

WHAT DID WE LEARN FROM THE ECO-MOBILITY FESTIVAL?

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ABSTRACT

Historically the South African transport system has been skewed towards car use, particularly in affluent urban areas. “The car” has become a symbol of prosperity for the masses, where people opt for private cars over public transport at the first available opportunity. Changing preferences and behaviour in favour of sustainable transport modes requires a mind shift.

A more sustainable, eco-mobile transport model is required to support Johannesburg’s growth. Eco-mobility is an environmentally friendly, socially inclusive way of moving, that aims to decongest major cities by reducing the number of private cars on the roads to allow freer movement of people. The Eco-mobility Festival, held in Sandton in October 2015, presented an opportunity to demonstrate that alternative modes of transport are just as relevant as private vehicles. The month long festival comprised of road closures for private cars in favour of more sustainable modes of transport such as walking, cycling, public transport and other low carbon mobility systems.

Traffic and transport data was collected before and during the festival to evaluate the success, or not, of the Eco-mobility Festival. In this paper a review of the impact of the Eco-mobility Festival on Sandton travel patterns and behaviours is presented.

1 INTRODUCTION

“Change happens when the pain of staying the same is greater than the pain of change” Tony Robbins

During the month of October 2015, officially known as the “Transport Month” in South Africa, the City of Johannesburg (CoJ) hosted the first Eco-mobility Festival in Africa. Eco-mobility is a term used to describe travel through integrated, socially inclusive and environmentally friendly transport options. It includes and integrates walking, cycling and using public transport.

The Mayor of Johannesburg selected Sandton to host the festival. Regarded as the country's economic hub, Sandton has become one of the fastest growing urban areas in South Africa. It is also one of the most congested areas in Johannesburg.

The transport system serving Sandton is mainly rooted on private car based transport. Embedded within a completely built-up residential environment, the transport network serving the node cannot be expanded easily. It is therefore a challenge to decongest the node and support the ongoing pressure for development.

Arup developed an Integrated Transport Master Plan (ITMP) for Sandton that demonstrated how the current car oriented transport system is unsustainable, requiring a search for alternative solutions. The recommended solution is based on more intense and optimal use of available transport infrastructure through a change in land use patterns, promotion of alternative means of transport to the car and rebalancing the street space towards eco-mobile modes.

The Eco-mobility Festival's aim was to enable and promote travel behavioural change of commuters traveling to, from and within the Sandton node, supporting the vision of decongesting Sandton. The rationale was that, if Sandton employees are willing to adopt an alternative way of travel, it will prove that change is possible in Johannesburg.

The festival provided the ideal opportunity to assess the effectiveness of proposals in the ITMP that support eco-mobile modes. Therefore, a number of projects to improve walking, cycling and public transport were implemented as key interventions during the Eco-mobility Festival.

2 OBJECTIVES OF THE STUDY

This paper provides a review of the impact of the transport interventions implemented during the Eco-mobility Festival. The festival aimed to:

- Showcase the use of public transport, cycling and walking as sustainable eco-friendly alternatives to using the private car.
- Show what a car free pedestrian/cyclist friendly environment can look like to illustrate the lifestyle changing benefits.
- Create and provide the catalyst to facilitate a mind shift change away from the use of the private car and explore the use of eco-mobile modes.

Arup, in collaboration with the CoJ and MPA Consulting Engineers, - monitored the travel patterns and commuter behaviour during the festival month. Arup trained volunteers to conduct surveys at locations where data was available from previous studies.

The findings were used to consider which transport interventions would best realise the goals of the ITMP if they were to be implemented permanently. This paper provides a summary of the monitoring results related to modal shifts, public transport usage and non-motorised transport as well as recommendations to the CoJ.

3 KEY RESULTS OF MONITORING

3.1 Public transport usage and modal shift assessment

Dedicated public transport lanes, additional public transport services and park and rides were implemented from various areas around Johannesburg. It was envisaged that road restrictions, combined with public transport priority measures, would encourage commuters to use alternative modes of travel. The following interventions were implemented to improve public transport alternatives:

- Managed contraflow public transport lanes (used by buses and mini-bus taxis) were implemented along:
 - Republic Road between View Road and William Nicol Drive
 - William Nicol Drive between Republic Road and Sandton Drive
 - Sandton Drive between William Nicol Drive and Grayston Drive
- A dedicated public transport lane was implemented along Katherine Street in the direction of traffic flow.
- Park and ride facilities supported by express bus services.
- Additional rail and bus peak period services were introduced by the Gautrain and Metrobus.
- Mixed traffic lanes were reduced to accommodate the public transport priority lanes.

Classified traffic counts undertaken on the key routes into Sandton were analysed to determine the mode choice and public transport usage during the festival month.

Figure 1 provides a summary of the peak hour traffic volumes, by mode, before and during the festival. The findings can be summarised as follows:

- **Private car volumes:** on average, an 8% reduction in car usage was measured along Katherine Street, Republic, Sandton Drive and William Nicol Drive during the Eco-mobility Festival.
- **Mini-bus taxi volumes:** during the festival, approximately 680 taxis trips were recorded in the morning peak hour along the routes surveyed compared to the 535 taxi trips recorded in 2014. The additional 144 vehicles is an increase of 27%. A possibility for the increase could be taxis saving time using the managed lanes allowing a quicker turn-around and trips.

- **Bus volumes:** on the routes considered, a 98% increase (from 42 to 83) in bus trips was recorded during the peak hour - assumed due to the increased bus services from the park and ride facilities.

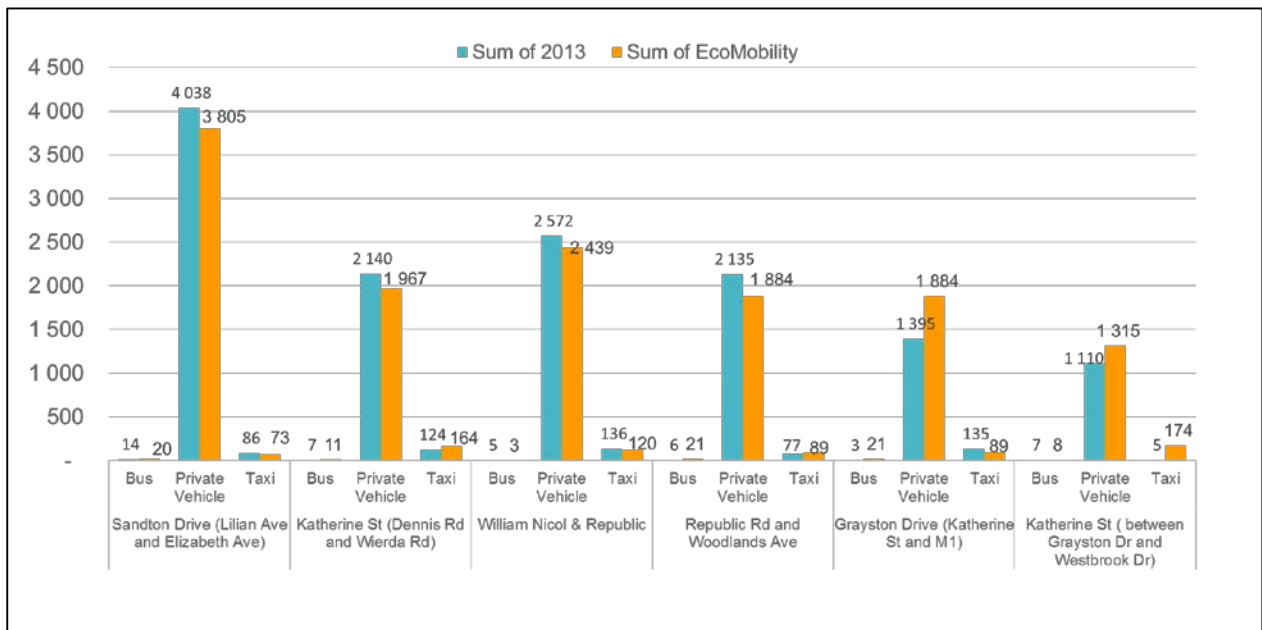


Figure 1: Peak hour traffic volumes before and during Eco-mobility month

From surveys at the park and rides, it was determined that the average number of people making use of the park and ride sites in the morning peak period was approximately 200 per day from Bright Water Commons, 120 from Monte Casino and 115 from Randburg square. The average peak volume for all park and ride sites was 690 per day. The bus service from Brightwater Commons was mostly full during peak hours.

The Gautrain experienced an overall increase of 13.9% in train passengers for the month of October compared to 12 months earlier and 15% for Sandton Station alone.

A web-based opinion survey was launched and 1,290 responses were received. From the origin data, it was possible to determine the distribution of trips and current modal split, by area, of the people who responded to the online opinion surveys.

Figure 2 indicates the origin of trips made to Sandton and illustrates that the Sandton node attracts daily commuters from all over the Gauteng Province. People travel from places as far as Pretoria north, Roodepoort, Benoni, Vanderbijlpark and the East Rand. The significant proportion (24%) of respondents indicated that they travel from the western parts of Johannesburg. This is followed by the surrounding suburbs to the north of Sandton (14%). This information provides a good reference for the CoJ when deciding which transport projects to prioritise.

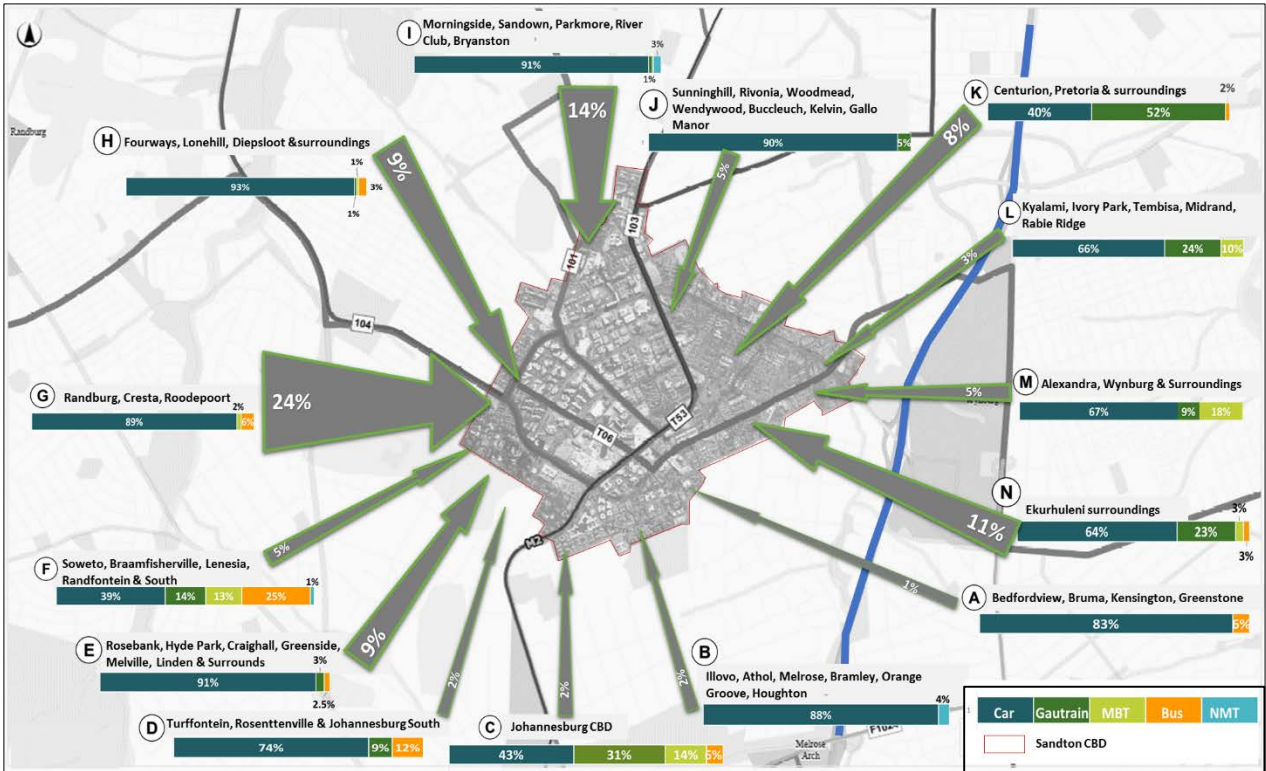


Figure 2: Current trip distribution and modal split by trip origin

The web-based survey further indicated that 15% of people changed from single occupant cars to alternative modes. The modes adopted by these respondents are shown in Figure 3. It shows that the majority changed to the Gautrain and buses.

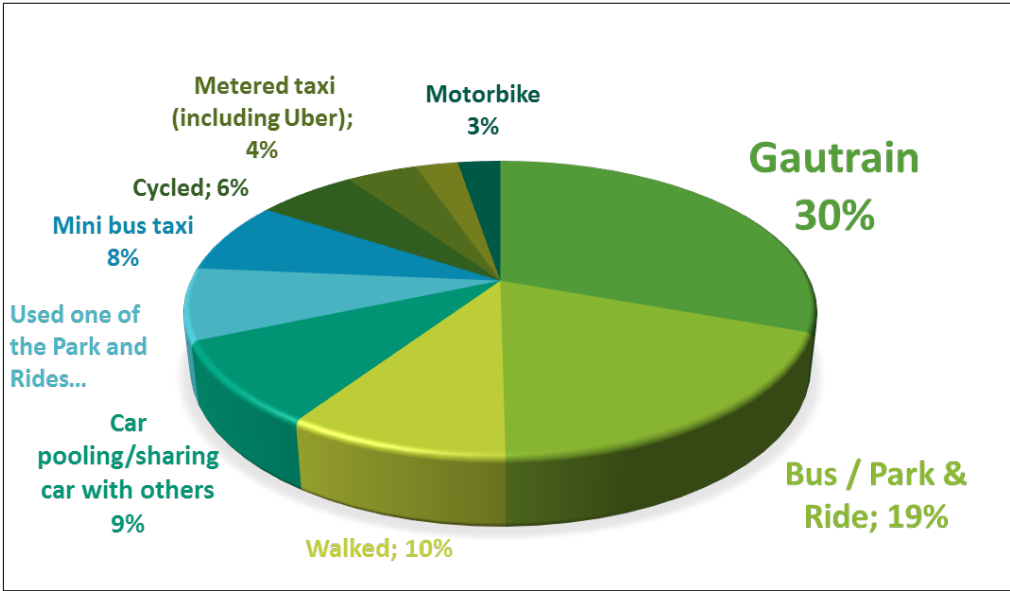


Figure 3: Mode changed to during Eco-mobility month – all respondents

The number of commuters who indicated in the web-survey that they changed their mode of transport, is summarised in **Figure 4** and split by area of origin and mode changed to from private car. The modal choice of commuters who changed their main mode of travel reflects the availability of transport options. It is evident that where the Gautrain is available, it was the most popular alternative to the car.

The most significant shifts to the Gautrain were by commuters from Centurion, Pretoria and surrounds, Rosebank, Hyde Park, Parktown, Greenside, Melville, etc.) who used the Gautrain, presumably from the Rosebank station. Where safe park and rides were combined with bus services using managed lanes, it proved a popular choice as showed for Randburg and Fourways.

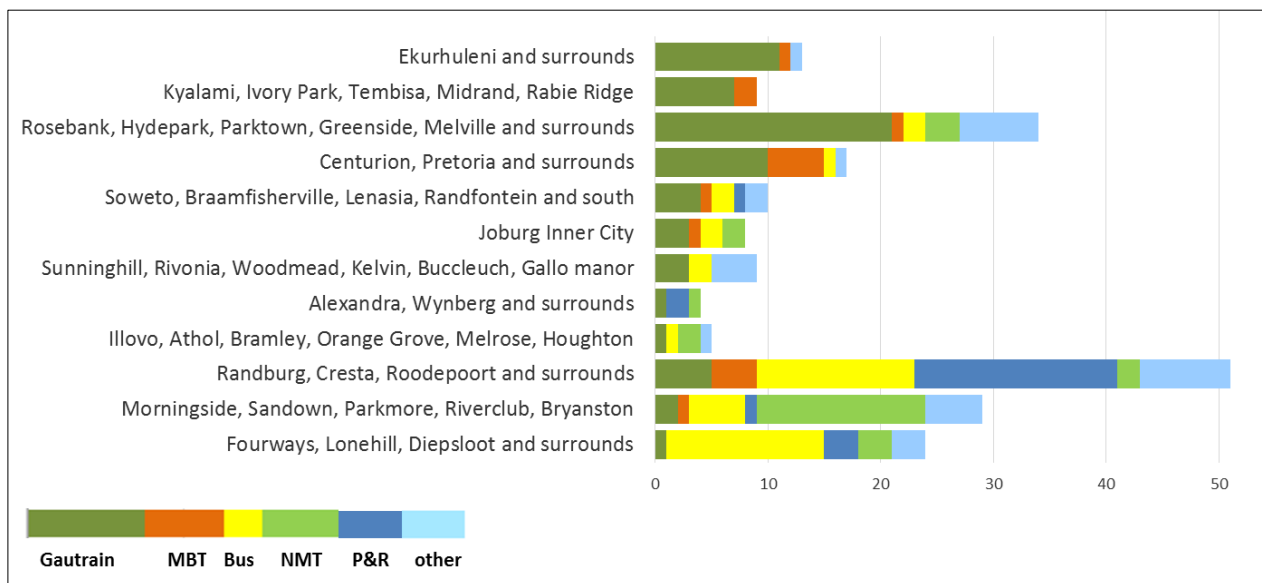


Figure 4: Mode changed to during Eco-mobility month by trip origin

3.2 Travel time surveys

Travel times into Sandton were measured in the morning peak, by driving a private car from a number of areas outside Sandton and using mobile GPS technology. The surveys were done at weekly intervals from a week before and during the festival. The results of the travel surveys from two of the areas, Fourways and Randburg, are reflected in **Figures 5 and 6**.

For the Fourways route, which was measured from the William Nicol Drive/Leslie Avenue intersection, travel time increased by ± 6 minutes from before the festival. For the Randburg route, starting at Brightwater Commons, it increased by ± 11 minutes. Both these routes had contra-flow managed lanes. Pointsmen were used to manage the traffic at intersections. The increase in travel times was mainly caused by the time allocated to public transport vehicles at the intersections.

From the surveys, it was clear that the managed lanes did not start far enough out of the periphery of the Sandton node. It meant that for the first part of the trip, public transport vehicles experienced congestion delays up to the start of the managed lanes. The change in travel speed on these graphs provide a good indication of

where the public transport priority measures should be implemented from to ensure public transport travel speeds are not impacted by congestion.

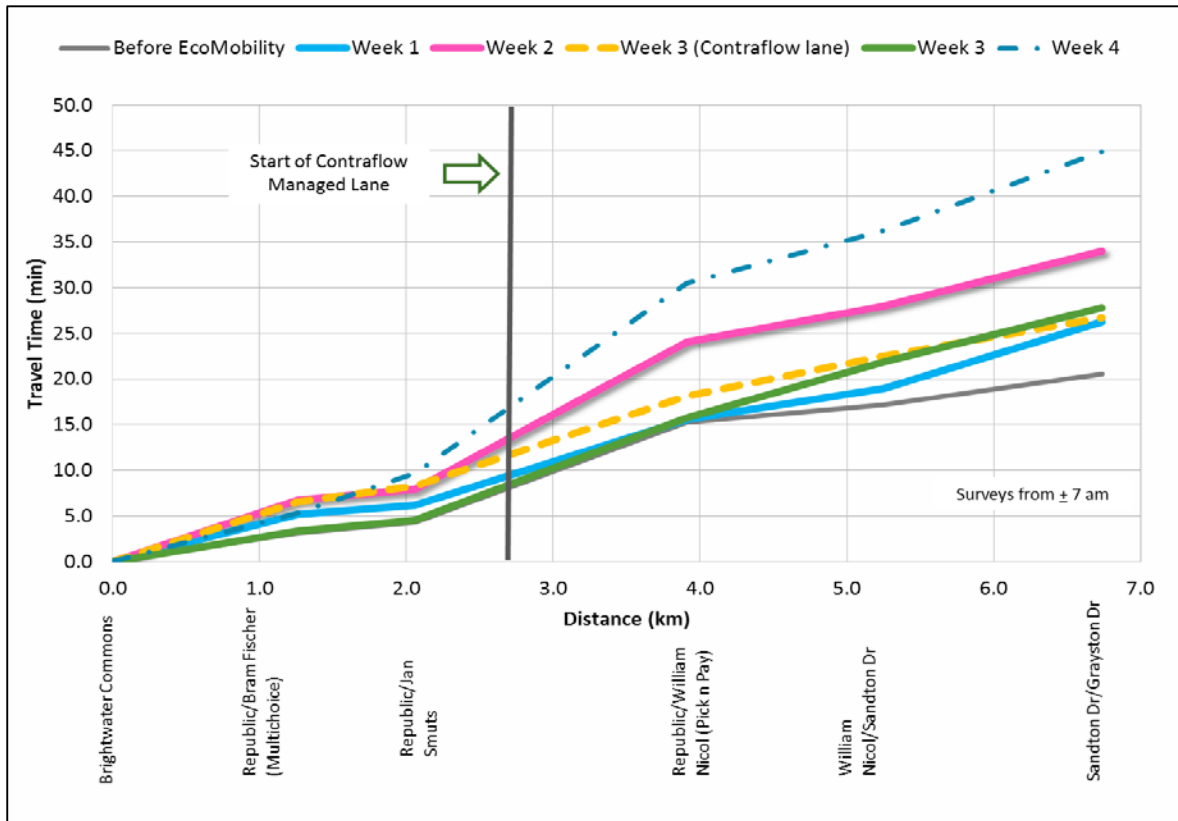


Figure 5: Travel times from Bright Water Commons in the AM peak

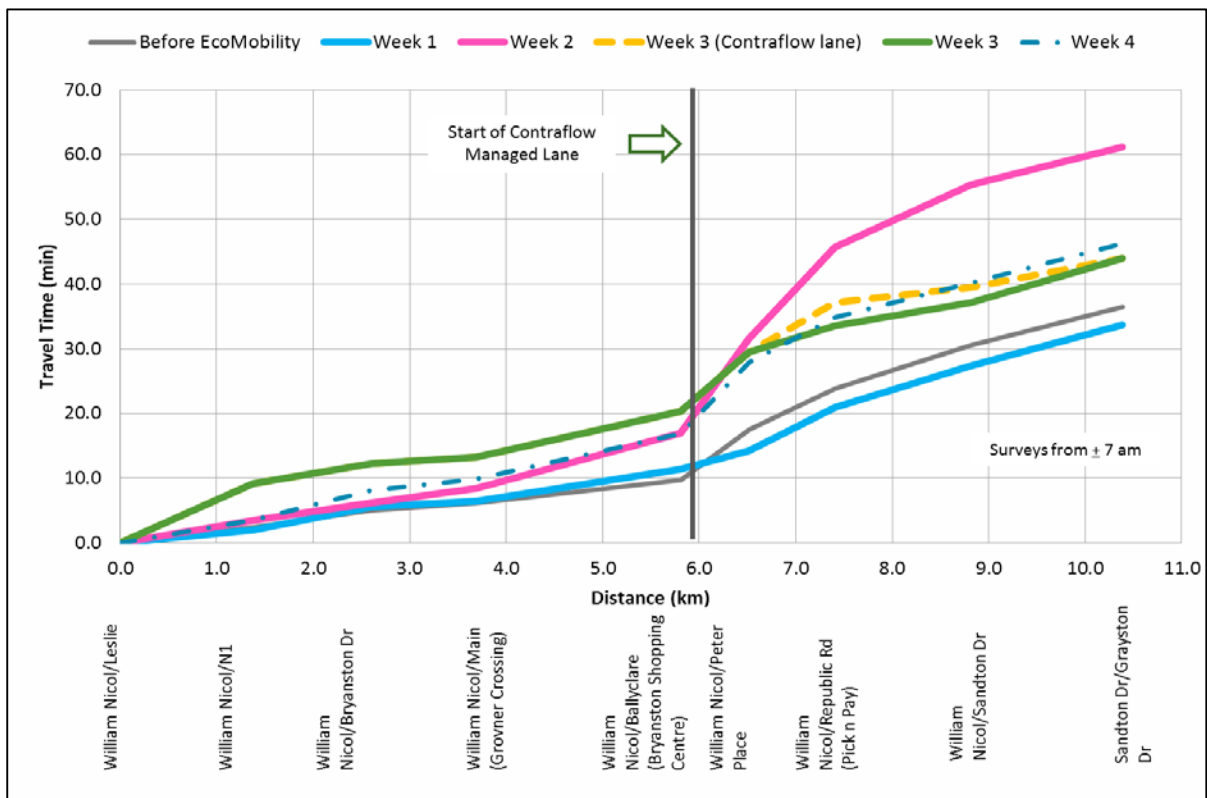


Figure 6: Travel times from Monte Casino in the AM peak

Interestingly, drivers respected the contra-flow managed lanes on William Nicol Drive and Republic Road, but they cars contravened the public transport priority lanes on Katherine Street. The assumption is that the lanes on Katherine Street were in the direction of flow and assessed easily by all traffic at the intersections, whereas this was impossible with the contra-flow managed lanes.

On-board surveys and travel time journeys were also undertaken on buses using the managed lanes (indicated by the yellow dotted lines in **Figures 5 and 6**). The managed lanes did not reduce the travel time for public transport vehicles compared to vehicles travelling in mixed lanes. However, an attitudinal survey on the buses indicated that passengers perceived an overall saving of time.

The increase in travel time for people in cars was marginal, but the managed lanes created a perception of time saved for people in public transport. This combined resulted in a significant percentage of travellers opting for public transport.

3.3 Car free pedestrian/cyclist friendly environment

Catering for pedestrians is perhaps both the biggest challenge and opportunity for improving the transport system as all users of public transport typically walk the last leg of their journey. Walking is also the essential connector between different transport modes. The two interventions that affected travellers most were the closure of West Street at the Gautrain station to vehicular traffic and the new sidewalk and cycle lane on Linden Street from Alexandra to the Sandton station.

Manual pedestrian counts conducted along West Street, just to the north of the Gautrain Sandton station, showed a significant increase in the number of pedestrians during the festival. On one day it increased from about 300 in 2013 to about 2,400 as shown in **Figure 7**. The surveys were undertaken on a day when there were no festival events and the nearly five-fold increase can be attributed to commuters using the Gautrain and other public transport.

The majority of pedestrians taking part in an attitudinal questionnaire, felt that the walkways and street closures improved their walking experience and made them feel safe and protected from vehicles.

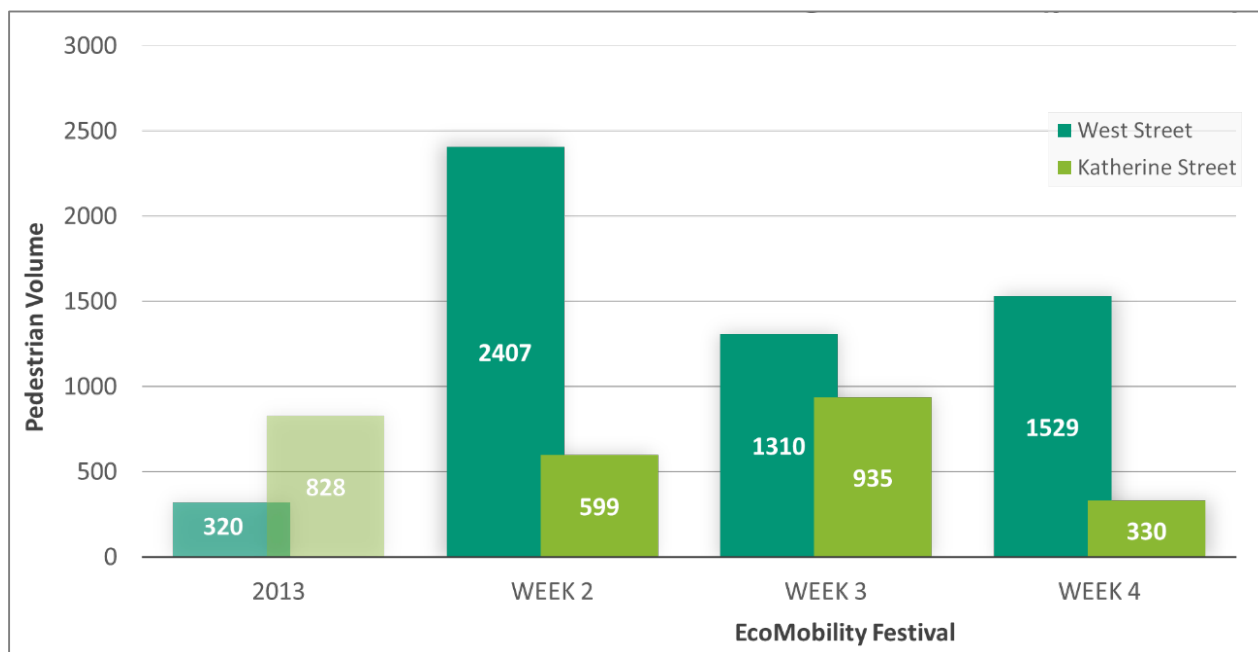


Figure 7: Pedestrian volumes before and during the festival (morning peak hour)

Some cycle facilities were implemented within Sandton for the festival. A permanent cycle route was in place along Katherine Street and Linden Street between Grayston Drive and Rivonia Road. Permanent cycle lanes were also implemented along West Street between Stella Street and Fredman Drive. No dedicated cycle lanes were implemented outside the Sandton CBD, but signage was installed to indicate preferred routes for cyclists.

The number of cyclist using the routes to and from Sandton was counted on 8 October (as summarised in **Figure 8**) during the morning and afternoon peaks. One hundred and three cyclists were recorded during the morning period traveling to and from Sandton. Unfortunately it was not possible to compare these results with previous data, but anecdotal evidence indicated that very few people usually cycle on Mattie and Sandton Drive.

Of the 1,290 respondents to the web-based survey, a very small proportion took up cycling. They felt that the cycling provision was limited and that they would cycle to work if the catchment of the routes were extended and the infrastructure was convenient and safe. Based on the web-based survey, a third of those who attempted cycling during the festival were from Randburg and surrounds. This corresponds with the highest number of cyclists recorded on Mattie and Sandton Drive, as shown in **Figure 8**.

Although the actual numbers are insignificant, it nevertheless provides a good indication of where cycling investment be considered.

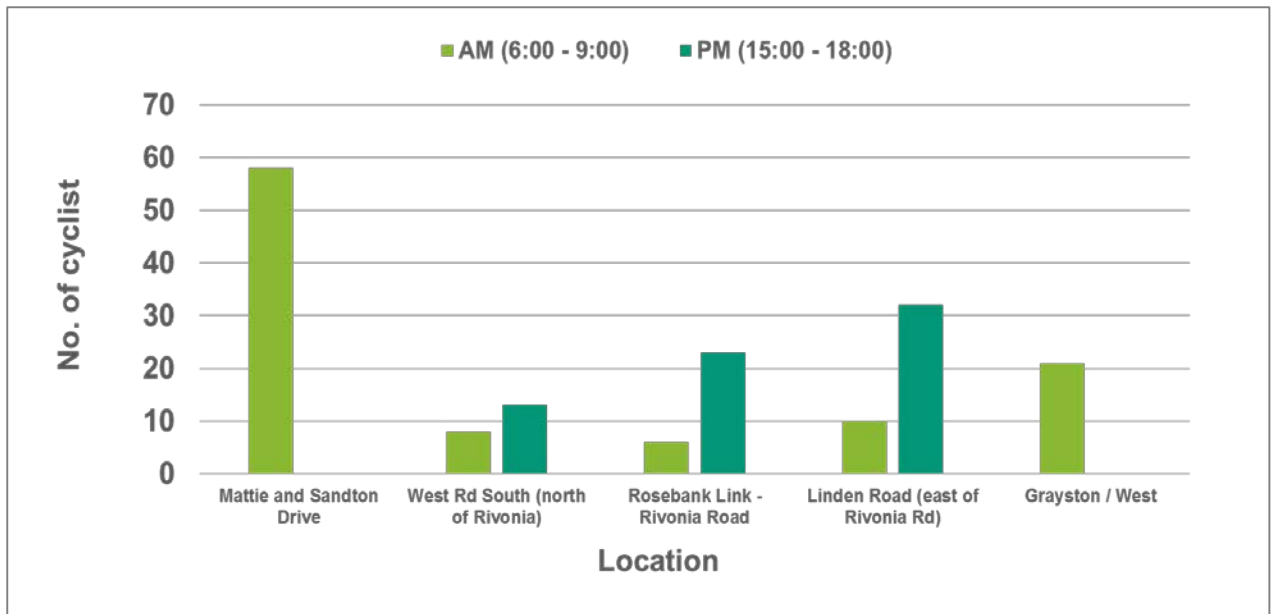


Figure 8: Cyclists counted on one day of Eco-mobility month

3.4 Public transport distribution services

The Eco-mobility project presented an ideal opportunity to assess the operational characteristics of the public transport loop project that was proposed in the Sandton ITMP as a distribution system around the core area of the Sandton CBD. A free hop-on hop-off minibuss taxi shuttle service was introduced for distribution of passengers and to serve as pick up and drop-offs for the park and ride facilities.



It operated along a temporary public transport loop. The loop was introduced for the festival with the aim to implement it permanently as part of the planned BRT system in Sandton.

The loop followed:

- 5th Street between Fredman Drive and Rivonia Road
- Rivonia Road between West Street and Fredman Drive
- Fredman Drive between Rivonia Road and 5th Street

The boarding and alighting numbers on the public transport loop indicated a satisfactory utilisation of the service. In a full day survey in the last week of the Eco-mobility month, 1,037 passengers were recorded boarding the free shuttles along the temporary loop. Of these passengers, 44% of them boarded at the Gautrain Station.

Although only pilot in nature, various critical factors were noted as potential risks to the efficient operation of a loop type concept. The management of the interface and conflict with mixed traffic, particularly at access points to adjacent properties, became an issue that severely hampered the efficiency of the public transport service. Illegal entry and contamination of the public transport lane by private cars entering it, or conflict between the vehicles turning into accesses across the lanes, caused significant friction in the system. These operational challenges highlighted that the design of the loop should be revisited.

4 SUMMARY OF FINDINGS AND RECOMMENDATIONS TO THE CITY OF JOHANNESBURG

The festival provided an opportunity to assess whether the transport infrastructure implemented could be effective in meeting the goals set out in the Sandton ITMP.

Respondents to the web-survey were also asked which of the transport infrastructure interventions they would support, if implemented on a permanent basis. As shown in **Figure 9**, 60% of the 1,290 respondents indicated a support for either improved facilities for non-motorised transport users or a combination of interventions in support of eco-mobile travel.

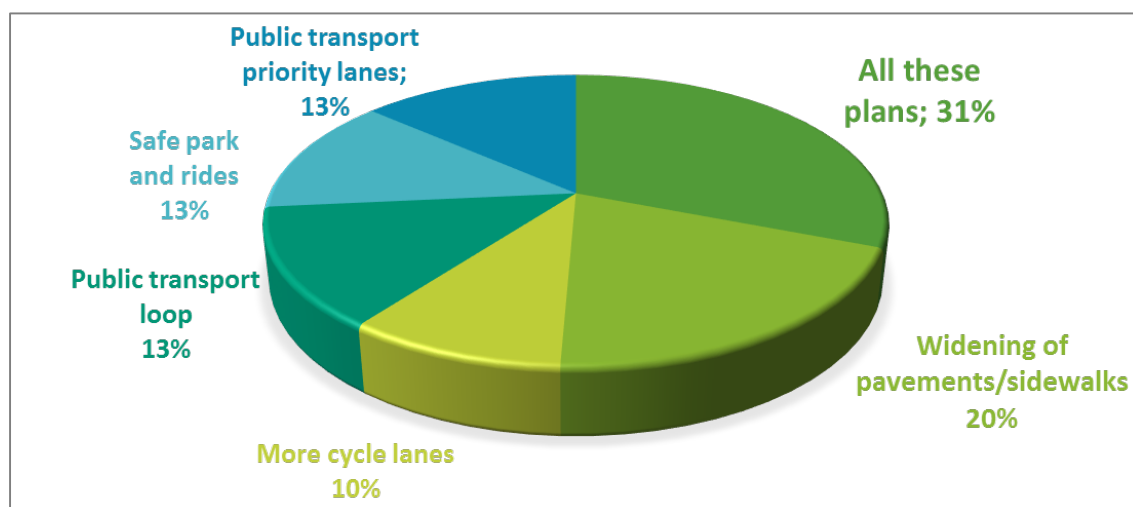


Figure 9: Indication of which projects Sandton employees will support

In summary, the main conclusions from the monitoring were:

- A notable change in travel behaviour was observed in one month.
- People are prepared to change from car transport, when alternatives are provided and using a car becomes inconvenient.
- Commuters will use public transport if a safe and reliable option such as the Gautrain is available.
- The number of people who walked increased significantly and they indicated a desperate need for improved non-motorised transport infrastructure facilities.

Based on the observations and monitoring of the Eco-mobility Festival and a revisit of the master plan proposals, the following short-term interventions are proposed.

5.1 Public Transport Services

The Sandton ITMP proposes a public transport hierarchy consisting of intercity services (Gautrain), intra-city services (BRT trunk) and local feeder bus services. The Eco-mobility Festival observations suggest that bus services are well utilised when buses have priority along the entire route so that commuters perceive a time saving in using the bus service over the private vehicle.

Recommended is prioritisation of the implementation of the following bus services:

Randburg: planned as a BRT trunk route, but for the short-term, a service introduced which runs on contra-flow bus priority lanes. The opinion survey results indicated that 24% of commuters originate from this area and therefore, the route underlines the major catchment area. The high utilisation of the park and ride facilities confirmed significant demand for such a service.

Bryanston: 14% of commuters originate from this area. The travel distance to Sandton from these areas is less than 5km and a number of bus stops along the way would be required to maximise the catchment. A suitable location for park and ride be investigated.

Fourways: 9% of commuters originate from this area. The high usage of the park and ride facility and express service indicates high demand for such a service.

These services should be combined with strategically located park and ride facilities along the routes, located prior to where major traffic queues occur, so that users can benefit from travel time savings. Due to the distance of the Randburg and Fourways routes, a combination of express and frequently stopping services is recommended.

4.1 Transit Oriented Development (TOD)

The Sandton ITMP proposed the area within 600m of the Sandton Gautrain station as a TOD area. Based on the 600m radius around the station, Linden Road, West Street and Rivonia Road were identified as primary pedestrian routes within the TOD

area. Linden Road was upgraded as a primary pedestrian link to Alexandra. Of the pedestrians who were interviewed during the Eco-mobility Festival, 89% indicated that they felt safer with the interventions such as new walkways and 82% felt that their trip to work improved.

Recommended is that the TOD concept be strengthened by providing permanent pedestrian improvements along West Street and Rivonia Road as short-term actions. Also identifying West Street as a 'high street', together with Maude Street. A proposal to the CoJ that a consistent urban design framework for each of the streets should be developed based on TOD principles. Introducing the high street concept should be prioritised, as it would act as a catalyst for change in Sandton and create a pedestrian friendly environment. The design should integrate the bus services as recommended in the previous section.

Figure 10 below shows the proposed pedestrian network centred around the TOD area. The secondary pedestrian routes identified can be implemented over the medium term.

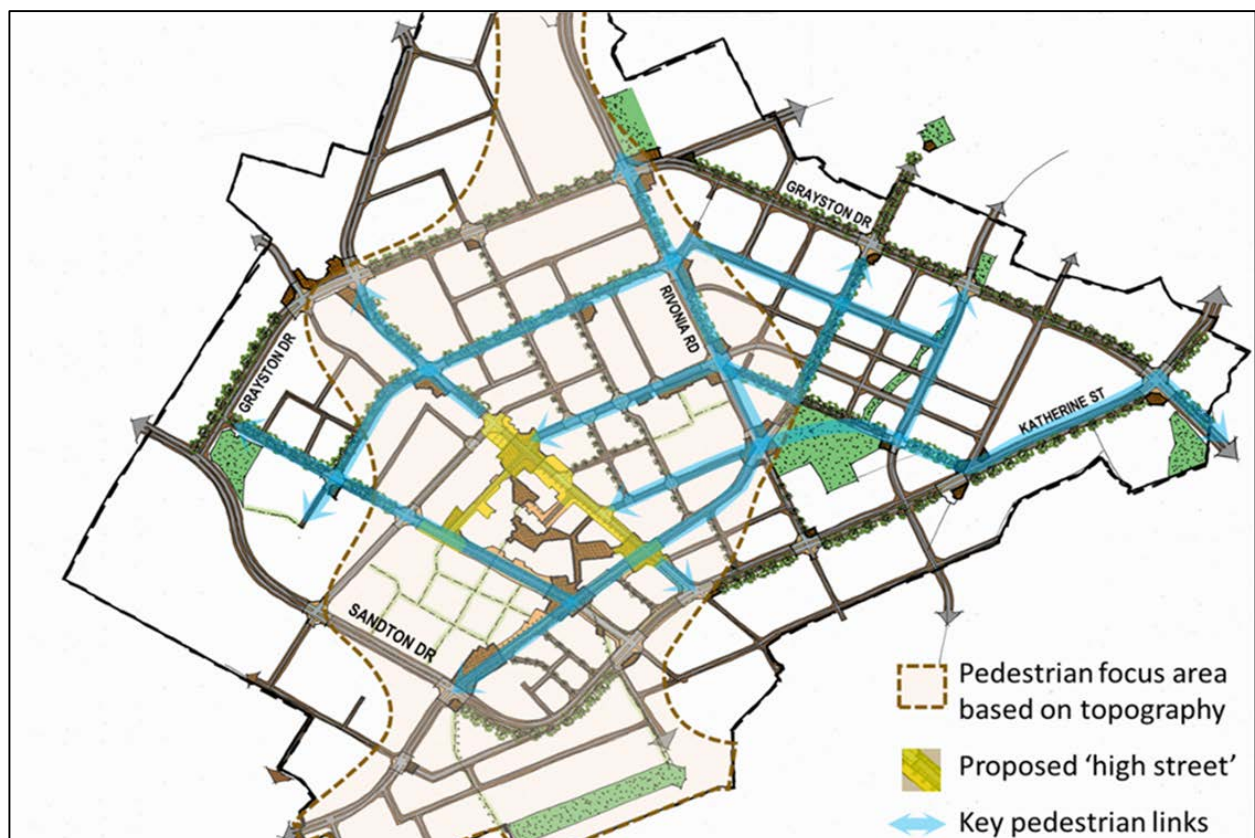


Figure 10: Proposed pedestrian priority network for Sandton

4.2 Cycling network

The Sandton ITMP proposes an extensive cycle route network that connects Sandton to surrounding areas within a radius of 5 to 7km. The majority of commuters to Sandton live within this catchment, which is within a comfortable cycling distance. The major concern for cyclists recorded during the Eco-mobility festival is road safety and lack of cycle infrastructure.

As stated earlier, almost a third of the cyclists during the festival were from Randburg and surrounding suburbs. Even though only a few cyclists were observed, it is believed that the introduction of new cycle infrastructure to this area will have a positive influence on travel behaviour.

Recommended is a permanent cycle link be provided between Sandton and Randburg. The route should be located on lower order roads, as far as possible, promoting cycling on safer roads and minimising vehicle conflicts. The ITMP also recommended cycle lanes on Linden Road, Maude Street and West Street. The Linden Road cycle link is completed and it is recommended that the full internal cycle network be implemented next. This will improve the current perception of Sandton as a car-centred node towards becoming friendlier towards non-motorised transport, particular once the TOD takes off.

4.3 Pedestrian network

The implementation of TOD principles around Sandton station will improve the quality of place for pedestrians. The current pedestrian network in Sandton is in a poor condition and does not invite journeys on foot. The Sandton ITMP outlines many initiatives that can be undertaken in the short term to improve the pedestrian experience. As a minimum, pedestrian routes should simply be de-cluttered, paths should be unrestricted and clearly defined, street frontage activity should be encouraged and adjacent developments should be highly permeable. De-cluttering and fixing up of sidewalks is a quick-win project in Sandton towards turning the area into an attractive and 'pedestrian-friendly city'. This was perhaps the biggest missed opportunity during the festival.

"I struggled walking to the Gautrain as most pavements and sidewalks were blocked off by construction forcing me to use the roads (and nearly getting hit by cars and taxis every day). This would work so well if executed properly as I am all for going Green."

A respondent to the survey

4.4 Mobility management

There is a greater awareness of the impact that transport and private car travel have on carbon emissions and the environment. Therefore, a sense of responsibility and willingness amongst individuals and organisations to adopt and promote a more sustainable transport mind-set is growing. Organisations with head offices in Sandton, such as Discovery and Nedbank, are leaders on this front and could drive the promotion of a sustainable travel culture in Sandton.

A change in modal split away from private cars has been successfully achieved in Europe through multi-year programmes. Therefore, a programme of awareness raising and activities, supported by a multi-year programme of well-packaged interventions, could have a significant impact on the travel behaviour in Sandton.

A mobility management programme adopted by the Sandton business improvement district (SBID) is

*One of the respondents recommended:
"...regular education and seminars and ads going forward. It was great, but let us continue with awareness going forward. Viva Eco-mobility Viva."*

recommended to raise awareness and drive an ongoing change in travel behaviour through the main employers. Ideally, this should be a partnership between CoJ and the SBID, focussed on providing facilities, rideshare opportunities, improved information on public transport, incentive schemes to limit private car use and, where appropriate, making properties easier to access on foot.

The CoJ will be responsible for providing public transport services and infrastructure; the employers for programmes to change commuters travel behaviour. Companies could package interventions accordingly in order to reach the targets set. The CoJ's travel demand management strategy (May 2012), which advocates precinct and employer trip reduction programmes, can be used as a source of options.

4.5 On-going data collection

Although only limited data was collected during the Eco-mobility festival, it indicated that the transport interventions implemented for the festival had a positive impact on commuters' travel behaviour during the Eco-mobility month. It should be noted that the assessments in this paper were based on data collected during the festival and shows the impact the festival had during the month of October 2015.

Unfortunately, no subsequent data collection has been undertaken to assess the true impact of the festival in terms of a permanent change in travel behaviour. Ongoing monitoring will be beneficial when future projects such as the BRT trunk service to Alexandra is implemented. New technology should be taken advantage of, for example, traffic data can be obtained from sources such as TomTom, and data which is regularly collected such as the Gautrain/Putco/Metrobus passenger numbers should be analysed to measure changes in traffic patterns.

5 CONCLUSIONS

The traffic surveys undertaken during the festival show a decline in private car volumes and an increase in buses on the Sandton gateway approaches. This is based on a comparison with 2013 traffic volumes that were surveyed for the purpose of the Sandton ITMP and therefore other transport interventions implemented since 2013 may also have affected the redistribution of traffic.

Irrespective of this, when viewed in combination with the park and ride utilisation and the Gautrain occupancy figures, it shows that on an average day in the morning peak period there was a notable shift from private cars to public transport.

The opinion surveys indicate that commuters who changed from private car to the Gautrain during the festival did so because the Gautrain was accessible in the beginning and at the end of their trip. This highlighted the importance of public transport being accessible to commuters from the origin to the destination of their trip.

Overall, the festival was successful in terms of promoting walking and cycling by providing safe walkways for pedestrians and by starting to implement a safe cycle

route network. The need for strategic cycle routes from outside the node, particularly from the west, as proposed in the Sandton ITMP, was confirmed by the results.

Considering that public transport systems normally take more than a month to ramp up, the festival showed that a reduction in private car usage can be achieved rapidly when road capacity is limited and viable alternative public transport systems are provided and promoted.

The CoJ's travel demand management strategy (May 2012) advocates precinct and employer trip reduction programmes. Based on the results of the festival it can be concluded that rolling out this strategy in Sandton will have a positive impact. The programme would require companies to set realistic future modal split targets, aligned with planned public transport interventions and supported with programmes of promoting alternative ways of travel.

The festival served as a pilot project for the Sandton ITMP, concluding that the transport interventions implemented during the festival would certainly lead to the achievement of the goals set out in the plan. It provided an extremely useful opportunity to assess the effectiveness of each of these measures and the lessons learnt during the festival can be used to reengineer the proposed interventions for optimal return.

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