M55 Heyhouses Link Road

Lancashire County Council

Traffic Modelling and Economic Appraisal Report

February 2019

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M55 Heyhouses Link Road

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5	03/11/17	Updated to address Assurer's comments	MR	PH	PH
6	21/02/2019	Updated to reflect the latest scheme cost estimates	MR	PH	PH

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1 Introduction

1.1 Introduction

Jacobs were commissioned by Lancashire County Council (LCC) to produce a Strategic Outline Business Case (SOBC) for the proposed M55 Heyhouses Link Road Scheme. To inform the Economic Case of the scheme Jacobs undertook economic appraisal based on the results of proportionate traffic modelling and forecasting in line with the methodology agreed in the Appraisal Specification Report (ASR, June 2016).

Whilst Benefit Cost Ratio (BCR) is the traditional approach to assessing the merit of transport schemes, GVA analysis was also undertaken to complement standard transport appraisals.

The wider economic impacts of the proposed transport schemes are particularly important to understand in terms of the potential benefits for the locality, and in the context of supporting the Growth Deal Funding and Highways England Growth and Housing Fund bids for the scheme as well as the Government's economic growth agenda.

1.2 Purpose of the Report

This report documents the methodology and findings of the economic assessment of the proposed M55 Heyhouses Link Road Scheme. It also reports the methodology and assumptions used in proportionate traffic modelling and forecasting which informed calculation of the scheme transport user benefits.

1.3 Overview of Scheme

The B5410 provides a link between Lytham St Annes to the south and the A583 Preston New Road to the north, the latter forming a grade separated junction with the M55 and thus a connection to the strategic road network.

The B5410 is presently a substandard single track carriageway with passing places. In August 2013 a section of the road known as Wild Lane was closed between Division Lane and Cropper Road roundabout to the north due to a 'structure failure' of the road and remains so.

The scheme will deliver a new 2.5km, high quality link road that runs parallel to the existing B5410 and in effect will replace the road. The new link road proposals include a standard single lane carriageway (two-way) road with the speed limit of 50mph and will extend from Lytham St Annes Way to Cropper Road roundabout.

The scheme originally comprised of three sections, namely the northern, central and southern sections. The planning permission for the northern section of the road was granted by the Secretary of State in 1996, as part of the proposed extension to the Blackpool / Fylde Industrial Estate at Dugdale Farm. The northern section between the A583 and Cropper Road / Whitehill Road was then constructed by the developer in association with Whitehills Park development. The southern sections were partly completed with financial contribution received via Cypress Point development in 2001 and partly by LCC during 2009.

The remaining section of the scheme, which is the scope of this project, was granted planning permission by the Secretary of State in 2012, in conjunction with the proposed Queensway residential development, north of Lytham St Annes. Once delivered, the

scheme will provide a consistent, high quality link to the Strategic Road Network from Lytham St Annes.

The proposed link road is highlighted within the Lancashire LEP's Strategic Economic Plan as a key priority infrastructure project to help deliver its housing and employment growth objectives.

The M55 Heyhouses Link Road, under the current delivery funding mechanism, will directly unlock 1,150 homes to be delivered by the Queensway housing development (HSS1, the primary residential scheme), whilst accelerating the adjacent employment site (ES1).

It will enhance access to residential sites to the west of Cropper Road (HSS5), east of Cropper Road (HSS6), north of Moss Hall Lane and link to Whyndyke Farm (MUS2).

It will also provide support for employment of up to 2,000 people at two existing business parks adjacent to the M55 (Whitehills Business Park and Blackpool and Fylde Industrial Estate – MUS1, ES4, ES6, ES7), which will heighten accessibility and support their continued growth.

The scheme will provide a new roundabout to the south of Moss Sluice to connect the B5410 to the B5261 Queensway Road and provide access to the Queensway development.

Figure 1-1 illustrates the location of the scheme.

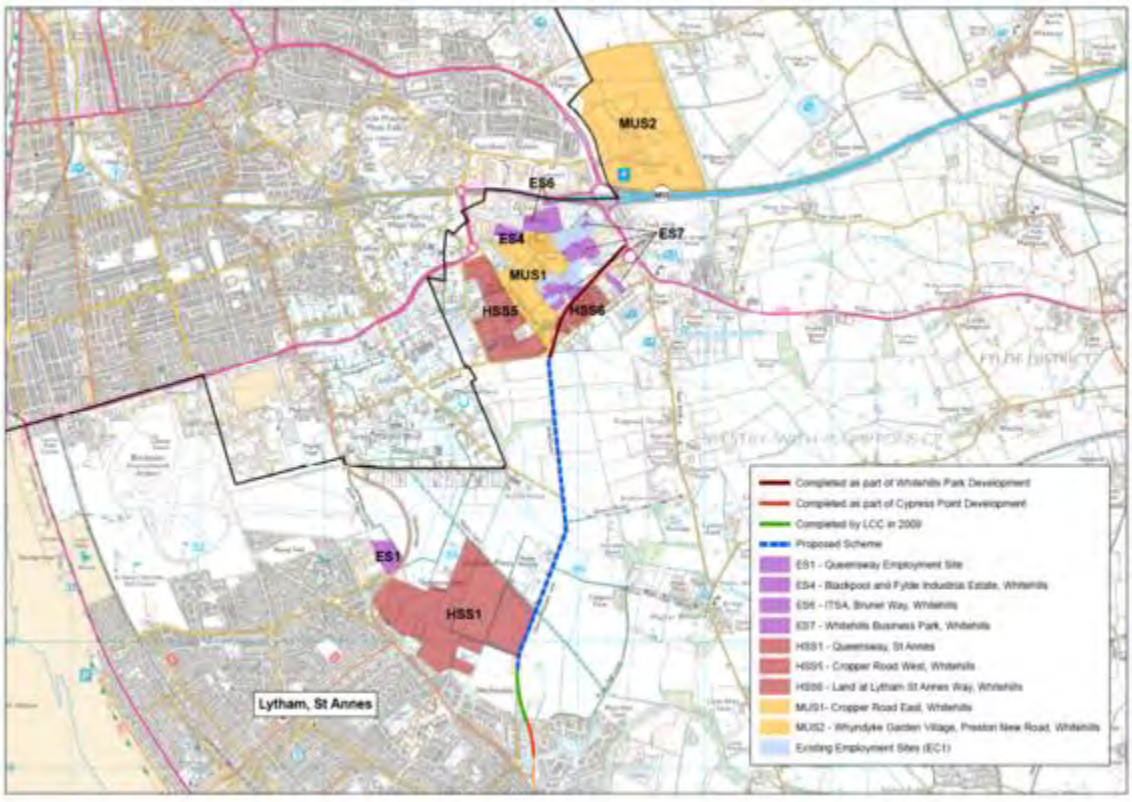

Figure 1-1: Proposed Scheme Location

1.4 Report Contents

This remainder of this report is structured as follows:

1. *Chapter 2: Traffic Modelling Methodology;*
2. *Chapter 3: Route to M55 Junction 3;*
3. *Chapter 4: Forecasting;*
4. *Chapter 5: Economic Appraisal; and*
5. *Chapter 6: Summary & Conclusion.*

2 Traffic Modelling Methodology

2.1 Introduction

Due to lack of a suitable traffic assignment model in the area, a proportionate approach, largely spreadsheet based, was used to provide value for money evidence for the proposed scheme. The approach has been agreed in the ASR issued in June 2016 and takes into account the comments from LCC, Highways England and LEP Independent Assurer.

As specified in the ASR a spreadsheet route choice logit model was developed to derive changes in traffic flows and journey times as a result of the scheme. The outputs from the logit model were then used to quantify the transport benefits/disbenefits of the proposed link road.

This chapter of the report outlines the traffic modelling methodology adopted for this study.

2.2 Study Area Network

The study area for the scheme appraisal has been informed by the analysis of the existing road network and the expected impacts of the scheme. The roads which are most likely to experience changes in traffic flows and journey times as a result of the intervention have been identified and included in the model.

As stated earlier, the proposed link road will be built along B5410 Wild Lane corridor, extending from Whitehill Road to Lytham St Annes Way to enhance connectivity between Lytham St Annes and the strategic road network via M55 Junction 4. In addition to the Wild Lane the parallel roads (Peel Road and Queensway) identified as the main alternative routes to the B5410 Wild Lane corridor that local traffic diverted from as a result of the closure of Wild Lane in 2013 formed the study area network. As they are also likely to be experiencing reduction in traffic once the Wild Lane corridor is reinstated and improved. It was also recognised from the traffic counts that the route via B5259/A585 acts as an alternative route to Wild Lane for the traffic between Lytham St Annes and the M55 J3, rather than J4. The routes affected by the scheme were also further discussed with LCC to ensure their suitability.

The study area network is therefore composed of series of links forming the routes between Lytham St Annes and M55 J4 to provide route choice. The routes included in the study area are Queensway (Route 1), North House Lane (Route 2) and Peel Road (Route 3), as shown in Figure 2-A. In order to simplify the trip assignment, the model links are coded with the average journey times of two directions to assign the two-way traffic flows; therefore the model does not distinguish between directions of travel.

The route to M55 J3 via A585 was not explicitly modelled. However, Route 3 was used as a proxy for this route, as outlined in the subsequent sections.

The study area is divided into four zones in order to represent the areas influenced by the scheme and also allow assigning the traffic to the study area routes. These zones would ensure consistent start/end points for traffic assignment in all scenarios in the assessment. Three of the zones are defined in the southern area of the logit model to represent the local areas – Lytham St Annes (Zone 1), Fairhaven (Zone 2) and Lytham (Zone 3).

A single common point, Zone 4, is also identified in the northern area of the logit model at Annes Way roundabout, where all modelled routes converged. The reason for selecting

this location is that the proposed scheme will run along B5410 Wild Lane corridor and traffic travelling along this road will pass through Annes Way roundabout to access the SRN, regardless of their exit direction at the M55 J4.

The local areas included in the study area are also shown in Figure 2-1.

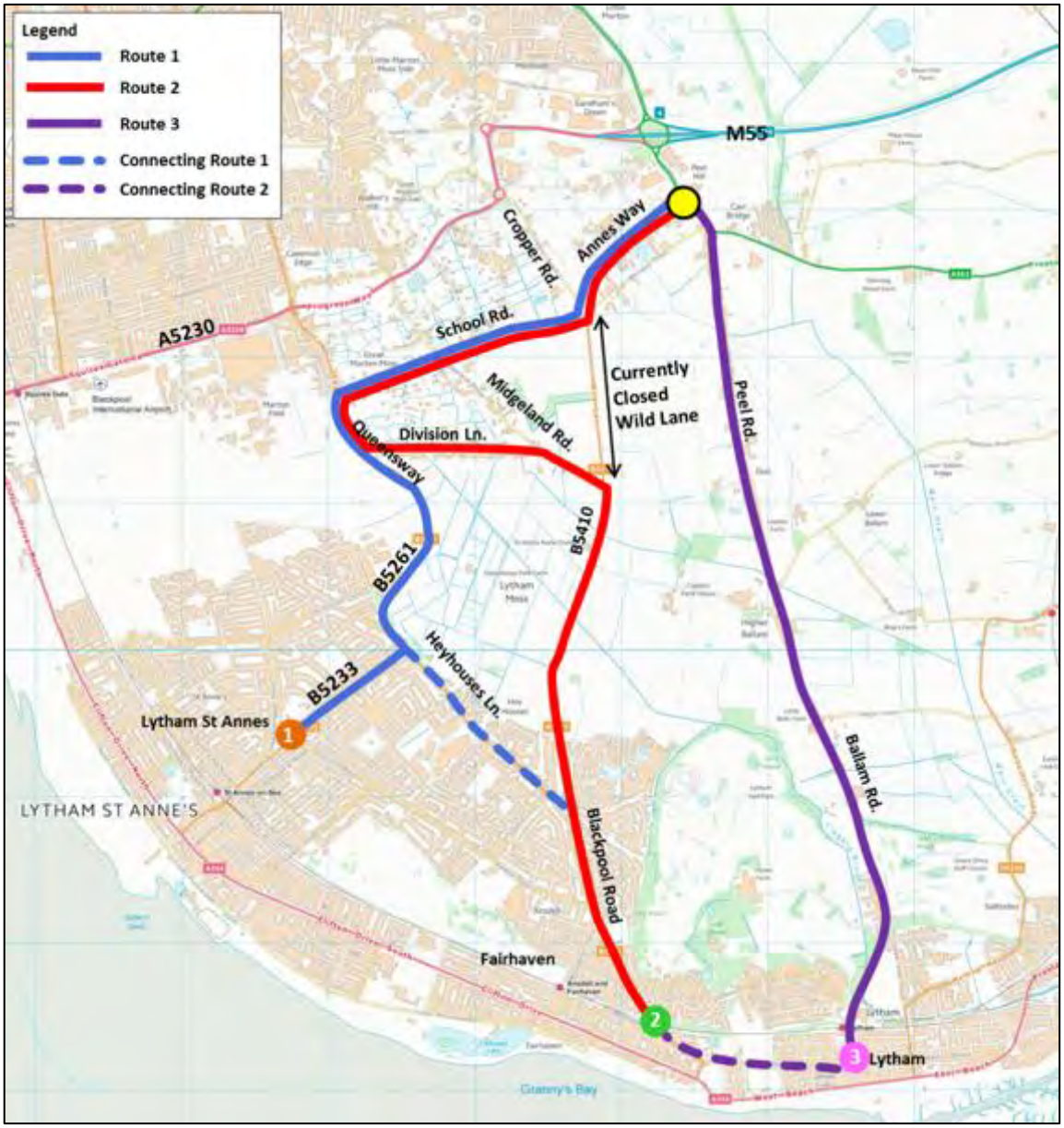

Figure 2-1: Assessment Routes – Baseline Scenario

It is recognised that Routes 1 and 2 are different from the signed routes between Lytham St Annes/Fairhaven and the M55. However, as demonstrated in Figure 2-2 accessing the M55 via School Road is not only faster but also shorter than the signed route via Progress Way. Therefore this route is used in the logit model rather than the signed route to ensure a more conservative approach in calculating journey time benefits as a result of traffic transfer to the improved Route 2. On the other hand, Route 3 lies within the alignment of the signed routes.

Figure 2-2: Comparison of Signed and Modelled Routes

The identified routes do not vary across a typical day based on the analysis of the google journey planner information; however, their travel times do vary between time periods which have been taken into account by modelling the three peak hours:

1. AM (8:00-9:00)
2. IP (average hour of 10:00-16:00)
3. PM (17:00-18:00).

The suitability of the selected routes were further confirmed through the comparison of pre and post closure traffic count data on Queensway Road and Peel Road, which indicated higher traffic numbers on these roads as a result of Wild Lane Closure. Surveyed traffic data on Peel Road and Queensway Road are summarised in Table 2-1 and Table 2-2, respectively.

The percentage change in traffic flow on Peel Road (since the closure of Wild Lane) has been higher than on Queensway Road; while the absolute flow change is higher on Queensway. Therefore, both have been assumed to be alternative routes for diverted traffic post closure of Wild lane.

Table 2-1: Peel Road Daily Traffic Flows

Date of Survey	Average Weekday Daily Traffic Flows	ATC Site Location
12-18th October 2011 Pre-Closure of Wild Lane Data	6,238	Peel Road (north of caravan park)
12-20th July 2014	6,633	Peel Road (south of caravan park)
8-21st June 2016	6,704	Peel Road (south of caravan park)
Difference	**+466**	
Percentage difference	**+7.5%**	

Table 2-2: Queensway Daily Traffic Flows

Date of Survey	Average Weekday Daily Traffic Flows	ATC Site Location
2013 Permanent ATC Pre-Closure of Wild Lane Data	22,274	Queensway, North of Kilnhouse Lane
After closure of Wild Lane Data 2014 Permanent ATC	22,981	Queensway, North of Kilnhouse Lane
7-21st June 2016	23,085	Queensway, North of Kilnhouse Lane
Difference	**+811**	
Percentage difference	**+3.6%**	

As stated earlier, the route to M55 J3 was not explicitly modelled; instead for the purpose of this study Route 3 was considered representative of the B5259/A585 route for traffic travelling towards M55 J3 given similar travel cost as shown in Figure 2-3.

The marginally shorter travel time on Peel Road compensates for its longer distance. The B5259/A585 route was considered in the Housing and Growth Fund Application Technical Note produced by Jacobs in May 2016 for Highways England in addition to those immediately parallel routes, but not monetised for the transport benefits. A summary the technical note is presented in Chapter 3 of this report.

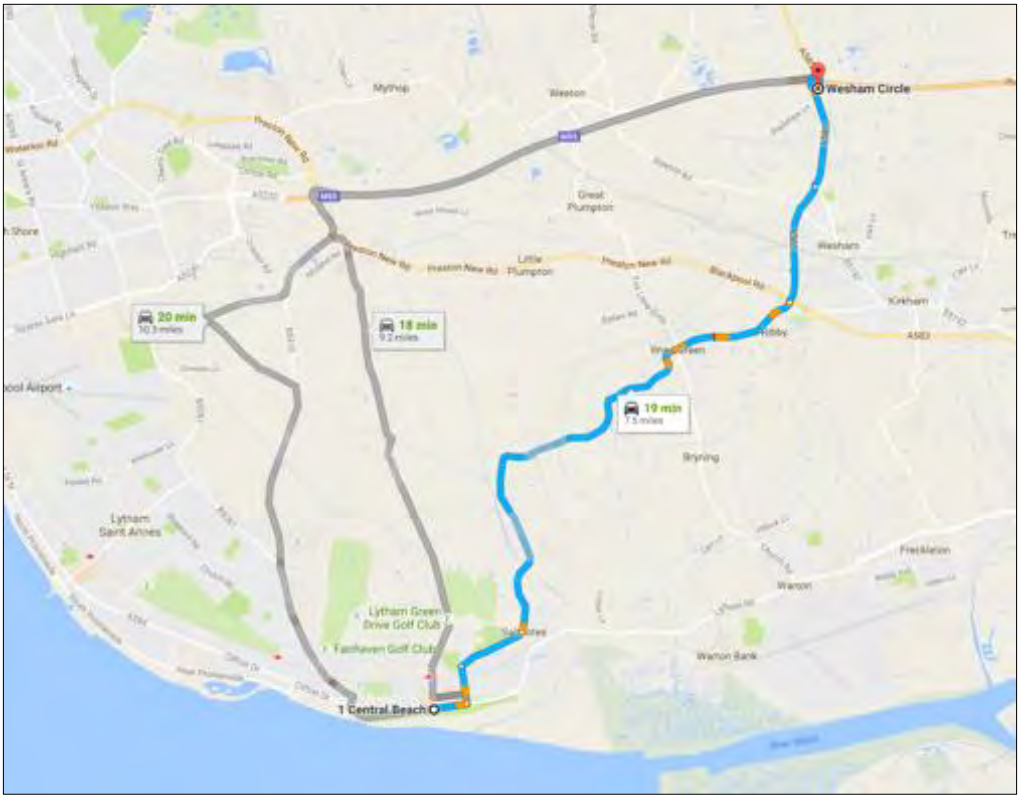

Figure 2-3: Comparison of Current Route Alternatives between Lytham and the M55 J3

The impacts of the scheme on all other routes are assumed to be neutral (or negligible) and are therefore not included in the assessment.

2.3 Traffic Count Data

Observed traffic data and TrafficMaster journey times provided by Lancashire County Council have been used to estimate origin/destination trips and calibrate the logit route choice model.

The traffic data was collected using Automatic Traffic Counts (ATC) deployed by the in-house LCC team, over the course of two weeks from Wednesday 8th to Tuesday 21st June 2016, and one Manual Classified Turning Count (MCTC) survey conducted at Midgeland Road / School Road junction to provide information regarding the vehicle composition of the traffic for the journey time benefit calculation.

The location of the traffic surveys undertaken is shown in Figure 2-4.

In addition, LCC provided traffic data for the local network on the B5410 (Wild Lane), Peel Road and B5261 Queensway prior to the closure of Wild Lane (in August 2013) along with ATC data on Lytham Road.

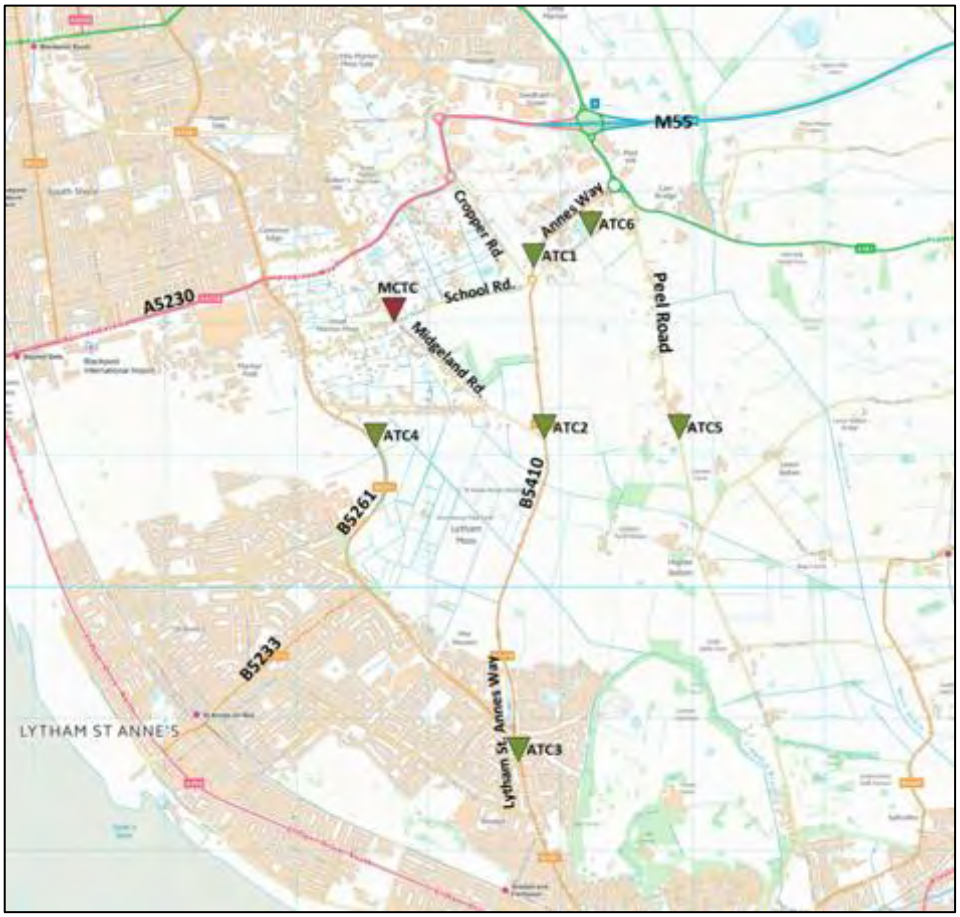

Figure 2-4: Traffic Count Survey Locations, June 2016

The reopening of Lower Ballam Bridge on Monday 13th June caused a significant drop in the daily traffic flows on Peel Road and therefore it was determined that only the latter week of the survey period would be suitable for use reflecting 'normal' traffic conditions on Peel Road. Ballam Road was closed between Peel Road and Fox Lane End during the reconstruction of the bridge. The traffic data from the first week of the survey was however used to understand the level of traffic on Ballam Road. Figure 2-5 provides the baseline traffic vehicular flow conditions in the study area.

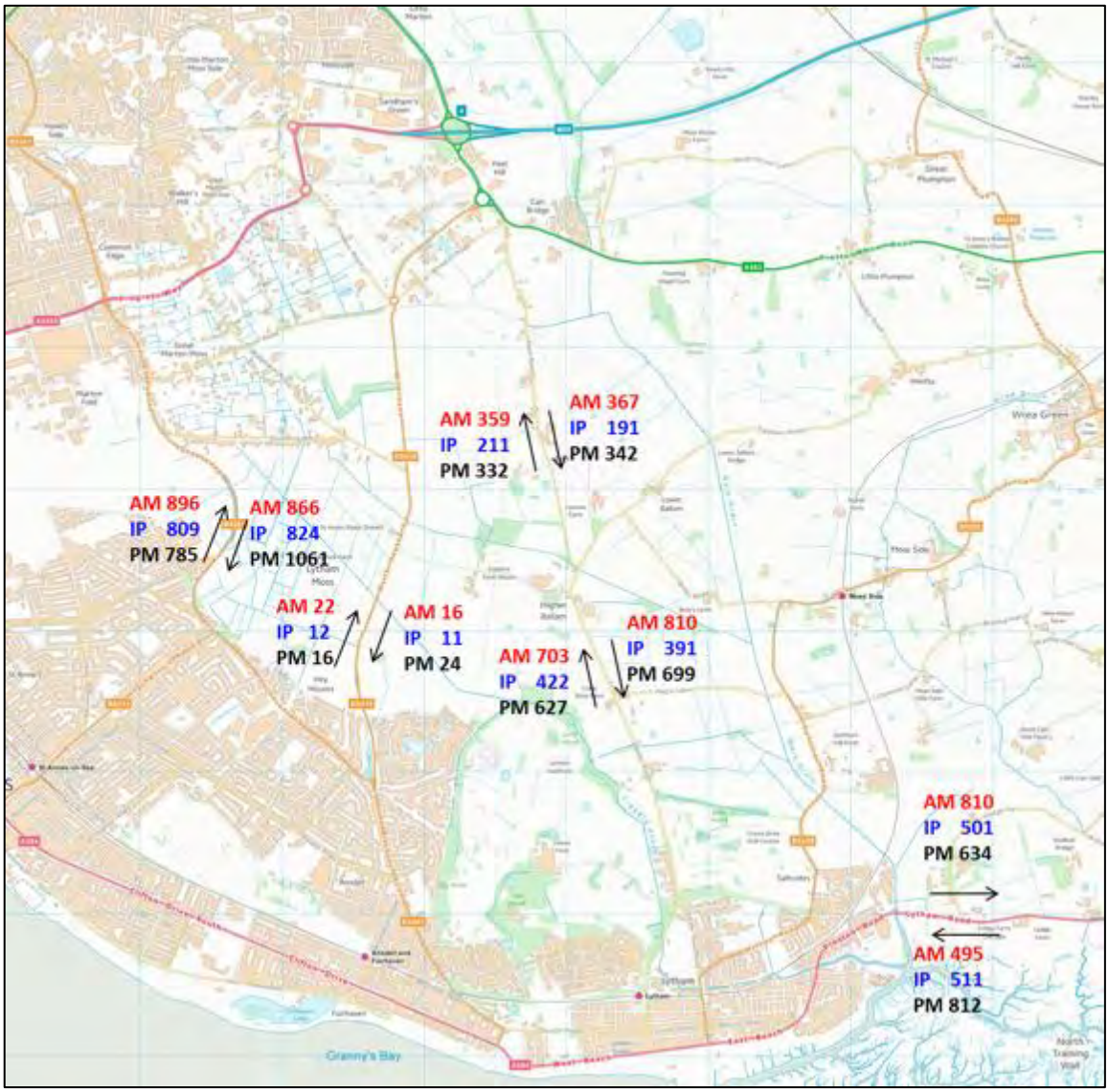

Figure 2-5: Baseline (2016) Traffic Flows

Additional traffic data from July 2014 was also provided by LCC for Peel Road and Queensway Road, which closely matched the most recent survey data carried out in June 2016 (latter week of the survey). This helped to confirm the reliability of the data by establishing a broadly consistent level of flow on these roads post closure of Wild Lane (B5410).

2.4 Analysis of Seasonal Variations

The ATC data on Queensway Road has been used to inform the seasonal variations in the traffic pattern in the area. For this purpose, the average weekday traffic flows (Monday to Thursday) during AM and PM peak hours for each month have been calculated for 2012, as a pre-closure year to reflect the normal traffic condition on this road, and for 2013/14, as a more recent year to reflect traffic demand variations as a result of Wild Lane Closure.

As shown in Figure 2-6 and Figure 2-7, the traffic flow variations are more evident in AM peak hour than PM peak hour in both years. It can also be observed that the level of traffic in the PM peak is generally higher than the AM peak for the same month.

In 2012, the traffic demand in May appears to stand out from the remaining months potentially due to sport events taking place at Royal Lytham & St Annes Golf Club.

Using the annual traffic data, the Seasonality Index (SI) has also been calculated as the ratio of the average August weekday flow to the average weekday flow in October as a neutral month, according to COBA Manual (Part 4, Chapter 6). The SI is used to inform the variation of total vehicle flow throughout the year and is 1.01 in 2012 and 0.98 in 2013/14.

As expected due to the nature of the study area, the level of traffic flow does not vary substantially throughout a year based on the analysis on ATC data on Queensway.

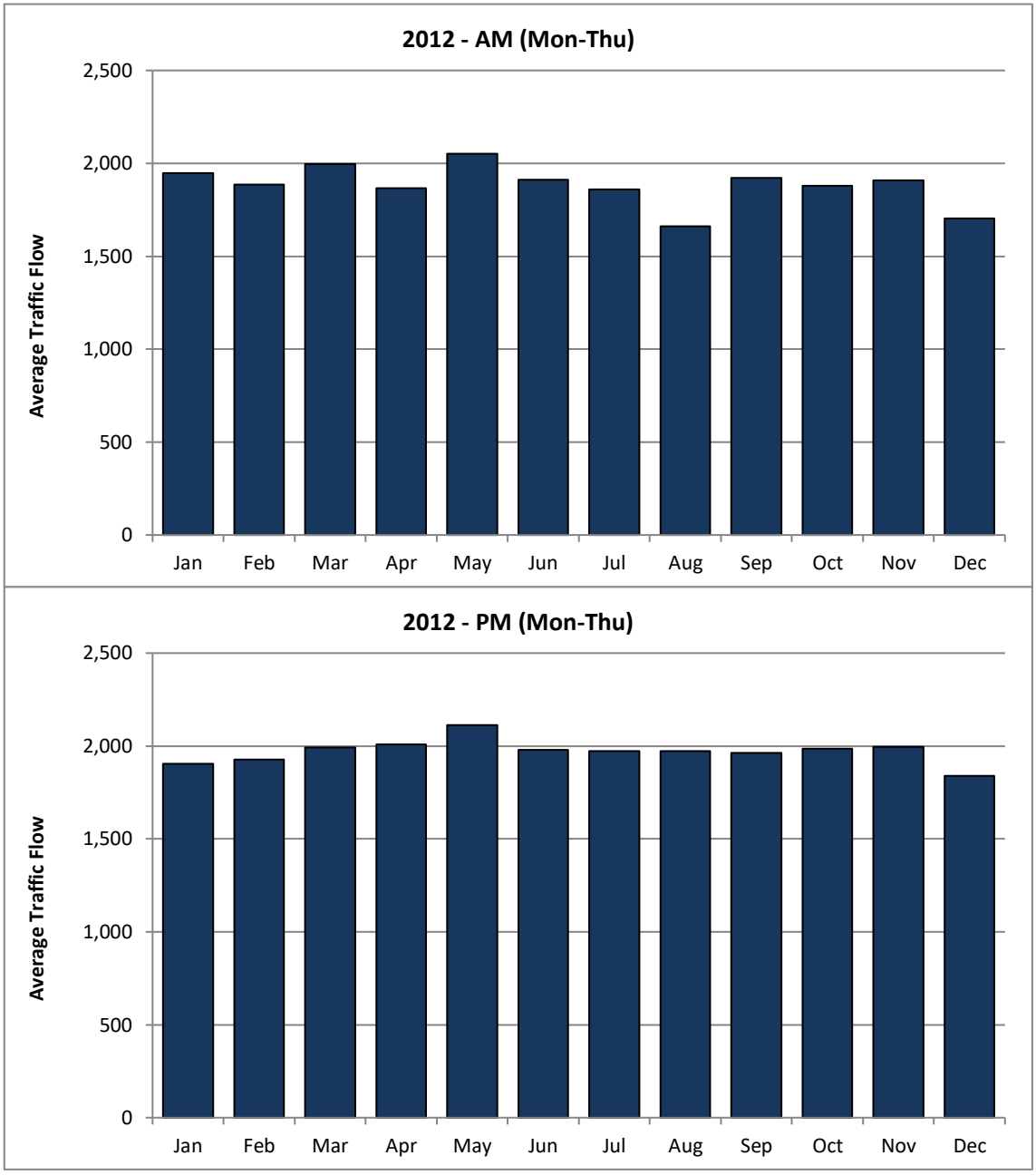

Figure 2-6: Average Two-way Traffic Flow (Two-way) on Queensway - 2012

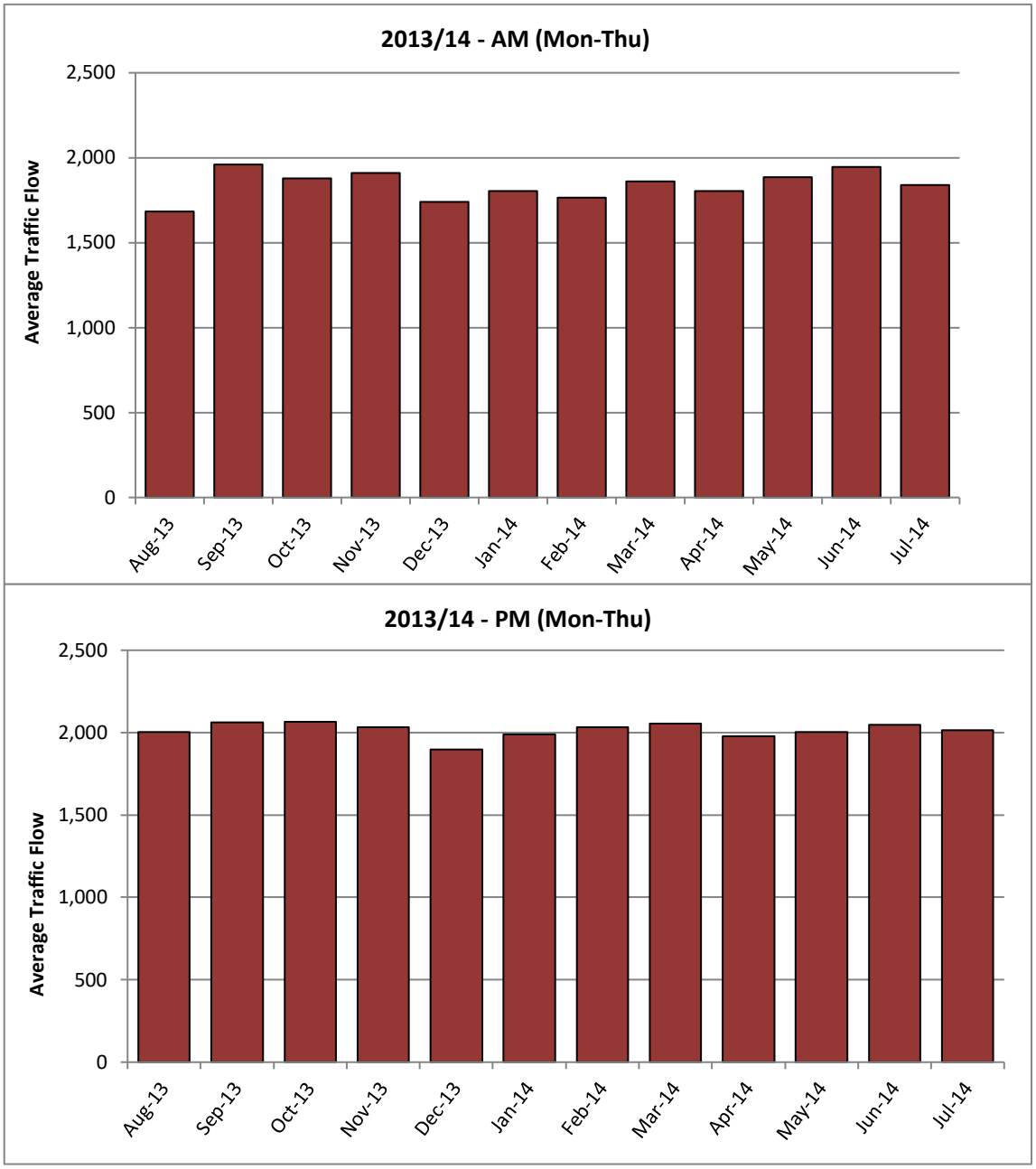

Figure 2-7: Average Two-way Traffic Flow (Two-way) on Queensway – 2013/14

2.5 Journey Time Data

Journey time data were required to determine observed link speeds and consequently derive travel cost of each modelled route within the logit model. As stated earlier, the average of journey times for both directions of links are used in the model.

Journey times are extracted from TrafficMaster database which were provided by LCC and sufficiently covered the study area. They were collected for term times between September 2014 and August 2015 during the weekdays (Monday to Thursday) for three modelled peak periods.

Figure 2-8 and Figure 2-9 provide the details of the baseline traffic conditions, in terms of link speeds and journey times on the key routes in the study area road network.

Figure 2-8: Baseline Link Average Speed (kph)

Figure 2-9: Baseline Journey Time on Key Routes (sec)

2.6 Base Year Logit Model Development and Calibration

As detailed above, a spreadsheet logit based route choice model has been developed for the purpose of this study, which simulates assignment of traffic to different routes using generalised costs of travel calculated from journey time and distance information.

The logit model is based on exponential utilities, themselves derived from the generalised costs of travel for each route; before and after the scheme, using the WebTAG formulation (TAG Unit M2), as defined below:

$$P_P = \frac{\exp(-\lambda U_p)}{\sum_q \exp(-\lambda U_q)}$$

Where,
P_p = Proportion of trips using route p
λ = Scaling parameter
U_p = Utility (cost) of using route p

The scaling factor is the route choice parameter and determines the sensitivity of the model to the travel costs. It has been selected based on recommendation by WebTAG Unit M2 guidance for the destination choice model. In this study, its starting value was 0.065; the median value for the home-based work car trips. It has ensured that the scaling parameter value would remain within the range of ±25% of median value during the calibration process.

WebTAG generalised cost parameters (Pence per Minute – PPM, and Pence per Kilometre- PPK) for Average Car user class were used as key inputs to the logit model, and were developed from the Summer (July 2016) release of the WebTAG databook, reflective of very latest and current guidance at the time of assessment. The values are presented in Table 2-3.

Table 2-3: Before and Post Closure Models PPM and PPK Values

Year	AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK
2013	22.1	9.14	24.29	9.14	20.57	9.14
2016	23.31	7.21	25.62	7.21	21.7	7.21

The following two scenarios were produced for the purpose of calibration of the route choice scaling factor to the local situation.

- Before Closure of Wild Lane – 2013
- Current Scenario (Wild Lane closed) – 2016

Using an iterative process the scaling factor was calibrated to ensure that the modelled traffic flows on each route pre and post closure of Wild Lane match the observed traffic. The pre-closure model traffic demand input was obtained from 2013 traffic count data, and the traffic demand for the post-closure model was based on the ATC locations 2, 4 and 5 shown in Figure 2-4 and Figure 2-5 in Section 2.3.

In order to set up the logit model, a number of assumptions were made in relation to the use of traffic data. It was assumed that all traffic captured by traffic counts on a given route travel all the way to/from zone 4 of the model, except for Route 1 where traffic captured by ATC on the Queensway Road also included traffic travelling towards Blackpool.

To filter out such trips from the logit model, Census travel to work data was analysed for LSOAs representing Zone1 and Zone 2. From this analysis, it was determined that only 30% of traffic captured by Queensway ATC is likely to travel toward the M55. The remaining 70% travelling towards Blackpool were not included in the model.

It was also assumed that no demand from the Fairhaven (Zone 2) and Lytham (Zone 3) used Queensway Road to access M55 J4 in the pre-closure scenario. This is a sensible assumption given that the routes via Wild Lane or Peel Road were significantly shorter before the closure. This assumption was particularly helpful to distribute the link flows to the study area zones, in the absence of origin-destination information for the ATC counts.

It was also found that the sum of 2013 pre-closure traffic flows on the three modelled routes were higher than the 2016 post-closure traffic flows approximately by 300 vehicles in peak hour. These were potentially the traffic shifted to other routes going to M55 J3 due to closure of Wild Lane. It was therefore assumed that Peel Road traffic flow in the post-closure model should be increased by 300 vehicles, as this road is the representative of the routes to M55 J3.

The following steps were followed to develop and calibrate the logit model for each peak hour:

- Cost of travel for each zone via each route was calculated using distances and observed journey times in the pre-closure scenario.

- These costs along with the scaling parameter were applied to the logit equation described above to calculate the proportions of the traffic using each route.

- The calculated proportions, the O-D assumptions stated above and Microsoft Excel Solver tool were then used to distribute the link flows to the study area zones. The outcome of this step was to derive a demand matrix from the ATC counts.

- The trip matrix was then imported into post-closure assignment model to check if the model would assign the traffic such that the modelled link flows were sufficiently close to the observed post-closure counts. The percentage difference in flow and GEH were calculated to determine fitness of the model. The acceptable thresholds were ±10% for percentage flow difference and 5 for GEH.

- Steps 2 to 4 were then repeated by adjusting the value of the scaling parameter until the met the defined criteria. The final calibrated value of scaling parameter was 0.070.

Table 2-4 to Table 2-6 present the results of pre-closure and post-closure models for the three modelled peak hours. The results of the post-closure model demonstrated that by closing Wild Lane significant amount of traffic from Lytham and Fairhaven zones shifted to Ballam Road and Peel Road; and all trips from Lytham St Annes re-routed to Queensway Road.

In both models the differences between the modelled and observed flows on all routes were within acceptable thresholds, except Wild Lane in the post-closure model; as it carries very low traffic demand during the peak times. Based on these results, the post-closure logit model was found suitably calibrated to be utilised for the forecast scenarios and value for money assessment of the proposed scheme.

Table 2-4: Base Year Model Results – AM Peak Hour

Pre-Closure Scenario		Probability			AM Peak Hour			
		Route 1	Route 2	Route 3	Route 1*	Route 2	Route 3	Total Zone Demand
Zone 1	Lytham St Annes	94%	6%	0%	526	33	0	**559**
Zone 2	Fairhaven	0%	99%	1%	0	317	4	**321**
Zone 3	Lytham	0%	12%	88%	0	85	644	**729**
Modelled Flows (Two Way)					**526**	**435**	**648**	
Observed Flows (Two Way)					**526**	**436**	**647**	
Difference					**0**	**-1**	**1**	
% Difference					**0%**	**0%**	**0%**	
Post-Closure Scenario		**Probability**			**AM Peak Hour**			
		Route 1	**Route 2**	**Route 3**	**Route 1***	**Route 2**	**Route 3**	**Total Zone Demand**
Zone 1	Lytham St Annes	100%	0%	0%	559	0	0	**559**
Zone 2	Fairhaven	2%	5%	93%	5	17	299	**321**
Zone 3	Lytham	0%	0%	100%	0	0	728	**728**
Modelled Flows (Two Way)					**567**	**18**	**1,024**	
Observed Flows (Two-way)					**529**	**38**	**1,041**	
Difference					**38**	**-20**	**-17**	
% Difference					**7%**	**-56%**	**-1%**	
GEH					**1.51**	**4.04**	**0.43**	

**** Note: Traffic flow shown on Route 1 is only 30% of total flow, which are expected to be impacted by the scheme.***

Table 2-5: Base Year Model Results – IP Peak Hour

Pre-Closure Scenario		Probability			IP Peak Hour			
		Route 1	Route 2	Route 3	Route 1*	Route 2	Route 3	Total Zone Demand
Zone 1	Lytham St Annes	91%	9%	0%	464	46	0	**510**
Zone 2	Fairhaven	0%	96%	4%	0	127	6	**133**
Zone 3	Lytham	0%	1%	99%	0	4	385	**389**
Modelled Flows (Two Way)					**464**	**177**	**391**	
Observed Flows (Two Way)					**464**	**177**	**391**	
Difference					**0**	**0**	**0**	
% Difference					**0%**	**0%**	**0%**	
Post-Closure Scenario		**Probability**			**IP Peak Hour**			
		Route 1	**Route 2**	**Route 3**	**Route 1***	**Route 2**	**Route 3**	**Total Zone Demand**
Zone 1	Lytham St Annes	100%	0%	0%	510	0	0	**510**
Zone 2	Fairhaven	1%	1%	98%	2	1	130	**133**
Zone 3	Lytham	0%	0%	100%	0	0	389	**389**
Modelled Flows (Two Way)					**515**	**1**	**516**	
Observed Flows (Two-way)					**490**	**23**	**519**	
Difference					**25**	**-22**	**-3**	
% Difference					**5%**	**-96%**	**0%**	
GEH					**0.97**	**6.39**	**0.03**	

**** Note: Traffic flow shown on Route 1 is only 30% of total flow, which are expected to be impacted by the scheme.***

Table 2-6: Base Year Model Results – PM Peak Hour

Pre-Closure Scenario		Probability			PM Peak Hour			
		Route 1	Route 2	Route 3	Route 1*	Route 2	Route 3	Total Zone Demand
Zone 1	Lytham St Annes	93%	7%	0%	537	40	0	**577**
Zone 2	Fairhaven	0%	99%	1%	0	288	3	**291**
Zone 3	Lytham	0%	6%	94%	0	39	640	**679**
Modelled Flows (Two Way)					**537**	**367**	**643**	
Observed Flows (Two Way)					**537**	**367**	**643**	
Difference					**0**	**0**	**0**	
% Difference					**0%**	**0%**	**0%**	
Post-Closure Scenario		**Probability**			**PM Peak Hour**			
		Route 1	**Route 2**	**Route 3**	**Route 1***	**Route 2**	**Route 3**	**Total Zone Demand**
Zone 1	Lytham St Annes	100%	0%	0%	577	0	0	**577**
Zone 2	Fairhaven	2%	7%	90%	7	21	263	**291**
Zone 3	Lytham	0%	0%	100%	0	0	679	**679**
Modelled Flows (Two Way)					**587**	**23**	**936**	
Observed Flows (Two-way)					**554**	**40**	**953**	
Difference					**33**	**-17**	**-17**	
% Difference					**5%**	**-46%**	**-1%**	
GEH					**1.26**	**3.32**	**0.37**	

**** Note: Traffic flow shown on Route 1 is only 30% of total flow, which are expected to be impacted by the scheme.***

3 Route to M55 Junction 3

In addition to the routes immediately parallel to the scheme and which were discussed above (e.g. Peel Road and Queensway), it is also recognised that the A585 route (post closure of Wild Lane), could act as an alternative route for traffic travelling to/from Preston and further east as it provides a direct link between Lytham St Annes and the M55 J3.

Once the scheme is in place the traffic on this route could transfer to Route 2 which is whilst longer distance will have a shorter journey time due to faster speeds on the new link road.

This potential transfer of traffic from the A585 route to the scheme was specifically assessed and described in the Growth and Housing Fund Application Technical Note produced by Jacobs for Highways England. The study aimed to demonstrate the benefits of the proposed scheme to the Strategic Road Network and particularly to the M55 Junction 3 which currently experiences congestion issues. It should be noted that the benefits were not monetised as part of that work.

The study made use of a RSI data undertaken on the A585 to demonstrate the traffic demand between Lytham St Annes and the M55 J3 to estimate the approximate demand between Lytham St Annes and M55 J3. The GIS analysis of the RSI site is shown in Figure 3-1 and revealed that 120 daily records passed through the M55 J3 from Lytham St Annes- out of the 1,049 (clean) observations collected.

Given that the A585 RSI was undertaken in April 2014, i.e. post closure of Wild Lane, it was assumed that 120 records included traffic diverted from the B5410.

A logit model similar to the one used in this study was developed to estimate the change in traffic as a result of the M55 to St Annes link road scheme. The model utilised the journey times and distances for three routes to the M55 J3 (via A585, B5410 Wild Lane and Ballam/Peel Road) in with and without scheme scenarios. The journey times and distances were obtained from Google Map Journey Planner software, as shown in Figure 3-2.

Figure 3-1: RSI Observations on the A585 South of the M55 J3

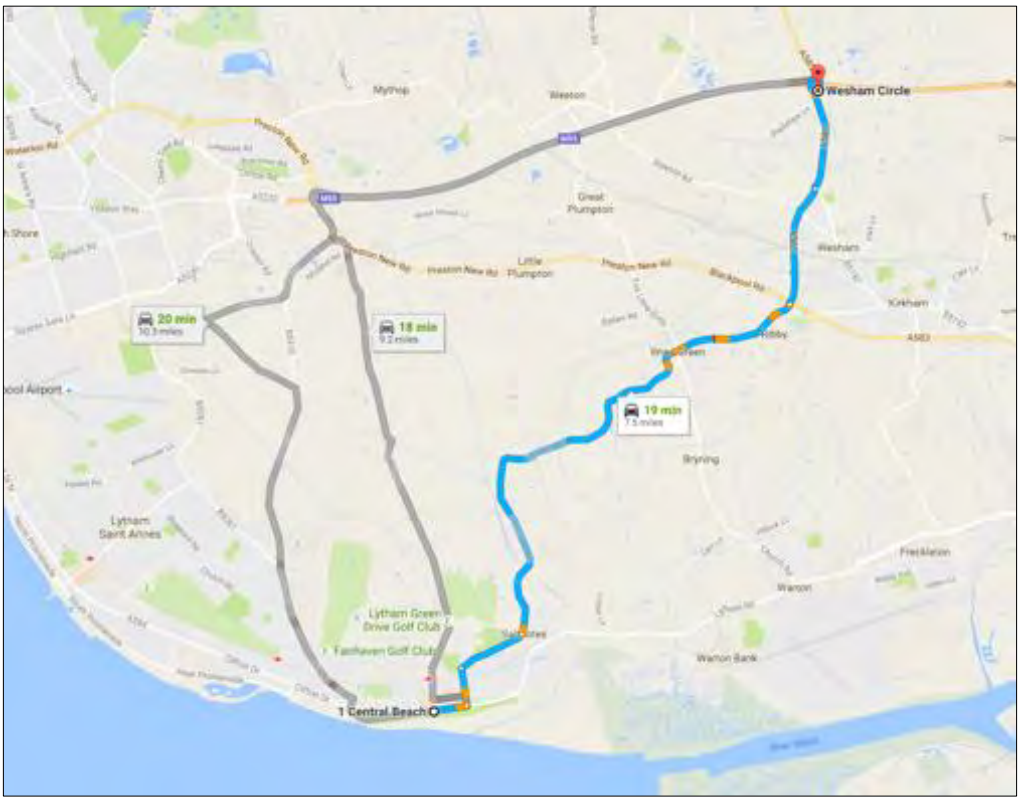

Figure 3-2: Route Alternatives between Lytham and the M55 J3

Table 3-1 shows the generalised costs of the selected routes, before being input into the exponential logit formula, and then the resulting proportions of traffic on each route in the With and Without scheme scenarios.

It can be seen that journey time saving brought about by the scheme through enhanced speeds and the removal of the diversionary link (via School Road) is sufficient to transfer the majority of in-scope traffic from J3 to J4 route, based on the overall utility of travel.

Expanding the 120 trips to the 828 (minimum) daily trips noted from the RSI information, this equated to almost all of those trips transferring from M55 J3 to M55 J4 as a result of the scheme.

Table 3-1: Scheme's Journey Time Impacts on M55 Jn4

Route to SRN	Generalised cost- present (pence)	Generalised cost- with scheme (pence)	% of users- current	% of users- after scheme
Route to SRN - Via A585	322	322	66%	3%
Route to SRN - Via B5410 Wild Lane	347	267	15%	96%
Route to SRN – Via Ballam-Peel Rd	343	343	20%	1%

The note also points out to benefits other than travel time savings expected from the implementation of the proposed scheme:

- Improving access to development areas and unlocking major housing developments sites identified in the Lancashire LEP's Strategic Economic Plan;
- Reducing traffic volume accessing the M55 at J3 via the A585, with a daily transfer away from the junction of over 800 trips;
- Relief to the local road network in south Blackpool and communities including Wrea Green; and,
- Additional benefits for the Strategic Road Network during Special Events of Open Golf Championships at Lytham St Annes.

As the route to J3 via A585 has a very similar disutility when compared to the route via Ballam Rd/Peel Rd (Route 3 in this study) an assumption was made that Ballam/Peel Road route is representative of the A585 route to M55 J3 in the economic appraisal of the scheme.

4 Forecasting

4.1 Future Road Network

The future networks have been developed for two forecast years: 2019 opening year and 2034 design year of the scheme.

Following further correspondence with LCC, it has been assumed as part of this study that Wild Lane will remain closed in the future and therefore Without Scheme scenario network is consistent with the 2016 post-closure network.

The road network changes associated with the scheme have been incorporated in the With Scheme scenario model as shown in Figure 4-1. In this scenario, Route 2 passes along the proposed M55 Heyhouses Link Road (Wild Lane). Moreover, traffic from Lytham St Annes (Zone 1) would access the proposed link road via the East-West Heyhouses Bypass which will run through the Queensway Development, rather than Heyhouses Lane.

The East-West Heyhouses Bypass, known as T5 Link Road, is a development related road and will provide direct vehicular access to the Queensway Development via the proposed M55 Heyhouses Link Road. It will be single carriageway with the speed limit of 30mph and will connect to the new M55 Heyhouses Link Road to the east and the existing B5261 Queensway to the west, creating two new roundabouts at the tie-in points. The East-West Heyhouses Bypass is granted the planning permission as part of the Queensway Development planning application. This link road is also expected to divert traffic away from B5261 Queensway, School Road, and Progress Way to the proposed Heyhouses Link Road to access the SRN.

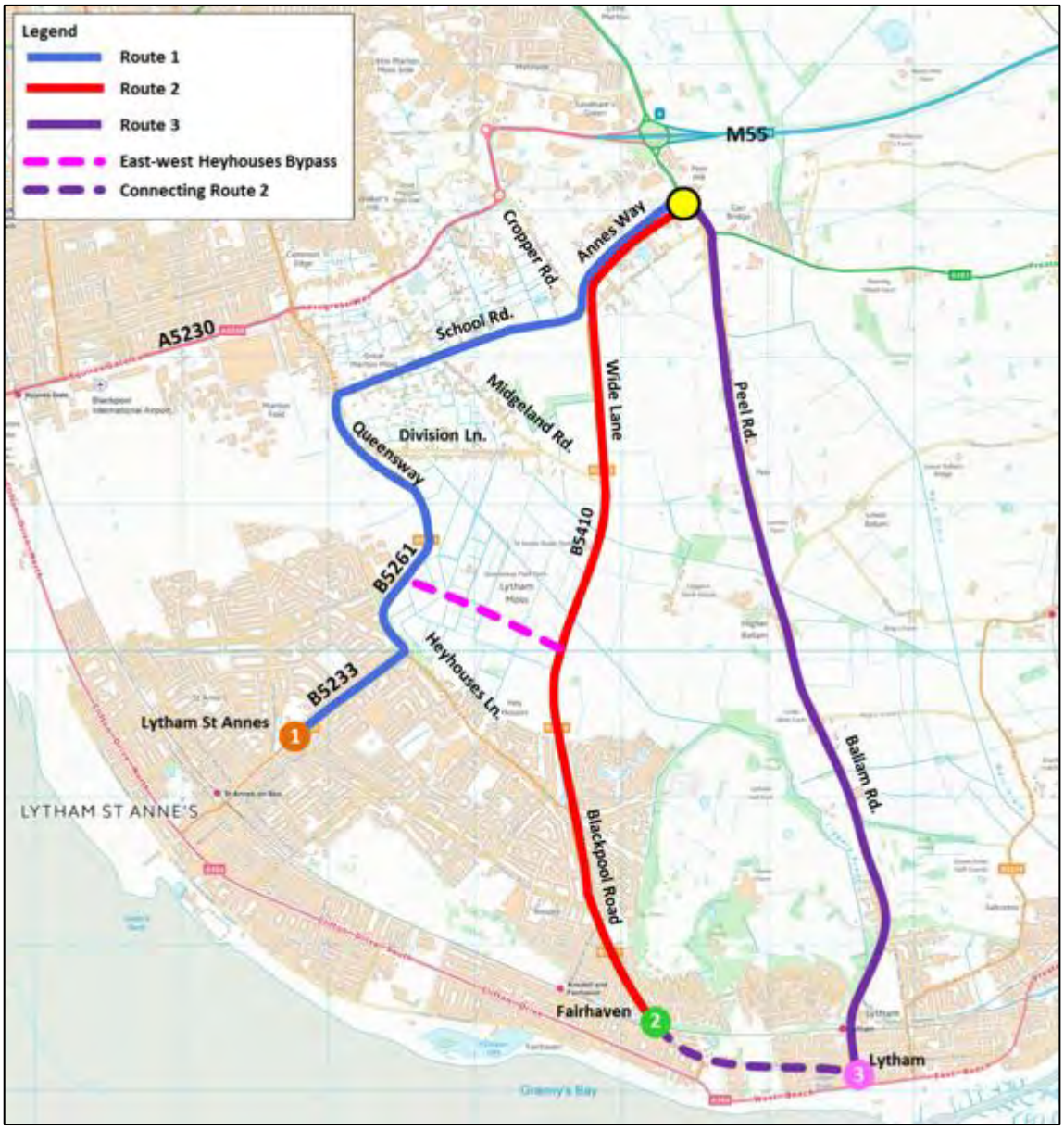

Figure 4-1: Assessment Routes - With Scheme Scenario

The proposed journey time on the new link road was calculated using a Speed Flow Curve (SFC) which would consider the effect of traffic congestion on link travel time. This was important, such that the new link was not coded in at its speed limit which was 80kph (50mph), but rather at a speed that was based on actual usage, and to not overstate transport benefits.

The formula used in this assessment is in accordance with the SATURN Manual and is as follows,

$$t = t_0 + aV^n$$

Where,

t = time on link (analogous to speed)
t_0= free flow time (analogous to free flow speed)
a= constant (determined from speed and flow at capacity)
V= link flow
n= power of the curve (determines the length of the flat part and how quickly the curve falls)

Based upon Independent Assurer comments on the ASR, due consideration has been given to applying the SFC to the other two routes, Queensway Road and Peel Road, given significant changes in traffic on those routes once the scheme is in place.

A sensitivity test has been undertaken to this effect which showed that the transfer of traffic resulted in minimal travel time saving (a few seconds) on these routes, as shown in Table 4-1. The reduction of travel time on these routes are considered minimal and therefore not incorporated in the travel time saving calculation of the scheme to ensure conservative approach.

Table 4-1: Result of Travel Time Sensitivity Tests on Queensway and Peel Road

Road	Peak Hour	2019			2034		
		DM (Sec)	DS (Sec)	Diff (Sec)	DM (Sec)	DS (Sec)	Diff (Sec)
Queensway	AM	267	244	-24	279	245	-34
	IP	264	243	-20	275	245	-31
	PM	272	244	-28	287	246	-41
Peel Road	AM	385	372	-13	391	372	-19
	IP	375	373	-2	376	373	-3
	PM	383	373	-10	387	373	-15

In addition, analysis of the TrafficMaster data for these routes showed that junction delays are significant proportion of the travel time compared to link delays.

Thus, a conservative approach to use fixed TrafficMaster journey times on the other routes was adopted, as this would not take into account the benefits gained from shorter travel time on Queensway Road and Peel Road.

Figure 4-2 depicts forecast years link speeds.

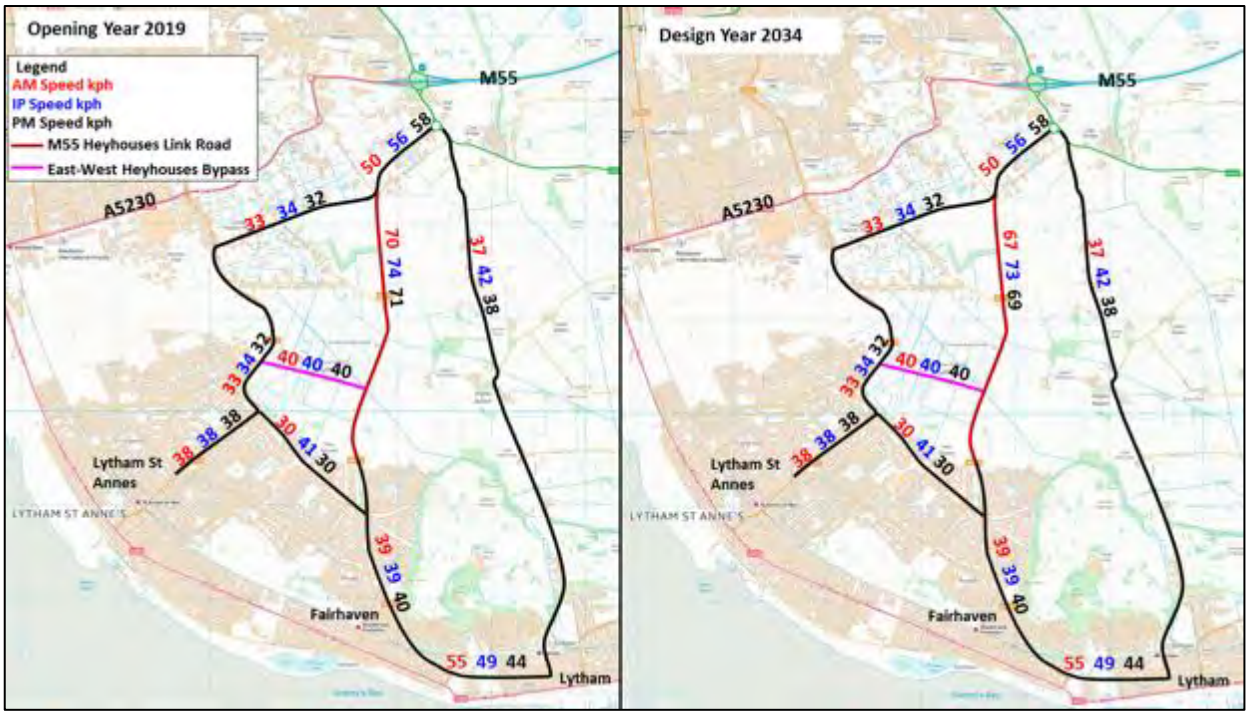

Figure 4-2: Forecast Years Link Speed (kph)

4.2 Traffic Forecasting

Prior to assigning flows on the network, the base year traffic counts were uplifted to incorporate the additional traffic between the base year and the forecast years as a result of future changes in population, car ownership levels, economic growth and national transport policies.

Due to lack of a traffic model, a simple traffic forecasting approach using a combination of National Trip End Model (NTEM7.2) and Road Traffic Forecast 2015 (RTF15) was used to estimate the traffic growth for this study in line with Section 9 of WebTAG Unit M-4.

RTF factor adjustment has been undertaken using the formula below:

$$\text{RTF Adjusted} = \text{RTF} \times \frac{\text{Local TEMPRO Factor}}{\text{Regional TEMPRO Factor}}$$

The RTF and TEMPRO growth factors used for traffic growth calculation are shown in Table 4-2 below.

Table 4-2: Traffic Growth Factors

Forecast Year	Peak Hour	Road Type	RTF (All Veh)	Local - Lytham St Anne's	Regional - NW	RTF Adj
2019	AM	Minor - Urban	1.047	1.0258	1.035	**1.038**
	IP	Minor - Urban	1.047	1.0312	1.035	**1.043**
	PM	Minor - Urban	1.047	1.0238	1.035	**1.036**
2034	AM	Minor - Urban	1.227	1.1195	1.146	**1.200**
	IP	Minor - Urban	1.227	1.1417	1.146	**1.223**
	PM	Minor - Urban	1.227	1.1139	1.146	**1.194**

The future years' scenarios were then created using the forecast traffic demand and appropriate PPM and PPK values. The PPM and PPK values used in the models are presented in Table 4-3.

Table 4-3: Forecast Years Models PPM and PPK Values

Year	AM		IP		PM	
	PPM	PPK	PPM	PPK	PPM	PPK
2019	24.53	6.9	26.95	6.9	22.83	6.9
2034	32.61	6.54	35.84	6.54	30.36	6.54

The following section provides the results of the future years' traffic models.

4.3 Model Outputs and Checks

Table 4-4 and Table 4-5 present a summary of the logit model assignment results in 2019 and 2034 for the Without Scheme and With Scheme scenarios. The results in terms of link flows are graphically provided in Figure 4-3 and Figure 4-4.

In the Without Scheme scenario, Route 2 (North House Lane / Wilde Lane) is the least attractive to traffic due to the closure of Wild Lane, which has resulted in a longer journey times and distance.

By implementing the proposed scheme, more than 80% of traffic travelling between the southern zones and the M55 transfer to Route 2 (North House Lane / Wilde Lane) from parallel routes in the AM and PM peak hours.

The shift of traffic demand proportion is expected to be higher from Queensway Road than Peel Road, since the combination of the East-West Heyhouses Bypass and the M55 Heyhouses Link Road will provide significantly faster route compared to Queensway Road.

The model outputs show that traffic on Queensway Road will decrease as a result of the scheme. It should be noted however that the modelled traffic on Route 1 represents only 30% of the total flow and does not include Blackpool traffic.

Moreover, this route could become a potential alternative for non-modelled traffic travelling to/from Blackpool via Clifton Drive North and alter their route choice. Such impacts are not however demonstrated in this assignment model.

Among the three peaks, the proposed scheme is anticipated to attract the least traffic from Peel Road during IP peak hour. This can be related to lower delays at junctions with Ballam Road and the A583 Road in this peak, which result in shorter journey time along Route 3 and makes it more competitive with the proposed scheme.

Moreover, the amount of traffic remaining on Peel Road (Route 3) following the implementation of the proposed scheme seems lower than the baseline traffic. Similar to Queensway Road, the impacts of traffic possibly shifting from other routes to occupy the spare capacity on Peel Road are not considered in this study. It is also worth noting that the modelled flow on this route does not include Ballam Road traffic.

Table 4-4: Summary of Assignment Results (Two-way Flows) – Opening Year 2019

Zone		AM Peak Hour						
		Without Scheme			With Scheme			Total Zone Demand
		Route 1*	Route 2	Route 3	Route 1**	Route 2	Route 3	
Zone 1	Lytham St Annes	580	0	0	9	571	0	**580**
Zone 2	Fairhaven	4	16	313	0	333	0	**333**
Zone 3	Lytham	0	0	756	0	554	202	**756**
Total		**584**	**16**	**1,068**	**9**	**1,457**	**202**	**-**
% of Demand Assigned to Route		**35%**	**1%**	**64%**	**1%**	**87%**	**12%**	**-**
Zone		**IP Peak Hour**						
		Without Scheme			**With Scheme**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	532	0	0	7	525	0	**532**
Zone 2	Fairhaven	2	1	137	0	139	0	**139**
Zone 3	Lytham	0	0	406	0	100	306	**406**
Total		**534**	**1**	**543**	**7**	**764**	**306**	**-**
% of Demand Assigned to Route		**50%**	**0%**	**50%**	**1%**	**71%**	**28%**	**-**
Zone		**PM Peak Hour**						
		Without Scheme			**With Scheme**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	597	0	0	9	588	0	**597**
Zone 2	Fairhaven	6	21	274	0	302	0	**302**
Zone 3	Lytham	0	0	703	0	394	309	**703**
Total		**604**	**21**	**978**	**9**	**1,283**	**310**	**-**
% of Demand Assigned to Route		**38%**	**1%**	**61%**	**1%**	**80%**	**19%**	**-**

**** Note: Traffic flow shown on Route 1 is only 30% of total flow, which are expected to be impacted by the scheme.***
*****Note: Traffic flow shown on Route 1 does not include Blackpool Traffic.***

Table 4-5: Summary of Assignment Results (Two-way Flows) – Design Year 2034

Zone		AM Peak Hour						
		Without Scheme			With Scheme			Total Zone Demand
		Route 1*	Route 2	Route 3	Route 1**	Route 2	Route 3	
Zone 1	Lytham St Annes	670	0	0	3	667	0	**670**
Zone 2	Fairhaven	1	9	374	0	385	0	**385**
Zone 3	Lytham	0	0	873	0	701	172	**873**
Total		**671**	**9**	**1,248**	**3**	**1,754**	**172**	-
% of Demand Assigned to Route		**35%**	**0%**	**65%**	**0%**	**91%**	**9%**	
Zone		**IP Peak Hour**						
		Without Scheme			**With Scheme**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	624	0	0	2	622	0	**624**
Zone 2	Fairhaven	0	0	162	0	163	0	**163**
Zone 3	Lytham	0	0	476	0	103	373	**476**
Total		**624**	**0**	**639**	**2**	**888**	**373**	-
% of Demand Assigned to Route		**49%**	**0%**	**51%**	**0%**	**70%**	**30%**	
Zone		**PM Peak Hour**						
		Without Scheme			**With Scheme**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	688	0	0	3	685	0	**688**
Zone 2	Fairhaven	2	14	331	0	348	0	**348**
Zone 3	Lytham	0	0	810	0	498	313	**810**
Total		**690**	**14**	**1,142**	**3**	**1,530**	**313**	-
% of Demand Assigned to Route		**37%**	**1%**	**62%**	**0%**	**83%**	**17%**	

**** Note: Traffic flow shown on Route 1 is only 30% of total flow, which are expected to be impacted by the scheme.***
*****Note: Traffic flow shown on Route 1 does not include Blackpool Traffic.***

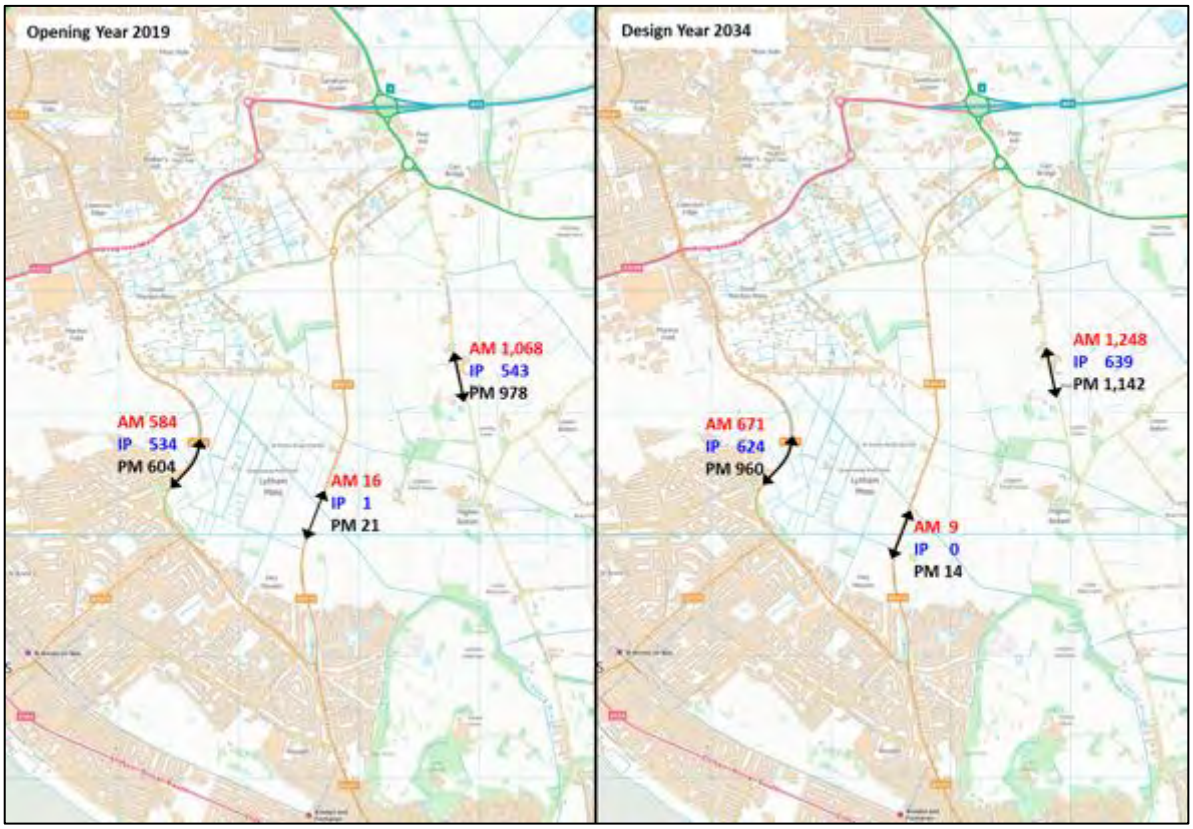

Figure 4-3: Logit Model Two-way Traffic Flow Results - Without Scheme Scenarios

**** Note: Traffic flow on Queensway is only 30% of total flow, which are expected to be impacted by the scheme.***

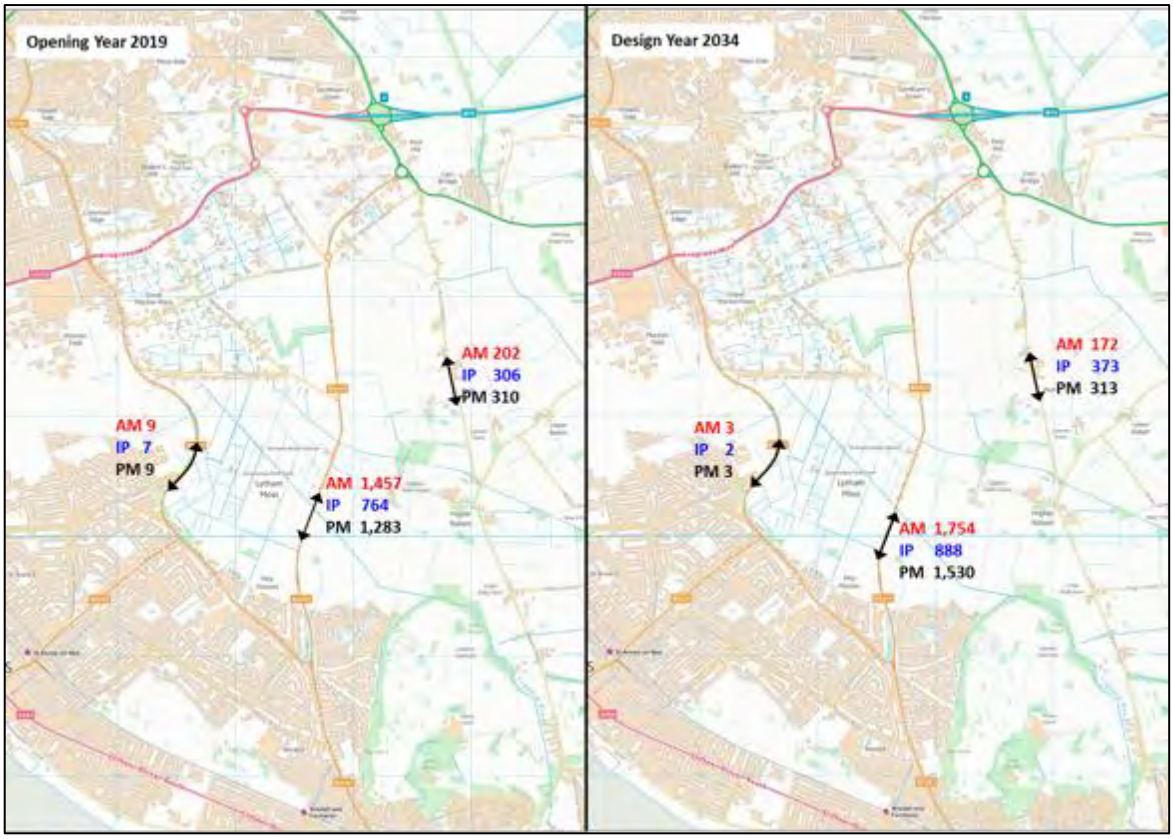

Figure 4-4: Logit Model Two-way Traffic Flow Results - With Scheme Scenarios

****Note: Traffic flow on Queensway does not include Blackpool Traffic.***

Furthermore, the impacts of the proposed scheme in relation to overall network time savings are provided in Figure 4-5. In both modelled years, vehicle-hour is reduced by 20% in AM and PM peak hours and 16% in the IP peak. This translates as 2 minutes of travel time saving on average per vehicle in the peaks.

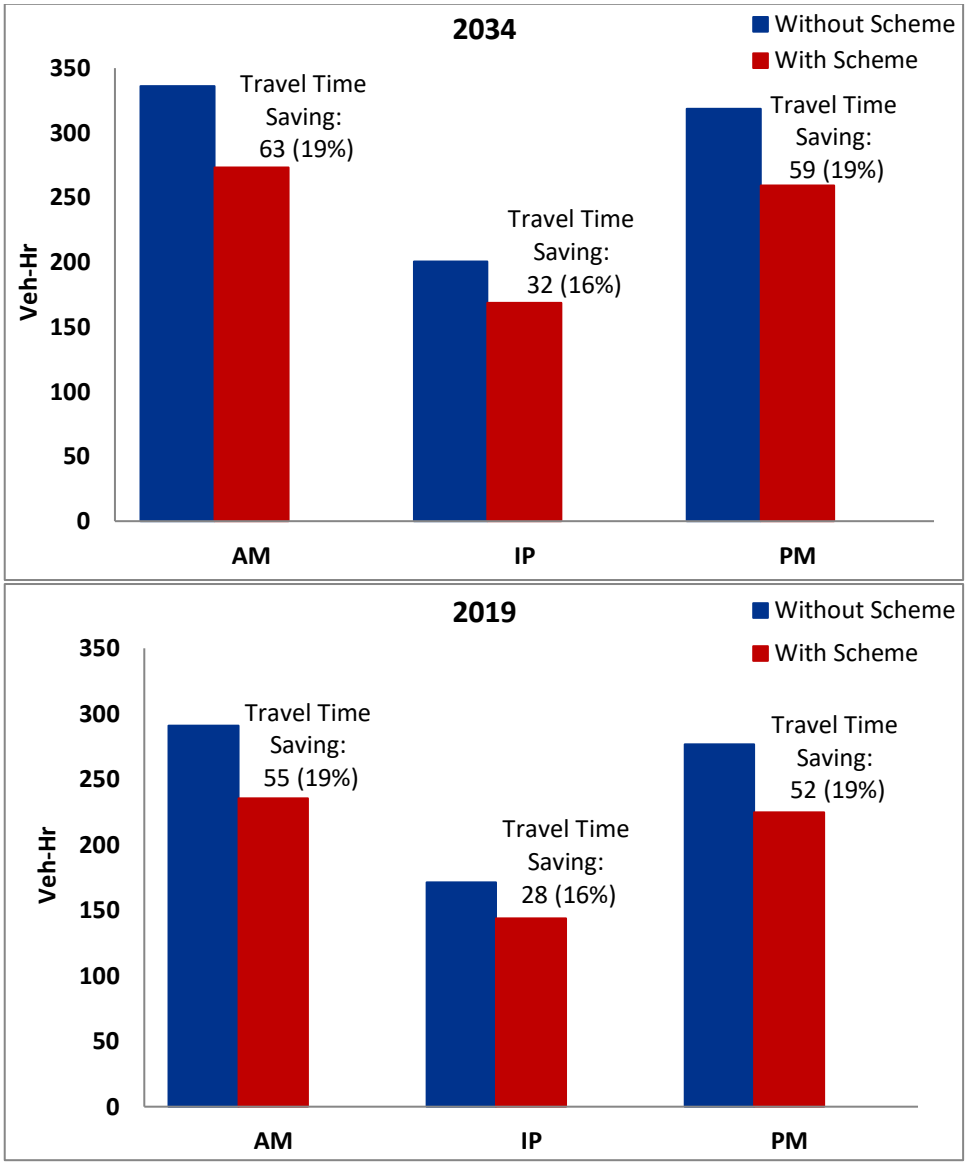

Figure 4-5: Journey Time Savings

4.4 Generalised Cost Changes

In view of a new set of WebTAG values of time and operating cost (November 2018) a comparison of the cost values is shown below in Table 4-6 and a sensitivity test has been undertaken as part of the monetisation of scheme benefits to understand the impact of new values on the scheme Benefit-Cost ratio and Value for Money.

The comparison of VOT and VOC between the July 2016 WebTAG release used for modelling and the latest November 2018 release show that the change in VOC is at most increase of 5% for weekday average car user and change in VOT is the reduction of 15% to 35%. This effect of the large VOT changes to car trip route choice is shown through the change in scheme benefits in the sensitivity test, Section 5.4.

Table 4-6: VOT and VOC Changes Comparison

Source	Year	AM		IP		PM	
		PPM	PPK	PPM	PPK	PPM	PPK
WebTAG - July 2016	2019	24.53	6.9	26.95	6.9	22.83	6.9
	2034	32.61	6.54	35.84	6.54	30.36	6.54
WebTAG - November 2018	2019	19.97	7.23	18.72	7.23	19.41	7.23
	2034	25.01	6.7	23.45	6.7	24.31	6.7
% Difference - November 2018	2019	-19%	5%	-31%	5%	-15%	5%
	2034	-23%	2%	-35%	2%	-20%	2%

5 Economic Appraisal

5.1 Overview of the Approach to Economic Assessment

An economic assessment has been undertaken to assess the transport user benefits of the scheme, in relation to the scheme costs, using the results of the logit models.

The derivation of a Benefit Cost Ratio (BCR) is the traditional approach to quantifying the costs and benefits of a transport intervention. This considers travel time savings, distance based user benefits/ disbenefits, and associated vehicle operating cost, safety, noise, carbon, air quality, indirect taxation and infrastructure maintenance cost changes as a result of the scheme.

Costs of the scheme, outlined in the next section, have been provided by Lancashire County Council (the Scheme promoter).

The output BCR from the assessment is a prominent input into how a scheme intervention is appraised as part of the Business Case submission and supporting documentation.

Figure 5-1 illustrates how the outputs from the economic appraisal feed into the scheme appraisal process and 'Value for Money (VfM)' categories.

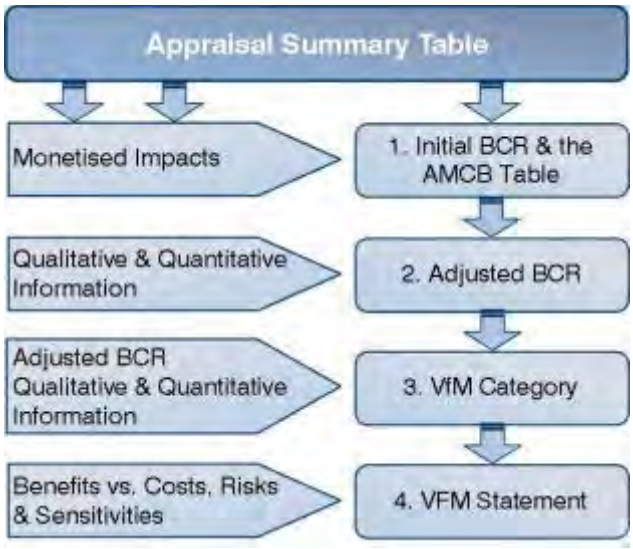

Figure 5-1: BCR & VfM[1]

As per Department for Transport (DfT) guidance and the Transport for Lancashire assurance framework requirements, the output BCR determines the VfM category the scheme falls within, as defined below:

- poor VfM if the BCR is less than 1.0;
- low VfM if the BCR is between 1.0 and 1.5;
- medium VfM if the BCR is between 1.5 and 2.0;
- high VfM if the BCR is between 2.0 and 4.0; or;
- very high VfM if the BCR is more than 4.0.

[1] DfT (Dec 2013) *Value for Money Assessment: Advice Note for Local Transport Decision Makers.*

In addition to the user benefits outlined above, calculation of planning gain associated with land value changes as result of implementation of the proposed scheme has been undertaken specifically for development that is dependent on the link road.

A separate assessment has been undertaken to assess the Gross Value Added (GVA) benefits associated with housing and employment developments which depend on the scheme. The additional jobs associated with these developments would have a positive impact on the local economy. This GVA assessment was undertaken using a methodology consistent with that required for Highways England's Growth and Housing Fund submissions. It aligns with guidance on additionality, and the principles and procedures adopted in WebTAG.

This section of the report provides the scheme cost estimates and presents methodology and results from the BCR, dependent development and GVA analysis.

5.2 Scheme Costs

5.2.1 Cost Estimates

Part of the economic assessment process is to derive the costs associated with the scheme development and maintenance. The costs estimates have been provided by Lancashire County Council, the scheme promoter, and represent the latest available estimates at the time of writing.

The scheme cost includes construction, design, preparation and supervision costs. These costs are comprised of the following elements

- *£2.78m Preliminaries*
- *£2.05m Statutory Undertakers Costs*
- *£0.42m Signs and Road Marking*
- *£0.28m Landscape and Ecology*
- *£11.0m Road Construction Cost*
- *£1.81m Structural Costs*
- *£5.63m QRA*
- *£0.83m Inflation*
- *£0.38m Land Compensation*
- *£1.43m Site Supervision*
- *£0.57m Optimism Bias*

Table 5-1 and Table 5-2 summarise the scheme cost estimates and the corresponding expenditure profile.

Table 5-1: Scheme Cost Estimate

	Construction	Land	Supervision	Risk
Cost	£19,164,919	£375,000	£1,430,000	£5,631,784
Total	**£26,601,703**			
Total including Optimism Bias	**£27,176,651**			

Table 5-2: Scheme Cost Expenditure Profile

Year	18/19	19/20	20/21	21/22	22/23	Total
Profile	4%	19%	49%	26%	2%	100%

The above costs include the following assumptions:

- Optimism Bias has been included at 3% of construction cost
- To ensure that the scheme costs account for real changes above and below general inflation in the economics modelling, a further adjustment was applied based on the conservative assumption of 5.5% per annum construction related inflation beyond 2020 (the scheme costs include an allowance for inflation up to 2020). This rate is based on the report by the Royal Institution of Chartered Surveyors' Building Cost Information Service (BCIS) report issued in March 2016.

The capital cost of maintenance is the cost of people, machinery and materials to maintain the highway network. There would be an additional cost associated with the maintenance of the M55 Heyhouses Link Road scheme. This has been calculated based on standard road maintenance profiles and costs contained within Table 4/1 of the QUADRO 4 Manual (DMRB Volume 14, Section 1, Part2, Chapter 4, May 2016). The proposed scheme is assumed as Single Carriageway 2 Lane road.

Table 5-3 presents the capital cost of maintenance in 2010 and 2017 prices. It should be noted that these costs were discounted to 2010 prices and values, based on the year of actual spend, and as per guidance in the QUADRO manual (May 2016).

Table 5-3: Capital Cost of Maintenance and Expenditure Profile

Years after Scheme Opening	0	11	22	32	42	52	
Year	2022	2033	2044	2054	2064	2074	TOTAL
Works	NEW	TS*	Ov**	TS	Ov	TS	
Cost (£000s)/ km (2010 Prices)	-	£66	£240	£66	£252	£66	-
Cost (£000s) for 2.5km Link Road (2010 Prices)	-	£165	£600	£165	£630	£165	£1,725
Cost (£000s) for 2.5km Link Road (2017 Prices)	**£0**	**£181.65**	**£660.54**	**£181.65**	**£693.57**	**£181.65**	**£1,899.05**
*** TS = Thin Surfacing (Typically 30mm)** **** Ov = Overlay (height = 50mm, 100mm)**							

The maintenance cost of the M55 Heyhouses Link Road is likely to be partially off-set by a reduction in the maintenance required on the local road network, due to a reduction in traffic, particularly on Ballam/Peel Road. However, this effect is likely to be negligible and has not been included in the analysis.

5.2.2 Developer Contributions

The scheme will be partially funded through £7m of developer contributions, as part of Queensway Residential Development by Kensington Developments Limited. As these contributions mean that part of the scheme cost ultimately comes from the private sector rather than government funding, these contributions are subtracted from the overall scheme costs when calculating the PVC. However, the developer contributions are also subtracted from the transport user benefits accruing to business users and providers.

5.2.3 Present Value of Costs

In order to use the scheme cost estimates and the capital cost of maintenance in the economic appraisal, they have been adjusted to a common base to ensure they are compatible for direct comparison with the monetised benefits of the scheme.

Based on DfT's standard appraisal assumptions, costs have been deflated and discounted to a 2010 price base. Further details on the discounting procedure are provided in section 5.3.4.

Costs have been provided in resource prices, i.e. net of indirect taxation. As part of the economic appraisal process, scheme costs have been converted into market prices, as required, using an appropriate factor of 1.19.

The adjusted costs have been summed up from a stream of costs over the 60 year appraisal period to a single figure known as the Present Value of Costs (PVC).

The PVC for the proposed scheme is shown in Table 5-4.

Table 5-4: Present Value of Costs (2010 prices, discounted to 2010)

Cost	PVC
Scheme Cost	£19,695,694
Maintenance Cost	£508,541
Developer Contribution	-£5,306,771
Total PVC	**£14,897,463**

5.3 Scheme Benefits

5.3.1 Quantification of Scheme Benefits

Using the outputs from the logit model described above, the following benefits/ disbenefits have been quantified to derive the Value for Money of the scheme.

Travel Time Savings

Travel time saving benefits were derived by comparing the travel times in the Without Scheme scenario with travel times in the With Scheme scenario. It will generally take a shorter time to travel through the study area when the scheme is implemented and these time savings are converted into a monetary value over the entire appraisal period using Values of Time (VoT).

A rule of a half was applied to ensure consistency with the approach otherwise adopted in TUBA, along with use of the Summer (July 2016) WebTAG Databook.

Time savings for the opening and forecast years have been monetised for an AM, IP and PM time period, using standard WebTAG values of time (VoT) based on vehicle and journey purpose splits, as outlined in WebTAG guidance.

Given the more rural nature of the networks in the study area, an assessment was also undertaken to see how weekend traffic compared to weekday traffic, to establish whether there was also a robust case for using weekend benefits as part of the scheme's annualisation.

Vehicle Operating Cost (VOC)

Vehicle Operating Cost (VOC) changes occur due to changes in costs associated with such items as fuel, maintenance, and wear and tear. These occur due to changes in speed and travel 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.

These have been quantified using the non-fuel and fuel rates based on market prices, calculated as per WebTAG Databook Summer (July 2016).

Accident Benefits

The accident benefits of the scheme have been calculated using COBALT(Version 2013.02). The three routes used in the route choice logit model formed the COBALT network. Available ATC flows (in AADT), link distances and accident numbers from the STATS19 database for a 5 year period (2011-2015) were utilised to calculate the observed accident rates. For links where observed traffic flows were not available and for the scheme links COBALT default accident rates were used.

The accident rates and the future demand flows obtained from the logit model were coded into COBALT input file for with and without the scheme scenarios. The forecast numbers of accidents in each scenario were quantified and monetised in COBALT and included in the calculation of the scheme PVB and BCR.

Marginal External Costs (MECs)

These are the external costs borne by non-travellers, in addition to private costs borne by the individual traveller (such as fuel costs and personal travel time).

In this study, these external cost changes include congestion changes, infrastructure maintenance changes, noise, green gases and fuel/ indirect tax changes; using the change in vehicle kilometres saved between the Without Scheme and the With Scheme scenarios as the core driver of the appraisal.

The assessment utilised the methodology outlined in WebTAG Unit A5.4 'Marginal External Costs' and applied appropriate rural road types.

5.3.2 Annualisation Factors

In accordance with transport appraisal guidance, annualisation factors are required to expand hourly benefits to daily and to a full year.

Benefits were calculated using traffic counts for AM, IP and PM peak hours that represent single hours for a typical average, neutral month weekday.

To produce a robust assessment, the annualisation factors were needed to factor modelled hours to be representative of those periods with similar flows within a year.

Local, scheme specific annualisation factors have been derived using Automatic Traffic Count (ATC) data on the B5261 Queensway and Peel Road for weekday and weekend.

Figure 5-2 depicts Queensway 24-hr average flow profile for a weekday and an average weekend day.

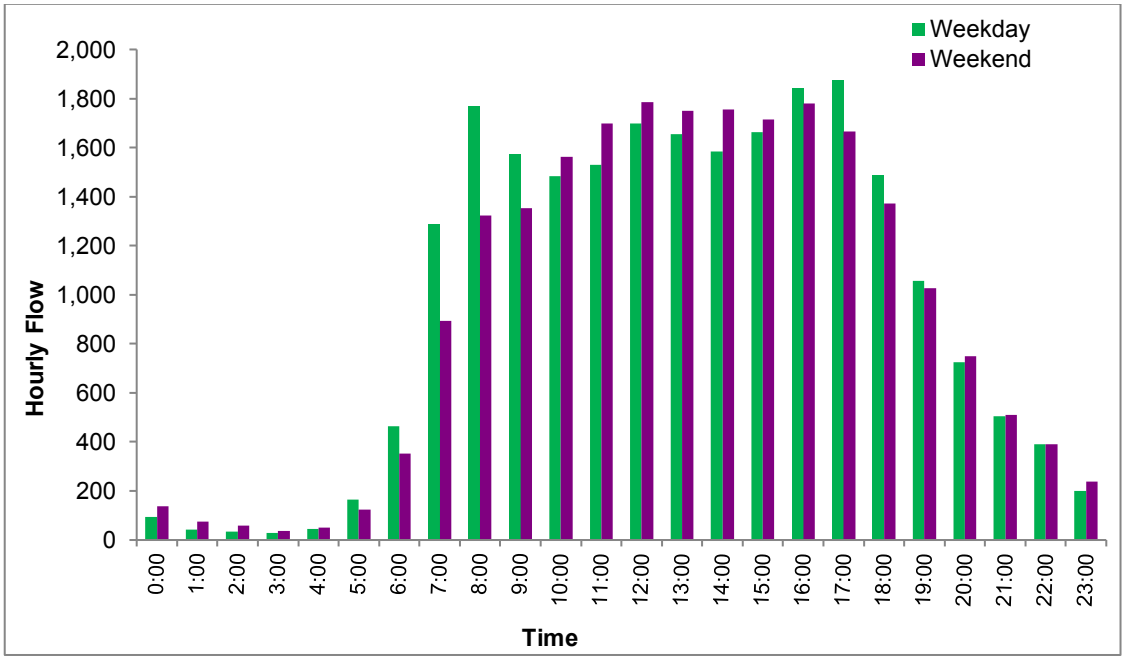

Figure 5-2: Queensway 24-hr Flow Profile

Peak hour factors were derived from the traffic counts and flow profile to determine how many hours per day each modelled hour represents. These factors are shown in Table 5-5. This shows that, for example, the traffic flows and journey times modelled for the PM peak can be used to represent two hours during the PM peak period each day.

Table 5-5: Peak Hour Factors

Time Period	Peak hour to Peak Period Factor
AM	1
IP	6
PM	2

The final annualisation factors for each weekday time period were calculated by multiplying peak period factors by the number of working days per year (253).

Comparison of the weekend traffic flow pattern with the weekday was used to monetise the benefits gained in weekend. It showed that the demand level for 2 hours in weekend was similar to weekday PM demand level; and similarly 9 hours throughout weekend had the traffic flow close to weekday IP demand. These were then used to derive annualisation factors for weekend transport benefits.

The resultant annualisation factors are shown in Table 5-6.

The off-peak periods (19:00 – 07:00) and bank holidays have not been considered.

Table 5-6: Annualisation Factor

	Time Slice	Time	Peak hour to Peak Period Factor	Days	Annualisation Factor
Weekday	AM Peak	07:00 to 10:00	1	253	253
	Inter-peak	10:00 to 16:00	6	253	1518
	PM Peak	16:00 to 19:00	2	253	506
Weekend	Inter-peak	-	9	100	900
	PM Peak	-	2	100	200

5.3.3 Appraisal Period

In accordance with TAG Unit A1.1 (Paragraph 2.1.1), the economic assessment period should extend 60 years after the scheme opening. The scheme opening year was initially programmed to be 2019. However, due to the scheme opening year being moved back, the economic assessment has now been carried out over a 60 year appraisal period from 2022 to 2081. Based on the advice provided in the DfT's TUBA software guidance, the modelled data for the 2019 opening year has been retained, and used to calculate benefits for a 63-year period between 2019 and 2081. However, benefits for the first three years between 2019 and 2021 were removed from the final calculation of benefits.

The benefits have then been calculated and factored up to an annual period to produce a yearly benefit for the scheme (for the opening and forecast years) and interpolated and projected over a standard 60-year appraisal period as illustrated in Figure 5-3.

As shown, benefits were assumed to be constant after the last model year and were discounted to 2010, as explained in the next section.

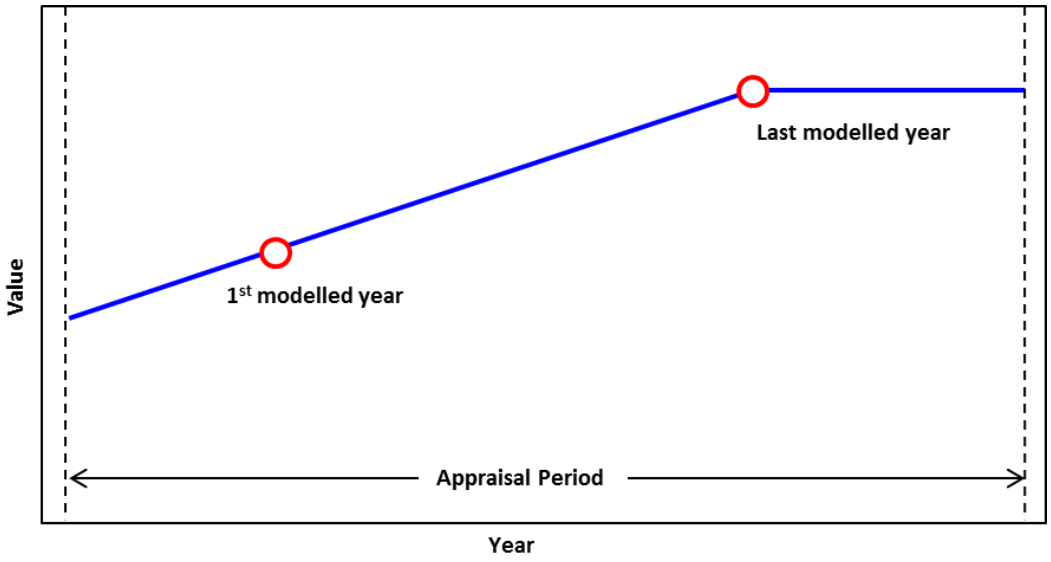

Figure 5-3: Interpolation and Projection of Benefits

5.3.4 Discounting

Discounting was undertaken within a spreadsheet over the 60-year period using a 3.5% discount rate for the first 30 years and then a 3% discount rate for the next 30 years, as defined in WebTAG, and in line with Treasury Green Book guidance.

Summing the stream of discounted benefits over the appraisal period results in the Present Value of Benefits (PVB); the value of a benefit in the base year equivalent to the stream of estimated benefits.

PVC and PVB therefore mean that all costs and benefits are in 2010 price base and also discounted to 2010.

5.3.5 Sensitivity Tests

The economic assessment has been undertaken to monetise the scheme benefits using 'the most likely' traffic forecasts known as the Core Scenario, discussed in Section 4.2. Additionally, two sensitivity tests have also been carried to ensure that the benefits have not been overestimated due to uncertainties around traffic demand forecast. The sensitivity scenarios are 'Core Scenario without Weekend Benefits' and 'Low Growth Scenario'.

In line with WebTAG, the Low Growth traffic forecast scenario has been developed to take into account of the possibility of reduced traffic demand as a result of national uncertainty regarding forecasts of population, households, employment, GDP growth and fuel price trends and their impact on future traffic growth.

To create a Low Growth scenario in line with WebTAG Unit M4 a percentage of the base year demand has been subtracted from the Core scenario. The proportion to be subtracted has been calculated in line with the proportion of square root of the difference of forecast and base years, as described below.

$$Reduction\ Proportion = \sqrt{(Forecats\ Year - Base\ Year)} \times p$$

According to WebTAG guidance in this study, the parameter p takes the value of 2.5%, reflecting the uncertainty around annual forecasts from the National Transport Model, based on the macro-economic variables that influence the main drivers of travel demand.

In addition to the above, a sensitivity test has also been carried out in order to investigate the impacts of new PPM and PPK parameters (from WebTAG Databook November 2018) on the BCR analysis of the proposed scheme. It should be noted that other parameters such as VoT growth factors, and MEC rates were also updated in line with the latest version of the WebTAG Databook. (November 2018)

Finally, since the scheme costs are not finalised at this stage, sensitivity analysis have also been undertaken to consider other possible levels of optimism bias included in the scheme construction costs and examine their impacts on the value for money assessment of the proposed scheme. These tests were performed for 15% and 44% optimism bias in the November 2018 WebTAG Core Scenario.

The results of these assessments are provided in Section 5.4.

5.4 BCR Analysis Results

5.4.1 Core Scenario

Table 5-7 outlines the outputs of the BCR analysis for the scheme.

The appraisal results of the scheme show that the majority of benefits come from the journey time savings as a result of implementing the proposed scheme.

Having the scheme in place is expected to increase the amount of distance travelled; therefore the MEC benefits are all negative since they have been calculated based on a change in distance travelled between the Without and With Scheme scenarios. However, the amount of disbenefits is insignificant compared to the expected journey time benefits.

The result of COBALT assessment shows that the proposed scheme will reduce the number of accidents, resulting in £1.7m of benefits over the appraisal period. Although it is expected that there will be an overall increase in distance travelled, the scheme provides accident benefits as a result of lower forecast accident rates on the new route compared to observed accident rates on parallel existing routes. Indirect Tax Revenue is positive due to an increase in the distance travelled and consequently an increase in fuel consumption.

In line with the WebTAG guidance, the value of the developer contribution has been recorded as a negative value in both PA table (to offset the cost to the public sector provider) and TEE table (to record the cost to the private sector developer).

Table 5-7: BCR Results - Core Scenario (2010 prices, discounted to 2010)

Element		Benefits
MEC - Noise		-£7,066
MEC - Greenhouse Gases		-£34,548
MEC - Journey Quality (Congestion)		-£403,592
MEC - Physical Activity		-
MEC - Infrastructure Maintenance		-£7,647
Accidents		£1,702,700
Economic Efficiency: Consumer Users (Commuting)	Travel Time	£5,390,824
	Vehicle Operating Costs	-£98,688
Economic Efficiency: Consumer Users (Other)	Travel Time	£35,292,199
	Vehicle Operating Costs	-£646,083
Economic Efficiency: Business Users and Providers	Travel Time	£12,264,564
	Vehicle Operating Costs	-£224,523
	Developer Contribution	-£5,306,771
Wider Public Finances (Indirect Taxation Revenues)		£138,879
Present Value of Benefits (PVB)		**£48,060,247**
Broad Transport Budget		**£14,897,463**
Present Value of Costs (PVC)		**£14,897,463**
Net Present Value (NPV)		**£33,162,784**
Benefit to Cost Ratio (BCR)		**3.23**

With a **BCR of 3.23,** the M55 Heyhouses Link Road Scheme delivers '**high'** value for money, as outlined in DfT guidance. This does not incorporate dependent development benefits, nor the net GVA associated with their delivery.

Analysis of the travel time benefits by trip purpose, shown in Table 5-9 below, indicates that 23% of the benefits come from Business trips, 10% are associated with Commuting trips and 67% with Other trips. The proportions of Other and Business trips benefits are slightly higher than usual due to consideration of the weekend benefits in which the trip purposes are mainly Business and Other.

Table 5-8: Travel Time Benefits by Journey Purpose - Core Scenario (2010 prices, discounted to 2010)

Purpose	Time Benefits
Business	£12,264,564
Commuting	£5,390,824
Other	£35,292,199
Total	**£52,947,587**

Analysis of the travel time benefits by time period, as shown in Table 5-10 indicates that 11% of the benefits are associated with AM trips, 21% with PM trips, 37% with IP trips and 30% from weekend trips. This is logical as annualisation factor for IP benefits is higher than for AM and PM benefits.

Table 5-9: Travel Time Benefits by Time Period- Core Scenario (2010 prices, discounted to 2010)

Time Period	Time Benefits
Weekday AM	£5,867,628
Weekday Interpeak	£19,845,045
Weekday PM	£11,118,397
Weekend	£16,116,516
Total	**£52,947,587**

5.4.2 BCR Results – Core Scenario without Weekend Benefits

A sensitivity test has also been carried out to assess the impact of excluding weekend benefits from the value for money assessment of the proposed scheme.

As presented in Table 5-11, the **BCR** of the M55 Heyhouses Link Road Scheme, 2.23, is forecast to remain 'high' value for money, in traditional BCR terms, even when excluding weekend benefits.

As expected, this scenario predicts lower travel time benefits than the core scenario in particular for Other users, since the majority of weekend trip purpose split was given to this user class in line with WebTAG Unit A1.3.4.

Table 5-10: BCR Results – Core Scenario without Weekend Benefits (2010 prices, discounted to 2010)

Element		Benefits
MEC - Noise		-£6,175
MEC - Greenhouse Gases		-£30,162
MEC - Journey Quality (Congestion)		-£352,269
MEC - Physical Activity		-
MEC - Infrastructure Maintenance		-£6,680
Accidents		£1,702,700
Economic Efficiency: Consumer Users (Commuting)	Travel Time	£5,283,276
	Vehicle Operating Costs	-£123,311
Economic Efficiency: Consumer Users (Other)	Travel Time	£19,262,042
	Vehicle Operating Costs	-£449,575
Economic Efficiency: Business Users and Providers	Travel Time	£12,285,753
	Vehicle Operating Costs	-£286,749
	Developer Contribution	-£5,306,771
Wider Public Finances (Indirect Taxation Revenues)		£121,104

Present Value of Benefits (PVB)	**£32,093,182**
Broad Transport Budget	**£14,897,463**
Present Value of Costs (PVC)	**£14,897,463**
Net Present Value (NPV)	**£17,195,718**
Benefit to Cost Ratio (BCR)	**2.15**

Analysis of the travel time benefits by trip purpose, shown in Table 5-12 below, indicates that 33% of the benefits come from Business trips, 14% are associated with Commuting trips and 52% with Other trips. As expected, the Other and Business trip benefits have dropped due to exclusion of weekend benefits.

Table 5-11: Travel Time Benefits by Journey Purpose - Core Scenario without Weekends (2010 prices, discounted to 2010)

Purpose	Time Benefits
Business	£12,285,753
Commuting	£5,283,276
Other	£19,262,042
Total	**£36,831,070**

Analysis of the travel time benefits by time period, as shown in Table 5-13 indicates that 16% of the benefits are associated with AM trips, 30% with PM trips and 50% with IP trips. This is again logical as annualisation factor for IP benefits is higher than for AM and PM benefits.

Table 5-12: Travel Time Benefits by Time Period- Core Scenario without Weekends (2010 prices, discounted to 2010)

Time Period	Time Benefits
Weekday AM	£5,867,628
Weekday Interpeak	£19,845,045
Weekday PM	£11,118,397
Total	**£36,831,070**

5.4.3 BCR Results - Low Growth Scenario

The results of the Low Growth sensitivity test are presented in Table 5-14.

With a **BCR of 2.97** the M55 Heyhouses Link Road Scheme is still forecast to deliver '**high**' value for money, even when considering a low growth scenario.

As expected, the Low Growth scenario predicts moderately lower travel time benefits than the core scenario, as shown in Table 5-15 and Table 5-16, with a similar proportion of benefits from each user class and peak hour, as the core scenario.

As previously, this again excludes dependent development benefits, and the net GVA associated with their delivery.

Table 5-13: BCR Results – Low Growth Scenario (2010 prices, discounted to 2010)

Element		Benefits
MEC – Noise		-£7,280
MEC - Greenhouse Gases		-£35,546
MEC - Journey Quality (Congestion)		-£415,120
MEC - Physical Activity		-
MEC - Infrastructure Maintenance		-£7,874
Accidents		£1,702,700
Economic Efficiency: Consumer Users (Commuting)	Travel Time	£5,015,915
	Vehicle Operating Costs	-£101,996
Economic Efficiency: Consumer Users (Other)	Travel Time	£32,804,998
	Vehicle Operating Costs	-£667,072
Economic Efficiency: Business Users and Providers	Travel Time	£11,393,144
	Vehicle Operating Costs	-£231,673
	Developer Contribution	-£5,306,771
Wider Public Finances (Indirect Taxation Revenues)		£142,663

Present Value of Benefits (PVB)	**£44,286,089**
Broad Transport Budget	**£14,897,463**
Present Value of Costs (PVC)	**£14,897,463**
Net Present Value (NPV)	**£29,388,625**
Benefit to Cost Ratio (BCR)	**2.97**

Table 5-14: Travel Time Benefits by Journey Purpose – Low Growth Scenario (2010 prices, discounted to 2010)

Purpose	Time Benefits
Business	£11,393,144
Commuting	£5,015,915
Other	£32,804,998
Total	**£49,214,058**

Table 5-15: Travel Time Benefits by Time Period- Low Growth Scenario (2010 prices, discounted to 2010)

Time Period	Time Benefits
Weekday AM	£5,529,291
Weekday Interpeak	£18,401,204
Weekday PM	£10,330,728
Weekend	£14,952,835
Total	**£49,214,058**

5.4.4 BCR Results – WebTAG Databook November 2018 Sensitivity Analysis

Table 5-16 provides the summary results of applying the latest WebTAG databook (November 2018) parameters in the transport user benefit calculations of the proposed scheme. The BCR value is 2.57 which indicates that the propsoed scheme still remains within high VfM category.

Table 5-16: BCR Results – WebTAG Databook November 2018 Sensitivity Analysis (2010 prices, discounted to 2010)

PVB	PVC	NPV	BCR
£36,746,181	£14,297,329	£22,448,852	2.57

5.4.5 BCR Results – Optimism Bias Sensitivity Analysis

Table 5-17 presents the results of sensitivity tests around the scheme cost in the core scenario using the latest WebTAG databook values (November 2018). As shown, the proposed scheme still shows high to medium value for money by including 15% or 44% optimism bias, with the BCR ranging from 2.30 to 1.84.

Given the high amount of risk included in the scheme cost estimate (over 30% of the construction cost) and the level of detail behind the scheme cost estimate 44% optimism bias is unrealistic at this stage, and this exercise has been merely performed to provide assurance with regards to the robustness of scheme cost and its impact on the BCR analysis.

Table 5-17: BCR Results – Optimism Bias Sensitivity Analysis (2010 prices, discounted to 2010)

Level of Optimism Bias	PVB	Scheme Cost	PVC	NPV	BCR
15%	£36,746,181	£29,476,441	£15,952,577	£20,793,604	2.30
44%		£35,034,267	£19,952,762	£16,793,419	1.84

5.5 Dependent Development Assessment

In line with WebTAG Unit A2.3 the dependent development benefits and external costs of the scheme have been estimated but not included in the calculation of the scheme BCR.

It has been established from LCC and through the planning application process that the Queensway residential and employment developments can only go ahead in full if the link road is built and are therefore dependent on the scheme.

None of the other developments are actually directly dependent on the scheme, although access to them will be improved by the scheme.

The planning gain associated with the change in land use of the dependent development is represented by the uplift in land value arising from the decision to grant planning permission for that development. This uplift is defined as the value of the land in its new residential or employment use minus the value of the land in its existing (e.g. agricultural) use.

The non-transport external impact of the 'dependent development' reflects the loss in amenity value of the land in its existing use. This is calculated based on values within the WebTAG 'Valuing Housing Impacts' workbook.

The transport external costs result from the congestion caused by the additional trips from these developments; thus disbenefiting the existing road users. To estimate the transport external costs, the following two model runs were undertaken:

- With the proposed M55 Heyhouses Link Road, but without Queensway Development

- With the proposed M55 Heyhouses Link Road, and with Queensway Development

In the latter model, only the proportion of the trips affecting the study was included in the model. The impacts of remaining trips were however considered in terms of junction delays, wherever appropriate. In addition, the forth zone was created in this model to represent the proposed development and allow assigning the additional trips.

The number of trips and their distribution pattern were obtained from the Queensway Development TA and are summarised in Table 5-18 below. It should be noted that the trips to/from Whitehill Road, highlighted in bold in the tables, were assigned to the road network. The IP peak hour trips were assumed to be same as those of the PM peak hour since no trip generation was undertaken for the IP peak hour.

Table 5-18: Residential Development Trip Generation and Distribution

To/From	Trip Distribution	Residential Development Trips					
		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Blackpool Road	24%	54	122	176	118	74	192
St Anne's Road East	15%	34	76	110	74	46	120
Highbury Road East	7%	16	35	51	34	22	56
Common Edge Road	27%	61	137	198	132	83	216
Whitehill Road	**27%**	**61**	**137**	**198**	**132**	**83**	**216**
Total	100%	227	507	734	490	309	799

As presented in Table 5-19 and Table 5-20, the trips from Queensway Development would create additional delays and therefore increase the journey times on the proposed link through SFC. The induced delays would push the existing users back to the parallel routes, particularly Lytham trips to Peel Road.

Due consideration was given to include the additional delays at junctions as a result of the development traffic, using the junction modelling results in the TA. However, the delays were found relatively short and unlikely to cause a significant change in the trip assignment results.

Table 5-19: Dependent Development Models Trip Assignment Results – 2019

Zone		AM Peak Hour						
		Without Queensway Development			With Queensway Development			Total Zone Demand
		Route 1*	Route 2	Route 3	Route 1**	Route 2	Route 3	
Zone 1	Lytham St Annes	9	571	0	10	570	0	**580**
Zone 2	Fairhaven	0	333	0	0	333	0	**333**
Zone 3	Lytham	0	554	202	0	539	216	**755**
Zone 4	Queensway Development	-	-	-	0	198	0	**198**
Total		**9**	**1458**	**202**	**10**	**1640**	**216**	**-**
Zone		**IP Peak Hour**						
		Without Queensway Development			**With Queensway Development**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	7	525	0	7	525	0	**532**
Zone 2	Fairhaven	0	139	0	0	139	0	**139**
Zone 3	Lytham	0	100	306	0	97	310	**407**
Zone 4	Queensway Development	-	-	-	0	216	0	**216**
Total		**7**	**764**	**306**	**7**	**977**	**310**	**-**
Zone		**PM Peak Hour**						
		Without Queensway Development			**With Queensway Development**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	9	588	0	10	587	0	**597**
Zone 2	Fairhaven	0	302	0	0	302	0	**302**
Zone 3	Lytham	0	394	309	0	387	317	**704**
Zone 4	Queensway Development	-	-	-	0	216	0	**216**
Total		**9**	**1284**	**309**	**10**	**1492**	**317**	**-**

Note: Traffic flow shown on Route 1 does not include Blackpool Traffic.
****Note: Traffic flow shown on Route 1 does not include Blackpool Traffic.***

Table 5-20: Dependent Development Models Trip Assignment Results - 2034

Zone		AM Peak Hour						
		Without Queensway Development			With Queensway Development			Total Zone Demand
		Route 1*	Route 2	Route 3	Route 1**	Route 2	Route 3	
Zone 1	Lytham St Annes	3	667	0	4	667	0	**671**
Zone 2	Fairhaven	0	385	0	0	385	0	**385**
Zone 3	Lytham	0	701	172	0	682	192	**874**
Zone 4	Queensway Development	-	-	-	0	198	0	**198**
Total		**3**	**1753**	**172**	**4**	**1932**	**192**	**-**
Zone		**IP Peak Hour**						
		Without Queensway Development			**With Queensway Development**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	2	622	0	2	622	0	**624**
Zone 2	Fairhaven	0	163	0	0	163	0	**163**
Zone 3	Lytham	0	103	373	0	98	378	**476**
Zone 4	Queensway Development	-	-	-	0	216	0	**216**
Total		**2**	**888**	**373**	**2**	**1099**	**378**	**-**
Zone		**PM Peak Hour**						
		Without Queensway Development			**With Queensway Development**			**Total Zone Demand**
		Route 1*	**Route 2**	**Route 3**	**Route 1****	**Route 2**	**Route 3**	
Zone 1	Lytham St Annes	3	685	0	3	685	0	**688**
Zone 2	Fairhaven	0	348	0	0	348	0	**348**
Zone 3	Lytham	0	498	313	0	480	330	**810**
Zone 4	Queensway Development	-	-	-	0	216	0	**216**
Total		**3**	**1531**	**313**	**3**	**1729**	**330**	**-**

Note: Traffic flow shown on Route 1 does not include Blackpool Traffic.
****Note: Traffic flow shown on Route 1 does not include Blackpool Traffic.***

The results of the logit models were used to monetised the transport external costs in a similar manner as the Core Scenario. These costs were then subtracted from the planning gain benefits to calculate the total benefits from the dependant developments. In line with the guidance, the development trips were not considered in monetisation of disbenefits to the existing users.

These benefits are not incorporated in the BCR itself, but have been provided as further evidence in terms of social welfare benefits associated with the scheme. [2]

The external costs and benefits caused by the dependent development have been monetised in accordance to TAG unit A2.3 and reported in Table 5-21.

[2] It is recognised that the external costs of the development are difficult to calculate without a formal model, but that given the improved nature of Wild Lane, disbenefits would not be expected to erode a significant amount of the planning gain benefits

These benefits have not been incorporated in the scheme BCR.

Table 5-21: Dependent Development Benefit Results

Dependent Development Impacts Stream	Benefits (£m)
Planning gain	£94.3m
Non-transport external costs caused by dependent development	-£56.2m
Transport external costs caused by dependent development	-£0.6m
Total	**£37.5m**

With the use of the WebTAG 'Valuing Housing Impacts' spreadsheet model the overall uplift in land value arising from the planning permission for this area has been estimated to be £94.3m.

The loss in amenity value of the agricultural land for the 71ha was estimated to be £56.2m which represents the non-transport external costs from the dependent development.

The transport external costs caused by the dependent development have also been calculated to be £0.6m, based on the results of the logit assignment models describe in Section 5.3. As stated earlier, the development trips have been excluded from the calculation of disbenefits to the existing users.

Thus, the benefits of the Queensway dependent development are expected to be £37.5m. Considering qualitative assessment scores suggested by WebTAG guidance in Table 5-22, this development is expected to have a **moderate beneficial** score.

Table 5-22: Qualitative assessment scores suggested by WebTAG guidance for Dependent Development benefits

Table 1 Suggested qualitative assessment scores

Benefits	Score
Greater than £100m	Large beneficial
Between £100m and £25m	Moderate beneficial
Between £25m and zero	Slight beneficial
Zero	Neutral
Between zero and -£25m	Slight adverse
Between -25m and -£100m	Moderate adverse
Less than -£100m	Large adverse

In line with WebTAG guidance, this element is not considered within the Analysis of Monetised Costs and Benefits (AMCB) and therefore has not been included in the calculation of the Benefit to Cost Ratio (BCR).

In addition to quantification of benefits, Queensway Development Transport Assessment (TA, 2011) was also reviewed to realise forecast performance of the junctions on the new route. The objective was to make a judgement on whether the additional traffic that is forecast to transfer to the new link road can be accommodated without causing significant delays. Queensway Development is the only residential proposal that is able to proceed fully only with the M55 Heyhouses link road in place, based on the Secretary of State Statement in 2012.

B5410 Lytham St Annes Way/Heyhouses Lane and Whitehill Rd/School Rd/B5410 Wild Lane were the junctions situated on the new route and assessed as part of the TA operational assessment for the fully built scenario in 2026. This scenario included the 1,150 dwelling units, Heyhouses East-West Bypass and M55 Heyhouses Link Road.

In this scenario, the LinSig assessment of B5410 Lytham St Annes Way/Heyhouses Lane junction showed that this junction was anticipated to approach its theoretical capacity and perform with marginal negative PRC under the future forecast demand, as presented in Table 5-23 However, the TA indicates that considering the effect of MOVA control, the junction will perform within capacity.

Table 5-23: Summary Result of B5410 Lytham St Annes Way/Heyhouses Lane junction LinSig Model

Peak Hour	Max Deg. Sat (%)	Total delay over all Links (pcuHr)	PRC over all links (%)	
			Without MOVA	With MOVA
AM	88.4	22.59	1.8	8.8
PM	90.2	29.31	-0.2	6.8

Source: Queensway Development TA, 2011

Comparing the level of through traffic at this junction between the TA and the SOBC forecasting shows the TA flows are actually higher than those of the SOBC. Therefore, this junction is expected to perform within its capacity considering the SOBC flows. The comparison is presented in Table 5-24.

Table 5-24: Comparison of Through Traffic at B5410 Lytham St Annes Way/Heyhouses Lane Junction

Source	AM	PM
TA	924	1071
SOBC	872	688
Difference	**-52**	**-383**

Moreover, the Arcady assessment shows that Whitehill Rd/School Rd/B5410 Wild Lane will reach its capacity even before the forecast year 2026, if no mitigation measure is in place. The TA recommends widening of the south arm (Wild Lane) and extending its flare lane would improve the junction's operation with the maximum ratio of flow to capacity (RFC) of 0.8 by 2026. The result of this scenario with the improvements to the Wild Lane approach is presented in Table 5-25. As presented, the delays and queues are relatively low in both peak hours.

Table 5-25: Summary Result of Whitehill Rd/School Rd/B5410 Wild Lane Arcady Model

Approach	AM Peak Hour			PM Peak Hour		
	RFC (Max)	Queue (Max)	Delay (min/vehicle)	RFC (Max)	Queue (Max)	Delay (min/vehicle)
Lytham St Anne's Way	0.56	1.3	0.11	0.48	0.9	0.09
Whitehill Road	0.17	0.2	0.07	0.23	0.3	0.07
T6 (Wild Lane)	0.79	3.8	0.15	0.65	1.9	0.11
School Road	0.45	0.8	0.09	0.46	0.9	0.09
Cropper Road	0.44	0.8	0.1	0.53	1.1	0.12

Source: Queensway Development TA, 2011

Table 5-26 compares the level of traffic on the proposed link road at the Whitehill Rd/School Rd/B5410 Wild Lane roundabout between TA and SOBC. Unlike the other junction, SOBC forecast flows are higher than those of the TA. Given that the maximum RFC at Wild Lane approach is 0.8, the additional traffic forecast by the SOBC may potentially deteriorate the junction's performance and may result in junction's failure. However, a more robust assessment of the junction is required to confirm the junction's performance.

Table 5-26: Comparison of New Link Road Traffic at Whitehill Rd/School Rd/B5410 Wild Lane Junction

Source	AM	PM
TA	1,698	1,479
SOBC	1,931	1,729
Difference	+233	+250

Differences in the assignment results between TA and SOBC could possibly be due to differences in modelling parameters, modelling tools, and forecasting assumptions. Given that the study has undertaken VfM assessment under various level of demand lower than core scenario, it is not expected that these differences in flows would change the conclusion of the this study. The results of sensitivity tests reported in Section 5.4 show that the proposed scheme remain high VfM despite lower traffic demand. However, the above flow differences may have an impact on the performance of the junction. As above, a more robust assessment of the junction would be required to confirm the junction's performance.

5.6 GVA Analysis

5.6.1 Overview

GVA measures the total value of goods and services; i.e. economic activity. In its simplest terms, it is therefore Gross Domestic Product (GDP) at a local/regional level.

Transport acts as an enabler of growth by allowing additional jobs to be accommodated in a certain location thanks to enhanced transport links and transport capacity. This applies especially to areas suffering from congestion and insufficient transport links. These jobs are therefore not created by the transport scheme itself, but are supported by the increase

in accessibility facilitated by the scheme. The jobs are therefore (to varying proportions) dependent on the transport scheme. This GVA assessment aims to quantify the increase in GVA for the local economy as a result of these additional jobs.

The GVA analysis seeks to complement the standard economic appraisal and provide an indication of the total GVA that could be realised if a transport scheme is implemented.

For the M55 Heyhouses Link Road scheme, an assessment tool developed to support Highways England's Growth and Housing Fund (GHF) scheme was used to assess the scheme's impact on GVA. This is based on empirical evidence and research and has been used to assess similar transport schemes across the country.

5.6.2 Unlocked Developments

The GVA assessment has been undertaken based on the number of jobs likely to be created by the developments that are specifically dependent on the M55 Heyhouses Link Road scheme[3], shown in Table 5-27 below. Other developments as highlighted in Wyre's emerging Local Plan will also benefit from the delivery of the link road.

Table 5-27: Developments Considered in GVA Assessment

Site Name	Number of Homes	Employment Land
Queensway Residential Development (HSS1, 948 units), Valentines (53 units) & Roseacre (46 units)	1,047	N/A
Queensway Employment Site (ES1)	N/A	3.8 Hectare site

Note: In a scenario without Growth Deal funding the approved Queensway Residential development provides a mechanism to deliver the road over a long time period. Until the road is delivered providing its network benefits, a development restriction would remain to those proposals that impacts on Queensway such as Queensway Employment site not being supported by the local highway authority as development impact would result in severe conditions on the network.

The above developments as highlighted in Table 5-27 (this excludes those as highlighted in the Wyre emerging Local Plan) will generate jobs in two ways: directly from the new jobs located within the employment site and indirectly through new jobs that are generated in the area to support the increased population in the new housing site.

Every new job generated by a scheme will bring additional economic benefit to an area. To understand this we must understand which, if any, developments are directly dependent on the scheme. An allowance has been made within the GVA calculations for 'deadweight', i.e. the proportion of the development that would have happened even without the scheme in place.

The GVA quantification has been carried out in three steps. Firstly, the number of jobs provided from the developed employment land was estimated. This draws on HCA guidance, and guidance on employment density[4] to gain estimates for the GFA required

[3] It should be noted that there are other developments in the area that could be supported by the scheme, but they are not specifically unlocked by the scheme, and thus are not incorporated into the transport scheme GVA assessment.

[4] Employment Density Guide 3rd Edition, 2015, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/484133/employment_density_guide_3rd_edition.pdf

per full time employee. Secondly, an estimate was made of the number of permanent jobs related to the new housing. Thirdly, the number of temporary construction jobs associated with building both the road scheme and the unlocked houses was estimated.

For the Queensway employment site, the following breakdown of employment type has been assumed, based on the types of employment present at nearby employment sites:

- 25% B1a General Office and Call Centres
- 25% B2 Industrial and Manufacturing
- 50% B8 Storage and Distribution

Based on the known site area and the job densities of the above employment types, it has been calculated that the Queensway employment site will provide 418 jobs when fully occupied.

The Queensway residential, Roseacre and Valentine's development sites are expected to generate a further 157 jobs indirectly. This is based on evidence in HCA guidance, which suggests that 15 new permanent jobs will be indirectly supported per each 100 new housing units.

It is important to understand that not all the homes and jobs will be realised at the same time given how the development is scheduled to be phased and how occupancy at the employment site is likely to grow over time.

Appendix Aprovides the proposed dates for the completion of each phase of housing of the Queensway residential site, Roseacre and Valentine's development and includes the earliest opportunity that the Queensway employment site can come forward. This presents the phasing under two scenarios: one where Growth Deal funding is available (accelerated delivery), and one where it is not (with development related trigger points).

For the employment site, it is assumed that without Growth Deal funding it would be ready for occupancy from 2028 (in line with the completion of the Queensway residential site). However, should the scheme receive Growth Deal funding the employment site has been assumed to be ready for occupancy from 2021 (7 years earlier, in line with the accelerated delivery programme of the link road). In both cases it is assumed that occupancy increases by 10% each year to full occupancy 10 years after opening.

The number of temporary jobs relating to the construction of both the road and the housing units has been calculated based on the known relationship between construction costs and the number of temporary employees required.

5.6.3 GVA Forecasting Methodology

As mentioned previously, the GVA benefits were calculated using the spreadsheet assessment tool developed to support Highways England's Growth and Housing Fund (GHF) scheme. Benefits were calculated over a fixed appraisal period ending in 2037.

The net GVA was calculated by multiplying the number of new jobs (as calculated above) with an average GVA figure per job. This GVA per job is based on data released by the Office for National Statistics for the Lancashire County Council area.

As well as the allowances made for deadweight (i.e. to account for development that would happen even without the scheme in place); allowances were also made for the following impacts:

- Leakage, accounting for the benefits arising outside the area of impact of the scheme.
- Displacement of jobs from elsewhere with people moving to newly created jobs that had been working elsewhere.
- The multiplier effect, which captures additional economic activity associated with the additional local income, local supplier purchases and longer term development effects.

The factors used to a

ccount for these impacts were based on evidence in HCA Guidance.

5.6.4 Results

The results of the GVA analysis for both the With and Without Growth Deal Funding scenarios are presented in Table 5-29.

Table 5-28: GVA Results

GVA Measure	Without Growth Deal Funding	With Growth Deal Funding
Total Benefits in period ending 2037 (discounted)	£49.59m	£78.35m

With Growth Deal funding leading to the accelerated delivery of the scheme, the development will add an estimated to £78.35m to the economy over the period up to 2037. This compares to £49.59m no Growth Deal funding is available.

The accelerated delivery of the scheme (which the Growth Deal funding enables) would therefore add approximately £30m more to the local economy over the period up to 2037 compared to the situation where no Growth Deal funding is provided. This is due to the employment and housing sites being delivered earlier, resulting in the economic benefits of these jobs also being realised earlier.

6 Summary & Conclusion

6.1 Summary

This report presents the results of the Economic Appraisal undertaken for the M55 Heyhouses Link Road Scheme.

The economic assessment has been carried out over a standard 60 year appraisal period from 2022 to 2081.

Standard WebTAG and Treasury Green Book approaches have been used to undertake the economic appraisal, with benefits and costs discounted to 2010 prices over the 60 year appraisal period.

The appraisal results of the scheme show that the majority of benefits come from the journey time savings as a result of implementing the proposed scheme.

Having the scheme in place does result in an increase in distance travelled; therefore there are some Marginal External Cost disbenefits to existing users of the road network from environmental impacts, additional congestion and accidents. However, the amount of disbenefits is insignificant compared to the expected journey time benefits.

An additional GVA analysis has been undertaken which is consistent with the methodology set out in Highways England's Growth and Housing Fund guidance. It involved collaborative working with the Client to determine a realistic position as to what might happen in terms of development if the £2m of Growth Deal funding did not come forward. This approach has ensured that the GVA assessment does not overstate the potential benefits.

6.2 Conclusion

With a **BCR of 3.23**, the M55 Heyhouses Link Road Scheme delivers '**high'** value for money, as outlined in DfT guidance.

The core scenario without weekend and low growth scenario benefits resulted in a BCR of **2.15 and 2.97, respectively**, which still represents '**high'** value for money.

The BCR excludes the GVA benefits associated with housing and employment developments which depend on the scheme. The additional jobs associated with these developments are estimated to add **£78.35m** to the local economy between now and 2037.

The accelerated delivery of the scheme (which the Growth Deal funding enables) would allow the GVA benefits associated with these new jobs to be realised earlier. This accelerated delivery results in the above GVA benefits figure being approximately £30m higher than if no Growth Deal funding was available.

The scheme is also expected to reduce traffic volumes accessing the M55 at J3 via the A585, with a daily transfer away from this junction of over 800 trips. However, this benefit has not been monetised as part of this appraisal and therefore the scheme VfM could in fact be higher than reported.

Appendix A. Housing Development Phasing

Year (end)	Without Growth Deal Funding (& assumes the Queensway development is viable)				With Growth Deal Funding				
	Phase & (homes)	Valentines and Roseacre	Homes	Notes	Phase & (homes)	Valentines and Roseacre	Homes	Notes	
2018	1 (65)		10	**Development stops at 150 units**, until funding is provided for road section between Whitehills roundabout – Annas Road (15 months to deliver- post tender process)	1 (65)		10	Early construction commenced	
2019			60			31	60		
2020	2 (100)		110		2 (100)	91	160		
2021		31	160		3 (105)	99	260	**Road completed (end 2021)**	
2022	3 (105)	91	210		4 (180)		360		**Infrastructure in place to support other development:** • Queensway industrial • Employment within the EZ • Residential development on Wildings Lane (53 units Valentines + 46 units Roseacre • Other developments
2023		99	260				460	Additional access from the link road to the west	
2024	4 (180)		310	**Development stops at 300 units,** until funding is provided for road section between Annas Road and T5 and new roundabout (15 months to deliver – post tender process)	5 (162)		560		
2025			360		6 (149)		660		
2026			410	**Development stops at 375 units,** until a continuous link is provided through the site to Queensway. Earliest opportunity that the impacts of Queensway employment site can be accommodated without severe impacts relies on the Kensington internal road is available for all to use. (link road not completed)	7 (98)		760		
2027	5 (162)		460	Funding provided at 425 units to complete Link Road	8 (89)		860		
2028			560				**948**	**Queensway residential development completed**	
2029	6 (149)		660	**Infrastructure in place to supports other development**		**Dwellings: 1,047** (948 Queensway + 53 Valentines & 46 Roseacre) **Employment: Queensway Industrial + Blackpool Airport EZ**			
2030	7 (98)		760						
2031	8 (89)		860						

2032			**948**	**Queensway residential development completed**		
	Note: Kensington's development site layout includes 948 units, Fylde approved 984 in the latest conditions to be discharged/amended. N.B. The housing delivery forecast presented is cumulative totals Table revised Feb 2019					