability of skills and materials. A key decision taken to maximise construction outputs was to utilise reinforced soil and reinforced concrete substructures to allow substructures to be constructed simultaneously, thus minimising skills shortage impacts on the programme;
- Afon Gwyrfai Viaduct, an 8 span steel concrete composite multi-beam superstructure continuous over reinforced concrete leaf piers, with reinforced concrete cantilever abutments;
- Pont Afon Seiont Newydd Viaduct, a 6 span steel concrete composite ladder deck superstructure continuous over reinforced concrete pier columns to each edge girder, with reinforced concrete cantilever abutments and a single span pre-cast pre-stressed concrete beam solid infill superstructure cast fully integral with reinforced concrete cantilever abutments over A4085;
- Structures designed include; 12 concrete culverts (proprietary concrete pipes and reinforced concrete box culverts), 7 underbridges (in-situ reinforced concrete box structures with either in-situ reinforced concrete roof slab incorporating pre-cast concrete beams and a single span pre-cast pre-stressed concrete beam solid infill superstructure cast fully integral with deck end bank seats, supported on reinforced soil substructures incorporating vertical pre-cast concrete fascia panels) and 3 overbridges (single span pre-cast pre-stressed concrete beam solid infill superstructures cast fully integral with deck end bank seats, supported on reinforced soil substructures incorporating vertical pre-cast concrete fascia panels and a 3 span pre-cast pre-stressed concrete beam superstructure made fully integral with 2 no. reinforced concrete piers and 2 no. bank seat abutments);
- The reinforced soil substructures will be the first application of this technology in Wales.

Outcome/Client Benefits

WSP in a joint venture with Balfour Beatty/Jones Brothers is delivering the detailed design for the Client with all specialist discipline requirements necessary to develop a suitable and practical design thus offering hugely improved and journey reliability benefits.

- Project delivered with a sympathetic design to the surrounding area of natural beauty, considering the designated sites of international, national and local biodiversity value
- ECI effectively used to ensure different structural forms and materials specified to account for available skills and materials
- First application of reinforced soil substructures in Wales



TOP LEFT: SECTION THROUGH PONT AFON SEIONT NEWYDD VIADUCT REINFORCED CONCRETE COLUMN | TOP RIGHT: SECTION THROUGH PONT AFON SEIONT NEWYDD VIADUCT DECK | BOTTOM: PONT AFON SEIONT NEWYDD VIADUCT PLAN VIEW

Beccles Southern Relief Road (SRR)

Detailed Design and Site Supervision



PROJECT DESCRIPTION

The scheme comprises the construction of the Southern Relief Road (SRR) from London Road (A145) to Ellough Road / Benacre Road south of Beccles urban fabric.

A new 2km long single carriageway road, running in an east-north-easterly direction from A145, is proposed.

Two new roundabouts are proposed on either end of the SRR allowing connection to the existing highway network.

A number of simple junctions are proposed throughout the scheme improving access to adjacent properties and business premises, including the Moor Business Park.

LOCATION

Beccles, Suffolk, UK

CLIENT

Suffolk County Council

PROJECT VALUE

£6.5 million

STATUS

Currently in construction phase

Client Brief/Project Challenges

To provide detailed design through to for the proposed 2km single carriageway scheme. Work consists of

- Two roundabouts and over 2km of associated single carriageway link roads
- 3m wide shared used pedestrian / cycleway facility
- 3.5m wide bridleway and equestrian crossing facilities
- Development of drainage system incorporating multiple SUDS features and promoting suitable landscaping to meet Client aspirations
- One mammal tunnel to maintain habitat linkages
- Identified areas of no dig construction to protect established trees
- Provided ecological advice for the advanced vegetation clearance and for the protection and relocation of Greater Crested Newts within the scheme extents
- Vehicle restraint system
- New pavement construction

Our Approach

- Detailed design (highways, drainage, pavement, road restraint system etc)
- Production of the Tender and Contract documents using NEC3 Option A Priced Contract



- Compilation of the Specification in accordance with MCHW
- Development of designs for the public services diversions
- Ecological Mitigation Planning

Outcome/Client Benefits

WSP provided the Client with all specialist discipline requirements necessary to develop a suitable and practical design and to enable the discharging of all planning conditions. This included the development of a complex network of swales and infiltrations features and provision of ecological advice for the relocation of Great Crested Newts.

Services provided by WSP to achieve these aims included

- Project Management
- Detailed Design
- Tender and Contract Documents
- Technical advisor role through construction phase (currently live on site)
- Liaison with Utilities Companies and Stakeholder in order to prepare the site for future development in numerous adjacent plots
- Ecology advise
- Stakeholder Management
- Principal Designer

Bury St. Edmunds Eastern Relief Road (ERR)

Detailed Design and Construction Support



PROJECT DESCRIPTION

The scheme comprises the construction of the ERR from Skyliner Roundabout to the A14 junction at Rookery Junction.

The single carriageway road is proposed, running in an easterly direction from Skyliner Roundabout, including the addition of 5 roundabouts, tying into Sow Lane to the northeast of the industrial estate.

Proposed roundabouts will provide access to future developments to both the north and south, including a new school.

LOCATION

Bury St Edmunds, Suffolk County, UK

CLIENT

Suffolk County Council

PROJECT VALUE

£15 million

STATUS

Scheme open to public Sep 2017

Client Brief/Project Challenges

WSP were contracted to undertake detailed design of the scheme, and provide design support during the construction of the works. The scheme consists of:

- Four roundabouts and 2.4km of associated link roads
- Alteration of the A14 Junction 45 slip roads to ensure the provision of compliant merge and diverge on eastbound and an extended auxiliary lane for the westbound merge
- Provision of a shared use footway cycleway
- Toucan pedestrian crossings
- Over 5km of SuDS features (drainage outfall 100% to ground as no outfall to watercourse were available. The design included provision of crate system to minimise land take and maintenance, swales, ponds)
- Design of two mammal tunnels within a constrained site boundary whilst satisfying the requirements of relevant statutory bodies
- Identified areas of no dig construction to protect established trees
- Provided engineering advise for the protection and relocation of a World War II pyrotechnic store located within the scheme extents

Our Approach

- Detailed design (highways, drainage, pavement, road restraint system, earthworks etc)



- Production of the Tender and Contract documents using NEC3 Option B Priced Contract with Bill of Quantities
- Compilation of the Specification in accordance with MCHW
- Development of designs for the public services diversions

Outcome/Client Benefits

WSP identified that the drainage design for the scheme would require an infiltration system due to topography and geology. Further investigation identified poor infiltration rates throughout the site which resulted in the design of a complex network of swales, ditches and ponds. Other design services undertaken by WSP include:

- Project Management
- Detailed Design
- Tender and Contract Documents
- Technical advisor role through construction phase (currently live on site)
- Liaison with Utilities Companies and Stakeholder in order to prepare the site for future development in numerous adjacent plots
- Principal Designer

ECS1 Northern Hub

Ordsall Chord Railway Bridge



PROJECT DESCRIPTION

The Northern Hub programme is a radical change to the rail network around Manchester – the most critical being the Ordsall Chord (pictured).

Approximately 500m of new bridge structures are required to create new elevated routes, including an 89m-span network arch river crossing, a skewed crossing of the inner ring road dual carriageway, and structural interface with the Grade I listed George Stephenson’s arches.

Changes to rail loading including realignment of tracks throughout the central Manchester area led to a requirement for assessment of more than 500 masonry

arch spans and 15 historic cast iron flat-deck structures

LOCATION

Manchester, UK

CLIENT

Network Rail

PROJECT VALUE

£3 million

STATUS

September 2011 – June 2014

Client Brief/Project Challenges

The Northern Hub railway is mainly elevated through the city centre, and on the approaches to the main viaducts we designed various retaining structures including earth retaining walls. WSP undertook designs for ancillary structures, components and gantries; examples include concrete gravity sign bases, overhead line structures and foundations, signal gantries and foundations for equipment cabinets and rooms. The city centre has numerous culverts for both watercourses and surface water and foul drainage. Determining the size and locations of these, to avoid clashes with proposed new foundations, was a necessary step for the project.

- Use of structural Eurocodes, DMRB and TfL Standards
- Design, checking and assessment of Bridges (or elements of bridges)
- Design, checking and assessment of structures
- Behaviour of bridge structures and materials

Our Approach

- In order to facilitate the Ordsall Chord network arch, an existing pedestrian bridge carrying a major gas main had to be removed. WSP designed the replacement bridge, to carry utilities and pedestrians, using the Design Manual for Roads and Bridges. In addition, WSP have been responsible for developing and drafting sections of the DMRB with recent examples including parts of IAN 124/11 Use of Eurocodes for the design of highway structures.

- WSP carried out assessments for 15 metallic flat-deck structures which were subject to modified loading arising from the Northern Hub programme and which were on the programme critical path. All of these were part of the Grade II listing of the viaduct complex; several of these were constructed of cast iron using unusual details. WSP carried out finite element analysis to demonstrate enhanced capacities compared with traditional analysis methods
- WSP were responsible for managing assessments for approximately 500 masonry arch spans throughout the central Manchester section of route. Assessments were carried out using standard MEXE and Archie software. WSP commissioned further investigations to confirm the fill depth on the structures, arch barrel thickness and masonry strength, in order to refine the results of the assessments and demonstrate acceptable capacities.
- The design of new structures included the main 85m-span network arch bridge over the navigable river, 35m-span steel box girders over the inner ring road, replacement prestress concrete beam bridge decks and other approach structures. The designs took into account careful consideration of constructability and temporary works, given the congested city centre location. Many WSP proposals involved offsite prefabrication to minimise onsite construction activities, and gave explicit consideration to crane locations, necessary road closures and planned railway possessions. Although many of the new designs were for rail bridges, the interface with the highway network was a key consideration.

Outcome/Client Benefits

Summary

- BIM - 3D visualisation allowed WSP to consult closely with architects and environmental planners using clearly presented realistic visuals as well as the use of clash detection techniques. In the case of George Stephenson's Grade 1 listed bridge over the River Irwell, it meant a solution could be found to protect the bridge by modelling alternative layouts throughout the option selection phase and assisted in the development of a bowstring network arch solution. To date BIM has been little used in heavy rail infrastructure, but WSP embraced it to bring multiple benefits: improving health and safety, and time saving, through the removal of 1000s of hours otherwise spent on site; stakeholder engagement, through clear communication of design, and life-cycle asset management
- A laser scan survey was used to provide Point Cloud information. This provided accurate dimensions of the significant numbers of structures involved in the scheme and minimised the amount of time that surveyors needed to work on the live railway. The survey minimised the need in revisiting site to confirm critical dimensions.
- Collaboration – We embraced the approach of collaborative working in line with BS11000. WSP provided Network Rail with a multi-disciplinary programme of management services by way of an integrated and co-located team.

South Wye Transport Package, Southern Link Road, Hereford

Link Road Between A49 and A465 South of Hereford, Planning Application



PROJECT DESCRIPTION

The Southern Link Road is part of a wider aspiration to have a road which bypasses Hereford city centre and joins the A49 to the north and south. The bypass will make the city centre a more pleasant environment and will make it easier to reach the enterprise zone and the new housing.

The planning application for the Southern Link Road sought permission for a new road approximately 3 kilometres in length joining two arterial routes linking the South Wye area with the centre of Hereford.

LOCATION

Hereford, Herefordshire, UK

CLIENT

Herefordshire Council

PROJECT VALUE

£27 million

STATUS

Planning permission granted July 2016

Client Brief/Project Challenges

Herefordshire Council has a long term strategy for the city of Hereford which is set out in the adopted Local Plan. This involves both commercial and residential development, including an Enterprise Zone to the south east. WSP were to undertake all public consultations, assessments and design works required to support the Council's planning application for the Southern Link Road.

- An initial public consultation exercise was undertaken aimed at obtaining the public's views on the choice of the route for the new road, as well as detailed design elements and mitigation. The route is subject to compulsory acquisition and therefore the landowners also need to be kept informed. A second stage of consultation was carried out once the preferred route had been chosen.
- Environmental constraints that required mitigation within the design included the setting of a number of listed buildings, the presence of protected species including rare bat species, and areas of ancient woodland. The presence of the railway crossing the site also had to be considered in the design.
- There was a significant amount of public opposition from local residents to the project, particularly from affected landowners, regarding the choice of route. In order to address this, WSP carried out a series of public engagement events prior to submission of the application. The client and WSP also held face to face meetings with landowners to explain the proposals where possible.
- It is not possible to mitigate the loss of Ancient Woodland. Therefore the landscape mitigation design included an area of woodland much larger than the area to be lost in order to compensate for the impact.
- A Grade II* Listed Building lies 300 metres from the route of the road which required a significant amount of mitigation such as dense planting and the shaping of the earthworks to reduce the impact. Historic England required a comprehensive assessment of the historic landscape in order to justify the mitigation proposals.



Our Approach

- WSP prepared and submitted a detailed planning application to Herefordshire Council including:
- Planning Statement;
- Design and Access Statement;
- Transport Assessment;
- Environmental Statement; and
- Consultation Report.
- A number of stages of public consultation were undertaken. WSP arranged and ran the public exhibition providing specialists in a number of disciplines to answer the public's questions.
- WSP carried out an extensive suite of environmental surveys, including a wide range of species surveys to determine which protected species were present.
- A comprehensive Transport Assessment was carried out, considering the impact of the Southern Link Road on the surrounding road network, as well as other sustainable options such as bus lanes and footpath improvements. The assessment also considered the cost and benefits of the proposal.
- WSP also monitored the application process, responding to objections to the proposal, and spoke on behalf of the applicant at the Planning Committee. WSP are also providing the detailed work required in order to discharge the conditions of the planning permission.

Outcome/Client Benefits

Planning permission for the Hereford Southern Link Road was successfully granted in July 2016. This allows Herefordshire Council to continue design and construction works on the 3km section of road between the A49 and A465, thus providing a crucial link to the road network which supports the Hereford adopted Local Plan.

- WSP provided an integrated transport, environmental and planning service to deliver the planning application. This included input into the business case to support an application for funding using knowledge gained through the Environmental Impact Assessment process.
- WSP also used their extensive knowledge of the Development Consent regime to advise the client on whether the project fell within the parameters of a Nationally Significant Infrastructure Project.

Wirral Borough Council

Road Lighting – Invest to Save



PROJECT DESCRIPTION

Wirral Borough Councils (WBC) street lighting stock consists of 42,000 units.

The Council were very keen to consider ways in which they could reduce the current energy and maintenance costs.

LOCATION

North West – Wirral, UK

CLIENT

Wirral Borough Council

PROJECT VALUE

£3.15 million

STATUS

Phase 1 completed March 2016

Client Brief/Project Challenges

The Invest to Save project has been split into two phases, the first considering implementing LED retrofit for 7,500 units along routes which currently use higher wattage luminaires. The second phase will consider the remaining units (35,000) and how these can also be retrofit with LED luminaires.

WSP were successful in securing the Phase 1 which included the following works for the replacement of Phase 1:

- Design
- Procure
- Monitor
- Project Manage

Our Approach

- Due diligence.
- Site surveys.
- Procurement strategy.
- Production of tender documentation.
- Tender evaluations.



- Cost estimates.
- Phase 2 business case.
- Liaison with suppliers, contractors and manufacturers.
- Site monitoring and reporting.

Outcome/Client Benefits

In addition to this work on Phase 1 WSP carried out a full assessment and business case to enable capital and operating costs to be considered for Phase 2, to allow funding streams to be identified and considered for the future project.

- The Phase 1 project is set to save WBC £500k per annum in energy, whilst Phase 2 is estimated to be in the region of £700k per annum.
- This will allow a total energy saving of approximately £38 million over 25 years to be achieved.

A1 Birtley to Coal House

Widening and Replacement of Allerdene Bridge



PROJECT DESCRIPTION

The scheme forms part of the Newcastle/Gateshead Western Bypass (NGWB) on the A1 between J65 (Birtley) and J80 (Seaton Burn). It is part of Highways England's strategic road network serving the metropolitan area of Tyne and Wear.

This project is located between J65 (Birtley) and J67 (Coal House) on the NGWB and is approximately 4.2km in length.

The section between Birtley (J65) and Coal House (J67) currently experiences delays, journey time reliability issues and accident problems which are forecast to worsen in the future as a result of traffic growth from development sites

within the region.

A further issue is the condition of Allerdene Bridge which carries the A1 over the East Coast Mainline. The bridge is an ongoing maintenance issue for Highways England and it is considered that the entire structure will need to be replaced in the medium term.

LOCATION

Gateshead, Tyne and Wear, England

CLIENT

Highways England

PROJECT VALUE

Preferred Option Construction Cost Estimate:
£245.9 million

STATUS

As at May 2016, Estimated Completion Date :
July 2024

Client Brief/Project Challenges

The primary objective of the scheme is to support economic growth and development by increasing capacity and improving journey time reliability which will reduce congestion, delays and incidents on this stretch of the A1.

- The scheme aligns well with both local and national policy which is focused on improving the economic performance of the region, and improving accessibility to jobs and services whilst supporting additional developments in the area.
- Without intervention, the issues on this section of the A1 will have a detrimental effect on the local economy and suppress the potential for regional economic growth.
- If restrictions become necessary on Allerdene Bridge due to issues with the structure, this would have a major impact on traffic movements in the region.

Our Approach

- During the PCF Stage 1, WSP developed the following three options: Option 1: Online Replacement of Allerdene Railway Bridge with retention of Coal House Interchange; Option 2: Offline Replacement of

Allerdene Railway Bridge with retention of Coal House interchange; Option 3: Offline Replacement of Allerdene Railway Bridge and new interchange at Coal House.

- Due to the development of alternative Options 1 & 2 during PCF Stage 1, WSP reduced the scheme cost from PCF Stage 0 of £526.4 million (Option 3) to £245.9 million (Option 2).
- A risk register was developed at PCF Stage 1 (Option Identification) to initiate the project risk management process. The register was progressed in PCF Stage 2 (Option Selection). A risk workshop was held with key stakeholders to attain their feedback into the process. This risk register has continually been managed for successful delivery of the project. High value risks have been targeted and mitigation work undertaken to eliminate / minimise those risks, however all risks have been managed irrespective of value / impact.
- An efficiency register was also developed at PCF Stage 1 (Option Identification) to initiate the value management process, which progressed to PCF Stage 2 (Option Selection). The reduction in works cost has been developed by a rigorous value engineering exercise. The reduction in works costs has been developed by consideration of the following efficiencies:
 - o The order of magnitude estimates undertaken for Option 3 at PCF Stage 0 have reduced due to alternative Options 1 and 2 developed at PCF Stage 1;
 - o Landscape and retain the abandoned section of the existing A1 embankment adjacent to Allerdene underbridge;
 - o Retain Smithy Lane overbridge with mainline alignment departures;
 - o Obtain Network Rail consent to construct intermediate supports for Allerdene Rail underbridge on their land thereby reducing the span needed;
 - o Reduce the length/standard of Coal House Interchange south facing slip roads to reduce the width of Allerdene Bridge.

Outcome/Client Benefits

In terms of added value at a scheme level, a significant amount of work has been undertaken to help ensure that the safety objective for road workers, road users and NMUs will not only be achieved but be improved. Examples of this include:

- Provision of concrete barrier within the central reserve to reduce the need for maintenance;
- Provision of a system of traffic management signing within the central reserve;
- Hard-standings to enable maintenance vehicles to park off the mainline carriageway

Grantham Southern Relief Road



Visualisation of New Viaduct Spanning River Witham and East Coast Main Line (ECML)

PROJECT DESCRIPTION

The Grantham Southern Relief Road (GSRR) scheme involves the delivery of a new route to the south of Grantham, Lincolnshire, between the A1 to the west and the A52 in the east. The new highway will be primarily rural and will be constructed through graded open landscape, largely characterised by farmland and hedge boundaries. The scheme will tie in to the B1174, which runs north-south out of Grantham, approximately 1km to the east of the new grade-separated junction with the A1. The main feature of the scheme is the construction of a new viaduct, which will cross over both the River Witham and the East Coast Main Line (ECML). Whilst the scheme does not include any sites of specific biodiversity interest, it will require the need for mitigation in relation to specific local wildlife, and does include for areas of local archaeological interest

The new route is intended to assist in achieving a number of key objectives, mainly the removal of through traffic from the town centre, due to delays and congestion caused by the high number of incidents involving HGVs striking bridges carrying the ECML, which passes through Grantham Town Centre. The new route will also assist in facilitating the provision of a mixed use development including up to 3,500 homes through the provision of a roundabout 1.8km to the west of the realigned A52 roundabout, as well as creating a safer, more attractive and accessible environment in Grantham, by reducing carbon emissions and noise pollution, so improving the quality of life for local residents.

WSP's role on this scheme has been to work alongside the client to develop and secure planning permission for Phase 3 of the scheme (planning permission for Phases 1 and 2 were obtained through other planning applications submitted by third parties). Having been secured, the role has been expanded to cover the detailed design of Phases 2 and 3, including highways, geotechnical, drainage, environment and structural. In addition, WSP have also been involved in working alongside the client to secure the various Orders (Side Roads, CPO), and agreements with a number of key third parties with whom agreements are required, in order for the scheme to be constructed, including Highways England, Network Rail, the Environment Agency, utility providers and a number of local landowners.

LOCATION

Grantham, Lincolnshire, UK

CLIENT

Lincolnshire County Council (LCC)

PROJECT VALUE

Circa £80m (incl fees)

STATUS

Phase 1 Planning Permission Granted 2010

Phase 2 Planning Permission Granted 2016

Phase 3 Planning Permission Granted 2015

Grantham Southern Relief Road

Client Brief/Project Challenges

The proposals include a new route of approximately 4.2km in length, to the south of Grantham Town Centre. The route is made up of three phases, with the majority being single carriageway, and a section of wide single carriageway including climbing lanes over a length of 1.2km between the B1174 roundabout and the development roundabout. The design for Phase 1 has already been completed and the works constructed. Key features are:

- Provision of a new grade separated junction with a vehicular underpass on the A1 to the south of Grantham;
- Provision of a new roundabout on the north-south B1174 to enable the tie-in of the new east-west GSRR scheme (already constructed);
- Provision of a significant new viaduct over the River Witham and the ECML. The viaduct will be a steel structure with a concrete deck slab some 300m in length over 5 spans, and will require the construction of embankments some 14m high in order to provide support at the eastern and western ends. The bridge will also be supported by 4no. steel support piers with concrete bases;
- Realignment of the existing A52 Somerby Hill roundabout to tie-in to the GSRR;
- Phase 3 of the scheme will involve a variety of embankments up to approximately 14m in height (B1174 to the development roundabout) and cuttings of up to 9m in depth (development roundabout to the A52);
- Provision of 2no. attenuation ponds for highway drainage on the section of the scheme between the B1174 and the development roundabout, fed by concrete drainage channels discharging into pipes along the Scheme. The section of the scheme between the development roundabout and the realigned A52 roundabout is drained through grassed swales discharging into the underlying limestone rock via soakaways;
- Highway drainage on the new viaduct will be provided through a kerb and gully system, which will discharge into a pipe suspended from the underside of the deck;
- New or diverted Public Rights of Way and Private Means of Access would be provided where necessary to replace those affected by the Scheme.

Our Approach

- Working closely alongside the Senior Project Leader and Design Reviewer at LCC, including regular design team meetings to consider how each of the different design disciplines integrate together to provide a seamless design, where all known clashes have been identified and suitably mitigated for;
- The significant embankment works will be undertaken using site won material, with the majority of the material for the western embankment needing to be transferred across from the part of the site lying to the east of the ECML. Excess material from the scheme, mainly topsoil and other material unsuitable for use in the construction of the embankments, will be used to provide an area identified for future use as an allotment when the associated housing development is built out, rather than being taken off site, and so incurring additional fees;
- As the scheme has been identified as a relief road, there will be limited provision made for Non-Motorised Users (NMUs), with footways provided between the B1174 roundabout and the development to be provided immediately to the east of the A1;
- Significant utility works are being undertaken to enable the scheme to be constructed, including raising a pylon supporting overhead power cables to facilitate construction of the viaduct, major high pressure water pipe, sewer pipe and fibre optic cable diversions;
- Planning requirement for provision of acoustic mitigation on the viaduct in the form of an acoustic barrier, has raised issues surrounding the overall suitability from a maintenance and visual impact perspective (see image on page 1). Possible alternatives may have negative impact on wildlife (i.e. a clear barrier



Grantham Southern Relief Road

likely to increase bird strikes and so increase ongoing maintenance requirements). Discussions with Planning Authority to agree a way forward are ongoing.

- A number of buildability challenges have been identified, for which solutions have been developed, including construction of the viaduct over the ECML, construction of pier 3 between the River Witham and the ECML to support the new viaduct, proximity of a high pressure water main to the toe of the western embankment, provision of a natural spring interceptor drain (6m deep) below the western embankment, interface with Anglian Water's Saltersford Water Treatment Works beneath the new viaduct, maintaining access to an existing working quarry during construction.

Outcome/Client Benefits

WSP is delivering the detailed design for the Client with the responsibility for the majority of the specialist discipline requirements necessary to develop a suitable and practical design (the Client is undertaking some specialist design activities, namely sign design and street lighting). The close liaison with the client, in particular the design reviewer, has enabled the design team to produce a scheme that is buildable given the known scheme constraints, and will assist in achieving the clients objectives, whilst remaining cost effective and giving due consideration to the surrounding area and the requirements of key third parties.