Motorcycle Lane Filtering Trial

Summary of Trial Findings

April 2014

1. Background

Despite lane filtering being an illegal practice in NSW and all Australian jurisdictions, it is acknowledged that it is widely practised, especially in congested urban areas or where traffic queues occur.

Lane filtering is legal in some European countries, including the United Kingdom, and is a common practice in California in the USA. However, there is very little research on lane filtering here in Australia or in other countries, and no studies have focused on measuring traffic congestion and safety benefits or risks associated with lane filtering. Local motorcycle groups have advocated to have lane filtering permitted in NSW.

On 18 October 2012 the Minister for Roads and Ports announced the commencement of a lane filtering trial that allowed the practice within a designated area of the Sydney CBD. The trial was enabled by an exemption from certain road rules introduced during the trial period to permit motorcyclists to lane filter within a designated trial area.

2. Overview

Transport for New South Wales (TfNSW) conducted a trial of motorcycle lane filtering within a defined area in the Sydney CBD over an eight week period from 1 March to 30 April 2013. The purpose of the trial was to gain an understanding of the impacts of motorcycle lane filtering on traffic congestion, road user behaviour, attitudes and road safety, across all road user groups.

For the purposes of the trial, lane filtering referred to a motorcycle moving between lanes of stationary vehicles that are proceeding in the same lane. Lane splitting was not a permitted manoeuvre under the trial. Lane splitting was defined as moving through moving vehicles travelling parallel to each other in an unsafe manner and at an unsafe speed.

The Motorcycle Lane Filtering trial was developed in consultation with the NSW Police Force, City of Sydney Council, the Motorcycle Council of NSW, NSW Motorcycle Alliance and Roads and Maritime Services. ARRB Group (ARRB) was commissioned by TfNSW to undertake the monitoring and evaluation of the trial.

The trial treatment area was located in the northern sector of the Sydney CBD, as bound by Sussex Street, Market Street, St James Road, Macquarie Street, Alfred Street, George Street and Hickson Road.

3. Methodology

A before and after trial research method was used to assist in evaluating the change in congestion and behaviour associated with motorcycle lane filtering.

To quantify whether lane filtering helps to ease traffic congestion while not jeopardising road safety for all road users, the following data was collected during the trial across the five sites in the trial area:

- Traffic volume and vehicle classification
- Incidence of motorcycle lane filtering
- Measures of traffic flow, traffic congestion, travel time

- Nature of lane filtering manoeuvres, such as lane position and lane changing
- Motorcycle stopping position at intersections
- High-risk motorcycle manoeuvres, such as lane splitting
- Incidence and nature of motorcycle conflicts with all other road user groups, including pedestrians, cyclists and other motor vehicles
- Road user attitudes, experiences and acceptability toward lane filtering.

A combination of data collection methods were used to ensure coverage of the research areas and for quality, reliability and timeliness of the data being collected.

The lane filtering activity and associated behaviour of each road user group – motorists, motorcyclists, pedestrians and cyclists – was subject to monitoring and evaluation in the trial, as observed at selected midblock and intersection locations in the trial area.

One of the key risks to manage for the trial was the possibility of a serious incident in the trial area involving a motorcycle lane filtering. The Police Motorcycle Response Team (MRT) monitored the progress of the trial to identify any illegal and high-risk motorcycling activity throughout the trial area. The Centre for Road Safety (CRS) was in regular contact with the Police MRT to confirm if they had identified any incidents or behaviour of note that would warrant a review of the trial.

Five treatment sites were used in the trial area located in the north of the Sydney CBD (Figure 1). A control site, located at Chalmers Street, adjacent Central Railway Station between Foveaux Street and Devonshire Street, was also used to obtain a baseline measure.

Congestion Data Collection

Congestion performance measures that were assessed in the trial were:
- travel time
- travel time variance
- Sydney Coordinated Adaptive Traffic System (SCATS)[1] congestion minutes
- travel speed.

The treatment sites were used in the trial area for monitoring and data capture using remote video cameras. Three of the treatment sites had The Infra-Red Traffic Logger (TIRTL)[2] vehicle counters installed to permit classified vehicle and speed data to be captured. Two of the treatment sites used SCATS detectors to capture information related to the level of congestion at the signalised intersections of the treatment sites. The control site was also monitored with remote video cameras and SCATS detectors. TIRTL units were also installed at the control site to capture motorcycle and vehicle data.

A video observation survey was conducted before and after commencement of the trial to assess the travel time for both motorcycles and other vehicles.

[1] *Collects data from stop-line detectors at signalised locations to compute a level of congestion at that intersection, which is defined as a congestion performance indicator referred to as SCATS congestion minutes.*

[2] *A unique light-based non-invasive vehicle detector, counter, classifier and speed measurement product. TIRTL consists of transmitter and receiver units on opposite sides of a carriageway, using two parallel and two cross beams below axle height to detect and classify passing vehicles.*

A table of the various data collection methods that were used at each trial monitoring site is outlined in Table 1.

Behavioural Data Collection

The trial sought to evaluate the impact of motorcycle lane filtering by observing road user behaviours and comparing the change in observed behaviours between the periods before and after the commencement of the lane filtering trial. Additionally, an attitudinal intercept survey was undertaken to obtain additional data on the perception and experience of road users during the trial.

Video observation
Video-based observation using fixed digital video cameras was the primary method used to capture road user behaviours for the trial.

Intercept attitudinal survey
In addition to site observation (video) survey, two attitudinal survey methods were used that included an intercept attitudinal survey and online attitudinal survey.

Intercept surveys of motorcyclists, motorists, pedestrians and cyclists were used to provide insight into the attitudes held by road users towards motorcycle lane filtering and of their experiences before and after the trial period.

Online attitudinal survey
An online survey was also used to seek opinions from road users farther afield than just those approached in the trial area. An understanding of the views of road user groups towards motorcycle lane filtering, whether directly a part of the trial or more generally, was explored. Participation in the online survey was invited via media statements and information dissemination that included the website link to the online questionnaire.

The results from the online survey formed a separate assessment of the views of road users to the intercept surveys.

Police Monitoring
A monitoring process was established between TfNSW and the NSW Police Force for regular reporting of motorcycle incidences during the trial. The process involved a weekly email or telephone call between the CRS Project Manager and a nominated MRT representative to discuss the nature of any major motorcycle incidences that occurred during the trial within the trial area, as well as the ongoing experience of Police during the trial.

An observation sheet was developed by TfNSW for MRT officers to complete after each shift, as an additional one-pager to their regular reporting. The observation sheet sought to obtain the general experience of Police during the trial. All Police feedback was collated and analysed, and contributed to the wider findings of the trial.

Data Coding and Analysis

Video survey coding method
Coding was conducted by a specialist data survey company. The video coding method involved coding motorcycle movements using categories provided in a coding sheet. The data was compiled into worksheets for analysis.

TIRTL coding method
TIRTL data was used in order to identify whether a motorcycle was filtering, splitting or continuing in the lane to analyse the speeds that lane splitting motorcycles and adjacent vehicles travelled at. Instances of motorcycles splitting were defined based on all of the following occurring:

- A motorcycle was detected within 0.5 m of a lane line.
- Adjacent vehicles were within 6 m (downstream or upstream) of a motorcycle at the time the motorcycle was detected.
- Adjacent vehicles travelled at speeds of 10 km/h or greater.

Intercept and online surveys
The QuickTabSurvey software used on the Galaxy tablets collated the intercept survey data directly into csv spreadsheets. This meant no post-survey data entry was necessary.

ARRB reviewed the intercept survey data, coding it for analysis using the SPSS Statistics software version 21.0.

Similarly, the online survey, using Survey Monkey, allowed results to be directly collated into a spreadsheet for analysis.

Data analysis
ARRB analysed the coded video data from the data surveyor using spreadsheet software, with statistical analyses performed using SPSS Statistics version 21.0.

Statistical tests were calculated and used to indicate the statistical significance of any observed differences such as preference for a particular response, prevalence of a behaviour of interest, and any change in important motorcycle behaviours between the before and after trial periods.

4. Key Findings

The results of the video observation, TIRTL and attitudinal surveys were analysed to assist in answering the research questions and to provide an objective assessment of the effects of motorcycle lane filtering on traffic congestion, road user behaviour and road safety.

The key findings of the trial included:

Overall Safety

- Lane filtering was a relatively low risk riding activity for motorcyclists under the conditions of the trial. No crashes were reported during the trial period, although one near miss was recorded. Four other near-miss incidents were identified during the limited scope pre-trial pilot survey. While not a focus of the trial, no rear-end crashes were reported for motorcyclists who did not participate in lane filtering manoeuvres during the trial period.

- Lane filtering was reported to be a common manoeuvre for motorcyclists as a means of moving through traffic, with 63% of those surveyed online indicating they 'always' or 'mostly' lane filter. However, video data found a lower frequency of lane filtering than perceived by online survey respondents, with around 20 - 30% of riders observed filtering across all sites in the trial.

- Motorcyclists observed to be lane filtering demonstrated a good level of appropriate and compliant action. Between 80 and 85% of motorcyclists at the treatment sites and all motorcyclists at the control site filtered or wriggled between travel lanes, as per the defined conditions of the trial.

- While not a focus of the trial, some incidents of lane splitting were observed. Analysis of video data at treatment sites showed the level of splitting remained relatively consistent across the 3 periods, with approximately 15% of splitting observed.

- Almost half (48%) of the motorcyclists surveyed indicated they felt safer when lane filtering, believing that lane filtering improved their safety by having greater control over their exposure to traffic, particularly vehicles following behind. Though approximately a quarter of respondents felt less safe when performing the manoeuvre.

Pedestrian Safety

- Safety risks posed by lane filtering were highest for pedestrians than any other road user group. Motorcyclists who lane filtered or 'wriggled' were found to cross the stop line at intersections, thereby intruding into the pedestrian crossing space.

- Also of risk to pedestrians, filtering in the kerbside lane of a multi-lane road was observed by Police during the trial, along with riders overtaking on the near side next to parked vehicles. Police observed lane filtering to be an opportunistic manoeuvre, with riders lane filtering or splitting in whatever gap they could fit their vehicle.

- The observed risks to pedestrian safety were supported by the survey findings, with all road users (including motorcyclists) identifying pedestrians to be at greatest risk from lane filtering. Concerns related to a perceived lack of familiarity with lane filtering, motorcyclists not giving way to pedestrians, and a lack of predictability of motorcyclist movements when lane filtering (where a pedestrian that crosses between stopped traffic, mid-block, might not think to look for a motorcycle moving through the lanes of traffic).

- Speed management is critical to delivering significant road safety benefits, with lower speeds reducing both the number and severity of crashes. Pedestrians are a key beneficiary of lower speeds because they are more susceptible to injury in a collision and as impact speeds increase, survivability decreases. At an impact speed of 30 km/h the average pedestrian has a 90% chance of surviving the crash. However, this reduces to around 70% at 40 km/h, whilst at impact speeds above 60 km/h, pedestrian survivability is less than 1% (see Figure 2). This shows that 30km/h is an optimal speed at which pedestrians are likely to survive a crash.

- A way to manage lane filtering risks to pedestrians would be to set a limit to the speed that lane filtering occurs, which mitigates the risk of a crash and also the severity of injury should one occur and would provide a high level of safety for pedestrians. A 30km/h speed restriction for lane filtering would be 10km/h below the 40km/h speed limit for high pedestrian areas in NSW. Another way to manage this risk is to not permit filtering in the kerbside lane or near parked vehicles.

Travel Time and Congestion

- Motorcyclists believed lane filtering improved their travel time by moving through congested traffic. The trial found some support for this belief with the link travel speed (i.e. speed over a monitored length during the trial) for riders found to be lower when lane filtering.

- While motorcycles are increasing in popularity, motorcyclists in the trial represented only 4% of the total traffic, and with only around a quarter lane filtering only 1% of total traffic reported to participate in lane filtering related manoeuvres. For this reason, the trial did not show a reduction in congestion for all traffic. However, common sense says that removing some motorcycles from traffic queues may help to minimise queuing at busy intersections. As the number of motorcycles increases, it is more likely that overall congestion would be improved in time.

5. Policy Development

Due to the complex nature of the trial and its subject matter, it was not always possible to draw precise conclusions about the benefits and risks of motorcycle lane filtering. However, the trial did provide a range of useful information and observations about lane filtering and its possible effects.

In addition to the trial, in order to inform policy development TfNSW has:

- analysed motorcycle crash data to identify any crash risks that may be associated with lane filtering
- reviewed Australian and international research on lane filtering
- reviewed international approaches to lane filtering and lane splitting
- extensively consulted with NSW Police and motorcycling groups such as the Motorcycle Council of NSW and the NSW Motorcycle Alliance.

Appendix A provides a new approach for lane filtering in NSW based on all available information obtained.

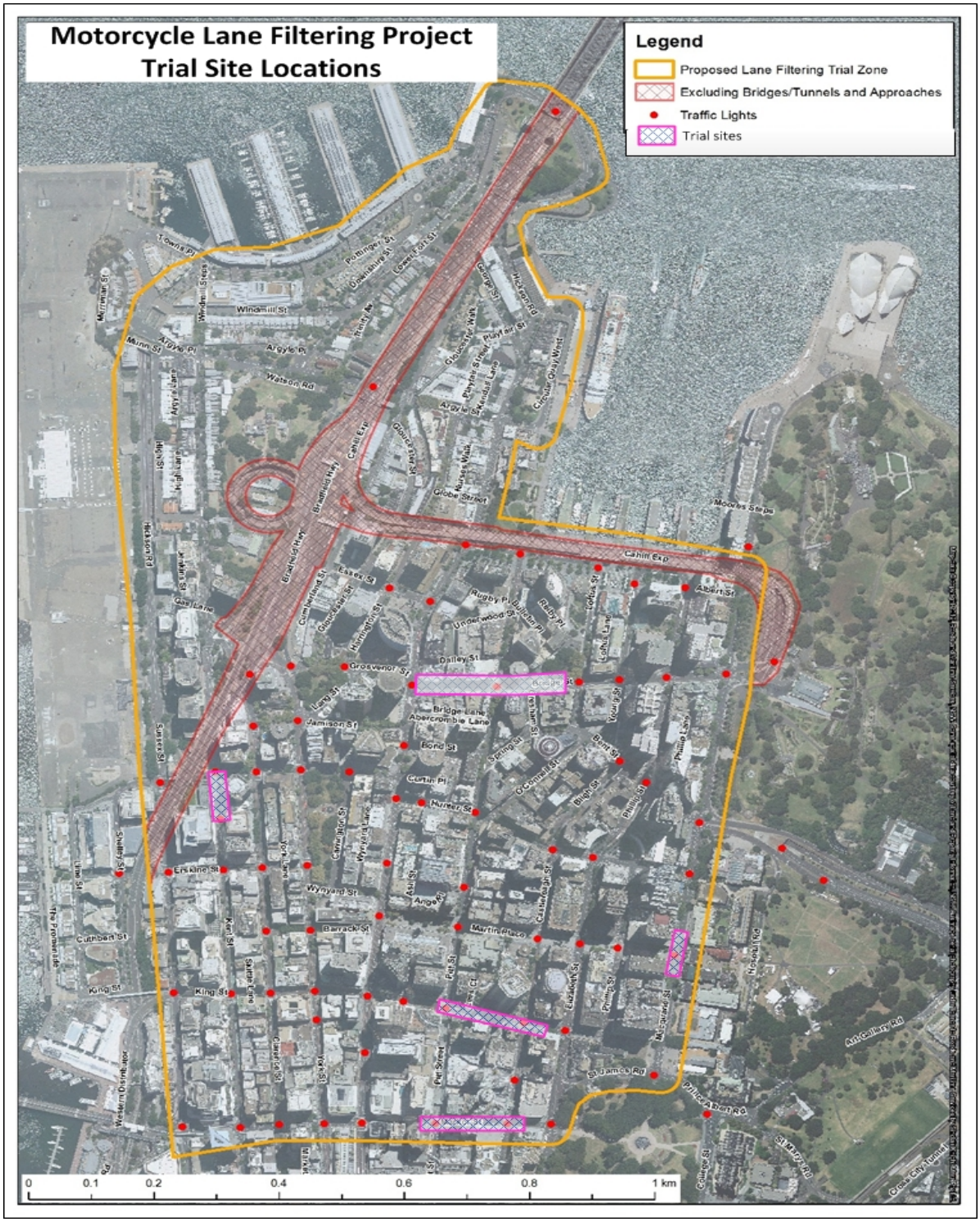

Figure 1. Motorcycle Lane Filtering Project Trial Site Locations

Table 1 - Data collection methods used at each trial monitoring site

Site	Video camera	SCATS detector *	TIRTL ^	Attitudinal Survey
Bridge Street: George Street to Loftus Street	✓	✓	×	✓
Macquarie Street near Martin Place	✓	×	✓	✓
Market Street: Pitt Street to Castlereagh Street	✓	✓	✓	×
King Street: Pitt Street to Castlereagh Street	✓	×	✓	×
Kent Street near Napoleon Street	✓	×	×	✓
Chalmers Street: Foveaux Street to Devonshire Street	✓	✓	✓	×

The combination of data collection methods employed at each trial evaluation site will differ due to the extent to which technical and operational requirements of each method are available and suitable based on the precise nature and physical layout of each location.

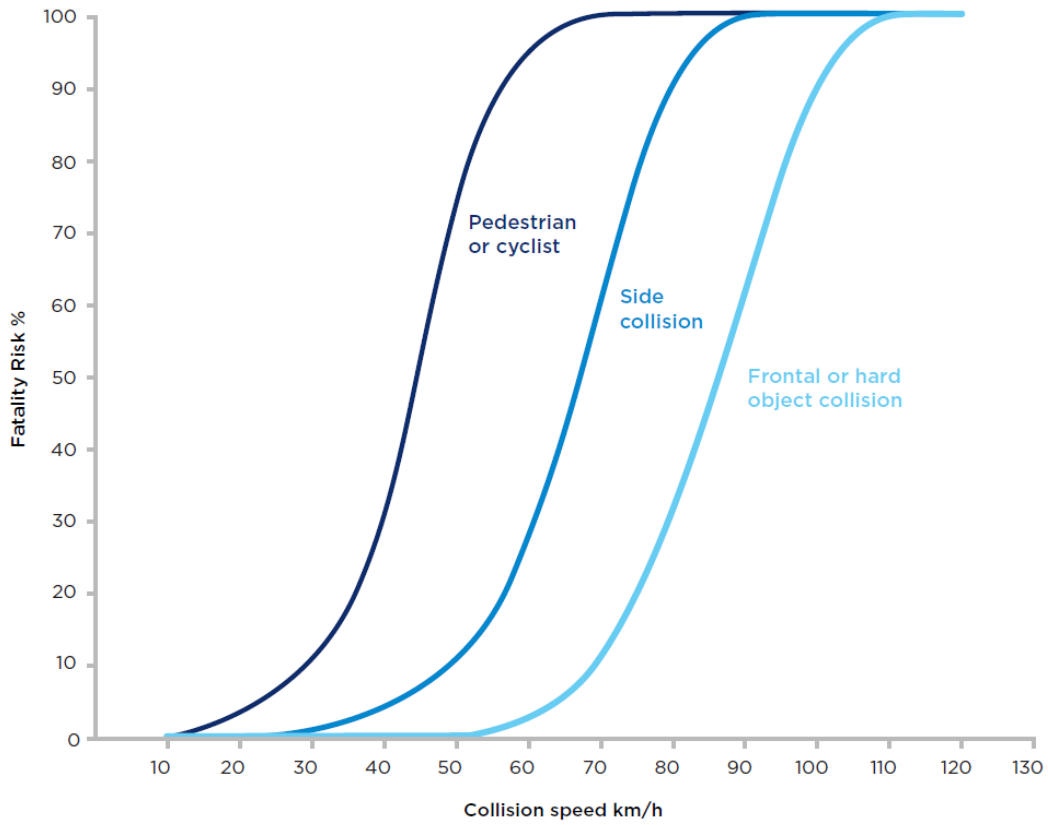

Figure 2. Fatality risk curves by impact speed for different crash types including pedestrian crashes.

Appendix A
Motorcycle Lane Filtering in NSW – Policy Approach

Lane filtering is legal in NSW from 1 July 2014

- The act of riding a motorcycle between lanes of stationary or slow moving traffic, known as "lane filtering", will be legal from 1 July 2014, following a Centre for Road Safety trial in parts of the Sydney CBD in 2013.
- In an Australian-first, NSW motorcyclists will be allowed to ride between stationary or slow moving vehicles at intersections or in congested traffic in a bid to improve travel time for motorcyclists and ease traffic congestions over time.
- New laws will be made to allow lane filtering and to impose a new penalty for lane splitting.

Lane filtering conditions to make it safe for all road users

- To ensure the safety of all road users especially pedestrians and cyclists at intersections and near kerbsides, lane filtering must be undertaken safely under the following conditions:
    - Filtering only allowed 'when safe to do so'
    - Riders must not filter at a speed greater than 30km/h
    - Full licensed riders only (i.e. no filtering from riders on Learner or Provisional rider licence).
    - Riders must not lane filter in a school zone during its hours of operation.
    - Riders to be warned not to lane filter near heavy vehicles or buses.
- Riders will also not be allowed to filter in kerb side lanes or next to parked cars. This is to protect pedestrians walking on footpaths and/or accessing parked cars, as well as cyclists who may be riding on the road.
- Riders must comply with all existing Road Rules when filtering, including stopping before stop lines at intersections with a red-light traffic signal, or when a stop sign is present .

Lane splitting is illegal

- A new offence will be created for 'lane splitting' to stop riders making high speed unsafe manoeuvres and riding between lanes of traffic at over 30km/h. This will be enforced by NSW Police Force.
- The 30km/h speed restriction for lane filtering riders is set at 10km/h below the 40km/h speed limit for high pedestrian areas. The speed restriction will ensure that lane filtering only occurs in stationary or slow moving traffic where riders and vehicles are travelling at up to 30km/h, which is consistent with research about the relationship between impact speed and pedestrian fatality risk.
- Additionally, because of the reduced risk, 30km/h is a speed limit adopted in

many European jurisdictions in areas where there is a high risk of a pedestrian crash.

Key road safety messages

- All riders must only lane filter when it is safe to do so and must take extra care when filtering near pedestrians and cyclists, and at intersections.
- Motorcycle ‘lane splitting’ (riding between lanes of traffic at speeds higher than 30km/h) is dangerous and illegal.
- When lane filtering, all riders must stop at stop lines at intersections with a red-light traffic signal, or when a stop sign is present, if at the front of the traffic queue.
- All road users should ‘check twice for bikes’ and always look out for the rapidly growing number of motorcyclists on NSW Roads.