Blyth Relief Road Economic Assessment Report

Northumberland County Council

Project Number: 60514724

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Quality information

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1. Introduction

1.1 Introduction

Northumberland County Council understand that the efficient operation of local and strategic highway routes is an important factor in helping deliver and sustain a thriving and competitive economy. They also recognise that traffic congestion in the town of Blyth is resulting in key routes into and out of the town not operating as efficiently as they could. This will hinder development in the town, and economic growth across the wider North of Tyne area, unless transport improvement measures are put in place.

In 2015, Northumberland County Council commissioned a study to identify transport problems in Blyth and develop a long list of options, which could be implemented to address these problems. The study looked at not just the current issues, but also the likely future issues if all of the proposed development in the area is realised. As part of a long term strategy for investment, the study concluded that a new road into Blyth would address many of the problems.

Northumberland County Council identified five potential alignments for a new road into Blyth to improve connectivity and facilitate growth. The list of five was distilled into a list of three for further review and appraisal; the two options ruled out had a number of constraints, which made them unfeasible within the current environment.

Alongside the development of the five highway options, AECOM was commissioned to develop a SATURN traffic model of the study area, which could be used to forecast the traffic impacts and economic benefits of any proposed scheme. The purpose of this report is to outline the methodology adopted to undertake a comprehensive economic assessment of the three options so that a preferred option can be identified.

1.2 Report Context

This report follows on from three other reports, which detail each step of the traffic modelling process:

- Blyth Traffic Model Report of Surveys: In order to facilitate the development of a fully validated base SATURN model, a detailed data collection programme was undertaken. A series of manual classified link counts and roadside interviews were commissioned to supplement the data already available from the local authority. The Report of Surveys provides a concise summary of the survey programme and data collected;
- Blyth Traffic Model Local Model Validation Report: The report presents the methodology adopted by AECOM in terms of building and validating a 2016 base year SATURN model to support the application for funding for a new road; and
- Blyth Traffic Model Forecasting Report: This report details the work undertaken to produce a series of forecast models for the proposed scheme for the opening year of 2021 and design year of 2036. A series of different growth scenarios were produced.

1.3 Description of Scheme Options

This report considers two options against each other:

- Do Minimum: The existing situation plus any committed transport schemes that will be implemented by the opening or design year;
- Do Something: The Do Minimum alongside the proposed scheme.

1.3.1 The Do Minimum Scenario

Consultation was undertaken with Northumberland County Council to identify any committed highway schemes within the study area that would impact on travel demand patterns into and out of Blyth. One scheme was identified on the A193 Cowpen Road that would impact on travel pattern. The scheme looks to improve congestion on the A193 Cowpen Road through increasing capacity of the west-east movement with the addition of two lanes straight on through the Chase Farm roundabout that merge into one downstream. The scheme also rationalised the traffic staging at the A193/Coniston Road/Tynedale Drive junction. The design of the improvements was an outcome of the 2015 study and the scheme has since been constructed; it was not present when the traffic surveys were undertaken to inform the base year traffic model.

Morpeth Northern Bypass also opened after the traffic data collection exercise was undertaken. This has also been coded into the future year models.

1.3.2 The Do Something Scenario

Three options have been identified for further appraisal to provide a relief road into Blyth:

- Option 3: A single carriageway road from the A192 Three Horse Shoes Roundabout to Ogle Drive. The link between Ogle Drive and Chase Farm Drive will also be connected;
- Option 4: A single carriageway road from the A192 Three Horse Shoes Roundabout to Plessey Road;
- Option 5: Realignment of the A1061 to provide a direct dual carriageway connection to the A192 Three Horse Shoes Roundabout.

NB: Option 1 and option 2 were ruled out due to the number of constraints that they posed.

1.4 Report Structure

Following this introductory chapter, the report has been prepared with the following structure:

- Section 2 outlines the estimation of scheme costs;
- Section 3 outlines the methodology used to assess the scheme;
- Section 4 discusses the economic assessment undertaken in TUBA;
- Section 5 discusses the COBALT assessment to identify any accident benefits accrued by the scheme;
- Section 6 details the results of the economic assessment;
- Section 7 outlines the social and distributional impacts of the appraisal;
- Section 8 summaries the key points of this report.

2. Estimation of Costs

2.1 Introduction

This section of the report discusses the scheme costs, which are offset against the scheme benefits during the appraisal process, producing a benefit to cost ratio (BCR). They are input into the TUBA program input file alongside the relevant GDP deflator to discount the costs to the economic appraisal base year of 2010. TUBA is the Department for Transport recommended program for undertaking economic appraisal of a transport scheme.

2.2 Scheme Costs

Scheme costs were calculated for all three options by the Technical Services Team at Northumberland County Council in accordance with guidance in TAG Unit A1.2 Scheme Costs. A north-south route was also costed, which will be built alongside the preferred relief road option to improve internal connectivity into Blyth. Costs are presented in Table 2-1 below.

Table 2-1: Calculated Do Something Costs

Cost Element	Base Cost at 2017 Prices (millions of £'s)			
	Option 3	Option 4	Option 5	North-South Route
Construction Cost	7.9	9.1	11.2	6.9
Design and supervision	0.8	0.9	1.1	0.7
Land	2.1	0.4	0.8	2.3
Planning application	0.2	0.2	0.2	0.2
Part 1 claims	1.4	2.0	1.7	5.1
Risk	1.2	1.3	1.5	1.5
Site investigation	0.1	0.1	0.2	0.1
Optimism bias	6.0	6.2	7.2	7.3
Total	**19.7**	**20.2**	**24**	**24.1**

The costs in the table above do not include Value Added Tax (VAT). In accordance with guidance, given that a quantified risk assessment has not yet been undertaken, an optimism bias of 44% has been applied to the costs.

2.3 TUBA Costs

In the TUBA assessment, costs are broken down into four categories; construction costs, land costs, preparation costs and supervision costs. The estimated costs have been merged into these four categories, with optimism bias being spread across the four categories.

In addition to the cost breakdown above, TUBA also requires a breakdown of how the costs are spent over the construction period. The spend profile for the TUBA input costs is outlined in Table 2-2. The same spend profile has been assumed for all options appraised.

Table 2-2: TUBA Spend Profile for Construction of a Blyth Relief Road

Year	Construction	Land	Preparation	Supervision
2017			0.4%	
2018			47.2%	
019			48.3%	
2020		28.9%	3.1%	
2021	44.9%	68.3%	1%	
2022	55.1%			43.9%
Total				56.1%

NB: The traffic modelling assumed an opening year of 2021. Since the traffic modelling was undertaken, the programme has changed so that the proposed opening year of the scheme is now 2022.

3. Overview of Methodology

3.1 Introduction

This section of the report briefly discusses the modelling and forecasting methodology, as well as the relevant terminology carried through into this report. It also covers in detail the methods employed to assess the economic costs and benefits of the preferred scheme.

3.2 Overview of Economic Appraisal

A 2016 base year SATURN model has been developed to model in detail the existing road network within Blyth, alongside a buffer network consisting of the surrounding highway network. This consists of a 2016 base year traffic demand matrix and the existing road network.

For the forecasting process, two networks have been used; a Do Minimum and a Do Something. The Do Minimum network replicates the existing network conditions at the opening year of the scheme should the relief road not go ahead. The Do Something is the network with the proposed relief roads fully built out and operational.

For the future year demand, local growth and development forecasts have been applied to the 2016 matrices to produce forecast demand for the opening and design year of the scheme (2021 and 2036 respectively). A number of different growth scenarios have been tested, which represents uncertainty in the traffic forecasting process. Detailed information for the process undertaken to generate the forecast year traffic matrices is discussed in detail in the *Blyth Traffic Model Traffic Forecasting Report.*

Following assignment of the future year matrices to the SATURN traffic model, time and distance skims for each origin and destination pair were output from the program for both the Do Minimum and Do Something scenarios. These were output for each year, time period and vehicle class and then converted to the relevant file format for input into the TUBA application.

The TUBA programme calculates the user benefits by comparing the Do Minimum and Do Something time and vehicle operating costs, and hence the overall benefits of the scheme. This is then compared to the cost of building the preferred Do Something scheme to produce the Net Present Value (NPV) and Benefit Cost Ratio (BCR). The public transport benefits have not been assessed as part of this process, due to the Blyth Relief Road being predominantly a highway scheme.

3.3 Overview of Accident Assessment

TUBA is the main DfT recommended program for assessing the benefits of a transport scheme but there are a number of areas of economic consideration it does not assess. The TUBA program does not calculate accident benefits, so it is necessary to run a COBA-LT assessment of the scheme. To undertake the COBA-LT assessment, it is necessary to output all link properties from the SATURN model as well as Annual Average Daily Traffic (AADT) flows. Accident costs/benefits are calculated in COBA-LT by assigning accident rates to the road type and a comparison made between the Do Minimum and Do Something network.

The results of the COBA-LT assessment feed into the Transport Economic Efficiency (TEE) table alongside the TUBA benefits.

3.4 Social and Distributional Impact Appraisal

With any transport scheme, there is likely to be a mixture of positive and negative impacts that will be experienced by different groups of people in different locations and to different magnitudes. It is important therefore, when appraising a transport scheme, like a Blyth Relief Road, that these winners and losers are identified so that they can be fully assessed within the appraisal process. An initial social and distributional impact appraisal has therefore been undertaken to map the benefits of the scheme against vulnerable groups.

3.5 Sensitivity Testing

In order to test uncertainty in future year forecasting, it is recommended in WebTAG that a series of sensitivity tests are conducted in order to reflect a range either side of the central scenario. Therefore, there are three scenarios that have been developed, which are the Central (realistic growth and developments), Pessimistic (low growth and minimal developments) and Optimistic (high growth and all developments. The forecast demand for these models has been forecast using the approved WebTAG method constraining all of the growth back to the NTM Local TEMPro factors.

4. TUBA Analysis

4.1 Introduction

In accordance with WebTAG, a TUBA (Transport User Benefit Analysis) assessment has been undertaken to carry out the economic appraisal of the Blyth Relief Road options. For the purpose of this assessment, TUBA version 1.9.7 has been used.

4.2 TUBA Overview

TUBA calculates the benefits of a scheme utilising demand, time and distance output skims from the traffic model. These matrices for the modelled assessment years of 2021 and 2036 are extracted from the SATURN model and input into the TUBA programme, which interpolates and extrapolates the demand over a sixty year period. A comparison between the Do Minimum and Do Something models can be made and the costs of the scheme assessed against the benefits produced as a result of the improvements. This then produces a benefit to cost ratio.

Accident benefits have been calculated using COBA-LT and are discussed in the following chapter of this report. Construction and maintenance benefits have not been assessed.

4.3 Scheme Costs

TUBA input costs for each of the proposed schemes are outlined in the table below. The spend profile was previously outlined in Chapter 2 of this report.

Cost Element	Base Cost at 2017 Prices (millions of £'s)			
	Option 3	Option 4	Option 5	North-South Route
Construction Cost	7.9	9.1	11.2	6.9
Design and supervision	0.8	0.9	1.1	0.7
Land	2.1	0.4	0.8	2.3
Planning application	0.2	0.2	0.2	0.2
Part 1 claims	1.4	2.0	1.7	5.1
Risk	1.2	1.3	1.5	1.5
Site investigation	0.1	0.1	0.2	0.1
Optimism bias	6.0	6.2	7.2	7.3
Total	**19.7**	**20.2**	**24**	**24.1**

4.4 Annualisation Factors

The annualisation factors used with the TUBA economic assessment are used to expand the modelled periods over the whole year to enable a full assessment of the benefits. The Blyth traffic model consists of three peak periods; the AM peak (0800-0900), the inter-peak (average 1000-

1600 hour) and the PM peak (1700-1800). The model outputs, which inform the TUBA process therefore represent one hour in a typical weekday.

The first stage of the process is calculating the adjacent peak hour flow to see what proportion of it should be included in the peak period. Analysis has been undertaken of the Automatic Traffic Count data from the four Road Side Interview sites discussed in the *Blyth Traffic Model Report of Surveys*.

Table 4-1: AM Peak Period

Time	Count	% of Peak Hour
0700-0800	4850	90%
0800-0900	5370	100%
0900-1000	4427	82%

Table 4-2: PM Peak Period

Time	Count	% of Peak Hour
0700-0800	6080	97%
0800-0900	6291	100%
0900-1000	5157	82%

If the shoulder peak hours are added to the peak hours, peak hour to period conversion factors are calculated as follows:

- AM Peak: 2.73
- PM Peak: 2.79

It is assumed that there are 6 hours in the inter-peak representing the hours between 1000-1600.

No benefits have been assumed for the off-peak or weekend traffic, although the A193 Cowpen Road is known to be just as congested on a Saturday, as people use this corridor to access the retail developments.

The peak hour to period factors are converted to annual values by multiplying by 253; the number of weekdays in a year less bank holidays. This gives annualisation factors for the TUBA program as follows:

- AM Peak: 690 hours
- PM Peak: 706 hours
- Inter-peak: 1518 hours

4.5 Matrix Input

Traffic input detailing the time, distance and demand between zones in the network was output from the SATURN model, converted to the appropriate format and input into the TUBA assessment. TUBA requires the following vehicle inputs as a minimum:

- Car
- LGV Personnel
- LGV Freight
- OGV1

- OGV2

The SATURN model contains 3 car matrices: commuter, business and other. It also contains a single LGV matrix and a single HGV matrix. The LGV demand matrix and HGV demand matrix have therefore been adjusted within TUBA by applying a factor to convert then to the different vehicle inputs: the factor is based on the split of these vehicles in NTM and WebTAG databook.

Once the relevant model outputs, annualisation factors and cost information was input into the TUBA program, results were generated for each of the scenarios being tested. The results are summarised in the following tables.

Table 4-3: TUBA Outputs Core Scenario (£'000s)

Scheme Benefits	Option 3	Option 4	Option 5
Consumer User Benefits: Commuting Travel Time	22387	12410	9667
Consumer User Benefits: Commuting Vehicle Operating Costs	3464	1916	1619
Consumer User Benefits: Other Travel Time	22802	11713	8406
Consumer User Benefits: Other Vehicle Operating Costs	4759	2589	2510
Business User Benefits: Travel Time	37621	18502	16630
Business User Benefits: Vehicle Operating Costs	3331	2181	-908
Wider Public Finances	-2682	-1805	-503
Total	91682	47506	37421
Scheme Costs	Option 3	Option 4	Option 5
Present Value of Costs	14290	14738	17324
Benefit to Cost Ratio	6.42	3.22	2.16

As can be seen above, the overall TUBA benefits are far greatest in option 3 when compared to both option 4 and option 5. As was observed in the analysis of the transport forecasts, option 3 alleviates both the A193 Cowpen Road and the A1061 Laverock Hall Road; option 4 and option 5 have limited impact on the A193 Cowpen Road. However, it is noted that all options offer high value for money.

Given option 3 performs better in terms of performance of the highway network and has the highest level of benefits, it also has a slightly lower cost, it was selected as the preferred option for further appraisal.

It was agreed that the preferred option would be delivered alongside a north-south route to improve internal connectivity within Blyth. The north-south route has been further appraised and more detailed costs for the scheme have been developed. The updated costs for option 3 alongside the north-south route are shown in the table below.

Table 4-4: Option 3 plus North-South Route Costs in 2017 Prices

Item	Cost
Preparation	£42,000
Preliminary Design	£316,000
Transport Assessment	£90,000
Site Investigation	£237,000
Detailed Design	£790,000
Tender Process	£21,000
Ecology Surveys	£60,000
Environmental Appraisal	£60,000
Planning Approval	£15,000
CPO	£20,000
Orders	£36,000
Land Acquisition	£4,358,000
Full Approval Bid	£28,000
Construction	£15,808,000
Supervision	£474,000
Risk	7,415,4221
Total	£29,763,421

These costs have been input into TUBA with a 44% optimism bias applied and discounted to 2010 prices. The results of the optimistic, core and pessimistic growth scenarios are summarised in the following table.

Table 4-5: Preferred Option TUBA Outputs Under Different Growth Scenarios (£'000s)

Scheme Benefits	Core	Optimistic	Pessimistic
Consumer User Benefits: Commuting Travel Time	27249	35852	21786
Consumer User Benefits: Commuting Vehicle Operating Costs	5191	2652	702
Consumer User Benefits: Other Travel Time	31340	51379	23067
Consumer User Benefits: Other Vehicle Operating Costs	6679	9958	5023
Business User Benefits: Travel Time	49197	84938	33784
Business User Benefits: Vehicle Operating Costs	4277	4932	4578
Wider Public Finances	-3934	-3638	-2653
Total	121669	187739	87559
Scheme Costs	Core	Optimistic	Pessimistic
Present Value of Costs	31024	31024	31024
Benefit to Cost Ratio	3.92	6.05	2.82

As can be seen in the table above, the overall TUBA benefits increase from pessimistic to central to optimistic growth. All growth scenarios demonstrate benefits, which are greater than the option 4 and option 5 previously appraised and deliver high value for money. It is noted that the benefit to cost ratio for the core option is lower than the previously appraised option 3 but this is due to the increase in costs to deliver the north-south route. Although the benefit to cost ratio is lower, the option 3 with the north-south route delivers connectivity benefits for the local residents of Blyth that would not be delivered with the standalone option 3 scheme.

4.6 Sensitivity Test

A sensitivity test has been undertaken around the annualisation used in the appraisal. Previous correspondence with DfT recommended that the shoulder peak hours could only be included within the peak hours if the traffic flow in the shoulder peak was within 90% of the peak hour. If they do not fall in the peak hour then they will be added to the inter-peak instead.

Using the information presented in Table 4.1 and 4.2 above, this would give revised annualisation factors as follows:

- AM Peak: 1.9
- PM Peak: 1.97

The TUBA appraisal for the core route 3 option with the north-south route has been ran again to ensure the scheme would still deliver value for money. The results are shown in the table below.

Table 4-6: TUBA Outputs Core Scenario Option 3 and North-South Route with Annualisation Sensitivity

Scheme Benefits	Core
Consumer User Benefits: Commuting Travel Time	27249
Consumer User Benefits: Commuting Vehicle Operating Costs	5191
Consumer User Benefits: Other Travel Time	31340
Consumer User Benefits: Other Vehicle Operating Costs	6679
Business User Benefits: Travel Time	49197
Business User Benefits: Vehicle Operating Costs	4277
Wider Public Finances	-3934
Total	121669
Scheme Costs	Core
Present Value of Costs	31024
Benefit to Cost Ratio	3.92

4.7 Analysis of TUBA warnings

The TUBA program contains within its assessment a number of present defaults concerning the percentage difference between zone to zone demand, times, distance and speed which, if exceeded, produce a warning. There warnings are displayed within a number of summary tables in the TUBA output for the user to consider. It is considered good practice to investigate these warnings and hence, Appendix A details the significant warnings that were encountered during the TUBA analysis and an explanation of what caused them. No critical or illogical warning messages were observed during this process, with the vast majority of the benefits being due to having distances on centroid connectors in the buffer network but no journey times assigned to them, resulting in some very quick speeds between origin and destination pairs. This is present in both the Do Minimum and Do Something scenario.

4.8 Analysis of Time Savings

WebTAG guidance requests that the benefits are presented in a series of time bands, showing the level of monetary benefits which are associated with each time saving. The results have been extracted from the TUBA outputs and are shown in the table below for the core scenario for option 3 with the north south route.

Table 4-7: Monetary Benefits Associated with Time Savings (£'000s)

Journey Purpose	Time Banding					
	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	2529
Business	-174	-56	-1765	27131	21541	2311
Commuting	-56	-411	-1983	14231	13160	2019
Other	-1	-149	-1373	16879	13972	2529

As can be seen in the table above, the majority of time savings lie in the 0 to 5 minute time saving, which is unsurprising given that the new relief road would provide a relatively short new link into Blyth. The outputs do show that there are few disbenefits as a result of the proposed scheme.

5. COBA-LT Analysis

5.1 Introduction

An accident analysis was necessary to understand and quantify the accident benefits which will result when the Blyth Relief Road scheme is in place. The following section describes the process that was adopted to undertake the accident appraisal.

5.2 Methodology Overview

COBALT (Cost and Benefit to Accidents – Light Touch) is the DfT's recommended computer programme for undertaking the analysis of the impact of a road scheme on accidents. This programme has been used to appraise the impact of option 3 with the north-south route on accidents.

The current version of the software is 2013_02. The WebTAG parameters file for 2017 has been used to run the software and includes up to date values for default accident rates and the monetary value of these accidents.

The accident appraisal is based on the outputs from the Blyth SATURN modelling. A combined links and junction appraisal has been undertaken. The program looks at the differences in junction and link properties, as well as the differences in traffic flows, to calculate the overall impact on accidents as a result of the scheme.

The outputs from the appraisal are summarised in the following section of the report.

5.3 Network Coverage

The fully modelled area of the Blyth traffic model has been included in the COBALT analysis. This includes the entire town of Blyth and the surrounding network into East Cramlington. To ensure compatibility with the COBALT program, properties output from the SATURN model were manually assigned a COBALT link category through comparison with aerial photography and prior area knowledge.

5.4 Link Flow Derivation

The COBALT programme requires traffic flows for links in units of Average Annual Daily Traffic (AADT). Traffic flows were output from the SATURN model for the future years of 2021 and 2036. The flows were converted to AADT using factors calculated from the ATC data. As would be expected, the outputs from the traffic model vary between the Do Minimum and Do something scenarios as traffic reroutes across the network to benefit from the increase in capacity as a result of the scheme.

5.5 Accident Savings and Monetary Benefits

The accident numbers, severity split and costs output table from the accident appraisal are summarised in the table below. The table shows that, overall, the scheme produces a small monetary benefit in terms of accidents, but the actual number of accidents increases across the 60 year appraisals period.

Table 5-1: COBALT Outputs Do Minimum Scenario

		Do Minimum
Category		**Total**
Number of Accidents		3,013.8
Casualties	**Fatal**	37.6
	Serious	421
	Slight	3598.5
Accident Costs (2010 Prices, £000'S)		**146,540.2**

Table 5-2: COBALT Outputs Do Something Scenario

		Do Something
Category		**Total**
Number of Accidents		3,020.8
Casualties	**Fatal**	36.1
	Serious	418.5
	Slight	3595.1
Accident Costs (2010 Prices, £000'S)		**145,612.1**

The results show a small benefit to accidents as a result of the scheme. Although the number of accidents increases, the number of casualties decreases, which is due to the differences in the link categorisation on the routes that vehicles now travel.

Although the results of COBALT only show a small benefit as a result of the proposed scheme, it is expected that the benefit to junctions along the A193 Cowpen Road will be much higher than that predicted by the software. Standard accident rates have been used in the COBALT assessment but the A193 has a high accident rate with many junctions located along its route. The A193 Cowpen Road is shown to benefit from a reduction in trips as a result of the proposed scheme and this is expected to manifest in a greater reduction in the number of road traffic accidents.

6. Economic Evaluation of the Proposed Scheme

6.1 Introduction

The section of the report summarises the TUBA and COBALT results and discusses the overall economic appraisal and TEE table.

6.2 Economic Assessment

The economic value of the scheme is calculated by comparing the user benefits and costs incurred in the proposed Do Something scenario, with those of the Do Minimum situation. The comparison is carried out with regard to link transit times, vehicle operating costs, wider public finances, environmental outputs and any accident appraisal outputs.

The TUBA and COBALT assessment undertaken for the Blyth Relief Road (Option 3 with the north-south route) show that the implementation of the scheme produces an overall net positive benefit. The TUBA assessment has shown that there are significant travel time savings gained for all user classes. The COBALT assessment has shown that there are safety benefits to be gained from reducing the level of traffic on existing congested routes.

The results of the two assessments are combined into a single TEE table for the preferred option core growth scenario. This is summarised below.

Scheme Benefits	
Consumer User Benefits: Commuting Travel Time	27249
Consumer User Benefits: Commuting Vehicle Operating Costs	5191
Consumer User Benefits: Other Travel Time	31340
Consumer User Benefits: Other Vehicle Operating Costs	6679
Business User Benefits: Travel Time	49197
Business User Benefits: Vehicle Operating Costs	4277
Wider Public Finances	-3934
Accidents	928
Total	**120927**
Scheme Costs	
Investment Costs	31024
Total Costs	31024
Benefit/Cost Ratio	3.9

The overall assessment shows that the proposed scheme delivers a **very high** value for money.

7. Social and Distributional Impacts Appraisal

7.1 Introduction

With any transport scheme, there is likely to be a mixture of positive and negative impacts that will be experienced by different groups of people in different locations and to different magnitudes. It is important therefore, when appraising a transport scheme like the Blyth Relief Road, that these winners and losers are identified so that they can be fully assessed within the appraisal process. An initial social and distributional impact assessment has therefore bene undertaken in accordance with WebTAG.

7.2 Guidance

WebTAG identifies 8 impacts which should be considered for assessment as follows:

- User Benefits;
- Noise;
- Air Quality;
- Accidents;
- Security;
- Severance;
- Accessibility;
- Personal Affordability

An initial screening of each impact identified above was undertaken to establish whether there was a potential for social and distributional impacts to occur as a result of the scheme. The conclusions for each impact are summarised below:

User Benefits: The scheme will improve journey times by providing an alternative route into Blyth. This will also reduce congestion along existing routes in the study area. The impacts are likely to be significant where the bypass reduces travel distance and removes congestion. Therefore, further screening is necessary to identify the extents of any SDIs.

Noise: The scheme is likely to remove traffic from existing congested routes and residential areas resulting in positive impacts on noise levels. This will be offset against those properties which are predicted to see an increase in noise levels located along the proposed bypass. Further appraisal is therefore needed and this will be undertaken at a later date when noise information is available.

Air Quality: Similar to noise, existing congested routes are likely to see an improvement in air quality levels as a result of reduced traffic levels. This will be offset by a worsening of air quality levels in the vicinity of the proposed scheme. Further appraisal is therefore needed and this will be undertaken at a later date when air quality information is available.

Accidents: The scheme is forecast to re-route motorised vehicles from existing congested routes to a new route. The reduction in traffic on existing routes will reduce the risk of accident to other road users. However, although the scheme is likely to result in accident savings, it will not target one particular vulnerable group and is not expected to produce significant reductions in traffic accidents. As such, any further appraisal would be disproportionate to the benefits received.

Security: The scheme is likely to have little impact on security as additional services and facilities are not being considered in the appraisal process. No further appraisal is required.

Severance: The scheme will be built through the centre of Blyth. However, it is being designed with the needs of cyclists and pedestrians in mind and is unlikely to sever any pedestrian and cyclist desire lines. Where possible, the scheme will provide improved access conditions for all road users.

Accessibility: As per WebTAG, this element focuses on public transport accessibility. The scheme will have little impact on the operation of public transport and therefore no further appraisal is required. It is noted that the scheme will improve journey time reliability for public transport.

Personal Affordability: The scheme is predominantly a highway scheme and will not impact on public transport fares or parking charges. No further appraisal is therefore required.

The only impact where further appraisal could be undertaken and is needed, is the user benefits impact. However, a full impact appraisal is not considered necessary as the scheme does not produce any overall disbenefits in any of the zones. To illustrate this point, the benefits have been mapped for the opening and design year in accordance with WebTAG guidance using only home based commute and other trips.

The trip matrices input into TUBA were based on origins and destinations (O-D's) and the origins are not necessarily a home based trip, in which case the benefits would be assigned to the wrong zone. As a workaround, the zonal benefits in the AM peak are benefits for origin trips only and in the PM peak the benefits are for destination trips only. An average of both the origin and destination benefits has been used for the inter-peak.

In addition, the input matrices were not originally segmented into home and non-home based trips. As the guidance requires the inclusion of consumer other trips as well as consumer commuting, the RSI data was used to calculate a factor for home based other trips based on an average of the proportion of home based and non-home based other trips. This factor was then applied to each of the TUBA outputs for only 'other' journey purposes.

User benefits were calculated as a sum of Time Benefits and both Fuel and Non-Fuel Vehicle Operating Costs (VOC).

The results of the analysis are illustrated in the following figures and the most deprived Lower Super Output Areas are illustrated. As can be seen in the results, the benefits are all positive in the study area. The benefits are lowest in the South East area of Blyth, which is not one of the most deprived groups. Overall therefore, the scheme is expected to have a large benefit, which does not unfairly penalise any economically disadvantaged groups.

Figure 7-1: 2021 User Benefits

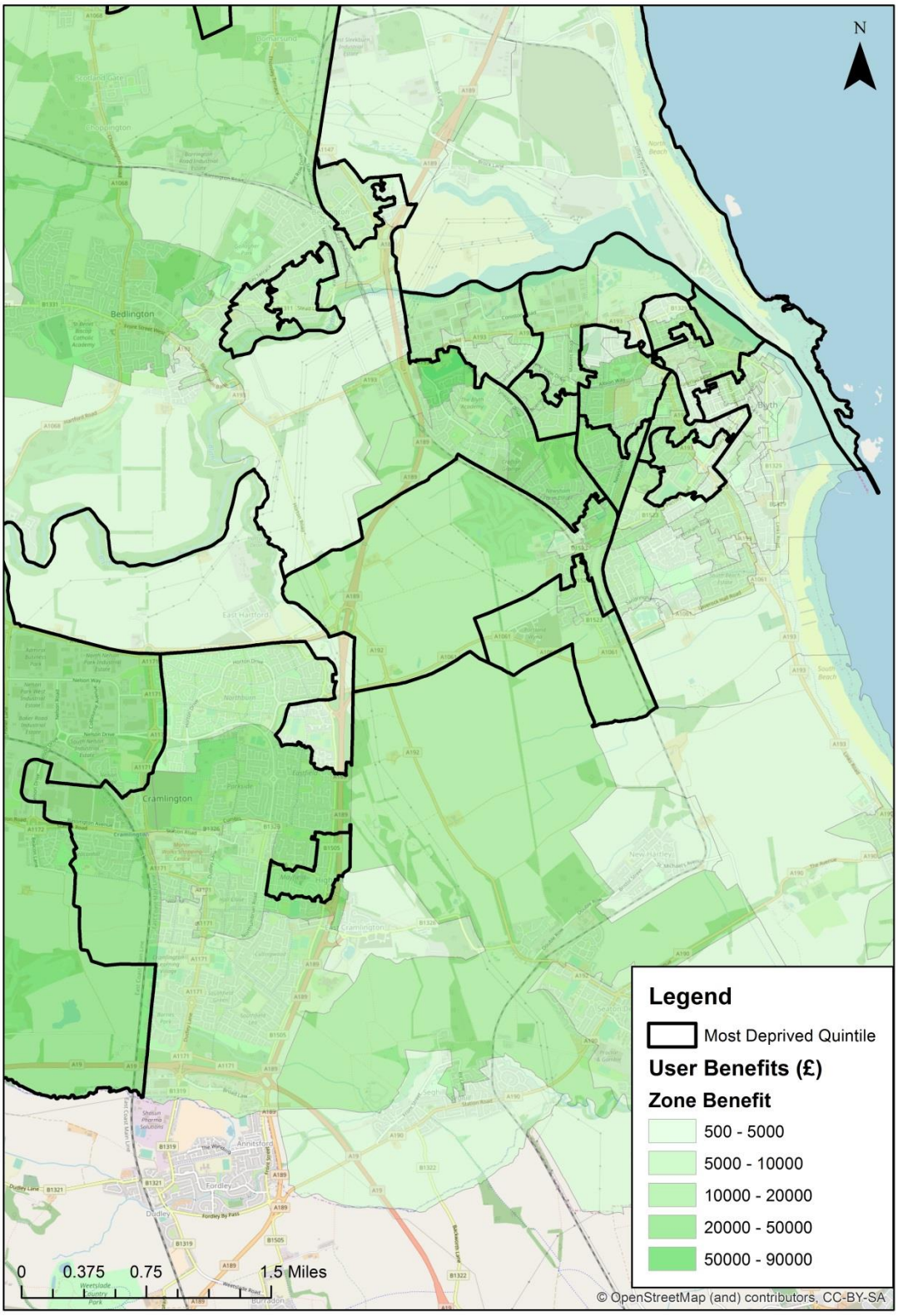
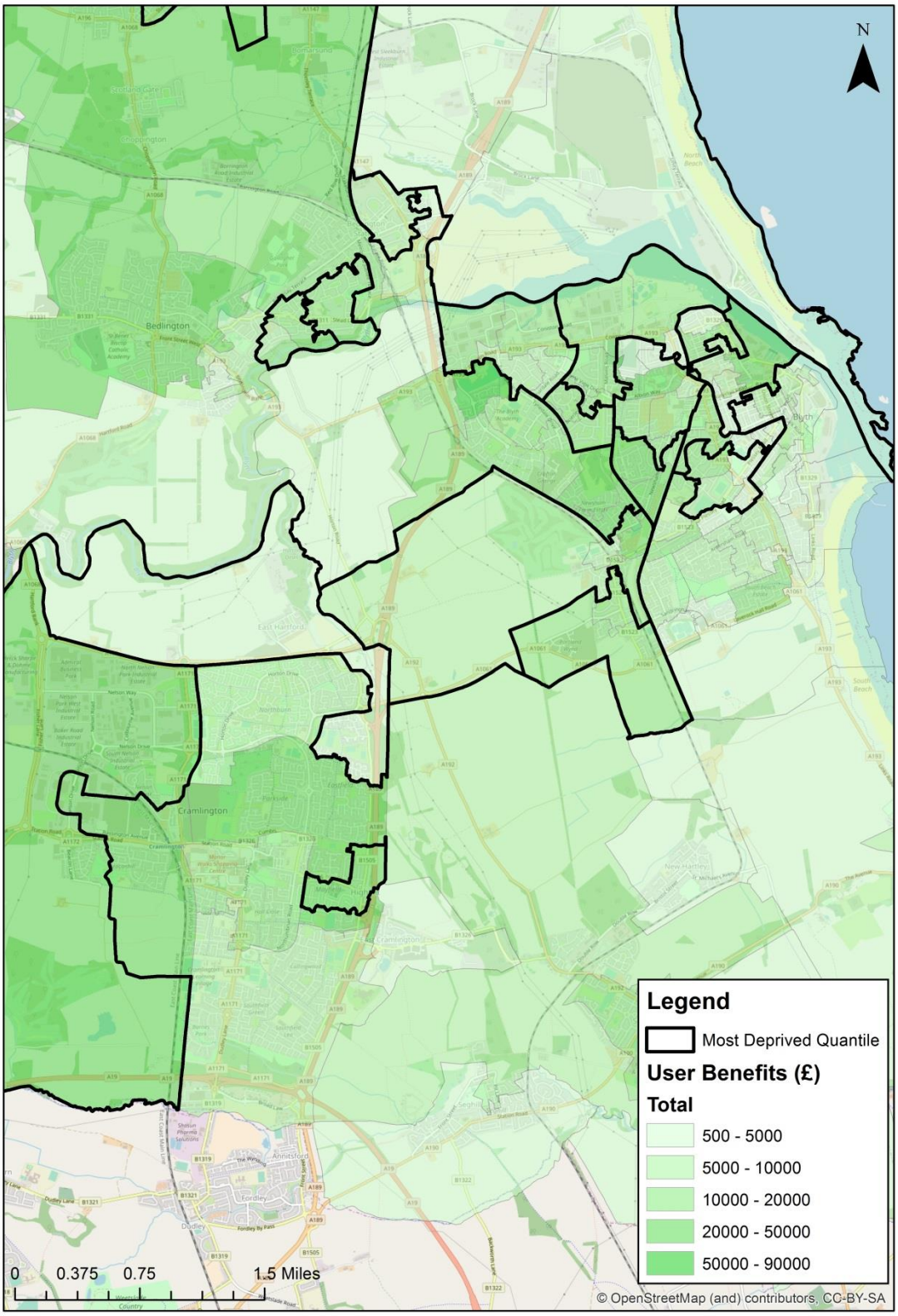


Figure 7-2: 2036 User Benefits



8. Summary and Conclusions

This section of the report provides a summary of the methods employed to assess the economic costs and benefits of the Blyth Relief Road option.

The economic appraisal of the three options being considered shows that all schemes would deliver value for money with a benefit to cost ratio in excess of 2. Option 3 has been identified as the preferred option as this will have the greatest impact on traffic flows.

Option 3 has since been modelled alongside a north-south route within Blyth to better improve connectivity. The option has been modelled under three growth scenarios to account for uncertainty in forecasting and to ensure the scheme will still deliver value for money if the central forecast does not materialise. The results again show that the scheme will deliver high value for money under all three growth forecasts.

A COBALT appraisal of the preferred option has been undertaken. This has shown a small benefit as a result of the scheme. It is expected that the COBALT appraisal underestimates accident benefits on the A193 Cowpen Road given the number of junctions on this corridor and the high accident rate it has.

The benefits of the scheme appraisal have been mapped to ensure the scheme does not unfairly disadvantage vulnerable groups. As can be seen from the analysis in the previous chapter, the most deprived areas within Blyth benefit from the scheme.

Appendix A – TUBA Warnings Analysis

Project:	**Blyth Relief Road; Forecasting**	Job No:	**60514724**
Subject:	**TUBA Economic Assessment Analysis**		
Prepared by:	**Philip Miller**	Date:	**20/12/17**
Checked by:	**Gemma Paget**	Date:	**20/12/17**
Approved by:	**Gemma Paget**	Date:	**21/12/17**

Introduction

This technical note has been composed when assessing the implications and understanding warnings that are shown in TUBA during the forecasting of options for a relief road in Blyth. It documents the process gone through to check, validate and potentially correct warnings in different future year scenarios ran through TUBA.

Warnings are commonplace as a consequence of running an assessment in TUBA and do not necessarily represent a serious issue. These warnings act as flags which serve to highlight potential concerns, such as part of the model being much quicker or slower in a Do Something (DS) forecast scenario compared to a Do Nothing (DN) forecast scenario. In most cases, warnings are a true representation in the model and the warnings require no further action.

Methodology

There are three options for a relief road alignment through Blyth. Future year scenarios have been built representing DN and DS scenarios for the three alignments, all for 2021 and 2036. Estimated costs of these routes have been provided to us by the client. This has allowed us to run outputs from the model in TUBA to appraise economic benefits.

This note will perform spot-checks on warnings in the core scenario for each of the three options and document these in this technical note

Option 3C – Core Scenario

BCR: 3.922

Table 1 displays a snapshot of the travel time ratio errors from the TUBA output for option 3C. These errors potentially flag up issues between the assigned DM and DS models. In this case, as the DS model provides a new corridor travel time ratios between the DM and DS are often flagged up, with the DM travel time being much higher than the DS travel time.

Table 1. Warning: Ratio of DM to DS travel time higher than limit for the following:

Origin	Destination	Time	Veh	Purpose	Person	Year	DM Time	DS Time	Ratio	DM Trips	DS Trips
160	163	3	Car	Other	Driver	2021	0.106	0.021	5.071	0.038	0.038
Analysis: New link road between Chase Farm Drive and Tynedale Drive eliminates need to loop/route via Cowpen Road in the DS – No issue											
161	163	3	Car	Commuting	Driver	2036	0.093	0.041	2.285	0.054	0.054
Analysis: New link road between Chase Farm Drive and Tynedale Drive eliminates need to loop/route via Cowpen Road in the DS – No issue											
160	120	3	Car	Other	Driver	2036	0.164	0.075	2.191	0.037	0.037
Analysis: New link road between Chase Farm Drive and Princess Louise Road eliminates need to route via Cowpen Road in the DS – No issue											
107	160	3	Car	Other	Driver	2036	0.209	0.109	1.910	0.029	0.029
Analysis: New link road between Chase Farm Drive and Princess Louise Road eliminates need to route via Cowpen Road in the DS – No issue											
160	158	1	Car	Commuting	Driver	2021	0.248	0.080	3.104	0.000	0.000
Analysis: New link road between Chase Farm Drive and A189 roundabout eliminates need to route via Cowpen Road and A189 in the DS – No issue											
215	148	3	LGV	Business	Driver	2036	0.168	0.098	1.724	0.012	0.012
Analysis: New link road between A189 roundabout from Cramlington to the centre of Blyth eliminates need to route via Cowpen Road or Laverock Hall Road in the DS – No issue											
220	157	2	Car	Commuting	Driver	2036	0.263	0.145	1.812	0.119	0.119
Analysis: New link road between Chase Farm Drive to Princess Louise Road eliminates need to route via Cowpen Road in the DS – No issue											

Table 2 displays a snapshot of DM speed errors from the TUBA output file for option 3C.

Table 2. Warning: DM speeds greater than limit for the following:

Origin	Destination	Time	Veh	Purpose	Person	Year	DM Dist	DM Time	Speed	DM Trips
317	320	2	OGV2	Business	Driver	2021	130.091	0.121	1077.438	12.903
Analysis: This error is due to long distances with no speed on external zone connectors, especially zones numbered 300+. Although there are a high number of errors for this, this does not represent an issue and can be ignored										
313	306	3	Car	Business	Driver	2021	30.111	0.075	402.732	44.387
Analysis: This error is due to long distances with no speed on external zone connectors, especially zones numbered 300+. Although there are a high number of errors for this, this does not represent an issue and can be ignored										

Table 3 displays a snapshot of DS speed errors from the TUBA output file for option 3C.

Table 3. Warning: DS speeds greater than limit for the following:

Origin	Destination	Time	Veh	Purpose	Person	Year	DS Dist	DS Time	Speed	DS Trips
317	320	2	OGV2	Business	Driver	2021	130.091	0.121	1077.438	12.903
Analysis: This error is due to long distances with no speed on external zone connectors, especially zones numbered 300+. Although there are a high number of errors for this, this does not represent an issue and can be ignored										
313	306	2	Car	Commuting	Driver	2036	30.111	0.075	402.654	304.915
Analysis: This error is due to long distances with no speed on external zone connectors, especially zones numbered 300+. Although there are a high number of errors for this, this does not represent an issue and can be ignored										

Table 4 shows that the TUBA assessment has been ran using the same volume of demand in both DM and DS models.

Table 4. Annualised total trip numbers

Submode	Year	Time Period	Do Min	Do Som
All	2021	All	18167675	18167675
All	2036	All	20883294	20883294

Summary

Overall, although there are a number of warnings in the TUBA output file, the warnings can be explained by the expected behaviour of the model.

Appendix B – Preferred Option TUBA Output

FINAL

Appendix C – Preferred Option COBALT Output

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