T0390 A5036 Tier 1 Governance and Business Case Support

Economic Appraisal Package

Version P01

October 2023

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
National Highways Company Limited registered in England and Wales number 09346363

DOCUMENT CONTROL

Document Title	A5036 Tier 1 Governance & Business Case Support - Economic Appraisal Package Report
Author	[redacted]
Owner	[redacted]
Distribution	Project Team, Project Sponsor, TPG Transport
Document Status	S3 Suitable for Review and Comment

REVISION HISTORY

Version	Description	Author	Date	Checked	Date	Approver	Date
P01	First Draft	[redacted]	22/09/23	[redacted]	25/09/23	[redacted]	27/09/23
P02	Second Draft	[redacted]	05/10/23	[redacted]	05/10/23	[redacted]	05/10/23

REVIEWER LIST

Name	Role
[redacted]	WSP Project Manager

ACCEPTANCE

Name	Signature	Title	Date	Version

© The original format of this document is copyright to National Highways.

Contents

1 Introduction 5
2 Economic Appraisal Approach 8
3 Estimation of Scheme Costs 13
4 Estimation of Scheme Benefits 15
5 Social Benefits 41
6 Economic Appraisal Outcome 42
7 Summary & Conclusions 47
Appendix A. Public Accounts Tables 48
Appendix B. Transport Economic Efficiency Tables 49
Appendix C. Analysis of Monetised Costs and Benefits 50
Appendix D. COBA-LT Tables 51
Appendix E. Social Benefits 52
Appendix F. Air Quality at Schools and Nurseries 62
Appendix G. Appraisal Summary Table 70

Figures

Figure 1-1 Enhanced Preferred Route Announcement (PRA) 5
Figure 1-2 Project Control Framework 6
Figure 4-1 TUBA Sectors 17
Figure 4-2 Extent of the COBA-LT network analysed 23
Figure 4-3 Income Deprivation 35
Figure 4-4 User Benefit Distribution 36
Figure 4-5 Personal Affordability Distribution 37

Figure 0-1 Income Deprivation 52
Figure 0-2 Proportion of Children 53
Figure 0-3 Proportion of Young Adults (16-24) 54
Figure 0-4 Proportion of People Over 65 55
Figure 0-5 Proportion of Women 56
Figure 0-6 Proportion of People with a Disability 57
Figure 0-7 Proportion of Black and Minority Ethnic People 58
Figure 0-8 Proportion of No car or van households 59
Figure 0-9 Proportion of Households with Dependent Children 60

Tables

Table 2-1 Model User Class 11
Table 2-2 Economic Assessment: Summary of Costs and Benefits and Their Use 12
Table 3-1 Outturn Costs 13
Table 3-2 PVC 2010 Values discounted to 2010 14
Table 4-1 TUBA Sectors 16
Table 4-2 TUBA Annualisation factors by time period 19
Table 4-3 TUBA Results for Weekday by User Type (£000) 19
Table 4-4 TUBA Results for Weekday by Benefit Type (£000) 20
Table 4-5 TUBA Results for Weekday by Time Period (£000) 20

Table 4-6 TUBA Results for Weekday by User Class (£000) 20
Table 4-7 TUBA Results for Weekend by User Type (£000) 21
Table 4-8 TUBA Results for Weekend by Benefit Type (£000) 21
Table 4-9 TUBA Results for HGV Values of Time assumed to be doubled by User Type(£000) 21
Table 4-10 TUBA Results for HGV Values of Time assumed to be doubled by Benefit Type (£000) 22
Table 4-11 Accident Benefits due to A5036 23
Table 4-12 Monetised reliability benefits 24
Table 4-13 WITA Benefits (£000) 25
Table 4-14 Summary of TAG appraisals 27
Table 4-15 Severance Benefits 32
Table 4-16 Distributional Impact Appraisal Screening Proforma 33
Table 4-17 Ranking Criteria 36
Table 4-18 User Benefit Impact Assessment 37
Table 4-19 Personal Affordability Assessment 38
Table 4-19 Air Quality DI Analysis – NO_2 39
Table 4-19 Air Quality DI Analysis – PM_{10} 39
Table 4-19 Air Quality Impact and DI Analysis at Schools 40
Table 6-1 Summary of PA Tables by scheme option: Core Scenario (£000) 42
Table 6-2 Summary of TEE Tables by scheme option: Core Scenario (£000) 43
Table 6-3 Summary of AMCB Tables by scheme optio 44
Table 6-4 Summary of adjusted AMCB Tables Core Growth (£000) 45
Table 6-5 Summary of Level 1 & 2 Adjusted BCR Values 46

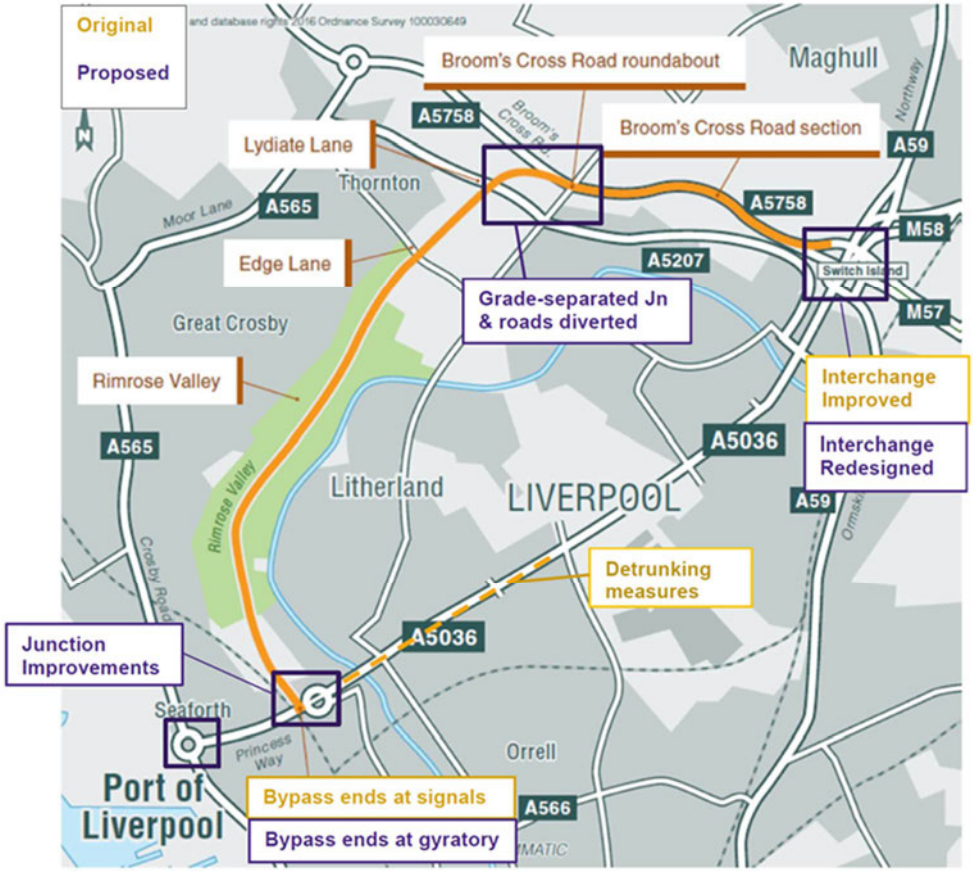
1 Introduction

1.1 Background

The 'A5036 Princess Way – access to the Port of Liverpool' scheme is intended to address problems of congestion, pollution and a poor safety record on the route of the A5036 connecting the Port of Liverpool to the motorway network at Switch Island. The preferred route announced in 2017 proposes to build a new dual-carriageway road through Rimrose Valley in Sefton, connecting with Princess Way at the southern end of the existing route and Brooms Cross Road at the northern end. The PRA scheme includes upgrading Brooms Cross Road between the connection with the new road and Switch Island, and the inclusion of that section into the SRN; and the detrunking of the existing A5036 between Switch Island and the junction of the new road and Princess Way.

In 2020, a review of the scheme led to the addition of improvements to Switch Island and to the junction of Princess Way with the A565 Crosby Road South to the scope of the scheme. The enhanced preferred route is shown in Figure 1-1 below.

Figure 1-1 Enhanced Preferred Route Announcement (PRA)



The scheme is being developed under the Project Control Framework (PCF) as the A5036 forms part of the SRN. As part of the PCF process, projects are expected to follow a standard lifecycle, which has been divided into defined stages as shown in Figure 1-2.

Figure 1-2 Project Control Framework

1.2 Current Status

Following a review of Kier Highways' recommendations by WSP, the scheme's allocated Technical Assurance supplier, National Highways accepted the merits of the arguments put forward in support of the enhanced PRA scheme, that the new road would not fully deliver against the scheme objectives without the enhancements proposed. This inevitably had cost implications, however; and a revised assured estimate produced in early 2022 concluded that the cost would be £565 million, exceeding the £500 million limit on National Highways' licence. The scheme therefore needs to transfer to Tier 1, subject to DfT and HM Treasury agreement.

The move to Tier 1 requires an up-to-date Outline Business Case (OBC). The most recent approved OBC was produced for PCF Stage 2. Since then, the transport landscape has changed significantly in respect of:

- The opening of Liverpool 2 container terminal;
- Freeport proposals in the vicinity of the scheme;
- Changing Travel Patterns catalysed by Covid 19;
- Changing patterns of short sea and deep sea trade resulting from the UK's departure from the EU; and
- Revised environmental targets.

Due to these changes, WSP have been commissioned to update the economic, strategic and environmental appraisals of the scheme.

1.3 Scheme Objectives

The project objectives have been derived from issues identified within the Port Access Steering Group (PASG) Feasibility Study, produced by Atkins in 2015. These are subject to change as a result of the additional assessments undertaken during the PCF Options phase. The project objectives summarised for the PCF Options phase are outlined below:

- Contribute to economic growth
- Improve the operation and efficiency of the existing transport network
- Support employment and residential/ commercial development opportunities
- Deliver capacity enhancement to the SRN
- Improve connectivity and community cohesion
- Provide maximum value for money
- Improve safety for all road users
- Minimize detrimental environmental impacts and offset by mitigation measures

The proposed Scheme will contribute to the key performance indicators and performance indicators, as outlined in the National Highways Delivery Plan (2020/2025).

1.4 Purpose of the Economic Appraisal Package

The purpose of this report is therefore to present the findings of the economic appraisal undertaken for the scheme, as required by guidance. The report follows the structure of that outlined in the National Highways 'Major Projects Economic Appraisal Report Product Description', therefore comprising of the following sections:

- **Section 1:** Scheme Overview: provides an overview of the proposed scheme and its objectives as well as background to previous economic assessments;
- **Section 2:** Economic Assessment Approach: provides a general description of the economic assessment methodology;
- **Section 3:** Estimation of Costs: provides a detailed description of the various components that make up the scheme costs;
- **Section 4:** Estimation of Benefits: provides a detailed description of the various components that make up the scheme benefits;
- **Section 5:** Economic Assessment Results: provides a detailed description of the results of the economic analysis;
- **Section 6:** Summary and Conclusions: provides a summary and conclusions to all of the above.

2 Economic Appraisal Approach

2.1 Introduction

This section of the report outlines the approach taken to quantify and monetise the benefits arising from the scheme. It outlines the approach to modelling the forecast scenarios, the scope of benefit quantification undertaken and how these have been monetised and discounted, as required by the HM Treasury Green Book guidance for the appraisal of public projects in central government.

2.2 Previous Assessment

During the previous Stage 2 economic assessment, several scheme options were assessed including several online and one offline option. The Stage 2 assessment found that some of the online options and the offline option provided significant benefits. The scheme design of the Stage 2 offline has been significantly updated leading up to the current assessment, as described above in Section 1. The Stage 2 assessment is reported in the Stage 2 Economic Assessment Report (A5036 Port of Liverpool Access Scheme Stage 2 Economic Assessment Report, National Highways, March 2017).

2.3 Forecast & Growth Scenarios

From the 2019 base year, future year forecasting has been undertaken for the following future years:

- 2031 - proposed opening year of the scheme;
- 2046 - proposed design year of the scheme; and
- 2061 - horizon year.

For each of the future forecast years listed above, a core scenario has been developed in line with guidance provided in TAG Unit M4: ‘Forecasting and Uncertainty’. The core scenario forms the basis for the analysis reported in the Appraisal Summary Table (AST), and represents the best basis for decision making given current evidence. The core scenario is based on:

- NTEM v8 growth in car demand, at a suitable spatial area;
- National Roads Traffic Projections (RTP22) for LGV and HGV vehicle classes;
- Sources of local uncertainty that are more than likely / near certain to occur; and
- Appropriate modelling assumptions.

The core scenario includes unbiased assumptions on economic growth and other trends that may influence transport demand and costs and is based on the TAG Databook v1.20.2 January 2023. In addition to the core scenario, high and low economic growth scenarios have been developed in line with the DfT Common Analytical Scenario (CAS) forecasts.

2.4 Uncertainty Log Development

The Uncertainty Log was developed for developments within Merseyside and West Lancashire, using recently data compiled for the Liverpool City Region Model.

Developments that are considered to be ‘near certain’ or ‘more than likely’ were included within the Uncertainty Log.

2.5 Forecast Demand Growth

The forecasting of trip demand within the study area needs to consider both the impacts of local and national trends in travel demand from the base year to each of the three forecast years.

The forecast matrices are composed from three datasets. These include:

- The Trip End Model Programme (TEMPro dataset v8): a database of local forecast growth rates produced at MSOA level using local predicted development growth from Local Authority planning documents, used to produce growth factors for various modes of transport and journey purposes;
- The National Road Traffic Projections (RTP22 data release): a national model used to produce growth factors for trips made by Light Goods Vehicles (LGVs) and Heavy Good Vehicles (HGVs);
- The Trip Rate Information Computer System (TRICS): used to obtain appropriate production and attraction trip rate factors for developments in the forecast models, making use of a qualitative 'Uncertainty Log' to categorise the likelihood of a particular development coming forward and its inclusion in the forecasts.

It is a requirement as stated in DMRB and TAG Unit M4 Section 7.3 that there is a need to control overall growth to TEMPro. Therefore, adjustment factors were calculated and applied such that the overall growth was constrained to local TEMPro factors. Origin and destination trip end totals were then balanced in order to enable the matrix furness procedure to be carried out successfully. Matrices were then furnessed to the revised row and column totals in MX in SATURN.

The TEMPro database considers potential for developments within each region but does not consider any specific planned developments. Since the methodology for the scheme will include several actual developments in the area, the TEMPro forecasts and specific development traffic will need to be combined whilst maintaining TEMPro growth to avoid double counting.

In order to constrain the growth of the matrices to the TEMPro factors, the following methodology was applied:

- Create a development matrix based on the trip totals calculated for the developments from the uncertainty log and distribution from suitable adjacent zones
- Calculate the number of trips due to NTEM growth forecast for each local government district within the TPS area and for each region elsewhere.
- Calculate the trip growth forecast due to developments for each local government district (or region).
- Where the growth due to development is lower than the NTEM growth, adjust the NTEM growth so that the adjusted growth plus the development equals the NTEM growth.
- Where the growth due to development is higher than the NTEM growth, adjust the development growth to equal the NTEM growth.
- Apply furnessing to create matrices of the base model with adjusted NTEM growth as well as for the developments adjusted and add to create the forecast matrices.

The above method constrains the development traffic to the TEMPro factored row and column totals for each year and time period. The matrices created using the above method contain both general background and specific development growth constrained back to the approved TEMPro overall growth rates for the region.

2.6 Growth Scenarios

To test uncertainty in future year forecasting, it is recommended in TAG Unit M4 that a series of proportional sensitivity tests are conducted to account for the possibility of forecasting error in the Core Scenario. To this end, two additional future year scenarios have been developed.

A total of three demand growth scenarios have been tested within the forecast model. These include:

- **Scenario 1:** Core Scenario – The Core Common Analytical Scenario..
- **Scenario 2:** High Economy – A Common Analytical Scenario with increased GDP, population and employment assumptions.
- **Scenario 3:** Low Economy – A Common Analytical Scenario with GDP, population and employment assumptions below core forecasts.

All three scenarios included trips due to future developments that were considered to be 'near certain' or 'more than likely'. Further details of the construction of the Core, High and Low demand matrices, and variable demand modelling of the three schemes included in this appraisal are further outlined in the *'A5036 Tier 1 Governance and Business Case Support T0390: Transport Forecasting Package Report'*.

2.7 Modelling Basis for Economic Assessment

The Trans Pennine Study Regional Transport Model (TPSRTM2) was used as the starting point for developing the model principally due to the coverage of the network and existence of matrices and traffic data.

Further data obtained for the model's development has also been used in the development of the model. Both the network and the zone system were refined to improve the accuracy of the representation of the network and movements in the core area of the study.

Time Periods

The model has three time periods, which represent average hours of AM peak, inter peak, and PM peak periods. The time periods are:

- AM Peak Period (average hour 07:00 – 10:00)
- Interpeak (IP) Period (average hour 10:00 – 16:00)
- PM Peak Period (average hour 16:00 – 19:00)

User Classes

The traffic demand within the A5036 model has been segmented into three vehicle classes (Car, LGV and HGV), with cars being split further by trip purpose. The user classes are given in **Table 2-1**.

Table 2-1 Model User Class

User Class (UC)	Trip Purpose	Vehicle Class (VC)
1	Car – Employer's Business	1 – Car
2	Car – Commute	
3	Car – Other	
4	LGV	2 – LGV
5	HGV	3 - HGV

Modelling Software

The A5036 model has been built in the SATURN modelling suite. The SATURN modelling suite covers all aspects of transport modelling, from initial network and matrix construction through to detailed assignment.

One of the main benefits of using SATURN for the assignment process is that it is applicable to both urban and rural networks and can model peak hour congestion and movements in sufficient detail. As a combined simulation and assignment model, SATURN also has the advantage that it enables detailed junction modelling, as well as on links between junctions.

2.8 Appraisal Approach Overview

The economic appraisal of the scheme includes consideration of the following key impacts as defined within TAG:

- Transport Economic Efficiency (TEE) benefits:
  - Travel time and vehicle operating costs (VOC) benefits calculated using the DfT's Transport User Benefit Appraisal (TUBA) software;
- The impact of the scheme on Accidents calculated using the DfT's COst and Benefits to Accidents Light Touch (COBA-LT) software;
- The **Wider Economics Impacts** of the scheme, calculated using a spreadsheet macro in keeping with the TAG methodology;
- The **Distributional Impacts** of the scheme, assessed using GIS spatial data;
- The impact of the scheme on **Journey Time Reliability** calculated with a spreadsheet macro using the urban road formula, referenced in TAG;
- The impact on Severance, calculated using National Highways' Severance Toolkit;
- Greenhouse Gas benefits, calculated in accordance with TAG guidance;
- Local Air Quality Benefits, calculated in accordance with TAG guidance; and
- Indirect Revenues, calculated by the TUBA software.

As each of these elements informs the overall Value for Money (VfM) of the scheme it is considered within the Appraisal Summary Table (AST). However, not all elements are currently included within the Analysis of Monetised Costs and Benefits (AMCB) and the calculation of the initial Benefit to Cost Ratio (BCR).

Some elements can be monetised, but the evidence relating to their appraisal is less developed so there is less certainty about their results. Some further elements cannot be monetised but still contribute to the overall benefits. the latter include some environmental benefits, which are reported in Table 4-14.

The relationship between each of the economic impacts, the AMCB, BCR and VfM is illustrated in Table 2-2, however these are dependent on the scope of assessment being undertaken and the nature of the scheme, with additional benefits generally reported as an "Adjusted BCR". Note the table below does not include quantitative analyses undertaken by other disciplines such as environmental impacts.

It was agreed that the following impacts will not be monetised during PCF Stage 2:

- Traffic related **Greenhouse Gas Impacts**, which have been evaluated but not monetised, are covered in Section 4.8.
- Construction and Maintenance benefits and maintenance costs have been excluded from this assessment.

Table 2-2 Economic Assessment: Summary of Costs and Benefits and Their Use

Impacts	Economic impacts that are typically monetised in the TEE table	Economic impacts that are typically monetised and included within AMCB and BCR	Economic impacts that are typically monetised and included within "adjusted" BCR contributing to overall VfM and included within the AST
TEE - Travel Times and VOC (TUBA)	✓	✓	✓
TEE - Travel Times and VOC (non modelled time periods)	✗	✗	✓
Accidents	✗	✓	✓
Journey Time Reliability	✗	✗	✓
Wider Impacts	✗	✗	✓
Severance	✗	✗	✓
Local Air Quality	✗	✓	✓
Greenhouse Gases	✗	✓	✓
Capital Cost of Maintenance*	✗	✓	✓
Scheme Capital Costs	✗	✓	✓
Indirect Revenue	✗	✓	✓

*not included in current assessment

3 Estimation of Scheme Costs

3.1 Introduction

This section of the report outlines how cost estimates have been produced for the scheme.

The estimation of scheme costs is a crucial part of the scheme appraisal. Economic assessment considers both the actual cost of the scheme, together with any changes in the capital cost of maintenance in future years for the situations with and without the scheme in place. However currently no maintenance costs have been included.

Costs were prepared by National Highways in January 2023. The outturn costs (price during spend period including portfolio risk) used in scheme appraisal are shown in Table 3-1.

Table 3-1 Outturn Costs

Minimum	Most Likely	Maximum	Mean
£302M	£627M	£1,252M	£720M

The costs used in scheme appraisal differ from the outturn costs used for funding decisions. Costs for scheme appraisal are adjusted to the DfT's standard present value year for appraisal (2010) to allow direct comparison with the monetised benefits, and the costs are in calendar years. Scheme costs used for funding submissions are the outturn costs in the expected years of expenditure and are in fiscal years.

3.2 Formulation of Cost Inputs

Base cost estimates for construction, land/property, preparation/administration and supervision, including adjustment for risk have been estimated by the National Highways Commercial Team.

The National Highways Commercial Team have also converted the costs into the PVC in the 2010 price base and present value year's values, for use in the economic assessment. The scheme costs exclude portfolio risks and historical costs.

The bulk of the scheme costs are spent between 2023 and 2031 with some preparatory costs prior to 2023 and some maintenance costs after the opening year.

3.3 Application of Risk

There is a project risk contingency amount included within the cost estimate. Portfolio level risk was not included in the costs used to calculate the PVC used in this economics assessment.

3.4 Operational & Maintenance Costs

No operational or maintenance costs have been included within this assessment.

3.5 Present Value of Costs

The resulting PVC, excluding portfolio risk and historical costs, is shown in Table 3-2.

Table 3-2 PVC 2010 Values discounted to 2010.

	PVC
PVC Pmean	£243,422,127

4 Estimation of Scheme Benefits

4.1 Introduction

This section of the report outlines the assessment approach to quantifying the monetary benefits generated from the scheme. The impacts to be assessed are listed above in Section 2.8.

4.2 Transport User Benefits

Assessing Benefits from SATURN Modelling

TUBA calculates the benefits of a scheme using three basic inputs from a traffic model. These are the number of vehicles moving between zones (the demand), the time it takes to move between these zones and the zone-to-zone distance.

The input time and distance matrices for the assessment years have been taken from the SATURN model using skimming of the assignments, while the input demand has been obtained from the demand matrices. These have been extracted for all years and time periods for the fixed demand assignments of the Do Minimum and Do Something forecast models.

The TUBA input scheme file was then adapted to lookup the necessary files, which are used to interpolate and extrapolate these single year 'skims' over a 60-year period and a comparison between the Do Minimum (DM) and DS models can then be made. The cost of the scheme is then assessed against the benefits produced and an initial BCR is calculated from the initial TEE benefits. An adjusted BCR is further calculated with the additional benefits included.

In addition to the user benefits for the modelled time periods of the AM, IP and PM of the weekday, user benefits during the busier part of the weekend (0900 to 2000 hrs), which have not been modelled have also been calculated. These non-modelled time period benefits will not be included in the Initial Benefits, but will be included in the Adjusted Benefits and used to calculate the Adjusted BCR.

Travel Time & Vehicle Operating Costs in TUBA

TUBA is the industry-standard software used to derive the travel time, VOC and Indirect Taxes elements of the TEE benefits of a scheme. It considers the Business and Consumer Traveller Impacts, the Private Sector Provider Revenues and Costs, and the Indirect Taxes elements of the TAG requirements.

TUBA takes demand (V), time (T) and distance (D) matrices from the traffic forecast model for each future year, vehicle type and journey purpose (i.e., each User Class) and each time period and calculates travel time saving benefits. It does this by comparing the travel times in the 'Do Minimum' scenario with those in the Do Something scenario. It then applies monetary values (known as Values of Time (VoT)) to derive the monetary benefits of those time savings over a standard 60-year appraisal period.

TUBA also calculates Vehicle Operating Cost (VOC) changes which occur over the standard 60-year appraisal period due to changes in costs associated with such items as fuel, maintenance, and vehicle wear and tear. These occur due to changes in speed and distance when the scheme is implemented and can include both positive and negative values depending upon the scheme's impact upon traffic flows and routing.

The travel time and VOC benefits are then discounted to 2010, the DfT's standard base year for appraisal, and converted to 2010 market prices.

TUBA outputs travel time and VOC benefits for the scheme, discounted over the 60-year assessment period. The results are included within the TEE table, as well as within the AMCB table and the initial BCR.

TUBA software version 1.9.17 was used for the appraisal along with economics file v1.21.0 which uses values from TAG Databook v1.21 May 2023.

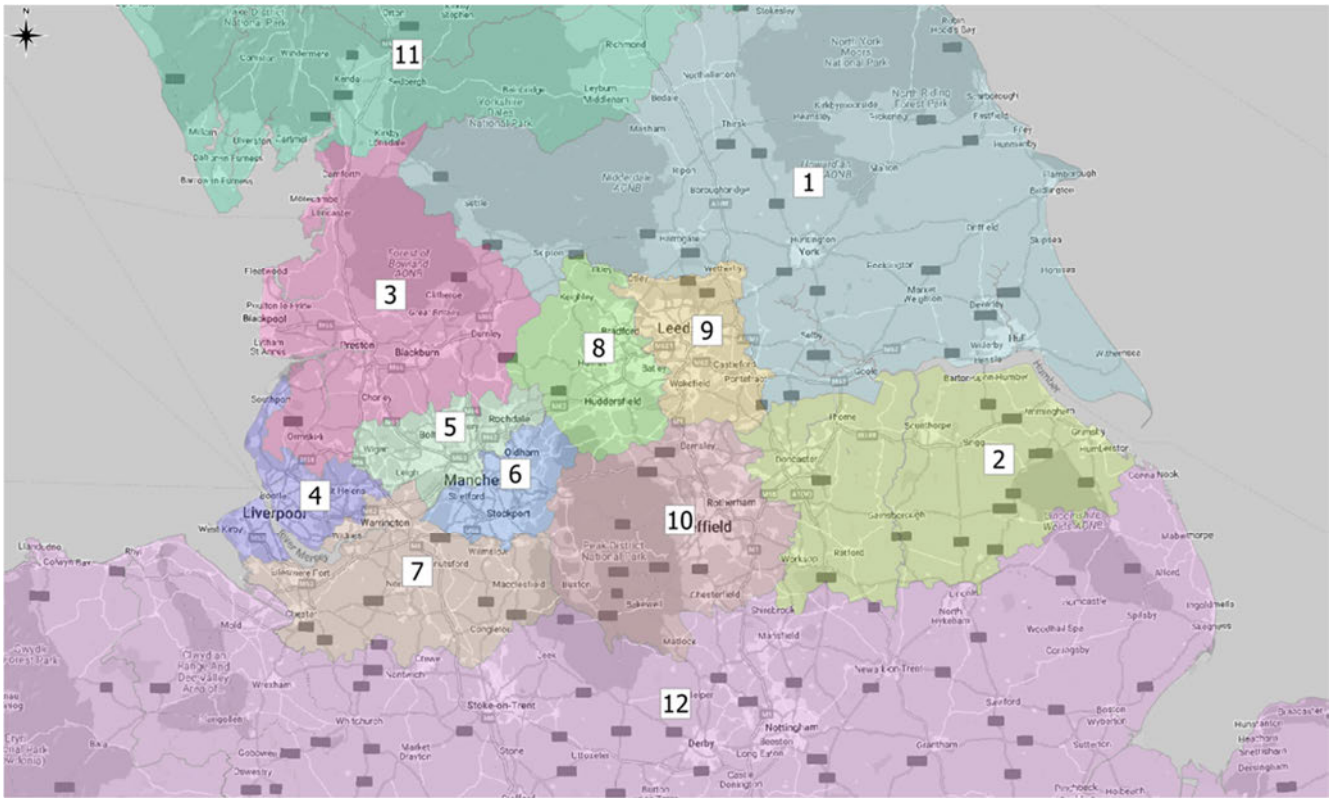
TUBA Sectoring

TUBA results were extracted from model runs and sectored using the sector system shown in Table 4-1 and Figure 4-1.

Table 4-1 TUBA Sectors

No.	Local Authority / County
1	North Yorkshire
2	North Lincolnshire
3	Lancashire
4	Merseyside
5	Greater Manchester North
6	Greater Manchester South
7	Cheshire
8	Bradford
9	Leeds
10	South Yorkshire
11	External South (includes Wales and Rest of England to south)
12	External North (includes Scotland and Rest of England to North

Figure 4-1 TUBA Sectors



In order to reduce model 'noise' certain sector to sector movements were removed from the analysis. Examples of model noise causes include;

- models not fully converging;
- models achieving convergence along different paths; and
- the averaging of time and distance model skims.

It is expected that the benefits due to the scheme will be experienced by trips with at least one trip end within the Merseyside, Lancashire or the Greater Manchester North area. Therefore, trips which do not have any tripends in these areas were excluded from the benefit calculation.

Non – Modelled Time Periods

The A5036 model, which forms the basis of the economic assessment, only covers the period during weekdays between 0700 and 1900 hours. It is expected that there will be some benefits due to traffic outside of the modelled hours. A less robust methodology has been used to estimate the user benefits during the busier part of the weekend (during weekend hours 0900 to 2000). The methodology included the following steps.

- Analyse ATC data to ascertain busy period during weekend;
- Calculate factor from ATC data to convert weekday IP hour to busy period weekend hour;
- Apply factor to obtain busy period weekend hour demand for forecast years;
- Assign weekend hour matrices to networks to obtain weekend hour assignments; and

- Apply TUBA program to the demand and skimmed time and distance data from the weekend assignments to calculate user benefits from weekend busy period.

The non-modelled time period benefits are considered to be of a lower confidence level than those from the modelled time periods. Therefore, they are included in the Adjusted Benefits, but not in the Initial Benefits.

Warnings and Error Checking

Whilst undertaking the calculations, if a TUBA run is successful, it also produces a detailed list of warnings flagging any comparisons between the Do Nothing and Do Something inputs. In summary it checks:

- Trip matrices (are) defined for both scenarios and for each modelled year;
- A time matrix is defined for each trip matrix;
- A distance matrix is defined for vehicle matrices;
- There is consistency in the use of user classes between the scenarios;
- Maximum matrix cell values (matrix totals);
- The ratio of DM to DS travel time and distances.

An automated process was set up to produce the required TUBA inputs, therefore reducing the likelihood of manual error. Checks were also undertaken in the TUBA outputs, as is suggested in the TUBA 'Guidance for Checking Outputs' note released with the programme.

4.3 TUBA Annualisation Factors

TUBA requires that the inputs from the traffic model be expanded up to annual values and has standard economic definitions for the following time periods.

- AM peak period (weekday 0700-1000)
- PM peak period (weekday 1600-1900)
- Inter-peak period (weekday 1000-1600)

The traffic model has the following time periods modelled.

- AM Peak Period (average hour 07:00 – 10:00)
- Interpeak (IP) Period (average hour 10:00 – 16:00)
- PM Peak Period (average hour 16:00 – 19:00)

The year can be divided up as follows:

- 253 weekdays
- 52 weekends
- 8 bank holidays
- with a total of 8760 hours.

As the modelled hours are the average hour within the weekday time period, the expansion factors from modelled hour to period are as follows.

- Average hour of 07:00-10:00 to 07:00-10:00 = 3

- Average hour of 10:00-16:00 to 10:00-16:00 = 6
- Average hour of 16:00-19:00 to 16:00-19:00 = 3
- For the non-modelled weekend busy period average hour of 09:00-20:00 to weekend 09:00-20:00 = 11

The following annualisation factors were used:

- 759 for the morning peak (253 working days multiplied by 3)
- 1,518 for the inter peak (253 working days multiplied by six hours in the average period)
- 759 for the evening peak (253 working days multiplied by 3)

This results in 3,036 modelled hours out of 8760 annual hours. These 3036 hours have been represented by the traffic model.

In addition, the weekend busy period was annualised using the below factors:

- 1,232 for the weekend busy period (104 weekend and 8 bank holiday days multiplied by 11)

The benefits from the non-modelled time periods are not included in the Core TEE benefits, but included in the adjusted benefits.

Table 4-2 shows the annualisation factors used in TUBA.

Table 4-2 TUBA Annualisation factors by time period

Time Period	Duration (mins)	Annualisation Factor
Weekday AM	60	759
Weekday IP	60	1518
Weekday PM	60	759
Weekend Busy	60	1,232

The user benefits from TUBA (not including benefits that have been masked) are given in Table 4-3 and Table 4-4

Comparing the Low and High Scenario benefits with the Core Scenario benefits in Table 4-3 shows that the trend is as expected, with the Low benefits being lower than the Core for all user types, and the High benefits being higher. .

Table 4-3 TUBA Results for Weekday by User Type (£000)

Benefit Type	Core	Low	High
Commuting Benefits	42,299	31,994	54,541
Other User Benefits	35,911	25,885	44,580
Business User Benefits	68,276	52,364	95,805
Wider Public Finances	6,985	6,699	7,640
Total	153,470	116,943	202,567

Comparing the Low and High Scenario benefits with the Core Scenario benefits in Table 4-3 shows that the trend is as expected, with the Low benefits being lower than the Core for all user types, and the High benefits being higher.

Table 4-4 TUBA Results for Weekday by Benefit Type (£000)**Benefit Type**	Core	Low	High
User Time	184,185	145,967	235,691
User Charges	386	112	-2,139
Fuel VOC	-17,489	-16,956	-18,527
Non Fuel VOC	-20,809	-19,443	-22,792
Operator Revenue	212	564	2,694
Indirect Taxes	6,985	6,699	7,640
Total	153,470	116,943	202,567

Comparing the Low and High Scenario benefits with the Core Scenario benefits in Table 4-4 shows that the trend is as expected, with the Low benefits being smaller in magnitude (whether benefit or disbenefit) than the Core for most benefit types, and the High benefits being larger in magnitude.

A similar trend can be seen by Time Period and User Class as shown in Table 4-5 and Table 4-6.

Table 4-5 TUBA Results for Weekday by Time Period (£000)

Year	Core	Low	High
AM Peak	62,805	41,865	84,629
Inter Peak	57,538	38,768	63,053
PM Peak	33,127	36,311	54,885
Total	153,470	116,943	202,567

Table 4-6 TUBA Results for Weekday by User Class (£000)

User Class	Core	Low	High
Car Employer Business	26,141	23,145	37,793
Car Commuting	43,632	33,267	56,078
Car Other	37,680	27,889	45,825
LGV	26,169	16,857	41,492
HGV	19,848	15,785	21,377
Total	153,470	116,943	202,567

The user benefits for the non-modelled weekend busy time period are given in Table 4-7 and Table 4-8.

Table 4-7 TUBA Results for Weekend by User Type (£000)

Benefit Type	Core
Commuting Benefits	85
Other User Benefits	-947
Business User Benefits	-486
Wider Public Finances	2,030
Total	683

Table 4-8 TUBA Results for Weekend by Benefit Type (£000)

Benefit Type	Core
User Time	9,571
User Charges	46
Fuel VOC	-5,107
Non Fuel VOC	-5,927
Operator Revenue	69
Indirect Taxes	2,030
Total	683

4.4 HGV Values of Time Sensitivity Test

National Highways have, in concert with the DfT, undertaken what is probably the largest freight value of time survey ever conducted in England. Due to timing considerations, some of the survey period overlapped with Covid, the worldwide shipping crisis and the escalating price of fuel. The work following the survey has returned a very high value of time that exceeds expectations considerably. While the work is being peer-reviewed and the DfT's TAG Governance Board are reviewing the work, the results cannot be directly used in appraisal, particularly of Tier 1 schemes. However, it is sensible, at this stage, to undertake sensitivity tests in appraisal (not modelling) of a value of freight Values of Time that are twice the existing values.

Accordingly, a sensitivity test has been undertaken for the Core benefits with the HGV business user time benefits doubled. The sensitivity test results are given below in Table 4-9and Table 4-10.

Table 4-9 TUBA Results for HGV Values of Time assumed to be doubled by User Type(£000)

Benefit Type	Weekday	Weekend
Commuting Benefits	42,299	85
Other User Benefits	35,911	-947

Business User Benefits	91,603	291
Wider Public Finances	6,985	2,030
Total	176,798	1,459

Table 4-10 TUBA Results for HGV Values of Time assumed to be doubled by Benefit Type (£000)

Benefit Type	Weekday	Weekend
User Time	207,512	10,348
User Charges	386	46
Fuel VOC	-17,489	-5,107
Non Fuel VOC	-20,809	-5,927
Operator Revenue	212	69
Indirect Taxes	6,985	2,030
Total	176,797	1,459

4.5 Accident Benefits

A key objective of the scheme is to improve safety, hence the need for the assessment of accident benefits.

COBA-LT v2.5 was used to assess accident benefits and is the industry-standard software used to derive the accident benefits of a scheme. It compares the predicted numbers of accidents with and without a scheme and converts them into monetary values by multiplying the numbers of accidents by their monetised costs. The benefits for each year are discounted to 2010 prices and summed over the 60-year assessment period.

COBA-LT calculates the number of accidents over the 60-year period from either default (national average) or observed (local) accident rates. The analysis undertaken in this study uses the default COBA-LT rates in line with the approach taken in similar National Highways schemes.

The traffic flows used for accident analysis are the modelled flows derived in the Transport Forecasting Package and are consistent with all other elements of economic analysis contained within this report.

COBA-LT outputs the number of accidents and casualties, and their associated costs, discounted over the 60-year assessment period for the forecasted scenarios with and without the scheme, together with the net changes in accidents and casualties. The final economic results are included within the AMCB table and the initial BCR, but not the TEE table.

The extent of the network used for the COBA-LT analysis is shown within the blue border in Figure 4-2. The COBA-LT allows input of link and junctions separately, as well as an option for links and junctions combined. With the former, the programme calculates accidents from the rates for the links separately from the junction. With the latter, a combined rate is employed. For this project, the bulk of the links were input as combined, but the existing A5036 as well as new A5036 were input with link and junction data separately.

Figure 4-2 Extent of the COBA-LT network analysed

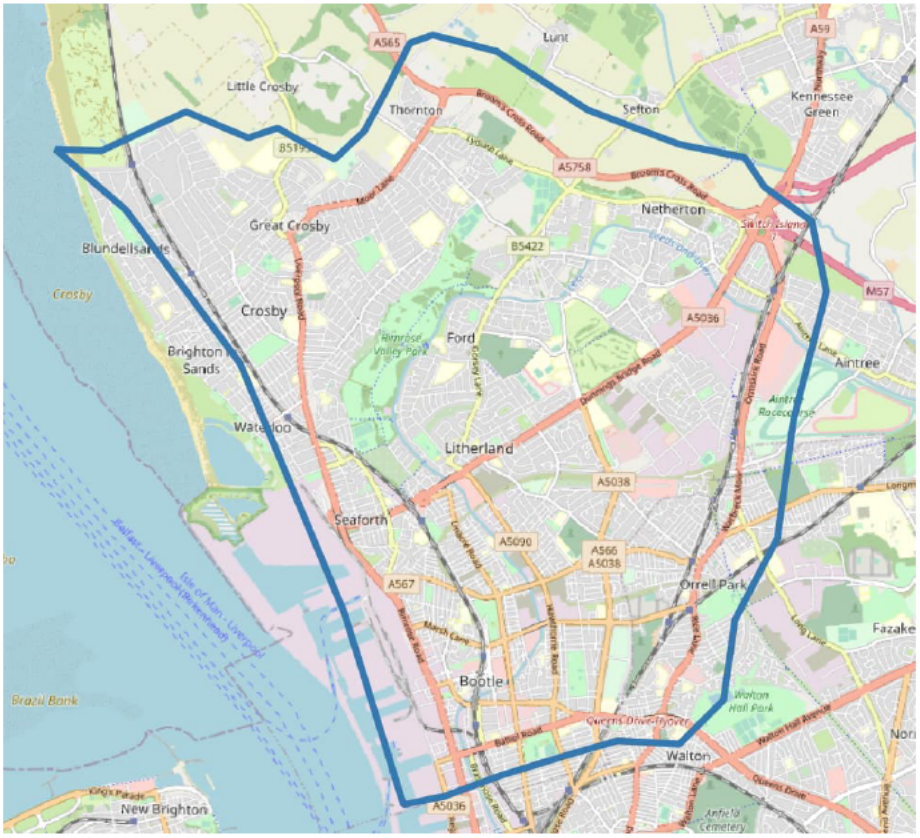


Table 4-11 is included below to summarise the total number of accidents (summed over all appraisal years) on each link of the network calculated by COBA-LT both without the scheme and with the scheme, as well as the number of associated casualties. More detailed results including number of casualties are contained within Appendix D.

Table 4-11 Accident Benefits due to A5036

	Accident Change due to Scheme
Benefit (£000)	27,931
Total Accidents Saved	948
Fatal Casualties Saved	2
Serious Casualties Saved	83
Slight Casualties Saved	1235

Table 4-11 shows that a significant reduction is expected due to the scheme.

4.6 Journey Time Reliability

An assessment of journey time reliability has been undertaken to understand the impacts of unpredictable journey time variation from day-to-day variability or other non-recurring incidents. As referenced in TAG Unit A1.3 Chapter 6.3 and agreed with the client, the urban road formula was employed to monetise the reliability benefits/disbenefits of the scheme options. The formula requires the input of trip number, distance and journey time matrices alongside a value of time and a reliability ratio to determine the benefit.

The urban road formula relates the journey time reliability to the Value of Reliability (0.4 * Value of Time) and the calculated change in standard deviation between the Do Minimum and Do Something. The urban road formula is given below in Equation 1.

Equation 1: Urban Road Formula for Journey Time Reliability

$$Benefit = -\frac{1}{2}\sum_{ij}\Delta\sigma_{ij} * \left(T_{ij}^{0} + T_{ij}^{1}\right) * VOR$$

T0 and T1 are the Do Minimum and Do Something trips respectively;

The VOR = Value of Reliability; and

Δσ = change in standard deviation

The calculations required by the urban road formula were processed using a WSP internal tool with the monetised results given in Table 4-12 below.

Table 4-12 Monetised reliability benefits

Summary of User benefits (£000s), 2010 market prices and values				
TEE table	**All modes**	**Highways**		
		Car	LGV	HGV
Business				
Travel time	5,483	2,706	2,478	299
Fuel VOC	0	0	0	0
Non-Fuel VOC	0	0	0	0
User charges	0	0	0	0
Sub-total	**5,483**	**2,706**	**2,478**	**299**
Commuting				
Travel time	5,309	5,309	0	0
Fuel VOC	0	0	0	0
Non-Fuel VOC	0	0	0	0
User charges	0	0	0	0
Sub-total	**5,309**	**5,309**	**0**	**0**
Other				
Travel time	3,671	3,522	149	0
Fuel VOC	0	0	0	0
Non-Fuel VOC	0	0	0	0
User charges	0	0	0	0
Sub-total	**3,671**	**3,522**	**149**	**0**
Operator revenues				
Sub-total	**0**	**0**	**0**	**0**
Indirect tax revenues				
Sub-total	**0**	**0**	**0**	**0**
Total user benefits	**14,463**	**11,537**	**2,627**	**299**

Table 4-12 shows that the scheme provides a positive journey time reliability benefit of approximately £14 million.

4.7 Wider Economic Impacts

In line with the TAG Unit A2.1, a Wider Economic Impacts Appraisal (WITA) has been undertaken for the A5036. The WITA assesses the impact of the scheme on the following:

- Induced Investments
- Employment Effects
- Productivity Impacts

The WITA employs data from the TAG databook (v1.21 May 2023), data from the Wider Impacts dataset (v3.3) and Employment Data for each Local Authority. A spreadsheet tool is used to calculate the WITA benefits.

The Wider Benefits will be accrued to the Car Employer Business and Car Commuting user classes. We have also applied a 30% reduction to the total benefits calculated (excepting Induced Investments) to account for the absence of Public Transport in the model. The 30% reduction is based on analysis from other highway projects. An assumption that the weekday daytime (AM, IP and PM) are as modelled and that changes during the weekday offpeak are insignificant have been made.

Masking was employed, as with the TUBA, to include benefits to or from Merseyside, Lancashire or the Greater Manchester North sectors only. The WITA benefits are given below in Table 4-13.

Table 4-13 WITA Benefits (£000)

Price Base: 2010, discounted to 2010 Appraisal Period: 60 years Unit: (£000)				
Wider Impact	**2031**	**2046**	**2061**	**Full Appraisal Period**
Productivity Impacts				
• **Manufacturing**	**46**	**30**	**37**	**2,000**
• **Construction**	**44**	**35**	**53**	**2,552**
• **Consumer Services**	**194**	**171**	**262**	**12,515**
• **Producer Services**	**345**	**324**	**518**	**24,292**
• **Sub Total**	**628**	**560**	**870**	**41,359**
Induced Investments	**-**	**-**	**-**	**7,655**
Employment Effects	**7**	**10**	**14**	**671**
Total	**635**	**570**	**884**	**49,685**

4.8 Environmental Impacts

A Traffic Appraisal Guidance (TAG) appraisal has been completed to refresh the PCF Stage 2 assessment. The Appraisal Specification Report was submitted in November 2022 which outlined the methodology to be used in the appraisals. Following a Government

announcement, the strategic decision was taken to suspend development of the scheme but to complete the revised appraisal of the scheme. As part of this the scope was reduced including a reduction in modelling and a foreshortened programme. As a result only data relating to the base year and the opening year were input to the environmental modelling. The monetised TAG appraisals were accordingly reduced in scope as defined here:

- Air quality – modelling of the opening year data was used to undertake the appraisal. The output was monetised.
- Greenhouse gases – Emissions were modelled across a sixty year period, from the opening year of 2031 out to 2090. As only opening year modelling was available, future year modelling was assumed to be the same as the opening year. The output was monetised.
- Noise – spreadsheet analysis only to predict short-term noise change comparing Do minimum opening year with do something opening year. The output was not monetised.
- Non traffic related deliverables – these were unchanged and consist of:
    - Cultural heritage
    - Biodiversity
    - Landscape
    - Townscape
    - Water environment

The design of the scheme has been based on the Port of Liverpool Conceptual Masterplan (RPS Jan 2020) which was developed as a ‘concept’ design at Stage 2. As there is no ongoing design, there has been no opportunity to secure any mitigation within the design. Therefore, for the purposes of the TAG appraisals, good practice mitigation has been assumed such as control of discharges to water and dust control measures, as has Scheme design as shown on the Masterplan. However, further mitigation that could reduce the impacts of the scheme further have not been proposed. For the purposes of the appraisals, existing scheme information and updated baseline information were obtained where available. No surveys, site visits or consultation was carried out, partially due to the sensitivity of the scheme. Further assumptions made during the appraisals are outlined in table 4-15.

The TAG appraisals have been carried out using the TAG Unit A3: environmental impacts worksheets (Department for Transport, 2018) as updated 31st May 2023. In addition, further guidance was taken from the Design Manual for Roads and Bridges (DMRB) where appropriate including reference to the following:

- LA 105 - Air quality
- LA 106 - Cultural heritage assessment
- LA 107 - Landscape and visual effects
- LA 108 – Biodiversity
- LA 111 - Noise and vibration
- LA 113 - Road drainage and the water environment
- LA 114 – Climate

Table 4-14 outlines the main findings of the TAG appraisals taken from the TAG Worksheets:

Table 4-14 Summary of TAG appraisals

<table>
<tr><th>Factor</th><th>Qualitative comments</th><th>Assessment Score</th></tr>
<tr><td>Air quality</td><td>Regionally, the change in emissions of NO_x is 1.46 tonnes (0.44%) in the opening year (2031) for the proposed scheme relative to the Do-Minimum scenario. The change in emissions of PM_{10} is 0.77 tonnes (1.0%) in the opening year (2031) for the proposed scheme relative to the Do-Minimum scenario.

For local air quality, the concentrations of NO_2 are predicted to decrease at 17,563 (53%) of the 33,037 identified sensitive receptors and increase at 14,832 (45%). Similarly, concentrations of $PM_{2.5}$ (as PM_{10}) are predicted to decrease at 16,350 receptors (49%) and increase at 15,527 (47%). This represents a net improvement in local air quality over the appraisal period.</td><td>NO_2 score: -1,570

$PM_{2.5}$ score: -237</td></tr>
<tr><td>Noise and vibration</td><td>The basic noise level (BNL) has been calculated for the do-minimum and the do-something opening year. The road links resulting in a BNL change of >+/- 3 dB are shown here.
<table>
<tr><th>Road Name</th><th>BNL Change (+/- dB)</th></tr>
<tr><td>A5758</td><td>+5.7</td></tr>
<tr><td>B5407</td><td>+4.2</td></tr>
<tr><td>St Bernards Drive</td><td>+3.3</td></tr>
<tr><td>Seaforth Road</td><td>+3.2</td></tr>
<tr><td>St Bernards Drive</td><td>+3.2</td></tr>
<tr><td>Ormskirk Road-A59 South</td><td>+3.2</td></tr>
<tr><td>Church Road - Bridge Road (roundabout link)</td><td>+3.2</td></tr>
<tr><td>Dartmouth Drive</td><td>+3.1</td></tr>
<tr><td>Runnels Lane</td><td>+3.0</td></tr>
<tr><td>North Perimeter Road</td><td>-3.0</td></tr>
<tr><td>Ormskirk Road-A59 North</td><td>-3.0</td></tr>
<tr><td>Ormskirk Road-A59 North</td><td>-3.1</td></tr>
<tr><td>Almod's Turn</td><td>-3.2</td></tr>
<tr><td>Swift's Lane</td><td>-3.2</td></tr>
</table></td><td>Total of nine roads that are predicted to have a >+3 dB BNL change.

Total of ten roads that are predicted to have a >-3 dB BNL change.</td></tr>
</table>

Factor	Qualitative comments	Assessment Score
	A5036 (Dunnings Bridge Road roundabout link): -3.2 Church Road - Bridge Road (roundabout link): -3.3 M57 - A5758: -3.4 M58 - A5036: -3.4 A5036 (Dunnings Bridge Road): Ranging between -3.6 and -9.5	
Greenhouse gases (Operational User Emissions)	The Operational User Greenhouse Gas Emissions for the Proposed Scheme are as follows. Change in CO_2 equivalent emissions over 60 year appraisal period (tonnes): 146,922 Of which traded: 4,216.990733 Change in CO_2 equivalent emissions in opening year (tonnes): 3,996 Net present value of traded sector CO_2 equivalent emissions of proposal (£): -£349,793	Overall Assessment Score. Net present value of carbon dioxide equivalent emissions of proposal (£): -£10,319,736
Greenhouse gases (carbon assessment)	Only the Greenhouse gases (Operational User Emissions) are considered as part of the TAG appraisals (described in the row above). The full carbon assessment sits outside of the TAG appraisals however for transparency the carbon assessment is discussed below. More detail on the carbon assessment can be found in the National Highways Carbon Management Report PCF Product, aligned to the Proposed Scheme. The carbon assessment has been undertaken for Preferred Option: Jan 2022. The carbon assessment is aligned to DMRB LA 114 and was undertaken using National Highways Carbon Tool v2.3, which utilises 2020 emission factors. A cost contingency uplift factor based on the scheme cost with risk/without risk has been applied to the construction stage emissions. The cost contingency uplift factor applied to construction carbon is: 1.061. The whole life carbon assessment stages evaluated in the carbon assessment include: - Construction Stage: Construction Materials - Construction Stage: Construction Transport - Operation Stage: User Emissions It should be noted construction plant (including land use change and waste disposal) was not included in the assessment of Construction Stage Greenhouse Gas Emissions for the Proposed Scheme along with other emission sources in the Operation and End of Life Stage.	The Construction Stage, Construction Materials Greenhouse Gas Emissions from the Proposed Scheme: 105,411 tCO_2e. The Construction Stage, Materials Transport Greenhouse Gas Emissions from the Proposed Scheme: 11,164 tCO_2e. The Operations Stage, User Greenhouse Gas Emissions from the Proposed Scheme: 146,922 tCO_2e.
Cultural heritage	There is one Scheduled Monument within 500m of the Proposed Scheme known as the Sefton Old Hall moated site and fish pond. It is likely that there could be permanent changes to its setting during the operation of the scheme. This would produce a slight adverse effect. Edge Farmhouse (NHLE: 1343290), Tan House Farmhouse (NHLE 1343281) and Orchard Farmhouse (NHLE 1199864) are Grade II listed heritage assets of medium heritage value.	Scheduled Monuments – slight adverse Listed Buildings – moderate adverse Conservation Areas – neutral

Factor	Qualitative comments	Assessment Score
	There would be a moderate adverse impact to the setting of these heritage assets during the construction phase and operation phase of the Proposed Scheme. There would be no impact on the Sefton Village, Waterloo Park and Christ Church Conservation Areas. Fifteen known non-designated heritage assets would have a moderate adverse effect. This could be reduced with mitigation, by preservation by record.	Non-designated assets – moderate adverse
Landscape	The Proposed Scheme is expected to introduce adverse effects on the following local landscape character areas within the study area: - Rimrose Valley; and - Sefton Agricultural Farmland The introduction of the Proposed Scheme within the Rimrose Valley landscape between Crosby and Litherland to the north of Liverpool is expected to result in significant adverse effects on the local landscape by severing the green corridor between the two residential developments. There would be a substantial disruption to the pattern, tranquillity and land cover within the Rimrose Valley and the cultural perception of the landscape would be impacted through a change in the setting of the landscape and how the local community use the green corridor. Impacts could be partially mitigated through an effective planting strategy and remodelling of the Rimrose Valley Country Park. The severance and introduction of a road corridor through the green space would result in a significant long-term change. The effects on the agricultural farmland to the north of Crosby and Litherland and to the west of the M57 and M58 are expected to introduce non-significant adverse effects into the local landscape through the introduction of a new road. Minimal effects on the landscape are anticipated through the A5758 online section of the Proposed Scheme to the west of 'Switch' Island. Long-term adverse effects on the pattern, tranquillity, culture and land cover are only anticipated through the offline section of the Proposed Scheme as it deviates south from the A5758 and travels south towards the Rimrose Valley Country Park.	Rimrose Valley - large adverse Sefton Agricultural Farmland - slight adverse
Townscape	The Proposed Scheme is expected to have no adverse effects on the following local townscape character areas within the study area: - Docks Mixed Development; - Crosby Suburban; and - Litherland Suburban The introduction of a small proportion of the Proposed Scheme within the Docks Mixed Development townscape area connecting Princess Way with the A565 adjacent to Seaforth is expected to result in no adverse effects on the local townscape as there would be no perceptible change to the fabric of the townscape. The Proposed Scheme would have no direct impact on the Crosby Suburban townscape character as it passes through the adjacent Rimrose Valley Country Park. Changes with the adjacent Rimrose Valley and Sefton Agricultural Farmland LCA's would not alter the perception of the townscape as intermittent views of the Proposed Scheme and associated mitigation proposals would only be afforded from the urban edge of Great Crosby, Moor Park and Thornton. There may be a potential benefit to Human Interaction through improved	Docks Mixed Development - neutral Crosby Suburban - neutral Litherland Suburban - neutral

Factor	Qualitative comments	Assessment Score
	connectivity to the adjacent Rimrose Valley as part of mitigation proposals. The Proposed Scheme would also have no direct impact on the Litherland Suburban townscape character as it passes through the adjacent Rimrose Valley Country Park. Changes with the adjacent Rimrose Valley and Sefton Agricultural Farmland LCA's would not alter the perception of the townscape as intermittent views to the Proposed Scheme and associated mitigation proposals would only be afforded from the urban edge of Seaforth, Litherland, Ford, Netherton and Bootle. There may be a potential benefit to Human Interaction through improved connectivity to the adjacent Rimrose Valley as part of mitigation proposals. The overall impact of the Proposed Scheme on the two Suburban townscapes and the Docks Mixed Development townscape, following landscape mitigation proposals, would be Neutral.	
Biodiversity	The Study Area encompasses the entirety of Rimrose Valley Country park including Rimrose Valley and Leeds - Liverpool Canal SLBI and Brookvale LNR with impacts to existing semi-natural habitats anticipated and fragmentation affects within those sites. The Proposed Scheme is considered to be of Very Large adverse impact to biodiversity at a local level without appropriate mitigation. The A5036 POL PCF3 RPS Conceptual master plan highlights areas of retained habitat, which includes the majority of the priority deciduous woodland and grassland within Rimrose Country Park. However, habitat loss is anticipated impacting all habitat types. Extensive compensation habitat is proposed within the northern section of the Proposed Scheme including wetland (ponds and associated marginal vegetation) and woodland areas. Additional ponds will be created within Rimrose Country Park to increase the high ecological value wetland habitat present within the Study Area of the Proposed Scheme post construction. Numerous green bridges are proposed to provide connectivity for species to either side of the road within areas of semi-natural habitat to reduce the impacts of fragmentation. However, further ecological survey is recommended to comprehensively record habitats within the Proposed Scheme to provide further information with regards to compensation and mitigation requirements for the detailed design stage. A number of species listed within the TAG require further survey to confirm presence/absence and the ecological value of species within the area to further influence mitigation and compensation requirements to reduce the impacts of the Proposed Scheme on populations. It has been assumed that the drainage design for the Scheme will ensure no changes to the hydrology/ground water will impact habitats or species, water run-off from the road will not enter directly in to Rimrose Brook and therefore features/attributes will not be negatively impacted from increased pollutants/nitrates.	Very large adverse – further survey and proposed mitigation may reduce magnitude of impact.
Road drainage and the water environment	Review of the Environment Agency's online maps for flood risk indicate that the vast majority of the Proposed Scheme is shown to be located in Flood Zone 1. Intermittent areas of the Proposed Scheme (to the north east (Switch Island)) are shown to be located in Flood Zone 2. The Flood Zone 2 extent is likely to be associated with the River Alt (Main river) and associated tributaries. The Proposed Scheme is also shown to be located on land at 'Very low' to 'High' risk of surface water flooding. The identified surface water flood risk is likely to be associated with overland flow paths, Rimrose Brook (Ordinary watercourse) and associated tributaries. Rimrose Brook (Ordinary watercourse) is located within the Scheme Extent, flowing predominantly through Rimrose Valley Country Park in a southerly direction. The Proposed Scheme is likely to have an impact on Rimrose Brook (Ordinary watercourse). Any identified localised	Low significance

Factor	Qualitative comments	Assessment Score
	impacts on Rimrose Brook (Ordinary watercourse) should be reviewed in more detail and subsequently mitigated through suitable design. Based on Sefton Metropolitan Borough Council's Strategic Flood Risk Assessment (March 2013), the Proposed Scheme, including areas within Rimrose Valley Country Park, may also be susceptible to groundwater flooding. Any identified localised impacts on the Proposed Scheme as a result of groundwater flooding should be reviewed in more detail and subsequently mitigated through suitable design. Localised impacts (specifically groundwater quality) to groundwater receptors (i.e., abstractions, superficial and bedrock aquifers) may be possible due to Proposed Scheme development activities (increased impermeable areas and sedimentation as a result of the proposed road). At present, there are limited data relating to the presence of private (licensed and unlicensed) water supplies, along with depth to the groundwater table. Increased impermeable areas as a result of the Proposed Scheme may result in localised impacts on aquifer recharge, although impacts are not expected to be significant. Any identified localised impacts on groundwater features should be reviewed in more detail and subsequently mitigated through suitable design.	

Further assessment work will be required should the Proposed Scheme progress to Stage 3 design development. Such work would include surveys to create an accurate baseline and consultation with bodies such as the Environment Agency, Historic England and Natural England.

4.9 Severance Impacts

Severance benefits have been estimated using the Community Severance Monetisation Toolkit (Version 0.3).

Pedestrian Count data based on pedestrian surveys undertaken in 2019 at several crossing points on the A5036 were input into the tool. Pedestrian count data was available for the following crossing points on the A5036:

- Copy Lane Junction
- Hawthorne Road Junction
- Netherton Way Junction
- Park Lane Junction
- Heysham Road Junction
- Princess Way Junction

Characteristics of the crossing point, including number of lanes, traffic density, speed and type of crossing point (e.g. straight pelican or staggered pelican) and category of reservation (narrow, wide or none) were also input.

The traffic density has three categories (high, medium and low) is related to the traffic flow to capacity ratio as follows:

- High: hourly traffic flows >80% of road capacity
- Medium: hourly traffic flows 50-80% of road capacity
- Low: hourly traffic flows <50% of road capacity

The forecast traffic model was used to select the traffic density category for each junction crossing. The traffic density category remained the same without or with the scheme for most of the crossing points, which therefore would not provide any monetizable severance benefits

from the Toolkit. The flow change due to the scheme was sufficient to change the traffic density category at the following locations:

- Copy Lane Junction
- Heysham Road Junction

The severance benefits are summarised in Table 4-15.

Table 4-15 Severance Benefits

Crossing	Pedestrian Count	Benefit (£000)
Copy Lane	563	415.9
Heysham Road – West of Junction	66	48.8
Heysham Road – East of Junction (not a legitimate crossing point)	6	1.4
Total		466.1

4.10 Distributional Impacts

The first step in the assessment process involves undertaking an initial screening of the indicators set out in TAG Guidance Unit A4.2. This is in order to identify those impacts that could potentially be affected by the scheme and any that are unlikely to be affected. The indicators are:

- User benefits;
- Noise;
- Air Quality;
- Accidents;
- Security;
- Severance;
- Accessibility; and
- Affordability

The screening outcomes are shown in Table 4-16.

Table 4-16 Distributional Impact Appraisal Screening Proforma

Indicator	Appraisal output criteria	Potential impact (yes / no, positive/negative if known)	Qualitative Comments	Proceed to Step 2
User benefits	The TUBA user benefit analysis software or an equivalent process has been used in the appraisal; and/or the value of user benefits Transport Economic Efficiency (TEE) table is non-zero.	The economic appraisal indicates that the user benefits due to the scheme amount to £153 million.	The latest economic appraisal indicates that the scheme is likely to generate significant user benefits	Yes
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %HDV content. Also note comment in TAG Unit A3.	Transport corridor alignment changes and flows, speeds and HDV content are likely to significantly change	A significant number of properties are likely to be impacted. However, it was agreed with National Highways that there would be a reduced assessment scope for the discipline of noise during the current assessment. This means that a specific social and distributional impact assessment for this environmental discipline has been scoped out.	No
Air quality	Any change in alignment of transport corridor or any links with significant changes in vehicle flow, speed or %HDV content: • Change in 24 hour AADT of 1000 vehicles or more • Change in 24 hour AADT of HDV of 200 HDV vehicles or more • Change in daily average speed of 10kph or more • Change in peak hour speed of 20kph or more • Change in road alignment of 5m or more	Transport corridor alignment changes and flows, speeds and HDV content are likely to significantly change	A significant number of properties are likely to be impacted. Local emissions are likely to change.	No
Accidents	Any change in alignment of transport corridor (or road layout) that may have positive or negative safety impacts, or any links with significant changes in vehicle flow, speed, %HGV content or any significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using road network.	Transport corridor alignment changes and flows, speeds and HDV content are likely to significantly change	Detailed collision statistics required to assess the impact on vulnerable users are not available. COBALT analysis only	No
Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	Reduced traffic on the existing A5036 due to the scheme may reduce road crossing times and some PT waiting times.	The scheme is expected to have a small impact on security, which is slightly beneficial.	No
Severance	Introduction or removal of barriers to pedestrian movement, either through changes to road crossing provision, or through introduction of new public transport or road corridors. Any areas with significant changes (>10%) in vehicle flow, speed, %HGV content.	The existing A5036 experiences high levels of traffic which may increase the connectivity between the two sides of the road. There are significant residential and business uses on either side of this road which can be impacted by severance. The new road is expected to cause a significant reduction in traffic along the existing road, potentially leading to a reduction in severance. However, detailed information about origins of beneficiaries is not available.	The Summary Assessment Score has been rated as beneficial. Data to distribute the Severance benefits are not available.	No

Indicator	Appraisal output criteria	Potential impact (yes / no, positive/negative if known)	Qualitative Comments	Proceed to Step 2
Accessibility	Changes in routings or timings of current public transport services, any changes to public transport provision, including routing, frequencies, waiting facilities (bus stops / rail stations) and rolling stock, or any indirect impacts on accessibility to services (e.g. demolition & re-location of a school).	A reduction in traffic on the A5036 may reduce bus delays.	Changes in traffic flows on some bus routes have a small impact on public transport accessibility. As a result of the modest impact on local bus routes no further appraisal is required	No
Affordability	In cases where the following charges would occur; Parking charges (including where changes in the allocation of free or reduced fee spaces may occur); Car fuel and non-fuel operating costs (where, for example, rerouting or changes in journey speeds and congestion occur resulting in changes in costs); Road user charges (including discounts and exemptions for different groups of travellers); Public transport fare changes (where, for example premium fares are set on new or existing modes or where multi-modal discounted travel tickets become available due to new ticketing technologies); or Public transport concession availability (where, for example concession arrangements vary as a result of a move in service provision from bus to light rail or heavy rail, where such concession entitlement is not maintained by the local authority[1]).	TUBA software will be used as changes in journey speeds. Congestion and Vehicle Operating Costs are likely to change	TUBA results show that vehicle operating costs change as a result of the scheme. Some small changes in user charges are also included in the TUBA result.	Yes

Step 2 explores the socio-demographic context and potential impacts in further detail and is split into three parts.

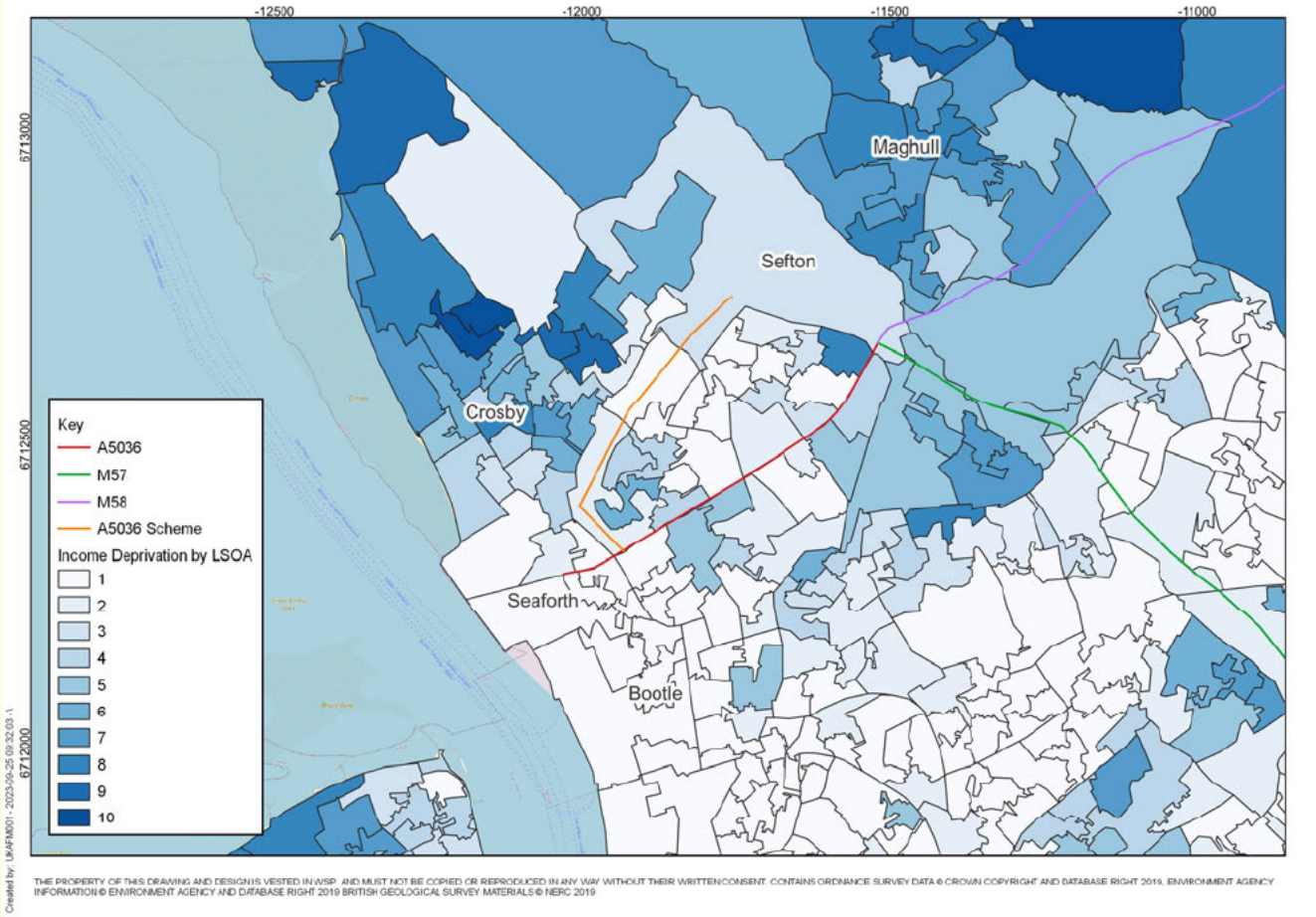
- Step 2a looks at the potential impacts and includes identifying the geographical area experiencing impacts and the specific areas likely to be affected by the proposed scheme. For this assessment, the impact area is Merseyside, with a focus on the LSOAs closest to the A5036.
- Step 2b explores the social groups in the impacted area. This step involves analysis of the socio-economic and social and demographic characteristics of those within the area, such as income deprivation, proportion of children and proportion of black and minority (BME) ethnic groups. This analysis is mapped alongside the proposed scheme in order to determine the impacted areas and social groups.
- Step 2c involves the identification of amenities in the impact area. Amenity data is reported qualitatively to add value to the appraisal.

TUBA (Transport User Benefit Appraisal) has been used to provide an assessment of the scheme's monetised benefits relating to travel time, vehicle operating costs, user charges, operator revenue and indirect tax revenues in conjunction with the transport model outputs. The benefits are calculated over a 60-year period for each scheme from the scheme opening year and the appraisals are carried out for the core, low and high forecast traffic growth scenarios. The TUBA outputs are disaggregated at a sector-to-sector level.

For user benefits, it is clear that these will be spread around the A5036 as well as the local highway network around Liverpool and Sefton.

For the purposes of this assessment, income deprivation data has been obtained to show the income distribution across Merseyside. The income deprivation data does not identify areas of affluence, instead identifies areas of relatively low deprivation which can be used as a measure of showing distribution of income. The data is presented for each LSOA surrounding the scheme and these results are illustrated in Figure 4-3.

Figure 4-3 Income Deprivation



Income deprivation deciles are calculated by ranking the 32,844 neighbourhoods in England from most deprived to least deprived in ten equal groups. Each decile represents a 10% level of deprivation. The LSOA's are given an Income Decile Rank on a scale of 1-10 (1 being the most deprived, and 10 being the least deprived). The ranks correlate to the percentages with decile 1 and 2 (the 20% most deprived areas in England) falling within the 10-20% deprivation boundary. The higher the percentage the less income deprived an area is.

The darkest blue areas show the least income deprived and the lightest blue the most income deprived areas. The areas with greatest income deprivation are generally to be found closer to the towns and cities in the area.

The majority of the areas surrounding the scheme fall within the lower deciles of income deprivation. LSOA's in Crosby are in higher deciles.

The distribution of user benefits is shown in Table 4-17. The ranking criteria shown in Table 4-17 has been used to assess user benefit impacts by income quintile. The assessment is shown in Table 4-18.

Table 4-17 Ranking Criteria

Key to individual assessment of each income quintile:	
Beneficial and 5% greater (or more) than the proportion of the group in the total population	Large Beneficial ✓✓✓
Beneficial and in line (+/-5%) with the proportion of the group in the total population	Moderate Beneficial ✓✓
Beneficial and 5% smaller (or less) than the proportion of the group in the total population	Slight Beneficial ✓✓
There are no user benefits or disbenefits experienced by the group	Neutral
A disbenefit which is 5% smaller (or less) than the proportion of the group in the total population	Slight Adverse ×
A disbenefit which is in line (+/-5%) with the proportion of the group in the total population	Moderate Adverse ××
A disbenefit which is 5% greater (or more) than the proportion of the group in the total population	Large Adverse ×××

Figure 4-4 User Benefit Distribution

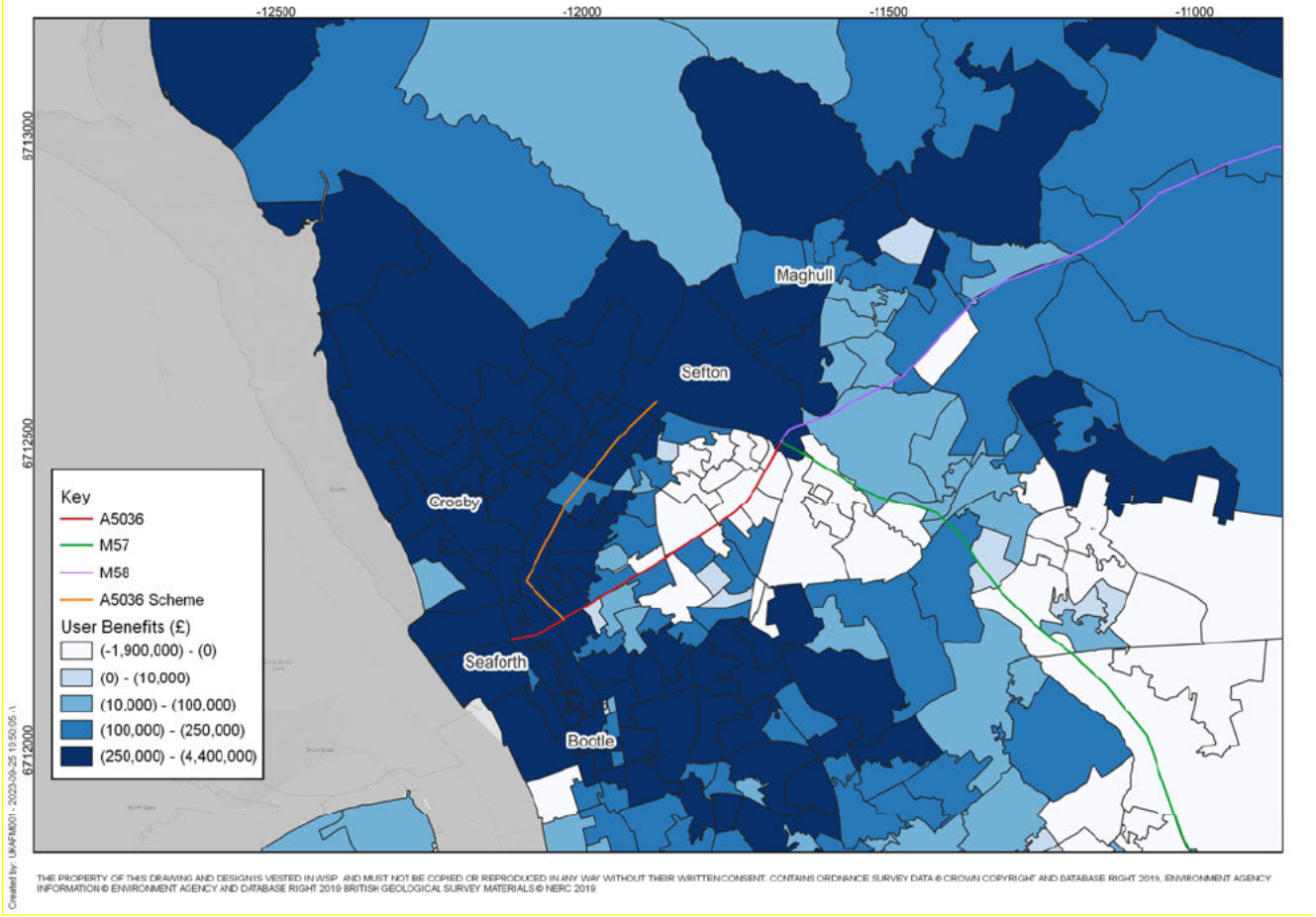


Table 4-18 User Benefit Impact Assessment

User benefits	Income quintile					Total
	1	2	3	4	5	
Total benefits	38,254,701	13,228,882	12,298,825	11,089,921	11,419,396	**86,291,726**
Total disbenefits	-	-	-	-	-	**0**
Direction	Benefit	Benefit	Benefit	Benefit	Benefit	-
Share of user benefits	44%	15%	14%	13%	13%	-
Share of user disbenefits	-	-	-	-	-	-
Population	387,732	130,296	178,882	174,679	121,914	**993,503**
Share of population in the impact area	39%	13%	18%	18%	12%	-
Difference	5%	2%	-4%	-5%	1%	-
Assessment	✓✓✓	✓✓	✓	✓	✓✓	-

Table 4-18 shows that income quintile 1 experiences the largest benefit. The other quintiles experience a similar benefit.

The distribution of personal affordability is shown in Figure 4-5. The ranking criteria shown in Table 4-17 has been used to assess user benefit impacts by income quintile. The assessment is shown in Table 4-19.

Figure 4-5 Personal Affordability Distribution

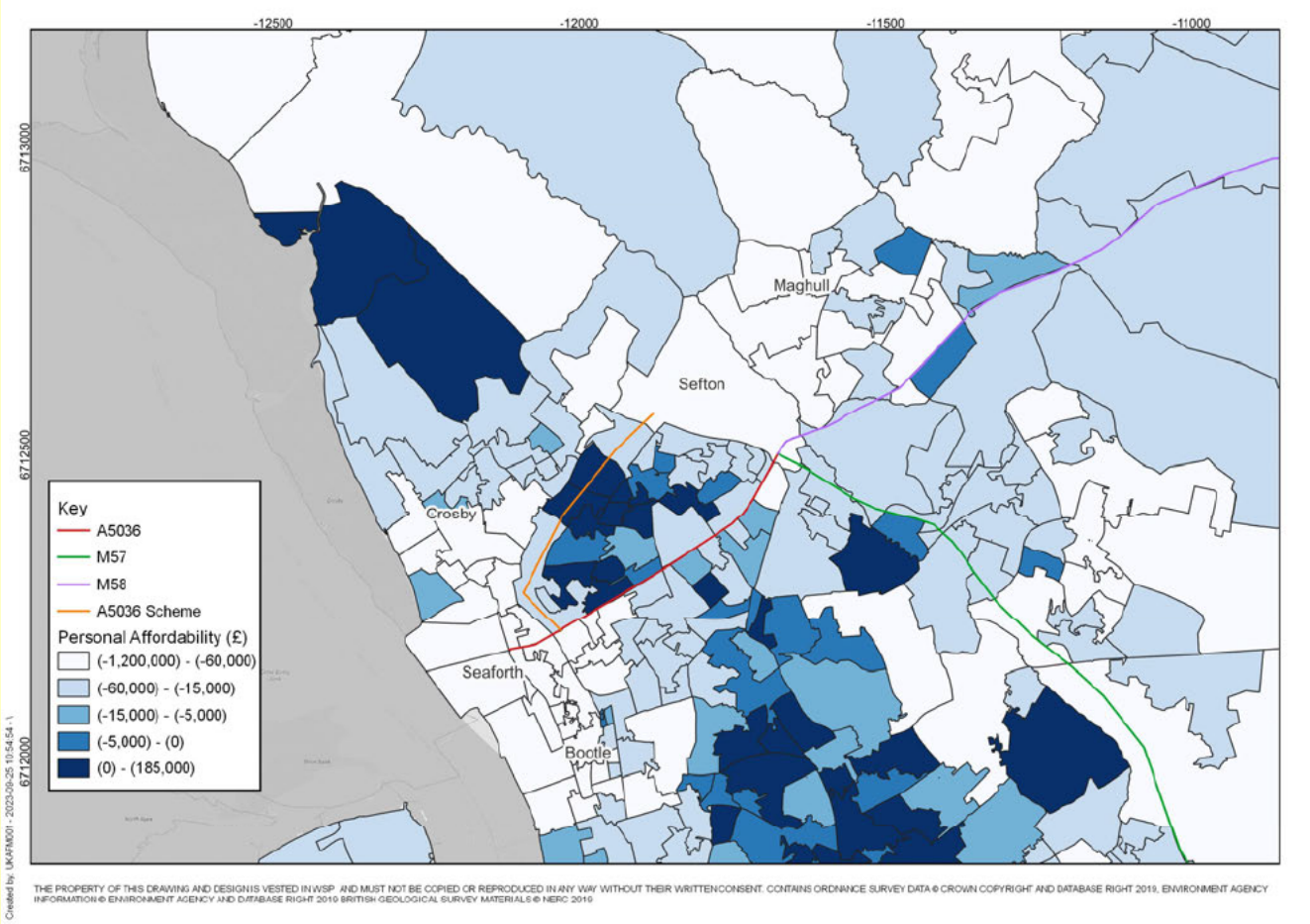


Table 4-19 Personal Affordability Assessment

Personal affordability	Income quintile					Total
	1	2	3	4	5	
Total increase in user charges	10,339,037	3,744,883	3,133,302	3,748,743	2,583,952	**23,549,916**
Total decrease in user charges	-	-	-	-	-	-
Direction	disbenefit	disbenefit	disbenefit	disbenefit	disbenefit	-
Share of increase in user charges	44%	16%	13%	16%	11%	-
Share of decrease in user charges	-	-	-	-	-	-
Population	387,732	130,296	178,882	174,679	121,914	**993,503**
Share of population in the impact area	39%	13%	18%	18%	12%	-
Difference	5%	3%	-5%	-2%	-1%	-
Assessment	✓✓✓	✓✓	✓	✓✓	✓✓	-

Table 4-19 shows that all income quintiles experience a disbenefit with quintile 1 experiencing the biggest disbenefit and quintile 5 experiencing the smallest benefit.

Air Quality DI

As a road scheme, Distributional Impact (DI) analysis of air quality is scoped in and undertaken in line with the guidance provided in TAG Unit A4.2. Chapter 4 of TAG Unit A4.2 guidance outlines the requirement to assess the impact of changes in air quality that are experienced by lower income groups and children (nurseries and schools). Evidence is provided which suggests that these lower income groups and children are more at risk from air pollution.

Index of Deprivation[1] (IoD) was used to classify each lower layer super output area (LSOA) within the air quality study area into deprivation quintiles (0-20% being most deprived, 80-100% being least deprived). All relevant receptors (residential, education, hospitals and care homes) within 200 metres of the ARN were included in the DI analysis. The DI Analysis requires identification of the number of receptors in each Income Domain quintile that experience an improvement, worsening or no change in NO_2 and PM_{10}. The respective air quality benefits / disbenefits were assessed for each Income Domain quintile, in relation to the share of the number of modelled properties within each domain. Each quintile was then given an overall Assessment Score. The results are shown in Table 4-20 below for NO_2 and Table 4-21 for PM_{10} for the opening year (2031).

[1] https://www.gov.uk/guidance/english-indices-of-deprivation-2019-mapping-resources

Table 4-20 Air Quality DI Analysis – NO_2

	IoD Income Domain					Total
	Most deprived				Least deprived	
	0-20	20-40	40-60	60-80	80-100	Overall
Number of properties with improved air quality [A]	2189	3483	4251	4730	2910	17563
Number of properties with no change in air quality [B]	266	65	63	35	213	642
Number of properties with worse air quality [C]	4274	3016	2222	2420	2900	14832
Number of net winners / losers [D] = [A] – [C]	-2085	467	2029	2310	10	-
Total number of winners / losers across all groups [E] = ∑[D]						2731
Net winners/losers in each area as percentage of total [F] = [D] / [E]	-76%	17%	74%	85%	0%	100%
Share of total population of study area	20%	20%	20%	22%	18%	100%
Assessment	Large adverse	Minor beneficial	Large beneficial	Large beneficial	Neutral	

The results of the assessment presented in Table 4-20 indicate that local air quality, with respect to concentrations of annual mean NO_2, is predicted to improve in four out of five income domains for the opening year of the Proposed Scheme (2031). However, the air quality will worsen in the most deprived domain, with a large adverse change.

Table 4-21 Air Quality DI Analysis – PM_{10}

	IoD Income Domain					Total
	Most deprived			Least deprived		
	0-20	20-40	40-60	60-80	80-100	Overall
Number of properties with improved air quality [A]	2038	3340	4084	4595	2293	16350
Number of properties with no change in air quality [B]	405	241	85	68	361	1160
Number of properties with worse air quality [C]	4286	2983	2367	2522	3369	15527
Number of net winners / losers [D] = [A] – [C]	-2248	357	1717	2073	-1076	-
Total number of winners / losers across all groups [E] = ∑[D]						823
Net winners/losers in each area as percentage of total [F] = [D] / [E]	-273%	43%	209%	252%	-131%	100%
Share of total population of study area	20%	20%	20%	22%	18%	100%
Assessment	Large adverse	Large beneficial	Large beneficial	Large beneficial	Large adverse	

The results of the assessment presented in Table 4-21 indicate that air quality, with respect to concentrations of annual mean PM_{10}, is predicted to improve in three income domain quintiles with a large beneficial change for the opening year of the Proposed Scheme (2031). The most deprived area is predicted to experience a large adverse change and the least deprived area is also predicted to experience a large adverse change.

A total of 73 schools and nurseries were identified in the air quality study area. The change in NO_2 and PM_{10} was reported for each of these schools, based on the local air quality

assessment results for the Proposed Scheme opening year (2031). The results are presented in Appendix F.

Of the schools and nurseries identified within the air quality study area, Table 6 demonstrates that 46 are predicted to experience an improvement in annual mean concentrations of NO_2 in the Proposed Scheme opening year (2031), with 24 experiencing a worsening, and 3 experiencing no change. With respect to annual mean PM_{10} concentrations, Table 4-22 shows that 34 schools and nurseries are predicted to experience an improvement in the opening year of the Proposed Scheme versus the Do-Minimum scenario. 33 locations are predicted to experience a worsening in PM_{10} concentrations and 6 to experience no change.

Table 4-22 Air Quality Impact and DI Analysis at Schools

IoD	Total No. School	Annual Mean NO_2			Annual Mean PM_{10}		
		Improvement	Worsen	No change	Improvement	Worsen	No change
0-20	8	2	6	0	1	6	1
20-40	17	11	4	2	8	7	2
40-60	17	13	4	0	10	7	0
60-80	14	9	5	0	8	5	1
80-100	17	11	5	1	7	8	2
Total	73	46	24	3	34	33	6

Table 4-22 shows that the majority of the schools in the most deprived area (IoD 0-20) are predicted to experience a worsening in air quality, both 75% for annual mean NO_2 and PM_{10} concentrations. The majority of the schools (64%) in the least deprived area (IoD 80-100) are predicted to experience an improvement in NO_2 concentration. There are slightly more schools are predicted to experience an improvement in PM_{10} concentrations in deprived areas 20-40, 40-60 and 60-80; whilst the slightly more schools in the least deprived area is predicated to experience a worsening in PM_{10} concentration.

Full details of school and the changes of pollutant concentrations is provided in Appendix F.

5 Social Benefits

The Social Benefits of the scheme have been qualitatively assessed. The following social groupings have been assessed:

- Income Distribution
- Proportion of Children
- Proportion of Young Adults
- Proportion of People over 65
- Proportion of Women
- Disability
- Ethnicity
- Access to a Car
- Dependent Children

A list of the key amenities in the area were also reviewed.

The Social Benefits are described in Appendix E.

6 Economic Appraisal Outcome

6.1 Introduction

This section of the report presents the results of these assessments and how they have been used to derive the overall Benefit to Cost Ratio (BCR) for the scheme. As outlined in guidance, the BCR will then partially inform the 'Value for Money (VfM)' case for the scheme, with consideration given to other impacts and elements of the scheme or scheme package.

Results in this section are presented for the Core growth demand scenario. All costs and benefits presented in this chapter have been assessed over a 60-year project lifetime. All costs and benefits are shown in discounted 2010 prices as required by TAG and the Green Book.

As described in Section 4, some elements of the assessment of benefits are included within the TEE and AMCB tables and within the initial BCR, whilst other additional elements are not included within these tables but form part of the overall Value for Money assessment and are included within the AST. An adjusted BCR is also presented that includes the Wider Impacts, Journey Time Reliability benefits and Non-Modelled time period user benefits.

The supporting Public Account (PA), Transport Economic Efficiency (TEE) and Analysis of Monetised Costs and Benefits (AMCB) tables are provided in Appendix A, Appendix B and Appendix C. They have been derived in accordance with the worksheets contained in TAG Units A1.2 and A1.3.

6.2 Public Accounts Tables

A summary of the Public Accounts (PA) table for the each of the schemes is included in Table 6-1 for the core scenario. PA tables outline the total cost of the scheme, discounted to 2010 values and prices.

Table 6-1 Summary of PA Tables by scheme option: Core Scenario (£000)

Public Accounts	(£000)
Local Government Funding	0
Central Government Funding: Transport	243,422
Central Government Funding: Non-Transport	0
TOTALS	
Broad Transport Budget[1]	243,422
Wider Public Finances[2]	-6,985

[1] does not include operational and maintenance costs
[2] equals the indirect tax revenue as estimated by TUBA

Full DfT standard PA tables are presented in **Appendix A.**

6.3 Transport Economic Efficiency Tables - Core Scenario

A summary of the Transport Economic Efficiency tables for the each of the schemes is included in Table 6-2 for the core scenario.

TEE tables outline the total benefits of the scheme, discounted to 2010 values and prices.

Table 6-2 Summary of TEE Tables by scheme option: Core Scenario (£000)

Transport Economic Efficiency	Modelled Time Periods Only
Non-Business: Commuting	
Travel time	52,223
Vehicle operating costs	10,008
User Charges	43
During Construction and Maintainance	0
NET COMMUTING BENEFITS	***42,258***
Non-Business: Other	
Travel time	51,519
Vehicle operating costs	-15,946
User Charges	-74
During Construction and Maintenance	0
NET OTHER BENEFITS	***35,499***
Business: User benefits	
Travel time	80,443
Vehicle operating costs	-12,344
User Charges	417
During Construction and Maintenance	0
Business: Private sector provider impacts	
Revenue, Operating costs, Investment costs & Grant/subsidy	212
Business: Other business impacts	
Developer contributions	£0
NET BUSINESS BENEFITS	***68,728***
Present Value of Transport Economic Efficiency Benefits (TEE)	**146,485**

Full DfT standard TEE tables are presented in Appendix B.

6.4 Analysis of Monetised Costs and Benefits Tables

A summary of the Analysis of Monetised Costs and Benefits (AMCB) tables for the each of the scheme options is included in Table 6-3 for the core scenarios.

Table 6-3 Summary of AMCB Tables by scheme option

AMCB	Core	Core with Low TUBA	Core with High TUBA	Sensitivity Test (HGV VOT)
Noise	0	0	0	0
Local Air Quality	365	365	365	365
Greenhouse Gases	-10,320	-10,320	-10,320	-10,320
Journey Quality	0	0	0	0
Physical Activity	0	0	0	0
Accidents	27,931	27,931	27,931	27,931
Economic Efficiency: Consumer Users (Commuting)	42,258	31,994	54,541	42,258
Economic Efficiency: Consumer Users (Other)	35,499	25,885	44,580	35,499
Economic Efficiency: Business Users and Providers	68,728	52,364	95,805	92,055
Wider Public Finances (Indirect Taxation Revenues)	6,985	6,699	7,640	6,985
Present Value of Benefits (PVB)	171,446	134,918	220,542	194,773
Present Value of Costs (PVC)	243,422	243,422	243,422	243,422
Net Present Value (NPV)	-71,976	-108,504	-22,880	-48,649
Benefit to Cost Ratio (BCR)	**0.70**	**0.55**	**0.91**	**0.80**

The initial BCR from the Initial PVB given in the AMCB table is 0.7.

Full DfT standard AMCB tables are presented in Appendix C. As expected the Core with Low Economy TUBA benefits have a lower BCR, while the Core with High Economy TUBA benefits have a higher BCR.

6.5 Adjusted BCR – Core Scenario

A summary of the adjusted BCR is shown in Table 6-4 for the core scenario.

It should be noted that the AMCB tables below include the level 1 and level 2 cost/benefits. The level 2 benefits include Wider Economic Impacts, Journey Time Reliability, Severance, and User Benefits from non-modelled time periods.

Table 6-4 Summary of Adjusted AMCB Tables (£000)

AMCB	Core	Core with Low TUBA	Core with High TUBA	Sensitivity Test (HGV VOT)
Noise	0	0	0	0
Local Air Quality	365	365	365	365
Greenhouse Gases	-10,320	-10,320	-10,320	-10,320
Journey Quality	0	0	0	0
Physical Activity	0	0	0	0
Severance	466	466	466	466
Accidents	27,931	27,931	27,931	27,931
Reliability	14,463	14,463	14,463	14,463
Wider Economic Impacts	49,685	49,685	49,685	49,685
Economic Efficiency: Consumer Users (Commuting) – Modelled Periods	42,258	31,994	54,541	42,258
Economic Efficiency: Consumer Users (Other) – Modelled Periods	35,499	25,885	44,580	35,499
Economic Efficiency: Business Users and Providers – Modelled Periods	68,728	52,364	95,805	92,055
Wider Public Finances (Indirect Taxation Revenues) – Modelled Periods	6,985	6,699	7,640	6,985
Economic Efficiency: Consumer Users (Commuting) – Non Modelled Periods	85	85	85	85
Economic Efficiency: Consumer Users (Other) – Non Modelled Periods	-947	-947	-947	-947
Economic Efficiency: Business Users and Providers – Non Modelled Periods	-486	-486	-486	291
Wider Public Finances (Indirect Taxation Revenues) – Non Modelled Periods	2,030	2,030	2,030	2,030
Present Value of Benefits (PVB)	236,742	200,214	285,838	260,846
Present Value of Costs (PVC)	243,422	243,422	243,422	243,422
Net Present Value (NPV)	-6,680	-43,208	42,416	17,424
Benefit to Cost Ratio (BCR)	**0.97**	**0.82**	**1.17**	**1.07**

The Adjusted PVB provides a BCR of just under 1.0 This puts it within the bounds of the 'Poor' Value for Money category, but approaching the 'Low' Value for Money category. Extended monetisation of non-quantified benefits may adjust this position.

The sensitivity test indicates that the PVB may be higher, based on a DfT survey data on freight Values of Time. With HGV Values of Time assumed to be twice their TAG values, the PVB is above 1.0.With TUBA benefits from the High economy scenario, the BCR approaches 1.2.

6.6 Summary

Table 6-5 summarises the Level 1 and Level 2 PVB and BCR values for the scheme. Level 2 benefits include Level 1 benefits plus the addition of wider economic impact benefits, user

benefits for non-modelled time periods, journey time reliability benefits and severance benefits.

Table 6-5 Summary of Level 1 & 2 Adjusted BCR Values

Scheme Option	Initial (Level 1)	Adjusted (Level 2)
PVB	171,446	236,742
BCR	0.704	0.973

This section of the report has presented the results of the economic appraisal undertaken on the scheme options. It has detailed the results of the TUBA, COBA-LT and other assessments undertaken, and outlined the benefits arising from these assessments to feed into the overall Appraisal Summary Table.

7 Summary & Conclusions

7.1 Overview of Findings

The Economic Appraisal has quantified the impacts of several elements of the scheme that can be monetised. The Appraisal shows that while there are significant user benefits, the scheme is marginally within the ‘Poor’ value for money category. However, based on recent research on HGV Values of Time which indicate higher values than in TAG, it is likely that the scheme BCR is within the ‘Low’ value for money category.

Appendix A. Public Accounts Tables

Core Growth

Public Accounts (PA) Table **£000**

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL		INFRASTRUCTURE			
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	0	*(7)*				
Central Government Funding: Transport						
Revenue	0					
Operating costs	0					
Investment Costs	243,422					
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	243,422	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	-6,985	*(9)*				
TOTALS						
Broad Transport Budget	243,422	*(10) = (7) + (8)*				
Wider Public Finances	-6,985	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Appendix B. Transport Economic Efficiency Tables

Core Growth

Economic Efficiency of the Transport System (TEE) (£000)

Non-business: Commuting	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	52,223		52,223			
Vehicle operating costs	-10,008		-10,008			
User charges	43		43			
During Construction & Maintenance	0		0			
NET NON-BUSINESS BENEFITS: COMMUTING	42,258	(1a)	42,258			

Non-business: Other	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	51,519		51,519			
Vehicle operating costs	-15,946		-15,946			
User charges	-74		-74			
During Construction & Maintenance	0		0			
NET NON-BUSINESS BENEFITS: OTHER	35,499	(1b)	35,499			

Business								
User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	80,443		23,328	57,115				
Vehicle operating costs	-12,344		-4,895	-7,449				
User charges	417		748	-331				
During Construction & Maintenance	0		0	0				
Subtotal	68,516	(2)	19,181	49,335				
Private sector provider impacts						Freight	Passengers	
Revenue	212							
Operating costs	0							
Investment costs	0							
Grant/subsidy	0							
Subtotal	212	(3)						
Other business impacts								
Developer contributions	0	(4)						
NET BUSINESS IMPACT	68,728	(5) = (2) + (3) + (4)						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	146,485	(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Appendix C. Analysis of Monetised Costs and Benefits

Analysis of Monetised Costs and Benefits Core Growth (£000)

Noise	0	*(12)*
Local Air Quality	365	*(13)*
Greenhouse Gases	-10,320	*(14)*
Journey Quality	0	*(15)*
Physical Activity	0	*(16)*
Accidents	27,931	*(17)*
Economic Efficiency: Consumer Users (Commuting)	42,258	*(1a)*
Economic Efficiency: Consumer Users (Other)	35,499	*(1b)*
Economic Efficiency: Business Users and Providers	68,728	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	6,985	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	171,446	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	243,422	*(10)*
Present Value of Costs (see notes) (PVC)	243,422	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	-71,976	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	0.704	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Appendix D. COBA-LT Tables

	Economic Summary 2010 values and prices		
	Accident Costs Without-Scheme (£000s)	Accident Costs With-Scheme (£000s)	Benefit of Scheme (£000s)
Total for all Years	282,021.4	254,090.0	27,931.4
2031	7,106.5	6,381.2	725.4
2046	5,527.2	4,966.7	560.5

	Accidents Summary (PIAs)		
	Accident Numbers Without-Scheme	Accident Numbers With-Scheme	Benefit of Scheme
Total for all Years	8367	7419	948
2031	136	120	16
2046	137	121	16

	Casualties Summary								
	Casualties Numbers Without-Scheme			Casualties Numbers With-Scheme			Benefit of Scheme		
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
Total for all Years	58	941	10362	56	858	9127	2	83	1235
2031	1	15	168	1	14	147	0.0	1	21
2046	1	15	170	1	14	149	0.0	1	21

Appendix E. Social Benefits

Distribution of Socio-Economic Indicators / Groups

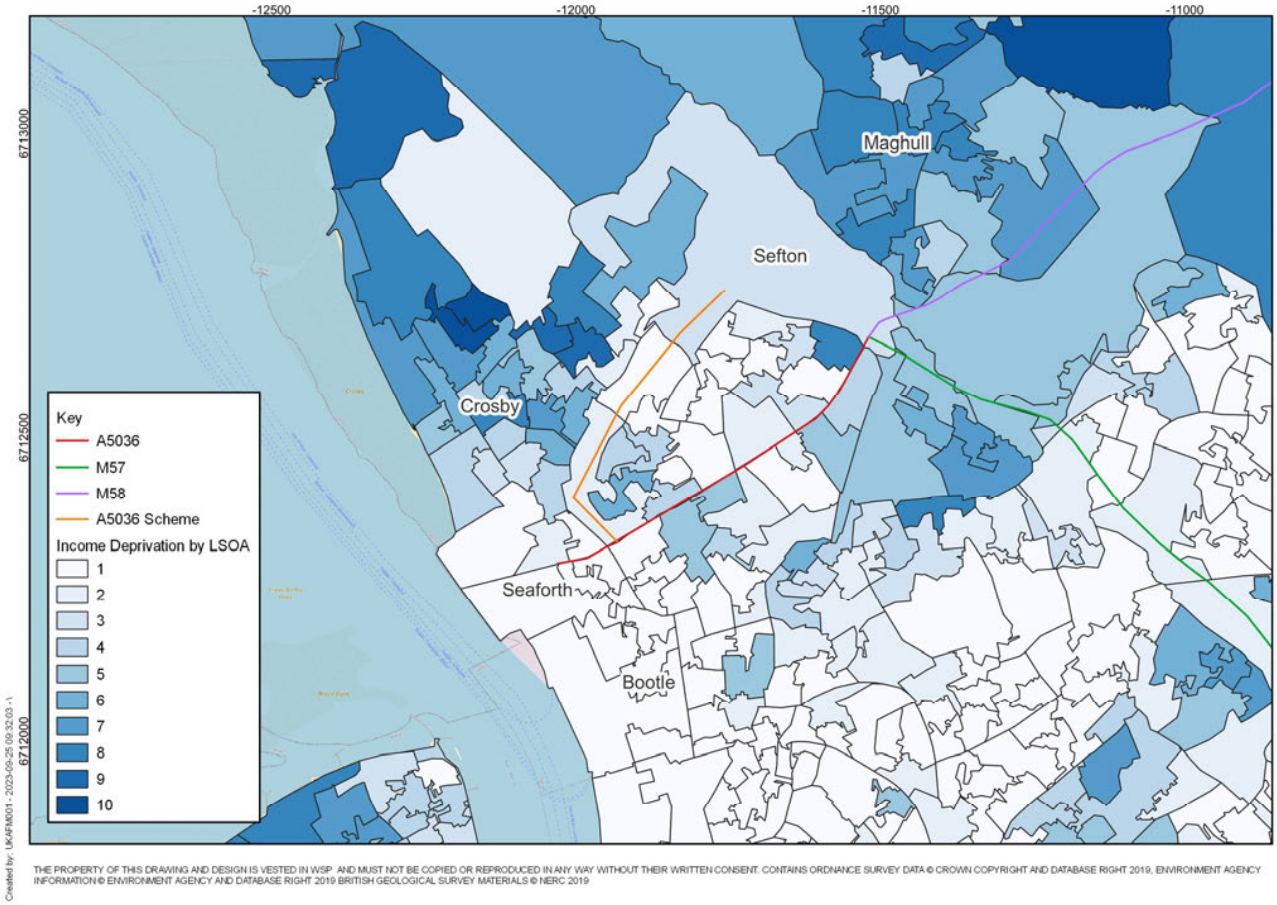
The distribution of socio-economic groups across the area near the scheme is indicated in this section. Census data for individual LSOAs in the study area provides the social indicators as shown below.

Income Distribution

Income deprivation is spatially dispersed throughout Merseyside and West Lancashire. The most deprived areas are concentrated mainly to the South of the A5036, near Bootle and Seaforth.

The new scheme road would go through areas with a high proportion of income deprivation.

Figure 0-1 Income Deprivation



Age and Gender Distribution

Proportion of Children

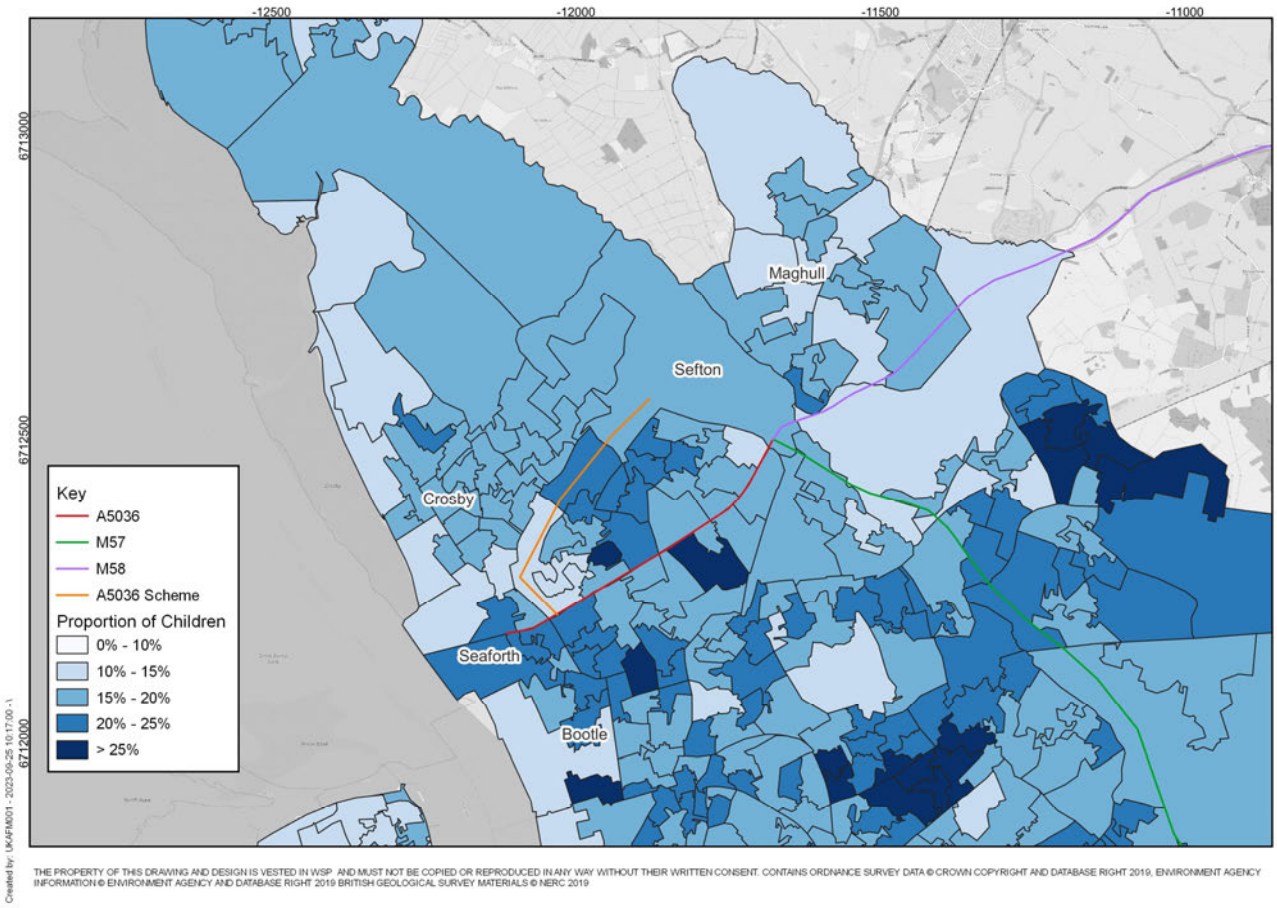
Children are defined as those under 16 as well as those under 18 and in full time education.

The areas with the highest proportion of children (>25%) are scattered in various areas, mainly Kirkby. There are also areas with high proportions of children to the North of the A5036, south of Rimrose Valley and around Seaforth.

Areas with the lowest proportion of children include areas around Maghull and along the Seafront.

The scheme runs through the darker blue areas to the north of the A5036, where proportions of children are high.

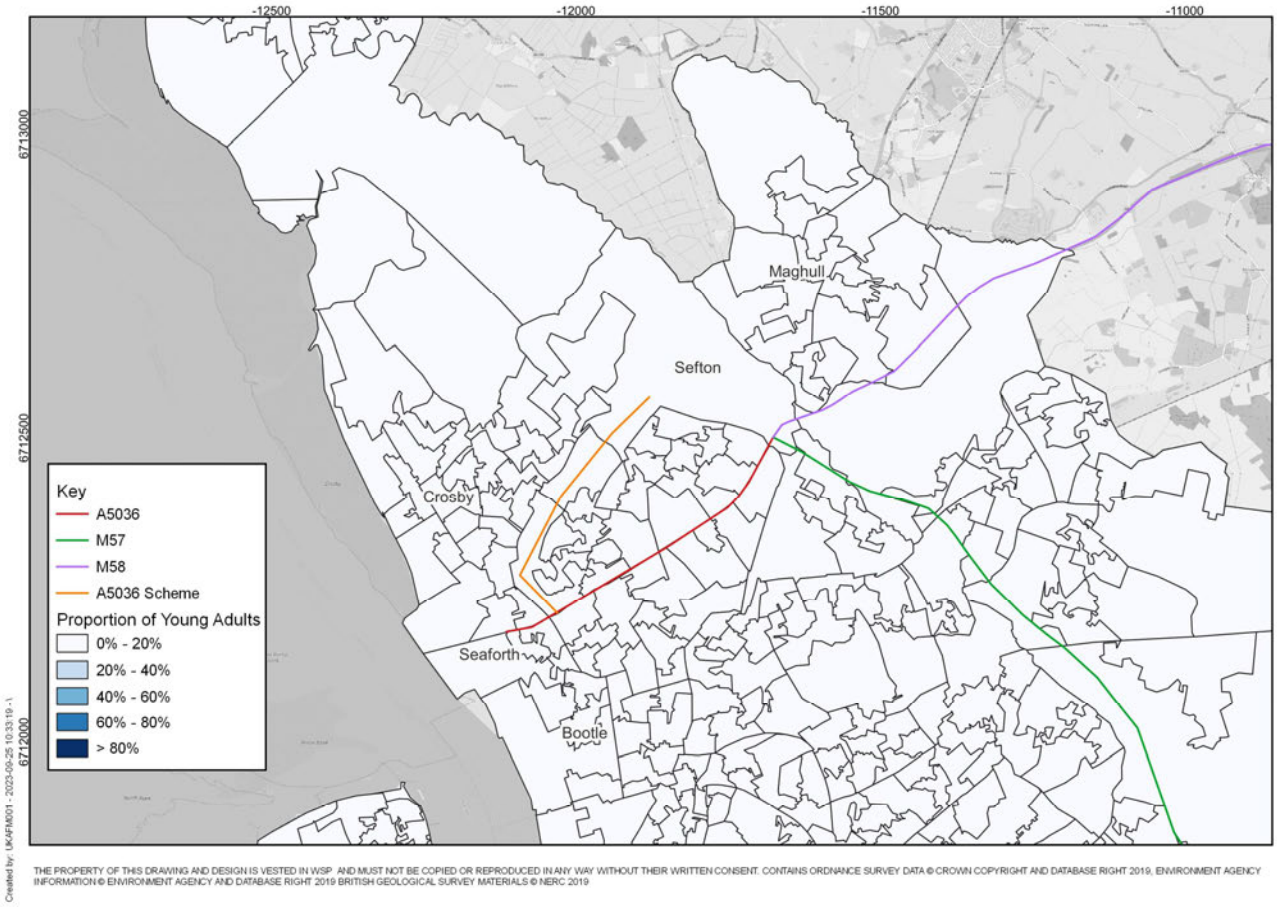
Figure 0-2 Proportion of Children



Proportion of Young Adults (ages 16 to 24)

Throughout the area surrounding the A5036, the proportion of young adults is under 20%.

Figure 0-3 Proportion of Young Adults (16-24)

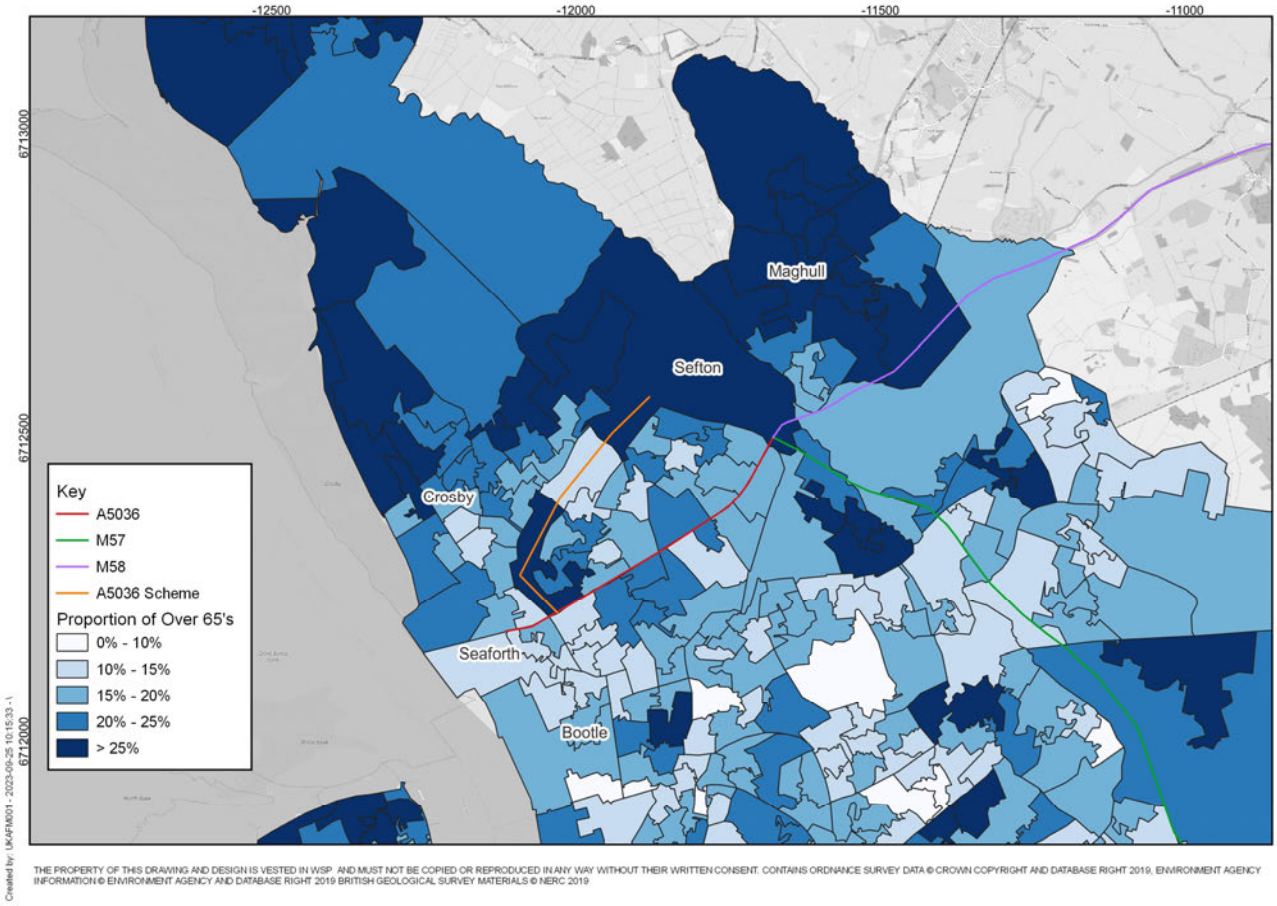


Proportion of People over 65

The highest proportions of people over 65 (25-50%) are located to the north of the A5036, mainly in Maghull.

The scheme mostly goes directly through LSOA's with a high proportion of people over 65. LSOA's along the A5036 have lower proportions of over 65's.

Figure 0-4 Proportion of People Over 65



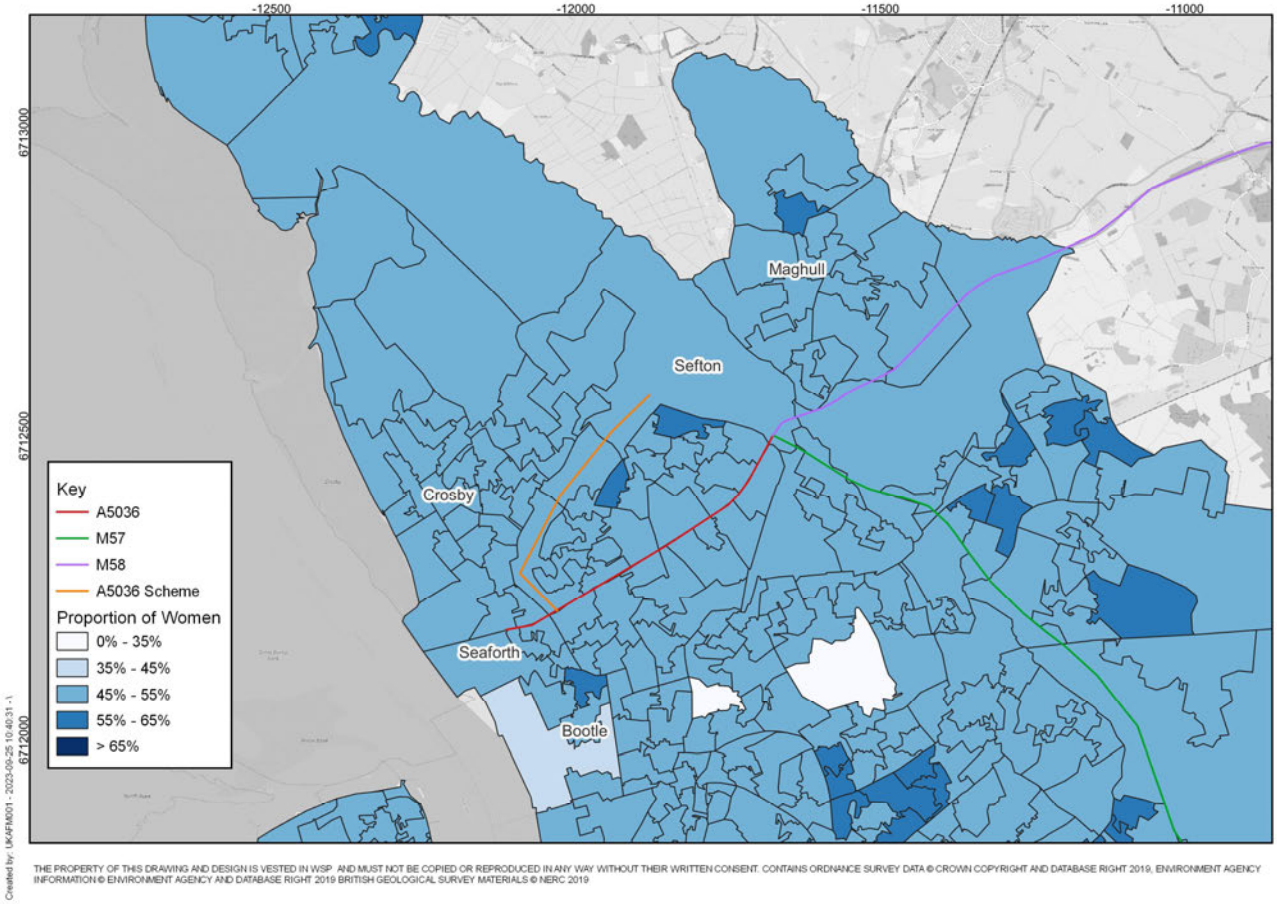
Proportion of Women

The proportion of women in Merseyside is between 45-55%, in line with national trends.

There are a small number of areas where the proportion of women is lower than the national average (35-45%), and a small number of areas where the proportion of women is higher than the average (55-65%), however there does not appear to be a pattern or concentration of areas where this is taking place, but rather these are dispersed across the district.

The scheme passes near a couple of areas that have a high proportion of women.

Figure 0-5 Proportion of Women

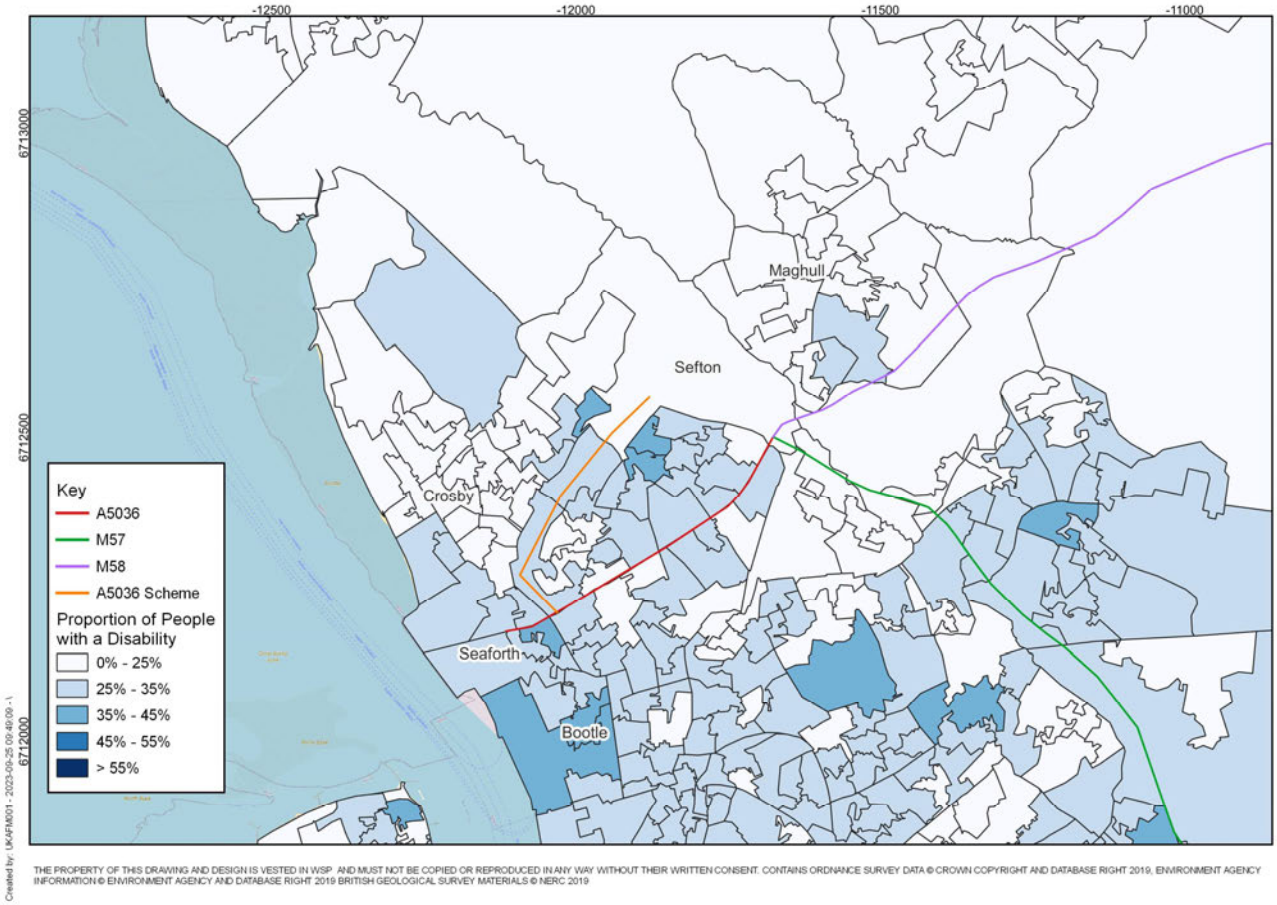


Disability

Overall, 0-35% of the population are disabled with a few LSOA areas having a higher proportion (35-45%).

The scheme is located near a couple of areas with a high proportion of people with a disability.

Figure 0-6 Proportion of People with a Disability

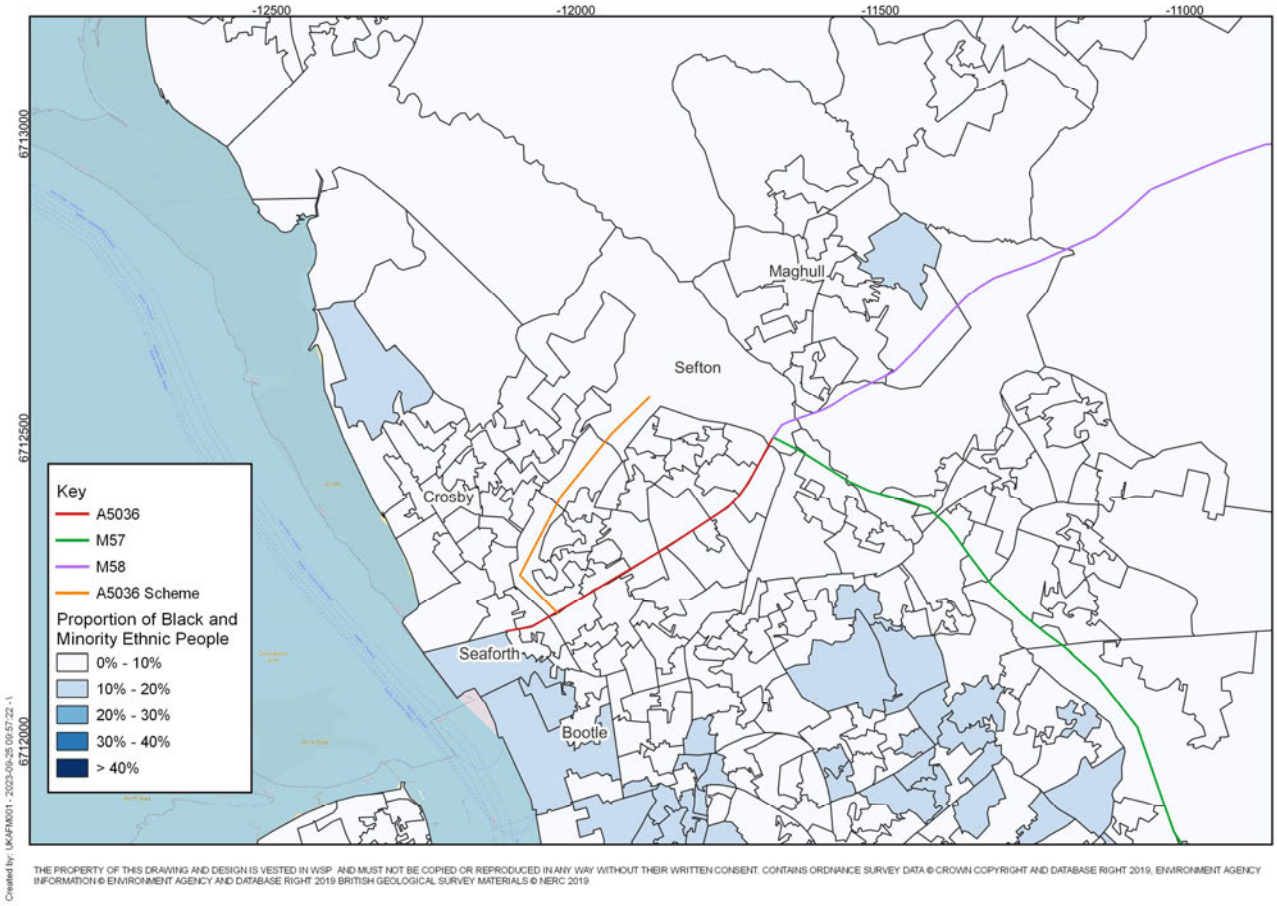


Ethnicity

The areas with a higher concentration of Black or Minority Ethnic (BME) people are located closer to the City Centre. Areas with a lower proportion of BME people are located in the suburbs and away from the City.

The scheme doesn't run through areas with a high proportion of BME people.

Figure 0-7 Proportion of Black and Minority Ethnic People



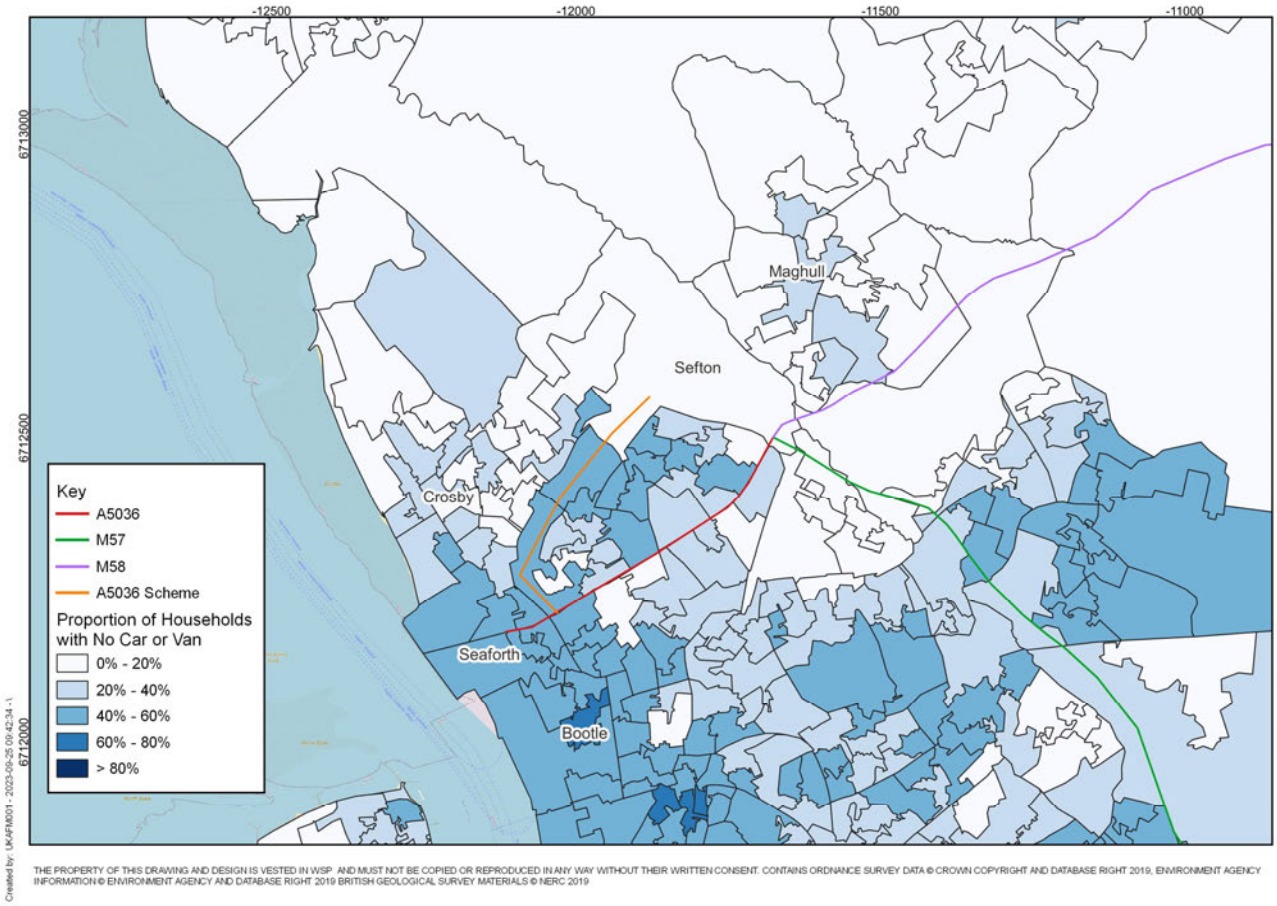
Access to a Car

The areas with the highest proportion of households with no cars or vans are located throughout the City, including on either side of the A5036.

Areas further out from Liverpool City Centre have a lower proportion of households with no cars of vans. North of the Scheme area most of the LSOA's are in the lowest proportion (0-20%).

The scheme runs through areas with 40-60% of households not owning cars or vans.

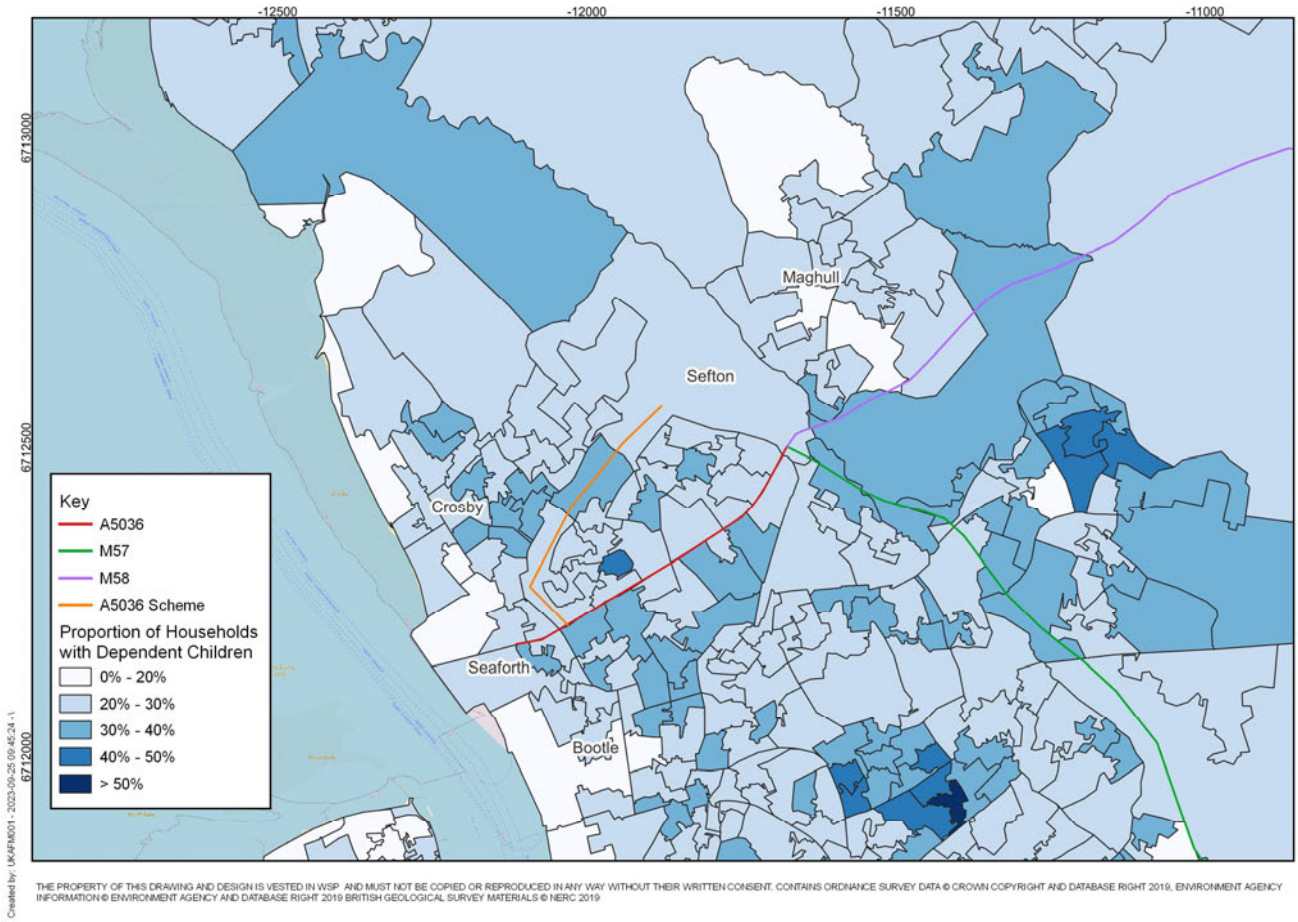
Figure 0-8 Proportion of No car or van households



Dependent Children

There are several areas near the A5036 and the new scheme with 30-40% of households having children.

Figure 0-9 Proportion of Households with Dependent Children



Datasets for Socio Demographic Analysis

Data	Source	Availability
Income	Index of Multiple Deprivation data, 2019 (LSOA level)	Free data available to downloads from https://www.gov.uk
Age	ONS, 2021 Mid-2020 Population Estimates by single year of age and sex (LSOA level)	Free data available to download from the National Statistics official labour market statistics website https://www.nomisweb.co.uk/
Disability	ONS, 2021 Disability by NS-SEC by age (LSOA level)	Free data available to download from the National Statistics official labour market statistics website https://www.nomisweb.co.uk/
Ethnicity	ONS, 2021 Ethnic group by religion (LSOA level)	Free data available to download from the National Statistics official labour market statistics website https://www.nomisweb.co.uk/
Car ownership	ONS, 2021 Car or van availability by household composition (LSOA level)	Free data available to download from the National Statistics official labour market statistics website https://www.nomisweb.co.uk/
Dependent children	ONS, 2021 Tenure by dependent children in household (LSOA level)	Free data available to download from the National Statistics official labour market statistics website https://www.nomisweb.co.uk/
Gender	ONS, 2021 Mid-2020 Population Estimates by single year of age and sex (LSOA level)	Free data available to download from the National Statistics official labour market statistics website https://www.nomisweb.co.uk/

Appendix F. Air Quality at Schools and Nurseries

Table F1 – Schools and Nurseries Opening Year Results

UPRN	Name	Address	Classification code*	NO_2 (µg/m³)				PM_{10} (µg/m³)			
				DM	DS	Change	Impact	DM	DS	Change	Impact
41090569	St. William Of York RC Primary School	ST WILLIAM ROAD, CROSBY, L23 9XH	CE03PS	9.6	9.92	0.32	Worsen	10.73	10.92	0.19	Worsen
41020675	St. Lukes Halsall C Of E Primary School	COOKS ROAD, CROSBY, L23 2TB	CE03PS	10.57	10.56	-0.01	Improve	10.21	10.22	0.01	Worsen
41236882	Jigsaw Primary Pupil Referral Unit	STANNYFIELD DRIVE, CROSBY, L23 1TY	CE07	9.83	10.1	0.27	Worsen	10.78	10.93	0.15	Worsen
41004246	St. Mary's Catholic Primary School	BACK LANE, LITTLE CROSBY, L23 4UA	CE03PS	8.29	8.3	0.01	Worsen	10.04	10.06	0.02	Worsen
41028512	Thornton College	EDGE LANE, CROSBY, L23 4TF	CE03	10.52	10.93	0.41	Worsen	10.9	11.11	0.21	Worsen
41028510	Newfield School	EDGE LANE, CROSBY, L23 4TG	CE06	10.26	10.72	0.46	Worsen	10.86	11.11	0.25	Worsen
41098886	Holy Family Catholic High School	VIRGINS LANE, THORNTON, L23 4UL	CE04SS	12.22	12.23	0.01	Worsen	11.11	11.14	0.03	Worsen
41020948	Site Of St Ambrose Barlow Catholic High School	COPY LANE, NETHERTON, L30 7PQ	CE04	12.25	12.3	0.05	Worsen	12.69	12.74	0.05	Worsen
41067100	-	NORTHWAY, MAGHULL, L31 5NF	CE01	15.03	14.81	-0.22	Improve	11.76	11.69	-0.07	Improve
41025145	St. Andrews Maghull C Of E Primary School	DEYES LANE, MAGHULL, L31 6DE	CE03PS	12.44	12.39	-0.05	Improve	11.38	11.35	-0.03	Improve

UPRN	Name	Address	Classification code*	NO_2 (µg/m³) DM	DS	Change	Impact	PM_{10} (µg/m³) DM	DS	Change	Impact
41024420	St. Georges Catholic Primary School	DENNETT CLOSE, MAGHULL, L31 5PD	CE03PS	12.15	12.1	-0.05	Improve	11.24	11.22	-0.02	Improve
41228816	St Andrews C Of E Church	DAMFIELD LANE, MAGHULL, L31 6DD	CE02	12.95	12.86	-0.09	Improve	11.47	11.43	-0.04	Improve
41025141	Deyes High School	DEYES LANE, MAGHULL, L31 6DE	CE04SS	11.27	11.25	-0.02	Improve	11.11	11.09	-0.02	Improve
41067030	Bumbles Nursery	NORTHWAY, MAGHULL, L31 7BG	CE02	20	19.52	-0.48	Improve	14.55	14.4	-0.15	Improve
41054801	Royal Mail	LIVERPOOL ROAD NORTH, MAGHULL, L31 1AA	CE01	15.13	15.12	-0.01	Improve	11.98	11.95	-0.03	Improve
41237049	Manna Day Centre	SEFTON LANE, MAGHULL, L31 8BT	CE06	11.77	11.88	0.11	Worsen	10.78	10.86	0.08	Worsen
38057764	Kirkdale St. Lawrence Community Primary School	FONTHILL ROAD, LIVERPOOL, L4 1QD	CE03	17.3	17.29	-0.01	Improve	12.55	12.55	0	No Change
41226285	Our Lady Of Walsingham Primary School	STAND PARK AVENUE, NETHERTON, L30 3SU	CE03	15.55	14.98	-0.57	Improve	12.67	12.38	-0.29	Improve
41090916	Our Lady Of Walsingham Primary School	STAND PARK AVENUE, NETHERTON, L30 3SA	CE03PS	15.6	15.02	-0.58	Improve	12.68	12.39	-0.29	Improve
41220217	Total Fitness	NORTHERN PERIMETER ROAD, NETHERTON, L30 7PT	CE02	25.93	23.41	-2.52	Improve	14.79	14.23	-0.56	Improve
41010308	Hillside High School	BREEZE HILL, BOOTLE, L20 9NU	CE04SS	17.79	17.74	-0.05	Improve	13.63	13.6	-0.03	Improve

UPRN	Name	Address	Classification code*	NO_2 (µg/m³) DM	DS	Change	Impact	PM_{10} (µg/m³) DM	DS	Change	Impact
41072853	Netherton Family Well Being	MAGDALENE SQUARE, NETHERTON, L30 5QH	CE02	13.96	13.68	-0.28	Improve	11.73	11.63	-0.1	Improve
41093774	Netherton Moss Primary School	SWIFTS LANE, NETHERTON, L30 3RU	CE03PS	12.58	12.41	-0.17	Improve	11.47	11.39	-0.08	Improve
41090873	Our Lady Of Walsingham R C Infants School	STAND PARK AVENUE, NETHERTON, L30 3SA	CE03	18.1	17.02	-1.08	Improve	13.16	12.67	-0.49	Improve
41017480	Netherton Park Primary School	CHESTER AVENUE, NETHERTON, L30 1QW	CE03	15.65	14.98	-0.67	Improve	12.7	12.35	-0.35	Improve
41109242	St. Monicas Catholic Primary School	KELLY DRIVE, BOOTLE, L20 9EB	CE03PS	17.6	17.48	-0.12	Improve	13.64	13.59	-0.05	Improve
41079013	St. Oswalds C Of E Primary School	RONALD ROSS AVENUE, NETHERTON, L30 5RH	CE03PS	12.99	12.81	-0.18	Improve	11.55	11.45	-0.1	Improve
41065834	Savio Salesian College	NETHERTON WAY, BOOTLE, L30 2NA	CE04	13.39	13.19	-0.2	Improve	12.26	12.16	-0.1	Improve
41011040	Early Learners Day Nursery	BRIDLE ROAD, NETHERTON, L30 4XR	CE02	20.87	20.58	-0.29	Improve	13.23	13.12	-0.11	Improve
41027150	Sefton New Directions	PARK LANE, NETHERTON, L30 1RW	CE	17.2	16.27	-0.93	Improve	12.95	12.54	-0.41	Improve
41128002	Thomas Gray Primary School	SALISBURY ROAD, BOOTLE, L20 4LW	CE03	19.58	19.67	0.09	Worsen	11.82	11.87	0.05	Worsen
41001975	Hatton Hill Primary School	ALWYN AVENUE, LITHERLAND, L21 9NZ	CE03PS	11.8	11.77	-0.03	Improve	11.44	11.44	0	No Change

UPRN	Name	Address	Classification code*	NO_2 (µg/m³)				PM_{10} (µg/m³)			
				DM	DS	Change	Impact	DM	DS	Change	Impact
41014448	Sefton Council Parenting Team	CAMBRIDGE ROAD, SEAFORTH, L21 1EZ	CE01	15.05	15.44	0.39	Worsen	11.33	11.56	0.23	Worsen
41064698	The Wendy House Day Nursery	MOSS LANE, LITHERLAND, L21 7NW	CE02	16.35	15.32	-1.03	Improve	12.28	11.92	-0.36	Improve
41045895	Treetops Nursery	IRLAM ROAD, BOOTLE, L20 4AL	CE02	22.07	22.3	0.23	Worsen	12.22	12.31	0.09	Worsen
41072512	St. Elizabeths Primary School	PENNINGTON ROAD, LITHERLAND, L21 8JH	CE03JS	15.75	15.75	0	No Change	12.89	12.89	0	No Change
41001207	Home From Home Day Nursery	ALEXANDRA ROAD, WATERLOO, L22 1RJ	CE02	16.98	17.06	0.08	Worsen	11.69	11.75	0.06	Worsen
41074380	Holy Spirit RC Primary School	POULSOM DRIVE, NETHERTON, L30 2NR	CE03PS	12.38	12.08	-0.3	Improve	11.21	11.08	-0.13	Improve
41053671	Merchant Taylors School For Girls	LIVERPOOL ROAD, CROSBY, L23 5SP	CE07	11.43	11.42	-0.01	Improve	10.85	10.86	0.01	Worsen
41208253	Early Days UK	LINACRE ROAD, LITHERLAND, L21 8NJ	CE02	18.26	18.25	-0.01	Improve	13.63	13.55	-0.08	Improve
41209246	Springwell Park Primary	MENAI ROAD, BOOTLE, L20 6PG	CE03	14.84	14.74	-0.1	Improve	12.72	12.67	-0.05	Improve
41018485	St. Philips (Controlled) C Of E Primary School	CHURCH ROAD, LITHERLAND, L21 8NZ	CE03PS	16.45	15.57	-0.88	Improve	13.13	12.6	-0.53	Improve
41098353	-	VICTORIA ROAD, WATERLOO, L22 1RP	CE02	15.48	15.57	0.09	Worsen	11.4	11.47	0.07	Worsen

UPRN	Name	Address	Classification code*	NO_2 (µg/m³) DM	DS	Change	Impact	PM_{10} (µg/m³) DM	DS	Change	Impact
41106067	Greenacre Nursery School	PROVINCE PLACE, BOOTLE, L20 6PJ	CE02	16.34	16.29	-0.05	Improve	12.99	12.97	-0.02	Improve
41015144	Seaforth Family Wellbeing Centre	CARADOC ROAD, SEAFORTH, L21 4NB	CE02	24.74	24.87	0.13	Worsen	12.26	12.35	0.09	Worsen
41069608	Site Of St Wilfrids Catholic High School	ORRELL ROAD, LITHERLAND, L21 8QT	CE04	15.14	14.84	-0.3	Improve	12.77	12.62	-0.15	Improve
41053615	Merchant Taylors Girls Junior & Mixed Infants School	LIVERPOOL ROAD, CROSBY, L23 5TH	CE04	11.86	11.84	-0.02	Improve	10.94	10.94	0	No Change
41053667	Merchant Taylors Boys School	LIVERPOOL ROAD, CROSBY, L23 0QP	CE07	12.19	12.19	0	No Change	10.94	10.97	0.03	Worsen
41053617	Gingerbread House Pre School Ltd	LIVERPOOL ROAD, CROSBY, L23 5TE	CE02	12.34	12.28	-0.06	Improve	11.03	11.03	0	No Change
41053670	Olsen House School	LIVERPOOL ROAD, CROSBY, L23 5TD	CE06	12.6	12.5	-0.1	Improve	11.06	11.05	-0.01	Improve
41032532	Forefield Community Infant & Nursery School	FOREFIELD LANE, CROSBY, L23 9SL	CE03	10.54	10.63	0.09	Worsen	10.58	10.66	0.08	Worsen
41023446	Impact Pupil Referral Unit	DALE ACRE DRIVE, NETHERTON, L30 2QQ	CE07	11.1	11.1	0	No Change	10.97	10.98	0.01	Worsen

UPRN	Name	Address	Classification code*	NO_2 (µg/m³) DM	DS	Change	Impact	PM_{10} (µg/m³) DM	DS	Change	Impact
41053668	Sacred Heart Catholic College	LIVERPOOL ROAD, CROSBY, L23 5TF	CE04SS	10.71	10.78	0.07	Worsen	10.72	10.77	0.05	Worsen
41217067	All Saints Catholic Primary School	CHESNUT GROVE, BOOTLE, L20 4LX	CE03PS	19.59	19.68	0.09	Worsen	11.83	11.87	0.04	Worsen
41083111	English Martyrs Primary School	SCHOOL LANE, LITHERLAND, L21 7LX	CE03PS	18.06	17.22	-0.84	Improve	13.5	13.13	-0.37	Improve
41022373	Waterloo Primary School	CROSBY ROAD NORTH, WATERLOO, L22 0LD	CE03PS	14.94	14.88	-0.06	Improve	11.6	11.61	0.01	Worsen
41064699	Litherland Moss Primary School	MOSS LANE, LITHERLAND, L21 7NW	CE03PS	14.26	13.72	-0.54	Improve	11.89	11.66	-0.23	Improve
41217014	Rowan Park School	STERRIX LANE, LITHERLAND, L21 0DB	CE06	13.78	13.38	-0.4	Improve	11.81	11.64	-0.17	Improve
41215857	South Sefton College	STERRIX LANE, LITHERLAND, L30 2DB	CE01FE	12.84	12.64	-0.2	Improve	11.62	11.52	-0.1	Improve
41072321	-	PENDLE DRIVE, LITHERLAND, L21 0HY	CE	12.28	12.24	-0.04	Improve	11.19	11.21	0.02	Worsen
41023455	Daleacre Primary School	DALE ACRE DRIVE, NETHERTON, L30 2QQ	CE03	11.13	11.11	-0.02	Improve	10.97	10.98	0.01	Worsen
41039938	St. Robert Bellarmine RC Primary School	HARRIS DRIVE, BOOTLE, L20 6ED	CE03PS	15.4	15.22	-0.18	Improve	12.83	12.74	-0.09	Improve

UPRN	Name	Address	Classification code*	NO_2 (µg/m³) DM	DS	Change	Impact	PM_{10} (µg/m³) DM	DS	Change	Impact
41030439	St. Marys College	EVEREST ROAD, CROSBY, L23 5TW	CE07	10.94	10.96	0.02	Worsen	10.76	10.79	0.03	Worsen
41065451	Sacred Heart Catholic College Lower	MYERS ROAD EAST, CROSBY, L23 0QU	CE04	10.69	10.8	0.11	Worsen	10.7	10.78	0.08	Worsen
41022374	Crosby Road North Infant School	CROSBY ROAD NORTH, WATERLOO, L22 0LD	CE03	14.87	14.81	-0.06	Improve	11.59	11.6	0.01	Worsen
41228641	Litherland Moss Primary School	MOSS LANE, LITHERLAND, L21 7NW	CE03	15	14.33	-0.67	Improve	12.03	11.75	-0.28	Improve
41032172	Our Lady Queen Of Peace RC Primary School	FORD CLOSE, LITHERLAND, L21 0EP	CE03PS	11.64	11.71	0.07	Worsen	11.41	11.47	0.06	Worsen
41214952	Rimrose Hope Primary School	SANDY ROAD, SEAFORTH, L21 1AD	CE03PS	18.16	19.71	1.55	Worsen	13.62	14.04	0.42	Worsen
41095993	Linacre Primary School	THORNTON ROAD, BOOTLE, L20 5ED	CE03PS	17.54	17.52	-0.02	Improve	13.22	13.22	0	No Change
41050166	Lander Road Primary School	PENNINGTON ROAD, LITHERLAND, L21 8HY	CE03PS	15.79	15.86	0.07	Worsen	12.9	12.93	0.03	Worsen
41098906	-	VOGAN AVENUE, CROSBY, L23 0SG	CE	9.92	10.26	0.34	Worsen	10.46	10.69	0.23	Worsen
41015146	Sand Dunes Nursery School	CARADOC ROAD, SEAFORTH, L21 4NB	CE02	24.65	24.77	0.12	Worsen	12.25	12.34	0.09	Worsen

UPRN	Name	Address	Classification code*	NO_2 (µg/m^3)				PM_{10} (µg/m^3)			
				DM	DS	Change	Impact	DM	DS	Change	Impact
41032533	Forefield Junior School	FOREFIELD LANE, CROSBY, L23 9TJ	CE03JS	10.81	10.8	-0.01	Improve	10.64	10.67	0.03	Worsen

*Where CE = Commercial Education
RC = Roman Catholic
C of E = Church of England
Rounded to 2d.p.

Appendix G. Appraisal Summary Table

Appraisal Summary Table

Date produced:	05/10/2023	**Contact:**	
Name of scheme:	A5036 Port of Liverpool	**Name**	
Description of scheme:	Off line dual carriageway connecting Princess Way roundabout to Brooms Cross Road, with accompanying grade seperated junction on Brooms Cross Road and improvements ot Switch Island, Brooms Cross Road, the Princess Way roundabout and the Princess Way/A565 road Roundabout at the Port.	**Organisation**	National Highways
		Role	Promoter/Official
Scenario:	Core		

Impacts		Summary of key impacts	Assessment: Quantitative	Assessment: Qualitative	Assessment: Monetary £(NPV)	Assessment: Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The additional capacity will provide journey time benefits especially during the peak periods. However there will be an increase in vehicle operating costs due to higher running speeds. - 47% of TEE benefit is due to changes in business journey times and vehicle operating costs. - In the opening year AM peak, there is a saving of 4 to 4 & 1/2 minutes in both directions. - In the opening year PM peak, there is a saving of 4 to 4 & 1/2 minutes in both directions. - In the opening year inter peak, savings are approximately 3 to 4 minutes in both directions.	Value of journey time changes(£): 80,443,000 Net journey time changes (£) 0 to 2min: 27,472,000 2 to 5min: 50,777,000 > 5min: 2,194,000	Major Beneficial	68,728,000	There are user benefits for all income quintiles but the biggest benefit is to the richest quintile. The other 4 quintiles experience a similar benefit.
	Reliability impact on Business users	Reliability is improved due to the scheme, with the extra capacity reducing unexpected delays.	-	N/A	5,483,000	
	Regeneration	Not assessed	-	N/A	N/A	
	Wider Impacts	Significant Wider Impacts are expected for the scheme, largely due to improved agglomoration.	Agglomoration Impacts £41,359,000, Output change in imperfectly competitive market, £7,655,000, Tax Revenues from labour market impacts will reduce by £671,000.	N/A	49,685,000	
Environmental	Noise	The basic noise level (BNL) has been calculated for the do-minimum and the do-something opening year. The road links resulting in a BNL change of >+/- 3 dB are shown here. Road Name BNL Change (+/- dB) A5758+5.7 B5407+4.2 St Bernards Drive+3.3 Seaforth Road +3.2 St Bernards Drive+3.2 Ormskirk Road-A59 South +3.2 Church Road - Bridge Road (roundabout link) +3.2 Dartmouth Drive +3.1 Runnels Lane +3.0 North Perimeter Road -3.0 Ormskirk Road-A59 North-3.0 Ormskirk Road-A59 North-3.1 Almod's Turn-3.2 Swift's Lane -3.2 A5036 (Dunnings Bridge Road roundabout link) -3.2 Church Road - Bridge Road (roundabout link) -3.3 M57 - A5758 -3.4 M58 - A5036-3.4 A5036 (Dunnings Bridge Road)Ranging between -3.6 and -9.5	Total of nine roads that are predicted to have a >+3 dB BNL change. Total of ten roads that are predicted to have a >-3 dB BNL change.		N/A	
	Air Quality	Regionally, the change in emissions of NOx is 1.46 tonnes (0.44%) in the opening year (2031) for the proposed scheme relative to the Do-Minimum scenario. The change in emissions of PM10 is 0.77 tonnes (1.0%) in the opening year (2031) for the proposed scheme relative to the Do-Minimum scenario. For local air quality, the concentrations of NO2 are predicted to decrease at 17,563 (53%) of the 33,037 identified sensitive receptors and increase at 14,832 (45%). Similarly, concentrations of PM2.5 (as PM10) are predicted to decrease at 16,350 receptors (49%) and increase at 15,527 (47%). This represents a net improvement in local air quality over the appraisal period.	NO2 score: -1,570 PM2.5 score: -237			
	Greenhouse gases (Operational User Emissions)	Change in CO2 equivalent emissions over 60 year appraisal period (tonnes): 146,922 Of which traded: 4217 Change in CO2 equivalent emissions in opening year (tonnes): 3,996 Net present value of traded sector CO2 equivalent emissions of proposal (£): -£349,793 (net loss)	Change in non-traded carbon over 60y (CO2e): 142,926 Change in traded carbon over 60y (CO2e): 3,996	Major Adverse	-10,320,000	
	Greenhouse gases (carbon assessment)	Only the Greenhouse gases (Operational User Emissions) are considered as part of the TAG appraisals (described in the row above). The full carbon assessment sits outside of the TAG appraisals however for transparency the carbon assessment is discussed below. More detail on the carbon assessment can be found in the National Highways Carbon Management Report PCF Product, aligned to the Proposed Scheme. The carbon assessment has been undertaken for Preferred Option: Jan 2022. The carbon assessment is aligned to DMRB LA 114 and was undertaken using National Highways Carbon Tool v2.3, which utilises 2020 emission factors. A cost contingency uplift factor based on the scheme cost with risk/without risk has been applied to the construction stage emissions. The cost contingency uplift factor applied to construction carbon is: 1.061. The whole life carbon assessment stages evaluated in the carbon assessment include: -Construction Stage: Construction Materials -Construction Stage: Construction Transport -Operation Stage: User Emissions It should be noted construction plant (including land use change and waste disposal) was not included in the assessment of Construction Stage Greenhouse Gas Emissions for the Proposed Scheme along with other emission sources in the Operation and End of Life Stage.	he Construction Stage, Construction Materials Greenhouse Gas Emissions from the Proposed Scheme: 105,411 tCO2e. The Construction Stage, Materials Transport Greenhouse Gas Emissions from the Proposed Scheme: 11,164 tCO2e. The Operations Stage, User Greenhouse Gas Emissions from the Proposed Scheme: 146,922 tCO2e.	Adverse	N/A	
	Landscape	The Proposed Scheme is expected to introduce adverse effects on the following local landscape character areas within the study area: - Rimrose Valley; and - Sefton Agricultural Farmland The introduction of the Proposed Scheme within the Rimrose Valley landscape between Crosby and Litherland to the north of Liverpool is expected to result in significant adverse effects on the local landscape by severing the green corridor between the two residential developments. There would be a substantial disruption to the pattern, tranquillity and land cover within the Rimrose Valley and the cultural perception of the landscape would be impacted through a change in the setting of the landscape and how the local community use the green corridor. Impacts could be partially mitigated through an effective planting strategy and remodelling of the Rimrose Valley Country Park. The severance and introduction of a road corridor through the green space would result in a significant long-term change. The effects on the agricultural farmland to the north of Crosby and Litherland and to the west of the M57 and M58 are expected to introduce non-significant adverse effects into the local landscape through the introduction of a new road. Minimal effects on the landscape are anticipated through the A5758 online section of the Proposed Scheme to the west of 'Switch' Island. Long-term adverse effects on the pattern, tranquillity, culture and land cover are only anticipated through the offline section of the Proposed Scheme as it deviates south from the A5758 and travels south towards the Rimrose Valley Country Park.		Rimrose Valley - Major adverse Sefton Agricultural Farmland - slight adverse		

	Impacts	Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary	Distributional
					£(NPV)	7-pt scale/ vulnerable grp
	Townscape	The Proposed Scheme is expected to have no adverse effects on the following local townscape character areas within the study area: - Docks Mixed Development; - Crosby Suburban; and - Litherland Suburban The introduction of a small proportion of the Proposed Scheme within the Docks Mixed Development townscape area connecting Princess Way with the A565 adjacent to Seaforth is expected to result in no adverse effects on the local townscape as there would be no perceptible change to the fabric of the townscape. The Proposed Scheme would have no direct impact on the Crosby Suburban townscape character as it passes through the adjacent Rimrose Valley Country Park. Changes with the adjacent Rimrose Valley and Sefton Agricultural Farmland LCA's would not alter the perception of the townscape as intermittent views of the Proposed Scheme and associated mitigation proposals would only be afforded from the urban edge of Great Crosby, Moor Park and Thornton. There may be a potential benefit to Human Interaction through improved connectivity to the adjacent Rimrose Valley as part of mitigation proposals. The Proposed Scheme would also have no direct impact on the Litherland Suburban townscape character as it passes through the adjacent Rimrose Valley Country Park. Changes with the adjacent Rimrose Valley and Sefton Agricultural Farmland LCA's would not alter the perception of the townscape as intermittent views to the Proposed Scheme and associated mitigation proposals would only be afforded from the urban edge of Seaforth, Litherland, Ford, Netherton and Bootle. There may be a potential benefit to Human Interaction through improved connectivity to the adjacent Rimrose Valley as part of mitigation proposals. The overall impact of the Proposed Scheme on the two Suburban townscapes and the Docks Mixed Development townscape, following landscape mitigation proposals, would be Neutral.		Docks Mixed Development - neutral Crosby Suburban - neutral Litherland Suburban - neutral		
	Historic Environment	There is one Scheduled Monument within 500m of the Proposed Scheme known as the Sefton Old Hall moated site and fish pond. It is likely that there could be permanent changes to its setting during the operation of the scheme. This would produce a slight adverse effect. Edge Farmhouse (NHLE: 1343290), Tan House Farmhouse (NHLE 1343281) and Orchard Farmhouse (NHLE 1199864) are Grade II listed heritage assets of medium heritage value. There would be a moderate adverse impact to the setting of these heritage assets during the construction phase and operation phase of the Proposed Scheme. There would be no impact on the Sefton Village, Waterloo Park and Christ Church Conservation Areas. Fifteen known non-designated heritage assets would have a moderate adverse effect. This could be reduced with mitigation, by preservation by record.		Scheduled Monuments – slight adverse Listed Buildings – moderate adverse Conservation Areas – neutral Non-designated assets – moderate adverse		
	Biodiversity	The Study Area encompasses the entirity of Rimrose Valley Country park including Rimrose Valley and Leeds - Liverpool Canal SLBI and Brookvale LNR with impacts to existing semi-natural habitats anticipated and fragmentation affects within those sites. The Proposed Scheme is considered to be of Very Large adverse impact to biodiversity at a local level without appropriate mitigation. The A5036 POL PCF3 RPS Conceptual master plan highlights areas of retained habitat, which includes the majority of the priority deciduous woodland and grassland within Rimrose Country Park. However, habitat loss is anticipated impacting all habitat types. Extensive compensation habitat is proposed within the northern section of the Proposed Scheme including wetland (ponds and associated marginal vegetation) and woodland areas. Additional ponds will be created within Rimrose Country Park to increase the high ecological value wetland habitat present within the Study Area of the Proposed Scheme post construction. Numerous green bridges are proposed to provide connectivity for species to either side of the road within areas of semi-natural habitat to reduce the impacts of fragmentation. However, further ecological survey is recommended to comprehensively record habitats within the Proposed Scheme to provide further information with regards to compensation and mitigation requirements for the detailed design stage. A number of species listed within the WebTAG require further survey to confirm presence/absence and the ecological value of species within the area to further influence mitigation and compensation requirements to reduce the impacts of the Proposed Scheme on populations. It has been assumed that the drainage design for the Scheme will ensure no changes to the hydrology/ground water will impact habitats or species, water run off from the road will not enter directly in to Rimrose Brook and therefore features/attributes will not be negatively impacted from increased pollutants/nitrates.		Very large adverse – further survey and proposed mitigation may reduce magnitude of impact.		
	Water Environment	Review of the Environment Agency's online maps for flood risk indicate that the vast majority of the Proposed Scheme is shown to be located in Flood Zone 1. Intermittent areas of the Proposed		Low significance		
Social	Commuting and Other users	The additional capacity will provide journey time benefits especially during the peak periods. However there will be an increase in vehicle operating costs due to higher running speeds. - 53% of TEE benefit is due to changes in consumer journey times and vehicle operating costs. - In the opening year AM peak, there is a saving of 4 to 4 & 1/2 minutes in both directions. - In the opening year PM peak, there is a saving of 4 to 4 & 1/2 minutes in both directions. - In the opening year inter peak, savings are approximately 3 to 4 minutes in both directions.	Value of journey time changes(£): 103,742,000 Net journey time changes (£) 0 to 2min: 52,894,000 2 to 5min: 49,117,000 > 5min: 1,730,000	Major Beneficial	77,757,000	There are user benefits for all income quintiles but the biggest benefit is to the richest quintile. The other quintiles experience a similar benefit.
	Reliability impact on Commuting and Other users	Reliability is improved due to the scheme, with the extra capacity reducing unexpected delays.	-	N/A	8,980,000	
	Physical activity	Not assessed	-	Neutral	N/A	
	Journey quality	Not Assessed. It is expected that the scheme will reduce traveller frustration due to increased speeds and smaller queues. Furthermore the fear of accidents is likely to reduce.	-	Moderate Beneficial	N/A	
	Accidents	The scheme is expected to prevent a significant number of accidents, including 2 fatalities, during the 60 year appraisal period.	948 accidents saved (2 fatalities, 83 serious injuries and 1235 slight injuries saved)	Major Beneficial	27,931,000	There is a reduction in accidents due to the increased safety of dualled carriageways.Tthere is also a reduction as less traffic passes through the numerous junctions on the existing A5036 and other roads.
	Security	The scheme is not expected to have a significant impact on security.	-	Neutral	N/A	N/A
	Access to services	The scheme is unlikely to have a significant impact on access to public transport and therefore little impact on access to services.	-	Neutral	N/A	N/A
	Affordability	There is a reduction in affordability due to an increase in vehicle operating costs.	-	Slight Adverse	included within user benefits	The scheme provides adverse affordability impacts across all income groups, with the highest income quintile disproportionately affected.
	Severance	A reduction in traffic on the existing A5036 road will make crossing the road for pedestrians quicker and easier. There are several crossing points along the road.	-	Moderate Beneficial	466,000	N/A
	Option and non-use values	Not assessed	-	-	-	
Public Accoun	Cost to Broad Transport Budget	The scheme cost includes construction, preparation, supervision and land costs. Historic costs and Portfolio Risk are excluded. The Pmean PVC value has been used.	-	-	243,422,000	
	Indirect Tax Revenues	There is an increase in indirect tax revenue due to increased fuel consumption caused by increased speeds.	-	-	6,985,000	