Sydney Bike Share Feasibility Study

Project Feasibility Report
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Executive summary

The City of Sydney, Randwick City Council and Inner West Council have commissioned a Sydney Bike Share Feasibility Study and this report is the third of three reports being undertaken for this study.

The first project report delivered is a set of Case Studies, providing an overview of six cities that have launched bike share in recent years, documenting lessons learnt, comparison metrics, costs, benefits and key implications for Sydney. The second report, the Operational Recommendations report reviewed various components of establishing a bike share system and made a number of operational recommendations for a scheme in Sydney, should one go ahead. This included a two-phase roll-out of bike share with Phase 1 introducing 3,160 bicycles among 632 docking stations and Phase 2 introducing another 2,195 bicycles, among 439 docking stations based on a Bike Share Propensity Index. This Feasibility Report provides advice to assist Sydney make an evidence-based decision regarding bike share. It discusses the overall feasibility of a Sydney Bike Share system and provides an indication of the potential demand. This demand forecast is informed by: usage of bike share programs in other cities, particularly in Australia; the 2007 Taverner Report; the Bike Share Propensity Index undertaken as part of the development of the Operational Recommendations report; and primarily by cycle demand forecasting, undertaken from the recent deployment of a survey of Sydney-siders as part of this project.

Overall, the demand forecasting suggests that there is a high latent demand for bike share with approximately 5% (including visitors) of the urban population within a 15km radius of the city having some interest in using bike share. However, when coupled with the willingness to pay, this proportion decreases to 1.66%. Including visitor numbers this would equate to a high forecast of approximately 17,845-21,727 trips daily depending on the helmet strategy adopted. The forecasts show that the approach to helmets would have a particularly strong impact on uptake, with much higher utilisation forecasts associated with free provision of helmets with bikes (and a complementary program to ensure ongoing sanitation and maintenance) or a waiver to the mandatory helmet law for bike share. Further consideration of the overestimated factors apparent in the Melbourne bike share scheme resulted in the production of mid and low range forecasts of 3,569-4,345 or 1,785-2,173 trips per day, respectively. This report also provides a risk assessment of establishing a bike share system in Sydney and notes that a significant risk to a bike share system in Sydney is low utilisation. However, adopting the operational recommendations would support uptake of bike share, help alleviate growth lag issues, and position Sydney to be more likely to achieve the mid, or closer to, high-range forecasts.

The future approach to the recent introduction in Sydney of two privately-run, dockless bike share systems would also have substantial effects on the viability of the potential introduction of a publicly-run bike share system. The demand forecasts did not account for the simultaneous presence of multiple bike share systems. The conclusion of the report includes the following key recommendations:

- Implementation of a public bike share scheme in Sydney be put on hold until the impacts of the dockless schemes are evident
- Sydney councils should gather as much data and information from the private dockless systems as possible Negotiate with operators for access to regular data.
- Undertake a future review of bike share in Sydney (in, say, 18 months) to evaluate whether private dockless systems are meeting the city’s strategic bike share needs or whether some form of a public system should be introduced and the appropriate strategy for doing so.
# Introduction

The City of Sydney, Randwick City Council and Inner West Council have commissioned a *Sydney Bike Share Feasibility Study* and this report is the third of three reports being undertaken for this study. It provides advice to assist Sydney make an evidence based decision regarding bike share.

The first report delivered for this project, a *Case Study* report, provided an overview of six cities that have launched bike share in recent years (Melbourne, Brisbane, London, New York City, San Francisco and Washington, D.C.). It documented the lessons learnt, comparison metrics, costs, benefits and key implications for Sydney. The second report, the *Operational Recommendations* report reviewed various components of establishing a bike share system and made a number of operational recommendations for a scheme in Sydney, should one go ahead. Sydney is fortunate to have the experience of numerous international cities as well as Melbourne and Brisbane to learn from for the potential development of its own scheme. While bike share has achieved much popularity and success overseas, both Brisbane and Melbourne usage has been lower than projected. The *Operational Recommendations* report provided insights for why this may have occurred and other lessons from overseas and made a number of strategic recommendations correspondingly in order to ensure a higher level of success for Sydney.

The present report discusses the overall feasibility of a Sydney Bike Share system. This feasibility analysis is based on the projected demand which is examined in Section 2 and a risk assessment (Section 3). From this a number of conclusions and recommendations are offered at the conclusion of the report (Section 4).

The Feasibility Assessment contained within this report assumes that the Operational Recommendations are adopted. A summary of these recommendations is provided in Table 1 below. More details about the recommendations can be found in the full *Operational Recommendations* report.

<table>
<thead>
<tr>
<th>#</th>
<th>Matter</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Launch time</td>
<td>Launch bike share at a seasonally appropriate time (e.g. Spring/early Summer).</td>
</tr>
<tr>
<td>2</td>
<td>Registration</td>
<td>Streamline sign-up registration process, make it easy, for spontaneous use.</td>
</tr>
<tr>
<td></td>
<td>process</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Customer</td>
<td>Establish pricing structure that incentivises use and is cost competitive to</td>
</tr>
<tr>
<td></td>
<td>pricing</td>
<td>existing transport options.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spatial</td>
<td>Ensure bike share system is large enough to create a ‘network effect’.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spatial -</td>
<td>Use the Bike Share Propensity Index to guide implementation of bike share (if</td>
</tr>
<tr>
<td></td>
<td>overall</td>
<td>goes ahead). It offers the best balance between system cost and usability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>through a two-phase implementation plan. Note that some minor adjustments might</td>
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<tr>
<td></td>
<td></td>
<td>be required to address key trip generators like Sydney University etc. Refer to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 4 for maps:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Phase 1: 3,160 bicycles, 632 docking stations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Phase 2: Additional 2,195 bicycles, 439 docking stations</td>
</tr>
<tr>
<td>6</td>
<td>Spatial -</td>
<td>Site docking stations in high exposure/visible locations</td>
</tr>
<tr>
<td></td>
<td>docking</td>
<td></td>
</tr>
</tbody>
</table>
### station locations
- Consider using docking stations to create bike lanes and activate retail strips
- Locate near major trip attractors
- Ensure stations are able to be accessed by service vehicles
- Site in locations with support from local council and other stakeholders
- Maximise system access and equity of usage, especially low-income groups
- Site stations where they will be supported by bicycle infrastructure: Docking stations along high quality bicycle infrastructure have higher usage levels (Buck & Buehler, 2011)
- Supporting a contiguous network of bicycle infrastructure
- Site with exposure to sufficient sunlight if relying on solar power or access to electrical network if shading is unavoidable
- Avoiding siting that causes significant disruptions to pedestrian traffic
- Do not impede emergency or public transport vehicles in siting locations
- Consult with public for final positioning of stations, use digital, spatial (GIS-enabled) platforms for the public to engage
- Maximise system access and equity of usage, especially low-income groups

### Spatial – public transport integration
- Integrate docking stations with current and future public transport in terms of siting locations and payment systems
- Target train stations where parking (of cars) fills early
- Offer docking stations within the 1-3km (5-15 minute rides) of train stations
- The busiest stations may require overflow corrals or rebalancing teams

### Hardware and technology
- Use electric bikes to increase uptake and reduce rebalancing burden

### Hardware and technology
- Use GPS and Near Field Communication (allowing smartphone ‘tap’ to release bikes), radio-frequency identification (RFID) on bikes, and integrate ticketing with OPAL. Enable smartphone app sign up, payment and unlocking. Use GPS enabled wayfinding technology to enhance safety. Encourage the private sector to propose tech options that allow for ‘virtual docking’ with electric assist bikes.
- Ensure contract requires bike share data to be open in General Bike Share Feed Specification format (in real time too)

### Pricing
*Illustrative* user prices are provided below.

<table>
<thead>
<tr>
<th>Membership Type</th>
<th>Price Per Day</th>
<th>Price Per Week</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>$2</td>
<td>$2</td>
<td>Cheaper than public transport, incentivise ‘trial use’</td>
</tr>
<tr>
<td>Weekly</td>
<td>$6</td>
<td>$0.85</td>
<td>As above + encourage regular use</td>
</tr>
<tr>
<td>Monthly</td>
<td>$13</td>
<td>$0.43</td>
<td>Embed bike share into everyday transport</td>
</tr>
<tr>
<td>Annual</td>
<td>$90</td>
<td>$0.25</td>
<td>As above + reward loyal membership</td>
</tr>
</tbody>
</table>

### Helmets
Helmets reduce bike share usage.
- Undertake a study to investigate the overall population health impact of a waiver to current helmet legislation for bike share use.
- Consult Perth & Adelaide who are also considering bike share and considering their ‘helmet’ approach.
- Should a waiver be dismissed, provide free helmets with all bikes along with regular sanitisation and safety check/monitoring

12 Cycling network
Upgrade the cycling network to improve perceptions of safety and attract more cyclists, including protected bicycle lanes

| 13 Costs & funding | Costs are given in the report and estimated at ~$25m for Phase 1.
- It is recommended that a Non-Governmental Organisation (NGO) be set up to establish the system but be funded by government (state government and local councils, and possibly federal if possible).
- To operate the system, it is recommended that costs be met by local government contributions (based on number of docking stations in a jurisdiction) and state funding. Revenue from user fees and sponsorship to contribute to operational costs
- Best case scenario: May generate ~60 cents for every $1 spent on operations, if system is well used and run

14 Marketing
Need to:
- Prioritise a ‘compelling value proposition’ to potential users
- Incentivise early use through substantial discounts and ‘bring a friend for free’ days – important to increasing visibility of program
- Engage reputable branding firm for initial marketing strategy

15 Contracts
Contractual recommendations are provided in the full report but include:
- Include SMART (Specific, Measurable, Attainable, Relevant and Timely) Key Performance Indicators (KPI’s)
- Develop and implement a reporting tool for bike crashes
- Incentivise maximising bike share use
- Develop separate contracts for the supply of hardware and the operations

An important point to note is that the current bike share environment in Sydney has changed with the recent introduction of two private dockless bike share operators (Reddy Go and oBike). These systems were introduced while this Feasibility study was underway. As this was quite late in the programme timeline, a thorough investigation into the impact this will have could not be included within this report. This report does however identify the entry of these operators as a risk to the utilisation of a public bike share scheme and has provided recommendations appropriate to this new context accordingly.
2 Projected Demand from Cycle Demand Forecasting

There are various elements that provide an indication of the potential demand for a Sydney Bike Share scheme. These include the following:

- Bike share usage in other cities, particularly in Australia
- The Bike Share Propensity Index undertaken as part of the development of the Operational Recommendations report
- The 2007 Taverner Report, commissioned by the City of Sydney
- Cycle demand forecasting, undertaken from the recent deployment of a survey of Sydney-siders as part of this project. Some desktop analysis has also been undertaken to inform the demand forecasting.

A brief review of the former two is offered in this section but the majority of this section documents the latter.

2.1 Bike Share Propensity Index

As part of the Operational Recommendations Report, Opus’ sub-consultant, the Institute for Sensible Transport, has developed a Sydney Bike Share Propensity Index. The index took account of factors that are known predictors of bike share use. The Index can be used to inform a city of the most fruitful areas for bike share, to guide the catchment planning process. These factors were based on known determinants of bike share membership in Australia, as described in Fishman, Washington, Haworth, & Watson (2015) and used data collected in the 2011 Census, including:

1. Residential Population Density, measured as people per hectare
2. Employment Density, measured as number of people working per hectare.
3. Density of young people, measured as number of people aged 18 – 34 years of age per hectare.
4. City based employment, measured as the number of employed people across Sydney with employment destinations within the Sydney-Haymarket-The Rocks SA2, by residential SA2.
5. Low motor vehicle ownership, measured as the number of households with one or zero motor vehicles per hectare.
6. Bicycle use - origin, measured as the number of workers per hectare who used the bicycle for at least one stage of their trip to work, by residential SA2.
7. Bicycle use – destination, measured as the number of workers per hectare who used the bicycle for at least one stage of their trip to work, by destination SA2.
The seven datasets identified above were mapped, showing areas relatively well-suited to bike share in Sydney and the variation across inner Sydney. It was found that there was relatively high bike share propensity on both sides of the Sydney Harbour Bridge and the areas with the highest propensity for bike share included Surry Hills, Darlinghurst, Ultimo, Erskineville and the area around the University of Sydney.

This analysis was validated by comparing the bike share spatial findings to that of car share locations (GoGet pods) as the influential membership factors are likely to be similar. There was very strong correlation between the areas that rated highly on the Bike Share Propensity Index and the actual locations of GoGet pods.

From this analysis, it was recommended that bike share be implemented using a 2-phase approach with 632 docking stations, each with the capacity to hold 10 bicycles, accommodating a fleet of 3,160 bicycles. This reflects a docking station density of 9 per km² (consistent with best practice) to provide an optimal balance between service coverage and user convenience. It was also recommended to undertake a detailed evaluation of Phase 1 after one to two years, to consider rolling out Phase 2 with an additional 2,195 bicycles and 439 docking stations to expand Sydney bike share. Refer to the Operational Recommendations report to see the maps and/or obtain more details about the Bike Share Propensity Index.

### 2.2 Bike share usage in other cities

This section is not intended to be a literature review as that has already been done as part of the Case Studies report. Rather, this section provides a summary of key points from other bike share schemes used to inform the forecasting method.

As noted in the Operational Recommendations report, when utilisation of schemes is examined by number of trips per bike per day, Brisbane and Melbourne have observed 0.5–0.8 trips per bike per day. In contrast, at the higher end, international schemes have reported usage rates of around 3–8 trips per bike per day (Fishman, Haworth, & Washington, 2014, p. 2) as shown in Figure 1.

![Figure 1: Trips per day, per bike, in cities around the world (Fishman, 2015). NB: The Boston, Minneapolis and Montreal systems close during their winter months due to harsh weather. NYC’s bike share program’s first full month of operation was June 2013](image-url)
Forecasting the uptake of bike share is therefore very challenging given the dependence on a large range of variables that may support or impede actual bike share uptake. Indeed, as noted above, the Melbourne bike share for example, “suffered from lower than expected usage (Fishman, 2015) with ridership levels five and ten times lower than initially anticipated”. This suggests that in the case of Melbourne, there has been a gap between forecasts and the actual uptake of the scheme. We have used this as overestimation factors to moderate our forecasts later in section 2.4.7.

Meanwhile, The Case Studies report suggests that tourists and visitors can make up a substantial portion of the bike share market. A DC Capital Bike share study (Foursquare Integrated Transportation Planning, 2015) found that registered users (30-day and annual memberships) accounted for 79 percent of bike share trips, while 21 percent were made by casual users (24 hour and 3-day memberships). Additionally, a study of casual users in San Francisco (Shaheen et al., 2015) found that of ‘casual’ memberships, only 16 percent were local. These proportions have been used to estimate potential tourist use of a Sydney bike share for each scenario, detail in section 2.4.5.

2.3 Taverner report

In 2007, consultants, Taverner Research, undertook a study for the City of Sydney on a Public Bicycle Hire System Study (Taverner Research, 2007). Some analysis of this report has been undertaken and the results of this review and analysis are provided in Table 7 in Appendix 2. However, this research was undertaken in 2007, before any bike share schemes were present in Australia, and even worldwide examples of bike share were limited. This means that respondents were likely less informed and familiar with bike share and might have answered questions on this basis. Thus, the findings from the Taverner report have some important limitations to their validity.

Overall the findings from the Taverner report suggest that bike share has the potential to attract not just the ‘already committed’ cyclist market but rather, more of the undecided market. This would be important for growing cycling participation in Sydney, but may mean that potential users are particularly sensitive to barriers to use, such as, for example, a lack of safe cycling infrastructure. Prospective bike share users identified safety concerns as a substantial barrier but the current development of the cycling network in Sydney might help to mitigate this barrier. While the Taverner Report notes that ‘only 1%’ of visitors to Sydney bicycle, this is under market conditions such as they were in 2007 (no bike share program anywhere in Australia) and still represents a reasonably large demand because the number of visitors to Sydney is very high and forecasted to continue growing. Overall, the Taverner report found strong support for a system and high interest in use, and this indicates strong latent demand, but there may have been some self-selection bias (i.e. those with interest in bike share might be more likely to participate in the survey than the general population).

2.4 Bike share demand forecasting

This section documents the bike share demand forecasting undertaken as part of the present Sydney Bike Share Feasibility Study. The forecasting is based on the responses to a survey conducted during May-June 2017 and uses existing research and knowledge to provide corrective weightings and factors. It is important to note that this survey was designed prior to the recent introduction of two private dockless bike hire systems in Sydney (Reddy Go and oBike). As such, the forecasting has also been undertaken with the assumption that there would only be one (public) bike share system in Sydney rather than multiple, potentially competing systems. The latter context of multiple competing systems could have significant impacts on the forecasted numbers. Speculatively, multiple systems could increase the overall number of trips being taken by bike
share (across systems) because the catchment boundaries would likely increase, and so would the density of total bikes), but perhaps each bike might be used less.

2.4.1 Method

A full overview of the forecasting method, from survey development to development of three high, medium and low range forecasts is provided in Figure 2. It is apparent that there is a lot of complexity in trying to generate reliable bike share uptake forecasts. The remainder of this Method section will describe the first stages of data collection and preparation. The remainder of the method is described in more detail in the results section.
1. Data preparation
   - Develop and deploy bike share survey
   - Clean data
   - Weight sample (based on local demographics in 15km radius population)
   - Group respondents based on current cycling behaviour

2. Initial calculations
   - Calculate descriptive statistics
   - Generate rough order forecasts based on respondents' intended frequency of bike share use under 4 scenarios:
     1. General
     2. Free shared helmets
     3. Helmet law change
     4. Helmets sold at local store

3. Calibration
   - Apply 'general reality factors' to each cycling sub-group
   - Add visitor numbers based on extrapolation (based on overseas' visitor splits)
   - Adjust numbers based on 'willingness to pay' calculated using the proportion of respondents who said they were willing to cycle daily and willing to pay a fee.

4. Further adjustments - mid and low forecasts
   - Consider: uptake trends in analogous cities (e.g. Melbourne), including difference between forecast and actual usage + bike share-specific barriers that may have not been fully appreciated by respondents
   - Provide highly conservative mid and low range forecasts based on Melbourne's overestimation factor

'High' forecast (based on willingness to pay)

Very conservative 'mid' and 'low' range forecasts

Actual usage likely to be within this range, but dependent on deploying operational recommendations and approach to recent emergence of dockless schemes

Figure 2: Overview of the Sydney bike share utilisation forecasting method
2.4.1.1 Survey development and deployment

The survey used for data collection was designed by Opus and hosted in a survey platform that allows respondents to provide geo-coded responses to some questions (a copy of the survey is available at: https://maptionnaire.com/en/1617/). The survey was reviewed numerous times by Opus staff and clients with multiple iterations, to ensure that it was short enough, easy enough to understand but would obtain the necessary data.

Opus had originally proposed undertaking all stages of the market research however, the client opted to use a market research company for recruitment. Participants were screened to obtain only responses from those living within a 15km radius of the CBD. In retrospect, it might have been more advantageous to include anyone who works, lives or studies within a 15km area to be involved.

According to the market research company, they use actively-managed proprietary panels for recruitment and also ‘partnership sources’: invited through banners, invitations and messaging. In order to achieve representativeness, the company selects participants from its online sample blend and uses a three-stage randomization process to match participants with a survey that they are likely to be able to complete. The three-stage process involves: random selection from panel invited to complete the survey, asked a set of randomly selected profiling questions, and upon completion are matched with an appropriate survey. Prospective respondents are not informed what potential surveys are about (to reduce self-selection bias) but are asked to ‘take a survey’ to earn points which they can redeem for rewards such as vouchers for a number of shops.

Data was collected between May 24th 2017- June 7, 2017 by the market research company.

2.4.1.2 Sample size and data preparation

The survey received a total of 1,403 responses. Data cleaning was undertaken to ensure only valid responses were analysed. Eighty-five responses were removed as the respondent either did not live within 15 kilometres of the city centre, or they did not answer the question. Seventy-five responses were deleted due to lack of weighting information (age or sex). Finally, six responses were deleted because they did not live in Sydney (they were just visiting). The remaining 1,237 were included in the analyses. The sample was weighted to be demographically representative of the residential population within a 15 kilometre radius of the Sydney city centre, using gender and age sub-groups from the 2011 Census data.

2.4.2 Survey results

Results from the survey are now presented and begin with some simple descriptive statistics which are followed by more sophisticated forecasting which integrates weighting of the sample by age and gender and are informed by previous research and observations which shape the projections of likely bike share usage.

2.4.2.1 Descriptive statistics

Looking at the unweighted sample (i.e. not yet weighted by gender and age to be representative of the wider population), 71% of the respondents expressed interest in seeing a bike share scheme implemented in Sydney as shown in Figure 3.
Forty-three percent of participants indicated they would not use bike share at all (see Figure 4). At the other end of the spectrum, 5% said they would use it daily (5 times a week) and 14% said they would use it a few times a week (2.5 times a week). Meanwhile, lower frequency users included those that indicated using it less than once a week (3 times a month), a few times a month (2.5 times a month) and less than once a month (2.5 times a year).

**Figure 3: Reported support for a bike share program in Sydney**

**Figure 4: Reported intended frequency of use**
Respondents were asked willingness to pay questions using a range of pricing structures for daily, weekly and yearly use. The wording and presentation of these questions is provided in Figure 5.

![Figure 5: Questions about willingness to pay](image)

Of those that indicated willingness to use the scheme daily (which was only 5% of respondents), only one-third (33%) indicated participating daily if they had to pay a fee. Of those that indicated willingness to use the scheme weekly, approximately one-third (35%) indicated they would pay $3-$5 weekly (which is lower than our recommended fee structure which was provided in Table 1) and an additional 22% were willing to pay $6-8 weekly (in line with our recommended fee structure). Approximately 40% were willing to pay an annual fee of up to $99.

It is worth noting that one-third of all respondents indicated that they would be willing to pay an additional $1 for a trip for an e-bike (Figure 6). When narrowed down into those who said they would cycle daily for a fee, a similar proportion (63%) said they would be willing to pay an additional $1 for
an e-bike. This supports the idea of providing some e-bikes at higher prices as there would likely be some market for them.

![Willingness to pay an additional $1 for an e-bike](image)

**Figure 6: Willingness to pay an additional charge for e-bikes**

As shown in Figure 7, two-thirds of the respondents indicated that the bike share scheme would be very/somewhat convenient.

![How convenient do you think a bike share system in sydney would be?](image)

**Figure 7: Perceptions of convenience of bike share**

Finally, over half of respondents (55%) indicated that Sydney is not a safe place to ride a bicycle as shown in Figure 8.
The survey also included some opportunities for participants to provide open-ended responses to questions about what would encourage and discourage bike share use. Key themes of what would encourage bike share use included: training, protected lanes and helmet regulations. Some respondents cited the helmet law as an important safety feature (perhaps because they find cycling in Sydney currently to be unsafe) but a vast majority cited it to be a deterrent. Key themes that might discourage use included cost, lack of bike lanes, fines, not knowing how to ride, perception of unsafe riding infrastructure, payment options, regulations and lack of regulation, traffic and mandatory helmet requirement.

2.4.2.2 Qualitative comments from bike share survey

Survey respondents were offered an opportunity to provide open-ended comments about establishing bike share in Sydney. There was a great range of written responses received from overall excitement and enthusiasm to reluctance and concerns. Key themes of concerns and/or impediments to the success of a successful bike share scheme in Sydney can be summarised as follows:

- Safety concerns largely related to sharing the road with general traffic, a lack of protected cycling facilities, driver behaviour (both cyclist and cars/trucks)
- Hygiene cited as an issue especially for helmets
- Potentially high usage costs
- High infringement fines (including the increase in infringement fines)
- High cost of installing bike lanes (onto taxpayers presumably)
- Concerns that design (e.g. docking station locations) would not be optimal for convenience and thus reduce uptake – “I would be discouraged if you could only return the bike to the dock you got it”
- Inexperience in cycling and discomfort in riding in the city amongst the traffic
- Unsuitable cycling routes
- Unsuitable for long distance
- Inappropriate sizing of bikes
- Theft and security of bikes

Figure 8: Perceptions of Sydney as a safe place to cycle
- Limitation of carrying a child/groceries etc. on a bike
- Lack of shower facilities at work
- Limited payment options (i.e. needing a credit card/Opal for booking)
- Bike availability when needed
- Questions regarding what happens if a bike has problem during a ride
- Doubts were raised over the maintenance of bikes
- Topography (inability to ride over the hills)
- Damaged cycles

One respondent nicely summed up the possible impediments to uptake of bike share that could be affected by system design:

*Needing a helmet, bikes being too big or small (most adult bikes are too big and dragsters too small - need an in between size for smaller people), having to pay for long periods of time if you just want to make a short trip or no day rate so you can hop on hop off all day, docking stations in the wrong place, insufficient bikes, poor maintenance of bikes, uncomfortable bike seats, nowhere to leave bike securely near places of interest e.g. you cycle to the Art Gallery of NSW but there is nowhere secure to leave the bike once you get there, having to cycle on unsafe or busy roads.*

While adopting the Operational Recommendations is our overarching recommendation to address some of these issues, other supportive ideas that may assist in mitigating these issues include:

- Cycling education programmes for public more generally (as was undertaken in NYC prior to the introduction of the successful Citi Bike program)
- Trial periods (where people might get free or discounted use to try out bike share).
- FAQ section on the app/websites with information on what to do in case there is an issue with the bike. 24-hour call support centre.

### 2.4.3 Scenarios

Forecasts were generated for four scenarios offered in the survey. These scenarios were:

1) **General**: A general bike share description was provided¹ and then respondents were asked, “How often do you think you would use a bike share system (Note that this question was asked prior to the next three, helmet-scenario questions).

2) **Free shared helmets**: The bikes have free-to-use, shared helmets with them. Bike share docking (parking) stations are located near the respondent’s desired origins and destination. The transport (including cycling) network remains similar to how it currently is.

3) **Helmet law change**: A law was passed exempting helmet requirements for bike share users and no helmets were provided with the bikes. Bike share docking (parking) stations are

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¹ Described in the survey as: “Increasingly, cities are offering bike share services where bicycles are made available for shared use to individuals on a short-term basis through a variety of subscription options. Bike share is different from bicycle rental in that the bikes can be returned to any of the many docking stations scattered throughout a city. Bike share is a fun and easy transport option and/or recreation service which gives people more transport choices and can improve connections available for travel. It is often used as a ‘last mile solution’ to/from public transport. Typically, prospective riders can choose from a variety of subscription options (such as 1 day, weekly, 30 days, or annual,) and then within each subscription period, the rider is entitled to an unlimited number of free rides for 30 (or 45 minute) increments, riding from one bike share docking station to another. For rides where a bike is not returned to a docking station within 30 (or 45) minutes, additional charges apply.”
located near the respondent’s desired origins and destination. The transport (including cycling) network remains similar to how it currently is.

4) **Helmets sold at local store**: The bikes did not have helmets with them, but discounted helmets were for sale at local convenience stores for $5. Under this scenario people would still be required by law to wear a helmet when they rode the share bike. Bike share docking (parking) stations are located near the respondent’s desired origins and destination. The transport (including cycling) network remains similar to how it currently is.

### 2.4.4 Grouping and weighting of data

The data from surveys was analysed using Opus Research’s unique demand forecasting method. This method modifies survey respondents ‘stated use’ of the shared bike system based on a scientific understanding of human behaviour. Firstly, respondents are grouped by their current cycling behaviour (non-cyclists, occasional cyclists, and regular cyclists, where regular cyclists cycle at least weekly) (see Table 2).

<table>
<thead>
<tr>
<th>Respondents’ cycling behaviour</th>
<th>Percent of weighted sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-cyclists</td>
<td>70%</td>
</tr>
<tr>
<td>Occasional cyclists</td>
<td>15%</td>
</tr>
<tr>
<td>Regular cyclists</td>
<td>14%</td>
</tr>
</tbody>
</table>

**Table 2: Percent of weighted sample within each group**

#### 2.4.5 Calibration

Calibration of the rough order forecasts (which were solely based on self-reporting) was then undertaken. This involved for three main steps:

1. Apply a ‘general reality factor’ for each cycling sub-group (-)
2. Add visitor numbers (based on extrapolation from overseas schemes) (+)
3. Adjust numbers down based on respondents’ reported ‘willingness to pay’ (-)

First a ‘general reality factor’ was applied to the rough forecasts for each cycling sub-group. Group-matched behavioural factors were used to account for the difference that commonly exists between what people say they will do and what they actually may do, based on how familiar they are with the behaviour in question. These behavioural factors are derived from meta-analyses of peer-reviewed scientific literature. These behavioural factors were then used to ‘correct’ the survey respondents stated use of the bike share system for each of the survey scenarios. For non-cyclists, a conservative factor of 0.2 was used, and for occasional cyclists a slightly less conservative factor of 0.3 was used.

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* Percentages do not add to 100% due to rounding.
(Bamberg, 2000), and for regular cyclists a behavioural factor of 0.59 was used (Ouellette & Wood, 1998).

The target population for the bike share survey was those residing within 15km of Sydney’s CBD and as such there was not a representative number of survey responses by visitors. In fact, six visitors to the survey did respond but because this number was too low to be representative, their responses were excluded from analysis. Because visitors and tourists were not targeted to complete the survey their use of the bike share was not included in the initial, rough-order forecasts. However, as revealed in the Case Studies report, tourists and visitors can make up a substantial portion of the bike share market. Visitor use can be extrapolated based on usage in other cities.

The proportions discussed in section 2.2 were used to extrapolate visitor use of a Sydney bike share for each scenario. Local contexts were considered for this extrapolation. There are factors that may increase or decrease the likely visitor uptake in Sydney compared with San Francisco and Washington DC. Like San Francisco and Washington DC, Sydney also experiences high tourist numbers, and from an annual perspective, the climate is likely more conducive to cycling than Washington DC’s. On the other hand, visitor usage may also be impacted by Australia’s mandatory helmet laws and the relatively immature provision of protected bike lanes. The two studies that informed the extrapolated forecasts were from cities without mandatory helmet laws (Washington DC and San Francisco), which as the Australian experience suggests, may have a negative effect on bike share uptake. This barrier might be exacerbated for visitors who could be hesitant to buy a helmet that they would then have to figure out what to do with when they were done. The simple extrapolation does not capture such subtleties.

These initial, rough order forecasts were adjusted down based on the reported willingness to pay. This was done for the respondents as well as visitors for consistency, but it is worth noting that cost could be less of an issue for visitors as research suggests pricing is very much dependent on the purpose of the trip. As mentioned in section 2.4.2.1, respondents that indicated using the scheme daily (which was only 5% of respondents), only one-third (33%) indicated participating daily if they had to pay a fee. That means the actual usage of this subgroup would be significantly lower, indicating a disconnect between intention to use the system and actual likely usage given the prices that would be applied. Therefore, daily trips per bike per, per day are derived based on the proportion of weighted sample of respondents who said they would cycle daily and be willing to pay a fee. The results are presented in section 2.4.4.5.

**2.4.6 Further adjustments: mid & low range forecasts**

Forecasting the uptake of bike share is very challenging given the dependence on a large range of variables that may support or impede actual bike share uptake. Indeed, as noted in the Sydney Bike Share Case Studies report the Melbourne bike share scheme for example, “suffered from lower than expected usage (Fishman, 2015) with ridership levels five and ten times lower than initially anticipated”. Given the existing cycle infrastructure in Sydney, existence of mandatory helmet laws, and observations of actual usage of analogous cities like Melbourne and Brisbane, even the relatively high utilisation based on the ‘willingness to pay’ may not be reached in Sydney. As such, much more conservative ‘mid’ and ‘low’ range forecasts have also been developed based on the overestimation of forecasts seen in Melbourne. Thus, factors of one fifth and one tenth of the forecast are applied to derive mid and low range utilisation rates in section 2.4.4.5.
There are a number of compounding reasons why the ‘high’ willingness to pay forecast may not be fully reached. These are summarised below.

**Self-reporting** through surveys has been used to inform the utilisation estimate. Although the results were adjusted based on willingness to pay, it is difficult to capture all potential considerations using this method and as such people may over-report intention to use a shared bike system. The reliance on self-reporting may have been associated with the following issues:

- A general ‘reality factor’ was applied to responses to try and correct for the gap between people’s intention to perform a behaviour and their actual behaviour, but this factor is based on a range of behaviour types documented in psychology research and is not specific to bike share.
- The degree to which habits influence travel behaviour is likely undervalued by respondents. Research that suggests travel behaviour, particularly commuting, is largely influenced by habits (e.g. Verplanken and Aarts 1999; Kuhninhof et al. 2006; Thøgersen 2009; Klöckner and Friedrichsmeier 2011).
- Survey respondents may have underestimated the moderating effect of various barriers and obstacles to actual usage.
  - For instance, respondents may have envisaged bikes being available whenever and wherever they had demand for them. Indeed, as shown in Figure 7 when asked about the convenience of bike share 70% of respondents thought it would be ‘very’ or ‘somewhat’ convenient - so an assumption of convenience underlies many responses of intended use. In reality, there may not be bikes and/or docking stations available in all places at all times to meet the full potential demand, especially if a smaller scheme is rolled out than what has been recommended. Thus, although dependent a bit on system design and management, bike share might not be as ‘convenient’ for all trips as people envisaged. This would likely reduce actual use.
  - Similarly, survey respondents first completed the ‘general interest in bike share question’ without yet being exposed to helmet discourse. It is hard to know to what degree they would have already considered the issue and factored it into their responses but a 6%-18% drop-in willingness to use bike share was seen when questions regarding helmets were introduced (unless helmets were freely available with bikes).
  - As noted above there was some disconnect between intention to use bike share and willingness to pay for it: i.e. there were a number of people keen to use bike share but unwilling to pay a likely cost for it
  - It is difficult to ascertain from the survey how much of an impact weather considerations had on responses. However, research suggests seasonal variations have an impact on the usage levels; winter weather was cited as a key barrier to using the Melbourne Bike Share Scheme (refer: Fishman, Sydney bike share feasibility study: case studies report, 2016).

Another factor which could have a moderating effect on actual bike share uptake is provision of **safe cycling facilities (or lack of).** As indicated in Figure 8, 55% of respondents disagreed with the statement that Sydney is a safe place to cycle. As noted in the Operational Recommendations report, high quality, protected cycle lanes are found to be key in encouraging non-regular cyclists to cycle. Sydney currently has 12.5km of separated cycleways and 60km of shared paths. The city is further encouraging growth in cycling uptake by building a 200km bike network which includes dedicated bike paths separating riders from motorised traffic and pedestrians (City of Sydney, 2017). Thus,

---

3 For instance if you ‘zoom in’ on any of the cities on this global bike share tracker ([http://bikes.oobrien.com/global.php](http://bikes.oobrien.com/global.php)), most systems have a number of stations which are ‘full’ (so you cannot park there), ‘nearly full’, ‘empty’ (no bikes available), or ‘nearly empty’.
safety concerns might reduce bike share uptake under current conditions but as the 200km bike network is further developed, concerns about safety may reduce as a barrier to bike share uptake.

Finally, there would likely be some **growth lag** in uptake after introducing bike share. This matter is discussed further in section 2.4.8, but it is worth noting that the pace of this growth lag could affect utilisation numbers at any given time of monitoring.

Some of these factors can be influenced by the design of a bike share system while others cannot.

### 2.4.7 Forecast results

Considering the above bike-share specific moderating factors, this section provides the ‘high’, ‘mid’ and ‘low’ range forecasts for a Sydney Bike Share system. Using the weighted sample of respondents, the high range forecast is based on reported willingness to pay while the mid and low range forecast figures take into account the overestimation factors that took place in Melbourne (which is likely one of the most closely analogous cities for bike share). The forecasts are summarised in Table 3 and indicate that under a high-range scenario Sydney bike share could see 3-4 rides per bike, per day, while the mid and low range forecasts suggest that Sydney could see less than one trip per bike per day. The latter two forecasts assume that the high forecast figure over-estimated at a similar level to the Melbourne scheme. Again, note that these forecasts were generated without full consideration of how demand could be impacted by multiple bike share systems (e.g. the presence of Reddy Go and a public system). The high forecast suggests that there is relatively substantial ‘latent demand’ for bike share.

**Table 3: Total number of trips – willingness to pay forecast, mid and low range forecasts**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Bike share (general)</th>
<th>Free shared helmets</th>
<th>Helmet law change</th>
<th>Helmets sold at local store</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-range forecasts based on willingness to pay</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecast based on willingness to pay</td>
<td>21,727</td>
<td>21,786</td>
<td>20,459</td>
<td>17,845</td>
</tr>
<tr>
<td>Usage per bike per day*</td>
<td>4.06</td>
<td>4.07</td>
<td>3.82</td>
<td>3.33</td>
</tr>
<tr>
<td><strong>Mid-range forecast</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-range initial forecast</td>
<td>4,345</td>
<td>4,357</td>
<td>4,092</td>
<td>3,569</td>
</tr>
<tr>
<td>Usage per bike per day*</td>
<td>0.81</td>
<td>0.81</td>
<td>0.76</td>
<td>0.67</td>
</tr>
<tr>
<td><strong>Low-range forecast</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-range forecast</td>
<td>2,173</td>
<td>2,179</td>
<td>2,046</td>
<td>1,785</td>
</tr>
<tr>
<td>Usage per bike per day*</td>
<td>0.41</td>
<td>0.41</td>
<td>0.38</td>
<td>0.33</td>
</tr>
</tbody>
</table>

*Usage per bike per day is based on phasing recommended in Operational Recommendations report: Phase 1: 3,160 bikes + Phase 2: 2,195 bikes for a total of 5,355.*
It is worth noting that this utilisation metric, ‘trips per bike per day’ is dependent on the number of bikes deployed.

Total daily trips forecast for each bike share scenario and each cycling group was calculated using the scenarios extrapolated as a percentage of Sydney city residents (those living within 15km of the city centre, a population of 1,306,216) using the bike share on any given day as shown in Table 4. While these percentages may seem like particularly high shares given that cycling only comprises about 1% of journeys to work in Sydney (Fishman, Sydney Bike Share Feasibility Study: Operational Recommendations, 2016, p. 17), recall that this is the more centrally-located population of Sydney, which as observed by the Bike Share Propensity Index, have a number of characteristics that make them more likely to use bike share.

Table 4: Percent of Sydney city centre residents (15km radius) using bike share on any given day

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Bike share (general)</th>
<th>Free shared helmets</th>
<th>Helmet law change</th>
<th>Helmets sold at local store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of population (high-range forecast)</td>
<td>1.66%</td>
<td>1.67%</td>
<td>1.57%</td>
<td>1.37%</td>
</tr>
<tr>
<td>Percent of population (mid-range forecast)</td>
<td>0.33%</td>
<td>0.33%</td>
<td>0.31%</td>
<td>0.27%</td>
</tr>
<tr>
<td>Percent of population (low-range forecast)</td>
<td>0.17%</td>
<td>0.17%</td>
<td>0.16%</td>
<td>0.14%</td>
</tr>
</tbody>
</table>

2.4.8 Growth lag

It is important to note that the success of any bike share scheme will depend on the adjustment rate of users with some coming on board early ‘just to try’ and others waiting for the scheme to be more established. Initial take-up figures may fluctuate over time reflecting a more realistic utilisation pattern. The inception of Sydney Cycleways website is a stepping stone in the right direction providing riders/potential riders with information regarding cycle routes, training events, safety references and other resources useful for cyclists and those contemplating uptake.

As indicated in the Case Studies report, the initial years of bike share in Melbourne and Brisbane were associated with particularly low usage. Some of the growth that occurred in subsequent years could be due to tweaking the system to better align the ‘offer’ with market expectation (e.g. eventually providing helmets with bikes, and streamlined, lower cost sign-up in Brisbane’s case). This period of necessary iteration of a system may be associated with a ‘growth lag’; a period of adjustment as a system becomes established.

Another factor and less related to system design itself is the power of habits to influence travel choices as discussed above. Evidence suggests that travel habits are not commonly interrupted, rather a whole body of transport research focuses on the power of rare ‘life events’, (such as moving houses, moving cities, starting university, starting a new job, obtaining a driver’s license, switching schools, retirement, changed personal mobility, workplace relocation and having children) to disrupt travel habits, providing an opportunity for new travel behaviours to become established (Davidov
This illustrates that for many people, just because a new bike share scheme is introduced, they may not stop and re-evaluate their travel options and immediately begin using a new system. Furthermore, research has also shown the importance of a personal recommendation for the uptake of bike share. These elements suggest that consideration of use of a bike share system will happen over time and especially as the population of Sydney changes, thus there may be a ‘growth lag’ associated with uptake.

With this context in mind, it is worth noting that there would likely be some growth lag in achieving the forecast utilisation under any circumstances, but the pace of implementation of bike share supportive factors can positively influence this growth lag. For example:

- Demand responsiveness of the system – monitoring the system and then providing additional bikes or facilities where demand is needed.
- Robust business operation:
  - Functional redistribution strategies to overcome system imbalances caused by ‘tidal-flow’ of bike share trips as identified in Sydney Bike Share Feasibility Study (Fishman, Sydney Bike Share Feasibility Study: Operational Recommendations, 2016, p. 57).
  - Inclusion of e-bikes within the bike share scheme to overcome tidal flows especially in hilly areas and encourage usage during hot and humid summer months in Sydney (Fishman, Sydney Bike Share Feasibility Study: Operational Recommendations, 2016, p. 65).
  - Providing a seamless journey through the integration with other public transport such as integration of booking and payment systems.
- The pace of rollout of the Sydney cycling network discussed above.
- Availability of appropriate docking stations to ensure the recommended density of docking station can be achieved.
- Further evaluation of the impact of the helmet requirement.

There are a number of further recommendations to support bike share uptake, including the operational recommendations summarised at the beginning of this report, and further discussion of recommendations in the remaining sections of this report. The pace of adherence with these recommendations will ultimately have an important impact on overall system usage, and the wider success of making Sydney a great cycling city.

### 2.5 Conclusions from forecasting

Overall, the Opus travel demand forecasting suggests that there is a high latent demand for bike share with approximately 5% (including visitors) of the population within a 15km radius of the city having some interest in using bike share. When coupled with the willingness to pay, this proportion decreases to 1.66%. Including visitor numbers this would equate to a high forecast of approximately 17,845-21,727 trips daily depending on the helmet strategy adopted. However, further consideration of the overestimated factors apparent in the Melbourne bike share scheme resulted in the production of mid and low range forecasts of 3,569-4,345 or 1,785-2,173 trips per day, respectively. It is also acknowledged that there will be a growth lag in utilisation, but adopting recommendations that would support uptake of bike share would help moderate growth lag issues and position Sydney to be more likely to achieve the mid or closer to high range forecasts.
3 Risk Assessment

From the previous two reports and the analysis offered in this report, it is evident that there are a great number of benefits to implementing bike share in Sydney. In summary, some of these include:

- Public health benefits – a more active population and reduced road safety risk for people on bikes (Graves et al., 2014; Fishman & Schepers, 2016)
- Improved transport choices and travel choice coverage, especially to assist with first and last mile issues of the public transport system extending the effective coverage of public transport and reducing public transport coverage gaps.
- Reduced crowding on public transport and associated flow-on effects
- Integration into urban renewal projects
- Reduced private vehicle demand and encouragement of car-lite and car free households
- Travel time savings for some trips using bike over other modes (e.g. walking)
- Enhancing Sydney’s position as a popular destination for tourists by providing a fun and individualised way for visitors to explore the city.
- Increased cycling numbers may encourage a stronger cycling culture in Sydney which would also support the implementation of improvements to cycling infrastructure.

However, as discussed in the Operational Recommendations report, a major risk to Sydney Bike Share is the **lack of utilisation** as has been problematic in Brisbane and Melbourne. Conversely, Sydney has an excellent opportunity to learn from the factors that inhibited widespread success in the cities. Moreover, as Australia’s highest density city, and with the lowest level of car ownership, Sydney has the potential to buck the low usage trend that has plagued the Brisbane and Melbourne systems. Boosting the level of protected bicycle infrastructure would capitalise on Sydney’s strengths. The Operational Recommendations already provided a review of lessons learnt from other cities, considered the Sydney context and then made a number of specific recommendations to mitigate this risk. Table 5 identifies some of the key risks to Sydney Bike Share, but as low utilisation is the primary risk, this key factor is explored in more detail in Table 6 in Section 3.2.
### Table 5: Risks to Sydney bike share and proposed mitigation

<table>
<thead>
<tr>
<th>Risk</th>
<th>Pre-mitigation risk level</th>
<th>Mitigation</th>
<th>Post-mitigation risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of public bike share system alongside retention of recently introduced dockless commercial operators, Reddy Go and oBike, leading to low uptake of public system due to competition</td>
<td>High</td>
<td>Undertake strategic assessment of existing private bike share to consider feasibility of public bike share as either: a supplementary system, potentially integrated into existing systems, or whether it would be preferred/possible to remove private operators and replace with public system. One option that might be worth considering would be a PPP with a dockless bike share provider. The deal would be: 1. Government provide X$ per bike 2. Provider offers a pricing policy/structure developed by government 3. Provider adjusts their hardware to enable their bikes to be locked to a fixed structure (such as bike hoops) 4. Provider adheres to the privacy regulations stipulated by the government. 5. Provider provides bikes that have 8 gears and other hardware improvements (e.g. better brakes) 6. Government installs more hoops. 7. Government and provider have a 50/50 split in revenue. 8. Provider shares all usage data with government.</td>
<td>Dependent on strategy adopted</td>
</tr>
<tr>
<td>Low uptake and utilisation</td>
<td>High</td>
<td>Adopt recommendations offered in the Operational Recommendations report and this report which have been formed on the basis of international and national experience and analysis of the Sydney context. Develop a strong branding and kick off market strategy to encourage early adoption. Prioritise upgrades to the Sydney bicycle network, particularly in terms of physically protected bicycle lanes and paths, including road space reallocation where necessary, in conjunction with lower speed limits in areas in which protected bicycle lanes are not possible. Further review of factors that can encourage utilisation and thus reduce this risk are covered in Table 6.</td>
<td>Medium</td>
</tr>
<tr>
<td>Smaller system is chosen over recommended size, this may not offer ‘network effect’ and be associated with low utilisation</td>
<td>High</td>
<td>Adopt guidance on network deployment</td>
<td>Low</td>
</tr>
<tr>
<td>Risk</td>
<td>Pre-mitigation risk level</td>
<td>Mitigation</td>
<td>Post-mitigation risk</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------</td>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Bike share operators usually have years of experience preparing contracts with City governments and this has sometimes led to the private operator achieving highly favourable contract terms, often resulting in reduced levels of service for potential system users</td>
<td>High</td>
<td>Government should source the necessary expertise to complement their staff’s experience in contract management and transport policy. This will enable the crafting of Request for Quotation (RFQ) documents that build in financial incentives linked to performance.</td>
<td>Low</td>
</tr>
<tr>
<td>Inability to obtain funding to establish and continue operating a bike share programme because bike share is not generally able to meet its costs through revenue generated from user fees</td>
<td>High</td>
<td>Ensure that any business cases for funding make all of the benefits, like public health impacts, of bike share very clear. The Operational Recommendations report provides a comprehensive review of these benefits and will provide useful guidance. Frame bike share as a complementary part of the public transport system which, of course, offers a beneficial public service but requires ongoing subsidy. Look for diversified revenue sources to operate the system as described in the Operational Recommendations report. Target station locations to increase revenue generation (major tourist and recreation sites attract a high proportion of casual riders who pay relatively more in membership fees for short-term access to the system, but are also much more likely to take trips over 45 minutes, thereby incurring usage fees.)</td>
<td>Low (if a long-term funding commitment/strategy is established)</td>
</tr>
<tr>
<td>Some parts of the community may not support bike share establishment due to a variety of concerns such as road safety issues, space requirements, or funding concerns.</td>
<td>Medium</td>
<td>Adoption of the operational recommendations should mitigate some of these issues. It would also be useful to use the period of disruption/construction happening in Sydney right now to set aside areas of land for docking stations if possible. If issues are emerging with the recently launched private bike share systems – could leverage off: have public messaging focus on how introducing a public system can enable better service for potential users and have better control of issues like where bikes are parked, maintenance, etc. The Taverner report did note 83% public support for the establishment of a public bike share system which does bode well.</td>
<td>Medium-Low</td>
</tr>
<tr>
<td>If a helmet waiver is adopted to increase utilisation and then a serious bike share crash occurs involving a</td>
<td>Medium</td>
<td>Undertake thorough and considered analysis of helmet waiver to investigate the overall population health impact of a waiver to current helmet legislation for bike share use, weighing up the costs and benefits. Sydney can also learn from other Australian cities considering bike share currently (Perth,</td>
<td>Low</td>
</tr>
<tr>
<td>Risk</td>
<td>Pre-mitigation risk level</td>
<td>Mitigation</td>
<td>Post-mitigation risk</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------</td>
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</tr>
</tbody>
</table>
| head injury, the program could come under considerable scrutiny | Gold Coast, Canberra and Adelaide) and facing this issue. This presents a unique opportunity to develop a joint study.  
If a waiver is instituted, implement appropriate signage and clear terms and conditions of bike share use/liability issues. Encourage the voluntary use of helmets.  
Prioritise implementation of a safe cycling network and lower speed limits, to decrease risk.  
Adoption of bike share itself may make cycling safer as discussed in the previous reports. | | |
3.1 Dockless bike share operators

The second risk identified in the Risk Assessment table relates to the recent introduction in Sydney of two private dockless bike share operators: Reddy Go and oBike (Figure 9), which could compete with the introduction of a public bike share system. Because these two systems were introduced while this Feasibility study was underway (and in fact late in the programme), a full strategic assessment for integrated bike share development under this new context is beyond the contractual scope of this project. If Sydney opts to rely on these private operators for Sydney’s bike share future, it would be important to understand the potentially adverse issues of such systems surfacing in some international examples including footpath clutter, inferior bike quality and servicing, poor coverage of less profitable geographic areas, and relatively high pricing for users which can be intentionally made unclear. Careful management and regulation of private operators may mitigate some of these potential issues. But again, specific recommendations in this regard are beyond the scope of this study.

![Figure 9: Two dockless oBikes parked in Melbourne (Photo credit: Lorelei Schmitt)](image)

3.2 Factors encouraging/discouraging the success of Sydney bike share

Factors encouraging/discouraging the success of Sydney Bike Share were reviewed through the Operational Recommendations report and are summarised in Table 6 below.

<table>
<thead>
<tr>
<th>Factors supporting/ discouraging bike share success in Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factors supporting success</strong></td>
</tr>
<tr>
<td>✓ Can learn from lessons from Melbourne, Brisbane and elsewhere</td>
</tr>
<tr>
<td>✓ Highest population density in Australia</td>
</tr>
</tbody>
</table>

Table 6: Factors supporting/discouraging bike share success in Sydney
<table>
<thead>
<tr>
<th>Factors supporting success</th>
<th>Factors discouraging success</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Lowest car ownership</td>
<td>- Mandatory helmet laws have been shown to decrease usage and can be a barrier to uptake</td>
</tr>
<tr>
<td>✓ High levels of public transport and car share use</td>
<td>- Hostile environment for cycling, due to an immature bicycle infrastructure network and driver culture that has to some degree normalised antagonistic attitudes to people riding bicycles. However, note that the Taverner Research (2007) study did not perceive issues with infrastructure to be great enough to prevent development of a system</td>
</tr>
<tr>
<td>✓ Short trip distances</td>
<td>- Greater Sydney currently has the lowest proportion of people riding to work of any Australian capital city.</td>
</tr>
<tr>
<td>✓ Sydney has the most challenging and difficult environment in which to drive a car (congestion and parking difficulties/costs) in Australia</td>
<td>- System very likely to require ongoing subsidy</td>
</tr>
<tr>
<td>✓ Government support: all three levels of Australian government have strategic objectives that include an ambition to grow the number of people cycling in inner Sydney</td>
<td>- Greater levels of enforcement of road rules relating to cycling and surge in infringements in NSW may put some people off cycling</td>
</tr>
<tr>
<td>✓ Bike share propensity index provides guidance to balance cost and utility through a two-phased implementation plan</td>
<td>- Is indicated in both the present study and the previous Taverner Research (2007), bike share may not result in much reduced private vehicle demand with many users being recreational or tourists. This may reduce the business case of implementing a system. However, Melbourne and Brisbane did observe that approximately 20% of trips replaces car use. Sydney has somewhat lower levels of base car use which may reduce the impact of mode shift, but it is still likely that 10-15% of bike share trips would replace car use</td>
</tr>
<tr>
<td>✓ Provides alternative mode and addresses first/last mile challenges and this is particularly relevant to Sydney, which, for geographic and other reasons, contains a number of significant gaps in public transport accessibility. Bike share can increase the catchment of the public transport network</td>
<td>✓ Road safety benefits</td>
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<td>✓ Electric bike share likely to increase utilisation if adopted</td>
<td>✓ Process of identifying and managing risks has been undertaken and should support successful deployment should bike share be adopted</td>
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<tr>
<td>✓ Can use advanced technology to improve functionality, increase efficiencies, and improve customer experience: like GPS, Near Field Communication (allowing smartphone ‘tap’ to release bikes) and integration with OPAL</td>
<td>✓ Government support: all three levels of Australian government have strategic objectives that include an ambition to grow the number of people cycling in inner Sydney</td>
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<tr>
<td>✓ Process of identifying and managing risks has been undertaken and should support successful deployment should bike share be adopted</td>
<td>✓ Bike share propensity index provides guidance to balance cost and utility through a two-phased implementation plan</td>
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</table>

- Hostile environment for cycling, due to an immature bicycle infrastructure network and driver culture that has to some degree normalised antagonistic attitudes to people riding bicycles. However, note that the Taverner Research (2007) study did not perceive issues with infrastructure to be great enough to prevent development of a system

- Greater Sydney currently has the lowest proportion of people riding to work of any Australian capital city.

- System very likely to require ongoing subsidy

- Greater levels of enforcement of road rules relating to cycling and surge in infringements in NSW may put some people off cycling

- Is indicated in both the present study and the previous Taverner Research (2007), bike share may not result in much reduced private vehicle demand with many users being recreational or tourists. This may reduce the business case of implementing a system. However, Melbourne and Brisbane did observe that approximately 20% of trips replaces car use. Sydney has somewhat lower levels of base car use which may reduce the impact of mode shift, but it is still likely that 10-15% of bike share trips would replace car use
4 Conclusions

The following conclusions and recommendations are made on the basis of the previous investigations, notably the two reports; *Case Studies* and *Operational Recommendations*, plus the demand forecasting contained herein. These recommendations assume that a potential system would adopt the vast majority of the guidance provided in the *Operational Recommendations* report as this guidance was developed with insights from lessons learned in Australia and overseas combined with consideration for Sydney’s context. The recent introduction of the dockless bike share operators has also been considered.

Sydney has longstanding transport challenges related to high levels of car use (congestion, pollution, costs etc.) and these challenges are projected to intensify into the future. Bike share offers an opportunity to address these challenges by diversifying the mix of transport options, especially for the 4.5 million car trips that take place in Sydney on a typical weekday that are under 4km (NSW Government, 2012, Figure 4.44, p.122) in a beneficial way. Currently cycling only makes up a small portion of mode share in Sydney but with its relatively mild climate, short distance, single occupant trips in the inner city, population density and other factors, plus growing interest in cycling worldwide, there is certainly potential to increase cycling though bike share. In addition, bike share provides visitors and locals with a unique recreational option for experiencing Sydney. Moreover, the forecasted continued intensification of Sydney will support the success of bike share, which in turn will reduce pressure on the road and rail system.

Like all new infrastructure projects, there are challenges to be addressed and risks to the success of the scheme. Sydney is however in the fortunate position to be able to learn from past experiences of other cities in Australia and abroad. A key risk to the success of a Sydney Bike Share is lack of utilisation, particularly if a public bike share system were introduced while the recently-introduced two dockless bike share systems were retained.

This risk of low utilisation has been considered very carefully and prior to the introduction of the two private dockless systems, a number of *Operational Recommendations* were made to ensure that the planning and design of a new bike share program will create a system that maximises the likelihood of success. This included careful consideration of helmet issues and other operational issues, such as rebalancing and contract development that incentivises the operator to maximise usability. In addition, a major upgrade to the Sydney bicycle network has been recommended to provide further support for cycling, particularly in terms of physically protected bicycle lanes and paths, in conjunction with lower speed limits in areas in which protected bicycle lanes are not possible. This approach has proven successful in cities such as New York City, London, Paris and Barcelona, none of which had a strong culture of cycling prior to the introduction of infrastructure improvements and bike share. If bike share is introduced as part of a package of measures, it is likely to act as a catalyst for Sydney’s efforts to become a bicycle friendly city. Given that the *Operational Recommendations* report was developed and issued prior to the introduction of the two private dockless bike share schemes any progression of a public bike share scheme would need to carefully consider the optimal way forward in this new operating environment.

The present report’s market-research informed demand forecasting indicated there is great latent demand for bike share. The initial forecasts, even with a general ‘reality factor’ applied and

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4 As noted in the *Operational Recommendations* report traffic congestion in Sydney is estimated to cost $5 billion per year (2013 figures), and predicted to increase to around $8 billion in the next four years (Transport for NSW, 2013).
adjustments for reported willingness to pay showed great support and interest in bike share. However, given the experience of much lower than predicted uptake of bike share in the comparable cities of Melbourne and Brisbane, and consideration of bike share specific moderating factors, some more conservative mid and low range forecasts are also offered. The actual uptake and utilisation of a scheme would, of course, be largely dependent on the design of the system itself, supporting infrastructure and management. In particular, as was evident in the forecasts, the approach to helmets would have a strong impact on uptake, with much higher utilisation forecasts associated with free provision of helmets with bikes (and a complementary program to ensure ongoing sanitisation and maintenance) or a waiver to the mandatory helmet law for bike share. The *Case Studies* report reaffirms the impact of mandatory helmet legislation which reduced bike share usage in the Melbourne Brisbane schemes.

It was interesting that a large number of respondents reported interest in using bike share but then expressed little willingness to pay. This may have had some to do with the survey recruitment method: those willing to fill in surveys for vouchers may have lower income and thus be more price sensitive. That said, the finding does suggest some strong latent demand, so it may be worth further investigating the role price would play in affecting uptake given low usage is the biggest risk factor. This is based on the assertion that each kilometre cycled has a value and that the additional kilometres cycled could potentially outweigh the cost of providing a free system. Given that bike share has the potential to help expand the effective coverage of public transport, some consideration could be made to integrating fares in with public transport (e.g. if one has already paid for 2 hours of public transport with their Opal card, they would be entitled to use public bike share during the 2-hour period at no additional charge).

As noted above, the demand forecasts contained in this report did not account for the simultaneous presence of multiple bike share systems as the private dockless systems (Reddy Go and oBike) were only recently introduced. The potential effect of multiple systems on utilisation of a public bike share system is yet to be fully appreciated. Moreover, the efficacy of these private dockless systems to satisfactorily fulfil bike share demand and meet Sydney’s strategic bike share objectives is yet to be determined. Given this current context, the present study recommends that implementation of a public bike share scheme be put on hold until the impacts of the dockless schemes are evident. If there is interest in progressing a public bike share system in the future, the present report will provide useful data, analysis and conclusions to guide the development of a public system. In the meantime, monitoring the successes and challenges associated with the private dockless systems should be undertaken to evaluate whether the private systems are meeting the strategic bike share needs of the city and to inform the potential development of a public system. Thus, it is also recommended that the Sydney councils closely monitor the private dockless systems by gathering as much data and information about the private dockless systems as possible, such as where bikes are being used, pricing options selected, a database of public feedback on the bikes etc. This may involve negotiating with the private operators to require the regular provision of their data (in a usable format) as a condition of their continued operation in Sydney (as they are using public infrastructure for commercial gain).

It is also recommended that a future review of bike share in Sydney be undertaken (in, say, 18 months) to evaluate whether the private systems are meeting the city’s strategic bike share needs or whether some form of a public system should be introduced, and the appropriate strategy for doing so. This review will help to ascertain an appropriate forward strategy for bike share in Sydney on the basis of the outcomes of the private dockless systems. Establishing an effective strategy for addressing any issues presented by the private bike share
operators would need to be a central part of the progression of any public bike share system. In the longer term, there are a variety of forms that bike share in Sydney could take. It could be that private dockless systems are retained as the sole bike share provider, that private bike share systems are banned from using public infrastructure and a public dockless system is introduced, or that a public system absorbs the private systems in some form (possibly through a public-private partnership). Again, determining the appropriate forward strategy will require some time and analysis of the performance of the current private bike share systems’ performance along with the emerging trends in bike share internationally.

In the event that a public bike share scheme is eventually progressed, measures need to be employed to encourage high uptake. The Operational Recommendations included a number of measures to support higher uptake, including for example, integration with public transport physically and in terms of payment. Proactive and forward-heavy marketing will be fundamental to the successful launch of a public bike share system in Sydney. One way to maximise the visibility and utilisation of bike share is by creating innovative marketing initiatives that are deployable at, and even before system launch. This is because ‘seeing someone’ riding a bike share bike is the most powerful marketing activity prompting increased usage. Incentivising early uptake is key. Targeting market segments with a higher propensity to use bike share as described in other sections of this report is essential. Moreover, the system should be designed to increase use by those who would have otherwise taken a short car trip. For this to occur, marketing will also need to target car drivers, as well as increasing the value proposition of bike share relative to car use. An example of such an approach would be a complementary policy of an increase in the cost and decrease in supply of inner city car parking. Whilst recognising the potential divisiveness of this issue, it is clear that the most successful bike share cities are all in places where car use is expensive and inconvenient (Fishman, 2015). Moreover, the present study found high levels of interest partnered with relatively low willingness to pay to use bike share, thus pricing needs to be looked at very carefully.

In summary, compared to other Australian cities, Sydney does have some attributes that would be particularly conducive to supporting bike share. There are a number of strategic benefits to implementing bike share. There are also several measures that can be put in place to manage low utilisation or other risks. However, the recent emergence of two private bike share operators has introduced a substantial risk to the potential utilisation of a public system if introduced while retaining the private dockless systems. Thus, overall it is recommended that:

- a public bike share system for Sydney be put on hold for the time being
- that close monitoring and documentation of the successes, challenges and trends of the private dockless systems take place
- And that a future review of bike share in Sydney take place, (in say 18 months) to evaluate whether the private systems are meeting the city’s strategic needs or whether some form a public system should be introduced.

If the introduction of a public system or public-private partnering system is deemed preferable, the guidance provided from the three phases of this Sydney Bike Share Feasibility study, along with lessons learnt from the dockless systems, will inform the development of an appropriate solution for Sydney.
5 References


Appendix 1: Bike Share Propensity Index and Phasing Catchments (from Operational Recommendations Report)
Bike Share Propensity Index and Phase Two Catchment

Phase 2
Bike Share Propensity Index
Coefficient of Multi-Criteria Analysis

- 0.2 - 0.35
- 0.35 - 0.5
- 0.5 - 0.7
- 0.71 - 0.8
- 0.81 - 0.9
- 0.91 - 1.0

Source: ABS Census, 2011

Docking Station with Catchment

Catchment radius of 1.96 km around 409 stations for 2016. Bicycle covers an area of 56.5 km².

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### Appendix 2: Analysis of the Taverner Report

#### Table 7: Taverner report findings of potential relevance

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<thead>
<tr>
<th>Finding</th>
<th>Analysis – demand implications</th>
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<tr>
<td>“43% of respondents initially categorised themselves as not owning a bicycle and not interested in cycling, however one third of this group expressed some interest in using a bicycle hire system”</td>
<td>This finding indicates that bike share has the potential to attract less experienced cyclists – but this also suggests potentially increased sensitivity to barriers or obstacles to bike share. Not owning a bicycle might encourage bike share uptake too, as who those already have bikes might not be inclined to pay to use a bike share when they already have a bike (free option)</td>
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<td>“Only 4% of respondents who work in the City of Sydney ride a bike to work and only 1% of visitors usually ride a bike when they visit Sydney.”</td>
<td>The 4% cycling mode share is a higher share than for the wider city (1%), indicating a higher propensity to cycle closer to the CBD (which bodes well for a relatively centrally-located bike share system). In terms of “only” 1% of visitors riding a bike when they visit Sydney might seem small, this actually equates to a lot of people: 2016/2017 saw 9.4 million domestic overnight visitors and 3.7 million international overnight visitors with numbers forecasted to continue growing (Destination NSW, 2017). This would equate to 131,000 visitors riding bikes over the course of the year under the status quo. It seems likely that the introduction of a highly visible and potentially easy-to-hire-a-bike scheme, partnered with increasing numbers of protected cycle lanes could be associated with much higher visitor cycling numbers.</td>
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<td>There is overall support for a public bicycle hire system with 83% of respondents saying it is a great (37%) or good idea (46%).</td>
<td>Overall support for the establishment of a bike share system does not imply actual usage of a system but does bode well for having public support in establishing a system. It also suggests that some people might be attracted to the novelty of a bike share system.</td>
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<td>Half of respondents expressed personal interest in using a bicycle hire system. One in three people (32%) said they would use a public bicycle hire system if hire stations were conveniently located for their travel. A further 20% of people said they might use the bicycle hire system.</td>
<td>50% of respondents reporting interest in using bike share is very high given that only 1% of Sydney-siders currently cycle as a commute mode. There may have been some self-selection bias in who responded to the Taverner Survey and there is a disconnect between what people report intending to do and what they actually do (discussed further in this report), but this high rate of interest does indicate substantial latent demand for bike share.</td>
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<td>Aside from respondents owning a bike, the main deterrents to using the bicycle hire systems are the lack of safe cycleways in Sydney (21%) and perceived dangers of cycling (16%).</td>
<td>The City of Sydney is currently developing a 200km cycling network which has the potential to strongly mitigate these safety concerns as a barrier to bike share uptake.</td>
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<td>The introduction of a cycling network would aid the success of the bicycle hire system with two-thirds of people (66%) who expressed interest in cycling saying improved cycling facilities would definitely increase the likelihood they would use it</td>
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<td>Three-quarters of potential bicycle hire system users say they would hire bikes for physical fitness and leisure (77%) and visiting parks and cycleways (76%). Over half of potential users who work in Sydney say they would use the bicycle hire system for getting to and from work.</td>
<td>These findings indicate that demand for bike share in Sydney is higher for recreational purposes than as a commuting mode. Existing research suggests that bike share in other cities is often used for both commuting and recreational purposes. For instance, a member survey from Washington DC’s Capital Bike share found 58% of respondents use bike share to go to/from work but also 70% of respondents reported that they at least occasionally use bike share for social/entertainment and errand/personal appointments</td>
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<td>70% of potential users say they are much more likely to use the bicycle hire system if it were free. However, people who only said they might use the bicycle hire system were more likely to say offering the bicycle hire for free would make no difference in their decision than people who said they would definitely use the system, indicating cost is not the main barrier for use of the bicycle hire system.</td>
<td>These results indicate a price sensitivity especially for those with a strong interest in using the system. That said, based on research in bike share cities, cost is not the primary driver of usage, but cost should be price competitive with all modes of motorised transport. In general, the cost of bike share (under an annual membership) is usually less than 50 cents per day. Brisbane’s CityCycle experienced an uptick in usage when their pricing was lowered.</td>
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<td>“While over half of respondents say they would or might use the bicycle hire system, the main uses would be for recreation and fitness. Therefore, many trips would be in addition to driving or using public transport and not reducing the use of other transport modes.”</td>
<td>While the high share of interest in using bike share for recreation/fitness (at least in 2007) may not reduce private vehicle and public transport demand substantially, at least directly, even use for recreation may encourage a stronger ‘cycling culture’ in Sydney and have flow-on effects with an increasing presence of cycling in Sydney. On the other hand, in Brisbane and Melbourne, around 20% of trips undertaken by annual members replace a car trip.</td>
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