LANCASHIRE COUNTY COUNCIL

CALLED IN PLANNING APPLICATION FOR PROPOSED HEYSHAM TO M6 LINK ROAD

LAND TO THE NORTH OF LANCASTER BEGINNING AT THE END OF THE A683 HEYSHAM TO M6 LINK PHASE 1 AND RUNNING IN AN EASTERLY DIRECTION TO CONNECT WITH THE M6 AT JUNCTION 34 OF THE M6

Planning Inspectorate reference:
APP/Q2371/V/07/1200928 and
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01/05/1584

PROOF OF EVIDENCE
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Traffic Details – Main Proof

June 2007

1. INTRODUCTION

1.1 My name is Nigel James Cleave. I am a Principal Engineer employed by Lancashire County Council, acting on behalf of the applicant for the purposes of this planning inquiry. I have a Bachelor of Science (Honours) Degree in Physics and a Master of Science Degree in Transportation and Traffic Planning. I am a Chartered Engineer and a Member of the Institution of Civil Engineers. I have nearly 30 years experience in the field of Transport Planning and, in particular, the assessment and appraisal of major highway schemes.

1.2 In my evidence I shall:

- outline the development of the traffic model used to forecast future traffic flows;
- comment on modelled base year traffic flows and existing traffic conditions;
- provide an overview of the traffic forecasting methodology and detail forecast traffic flows and traffic relief on completion of Heysham to M6 Link;
- demonstrate how the completion of Heysham to M6 Link will fulfil an improvement in road communications and a reduction in congestion;
- detail the forecast traffic relief for Lancaster's city centre and built-up area;
- summarise the economic appraisal and road safety assessment.

2. TRAFFIC MODEL DEVELOPMENT

2.1 Base year 2001 traffic models were developed for each of the weekday morning, evening and inter peak periods using the TRIPS suite of highway modelling programs. The full modelled highway network extends across most of North Lancashire, to cover an area bounded, roughly, by the M55 motorway in the south, the M6 motorway in the east and the border with Cumbria in the north. The study area network covers the majority of Lancaster District, and incorporates all the main highway network (motorway/'A'-class/'B'-class) together with all the minor roads, both urban and rural, considered to be significant. The area centres on the Lancaster/Morecambe/Heysham urban area and includes the town of Carnforth together with the villages of Bolton-le-Sands, Galgate, Halton, Hest Bank and Slyne.

2.2 The models utilised roadside interview survey data from September/October 2001, together with subsequent manual classified counts and continuous automatic counts, a survey of car parks in the Lancaster central area and an extensive programme of journey time surveys.

2.3 Each of the traffic models was validated in line with criteria laid down in the Department for Transport's Design Manual for Roads and Bridges (DMRB), Volume 12, Section 2, Part 1 (Appendix A). Comparison between modelled and observed journey time data – for all the main strategic routes and radial routes to and from Lancaster City Centre -

showed all the models to comply with the DMRB's Acceptability Guidelines. For link flows the DMRB's limit criteria were matched by each of the models and each model complied in respect of GEH values for screenlines. It was concluded that each of the three traffic models accurately reproduces the existing situation as independently observed, thus forming a suitable basis for the forecasting of future traffic flows and subsequent assessments. Full details of model development, calibration and validation are given in the Local Model Validation Report (Document LCC 37) and Technical Note 12 'Model Convergence' (Document LCC 53).

2.4 I would also add that the outcome of a recently completed independent review of the Major Scheme Business Case (by consultants KPMG and Atkins for the Department for Transport) was that the traffic modelling could be judged as acceptable for the Programme Entry approval stage.

2.5 Programme Entry status for the scheme will mean that the Department for Transport would expect to fund it subject to: affordability (including by contributors other than the Department for Transport); any necessary statutory powers being obtained; there being no significant changes to costs, scheme design or expected benefits; any other specific conditions. Therefore, whilst Programme Entry can confer no guarantee of funding, or it's timing, it is designed to give authorities the confidence to proceed with the further development of the scheme and, in particular, to apply for the necessary statutory powers.

3. MODELLED BASE YEAR TRAFFIC FLOWS AND EXISTING TRAFFIC CONDITIONS

3.1 Modelled daily traffic flows for 2001 are shown in Figure 3.1 at Appendix B. The main highway network is represented throughout the study area.

3.2 The heaviest traffic flows are to be found on the M6 east of Lancaster. South of Junction 34 the traffic flow is 60,700 Annual Average Daily Traffic (AADT) and north of Junction 34 it is 55,400 AADT. These rural motorway links are, respectively, at 54% and 44% of practical capacity as represented by their Congestion Reference Flows (see DMRB, Volume 5, Section 1, Part 3, TA 46/97 (Appendix C)).

3.3 The next busiest areas of the network are the radial routes leading to and from Lancaster City Centre together with the city centre gyratory system. The flows and capacities for the urban links making up these areas are detailed in Tables 3.1 and 3.2 below. Respectively, modelled uni-directional morning and evening peak hour flows (at 50^{th} Highest Hour level for the heaviest flow direction) are compared directly with assumed link capacities as detailed in DMRB, Volume 5, Section 1, Part 3, TA 79/99 (Appendix D).

Table 3.1 Morning Peak Hour Flows and Link Capacities for the City Centre Gyratory System and associated Radial Routes

Link	Modelled Flows – 2001 AADT	Modelled AM Peak Flows – 2001 50th HH (vph)	Assumed Link Capacity (vph)	AM Peak Flow/ Capacity
A6 King Street	17,400	1,780	2,000	89%
A6 Thurnham Street	16,700	1,850	2,000	93%
A683 Morecambe Road	30,600	1,340	1,530	88%
B5321 Torrisholme Road	9,700	680	900	76%
A6 Skerton Bridge	23,200	2,630	2,200	120%
A6 Greyhound Bridge	22,500	1,870	3,550	53%
A683 Caton Road	21,200	1,370	1,530	90%
A6 South Road	26,900	1,410	1,530	92%
A6 Greaves Road	17,900	970	1,300	75%

Table 3.2 Evening Peak Hour Flows and Link Capacities for the City Centre Gyratory System and associated Radial Routes

Link	Modelled Flows – 2001 AADT	Modelled PM Peak Flows – 2001 50th HH (vph)	Assumed Link Capacity (vph)	PM Peak Flow/ Capacity
A6 King Street	17,400	1,450	2,000	73%
A6 Thurnham Street	16,700	1,500	2,000	75%
A683 Morecambe Road	30,600	1,520	1,530	99%
B5321 Torrisholme Road	9,700	640	900	71%
A6 Skerton Bridge	23,200	1,970	2,200	90%
A6 Greyhound Bridge	22,500	2,490	3,550	70%
A683 Caton Road	21,200	1,220	1,530	80%
A6 South Road	26,900	1,280	1,530	84%
A6 Greaves Road	17,900	890	1,300	68%

3.4 Significant flows are also evident on the A683 and Ovangle Road routes respectively through and east of the White Lund Trading Estate, and on the A6/A5105/A589 Coastal Route between Carnforth and Morecambe. Comparison of modelled uni-directional morning peak hour and evening peak hour flows (at 50th Highest Hour level for the heaviest flow direction) and assumed link capacities (as detailed in the aforementioned TA 79/99) is set out in, respectively, Tables 3.3 and 3.4 below:

Table 3.3 Morning Peak Hour Flows and Link Capacities for Routes adjacent to White Lund and on the Coastal Route

Link	Modelled Flows – 2001 AADT	Modelled AM Peak Flows – 2001 50th HH (vph)	Assumed Link Capacity (vph)	AM Peak Flow/ Capacity
A683 Heysham Link Road	13,400	830	3,200	26%
B5273 Ovangle Road	19,100	1,020	1,300	78%
A5105 Coastal Road	16,300	810	1,470	55%
A6 at Bolton-le-Sands	22,600	920	1,300	71%

Table 3.4 Evening Peak Hour Flows and Link Capacities for Routes adjacent to White Lund and on the Coastal Route

Link	Modelled Flows – 2001 AADT	Modelled PM Peak Flows – 2001 50th HH (vph)	Assumed Link Capacity (vph)	PM Peak Flow/ Capacity
A683 Heysham Link Road	13,400	630	3,200	20%
B5273 Ovangle Road	19,100	1,080	1,300	83%
A5105 Coastal Road	16,300	940	1,470	64%
A6 at Bolton-le-Sands	22,600	990	1,300	76%

3.5 Such heavy traffic flows regularly lead to peak-time congestion on both the city centre radial routes and the gyratory system. These conditions were closely observed during the aforementioned (see Section 2) programme of journey time surveys, conducted in April/May/October 2002, and some examples are detailed below.

3.6 On A683 Morecambe Road, eastbound into Lancaster, morning peak congestion started from around 07:45 hours with stationary (or very slow moving) traffic queued back from the A6 Owen Road traffic signals to the B5273 Ovangle Road roundabout and beyond, a distance of approximately 2 km. By 09:15 hours traffic was still queued back to the Ovangle Road roundabout. On the parallel B5321 Torrisholme Road, eastbound towards Lancaster, queuing traffic by 08:10 hours stretched back from the A6 Slyne Road traffic signals for a distance of at least 500m. On A683 Caton Road, westbound into Lancaster, traffic congestion was worst in the morning peak period with queued traffic regularly extending back from the Parliament Street traffic signals to M6 Junction 34, a distance of approximately 3 km.

3.7 On A6 Slyne Road, southbound into Lancaster, traffic queues of at least 1 km regularly extend back through Skerton, and on A6 Skerton Bridge queues can occur throughout the day. In the reverse direction, on A6 Greyhound Bridge, congestion was observed throughout the day but was particularly severe during the evening peak period. This congestion emanates, primarily, from the downstream constraints of A683 Morecambe Road, which has both a much-reduced link capacity (to that of the bridge) and a traffic signals junction, of limited capacity, at Scale Hall Lane. Also, during the afternoon and evening peak period, traffic queues were observed to build back onto the bridge from the A6 Slyne Road/B5321 Torrisholme Road traffic signals.

3.8 On the A6 city centre gyratory northbound congestion was observed during both the morning and evening peak periods whilst congestion on the southbound leg was apparent throughout the majority of the working day. Queues built back from the A6 South Road/Thurnham Street traffic signals, with the worst congestion experienced during the evening peak period.

3.9 In addition, I would note that Carnforth, at the north end of the Coastal Route, routinely suffers at peak times from long queues and slow-moving traffic along the A6. During both the morning and evening weekday peak periods traffic queues develop to both the north and south of the B6254 Market Street traffic signals and, in the evening peak, traffic on Market Street (West) can experience delays as a result of both the heavy A6 flows and the traffic generated from a combination of the railway station car park, a local haulage company and other light industry in the area. Traffic congestion is also associated with the traffic signals at the A6/Tesco superstore junction, south of the town centre.

3.10 Congestion in Carnforth is also evident at weekends, particularly on fine days when extra day trips are generated to areas such as the Lake District. Traffic queues are commonly observed to stretch back to the south from the A6/B6254 traffic signals for almost 1 km, to the A6/Longfield Drive mini-roundabout. To the north queued traffic extends, at times, as far back as the Truckhaven roundabout.

3.11 Conditions as detailed above result in adverse effects in terms of noise and air pollution and cause delay and frustration to each and every form of road user. The conditions also mean an acute lack of journey time reliability, which is known to result in rat-running on inappropriate roads and a significant number of drivers choosing to use long detour routes.

3.12 The A683 corridor between Torrisholme and M6 Junction 34 is heavily trafficked for most of the working day. In the event of an accident, vehicle breakdown or other incident traffic will seek alternative routes to escape the congestion. Even minor incidents often result in flow breakdown and a significant increase in rat-running on unsuitable roads.

3.13 On B5321 Torrisholme Road, running through a predominantly residential area, heavy traffic flows result as drivers seek to avoid congestion on the parallel A683 Morecambe Road. Significant queues build up, in particular during both the morning and evening peak period at the traffic signals junction with A6 Slyne Road. I would add that a number of traffic calming measures are in place along this route. These include: flat top speed humps at a number of locations; raised speed tables in Torrisholme village; mini-roundabouts at Torrisholme Square and West Drive/Scale Hall Lane; and rumble strips east and west of the West Coast Main Line (WCML) railway.

3.14 The minor roads worst affected by long distance rat-running are Hasty Brow Road, Barley Cop Lane, Hammerton Hall Lane, Bottomdale Road and Foundry Lane. Hasty Brow Road, for example, is a minor rural road with high hedgerows and limited forward visibility that make it wholly unsuitable for heavy peak hour traffic movement. And a length of Barley Cop Lane, in the residential Skerton area of Lancaster, falls within a 20 mph zone. This means that, for the section between the

WCML railway and A6 Slyne Road, it is restricted to a speed limit of 20 mph. The rural roads east of A6 form part of a network that is used by rat-running traffic between the peninsula and M6 Junction 34. This traffic routes through the village of Halton in order to cross the river via the narrow, single track Halton Bridge.

3.15 At times of peak congestion many drivers travelling to and from M6 Junction 35 choose to avoid the problems on the A6 through Carnforth by using Bolton Lane and Back Lane to rat-run between the A6 at Bolton-le-Sands and B6254 Kellet Road immediately west of M6.

3.16 Rat-running is also prevalent around Lancaster City Centre. To the west the worst affected routes are Aldcliffe Road/Dallas Road. These suffer from more localised rat-running where local residents use the surrounding network of streets to avoid the congested A6 northbound. On the east side of the city centre Bulk Road, Ridge Lane and Kentmere Road create a major rat-running route. These streets lead to Ullswater Road, Wyresdale Road, Coulston Road, Bowerham Road and Barton Road (Scotforth), and create an unsuitable, but often desirable, alternative to the congestion and delays on the main A6 route. In addition, routes incorporating Bulk Road, St Leonard’s Gate, Alfred Street, Moor Lane, Nelson Street and Quarry Road provide a multitude of detour routes that avoid the congested A6 southbound.

4. TRAFFIC FORECASTING

4.1 Traffic forecasts were undertaken in respect of both the Do Minimum ('no scheme') and Do Something ('with scheme') scenarios for each of the forecasting years 2010 (opening) and 2025 (design).

4.2 Traffic growth forecasts were constrained to sub-District Level forecasts from the TEMPRO software, as adjusted for local projections of future household numbers detailed in the Replacement Joint Structure Plan 2001-2016 (Document LCC 03).

4.3 Explicit account was taken of committed developments at the following sites: Lancaster Business Park (at Cottam's Farm); Lancaster East mixed-use site; housing areas at Royal Albert East, Lancaster Moor, former Pye Feedmill, Mossgate and Pontins. The effects of suppressed demand/induced traffic were catered for as detailed in the DMRB, Volume 12, Section 2, Part 2 (Appendix E). The traffic forecasting methodology is detailed in the Forecasting Report, Technical Note 11 'Forecast Matrix Development' and Technical Note 13 'Calculation of Generalised Cost Elasticities' (respectively Documents LCC 37, LCC 52 and LCC 54).

4.4 For scheme opening year 2010 the forecast traffic flow on the scheme west of A6 Slyne Road is 33,700 AADT, and east of A6 Slyne Road it is 31,800 AADT. (The recommended economic flow range for a dual 2-lane all-purpose carriageway road, as set out in the DMRB, Volume 5, Section 1, Part 3, TA 46/97, is 11,000-39,000 AADT in the opening year (see Appendix F). These forecasts, therefore, are well within this range.)

4.5 For the existing route between M6 (Junction 34) and Torrisholme forecast daily flows (AADT), and estimated Heavy Goods Vehicles (HGVs), in 2010 with the scheme in place are as follows:

A683 Caton Road, west of M6 – 18,800 (24% reduction) with 1,170 HGVs (51% reduction);

A683 Caton Road (Southbound), at Bulk gyratory – 20,500 (12% reduction) with 660 HGVs (48% reduction);

A6 Skerton and Greyhound bridges (combined) – 37,500 (25% reduction) with 1,120 HGVs (52% reduction);

A683 Morecambe Road - 26,200 (19% reduction) with 920 HGVs (54% reduction).

4.6 On the A6 north of Lancaster very significant relief is afforded by the scheme at the following locations, resulting in forecast daily flows (AADT), and estimated HGVs, in 2010 as detailed below:

At Bolton-le-Sands – 14,200 (42% reduction) with 280 HGVs (53% reduction);

At Carnforth – 8,900 (53% reduction) with 270 HGVs (53% reduction).

4.7 At Torrisholme and in the immediate vicinity of Lancaster and Morecambe College, the forecast daily flows (AADT), and estimated HGVs, in 2010 with the scheme in place, and the consequent significant levels of relief, are as follows:

B5321 west of Torrisholme Square – 11,500 (34% reduction) with 140 HGVs (34% reduction);

B5321 at Lancaster and Morecambe College rear entrance – 6,200 (30% reduction) with 80 HGVs (30% reduction);

A683 Morecambe Road at Lancaster and Morecambe College main entrance – 18,800 (20% reduction) with 660 HGVs (41% reduction).

4.8 The significant traffic relief afforded by the scheme is worth noting at a number of other locations. On B5321 Torrisholme Road, east of Scale Hall Lane, the forecast flow is 5,600 AADT, a reduction of 50%. On A5105 Coastal Road the forecast flow is 7,100 AADT, a reduction of 60%. On A589 Marine Road East, in Morecambe, the forecast flow is 8,800 AADT, a reduction of 31%, and on A589 Heysham Road, also in Morecambe, the forecast flow is 7,400 AADT, a reduction of 33%.

5. IMPROVING ROAD COMMUNICATIONS INCLUDING THE ACCESS TO HEYSHAM PORT

5.1 Road communications to and from the Morecambe and Heysham peninsula are currently via the five roads (see Figure 5.1 at Appendix G) that cross the WCML railway:

A683 Morecambe Road (47% of daily traffic);

B5321 Torrisholme Road (19%);

Barley Cop Lane (4%);

Hasty Brow Road (5%);

A5105 Coastal Road (25%).

5.2 The vast majority of HGVs travelling to and from the peninsula is on A683 Morecambe Road (72%) and A5105 Coastal Road (19%), highlighting the importance of the A683 as a major route for HGV traffic.

5.3 On a daily basis the operation of the Port of Heysham and its various facilities results in some 2,000 vehicle journeys to and from the port, composed of similar numbers of HGV and other vehicle journeys. The high proportion, 72%, is journeys between the port and the M6 motorway and beyond, of which most is journeys made by HGVs and other vehicles utilising the ferry services. This (72%) proportion is comprised of 16%, 9% and 47% between the port and areas north, east and south respectively. With a total daily flow of 2,600 HGVs travelling to and from the peninsula it follows that, at present, the port contributes nearly 30% of this figure, and plays a significant part in this important aspect of the traffic problem. I would also add that the port continues to grow and that the Port Manager anticipates, over the next few years, a 60% increase in freight movements to and from the port. This means that the port's contribution will rise to nearly 40% of the (increased) total daily flow of 3,000 HGVs.

5.4 I envisage, because of the route standard, shortness of distance (0.4 km shorter than the existing route via A683 Morecambe Road) and the re-modelled M6 Junction 34, that the completed Heysham to M6 Link will be the appropriate route for the aforementioned 72% of Heysham Port traffic. Predicted journey time savings, afforded by the scheme over the existing A683 route between Torrisholme and M6 Junction 34, for each of the morning, inter peak and evening peak periods in opening year 2010 are provided in Table 5.1 below:

Table 5.1 Journey Time Savings

Period/Direction	Time via Existing A683 with scheme in place (min)	Time via Heysham to M6 Link (min)	Saving (min)
AM Peak EB	11.0	3.7	7.3
AM Peak WB	9.0	3.7	5.3
Inter Peak EB	9.4	3.7	5.7
Inter Peak WB	9.3	3.7	5.6
PM Peak EB	10.0	3.6	6.4
PM Peak WB	11.4	3.9	7.5

5.5 Avoidance of Lancaster and its one-way systems will be an additional incentive for the 60% of port traffic that travels via the city. Also, the avoidance of the built-up areas of Heysham, Morecambe, Bolton-le-Sands and Carnforth will be an incentive for the 12% of port traffic to and from M6 Junction 35. Therefore, in addition to the significant improvement in access afforded by the completion of the Heysham to M6 Link, removal of this traffic, comprising 1,440 vehicle journeys per day with around 50% HGVs, will provide substantial benefits to these urban areas.

5.6 Section 4 (above) notes that the forecast scheme flow west of A6 Slyne Road is 33,700 AADT in the year of opening (2010) with some 31,800 AADT predicted to use the section east of A6 Slyne Road. On the A683 existing route between A589 Morecambe Road roundabout and M6 Junction 34, significant flow reductions of 12-25% are predicted. The predicted overall transfer of traffic off the existing roads serving the peninsula is 30,000 AADT (a reduction of 42%). The individual transfer off each road is detailed in Table 5.2 below:

Table 5.2 Traffic Flow Transfers for Roads Serving the Peninsula

Road used by Peninsula Traffic	Modelled Flows – 2010 AADT		
	Without Scheme	With Scheme	Transferred Traffic
A5105 Coastal Road	17,800	7,100	10,700 (60%)
Hasty Brow Road	4,300	300	4,000 (93%)
Barley Cop Lane	2,500	400	2,100 (84%)
B5321 Torrisholme Road	12,900	6,800	6,100 (47%)
A683 Morecambe Road	33,400	26,300	7,100 (21%)
TOTALS	70,900	40,900	30,000 (42%)

5.7 Journey time comparisons with and without the scheme for each of the traffic modelling periods demonstrate that very substantial savings are predicted on completion of Heysham to M6 Link. Tables 5.3, 5.4 and 5.5 below show opening year 2010 comparisons of average modelled journey times and speeds between Torrisholme and M6 Junction 34 for, respectively, the weekday morning peak, inter peak and evening peak periods:

Table 5.3 Morning Peak Period Journey Time Comparison With and Without Heysham to M6 Link (2010)

Route/Direction	Distance (km)	Time (min)	Saving over Do Minimum (min)	Speed (kph)
Existing A683 EB	5.1	14.4	-	21
Existing A683 WB	5.4	11.9	-	27
Heysham to M6 Link EB	4.8	3.7	10.7	77
Heysham to M6 Link WB	4.8	3.7	8.2	77

Table 5.4 Inter Peak Period Journey Time Comparison With and Without Heysham to M6 Link (2010)

Route/Direction	Distance (km)	Time (min)	Saving over Do Minimum (min)	Speed (kph)
Existing A683 EB	5.1	13.0	-	24
Existing A683 WB	5.4	12.1	-	27
Heysham to M6 Link EB	4.8	3.7	9.3	78
Heysham to M6 Link WB	4.8	3.7	8.4	77

Table 5.5 Evening Peak Period Journey Time Comparison With and Without Heysham to M6 Link (2010)

Route/Direction	Distance (km)	Time (min)	Saving over Do Minimum (min)	Speed (kph)
Existing A683 EB	5.1	11.9	-	26
Existing A683 WB	5.4	16.5	-	20
Heysham to M6 Link EB	4.8	3.6	8.3	78
Heysham to M6 Link WB	4.8	3.9	12.6	74

5.8 The above results clearly demonstrate that very substantial journey time savings are predicted with the scheme in place. Journey times between the A683/A589 Morecambe Road roundabout and M6 Junction 34 are expected to reduce by as much as 74% eastbound (morning peak) and 76% westbound (evening peak) and, at the same time, become far more reliable.

5.9 Further journey time comparisons with the scheme in place, for traffic continuing to use the existing corridor between Torrisholme and M6 Junction 34, are shown below in Tables 5.6, 5.7 and 5.8 for, respectively, the modelled morning peak, inter peak and evening peak periods in opening year 2010:

Table 5.6 Morning Peak Period Journey Time Comparison on Existing A683 Corridor (2010)

Route/Direction	Distance (km)	Time (min)	Saving over Do Minimum (min)
Existing A683 EB	5.1	14.4	-
Existing A683 WB	5.4	11.9	-
A683 EB with scheme	5.2	11.0	3.4
A683 WB with scheme	5.5	9.0	2.9

Table 5.7 Inter Peak Period Journey Time Comparison on Existing A683 Corridor (2010)

Route/Direction	Distance (km)	Time (min)	Saving over Do Minimum (min)
Existing A683 EB	5.1	13.0	-
Existing A683 WB	5.4	12.1	-
A683 EB with scheme	5.2	9.4	3.6
A683 WB with scheme	5.5	9.3	2.8

Table 5.8 Evening Peak Period Journey Time Comparison on Existing A683 Corridor (2010)

Route/Direction	Distance (km)	Time (min)	Saving over Do Minimum (min)
Existing A683 EB	5.1	11.9	-
Existing A683 WB	5.4	16.5	-
A683 EB with scheme	5.2	10.0	1.9
A683 WB with scheme	5.5	11.4	5.1

5.10 Tables 5.6 to 5.8 clearly demonstrate that significant journey time savings are predicted on the existing A683 corridor following the completion of the Heysham to M6 Link. Journey times between the A683/A589 Morecambe Road roundabout and M6 Junction 34 are expected to reduce by up to 28% eastbound (inter peak) and 31%

westbound (evening peak). Significant time savings can, therefore, be expected for A683 public transport users even without implementing further bus priority measures or extending existing bus lanes. Also, significant time savings can be expected on bus routes using B5321 Torrisholme Road and A6 Slyne Road.

6. FORECAST CONGESTION REDUCTION FOR A683, A6 AND THE LUNE BRIDGES IN LANCASTER

6.1 Together the Lune Bridges in Lancaster form the most westerly crossings of the river and provide the route for much of the traffic travelling to and from the peninsula. Also, they are both the only road connection between the parts of Lancaster north and south of the river, and the principal north-south (A6) route through the city.

6.2 Table 6.1 below shows current morning peak journey times and speeds through the gyratory systems along the A683 from the A589 Morecambe Road roundabout at Torrisholme to the north end of the Bulk gyratory, and along the A6 between the south end of the city centre gyratory and the A683 Morecambe Road signals. The figures are averages of weekday observations made between 07:00 and 10:00 hours.

Table 6.1 Observed Journey Times and Speeds – Morning Peak

Route	Journey Between	Distance (km)	Time (min)	Speed (kph)
A683 Eastbound	A589 Morecambe Road and Kingsway	2.8	9.5	18
A683 Westbound	Kingsway and A589 Morecambe Road	3.1	6.6	28
A6 Northbound	Thurnham Street and A683 Morecambe Road	2.2	3.8	35
A6 Southbound	A683 Morecambe Road and Thurnham Street	1.9	7.4	15

6.3 Both the A683 eastbound and the A6 southbound routes, crossing Skerton Bridge towards the city centre, suffer from severe congestion and slow journey speeds (15-18 kph). In the reverse direction, crossing Greyhound Bridge, the congestion is less severe and the resultant journey speeds are considerably higher (28-35 kph).

6.4 The equivalent average evening peak journey times and speeds, observed on weekdays between 16:00 and 19:00 hours, are shown below in Table 6.2:

Table 6.2 Observed Journey Times and Speeds – Evening Peak

Route	Journey Between	Distance (km)	Time (min)	Speed (kph)
A683 Eastbound	A589 Morecambe Road and Kingsway	2.8	7.5	22
A683 Westbound	Kingsway and A589 Morecambe Road	3.1	9.9	19
A6 Northbound	Thurnham Street and A683 Morecambe Road	2.2	10.1	13
A6 Southbound	A683 Morecambe Road and Thurnham Street	1.9	6.9	17

6.5 Severe congestion is apparent on both A6 and A683 and in each direction of travel, with conditions particularly acute on the A6 routes. Journey speeds are consequently slow and range from 13-22 kph.

6.6 Using predicted journey times from the traffic model estimates of congestion reduction were achieved. For scheme opening year 2010 both east-west (A683) and north-south (A6) routes, across the River Lune and through the inter-linking gyratory systems of central Lancaster, were assessed with and without the scheme in place. Congestion was determined as total time lost per kilometre per vehicle, as predicted by both the morning peak and evening peak models. The A683 route was assessed between the A589 Morecambe Road roundabout and Kingsway/Bulk Road signals. The A6 route was assessed between Thurnham Street/Aldcliffe Road signals and A683 Morecambe Road signals. The results of the assessment are shown below in Tables 6.3 and 6.4 for, respectively, the morning and evening peak periods.

Table 6.3 Morning Peak Congestion Reduction (2010)

Route	Estimated Congestion (min/km/veh)		Proportional Reduction (%)
	No Scheme	With Heysham to M6 Link	
A683 Eastbound	2.35	1.29	45
A683 Westbound	2.73	0.30	89
A6 Northbound	0.40	0.26	35
A6 Southbound	2.24	1.20	46

Table 6.4 Evening Peak Congestion Reduction (2010)

Route	Estimated Congestion (min/km/veh)		Proportional Reduction (%)
	No Scheme	With Heysham to M6 Link	
A683 Eastbound	1.15	0.68	41
A683 Westbound	2.02	1.00	50
A6 Northbound	2.53	1.93	24
A6 Southbound	1.72	1.20	30

6.7 For the A683 route, therefore, congestion is predicted to reduce by up to 89%. The overall proportional reduction, across both peak periods and each direction, computes to 49%. Slightly more modest reductions are anticipated for the A6 route, with reductions of up to 46% forecast. In this case, the overall proportional reduction is estimated as 33%.

7. FORECAST TRAFFIC RELIEF FOR LANCASTER CITY CENTRE AND BUILT-UP AREA

7.1 North-south routes through the city centre comprise the A6 gyratory system together with a series of parallel residential streets to both east and west. Regular congestion on the A6 currently leads to rat-running along these streets. Measures that have been undertaken to try and prevent such activity are set out below:

20 mph Zones – Many of the residential streets east and west of Willow Lane in the Marsh area, west of the city centre, are subject to a 20 mph speed restriction.

Traffic Calming – To the east of the city centre Ridge Lane is traffic calmed and restricted to 20 mph, and includes speed humps at a number of locations along its length. There is a mini-roundabout at the junction with Kentmere Road which itself is also traffic calmed by speed humps. Continuing on this north-south route (aforementioned in Section 3) there are rumble strips at two locations on Moor Gate. Derwent Road, running between Keswick Road and Quernmore Road, makes use of chicanes whilst the east-west corridor of Quernmore Road and East Road has rumble strips along the route. Wyresdale Road also contains rumble strips. On the west side of the city centre there are speed humps on the Brook Street/Dallas Road route between Aldcliffe Road and Meeting House Lane.

Traffic Management Measures – Numerous traffic regulation orders have been imposed across Lancaster, creating waiting restrictions, access only, HGV restrictions and one-way streets. All of these traffic management measures contribute to defining the road hierarchy and the identification of routes unsuitable for heavy traffic flows.

7.2 Some traffic relief will be afforded by the scheme, with consequent reductions in congestion and delays, together with a reduced propensity for the use of inappropriate routes by drivers seeking to avoid problems on the A6.

7.3 Across an east-west screenline, running from Wheatfield Street in the west – Dallas Road – Fenton Street – A6 King Street (Northbound) – A6 Dalton Square (Southbound) – Bulk Street – St. Peter's Road – Moor Gate – Derwent Road in the east, the forecast daily flow (AADT) in 2010 with the scheme in place is 60,900, 4% below the Do Minimum forecast.

7.4 Immediately to the south of the city centre a similar analysis was undertaken for a second east-west screenline, running from Aldcliffe Road in the west – A588 Ashton Road – A6 Greaves Road – Bowerham Road – Wyresdale Road in the east. With the scheme in place the total forecast daily flow (AADT) in 2010 across this screenline is 45,000, a 7% reduction on the Do Minimum figure.

7.5 However, traffic relief due to the scheme across the remainder of the Lancaster built-up area (but excepting the existing A683 route between M6 Junction 34 and Torrisholme as already covered in Section 4) is far more significant and is summarised in Table 7.1 (see below) for radial routes to both the north and south of the city centre:

Table 7.1 Traffic Relief within the Lancaster built-up area

Link	Forecast Daily Flow (AADT) in 2010 with Heysham to M6 Link	Reduction on Do Minimum
A6 Slyne Road, Skerton	6,500	46%
A6 Owen Road, Skerton	10,900	36%
A6 Scotforth Road, Scotforth	20,500	14%
A588, south of Ashford Road	5,900	14%
Halton Road	3,300	49%

8. COST BENEFIT ANALYSIS

8.1 A cost benefit analysis for the scheme was undertaken in accordance with current guidance. The analysis was performed for a 60-year appraisal period using a discount rate of 3.5% until 2035 and 3.0% thereafter. The Department for Transport's TUBA program was used for the appraisal; with construction delay costs (on M6) determined using QUADRO tables from the Department for Transport's Trunk Road Maintenance Manual.

8.2 An assessment of accident savings for the proposed scheme was undertaken for a 60-year appraisal period, and employed the COBA methodology as set out in the DMRB, Volume 13, Section 1, Part 2, Chapter 3, (Appendix H). Over this period the scheme is anticipated to result in 691 fewer Personal Injury Accidents (PIAs). The majority of these accidents are slight, however there are also reductions in both serious and fatal accidents (see Table 8.1 below):

Table 8.1 Total Accident and Casualty Savings

Fatal Casualties	Serious Casualties	Slight Casualties	Total Casualties	Total Accidents
22	190	703	914	691

In monetary terms the reduction in accidents equates to around £31.5 million (at 2002 prices and values).

8.3 This forecast reduction in accidents is entirely in line with my own expectations. With the scheme in place a large volume of traffic, including HGVs, will be transferred off urban single carriageway roads onto a high standard rural dual carriageway with a much lower accident rate. Also, the existing M6 Junction 34 will be re-modelled to much superior modern design standards.

8.4 On, for example, the A683 existing route - running between the A589 Morecambe Road roundabout and M6 Junction 34 within the built-up area of Lancaster - the latest accident record gives 195 reported PIAs for the 5-year period between 1 January 2002 and 31 December 2006. Of the 195 PIAs there were 2 fatal, 13 serious injury and 180 slight injury accidents. It should be noted that 42, or 22%, of the accidents involved HGVs, which is at least four times the national average figure (in 2005) for urban ‘A’ roads, of 4.6%.

8.5 Close analysis of the PIAs involving HGVs revealed that, in terms of vehicle size, 35, or 83%, involved HGVs of more than 7.5 tonnes gross vehicle weight and 7, or 17%, involved HGVs of between 3.5 and 7.5 tonnes gross vehicle weight. Consideration of collision type showed 19 of the PIAs, or 45%, to have involved a rear shunt (of which 11, or 26%, occurred in slow moving traffic conditions). And 13 of the PIAs, or 31%, involved a lane change on the one-way sections of the route. With respect to time of the week and time of day: 38, or 90%, of the PIAs were recorded on a (Monday - Friday) weekday; 9, or 21%, were recorded between 07:00 and 10:00 hours; 8, or 19%, were recorded between 16:00 and 19:00 hours.

8.6 At present, M6 Junction 34 falls a long way short of modern design standards. This is a direct result of its development. In the late 1950’s, when the 11.5 mile Lancaster (Eastern) Bypass was proposed, it did not include the interchange with A683 Caton Road. However, concern was expressed at the difficulties likely to be experienced by the emergency services (based in the city) in gaining access to the bypass. It was, therefore, decided that a connection should be provided, for emergency services only, at the location where the bypass crossed the existing A683. As a result the design standards adopted for the junction were lower than would normally have been proposed at the time – in particular, the design of the slip roads and the separation of the slip road carriageways. Both northbound on/off slips and southbound on/off slips were simply separated by the use of double white lines. However, following local representations, it was subsequently agreed that this junction be opened for general use. While there have been numerous improvements to both the M6 mainline and the slip roads since the original construction, the junction remains a unique, substandard interchange.

8.7 M6 Junction 34 as it exists today has a half-cloverleaf layout with the northbound and southbound slip roads in diagonally opposite quadrants. The layout still consists of shared on and off slips with no central protection. There are discontinuous hard shoulders through the junction and there are no hard shoulders on the slip roads. The lack of hard shoulders poses problems of both safety and operation. There are tight radii on the loops on both the northbound and southbound slip roads. The minimum radii for motorway loops, as detailed in DMRB, Volume 6, Section 6, Part 1, TD 22/06 (see Appendix I) is set at 75m. The loop for the northbound slip roads has successive radii of 70m, 60m and then 40m – falling well below the requirement. And for the northbound off slip the successive reduction in radii is, again, contrary to TD 22/06 which states that successive radii must not reduce (see Appendix I). The loop for the southbound slip roads has radii of 67m, which is also substandard.

8.8 An assessment of the merge and diverge layouts against the TD 22/06 requirements (as detailed in Appendix J) showed the north-facing slip roads to be well below standard in respect of taper length. The northbound merge, at 80m, is 125m too short whilst the southbound diverge, at 85m, is only half the length it should be.

8.9 An analysis of the latest accident record at M6 Junction 34 revealed 33 PIAs for the 5-year period between 1 January 2002 and 31 December 2006. Of the 33 PIAs there were 3 serious injury and 30 slight injury accidents. The northbound slip roads accounted for 18 (of the 33) PIAs, with 11 on the off slip and 7 on the on slip. On the southbound slips there was only 1 PIA, on the off slip.

8.10 Extremely large economic benefits, deriving mainly (92%) from time savings (with the remainder split between vehicle operating costs (4%) and the aforementioned accident benefits (4%)), result in a net present value of £749 million and a first year rate of return of 14%. With a benefit to cost ratio of 7.3 the scheme may be said to provide a very high value for money. A summary of the monetised costs and benefits is provided in Table 8.2 below:

Table 8.2 Analysis of Monetised Costs and Benefits (£million, 2002 prices and values)

Accident Cost Savings	31.496
Consumer User Benefits	390.809
Business User Benefits	448.874
Construction/Delay Costs	-3.897
Present Value of Benefits (PVB)	**867.282**
Local Government Funding	4.273
Central Government Funding	113.847
Present Value of Costs (PVC)	**118.120**
OVERALL IMPACT	
Net Present Value (NPV = PVB – PVC)	**749.162**
Benefit to Cost Ratio (BCR = PVB/PVC)	**7.342**

8.11 It should be noted that the TUBA program now outputs carbon emission details, together with associated costs. Re-running the appraisal with the latest version of the software resulted in a total saving of 6,280 tonnes of carbon emissions over the 60-year period. This leads to an additional benefit of £187,000 (2002 prices and values).

8.12 The assessments are detailed in the Cost Benefit Analysis and Accident Evaluation technical notes, together with the Accident

Analysis file note (see Documents LCC 36, LCC 48, LCC 49 and LCC 50).

9. CONCLUSIONS

9.1 I consider the traffic assessment for the completion of Heysham to M6 Link to be based on a comprehensive set of traffic models, developed using well established techniques and validated in accordance with Department for Transport criteria. Further, it is based on a robust traffic forecasting methodology that, again, has closely followed Department for Transport guidance. Recently, the Department for Transport has judged the traffic assessment acceptable for the Programme Entry approval stage.

9.2 Existing traffic flows on the city centre gyratory system and associated routes are heavy with links close to, or exceeding, capacity. Such heavy flows regularly lead to peak-time congestion, resulting in noise and air pollution, and causing delay, frustration and an acute lack of journey time reliability. Consequently, there is rat-running on inappropriate roads and the use of long detour routes.

9.3 Forecast opening year traffic flows on the scheme, both east and west of A6 Slyne Road, are well within the recommended economic flow range for the proposed standard, as set out in the DMRB. For the existing A683 route between M6 and Torrisholme significant traffic flow reductions of 12-25% are predicted and incorporate HGV reductions of

48-54%. Significant traffic relief is afforded at many other locations across the study area including:

A6 through Bolton-le-Sands and Carnforth;

B5321 through Torrisholme, past Lancaster and Morecambe College and east of Scale Hall Lane;

A589 through Morecambe.

9.4 I envisage the scheme as the appropriate route for journeys between the Port of Heysham and M6, thus providing a significant improvement in access together with substantial benefits to the urban areas of Lancaster, Heysham, Morecambe, Bolton-le-Sands and Carnforth.

9.5 Overall, the scheme is forecast to transfer 30,000 AADT off the existing roads serving the peninsula in opening year 2010. This represents a total reduction of 42%. As a consequence, very substantial savings in Torrisholme - M6 Junction 34 journey times together with increased reliability are predicted for traffic transferring to the scheme. There will also be significant journey time savings for users of the existing A683 route, including users of public transport.

9.6 Traffic model estimates of congestion reduction in the scheme opening year were undertaken for both east-west (A683) and north-south (A6) routes, across the River Lune and through the inter-linking gyratory systems of central Lancaster. For the A683 route the overall reduction in congestion computed to 49%, whilst the equivalent reduction for the A6 route was 33%.

9.7 The traffic model predicts that the scheme will provide some relief to Lancaster City Centre’s A6 gyratory system and the series of parallel residential streets to both east and west. There will be consequent reductions in congestion and delays on A6 together with less rat-running through the residential street systems. More significant relief is predicted across the remainder of the Lancaster built-up area, particularly on the radial routes.

9.8 The existing layout of M6 Junction 34 is well below the current design standard as set out in the DMRB. Loop radii are too low for all the slip roads and merge/diverge taper lengths for the north-facing slip roads are much shorter than they should be. Also, there is inadequate separation for each of the on/off slip combinations and a lack of hard shoulders, both through the junction and on each of the slip roads.

9.9 Cost benefit analysis for the scheme has been undertaken in accordance with current guidance. It included both an economic appraisal using TUBA and a road safety assessment employing COBA methodology. Substantial accident savings are predicted with the scheme in place, which contribute to extremely large economic benefits overall. With a benefit to cost ratio of 7.3 I consider the scheme to provide a very high value for money.