Cycle journeys on the Anderston-Argyle Street footbridge: a descriptive analysis

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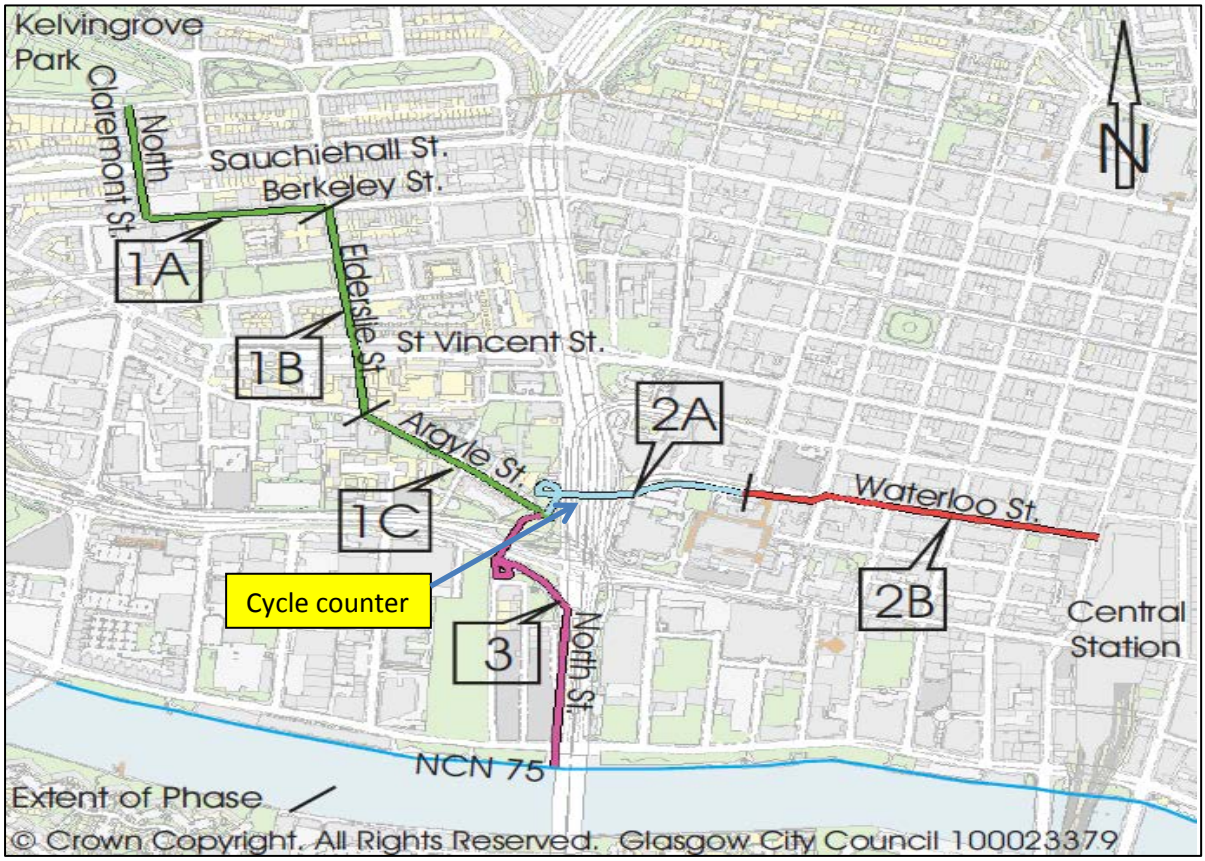
Key points:

- There were 116,334 cycle journeys made using the Anderston-Argyle Street Bridge in the two-year period from August 2014 to July 2016.
- The average number of journeys per day was 159. Usage of the route grew at a rate of approximately 26 journeys per month over the two years.
- Commuting is an important reason for cyclists using this route, with the number of journeys on weekdays approximately double that at weekends, and peaks in usage occurring between 7am and 9am and 4pm and 6pm.
- The major direction of travel in the morning was from the west into the city, and in the evening, from the city out to the west again. Tuesday is the most popular day for cycle journeys on the route.
- There were more journeys made in a westbound than an eastbound direction suggesting that an alternative route was being used for some eastbound travel.
- The route has a distinct seasonal cycling pattern with the number of journeys in August/September (range: 215 to 254 per day) between three and four times greater than the number in December/January (range: 61 to 84 per day).
- Weather conditions did have an impact on numbers of journeys, with increasing temperatures attracting greater numbers of cyclists, and increasing wind speeds, reducing numbers. Cloudy conditions did not have an impact on cycling levels, while rain depressed the number of cycle journeys made on the route and more people cycled in sunny conditions.
- Public holidays impacted on the number of cycle journeys made but not in a predictable way; school holidays appeared to make little difference to usage on the route.

1. Introduction

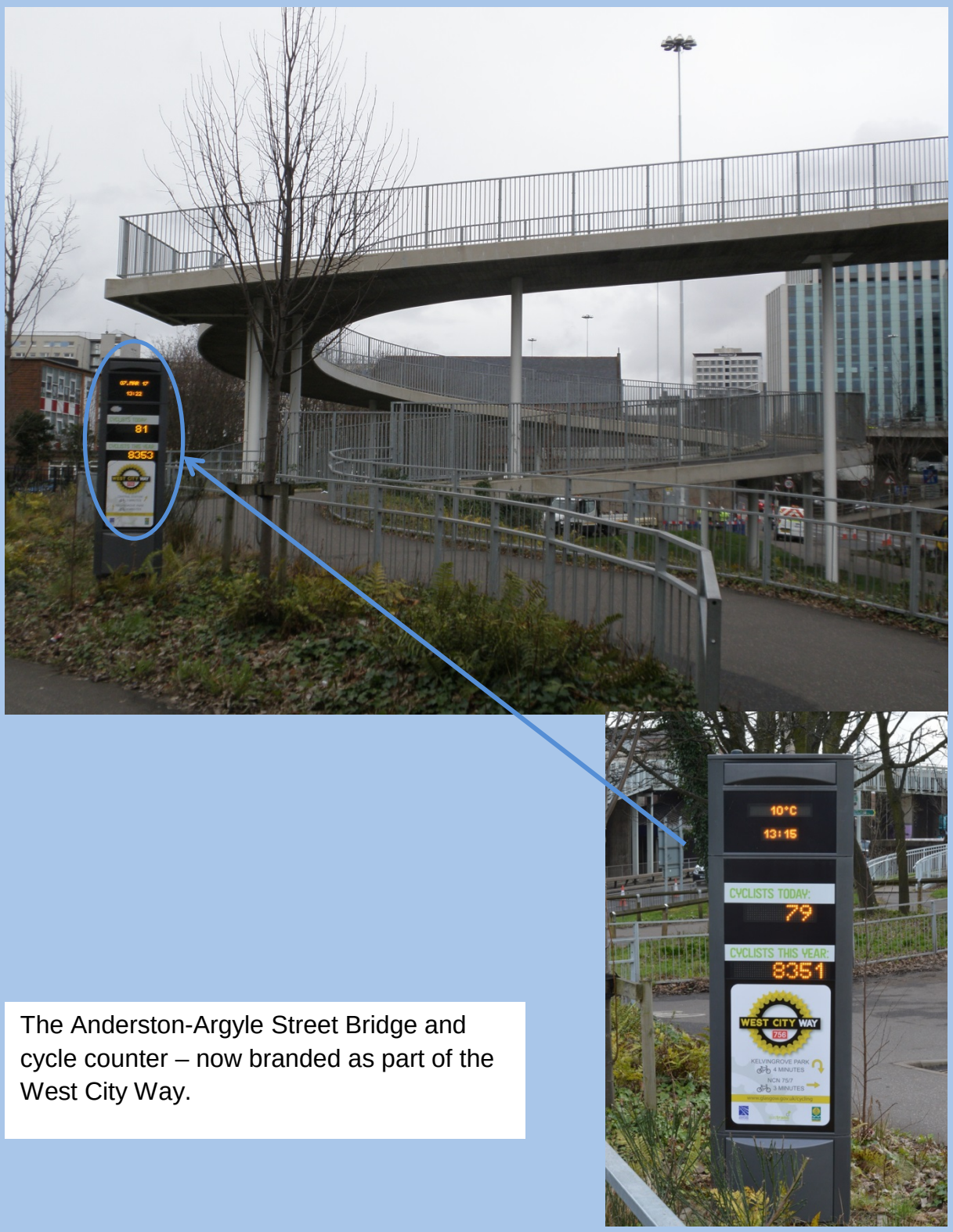
The Anderston-Argyle Street Bridge (section annotated as 2A in Figure 1 below) was completed in July 2013 and forms part of the larger Sustrans Connect2 project which was designed to provide a safe route for pedestrians and cyclists to travel from Kelvingrove Park in the west of the city into the city centre. This route is now known as the West City Way. A series of analyses was undertaken in October 2016 to investigate usage by cyclists of the route.

Figure 1: Glasgow city centre showing the West City Way cycle route (Glasgow City Council).



Numbers and letters correspond to different phases of development of the route. Section 2A is the Anderston-Argyle Street Bridge.

Figure 2a and 2b: The Anderston-Argyle Street Bridge and the cycle counter.



The Anderston-Argyle Street Bridge and cycle counter – now branded as part of the West City Way.

2. Methods

Analyses were based upon data gathered from a cycle counter placed at the western end of the bridge (location illustrated on Figure 1), which records numbers of cyclists passing the counter in 15 minute intervals. This data is obtained by Glasgow City Council from the suppliers of the cycle counter. The data is supplied to an interested party by Glasgow City Council, and made publicly available online by this third party. Data recording began on 28th July 2014 and data continue to be gathered on an ongoing basis.

To enable investigation of the impact of weather conditions on cycle behaviour the data have been linked at the publicly available website with weather data obtained from the Met Office and from the University of Glasgow's weather station. A further series of analyses were undertaken to investigate the impact of weather on cycling levels on the route, and the findings are described in this report.

The following analyses were undertaken:

- Daily cycle counts (Figure 3).
- Monthly cycle counts – eastbound, westbound, total (Figure 4).
- Comparison of monthly cycle counts (Figure 5).
- Cycle counts by day of the week – eastbound, westbound, total (Figure 6).
- Cycle counts by day of the week and time of day – eastbound, westbound, total (Figure 7).
- Hourly cycle counts – eastbound, westbound (Figure 8a and 8b).
- Impact of weather conditions on cycle counts (Figure 9).
- Impact of wind speed on cycle counts (Figure 10).
- Impact of temperature on cycle counts (Figure 11).

3. Results

3.1 Daily, monthly, hourly cycle journey counts

During the two-year period from 1st August 2014 to 31st July 2016, there were 116,334 cycle journeys recorded. This comprised 63,219 journeys in a westbound direction, and 53,115 in an eastbound direction. Figure 3 illustrates the spread of journeys across this time. It can be seen that there is a strong seasonal variation with cyclist numbers being at their highest during summer and then falling to around one third of summer values during winter. The highest daily count of 1,210 was recorded on 9th of August 2014, and the lowest count of three was recorded on 9th of January 2015. The mean number of journeys per day in either direction during this time period is 159 and the median 148. There are a number of spikes in the data. These occur on different days of the week at different times of year, without any consistent pattern or obvious explanation, but may relate to specific events, organised activities or other wheeled vehicles triggering the counter.

Figure 3: Daily counts of number of cycle journeys.

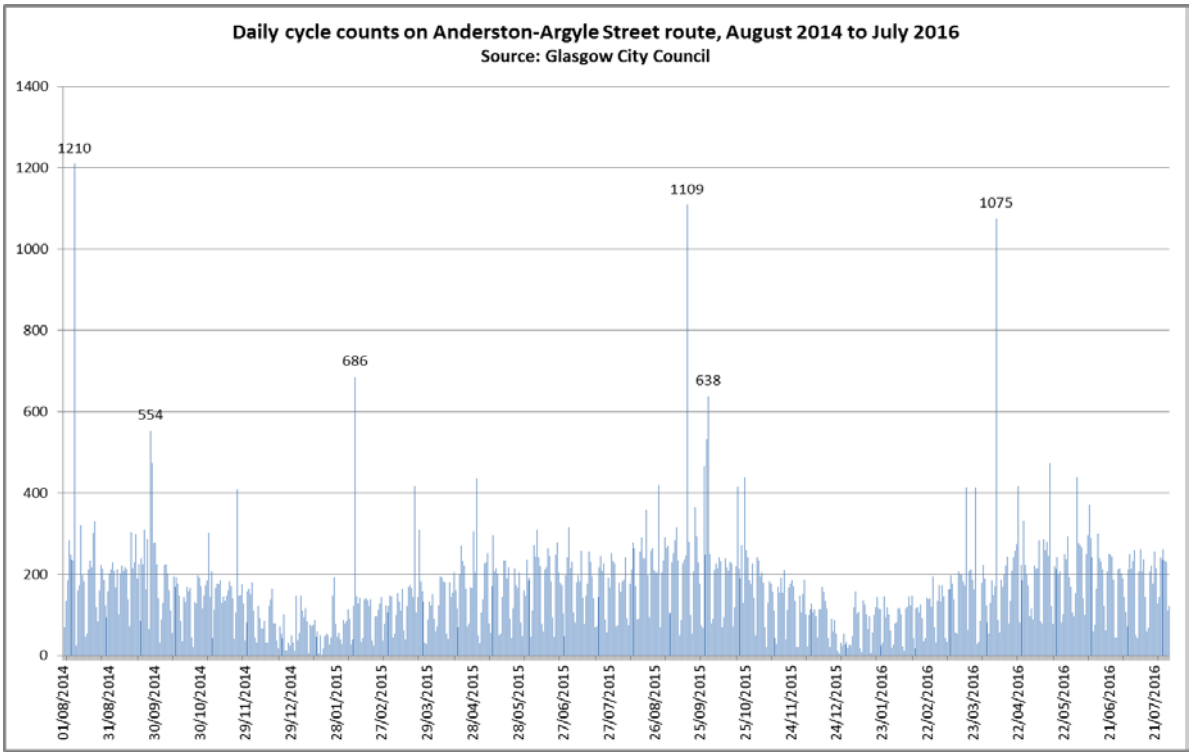


Figure 4 shows the spread of journeys through the year by direction of travel for the period August 2014 to July 2016. A clear seasonal effect is obvious with numbers in both 2014 and 2015 reaching a peak in September and falling to their lowest level in January. Figure 4 also shows that from August 2014 onwards, the number of journeys made in a westbound direction has consistently exceeded the number made in an eastbound direction. The reason for this difference requires further exploration. The Glasgow City Centre Cordon count which takes place over two days in September every year and records numbers of cyclists and pedestrians entering and leaving the city at 35 different points including the Anderston-Argyle Street Bridge, presents a similar picture for this location. Figures for numbers of cyclists travelling westwards from the city are higher than number of cyclists entering the city by this route.

There is some discussion in web-based cycle forums that people may continue to use an existing unsegregated road route to travel east, but given the one-way system in the area, it is less convenient to use this route to travel westwards. It may also be that it is easier to access the bridge from the east rather than the west. There appears to be an increase in numbers of cycle journeys over time overlying the seasonal effect (Figure 5). This may reflect more cycling taking place in the city as a whole, as suggested by the Glasgow cordon count which shows an average annual increase in cyclists entering and leaving of the city since 2009 of 12.3%. However, it could also indicate growing awareness of the route among cyclists over time, and increasing uptake of the Glasgow cycle hire scheme which was launched in June 2014 Several bike hire locations are close to the bridge. There were over 7,000 journeys made using the bridge in September 2015, the highest month of usage recorded within the two-year period analysed.

During 2016 there were major roadworks taking place on the Waterloo Street segment of the West City Way (shown as 2B in Figure 1). The Anderston-Argyle Street Bridge leads directly to and from Waterloo Street, so this is likely to have impacted upon cycling numbers on the bridge as cyclists sought to avoid this street.

Figure 4: Monthly cycle counts – east and westbound.

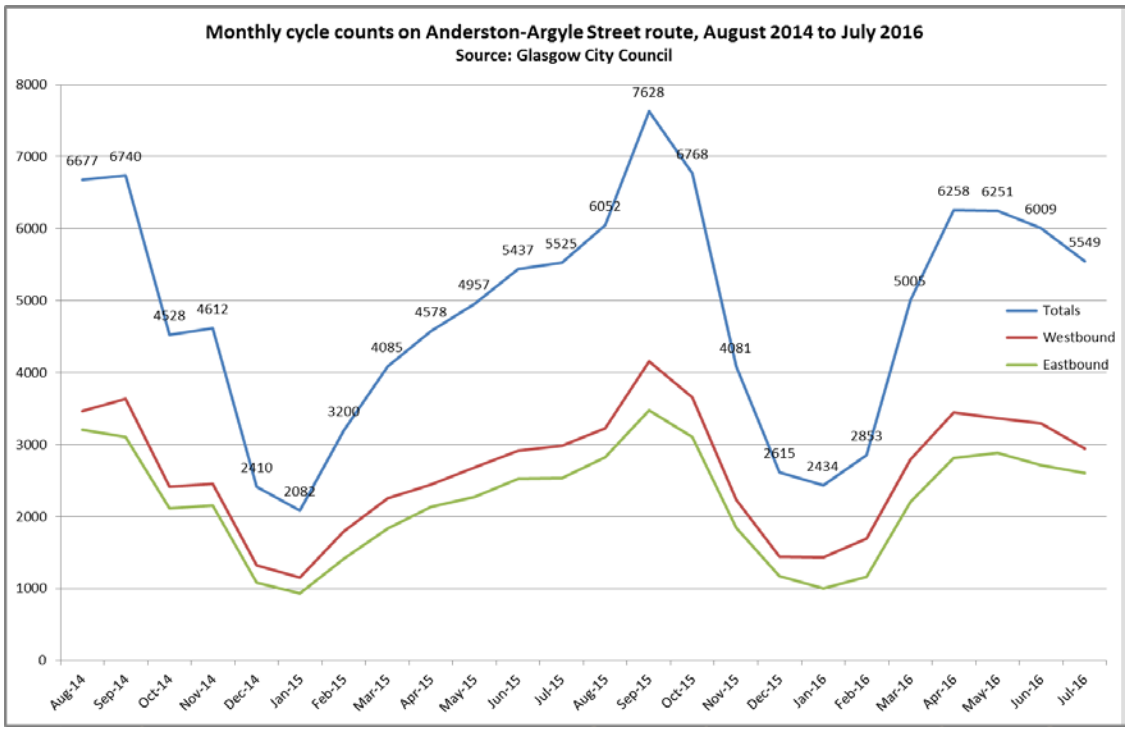
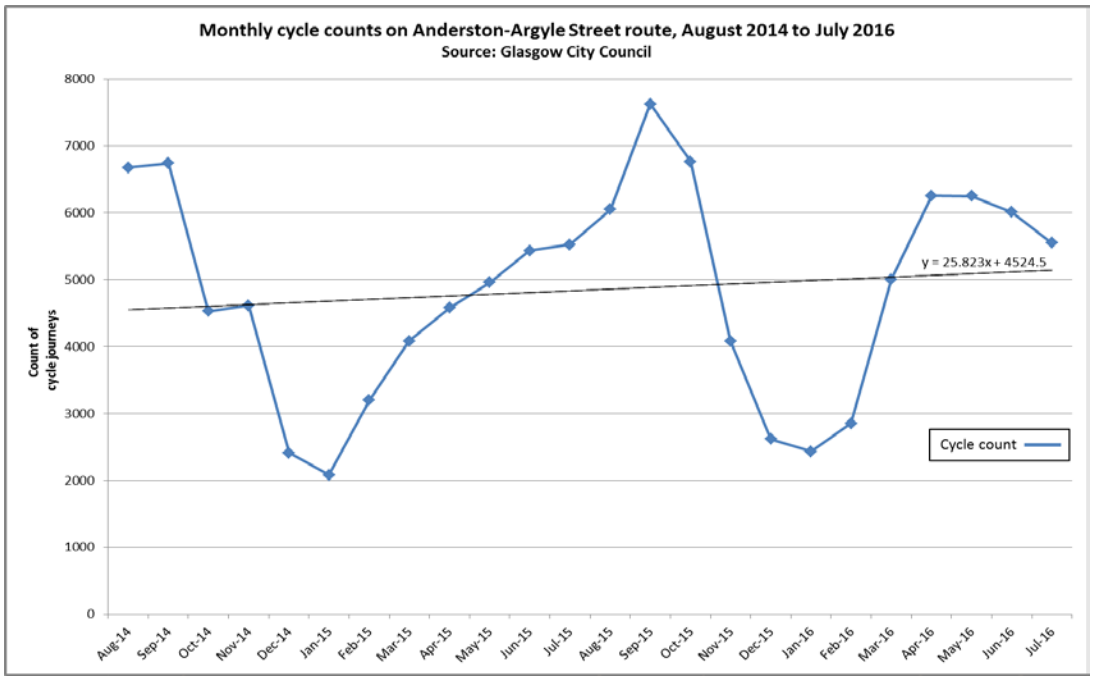


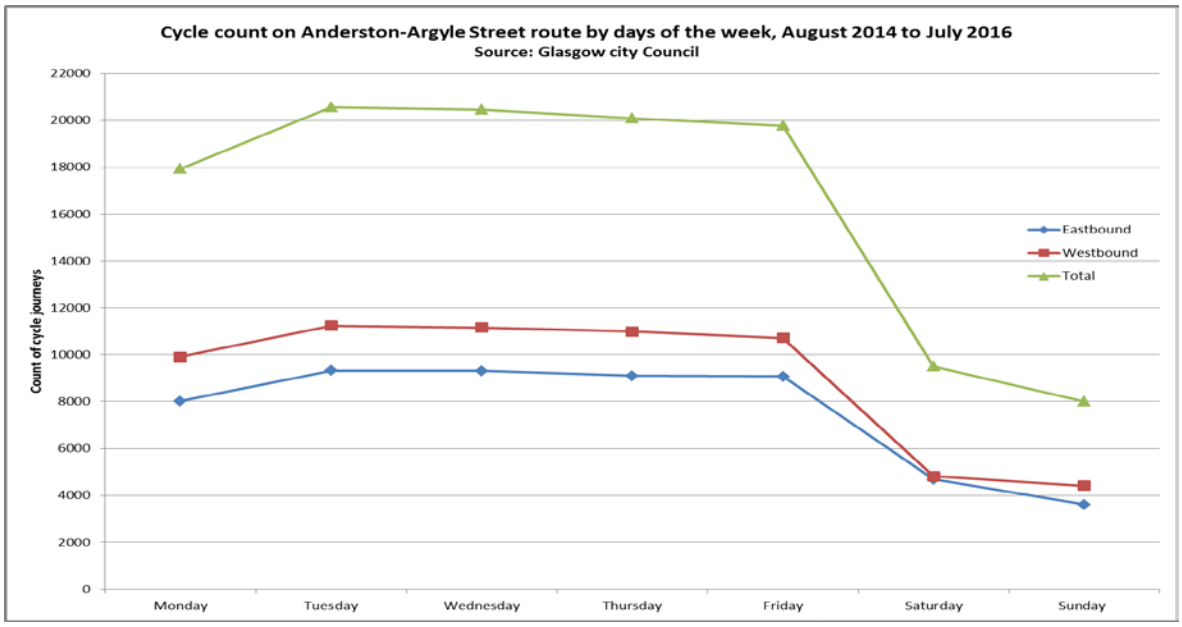
Figure 5 shows a comparison month-by-month of the number of cycle journeys over the period August 2014 to July 2016. Comparing 2014/15 data with 2015/16 data, cycle journeys in the latter period were found to exceed those of the former in nine of the 12 months. For some months, the increase exceeded 2,000 journeys. A trend line fitted to the data — and taking account of the seasonality — shows an increase in the number of journeys on the bridge of approximately 26 per month.

Figure 5: Comparison of monthly cycle counts.



There are a greater number of cycle journeys made on weekdays compared with weekends (Figure 6). The number of journeys on weekdays is fairly consistent, varying between 17,929 journeys on Mondays to 19,779 journeys on Tuesdays. There is a consistent east/west difference in usage on weekdays. Usage falls at the weekend to 9,504 journeys on Saturdays and 8,410 journeys on Sundays. This suggest that slightly over half the journeys being made on the route are potentially for commuting purposes. The discrepancy between eastbound and westbound usage is reduced at the weekend, although this may just reflect the smaller number of journeys in both directions at weekends.

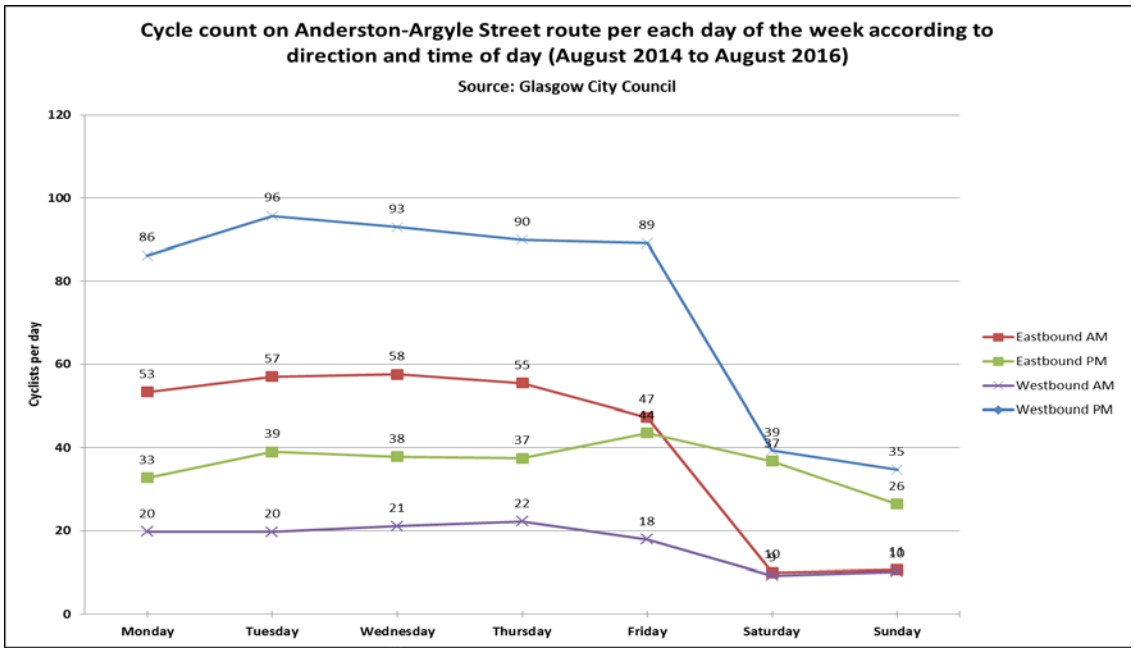
Figure 6: Comparison of total cycle counts over two years for each weekday.



To explore the differences in numbers travelling in each direction, a further analysis was undertaken to look at the cycle count per day of the week in each direction, by morning or evening.

Figure 7 shows that most cycle journeys are made westbound in the afternoon/evening period on weekdays (ranging from 86 to 96 per day), and the smallest number are made westbound in the morning (ranging from 18 to 22 per day). The pattern for eastbound journeys is reversed. There are more journeys made in an eastbound direction in the morning (ranging from 47 to 57 per day) and fewer in the afternoon and evening (ranging from 33 to 44 per day). This pattern of usage would support the suggestion that the route is being used for commuting, and indicates that the major direction of travel is eastbound into the city in the morning and westwards in the evening. The bridge is situated on the westernmost edge of the city centre, so these patterns of usage would be expected.

Figure 7: Comparison of cycle counts per day of the week according to direction and time of day.



Figures 8a and 8b provides more detail on the times of day of journeys. The complementary patterns of the charts for eastbound and westbound counts according to time of day for weekdays, and a different and lower pattern of use at weekends, would suggest that the route is being used for commuting.

Figure 8a: Hourly cycle counts for eastbound travel.

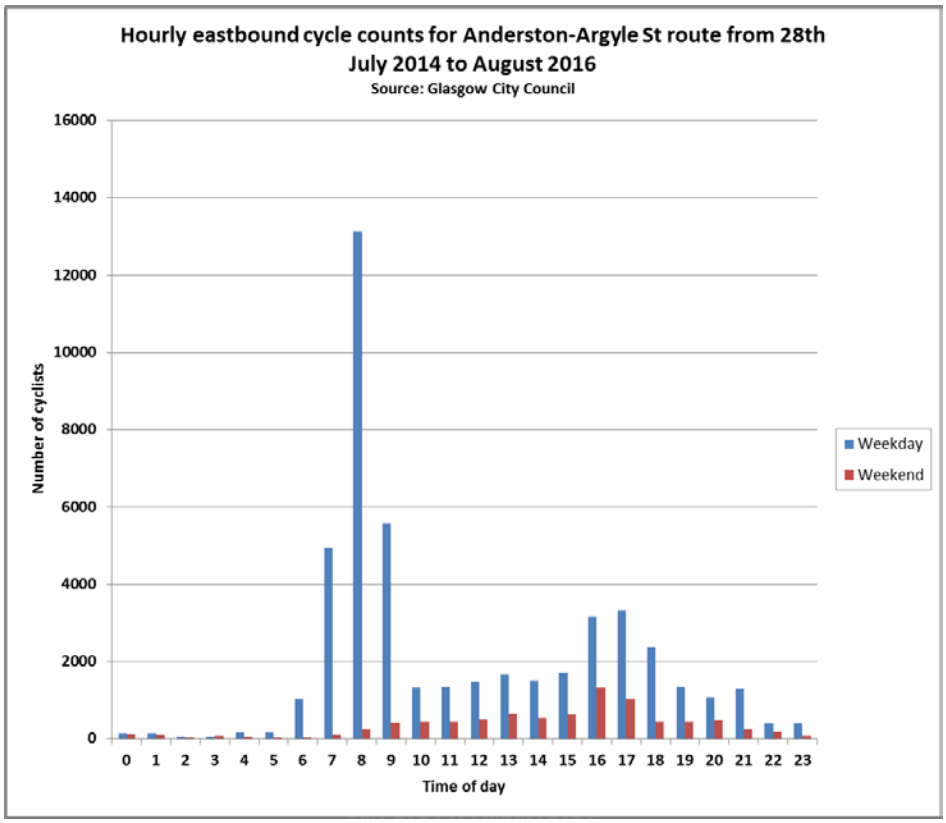
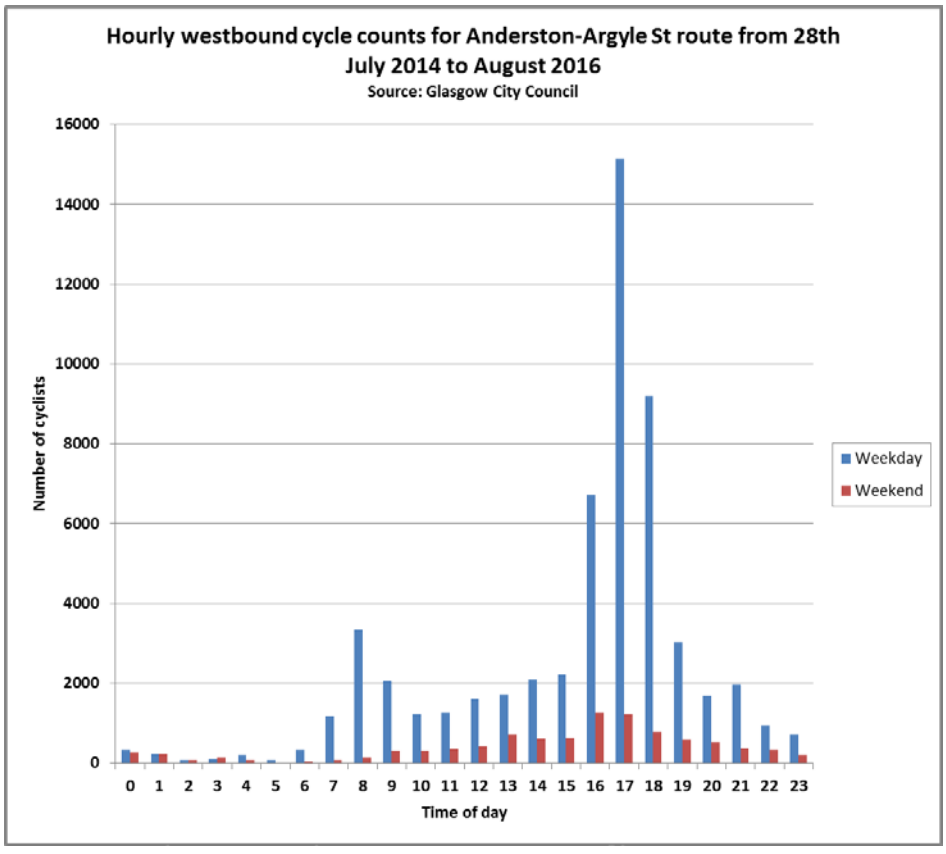


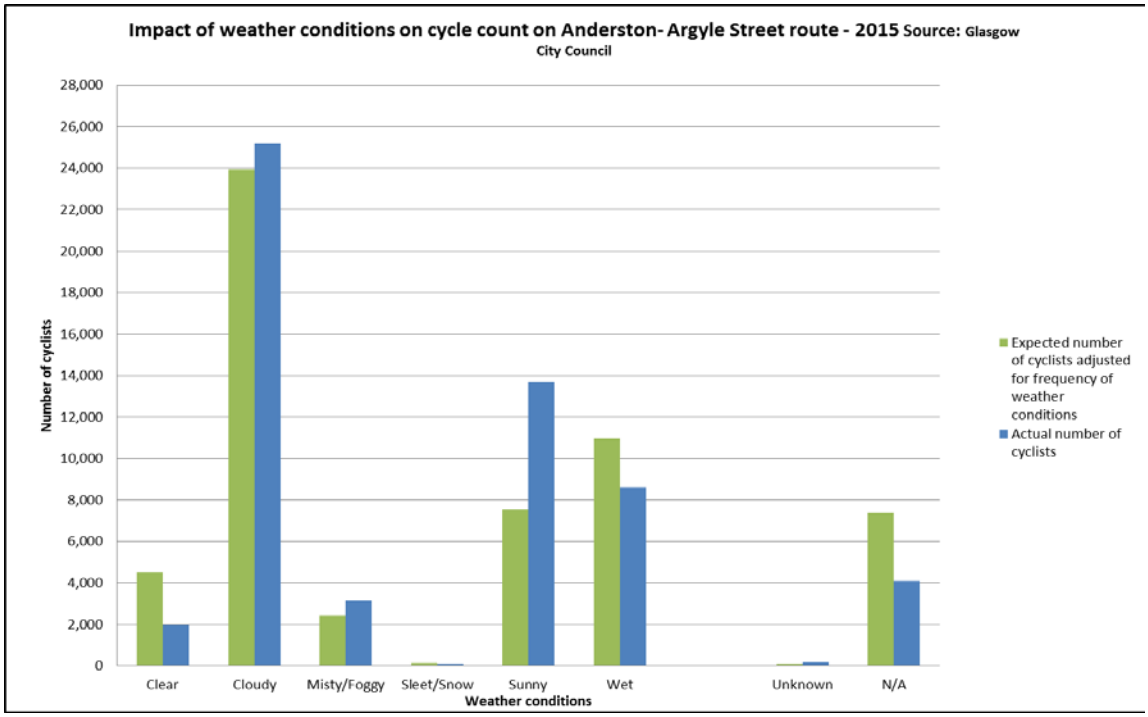
Figure 8b: Hourly cycle counts for westbound travel.



2.2 Impact of weather on cycle counts

It is of interest to know how much impact the weather has on cycle counts on the Anderston-Argyle Street Bridge. The cycle count data can be linked to weather data gathered from the Met Office weather station at Bishopton, and the University of Glasgow observatory in Acre Road in the northwest of the city. Weather observations for every 15 minute period were categorised on a publicly available website into broader mutually exclusive categories, namely clear, cloudy, misty/foggy, sleet/snow, sunny, wet, unknown. Based upon this linkage for 2015 data, Figure 9 shows columns in green giving the cycle counts that would be expected if usage was distributed across different weather conditions with exactly the same frequency of occurrence as the weather conditions. This would be expected if the weather conditions made no difference to use. The actual cycle count observed across the different conditions is shown in blue. Values where a weather category has not been specified, listed as unknown, and where the data are classed as not applicable, are included to ensure clarity on overall numbers.

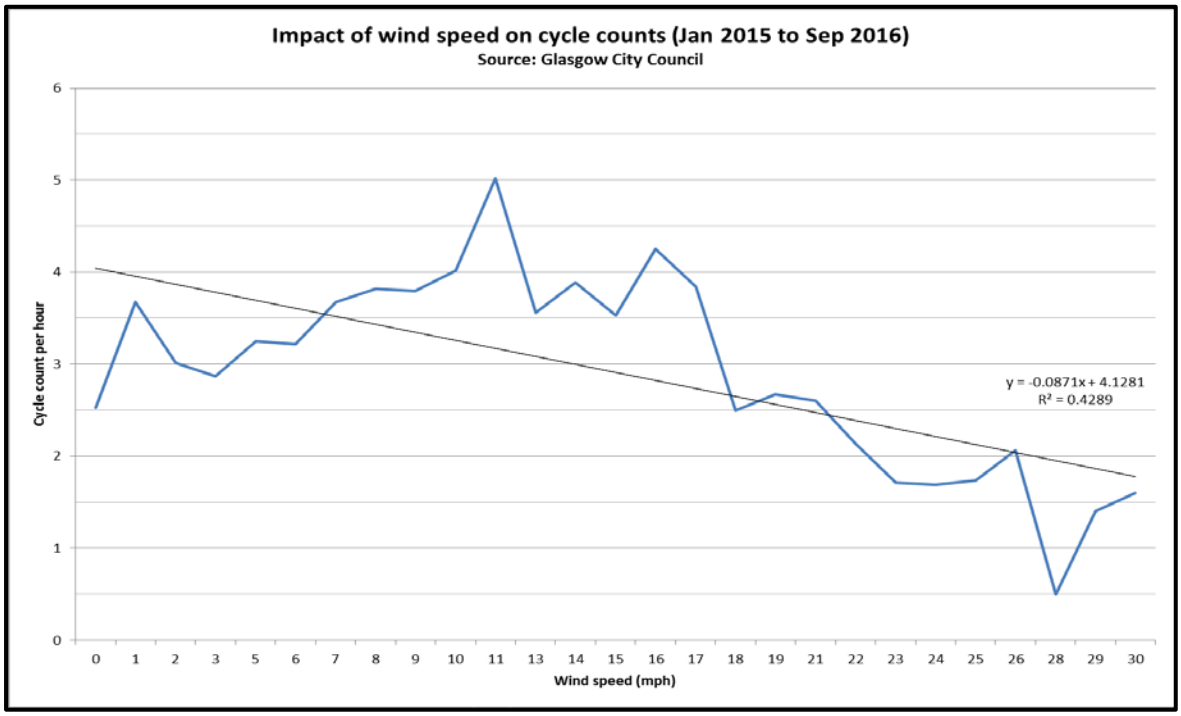
Figure 9: Impact of weather conditions on cycle counts.



The numbers of cyclists are higher than may be expected on sunny days and lower than expected on wet days. The occurrence of cloudy weather or misty/foggy weather doesn't make much of a difference to cycling numbers.The lower than expected values for clear conditions reflect that this observation relates to conditions during the hours of darkness.

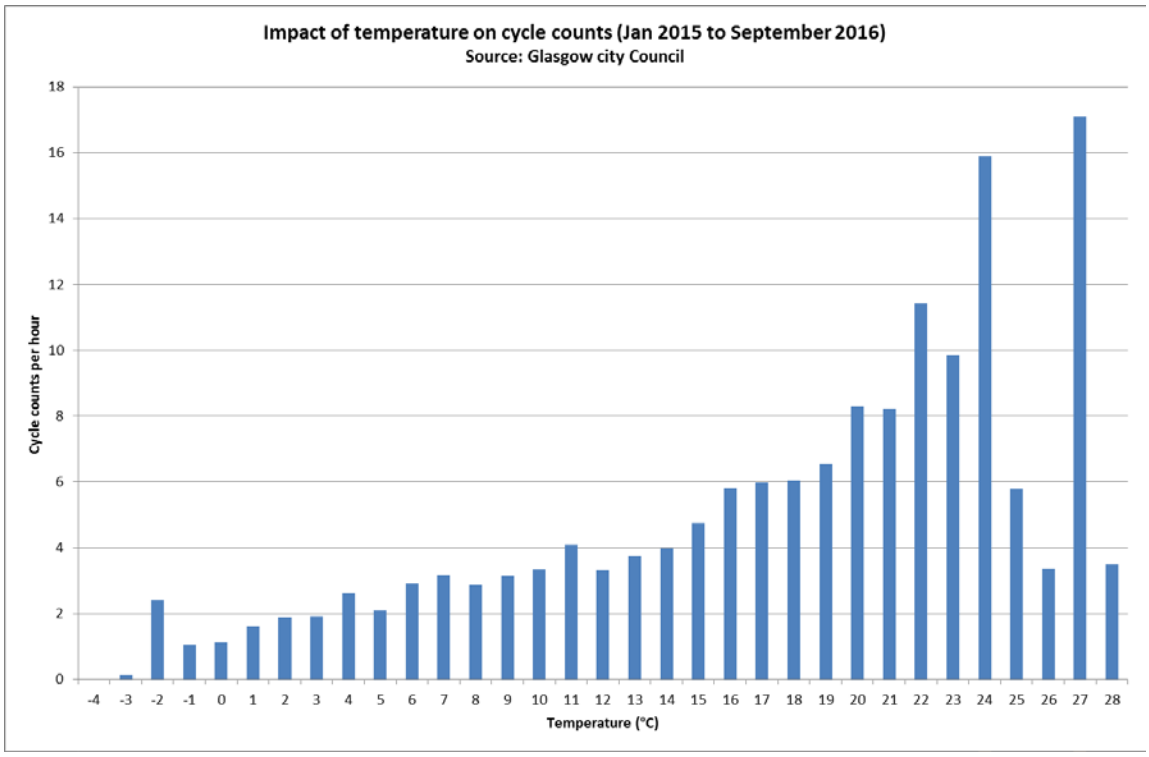
The impact of the wind speed on cycle counts is shown by examining the number of cycle journeys occurring per hour according to wind speed (Figure 10). Effects at either end of the chart should be treated with caution as they reflect small numbers of journeys given the low frequency of very light or very strong winds in Glasgow. For this reason, counts for wind speeds above 30mph have been excluded from the chart. However, the overall picture is one of decreasing cycle journeys as wind speed increases. A linear trend line fitted to the data suggests that approximately 43% of the variance in cycle journeys can be explained by wind speed, and each increase of 1mph in wind speed decreases cycle journeys per hour by 0.09.

Figure 10: Impact of wind speed on cycle counts.



A similar approach was taken to examine the impact of temperature on cycle counts (Figure 11). As with wind speed, the data at either end of the chart reflect the low occurrence of these conditions, but again there can be seen a clear effect of temperature on cycle numbers. Cycle counts per hour rise as the temperature rises, with a trend line showing an increase of 0.31 cycle journeys per hour per 1 degree Celsius rise in temperature. This fitted line also suggests that 56% of the variance in cycle journeys can be explained by temperature.

Figure 11: Impact of temperature on cycle counts.



2.3 Other influences on cycle counts

Public or school holidays within Glasgow are a further factor which may have an impact on cycle counts on the route. To investigate this, a couple of examples were considered using the 2015 data. Firstly the use of the route on Mondays, before, after and between the two public holiday Mondays in May (4th and 25th) were examined. In this instance, the cycle counts on the public holidays were lower than the Mondays before and after these dates.

In contrast, the same exercise looking at Mondays before and after the public holiday in September (28th), showed the opposite pattern, with increased usage on the public holiday. Examination of weather data doesn't offer any immediate explanation for these different patterns between May and September, and therefore all that can be said at present is that public holidays would appear to have an impact on cycle journeys on this route, but the direction of the effect is variable.

Usage in school holidays tends to reflect the season when the holiday is taking place. To try to gauge if a holiday has an impact, the cycle counts for the weekdays immediately preceding and following both the start and end of the school summer holidays were examined. Visual examination of the data did not suggest any clear impact of the summer holidays starting or ending. This may be because the route is not widely used for school attendance purposes, or because any reduction in travel to school use is masked by increased leisure use in holidays.

3. Summary

Since opening in 2013, the Anderston-Argyle Street Bridge has been providing a route into and out of the city for cyclists. Numbers of cyclists averaged 160 per day during the period July 2014 to July 2016, and overall use grew. Consideration of whether this constitutes high usage or otherwise, and how this figure corresponds to projections made for the route is beyond the scope of the current work. However, it can be seen from this study that the provision of infrastructure for cycling will attract cyclists to make use of it.

Research commissioned by GCPH in 2014[1] examined usage of the whole of the Connect2 route (now known as West City Way), and in particular who used the route and their attitudes towards it. While not specific to the infrastructure in question in this report, the findings of this previous research indicated that the enhanced feeling of safety offered by route was encouraging people to use it.

The Glasgow City Centre Cordon count, carried out each September over two days, suggests more people are cycling to and from the city generally and specific cycle routes such as the Anderston-Argyle Street Bridge, the Broomielaw, and the Tradeston Bridge show large average annual percentage growths. Although the cordon data only provides a snapshot of what is occurring throughout the year, the continuing growth in cycling numbers at city entry and exit points close to the Anderston-Argyle Street Bridge suggests that the bridge may be attracting new users rather than simply diverting cycling traffic from elsewhere. It would be interesting to examine cycle accident statistics for the area to determine whether the perceived safety advantage of the new route has translated into reductions in incidents. The bridge also provides a new route for pedestrians to and from the city centre, and in assessing the overall contribution of the infrastructure to active travel within Glasgow, increases in pedestrian usage would also be of interest.

There are clear seasonal effects apparent, with two to three times more cyclists using the bridge in the summer months compared with in the winter. Patterns of usage suggest that commuting is a major reason for cycle journeys on the route, with the main direction of travel being into the city from the west in the morning and in the opposite direction the evening. Findings of the previously mentioned GCPH study[1] appear to confirm this, with 43% of those interviewed stating that they were commuting. The numbers of eastbound and westbound journeys made using the bridge do not correspond and suggest that perhaps an alternative route is being used for some eastbound journeys. Further investigation would be required to understand this. The GCPH usage research consulted only with users of the route. It would also be of interest in future to speak to cyclists commuting into and out of the town from the west but who do not use the route, and ask about the reasons for their route choice. The cordon count data shows a similar pattern of higher westbound than eastbound travel on the bridge and suggests that usage of St Vincent Street by

cyclists travelling east may account for some of the difference. Weather conditions do impact on the number of journeys made with increasing temperatures associated with higher numbers of cycle journeys and higher wind speeds with reduced numbers of cycle journeys. Public holidays impact on number of journeys made but not in a predictable way; school holidays appear to have limited impact on usage, suggesting few school children are using the bridge.

This reports forms part of a series of reports detailing descriptive analyses of data relating to cycling in Glasgow. These reports provide a picture of aspects of current cycling activity within the city. The other three reports cover Glasgow's public cycle hire scheme, cycle journeys on the South West City Way, and the Hands Up Survey of methods of travel to school for Glasgow school pupils.

References

1. Hewitt E, MacMillan K, Shaw L. A mixed method study exploring the views of cyclists and pedestrians using the new Kelvingrove-Anderston route in Glasgow. Glasgow: GCPH; 2015. Available at: http://www.gcph.co.uk/publications/538_the_kelvingrove-anderston_route_views_of_cyclists_and_pedestrians (accessed January 2017)

Acknowledgements

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