Aberdeen City Transport Trends – Then, Now and the Future

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1 Introduction

1.1 Background

Aberdeen is a vibrant Scottish city with a unique position as a centre leading the way in energy production, research and development. The transport trends in general in the city area have matched the economic performance of the city and the region as a whole with a high standard of living and high car ownership.

Over the last decade, major transport interventions have been proposed, the City Centre networks modelled and future year assessment undertaken. The City Council have invested in modelling transport trends, in the short and longer term, to ensure value for money from investment.

However, sight has never been lost of actual travel behaviour and the need to re-state trends at regular intervals. Traffic modelling is a representation of potential effects but rebasing to take account of the effects of external real world influences gives confidence in the current methods employed to support infrastructure investment decisions.

1.2 Purpose of Paper

This paper hopes to explain general transport trends but to then set them in the context of base data from an actual city and how those trends have been used to bring forward the various proposed infrastructure interventions to support background and future needs for transport networks.

1.3 Structure of Paper

The paper provides some background to the traffic and economic changes in Aberdeen over the last 10 years and details some of the key interventions which have been implemented during this period. The Aberdeen and Aberdeenshire trends forecast to 2035 is then provided along with the key interventions proposed for the next 10 years to cater for the predicted transport demand changes.

The traffic models used for assessing future traffic trends and interventions in Aberdeen are detailed along with a comparison of the survey data sets collated at pertinent intervals over the last 15 years.

Finally, a comparison is made between model growth predictions and the actual growth in traffic within the Aberdeen City Centre area. Conclusions are made on the requirements for continual rebasing of models and the lessons learned from historical traffic growth predictions.

2 Aberdeen & Aberdeenshire Transport & Economic Trends to 2014

2.1 NESTRANS Regional Transport Strategy

Nestrans is the Transport partnership for Aberdeen City and Shire. In 2008, Nestrans published the Regional Transport Strategy to 2021 (RTS) outlining the requirements over the period to 2021 to

provide a transport system that ensures economic growth, improves accessibility and protects the environment and the quality of life in Aberdeen City and Shire.

In 2014, the RTS was updated due to a number of changes to the policy and economic context within which the RTS sits and a number of actions and policies emerging in recent years that the RTS needs to take account of. The most significant of which is the publication of the structure plan, the subsequent Strategic Development Plan (SDP) for the North East to 2035, and the adoption of Local Development Plans for Aberdeen City and Aberdeenshire Council in January 2012.

The RTS refresh now extends to 2035. The associated monitoring reports and Main Issues Report provide background traffic and economic indicators which show the general trends in transport and economic performance over the last decade.

The key trends related to transport in the North East are detailed as follows:

2.1.1 Population Growth

The Aberdeen and Aberdeenshire population has increased by 5.6% between 2006 and 2011 (443,000 to 468,000) and by 9% since 2001 (438,850)[1].

In Aberdeen City, the population growth between 2001 and 2012 was 6% and in Aberdeenshire, the growth was 13%. This compares to a national increase of 4.9% over the same period[1].

2.1.2 Housing Growth

From the Draft Housing Land Audit, the volume of housing in the Aberdeen and Aberdeenshire Structure Plan Area grew by 19,210 between 2004 and 2012. This is an approximate 4% growth on the total housing numbers in the North East of 468,000 (2011).

Table 2.1 shows the Aberdeen and Aberdeenshire Housing Completions by housing market area between 2004 and 2012.

Table 2.1 Aberdeen and Aberdeenshire Housing Completions

(By housing market area between 2004 and 2012)

2.1.3 Standard of Living – Household Income

The household income by local authority for 2009/2010 shows that both Aberdeen and Aberdeenshire have a significantly higher proportion of households with income over £40,000 compared with the Scottish average[2].

Table 2.2 Average Household Income in Aberdeen & Shire 2009/2010

2.1.4 Economic Output in Aberdeen City & Shire

The local economic forum, ACSEF, aims to achieve an annual growth rate of 2.5% for Aberdeen City & Shire. That target has been achieved in each year since 2001, with the exception of 2003 and 2009 when there were growth rates of 2.2% and 1.4% respectively. Despite missing the 2.5% target in 2009, the local economy continued to grow at a time when the UK economy contracted by 5%. This demonstrates a high degree of resilience in the Aberdeen City & Shire economy, particularly in the energy sector[3].

In general, cities have been decentralising in recent years, with the central areas of cities, roughly equating to city centres, performing less well than the wider city economy. Between 1998 and 2008 (the decade before the beginning of the cu4rent downturn), just 25 of our 63 cities saw a concentration of private sector jobs in their central areas[6].

Aberdeen saw a 2% decrease in share of private sector jobs in the central area 1998 to 2008[6]

2.1.5 Trunk Road

Two major trunk roads link the north east to the rest of Scotland and beyond – the A90 linking Fraserburgh and Peterhead through Aberdeen to the South and the A96 linking Aberdeen to Inverness. Table 2.3 details the average daily traffic flow changes on these routes between 2004 and 2010. The table shows that there has been traffic growth between 2004 and 2010 on strategic routes outside Aberdeen.

Table 2.3 (5 Day) Average Daily Traffic flow Changes on A90 & A96

(Vehicles)

Congestion data is monitored by Transport Scotland on Trunk Roads and is published in Scottish Transport Statistics on an annual basis. Congestion data for the North East (2009/2010) suggests that the percentage of driver journeys delayed due to congestion is 18% in Aberdeen City, 12% in Aberdeenshire and 15% in the North East as a whole. This compares to a national value of 11%[5].

2.1.6 Traffic in the North East

Traffic in the North East makes up 9.2% of all traffic in Scotland[5].

In Aberdeen, there was a reduction of 4% in traffic between 2005 and 2011, despite the trunk road increases. In Aberdeenshire, there was a reduction of 0.5% over the same period. Over the whole Nestrans area, traffic levels are now slightly less than the baseline year of 2005[5]. This may be partly attributed to the UK Economic downturn which occurred during this period, however strategic route growth has been experienced.

2.1.7 Rail in the North East

The number of Rail passengers per year through North East Stations has increased by 90% between 2004/2005 and 2012/2013. The number of rail passengers though Aberdeen station has increased by 73%. Both of these figures are significantly higher than the national growth of 47% over the same period.

Table 2.4 Number of Rail passengers through the North East Stations

(Passengers/annum)

2.1.8 Car Ownership & Travel to Work

Car ownership is high in the North East, with around 77% of households having access to a car. Aberdeenshire has the highest rate of car ownership in Scotland, with around 85% of households having access to at least one vehicle. Car ownership in Scotland has increased from 65% in 2005/2006 to 69% in 2009/2010[5].

Aberdeen City has the highest number of cars per household of all Scotland's principal cities, the 2011 National Census Data shows Aberdeen City has 31% of households with no vehicles per household. In Edinburgh, this figure is 40% and in Glasgow the figure is 51%.

Across the North East, 64% of employed adults drove to work in 2005/2006 and also in 2009/2010. This compares to 61% for the Scottish average[5].

2.1.9 Public Transport in the North East

Bus patronage has increased in the Nestrans area from 31 million passengers per annum in 2004/2005 to 33 million in 2011/2012 (an increase of 6.5%). Bus vehicle km travelled increased by 12% over the same period[6].

2.1.10 Car Parking in Aberdeen City

In Aberdeen City Centre, there are around 6,000 off street public parking spaces, 25% of which are council owned, the rest of which are operated by private companies. 7,000 on-street Pay and Display spaces are also available around the city centre. The number of car parking spaces available in Aberdeen City Centre has increased by 15% between 2007 and 2013 as detailed in Table 2.5.

Table 2.5 Number of Car Parking Spaces in Aberdeen

The volume of off-street commercial parking has more than doubled in the last 6 years within Aberdeen City Centre area. The Union Square shopping Centre alone has added approximately 1200 spaces within the City Centre area. New large office developments, particularly for oil sector

companies have also accounted for a large proportion of the off-street commercial parking increases in the last few years.

2.2 Aberdeen & Aberdeenshire Transport & Economic Trends Summary

The Aberdeen and Aberdeenshire Transport & Economic Trends can be summarized as follows:

- The average standard of living in the North East is higher than the Scottish average
- Car ownership in the North East is very high
- Population growth is higher than the national growth figures
- The Aberdeen & Aberdeenshire economy continued to grow at a time when the UK economy contracted, however economic growth did reduce through the period of national economic downturn
- Trunk Road traffic has increased since 2005 with associated congestion increases
- Rail usage in the North East has increased significantly with a net 90% in rail passengers between 2004/05 and 2012/13
- Bus patronage increased by 6.5% in the North East between 2004/05 and 2011/12
- In Aberdeen City, car parking has increased by 15%, with a significant increase in off-street commercial parking.

Traffic volumes within the city itself have reduced by 4% between 2005 and 2011. This could be due to a number of factors including:

- Economic Downturn Nationally
- Slight decentralisation of City Centre private sector jobs / growth of peripheral employment sites
- Increase in the use of public transport
- Traffic Management measures in City Centre including 20mph zones and bus lanes
- Traffic congestion out with City Centre area

3 Major Interventions 2004-2014

3.1 Introduction

Nestrans developed the Modern Transport System or MTS which is an integrated package of measures aimed at delivering significant benefits to the transport system in the North East over the period 2002 to 2011. This was followed by the Regional Transport Strategy to 2021, which has recently been refreshed and updated to 2035.

The following sections detail the major transport interventions from the MTS and RTS which have been implemented in the last 10 years 2004-2014.

3.2 Interventions

Table 3.1 details the major transport interventions which have been implemented in the North East in the last 10 years. The table is not an exhaustive list of all measures implemented but provides detail on the key measures for the various traffic modes.

Table 3.1 Major Transport Interventions in the North East 2004-2014

4 Aberdeen & Aberdeenshire Future Trends, Targets & Objectives

4.1 Trends Forecast to 2035

The key forecast trends for Aberdeen and Aberdeenshire over the next 10 years, as detailed in the Nestrans Regional Transport Strategy Refresh 2014, are as follows:

- Population of working age predicted to increase by 25% in Aberdeen and 15% in Aberdeenshire by 2035
- The population of the North East is predicted to increase from 468,000 in 2011 to 480,000 by 2030 and to 500,000 by 2035
- The Strategic Development Plan (SDP) sets out a proposed housing allowance of over 67,000 homes between 2011 and 2035 (mostly in the strategic growth corridors of Aberdeen City, Aberdeen to Huntly, Aberdeen to Laurencekirk, and Aberdeen to Peterhead)
- Over this period to 2035, at least 50% of all homes built should be in Aberdeen City
- The anticipated impact of the SDP to 2023 compared to 2010 traffic and travel conditions is:
  - +20% rise in daily car trips
  - +10% rise in daily public transport trips
  - +30% rise in annual vehicle kilometres
  - +15% rise in annual carbon emissions

4.2 Key Targets & Objectives:

4.2.1 Emissions

Climate Change (Scotland) Act 2009 sets a 42% reduction target in greenhouse gas emissions by 2020 and an 80% reduction target by 2050. The transport sector accounts for about 26% of total Scottish carbon emissions

4.2.2 Air Quality

The North East has three Air Quality Management Areas, which are continually monitored. ACC is committed to implement measures to reduce the air pollution in these areas and through the city. Aberdeen City Council published an Air Quality Action Plan 2011 which sets out measures required to improve air quality in Aberdeen.

4.2.3 Walking & Cycle Usage

- Cycling Action Plan for Scotland (2010). Target to increase the current proportion of trips by bicycle from 1% to 10% by 2020
- Aberdeen City Council LTS: Commitment to improve cycle facilities and infrastructure, cycle safety, and the development of an Aberdeen City cycling strategy
- Aberdeenshire Council: Walking & Cycling Action Plan 2009

4.2.4 Road Casualty Reduction Targets

- Joint Road Safety Plan ACC & ASC 2011-2015: Outline Strategies
- National Road Safety Targets to 2015 and 2020 as detailed in Table 4.1

Table 4.1: National Road Safety Target Reduction Figures

(Based upon 04-08 average)

4.2.5 Economic Targets

Aberdeen City and Shire Economic Future (ACSEF) Action Plan 2012-2018 includes the strategic priorities:

- Deliver a fully integrated transport network
- Deliver a City Centre Re-development

5 Proposed Major Transport Interventions 2014-2024

5.1 Introduction

The Regional Transport Strategy sets out an integrated approach to meet the future transport needs and bring sustainable improvements to transport across the region to 2035.

The following details the major interventions proposed for the North East over the next 10 years. The key intervention during this period is the construction of the Aberdeen Western Peripheral Route (AWPR) which, following legal delays, is due to be implemented in 2018.

Table 5.1 Proposed Major Transport Interventions 2014 - 2024

Figure 5.1 shows the location of the key strategic interventions proposed in the Aberdeen area over the next 10 years.

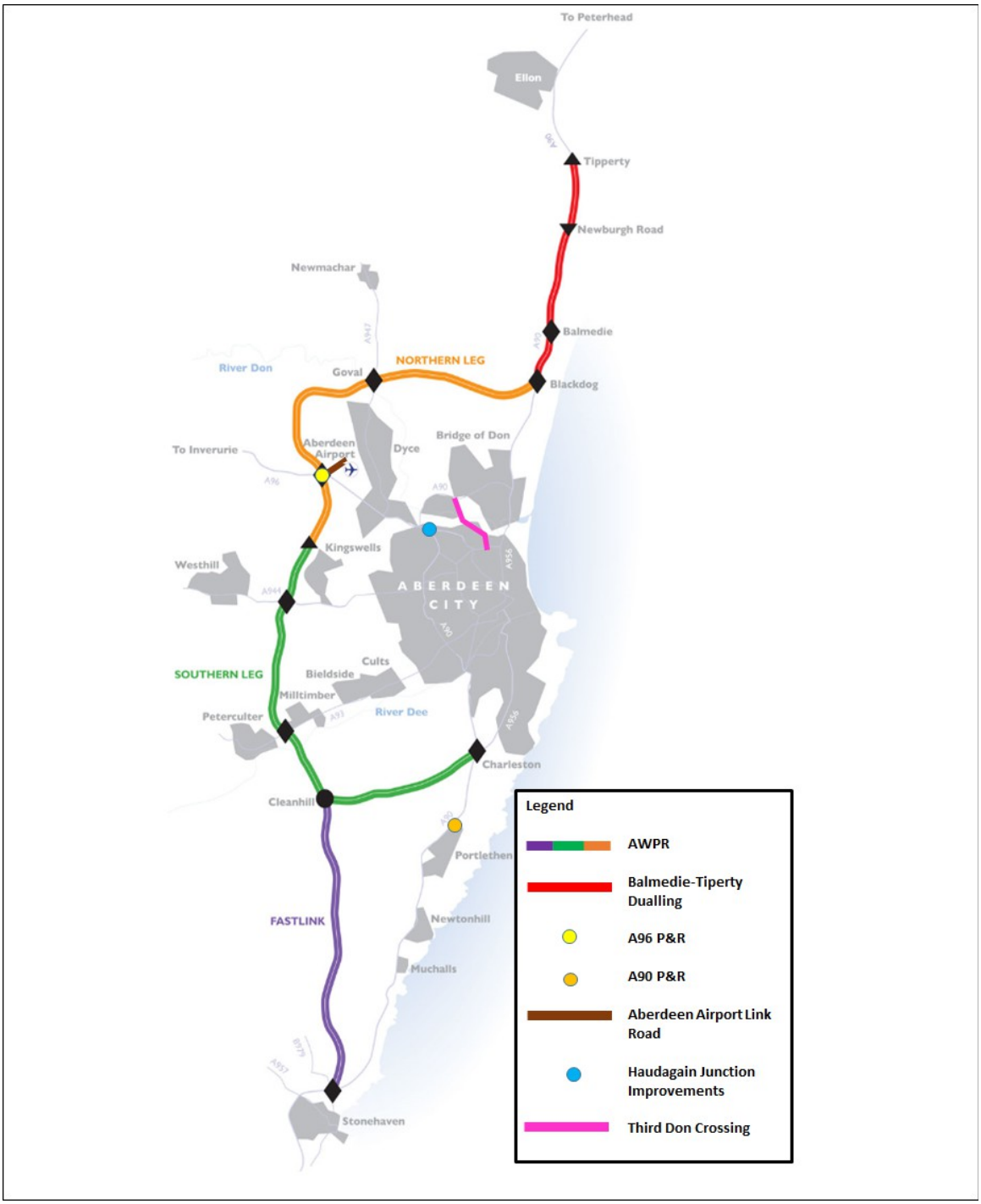

Figure 5.1 Proposed Strategic Road Interventions in Aberdeen Area 2014-2024

Figure 5.2 shows the location of the key strategic interventions proposed in the Aberdeen City Centre area over the next 10 years.

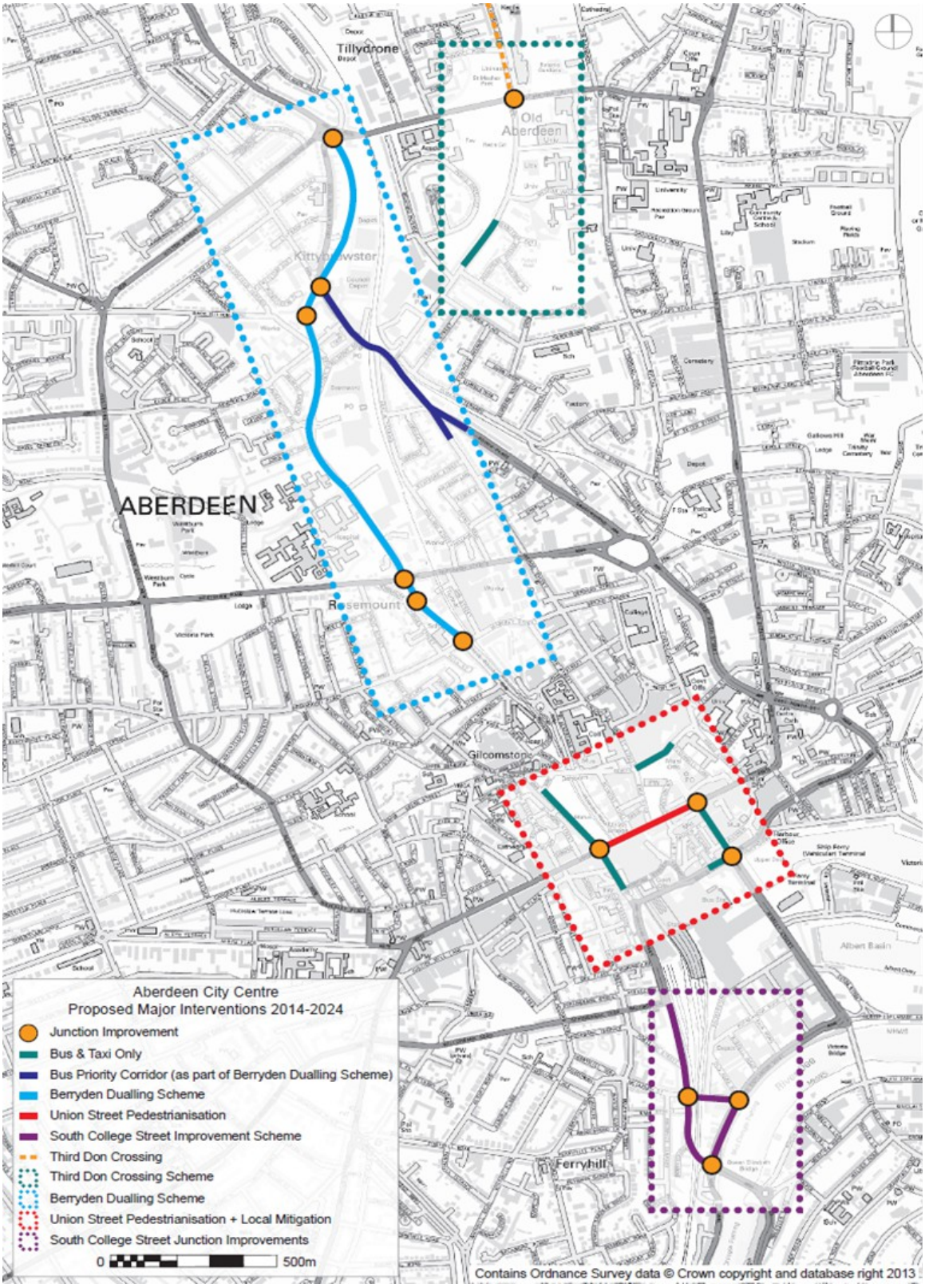

Figure 5.2 Proposed Major Road Interventions in Aberdeen City Centre 2014-2024

6 Traffic Modelling in Aberdeen

6.1 Wide Area Microsimulation Modelling in Aberdeen

Both Aberdeen City Council and Aberdeenshire Council have recognised the benefits of traffic modelling for the assessment of their local and regional transport plans and the development of infrastructure interventions to best cater for predicted future traffic changes.

This paper will focus primarily on traffic modelling within Aberdeen City. There are currently three wide area traffic models covering separate areas of Aberdeen City, all developed by SIAS Ltd on behalf of ACC.

Figure 6.1 details the model coverage of the three wide area traffic models developed.

The three Aberdeen City models have been utilised for a wide range of traffic and transportation studies, including many of the primary strategic interventions proposed between 2014 and 2024 and all of the primary City Centre interventions as detailed in Chapter 5.

The Aberdeen North Model was first developed in 2004 and was upgraded and extended in 2012 by SIAS on behalf of ACC

The Aberdeen South Model was first developed in 2004/05 by JMP and upgraded by SIAS in 2009 on behalf of ACC.

The Aberdeen City Centre Model was first developed in 2001, a model upgrade and extension was undertaken in 2005 and a further upgrade and extension in 2012. All three city Centre Base models were developed by SIAS on behalf of ACC.

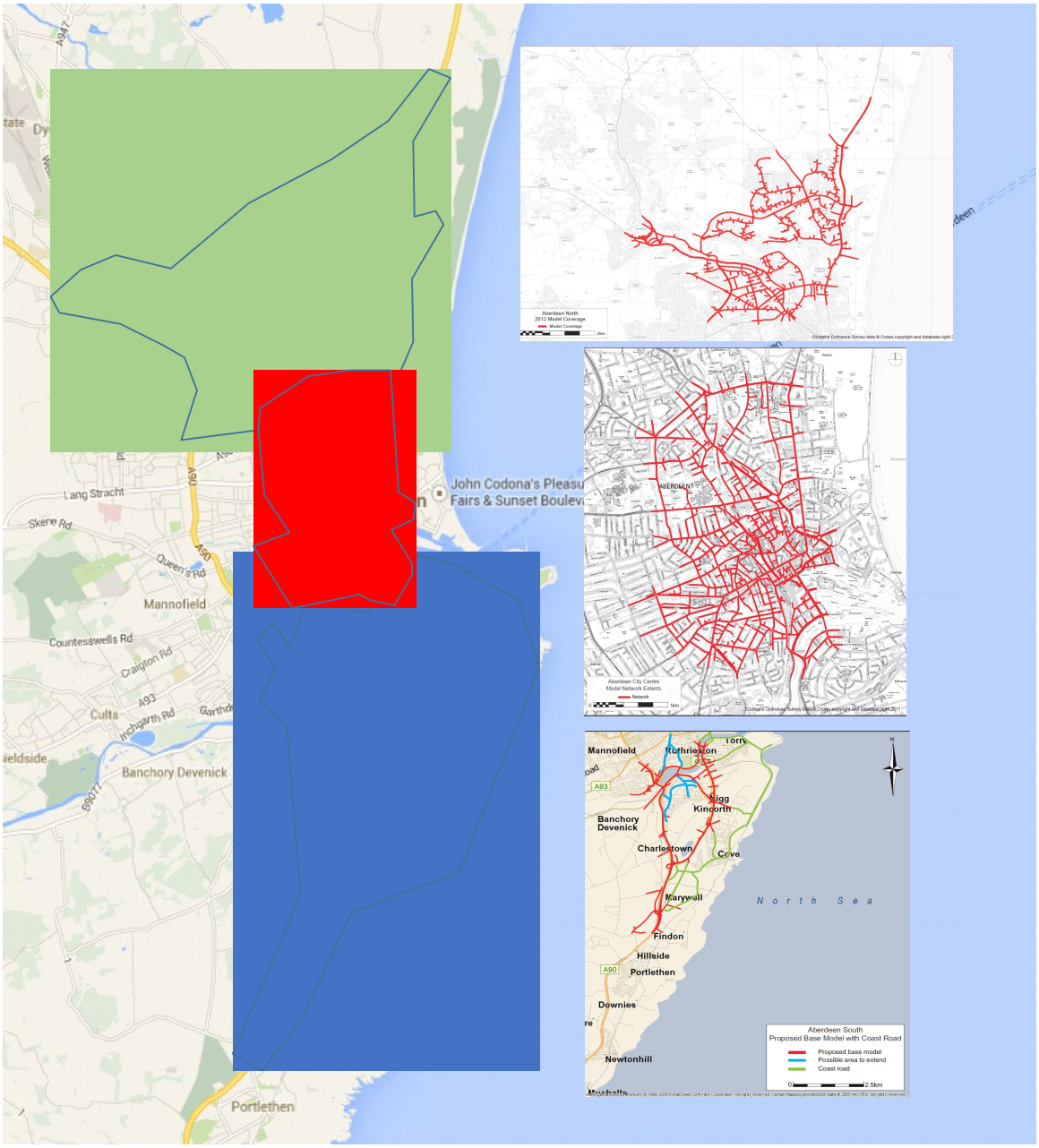

Figure 6.1 Aberdeen City Model Coverage

6.2 Strategic Modelling in Aberdeen and Aberdeenshire

There is a strategic model for the whole Aberdeen and Aberdeenshire area, the Aberdeen Sub Area Model (ASAM) is a higher tier strategic traffic model, developed to serve and provide a forecasting tool for Aberdeen and Aberdeenshire Councils. ASAM was developed and is maintained by Systra (MVA).

The latest ASAM model ASAM4A is a tool available to produce forecast effects of the following wide area measures:

- Aberdeen Western Peripheral Route (AWPR)

- Public Transport (Bus and Rail) Improvements
- Aberdeen City and Shire Local Development Plans/Structure Plan

The ASAM model is utilised to inform the wide area Aberdeen City models of the strategic influence of the major wide area measures detailed above.

7 Survey Data Analysis 2000-2012

7.1 Introduction

Both Aberdeen City and Aberdeenshire Council have recognised the need to re-state transport trends at regular intervals. Traffic modelling is a representation of potential effects but rebasing to take account of the effects of external real world influences gives confidence in the current methods employed to support infrastructure investment decisions. DMRB[7] also advises that, in cases where the original traffic data is more than six years old, a comprehensive new data set is advised to be collected.

Extensive traffic count surveys are required to be undertaken for the purposes of updating a traffic model to current conditions. Other data collation types can also be undertaken to assist with rebasing the network travel patterns and behaviour i.e. Automatic Number Plate (ANPR) surveys, Roadside Interview (RSI) surveys, Queue Length, and Journey Time surveys

The following section provides a comparison of the traffic flow changes at key junctions in Aberdeen that have occurred between the various base model development periods for the three Aberdeen City Models.

It should be noted that the turn count data is collated for only one day of survey, due to the extensive data set requirements. This actual day of survey also varies between years, depending upon the time of commission. There should therefore be a degree of daily variation considered when comparing a single day turn count data across different years.

7.2 Aberdeen North Model Surveys

Five key junctions were compared in the Aberdeen North model area between 2004 and 2012.

Figure 7.1 Aberdeen North: Key Junction Survey Comparison

PM Peak Period (16:00-19:00)

Figure 7.1 shows a 2% rise in traffic flow over the 3 hour period between 2004 and 2012. This growth is lower than the Trunk Road Growth of 11% which occurred on the A96 between 2004 and 2010 (Table 2.1). However, the trunk road growth was taken from an average daily flow as opposed to a fixed three hour period.

The 2012 surveys were actually undertaken over a 4 hour period. An assessment of the travel demand profiles show peak spreading occurred between 2004 and 2012 (Figure 7.2 and 7.3 showing the AM and PM Peaks respectively).

Figure 7.2 shows that the traffic demand in the AM period builds and peaks earlier in 2012. Figure 7.3 shows that the traffic demand in the PM Peak is higher at the start and end of the peak period in 2012.

The increase in traffic flow through these junctions in 2012 would therefore potentially be higher than the 2% suggested in Figure 7.1, if both survey periods were extended over a longer period, as the current road network is constrained.

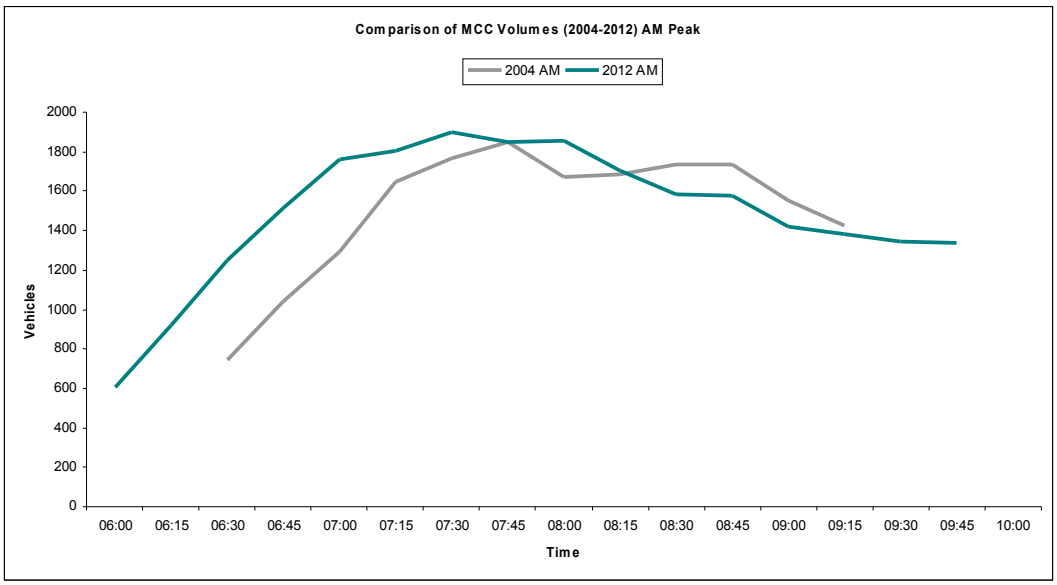

Figure 7.2 Peak Spreading Aberdeen North – AM Peak

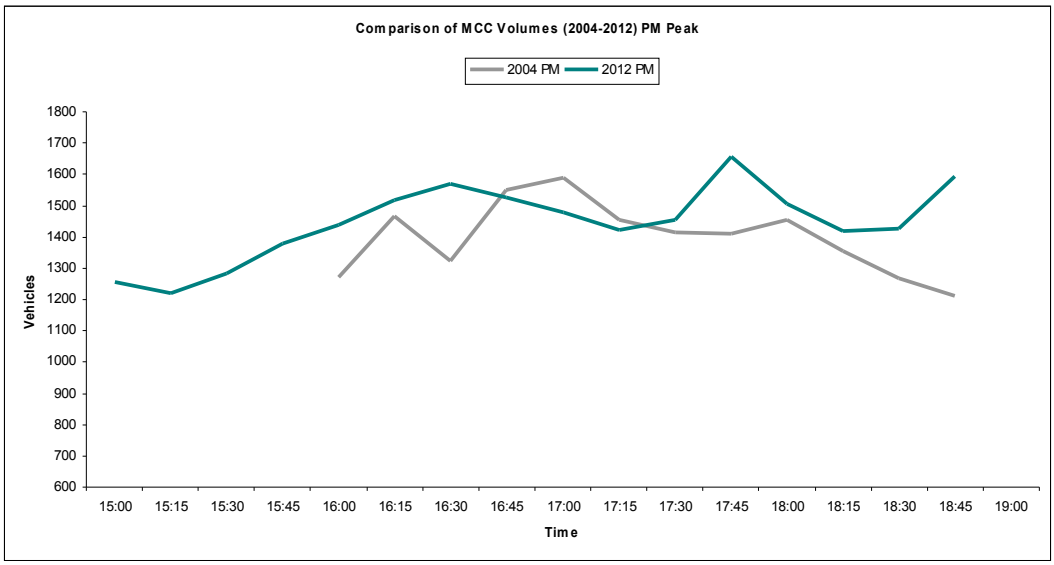

Figure 7.3 Peak Spreading Aberdeen North – PM Peak

7.3 Aberdeen South

Four key junctions were compared in the Aberdeen South model area between 2004 and 2009.

Figure 7.4: Aberdeen South: Key Junction Survey Comparison

PM Peak Period (16:00-18:30)

Figure 7.4 shows a 2% rise in traffic flow over the 2½ hour model period between 2004 and 2009. The traffic demand in Aberdeen South is likely to have similar peak spreading as per Aberdeen north. This could only be quantified if data was available for longer time periods than was surveyed.

This growth is lower than the Trunk Road Growth of 16% which occurred on the A90 between 2004 and 2010 (Table 2.1). However, the trunk road growth was taken from an average daily flow as opposed to a fixed three hour period.

The survey data does show an 11% increase on traffic on A90 at the Charleston interchange. This more closely concurs with the ATC growth detailed in Table 2.1.

7.4 Aberdeen City Centre

Ten key junctions were compared in the Aberdeen City Centre model area between 2000, 2005 and 2012.

Figure 7.5 Aberdeen City Centre: Key Junction Survey Comparison

PM Peak Period (15:30-18:30)

Figure 7.5 shows the following change in traffic flow over the three hour period between the three years assessed:

- 2005 – 2012 -8% reduction
- 2000 – 2012 -4% reduction
- 2000 – 2005 +5% Increase

The figures for the selected junctions generally tie in with Scottish Transport Statistics suggesting that in Aberdeen City, there was a reduction of 4% in traffic between 2005 and 2011 (Section 2.1.2).

There a many potential factors and reasons for traffic reduction in the City Centre area between 2005 – 2012. Some of which include:

- Economic Downturn Nationally
- Slight decentralisation of City Centre private sector jobs / growth of peripheral employment sites
- Increase in the use of public transport in the City Centre
- Traffic Management measures in City Centre including 20mph zones and bus lanes
- Traffic congestion out with City Centre area causing peak spreading

7.5 Conclusions from Survey Data Review

The survey data comparisons suggest that traffic growth has occurred (in the modelled time periods) in the North and South of Aberdeen. This ties in with the Scottish Transport statistics which have shown growth on the A90 and A96 over the last 10 years.

Traffic volumes have reduced in the Aberdeen City Centre area, suggesting that Aberdeen may not be immune from the effects of the UK economic downturn or there may be peak spreading or a movement of jobs to outer lying areas. The changes in traffic flow in the City Centre correlate with the findings from Scottish Transport Statistics.

A survey data comparison of this type is limited due to the constraints of the survey data period. Extended traffic survey data collation in Aberdeen North has shown that peak spreading has occurred over the 2004-2012 period.

In order to fully assess the changes in traffic flow through time within a city or large town, an average daily flow would be the most robust assessment. This, of course, would require extensive survey data collation.

8 Traffic Modelling Future Scenarios – Aberdeen City Centre Model

8.1 Introduction

A further method for assessing the change in transport trends over time is to review the predicted traffic growth from historical traffic models (i.e. Reference Case Model Scenarios) against updated Base Model scenarios to assess if trend predictions have been accurate. Additionally, an assessment of this type can be utilised to assess if traffic trends have been predicted correctly, and if not, can any lessons be learned from discrepancies when considering future growth?

This chapter provide some analysis on the various model iterations associated with the Aberdeen City Centre Traffic Model.

The Aberdeen City Centre Model was first developed in 2000. A model upgrade to 2005 conditions and model extension was carried out in 2005 and a further extension and upgrade to 2012 conditions was also carried out.

Due to the changing size and complexity of the three versions of the Aberdeen City Centre Model, a traffic matrix comparison between the Base Models cannot be drawn. However, we can assess each Base Model individually, and compare the future year predictions against the subsequent Base Model

8.2 Review of Future Growth Prediction from 2000 Base Model / Survey Data

Figure 8.1 shows the traffic growth predicted in 2006, utilising the 2000 Base Model, compared against actual growth in 2005 and 2012.

Figure 8.1 2000 Base Model / Surveys (PM Peak)

From Figure 8.1, the 2006 Reference Case Model prediction of an 8% growth is slightly higher than the 5% growth observed from (selected) survey data in 2005. Given the limited data set used for the survey data analysis, and the consideration of daily variation in survey data, the traffic growth prediction for 2006 was a reasonable prediction of what actually occurred. The 2000 Base Model was not utilised to look any further ahead than 2006.

8.3 Review of Future Growth Prediction from 2005 Base Model / Survey Data

Figure 8.2 shows the traffic growth predicted in 2007,2009, and 2012 utilising the 2005 Base Model, compared against actual growth in 2012.

Figure 8.2 2005 Base Model / Surveys (PM Peak)

From Figure 8.2, the 2007, 2009, and 2010 Reference Case Models predicted a gradual increase in traffic growth to 2.4%, due to the proposed implementation of various developments in the City Centre area through this time period.

However, the 2012 survey data comparison (limited junctions) has shown an 8% reduction in traffic demand since 2005. The future year traffic modelling undertaken on the 2005 Base Model did not include the effect of the economic downturn or any of the other potential reasons for the demand reduction noted in Section 7.4.

8.4 Review of Future Growth Prediction from 2012 Base Model / Survey Data

Figure 8.3 shows the traffic growth predicted in 2017 and 2023 utilising the 2012 Base Model

Figure 8.3 2012 Base Model / Surveys (PM Peak)

From Figure 8.3, a (currently initial) assessment of a 2017 Reference Case predicts an 11% increase in traffic demand in the City Centre area (From ASAM and Paramics predictions). The proposed implementation of the AWPR in 2018 results in a predicted reduction in traffic demand in the City Centre area of approximately 5%, which is a net increase on the 2012 baseline of 6%. By 2023, this 6% increase is predicted to rise to 7.5%.

It is important to note that the 11% increase in traffic predicted between 2012 and 2017 is offset by the 8% reduction in demand (detailed in Chapter 7) between 2005 and 2012. Thus, a net increase of 3% is predicted between 2005 and 2017.

The predicted traffic demand increase in City Centre Area over the next 10 years does not fit with the aspirations of Aberdeen City Council. Aberdeen City Council have stipulated in their transport strategy that any future City Centre Masterplan should priorities a transport hierarchy of walking and cycling, followed by public transport, and then other vehicular movement.

With that in mind, Aberdeen City Council and Nestrans have recently requested a re-assessment of future year predictions in the strategic ASAM model, taking more congniscience of local growth rates in other traffic modes i.e. rail.

Furthermore, these is also currently a study being commissioned to re-evaluate the strategic routing in and through the city centre area with the objective to develop a traffic management plan to reduce strategic through routing in the city centre area.

9 Conclusions

There is a clear need to continually re-base traffic models in light of continual changes to traffic growth, infrastructure changes, policy & legislation changes, economic changes, modal shift changes, and any other unforeseen changes.

For traffic modelling, DMRB Vol:12, Section 2, Part 1 (Traffic Appraisal in Urban Areas) advises that, in cases where the original traffic data is more than six years old, comprehensive new data is advised to be collected.

A five to six year model refresh programme would also tie in with the lifespan of key planning documents. Ideally, a traffic model refresh could be incorporated into the current planning policy structure, whereby a new base model refresh could be undertaken following the publication of the key planning documents (RTS, LDP, LTS). This would allow the traffic modelling to assess the key elements of the planning and infrastructure proposals and potentially provide a methodology to calculate any developer contributions.

There is also benefit to a retrospective review of predicted traffic growth to assess if there are lessons to be learned from previous changes in traffic trends and forecasts, as unforeseen global events and trends can occur.

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