

URS

**Stromeferry
Options
Appraisal
Traffic Survey
and Data
Report**

June 2013

Prepared for:
The Highland Council

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| Rev | Date | Details | Prepared by | Checked by | Approved by |
|-----|-----------|-----------------------|---|---------------------------------------|---------------------------------------|
| 0 | May 2013 | 1 st Issue | Jonathan Campbell Senior Transport Economist / Planner | David Taylor Technical Director | David Taylor Technical Director |
| 1 | June 2013 | 2 nd Issue | Jonathan Campbell Senior Transport Economist / Planner | David Taylor Technical Director | David Taylor Technical Director |
| | | | | | |
| | | | | | |

URS
Citypoint 2
25 Tyndrum Street
Glasgow
G4 0JY
United Kingdom

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1 INTRODUCTION

1.1 BACKGROUND

The A890 and the single track railway line share a tight corridor along the southern shore of Lochcarron. The road is restricted to a 4 metre single track carriageway with passing places between Ardnarff and Attadale.

Since the Stromeferry Bypass was opened, part of this road between Ardnarff and Cuddies' Point, located just west of Attadale, has been subject to landslides and rock fall events, causing the Local Authority to temporarily close the road on several occasions in order to undertake remedial works, forcing both road and rail users to undertake a 220 km temporary road diversion during these closure events.

Discussions have been held with The Highland Council to establish the scope of the road network to be examined. This document has therefore been prepared to take into account these discussions. This report should be read in conjunction with the Stage 1 report.

1.2 OVERVIEW OF THE STUDY AREA

The Stromeferry Bypass is an approximately 12km long section of public highway running alongside the southern shore of Lochcarron in Wester Ross. The road forms part of the A890 between the Strathcarron Junction and the A87 Invergarry to Kyle of Lochalsh Trunk Road, tying in at Auchtertyre.

The road also forms part of the wider road network linking Dingwall with the Isle of Skye via Achnasheen, and provides a popular route for tourists during the summer months.

Figure 1.1 in Appendix 1 shows the general location plan of the area.

1.3 STRUCTURE OF THIS REPORT

The overall structure of the remainder of this report is as follows:

- Chapter 2* – provides an analysis of the historical traffic data;
- Chapter 3* – summarises the new traffic surveys undertaken ;
- Chapter 4* – provides an analysis of the new traffic data; and
- Chapter 5* – presents a brief conclusion of the emerging findings.

2 ANALYSIS OF HISTORICAL TRAFFIC DATA

2.1 DAILY TRAFFIC MOVEMENTS

Two sets of traffic data were used to obtain historical information on the A890 Stromeferry Bypass in the study area. Highland Council provided 2012 traffic data for Achintee (just west of Strathcarron). 2010 traffic data was obtained from Transport Scotland for Attadale. It should be noted that this report interprets northbound and eastbound as the same direction, and southbound and westbound as the same direction.

Tables 2.1 and **2.2** show average vehicle counts for Achintee eastbound and westbound respectively for the months for which data was available, April through to September.

TABLE 2.1 VEHICLE COUNT REPORT STROMEYFERRY BYPASS, SITE REFERENCE 00020704 (ACHINTEE), EASTBOUND

| Average Flows – Mon-Fri | Apr | May | Jun | Jul | Aug | Sep |
|--------------------------------|-----|-----|-----|-----|-----|-----|
| 12 Hour, 0700 -1900 | 421 | 608 | 668 | 676 | 734 | 624 |
| 16 Hour, 0600 - 2200 | 456 | 665 | 732 | 751 | 811 | 673 |
| 18 Hour, 0600 - 2400 | 460 | 674 | 744 | 763 | 823 | 681 |
| 24 Hour, 0000 - 2400 | 464 | 679 | 751 | 771 | 832 | 687 |
| Average Flows – Mon-Sun | Apr | May | Jun | Jul | Aug | Sep |
| 12 Hour, 0700 -1900 | 391 | 587 | 640 | 663 | 713 | 588 |
| 16 Hour, 0600 - 2200 | 424 | 642 | 704 | 736 | 788 | 634 |
| 18 Hour, 0600 - 2400 | 428 | 650 | 714 | 746 | 799 | 642 |
| 24 Hour, 0000 - 2400 | 431 | 656 | 721 | 753 | 808 | 648 |

Source: Highland Council, 2012

Average daily traffic flows in the area are relatively low, but show strong seasonal variation. Traffic in August is nearly double that in April, reflecting the popularity of the route with tourists during the peak summer months. Traffic also appears heavier westbound, although the reason for this is not immediately clear.

To illustrate the strength of seasonal variation, the counts for August westbound traffic flows show that approximately 1160 vehicles are recorded over a 24 hour period averaged Monday to Friday. This represents a 76% increase over the relevant April traffic flow values.

TABLE 2.2 VEHICLE COUNT REPORT STROMEYFERRY BYPASS, SITE REFERENCE 00020704(ACHINTEE), WESTBOUND, SOURCE: HIGHLAND COUNCIL, 2012

| Average Flows – Mon-Fri | Apr | May | Jun | Jul | Aug | Sep |
|--------------------------------|-----|-----|------|------|------|-----|
| 12 Hour, 0700 -1900 | 598 | 773 | 888 | 921 | 996 | 848 |
| 16 Hour, 0600 - 2200 | 653 | 863 | 992 | 1035 | 1126 | 948 |
| 18 Hour, 0600 - 2400 | 657 | 878 | 1010 | 1054 | 1145 | 957 |
| 24 Hour, 0000 - 2400 | 661 | 887 | 1024 | 1068 | 1160 | 971 |
| Average Flows – Mon-Sun | Apr | May | Jun | Jul | Aug | Sep |
| 12 Hour, 0700 -1900 | 556 | 734 | 852 | 909 | 964 | 801 |
| 16 Hour, 0600 - 2200 | 606 | 821 | 951 | 1016 | 1091 | 894 |
| 18 Hour, 0600 - 2400 | 610 | 835 | 970 | 1034 | 1111 | 905 |
| 24 Hour, 0000 - 2400 | 615 | 844 | 984 | 1047 | 1126 | 917 |

In order to update the 2010 Attadale data to 2012, National Road Traffic Forecasts Annual Growth Rates for Rural Roads, (NRTF Forecasts Great Britain 1997) were used. **Table 2.3** shows the average 5 and 7 day counts, northbound (eastbound) and southbound (westbound).

TABLE 2.3 MONTHLY MEAN COUNTS, ATTADALE, SITE REFERENCE 224015, EASTBOUND & WESTBOUND, 2010

| Eastbound | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Average 5 day flows | 259 | 357 | 445 | 551 | 718 | 789 | 746 | 861 | 680 | 494 | 361 | 230 |
| Average 7 day flows | 223 | 321 | 411 | 521 | 699 | 763 | 723 | 830 | 669 | 458 | 327 | 199 |
| Westbound | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Average 5 day flows | 264 | 366 | 460 | 559 | 723 | 794 | 751 | 878 | 686 | 513 | 376 | 240 |
| Average 7 day flows | 226 | 334 | 425 | 529 | 681 | 765 | 730 | 853 | 666 | 476 | 341 | 209 |

Source: Transport Scotland, 2010

The traffic counts at Attadale, both eastbound and westbound, are slightly lower than those at Achintee, but the **Table** clearly shows the significant seasonal variation in traffic flows noted for Achintee in **Table 2.2**. August is the busiest month for both locations, traffic counts indicate traffic levels averaged over 7 days at four times that of those observed for December. It would appear that this is entirely attributable to peak tourist traffic during the summer months.

2.2

PEAK HOUR FLOWS

Tables 2.4 and **2.5** show the AM and PM peak hour flows at Achintee for 2012. The peak hours shown are for 10:00hrs – 11:00hrs (AM peak) and for 15:00hrs – 16:00hrs (PM peak).

TABLE 2.4 AM & PM PEAK FLOWS, STROMEY FERRY BYPASS, SITE REFERENCE 00020704(ACHINTEE), EASTBOUND, 2012

| Mon - Fri | Apr | May | Jun | Jul | Aug | Sep |
|------------------|-----|-----|-----|-----|-----|-----|
| AM Flows | 39 | 62 | 71 | 71 | 79 | 67 |
| PM Flows | 49 | 65 | 71 | 74 | 78 | 66 |
| Mon - Sun | Apr | May | Jun | Jul | Aug | Sep |
| AM Flows | 37 | 63 | 70 | 70 | 81 | 64 |
| PM Flows | 45 | 63 | 68 | 74 | 76 | 63 |

Peak hour patterns show the same distinct seasonal pattern as seen for average daily flows, with August showing the highest AM and PM peak flows, and April the lowest.

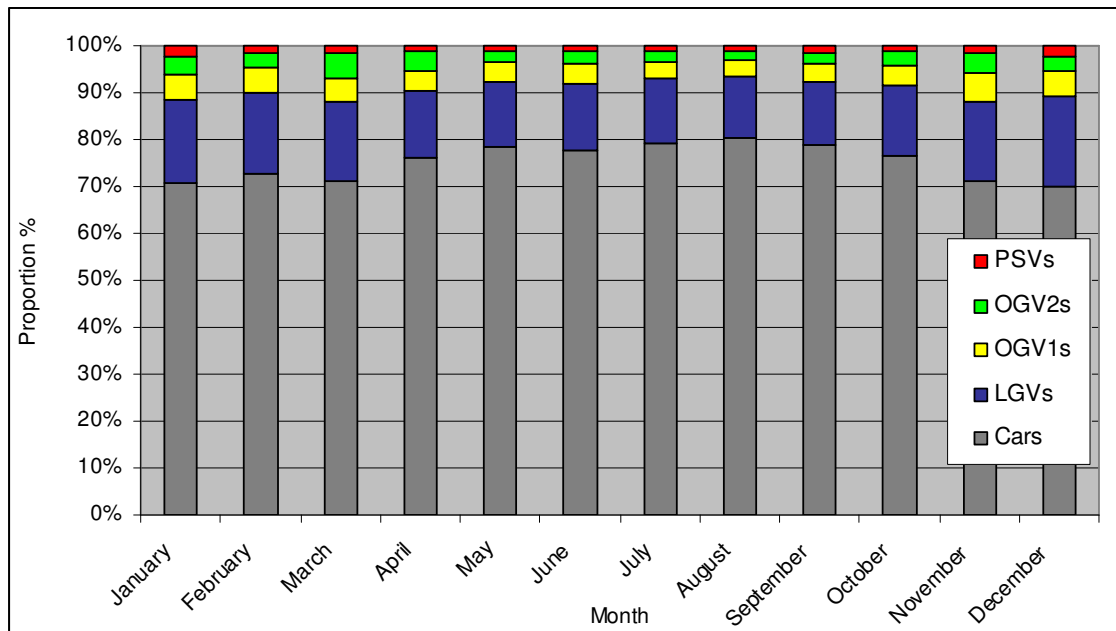
| TABLE 2.5 AM & PM PEAK FLOWS, STROMEFERRY BYPASS, SITE REFERENCE 00020704(ACHINTEE), WESTBOUND, 2012 | | | | | | |
|--|----------|----------|----------|----------|----------|----------|
| Mon - Fri | Apr | May | Jun | Jul | Aug | Sep |
| AM Peak | 11:00hrs | 11:00hrs | 11:00hrs | 11:00hrs | 11:00hrs | 10:00hrs |
| AM Flows | 62 | 80 | 93 | 99 | 115 | 91 |
| PM Peak | 16:00 | 17:00 | 16:00 | 16:00 | 15:00 | 15:00 |
| PM Flows | 57 | 80 | 89 | 91 | 96 | 85 |
| Mon - Sun | Apr | May | Jun | Jul | Aug | Sep |
| AM Peak | 11:00hrs | 11:00hrs | 11:00hrs | 11:00hrs | 11:00hrs | 10:00hrs |
| AM Flows | 58 | 77 | 92 | 106 | 114 | 87 |
| PM Peak | 16:00hrs | 15:00hrs | 15:00hrs | 16:00hrs | 15:00hrs | 15:00hrs |
| PM Flows | 52 | 75 | 86 | 97 | 95 | 85 |

Monday to Sunday average peak hour flows increase in June, July and August relative to the Monday to Friday average peak hour flows. This suggests that tourist traffic over the summer months dilutes the local AM and PM peak hour traffic flows, as would be expected.

2.3 VEHICLE PROPORTIONS

The proportion of vehicle types that make up the traffic flows throughout the year are shown in **Figure 2.1**. Clearly cars make up the vast majority of vehicles using the A890 Stromeferry bypass, contributing 70% and 80% of all traffic for January and August respectively. This difference between winter and summer values can be attributable to the visitors to and passing through the area.

FIGURE 2.1: RECORDED VEHICLE PROPORTIONS, ACHINTEE 2012



Source: Highland Council, 2012

The **Figure** suggests that heavy traffic, both heavy goods vehicles (HGVs) and buses (PSVs) make up a relatively small proportion of traffic – generally less than 12%.

2.4 FUTURE TRAFFIC GROWTH AND ASSESSMENT FORECASTS

2.4.1 24 Hour Traffic Flows Baseline Conditions

It has been assumed that for the route option selected for improving the road network, the construction period is likely to be undertaken in 2015. Hence, for the purposes of the appraisal period and assessment of baseline conditions, we have used 2015 as the opening year. The design period in DMRB is usually opening year plus 30 years, therefore the future network impacts are estimated for the years 2015 and 2045, and traffic projections for the baseline conditions assessed below relate to this period.

The same background traffic growth was adopted as described in Section 2.1. This was based on the National Road Traffic Forecasts Annual Growth Rates for Rural Roads, (NRTF Forecasts Great Britain 1997).

TABLE 2.6 24 HOUR ONE-WAY VEHICLE TRAFFIC FLOWS FOR ATTADALE & ACHINTEE, MARCH AND JULY, FOR YEARS 2012, 2015 AND 2045, WITH PCUS IN PARETHENSIS

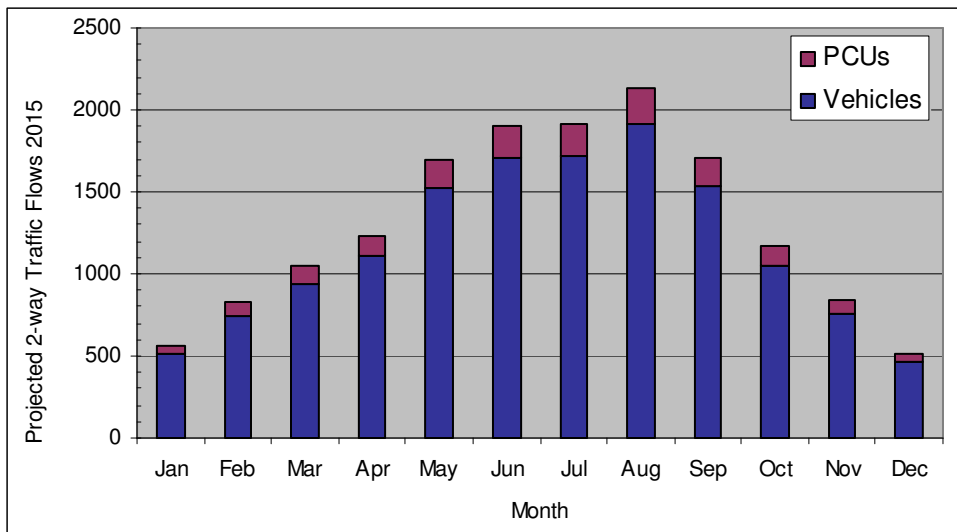
| Year | Direction | Attadale | | Achintee | |
|------|-----------|-----------|------------|-----------|-------------|
| | | March | July | March | July |
| 2012 | Eastbound | 423 (472) | 745 (830) | 393 (438) | 753 (840) |
| | Westbound | 438 (488) | 752 (839) | 557 (621) | 1047 (1167) |
| 2015 | Eastbound | 441 (492) | 777 (866) | 409 (456) | 785 (875) |
| | Westbound | 456 (509) | 784 (874) | 580 (647) | 1092 (1217) |
| 2045 | Eastbound | 561 (625) | 986 (1100) | 520 (580) | 997 (1112) |
| | Westbound | 580 (646) | 996 (1110) | 737 (822) | 1386 (1546) |

Table 2.6 also shows vehicle traffic flows in PCUs. Traffic flows have been converted to passenger car units (PCUs) using the proportions of traffic from the Transport Scotland data for Attadale (site 224015) which had been presented by vehicle type. Converting traffic data to PCUs takes account of the different vehicle classes in the data, and allows for capacity analysis, as per Government appraisal guidance.

Figures 2.2 to 2.7 shown in Appendix 2 show the baseline 24 hour traffic flows for March and July for the years 2012, 2015 and 2045.

Figure 2.8 below shows the projected 2015 2-way 24 hour traffic flows averaged for Attadale and Achintee. Both these sites are relatively close together, not more than 3.5km apart, so an averaged figure may give a better indication of traffic flows over this stretch of road.

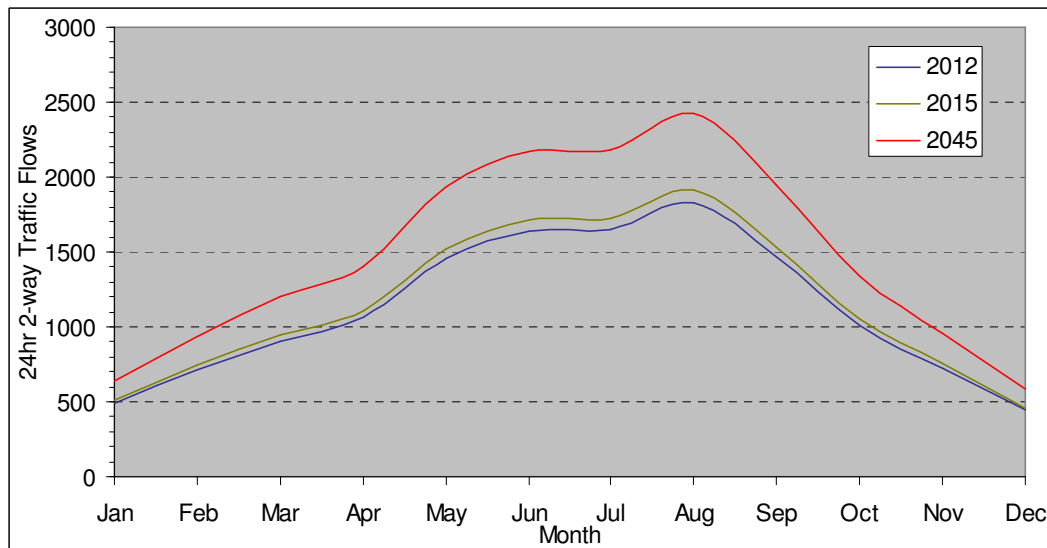
FIGURE 2.8: PROJECTED 2-WAY 24 HOUR TRAFFIC FLOWS, AVERAGED FOR ATTADALE & ACHINTEE, IN VEHICLES AND PCUS FOR YEAR 2015



The **Figure** suggests that by 2015, 24 hour 2-way traffic in PCU terms exceed 2,000 vehicles, whereas December – January traffic levels remain between 500 and 600 PCUs over the 24 hour period.

Figure 2.9 indicates the projected 2-way 24 hour vehicle traffic flows averaged for Attadale and Achintee for 2012, 2015 and 2045. This shows that by 2045 two way traffic flows for August may approach 2,500 vehicles per 24 hours, whereas the December – January traffic levels are circa 700 vehicles per 24 hours.

FIGURE 2.9: PROJECTED 2-WAY 24 HOUR VEHICLE TRAFFIC FLOWS, AVERAGED FOR ATTADALE & ACHINTEE, FOR YEARS 2012, 2015 & 2045



However, it should be noted that the further projections are made into the future, the less reliable these are likely to be, and can only give an indication of what the flows may be for the year in question.

2.4.2 *Peak Hour Traffic Flows Baseline Conditions*

Table 2.7 shows the AM and PM peak hour traffic flows, given in PCUs. The AM peak is an average of the two hour peak period 0800hrs – 1000hrs, and the PM peak is an average of the two hour peak period 16:00hrs – 18:00hrs. This is in order to give a better representation of the peak hour traffic where the hourly traffic levels vary considerably between these two hours and should consideration be given to only one hour, this may under-represent “true” peak hour flows.

| TABLE 2.7 AM & PM PEAK HOUR ONE-WAY TRAFFIC FLOWS IN PCUS, ATTADALE & ACHINTEE, FOR MONTHS OF MARCH AND JULY, FOR YEARS 2012, 2015& 2045 | | | | | | |
|--|-----------|----|----------|------|----------|------|
| Year | Direction | | Attadale | | Achintee | |
| | | | March | July | March | July |
| 2012 | Eastbound | AM | 41 | 82 | 36 | 78 |
| | | PM | 45 | 77 | 49 | 83 |
| | Westbound | AM | 42 | 82 | 60 | 118 |
| | | PM | 47 | 78 | 58 | 108 |
| 2015 | Eastbound | AM | 43 | 85 | 38 | 81 |
| | | PM | 47 | 80 | 51 | 87 |
| | Westbound | AM | 44 | 85 | 63 | 123 |
| | | PM | 49 | 81 | 60 | 113 |
| 2045 | Eastbound | AM | 54 | 109 | 48 | 103 |
| | | PM | 60 | 102 | 65 | 110 |
| | Westbound | AM | 56 | 109 | 79 | 156 |
| | | PM | 62 | 103 | 77 | 143 |

Converting peak hour traffic flows from vehicles to PCUs gives an indication that for Achintee, the eastbound traffic peak hour flows for 10:00hrs - 11:00hrs, shown in **Table 2.5**, are virtually identical to the peak hour traffic flows shown for Achintee in **Table 2.7**. However, for the westbound traffic, the peak hour traffic flows for 15:00hrs – 16:00hrs shown in **Table 2.5** under-represent the peak hour traffic flows for Achintee indicated in **Table 2.7**. Therefore for forecasting and assessment purposes, the peak hours are assumed to be 0800hrs – 1000hrs (AM) and 16:00hrs – 18:00hrs (PM).

Peak hour traffic flows at Attadale show particularly strong tidal flows indicative of commuting on this section of road. For example, at Attadale, eastbound and westbound peak hour traffic flows are within 10% of each other. However, peak hour tidal flow patterns are less evident at Achintee, suggesting random trips are made more frequently during the peak hours. However, for Achintee, March tidal flows are more well-defined than for July, which might be expected given the higher proportion of tourist traffic using this route during this period.

2.5 ROAD NETWORK CAPACITY

The relevant road network capacity of the A890 Stromeferry Bypass was calculated by a comparison of the base (2012), opening and design year flows (2015 and 2045), and from this an estimate for the level of congestion on the network can be derived. This is based on the ratio of flow to capacity (RFC).

The RFC is the standard network indicator used to show the level of utilisation of capacity, usually for traffic flows over one hour and in one direction of travel. An RFC of greater than 85% represents conditions of significant congestion, when safety and delay issues can be expected. An RFC of greater than 100% represents complete saturation. The local road network capacity is shown in **Figure 2.10** in **Appendix 3** of this document.

The road network capacity at Attadale is constrained by a 4m single lane carriageway, with a capacity classification given by NESAs¹ of 140 vehicles per hour per direction. However the road at Achintee is defined by NESAs as a rural (poor) 5.5m two lane carriageway with a capacity of 800 vehicles per hour per direction.

Table 2.8 shows the RFCs for the peak hour flows for Attadale and Achintee in terms of PCUs. The **Table** clearly shows a large increase in road capacity utilisation between March and July for Attadale. Nevertheless, even for the year 2045, although traffic is predicted to be heavy on this section of the road in relation to other sections of the A890 by 2045, the level of utilisation is below the level of conditions considered congested, and well below the level considered completely saturated.

TABLE 2.8 RATIO OF FLOW TO CAPACITY AM & PM PEAK HOUR FLOWS IN PCUS FOR ATTADALE & ACHINTEE, MARCH AND JULY, FOR YEARS 2012, 2015 AND 2045, IN PERCENTAGES

| Year | Direction | | Attadale | | Achintee | |
|------|-----------|----|----------|------|----------|------|
| | | | March | July | March | July |
| 2012 | Eastbound | AM | 29% | 59% | 5% | 10% |
| | | PM | 32% | 55% | 6% | 10% |
| | Westbound | AM | 30% | 59% | 8% | 15% |
| | | PM | 34% | 56% | 7% | 14% |
| 2015 | Eastbound | AM | 31% | 61% | 5% | 10% |
| | | PM | 34% | 57% | 6% | 11% |
| | Westbound | AM | 31% | 61% | 8% | 15% |
| | | PM | 35% | 58% | 8% | 14% |
| 2045 | Eastbound | AM | 39% | 78% | 6% | 13% |
| | | PM | 43% | 73% | 8% | 14% |
| | Westbound | AM | 40% | 78% | 10% | 20% |
| | | PM | 44% | 74% | 10% | 18% |

On the other hand, Achintee, by virtue of being a larger road, remains lightly trafficked for the road type over the whole design period.

¹ NESAs: Table 5/3/1: NESAs Road Categories, Link Speeds and Link Capacities, 2005

FIGURE 2.11: ROAD CAPACITY UTILISATION (PERCENTAGE) FOR TRAFFIC FLOWS IN PCUs, FOR THE A890 AT ATTADALE, AVERAGED BY DIRECTION, FOR YEARS 2012, 2015 & 2045

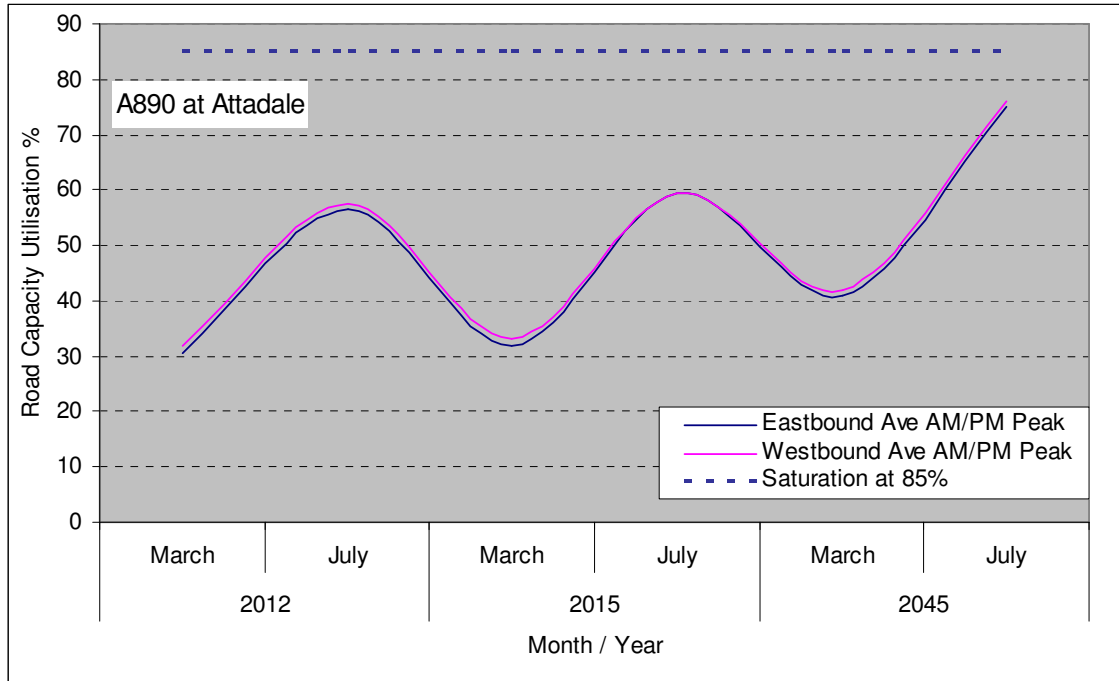


Figure 2.11 illustrates graphically the trend in road capacity utilisation for baseline conditions on the A890 at Attadale, with both eastbound and westbound traffic flows averaged for the AM and PM peak periods. It shows that there is sufficient road capacity at Attadale to accommodate increases in road traffic at least until 2045. Road capacity utilisation for the AM and PM peak periods for March and for July for the years 2012, 2015 and 204 is shown in **Appendix 4, Figures 2.12 to 2.17** for March and **Figures 2.18 to 2.23** for July.

3 NEW SURVEYS

In order to update and complement the traffic data provided by Highland Council and that sourced from Transport Scotland, new surveys were undertaken on the A890 Stromeferry Bypass from the 12th to the 18th March 2013. These surveys were of three types, comprising:

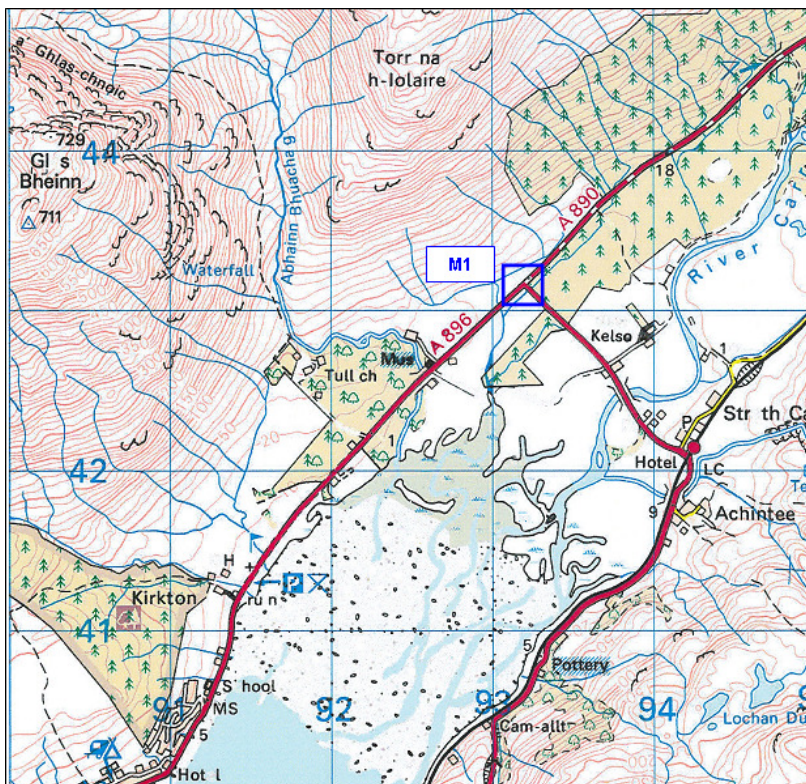
- junction turning counts;
- automatic traffic counts; and
- journey time measurement surveys.

3.1 JUNCTION TURNING COUNTS

A set of junction turning counts (JTCs) were undertaken at three sites over a 12 hour period between 7am and 7pm. Survey staff recorded the number of vehicles and vehicle type that undertook traffic movements at the three JTC sites in 15 minute periods.

Junction turning counts were carried out at the first site, marked M1 in **Figure 3.1**, located at the junction between the A890 and the A896, 5 kilometres east of Lochcarron and 1.5 kilometres north of Strathcarron.

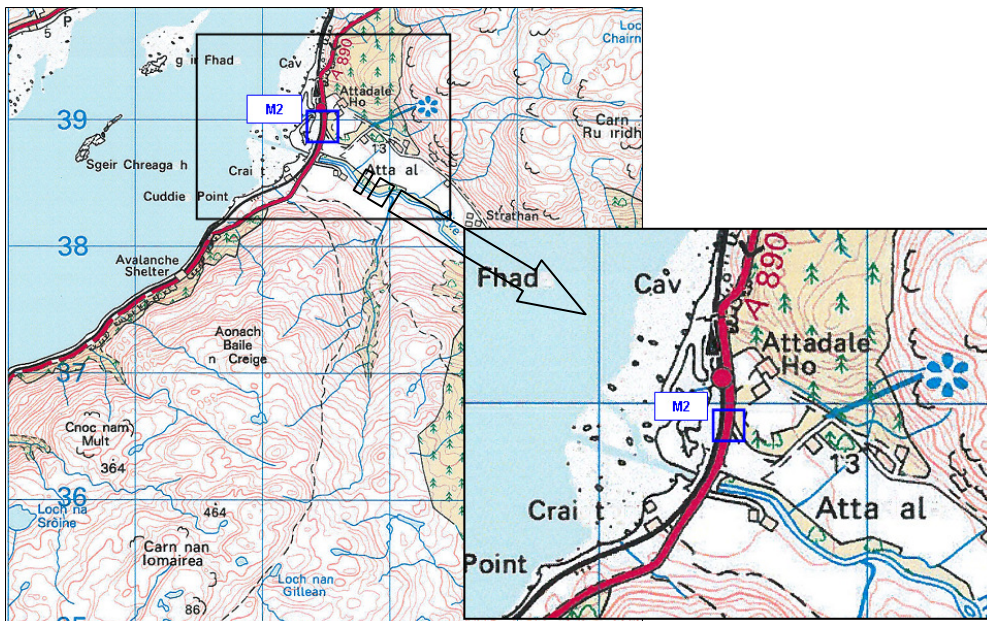
FIGURE 3.1: JUNCTION TURNING COUNTS AT THE A890 / A896 STRATHCARRON JUNCTION



This junction represents the northern / eastern end of the local road network under investigation in this study. The Stromeferry Bypass serves the settlements of Lochcarron, Strathcarron, Attadale, Ardnarff, Stromeferry and Achmore. The A890 eastbound from this junction connects these settlements with Achnasheen, and via the A832 with Dingwall and Inverness.

A second set of junction turning counts were carried out on the A890 at the Attadale Gardens Entrance, marked M2 in **Figure 3.2**.

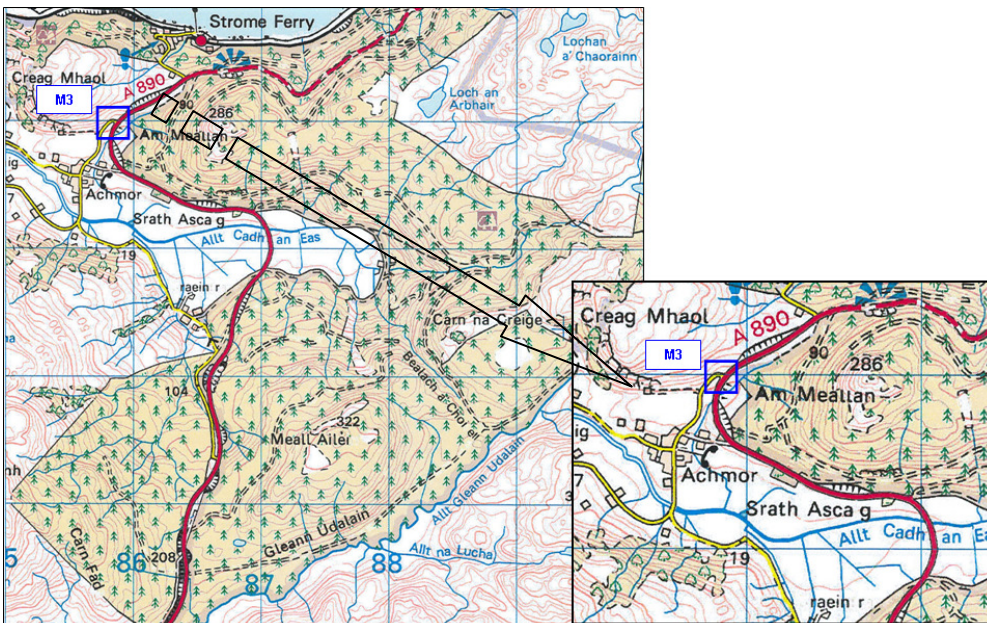
FIGURE 3.2: JUNCTION TURNING COUNTS AT THE A890 ATTADALE GARDENS ENTRANCE



The location was approximately 4.4 kilometres southwest of Strathcarron and 8.0 kilometres northeast of the Stromeferry junction. It also represented the closest JTC to the section of the A890 most vulnerable to rock-fall, being only 1.5 kilometres northeast of the avalanche shelter.

A third set of JTCs were carried on the A890 / C1222 Plockton Rd Junction north of Achmore, shown in **Figure 3.3**.

FIGURE 3.3: JUNCTION TURNING COUNTS AT THE A890 / C1222 PLOCKTON RD JUNCTION



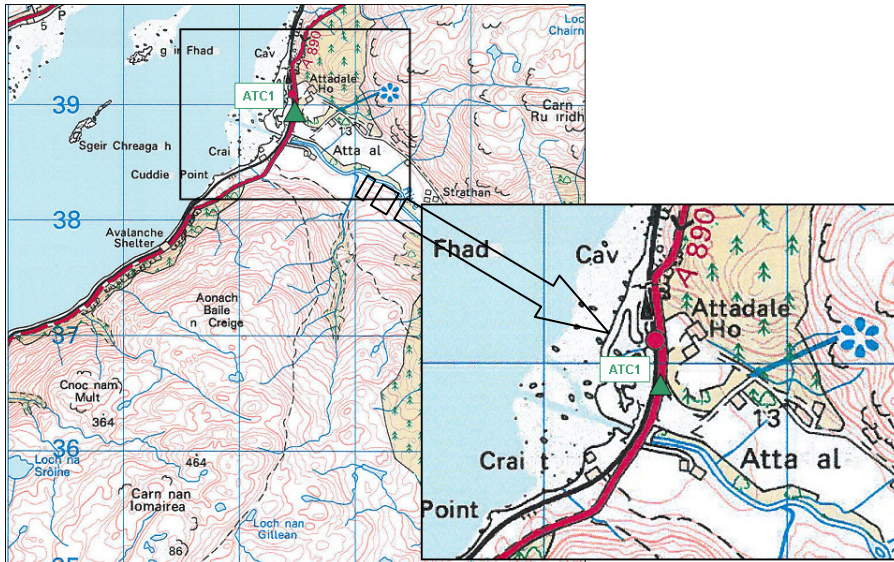
The location of these JTCs was 0.7 kilometres southwest of the Stromeferry / A890 junction and approximately 9.2 kilometres north of the A890 / A87 junction at Auchtertyre.

3.2 AUTOMATIC TRAFFIC COUNTS

Two sets of automatic traffic counts (ATCs) were undertaken over a 2 week period operating over 24 hours for the full two weeks. These were set to record vehicle flows by type in one hour periods and also vehicle speeds.

The first set of ATC counts were undertaken on the A890 40 metres north of the entrance to Attadale Gardens. **Figure 3.4** shows the exact location.

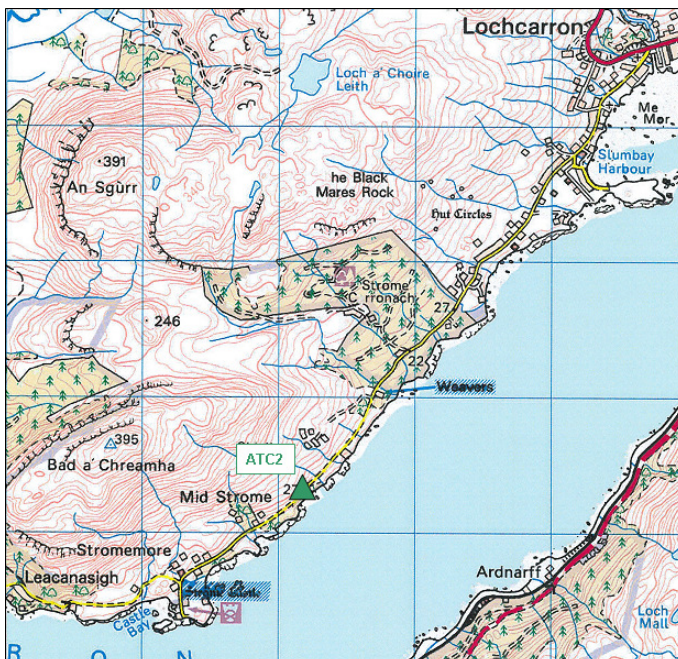
FIGURE 3.4: AUTOMATIC TRAFFIC COUNTS ON THE A890 ATTADALE GARDENS



The ATC location was adjacent to the JTC M2 shown in **Figure 3.2** and is therefore situated approximately 1.5 kilometres northeast of the avalanche shelter.

The second set of ATCs was located on the C1096 Lochcarron – Stromemore Road, approximately 20 metres northeast of the Strome Salmon Factory access road. The location is shown in **Figure 3.5**.

FIGURE 3.5: AUTOMATIC TRAFFIC COUNTS ON THE C1096 LOHCARRON – STROMEMORE ROAD



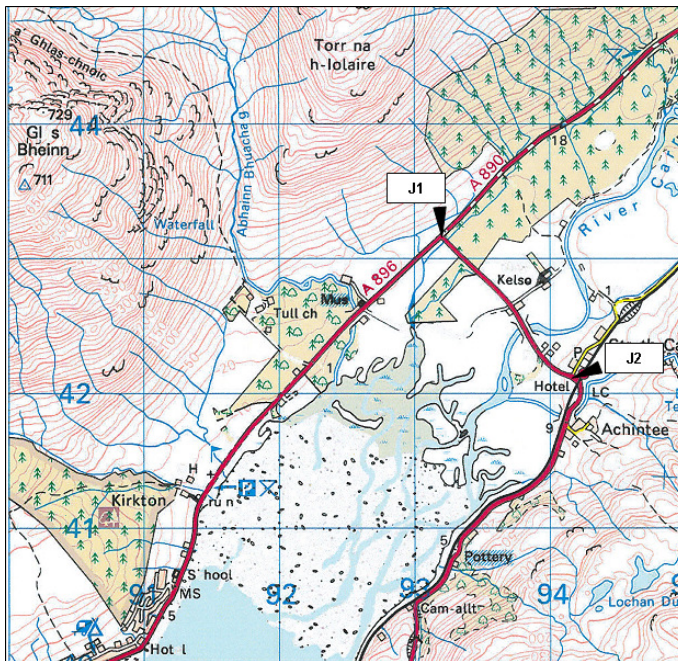
3.3 JOURNEY TIME MEASUREMENT SURVEYS

Journey time surveys were undertaken between the A890 / A896 Strathcarron Junction and the A890 / A87 Junction at Auchtertyre using one vehicle over 2 weekdays from 7am to 7pm, allowing for breaks. Journey time measurement surveys were undertaken both southbound and northbound, measuring distances and average speeds between timing points.

Six journey time measurement points were chosen between these two junctions, and the locations of these are noted below.

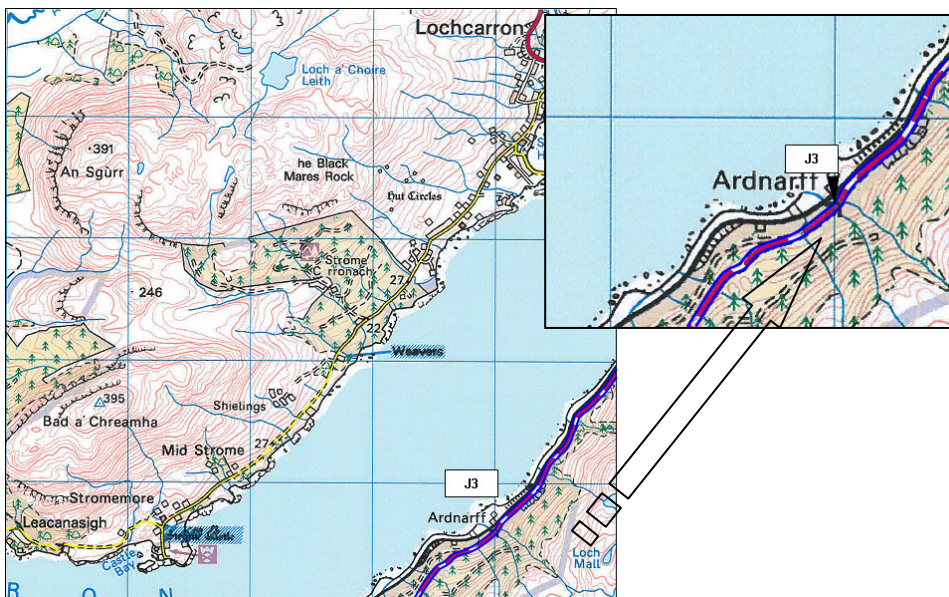
Journey time measurement points J1 and J2 are shown in **Figure 3.6**. J1 is positioned at the A890 / A896 junction and J2 is located at the entrance to Strathcarron Hotel.

FIGURE 3.6: LOCATION OF JOURNEY TIME MEASUREMENT POINTS J1 & J2



Journey time measurement point J3 was located at Ardnarff as shown in **Figure 3.7**.

FIGURE 3.7: LOCATION OF JOURNEY TIME MEASUREMENT POINT J3



The locations of journey time measurement points J4 and J5 are shown in **Figure 3.8**. Journey measurement point J4 was located at the A890 / C1222 Plockton Rd junction, the junction allowing access to Achmore and Plockton from the A890 from the north. Similarly journey measurement point J5 was located at the A890 / Braeintra junction allowing access to Achmore and Plockton from the south.

FIGURE 3.8: LOCATION OF JOURNEY TIME MEASUREMENT POINTS J4 & J5

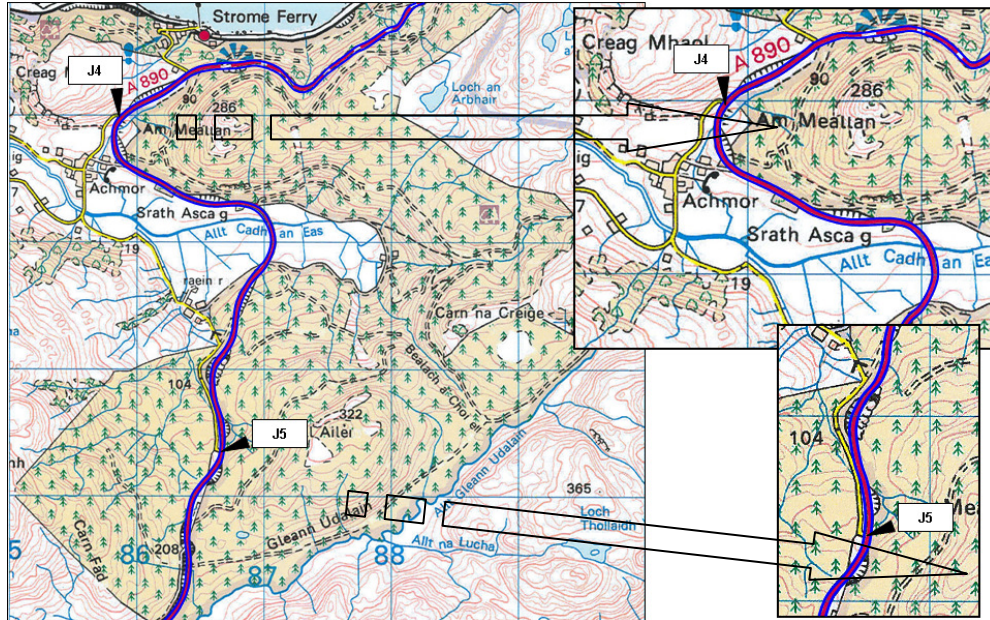
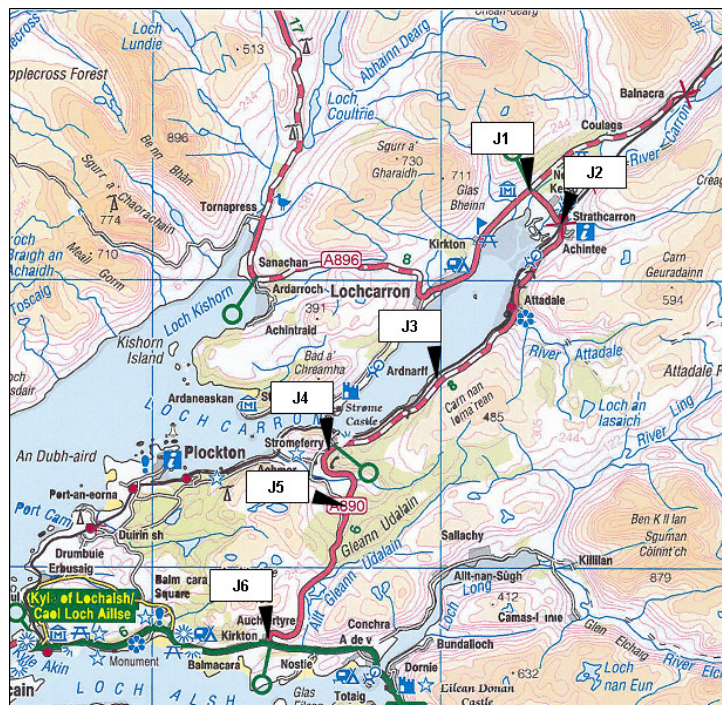


Figure 3.9 shows the locations of all the journey points J1 through to J6, the latter located at the junction between the A890 and the A87 at Auchtertyre. The total distance between these measuring points was 20.40 kilometres.

FIGURE 3.9: LOCATION OF SEQUENCE OF JOURNEY TIME MEASUREMENTS, INCLUDING MEASURING POINT J6



4. RESULTS OF THE NEW SURVEY DATA

The results of the junction turning counts (JTCs), automatic traffic counts (ATCs) and journey time surveys undertaken in March 2013 have been interrogated, and processed as:

- Daily traffic movements and peak hour flows;
- Road network capacity; and
- Road network speeds.

Where appropriate, a comparison is made between the results of the new set of survey data and the historical data which has been presented in Section 2.

4.1 DAILY TRAFFIC MOVEMENTS AND PEAK HOUR FLOWS

Table 4.1 shows the 24 hour base traffic flows for Attadale Gardens, for the C1096 to the west of Lochcarron and for the A896 Lochcarron Road between the Strathcarron junction and Lochcarron village. It should be noted that these are 6 day averages as there was no Friday data collected during the week long surveys.

TABLE 4.1 24 HOUR AVERAGE ONE-WAY TRAFFIC FLOWS, MARCH 2013

| Year | Direction | Attadale Gardens | C1096 Lochcarron |
|------|-----------|------------------|------------------|
| 2013 | Eastbound | 338 | 63 |
| | Westbound | 357 | 61 |

Source: March 2013 Surveys, ATC Data

It is clear that traffic volumes on the C1096 between Lochcarron and Stromemore at the Narrows is relatively light. This is as expected where population densities are relatively low on the north side of Loch Carron, especially west of the village of Lochcarron itself. Traffic flows are heaviest on the A896 Lochcarron Road. Not all of the traffic would have had their origin or destination in Lochcarron itself, as vehicles would be expected to use the A896 between Lochcarron and Kishorn and possibly Gairloch. However the number of vehicles using this route would be expected to be relatively low.

Transport Scotland Data for the Attadale site for March 2010 indicates that traffic flows eastbound are 411 vehicles, and westbound 425 vehicles in a 24 hour period. These flows are suggest that there has been little growth in overall traffic flows or even a decline in these during March between 2010 and 2013.

Table 4.2 below shows a comparison of the different vehicle types that make up the traffic flows between the Transport Scotland Data for the Attadale site and the results of the new surveys.

TABLE 4.2 COMPARISON BETWEEN TRANSPORT SCOTLAND & NEW SURVEY DATA FOR AVERAGE 7 DAY VEHICLE COMPOSITION, A890 ATTADALE, MARCH DATA

| Source | Transport Scotland Data (2010) | | New Surveys (2013) | |
|--------|--------------------------------|-----------|--------------------|-----------|
| | Eastbound | Westbound | Eastbound | Westbound |
| Cars | 71.3% | 71.4% | 79.2% | 83.7% |
| LGVs | 16.2% | 17.1% | 16.9% | 13.8% |
| OGV1s | 5.9% | 6.0% | 1.8% | 0.8% |
| OGV2s | 4.9% | 4.3% | 1.8% | 1.4% |
| PSVs | 1.7% | 1.2% | 0.3% | 0.3% |

4.2 ROAD NETWORK CAPACITY NEW SURVEY DATA

4.2.1 *24 Hour Traffic Flows Baseline Conditions*

As with the historical data, it has been assumed that 2015 is the opening year and design year is 2045 for the selected option for improvements to the Stromeferry Bypass, and traffic projections for the baseline conditions assessed below relate to this period.

The same background traffic growth was adopted as described in Section 2.1. This was based on the National Road Traffic Forecasts Annual Growth Rates for Rural Roads, (NRTF Forecasts Great Britain 1997).

Table 4.3 indicates 24 hour average traffic flows, projected to 2015 and 2045. The ATC data from the March 2013 surveys has been used to estimate 24 hour flows, peak hour traffic flows, traffic flow projections and road network capacity in this section.

TABLE 4.3 24 HOUR AVERAGE ONE-WAY VEHICLE TRAFFIC FLOWS, A890 ATTADALE GARDENS & C1096 LOCHARRON, PROJECTIONS FOR YEARS 2013, 2015 AND 2045

| Year | Direction | March | |
|------|-----------|-----------------------|------------------|
| | | A890 Attadale Gardens | C1096 Lochcarron |
| 2013 | Eastbound | 338 | 63 |
| | Westbound | 357 | 61 |
| 2015 | Eastbound | 348 | 65 |
| | Westbound | 367 | 63 |
| 2045 | Eastbound | 441 | 82 |
| | Westbound | 466 | 80 |

Source: March 2013 Surveys

4.2.2 *Hour Traffic Flows Baseline Conditions and Road Network Capacity*

Using Turning Count data from the March 2013 surveys, **Table 4.4** below shows the AM and PM Peak Hour traffic flows, given in PCUs. As with the historical data on peak hour flows, the AM Peak is an average of the two hour peak period 0800hrs – 1000hrs and the PM peak is an average of 16:00hrs – 18:00hrs in order to give a better representation of the peak hour traffic by smoothing over variations in this period.

TABLE 4.4 AM & PM PEAK HOUR WEEKDAY BASE FLOWS IN PCUS, A890 ATTADALE GARDENS & C1096 LOCHARRON, 2013, 2015 & 2045

| Year | Direction | | March | |
|------|-----------|----|------------------|------------------|
| | | | Attadale Gardens | C1096 Lochcarron |
| 2013 | Eastbound | AM | 30 | 5 |
| | | PM | 38 | 6 |
| | Westbound | AM | 35 | 4 |
| | | PM | 40 | 6 |
| 2015 | Eastbound | AM | 31 | 5 |
| | | PM | 39 | 6 |
| | Westbound | AM | 36 | 4 |
| | | PM | 41 | 6 |
| 2045 | Eastbound | AM | 39 | 6 |
| | | PM | 50 | 7 |
| | Westbound | AM | 46 | 5 |
| | | PM | 52 | 8 |

Source: March 2013 Surveys

Table 4.4 demonstrates that, consistent with 24 hour traffic flows noted previously, both AM and PM Peak Hour PCU traffic flows are lower for the new traffic survey data than the historical Transport Scotland survey data. This effectively translates into lower RFCs.

Table 4.5 shows the RFCs for the A890 Attadale Gardens and the C1096 for the years 2013, 2015 and 2045. When compared with the historical data in Section 2, where the RFC values for March range from 29% (AM eastbound) to 34% (PM westbound). The corresponding values for the March 2013 data set are lower, from 21% (AM eastbound) to 29% (PM westbound). The RFC values for the C1096 are very low, only reaching 5% in 2045.

| TABLE 4.5 RATIO OF FLOW TO CAPACITY AM & PM PEAK HOUR FLOWS IN PERCENTAGES, ATTADALE GARDENS & C1096 LOCHARRON, 2013, 2015 & 2045 | | | | |
|--|-----------|----|------------------|------------------|
| Year | Direction | | March | |
| | | | Attadale Gardens | C1096 Lochcarron |
| 2013 | Eastbound | AM | 21% | 3% |
| | | PM | 27% | 4% |
| | Westbound | AM | 25% | 3% |
| | | PM | 29% | 4% |
| 2015 | Eastbound | AM | 22% | 3% |
| | | PM | 28% | 4% |
| | Westbound | AM | 26% | 3% |
| | | PM | 29% | 4% |
| 2045 | Eastbound | AM | 28% | 4% |
| | | PM | 35% | 5% |
| | Westbound | AM | 33% | 4% |
| | | PM | 37% | 5% |

Source: March 2013 Surveys

Both the historical and recent survey results suggest that congestion is very unlikely to be a problem on the A890 Stromeferry Bypass for the foreseeable future. If the forthcoming summer period surveys show the same set of differences between historical survey and current survey data, then, although traffic volumes are much heavier during the summer months, they are likely to remain below the 85% threshold indicating congestion for the next 30 years after construction, to 2045.

4.2.3 ***Traffic Flow Design Conditions and Road Network Capacity***

The objective of the project is to deliver a safe and reliable, 2 lane carriageway between the A890 Strathcarron junction and the A890 Bypass south of the Achmore junctions, by applying appropriate / proportionate design standards, and applying 'Best Practice' during the design stage. To meet this objective, the proposed road cross section for Stromeferry Options Appraisal is a single 6m carriageway consisting of two 3.0m lanes, with two additional 0.65m hard strips and 2.5m verges.

On this basis, the preliminary route options aim to have geometry appropriate for a design speed of 100 kph. However due to the constrained nature of the study area including the local topography, the horizontal and vertical geometry and environmental considerations mean that this design speed may not be possible throughout the route corridor.

Nevertheless, with reference to the NESAs, this road design standard would meet that described as road category 24² with a speed limit of 96 km/h (60mph). Being a rural typical single 6.0m carriageway traffic capacity would be 900 vehicles per hour per direction.

Transport Scotland data for Attadale suggests that for AM and PM hourly one-way peak flows RFC measurements for road capacity utilisation in PCUs at Attadale is predicted to be between 39% and 44% by 2045 and between 73% and 78% for July 2045 (**Table 2.8**).

² NESAs: Table 5/3/1: NESAs Road Categories, Link Speeds and Link Capacities, 2005

Improving or replacing this section of road, which represents the poorest section of the A890 Stromeferry Bypass, with a new alignment designed to a single 6.0m carriageway specification, would provide additional road capacity to a significant extent. Road capacity utilisation would be reduced to the levels indicated in **Table 4.6** below. It is noted that the eastbound and westbound peak hour traffic has been averaged over the AM and PM periods.

TABLE 4.6 AM PEAK HOUR ONE-WAY FLOWS ROAD CAPACITY UTILISATION IN RFCS AT ATTADALE, 2045

| Direction | Current Alignment at Attadale | | New / Improved Road | |
|-----------------------|-------------------------------|-----------|---------------------|-----------|
| | March 2045 | July 2045 | March 2045 | July 2045 |
| Eastbound Ave Peak Hr | 41% | 75% | 6% | 12% |
| Westbound Ave Peak Hr | 42% | 76% | 7% | 12% |

Source: March 2013 Surveys

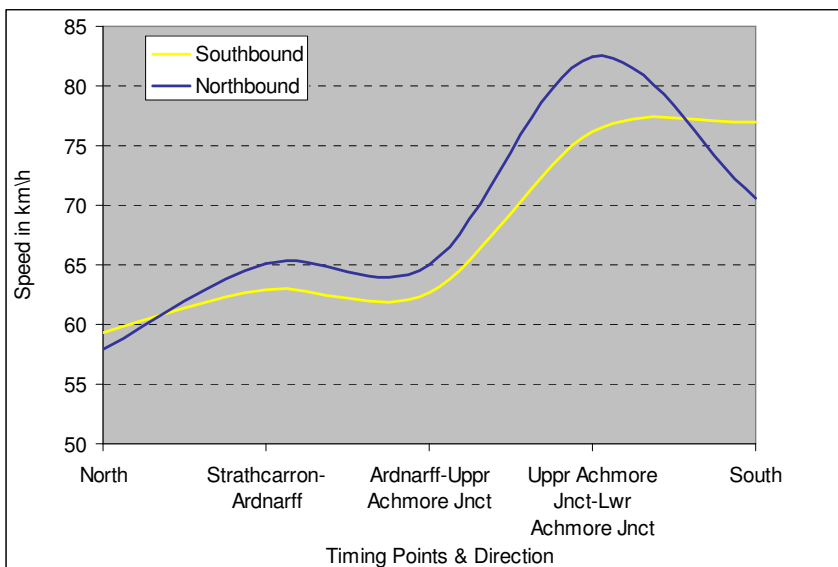
The **Table** clearly shows that capacity will not be an issue with the improved road / new alignment for the design period of the road.

4.3 ROAD NETWORK SPEEDS

Figure 4.1 shows current average speed between timing points on the A890 Stromeferry Bypass between Strathcarron junction in the east and the A890 / A87 Auchtertyre junction in the west. Traffic speed is a function of both traffic density and road type / quality. Clearly lower traffic volumes and a superior road type and alignment allow for higher speeds.

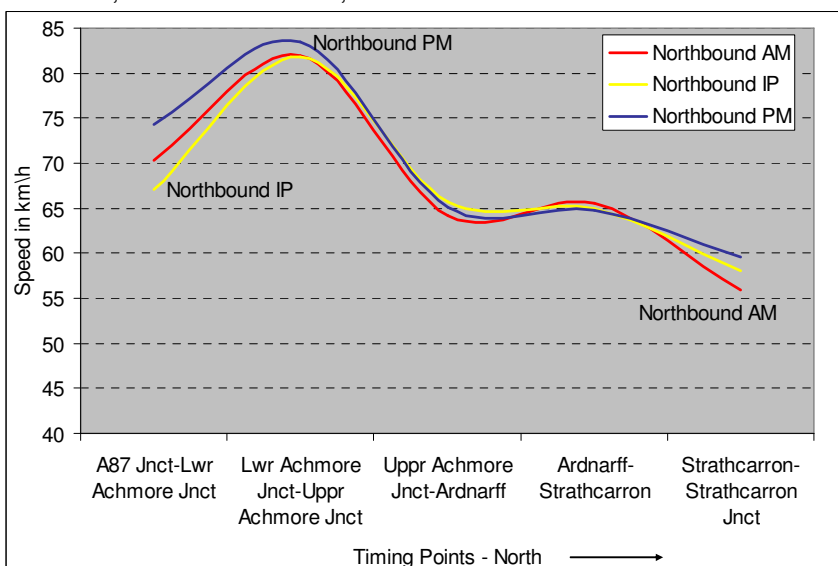
This is reflected in Figure 4.1. Both northbound and southbound traffic speeds are generally between 55 kph and 65 kph between Strathcarron and the upper Achmore junction (north end), and speeds accelerate sharply to between 77 kph and 83 kph south of this junction. This mirrors road performance. The A890 Stromeferry Bypass is either a 5.5 metre road or a poor 4 metre road with passing places with a challenging alignment environment north of the upper Achmore junction, whereas the road improves to a good 6 metre road south of this point.

FIGURE 4.1: AVERAGE SPEED BETWEEN TIMING POINTS, A890 STROME FERRY BYPASS, NORTHBOUND AND SOUTHBOUND, 2013



There is little difference in speeds throughout the day. Speeds are slightly higher in the PM peak period, especially in the stretch of road approaching the A890 / A87 junction, shown in Figure 4.2. Southbound average speeds (not shown) reflect northbound average speeds.

FIGURE 4.2: AVERAGE SPEED BETWEEN TIMING POINTS, A890 STROME FERRY BYPASS, BY TIME OF DAY, 2013



5 CONCLUSION

The historical traffic data obtained from Transport Scotland and The Highland Council have shown slightly higher traffic volumes for March for the years 2010 and 2012 respectively compared with the initial surveys that were carried out in March 2013. However, the differences are not considered significant.

Analysis of the historical traffic survey data for the study area has shown that the road has been and currently still is under capacity in relation to traffic demand. Even at the seasonal high points of traffic occurring in July resulting from a large influx of tourists using the road to visit the area or pass through it, the route remains below congestion levels, and well below saturation. The surveys carried out during March 2013 support this evidence for that month, although further surveys to be undertaken in August 2013 will determine whether this remains true for the peak summer months.

Further analysis of the data from the traffic surveys undertaken in March 2013 indicate that for the construction year, assumed to be 2015 and for the design year 2045, the predicted traffic demand on the road was still not significant enough to cause critical levels of congestion on the A890 Stromeferry Bypass.

The speeds noted from the journey time measurement surveys undertaken in March 2013 indicate that the speeds recorded in the area around Attadale were significantly lower than those recorded south of the A890 junctions at Achmore. This is to be expected as the road geometry and alignment both favour higher average traffic speeds south of the A890 junctions at Achmore.

It is noted that both the proposed improvements to the A890 Stromeferry Bypass or a entirely new road will enhance the existing road capacity of the A890 Stromeferry Bypass. Traffic congestion will not be an issue on the proposed solution over its design life.

APPENDIX 1

General Location Plan

APPENDIX 2

Baseline Traffic Flows 24-Hour PCU's

APPENDIX 3

Network Capacity

APPENDIX 4

DM Base, AM Peak, PCU, RFC's