Extended Essay

SUBJECT: Geography

RESEARCH QUESTION:

To what extent does the B-Line bus route impact the social and economic wellbeing of the population of Sydney's Northern Beaches while also maintaining environmental sustainability?

Word Count: 3985

Table of Contents

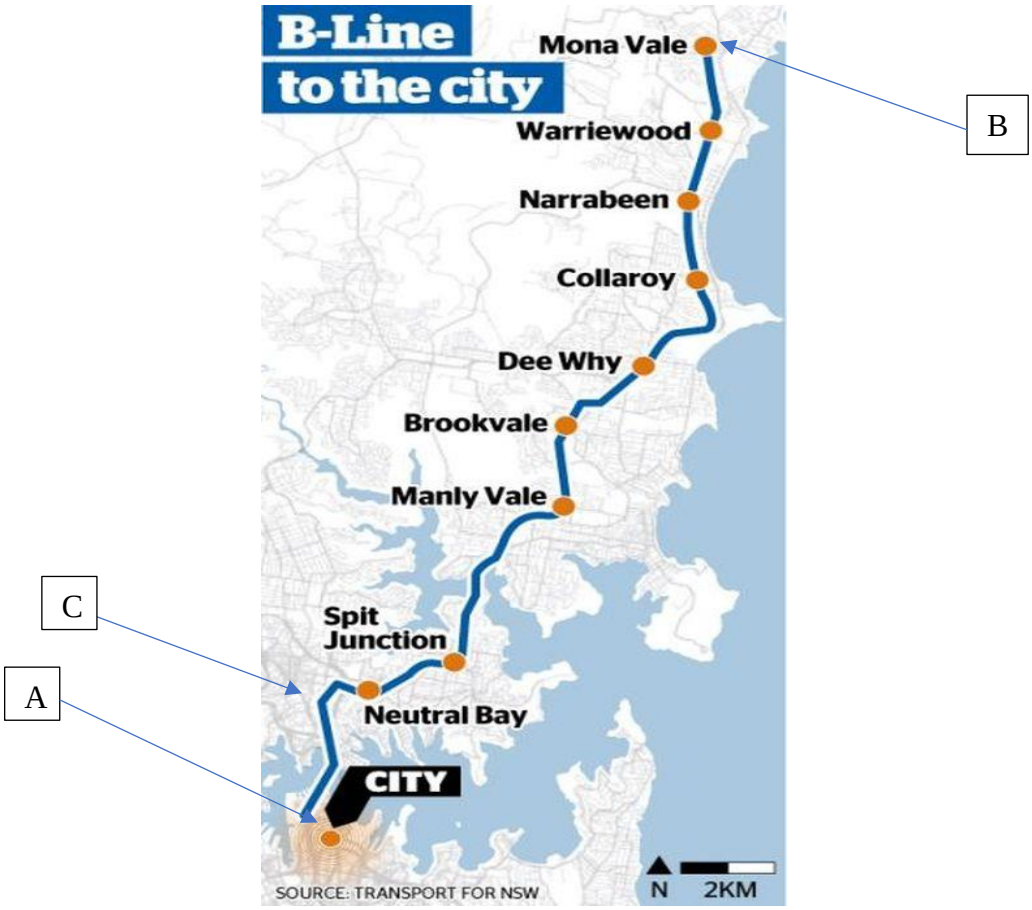
1 INTRODUCTION

In our urban culture, the balance between socio-economic growth and environmental sustainability is becoming ever more precarious. Implementations enacted and fuelled by government and business investment must be rigorously monitored and managed in a way that ensures this crucial balance is kept. In 2017, the Australian Government completed the B-Line bus program, a transport link from the Sydney CBD to the Northern Beaches. NSW transport details the program as an "integrated package of service and infrastructure improvements designed to provide more reliable journeys between Mona Vale and the CBD" (Transport NSW, 2016) In this report, the social, economic and environmental impacts of this project will be investigated, and as well as its effects on a variety of stakeholders, particularly those north of Mona Vale. Perspectives will be understood through a comprehensive online questionnaire, bringing to light various issues of social wellbeing, Survey data will be analysed and individual responses quoted and discussed in order to explore all stakeholders' perspectives on the program. On the other hand, secondary data and research will form the brunt of both economic and environmental analysis due to the difficulty associated with recording primary data during the Covid-19 epidemic. Given the emphasis the government places upon ensuring that this balance of meeting current needs without compromising the demands of future generations is met, the B-Line route is a critical representation of their ideals and capability to manage sustainability at a local level.

1.1 BACKGROUND

Sydney's Northern Beaches is a large metropolitan area comprising of over 250,000 people (Censusdata, 2016). With over 33,000 workers (Turner, 2016) commuting daily to North Sydney (C) or Sydney CBD, an efficient transport system is crucial to ensure accessibility to these locations and increasing the effective job market. Implemented in November 2017, the B-Line program aims to achieve this. The service runs between the Sydney CBD (A) and Mona Vale (B) on the Northern Beaches. Buses are available every 5 minutes at peak time, and every 10 minutes at other times, running from 04:30 to 00:30, 7 days a week (Transport NSW, 2018).

Figure 1 – *Route Map* (Visentin, 2017)



In outlining the program initiatives, Transport NSW cites three different areas: business, community, and sustainability (Transport NSW, 2016). While the overarching goal of the program is to “deliver improved connections” (Transport NSW, 2016) from the Northern Beaches to the CBD, a desire to “support businesses who may be impacted” and “positively contribute to…local area[s]” (Transport NSW, 2016), is also communicated. Given the multifaceted nature of these initiatives, the candidate will investigate the extent to which the three pillars of sustainability: social, environmental, and economic, have been met by the project.

2 SOCIAL IMPACTS

Social sustainability can be defined as “maintaining access to basic resources without compromising the quality of life” (Chokshi, 2017). This section of the report will investigate the extent to which the B-Line caters for all stakeholders, and in particular, addresses social problems that may have arisen as a result of development.

The author has used several indicators to measure the project’s social sustainability: quality of life in relation to travel time, access to resources, and community identity. These indicators were chosen as they were the issues most vocalised by affected residents, and are major components of social wellbeing.

2.1 QUALITY OF LIFE

Quality of life has several determinants. One key aspect is free time. A primary goal of the program was to reduce travel time for commuters, and in this section the author will investigate the outcome of the initiative.

Figure 2 – *Previous Mode of Transport* (Author, 2020)

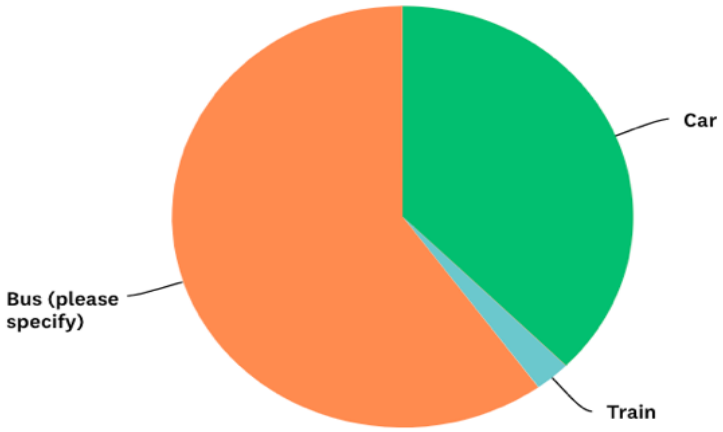
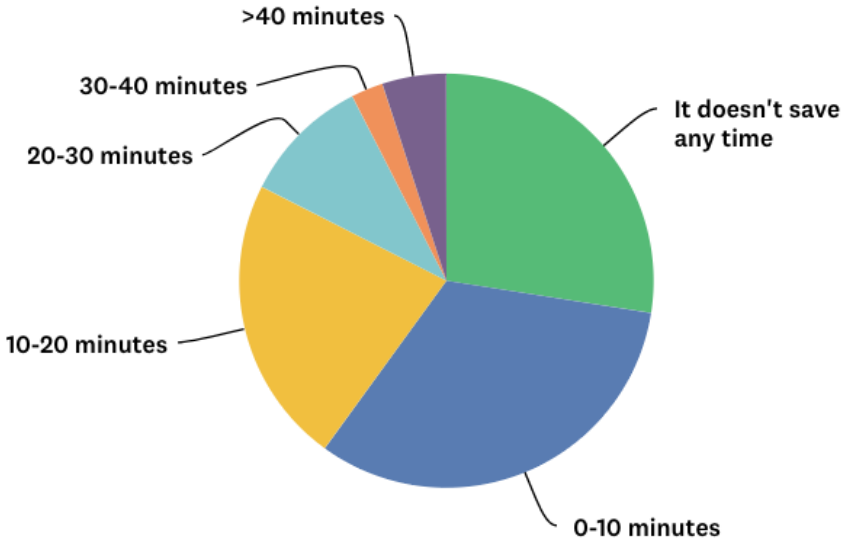
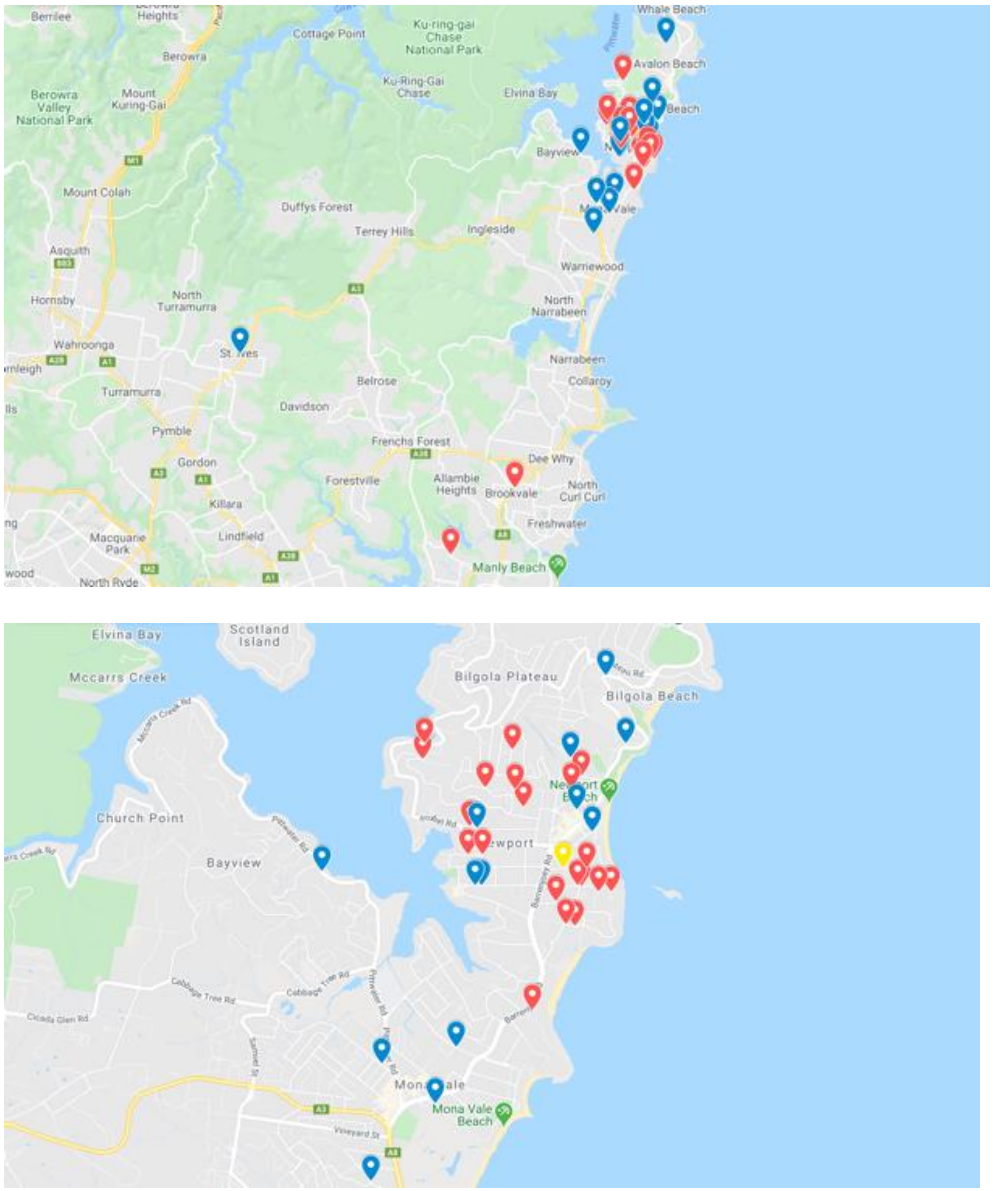


Figure 3 – *Travel Time Saved* (Author, 2020)



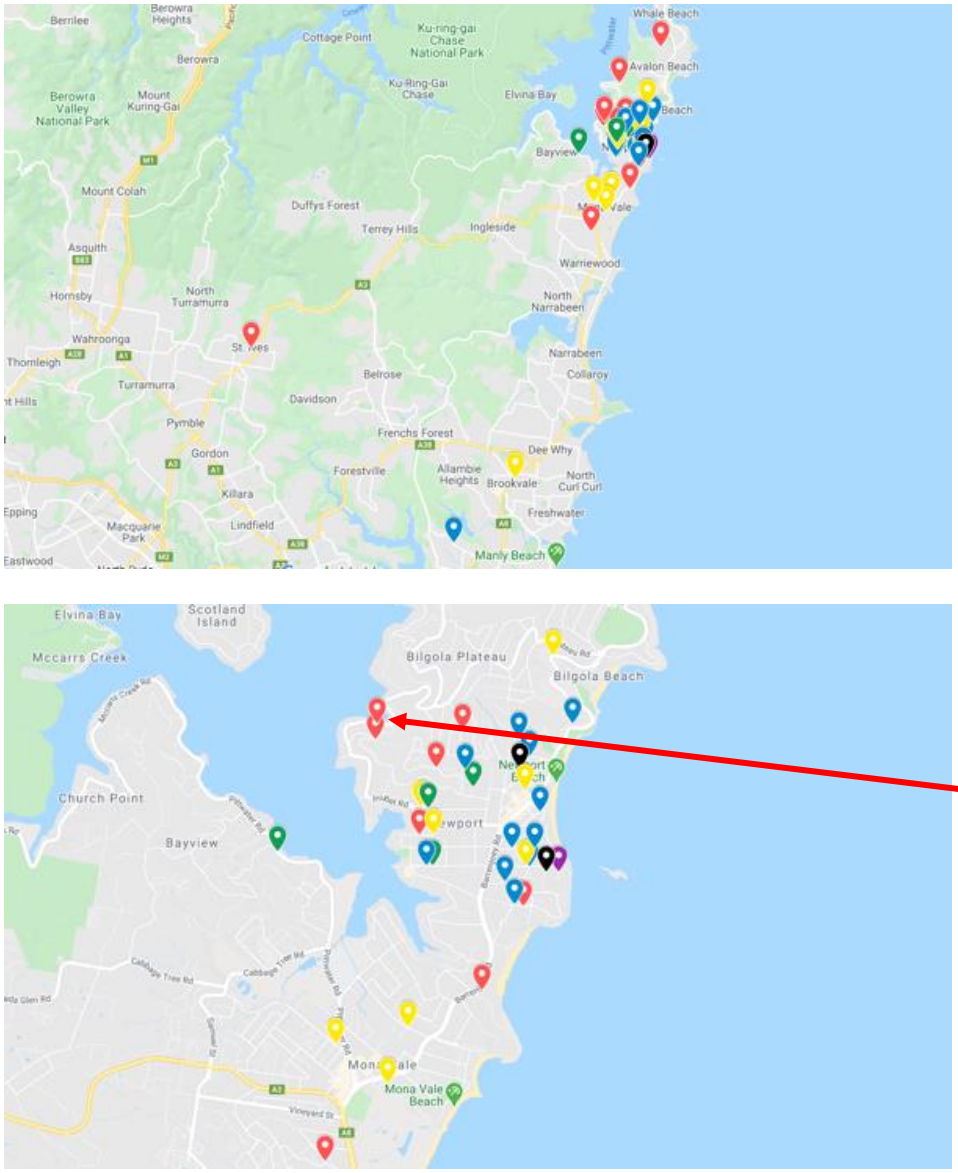
The B-Line program promised to save commuters across the Northern Beaches a great deal of time (Transport NSW, 2016). Although the program's implementation saw a number of previous services discontinued, the government hoped to offset this loss with the new route. Overall, this was successful, with Figure 3 demonstrating the time saved to be an average of approximately 11 minutes.

Figure 4 (a, b) – *Mapping transport modes* (Google Maps, 2020)



Key
Bus - 24
Car - 15
Train - 1

Figure 5 (a, b) – *Mapping change in travel time saved* (Google Maps, 2020)



Key
<0 mins - 11
0-10 mins - 13
10-20 mins - 9
20-30 mins - 4
30-40 mins - 1
>40 mins - 2

The implementation of the B-Line sees these two respondents' travel times increase

The questionnaire showed that B-Line passengers formerly used a variety of different transport modes. Individuals who formerly used cars saved an average of approximately 12 minutes. This is significant, not only for the fact that there are consequently less vehicles on the road, but also for the large increase in free time. This enables these commuters to have nearly two hours of extra productive time each day. As one respondent stated, "As someone

whom (sic) drove to the city for 20 years the B-Line has been a complete game changer for me" (respondent 18, 2020).

Similarly, people who formerly used buses also saw decreased travel time, as they saved 10 minutes on average. There were several significant outliers, with two individuals who formerly caught buses saving more than 40 minutes, and another saving 30-40 minutes. This shows that the B-Line has helped some people very significantly, this being somewhat surprising in that the B-Line's main function is to improve point-to-point travel time between two major urban centres. With this considered, it is interesting that these individuals were able to save such great amounts of time by catching this general service, given it does not offer extra services in these specific locations.

Although the B-Line program saw 4,200 new journeys weekly (Transport NSW, 2018), its implementation also involved the discontinuation or modification of many previous services (see Figure 6). While this was necessary for both economic and environmental reasons, it resulted in increased travel time for some users, particularly for bus-goers, one-third of whom were affected by extended journey times. An example of such situation is seen in Figure 5b, where an annotation shows two respondents in a more remote location. The program has likely seen their local bus discontinued, forcing them to spend extra time connecting to the B-Line route.

Services have been added to minimise this impact, but on the whole they are more inaccessible to residents in now-isolated locations and less frequent. For example, one survey respondent complained it "took longer having to drive to a major [B-Line] bus stop rather than my local stop for the E87". The E87 (CBD to Newport) route was discontinued in 2017,

and with no suitable alternative, not only was this individual's commute lengthened, but their car use now compounds traffic congestion and pollution which the government set out to prevent.

For all except 2 of the 24 respondents, the buses caught were the L90 (CBD to Palm Beach) and E88 (CBD to North Avalon).

Figure 6 – *E87, E88, L90 Routes – Termination Destination* (Google Maps, 2020)

The L90 was "reduced to a 60 minute frequency during weekday off-peaks and weekends" (B-Line, 2017) and the E88 route was modified such that the bus only stops at one stop between Narrabeen (see Figure 6) and the City (Transport NSW, 2017). As a result, commuters living in areas which are now not catered for are forced to connect with infrequent, remote services in order to catch the B-Line.

In an attempt to mitigate this issue, the government has implemented an on-demand service designed to provide access to and from remote Northern Beaches areas. Keoride is a low-cost, rideshare system, labelled as a "public transport service that will pick you up and take

you directly to the closest Northern Beaches B-Line transport hub" (Keoride, 2020). The service has proved valuable for residents' connections, especially in areas where previous routes have been discontinued. As one respondent states, "as it was impractical to have the B-Line go past Mona Vale, this Keoride introduction helped overcome a number of commuter deficiencies" (respondent 15, 2020). However, while the service brings many benefits, several disadvantages undermine the viability of the resource, including only being able to book in 30 minute intervals, and the service not being integrated with the local transport currency system.

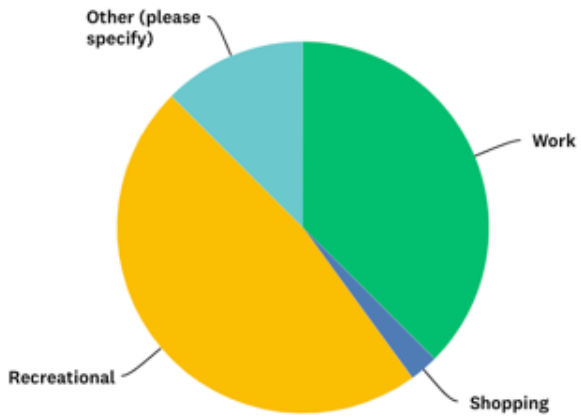
Figure 7 – *Keoride Vehicle* (Bennett, 2019)

On the whole, it is clear the program has decreased travel time. Whether individuals spend this time exercising, reading, or working (contribution to economic growth is discussed later), the social benefits are tremendous. However, many now-isolated residents are faced with great increases in travel time, and although this issue has been somewhat mitigated with the introduction of Keoride, there still exist cases in which individuals are severely worse-off than prior to the B-Line's implementation.

2.2 ACCESS TO RESOURCES

Above all, the B-Line provides fast, direct, frequent services between the Northern Beaches and Sydney CBD. As such, it would be expected for a majority of passengers to use the service for work purposes. Indeed, this was the government's intention in implementing this project. However, survey data shows that this is the case for just a third of passengers, while nearly half of respondents use the B-Line recreationally. As such, it is clear that the program has also attracted other stakeholders.

Figure 8 – *Purpose for using B-Line* (Author, 2020)



In this way, the B-Line provides not only a means for work-related travel, but its high frequency and speed also provides a means for Northern Beaches residents to easily gain access to other resources such as shopping hubs, parks, and beaches. However, as one respondent states: "Local bus services have been reduced and replaced with B-line buses. Whilst the B-Line may be beneficial if travelling to Sydney CBD, the loss of local bus services means…travel further to bus stops" (respondent 34, 2020). For those living in close proximity to bus stops), they can now do so more easily with the increased frequency. However, the discontinuation of local services means more isolated individuals face increased adversity in their obtaining of resources.

2.3 COMMUNITY IDENTITY

Especially in the smaller, more tight-knit suburbs found in the Northern Beaches, a sense of community identity is a valuable concept. Prior to the B-Line's implementation, there was heavy protesting from many community and resident groups. Among other reasons, one key claim was that the project would detract from the local identity that had been forged.

The author found there to be a general consensus among survey respondents that the B-Line should not be extended northwards to Newport from Mona Vale. As one individual stated, "I was very pleased it did not extend to Newport as I feel it would have had a detrimental effect on ambience, shops and quality of life" (respondent 23, 2020). In fact, 1 in 5 respondents voiced their concerns for any plan to extend the route northwards, citing "safety and environmental" issues.

2.4 CONCLUSION

Among survey respondents there exists a consensus that extending the B-Line route northwards would degrade the community identity and social ambience of, and cause pedestrian safety hazards in the small villages of Avalon, Palm Beach, and Newport in particular. With the discontinuation of several local feeder buses, many residents' travel times have been lengthened considerably, and their ability to access resources lessened significantly. It seems that one solution to this complex issue is the provision of a number of local services to provide the necessary connection between remote areas, particularly those north of Mona Vale, and the major B-Line bus hubs. However, as with all implementations, this would come at a cost, and economic wellbeing is a key issue, as explored below.

3 ECONOMIC IMPACTS

Economic sustainability is somewhat of a different concept to environmental and social sustainability. It centres around supporting economic growth without detrimentally impacting other stakeholders in the community. In this way, its implications for the B-Line involve the government ensuring that the program not only results in revenue for itself, but also an increase in local business growth, as well as not impinging upon the economic wellbeing of residents.

The project was initially set to cost around $300 million, but its "cost has since risen to almost $600 million" (Saulwick, 2016). This extraordinary price tag not only begs the question of economic sustainability, but also whether the program and what it delivers is worth that amount of money, especially considering funds could have been injected into other programs.

3.1 CONNECTIVITY

Improved connectivity between the CBD and major Northern Beaches hubs has several beneficial implications for overall economic growth. With faster travel times on the whole, workers are able to reduce time spent in active transit, freeing up time for work or relaxation, both of which increase productivity. Many studies show a positive correlation between free time and yield, citing that "leisure has a compensatory effect on work and can positively influence labour productivity in terms of per capita per hour GDP" (Cui, Cui, Nijkamp, Wei, Wu, 2019).

Also, businesses located in the CBD benefit through the activation of new supply routes, as well as in general economic growth. Through the provision of more efficient and faster transport, more workers are encouraged to find work in the area of the CBD. Given the myriad and strength of economic opportunities in this major urban centre, an influx of workers will prove very beneficial to overall growth. In this way, the route's provision of decreased travel time allows for an increase in the effective job market, meaning more Northern Beaches residents are now able to viably secure jobs in the CBD, as their travel time is sufficiently improved.

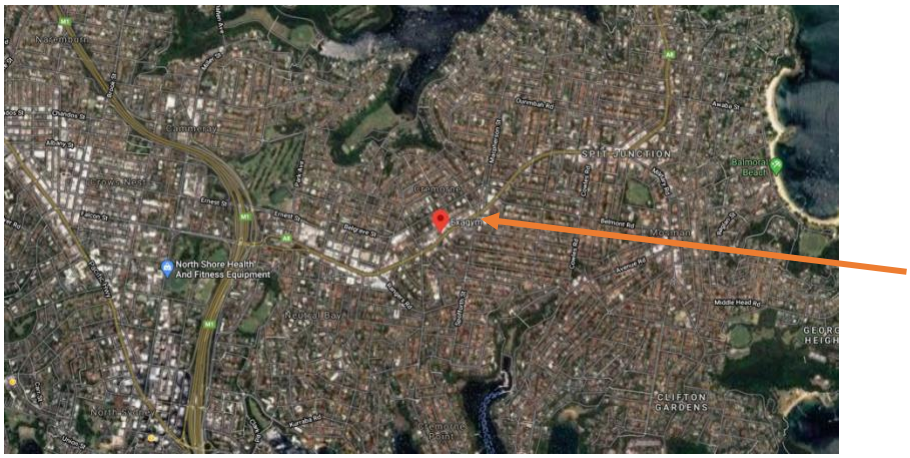
3.2 LOCAL BUSINESSES

The second issue of economic concern is the effect of the route, and of the route's infrastructure, upon local businesses. In order to reduce travel time, there has been major construction along the route, including road expansion and widening, bus stops, and car parks.

3.2.1 ROAD EXPANSION AND WIDENING

This process has had a significant impact on many businesses who relied upon previous lanes for access to their establishments. One such case is with fitness company 'Exagym', where the introduction of a tidal flow system to "provide the greatest benefit to bus travel times and reliability" (McCullagh, 2018) has resulted in the loss of parking which provided direct access to Exagym and multiple other businesses.

Figure 9 – *Location of Exagym* (Google Maps, 2020)



As seen in Figure 9, Exagym is located on Military Road near the Spit Junction, which has carried an average of over 46,000 vehicles daily since the beginning of 2020 (RMS, 2020). The congestion associated with the route (see Figure 10) is only exacerbated by roadworks and bus lanes. Environmental impacts stemming from this are discussed below, but in economic terms, as many commuters see increased travel times, overall economic growth falls in the same manner discussed previously.

Figure 10 – *Military Rd Traffic* (Tang, 2016)

Although the government is attempting to mitigate the issue through provision of other parking zones, these are, as Chris Quinn, Exagym Owner, said, “not ideal” (McCullagh, 2018). The loss of revenue that these businesses will experience as customers find it harder to access the service is not being alleviated by authorities, resulting in a severe loss of local economic growth, given customers may choose businesses in other suburbs without these issues.

3.2.2 BUS STOPS

While the operation of the route disadvantages some businesses along it, its bus stops bring significant benefit to many outlets. With “5.9 million passenger trips” in 2017-18 (Transport NSW, 2018), there is the potential for huge growth in revenue provided businesses are suited to the change.

For example, while a carpet shop may not benefit from the influx of consumers given carpets are a specific, expensive good, cafes and restaurants are likely to thrive where bus stops are implemented. With “23% of all coffees [being] takeaways” (Purebean, 2019) in Australia, the

influx of passengers who have minute time to spare in their commute, and who typically travel in the early morning where coffee is most popular, are very likely to purchase goods from cafes in close proximity to stops. Thus, adapting to these new changes by implementing more ‘take-away’ products could prove widely beneficial for businesses near major stops. Furthermore, Transport NSW has also undertaken an advertising campaign to promote them, with several “video campaigns” developed to “support businesses who may be impacted” (Transport NSW, 2016), further mitigating any negative effects stemming from construction.

3.3 CONCLUSION

Overall, the program has mixed effects on economic sustainability. While some local businesses have been disadvantaged by the route, in particular construction and road adaptations, the B-Line has not only improved business for local cafes, but has allowed for an increase in the effective job market. While local impacts must be individually mitigated to prevent loss of business, the potential for a huge increase in economic growth shows it has had a positive effect on economic sustainability.

4 ENVIRONMENTAL IMPACTS

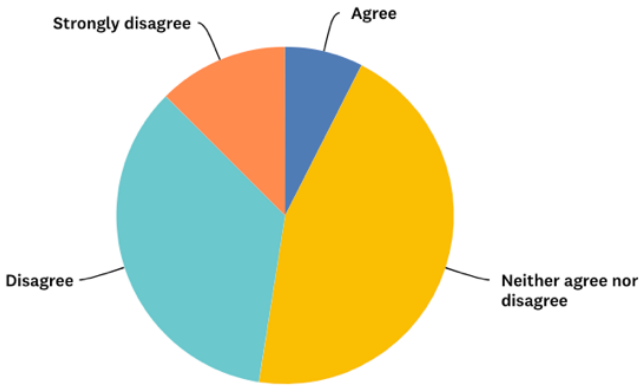
It often happens that transport projects, in their desire to aid economic and social growth, fail to take into account, or have a detrimental impact, upon environmental sustainability. Large-scale initiatives similar to the B-Line tend to have extreme environmental impacts, both in the construction and in the continuation of the program. NSW transport outlined several implementations to mitigate these impacts, including “new bus lanes, bus bays, minor lane widening, and other road improvements to improve traffic flow” (Transport NSW, 2016) , thereby reducing congestion and resultant pollution, as well as the revolutionary ‘breathing’ Manly Vale Car Park.

4.1 CONGESTION

There are several environmental concerns, including pollution stemming from both traffic congestion and the subsequent vehicle fumes, and infrastructure construction along the route.

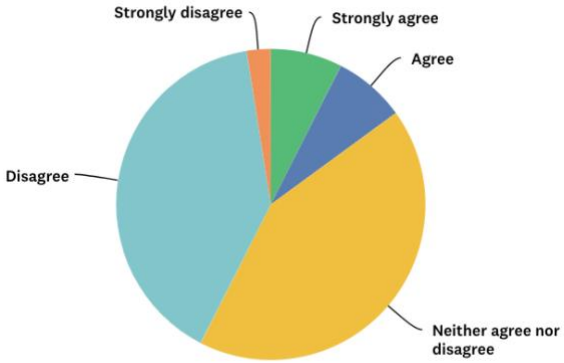
Figure 11 represents respondent's response to the issue of congestion. Over 90% the program had not increased congestion, and further, pollution.

Figure 11: ***Has the B-Line increased congestion?*** (Author, 2020)



However, when investigating responses to a different question, it becomes clear that the B-Line's high frequency may be unnecessary. In answering, 85% of respondents argued the route should not increase its frequency, with nearly 50% arguing it should come less often.

Figure 12: ***Should the B-Line come more often?*** (Author, 2020)

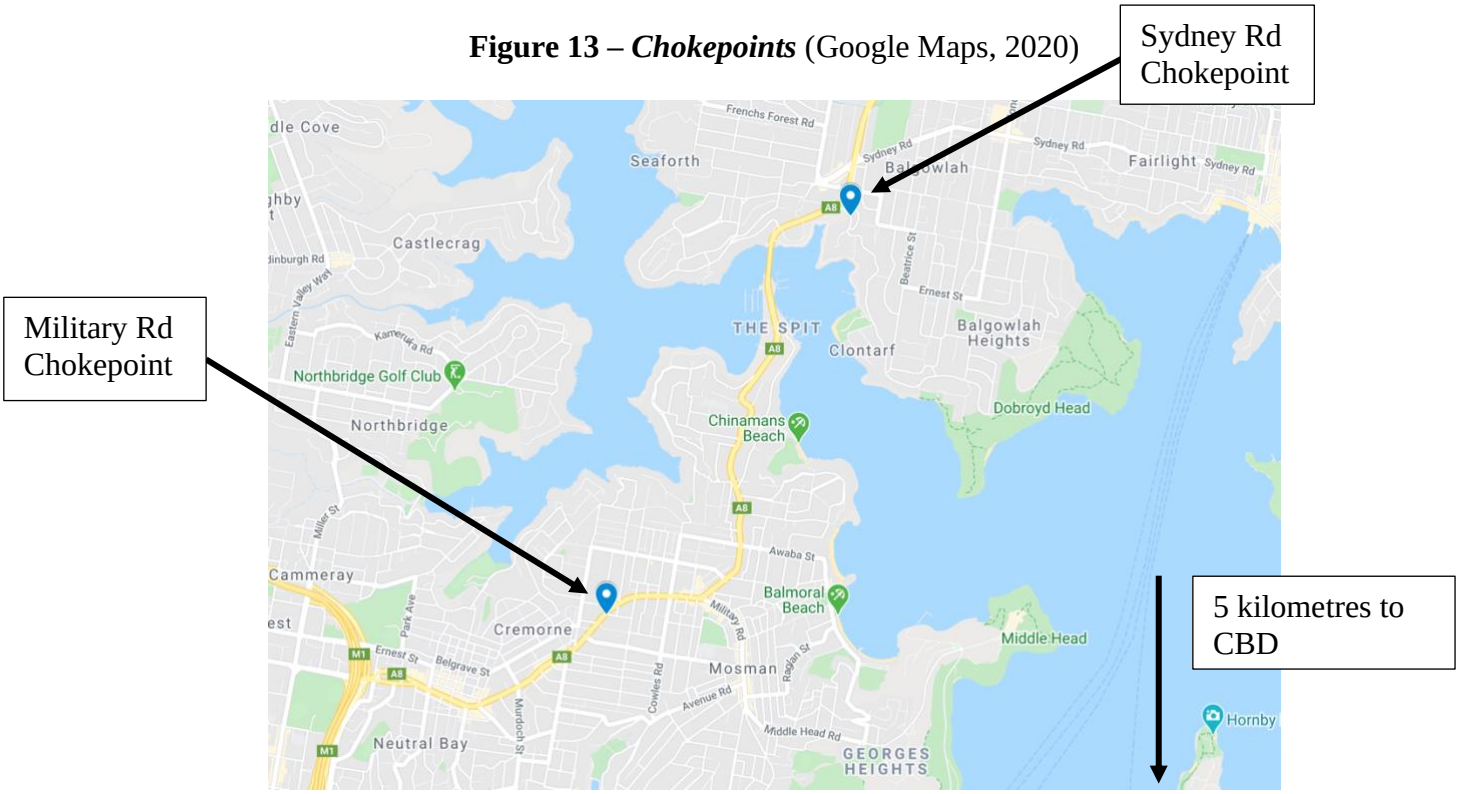


This shows that in terms of frequency, demands are being met, and commuters are not being forced to wait. Indeed, during peak hour a passenger will only have to wait an average of 2.5 minutes. This begs the question: is the high frequency model of the route only adding to unnecessary congestion? While respondents maintained the program did not increase congestion, the government could look into decreasing the frequency of the route, particularly during non-peak times, to further decrease any environmental impact. A significant drop-off in public transport use (in most cases, "at least 70% below pre-crisis levels" (Walker, 2020)) due to the ongoing Covid-19 epidemic also suggests that decreasing frequency may be beneficial in both economic and environmental terms.

Another issue, touched on previously, is the existence of various chokepoints of heavy congestion along the route. In most cases, they are due to the implementation of bus lanes which result in a fewer number of lanes for other vehicles. Although they encourage bus use, the fact that nearly 90% (RMS, 2020) of vehicles travelling on Military Rd are cars means the increase in congestion stemming from construction is likely to do more harm than good for

these commuters. This combination of road changes and pre-existing congestion creates a chokepoint along the route. Another example is discussed by Former Manly Councillor Candy Bingham: “Blocking off roads will just lead to even more congestion and longer tailbacks at choke points, and worse gridlock on Sydney Rd.” (Patterson, 2016) Both chokepoints are shown in Figure 13, and their proximity to the CBD means even more commuters will be forced to deal with the congestion that results. However, in areas where these chokepoints are not apparent, both bus and car journeys are likely to be quicker given the decrease in cars on the road, further decreasing congestion and subsequent pollution.

Figure 13 – *Chokepoints* (Google Maps, 2020)



While the program has resulted in an overall net increase in buses even when discontinued services are factored in, it has also recorded substantial passenger numbers, thus perhaps justifying this change in terms of pollution per capita. Although “the [B-Line buses] make up 10 per cent of the bus fleet on the Northern Beaches, they carry more than 26 per cent of

customers" (Transport NSW, 2018). While the author was unable to record average passenger volumes on buses due to Covid-19 restrictions, data published by Transport NSW shows there has been a "4.6 per cent increase in people using buses on the B-Line corridor" (Transport NSW, 2018). Thus, it can be surmised that the project has led to an overall increase in bus use, and a subsequent decrease in car use. This translates to having less vehicles on the road and less traffic congestion, both results meaning pollution is reduced substantially. Indeed, based on data assuming each bus takes 40 cars off the road, "Shifting from cars to public transport can deliver a 65 per cent emissions reduction during peak times and a 95 per cent reduction in emissions during off peak times" (Bureau of Infrastructure, Transport and Regional Economics, 2010). Even with lower passenger numbers, the program is more than likely to reduce pollution, and improve environmental sustainability.

4.2 ENVIRONMENTAL MITIGATION

The government has taken several steps to ensure environmental impacts are minimised. Approximately 53 trees were removed along Military and Spit Roads in order to accommodate the buses. However, to counteract any negative results stemming from this, an independent arborist was recruited to ensure none of the trees were ecologically endangered, and "all removed vegetation [was said to] be replaced by a greater number of new plants" (Coure, 2017).

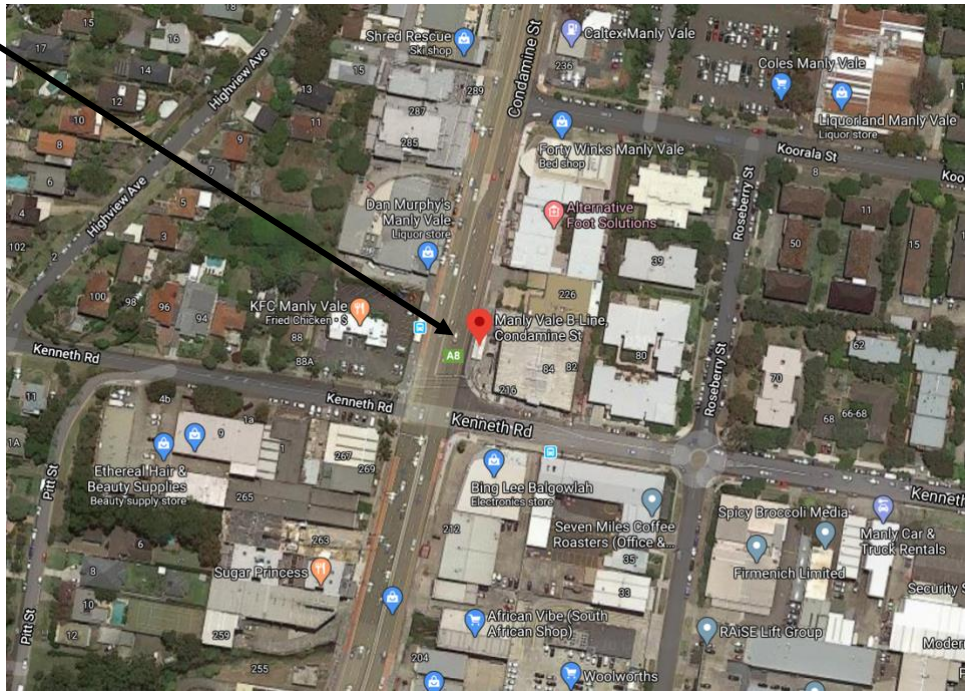
The B-Line program also involved the construction of six commuter car parks. Users of the route will receive free parking in a 'ride-and-park' scheme, introduced to encourage use of the buses. Furthermore, in an effort to offset any harmful impacts caused by the program's implementation, the government has integrated a "living, rotating, modular green wall system, scientifically proven to minimise the building's carbon footprint and save electricity costs" (Patterson, 2017) into the Manly Vale carpark's design (Figure 14). The facility also incorporates "roof solar-powered generation" and "around 9,000 plants" (Patterson, 2017), not only resulting in huge environmental benefits, but also advertising sustainable infrastructure methods to other corporations.

Figure 14 – *Manly Vale Carpark* (Patterson, 2017)

Breathable 'green' carpark exterior

Figure 15 – *Location of Manly Vale Carpark* (Google Maps, 2020)

Carpark surrounded only by industrial and commercial enterprise



8 kilometres to CBD

However, this implementation must be considered with respect to all stakeholders. As discussed in an online post opposing the project (marinejay, 2016), there exist several drawbacks, all of which can be applied to the remaining five 'park-and-ride facilities' along

the route. These include traffic congestion and safety, noise and light pollution, and air pollution.

The impact of traffic congestion has the potential to be more dangerous in areas with carparks. This is due to the high-frequency hotspot of traffic that exists in the immediate vicinity of the carpark. With a large number of vehicles entering and exiting the facility, pedestrian safety is at a higher risk, and air pollution is localised and intensified in a small area.

Noise and light pollution is also an issue, with many arguing that an increase in late-night activity "would disturb local residents with light streaming through their windows" (marinejay, 2016). While this is entirely plausible, after conducting surveys of all six carparks, the author maintains that each carpark is not in close proximity to any residence (see Figure 15). Although it is possible that some businesses and homes may be affected, it seems unlikely that noise and light pollution is a large drawback.

4.3 CONCLUSION

In terms of environmental wellbeing, it seems clear that the government has met their objective. Not only have passenger volumes increased since the program's implementation, showing an overall decrease in traffic congestion and pollution as a result, initiatives such as the Manly Vale car park have been beneficially incorporated. The only issue lies in the frequency of the route, and authorities must investigate passenger data to ensure buses are not being run more than is necessary.

5 CONCLUSION

The B-Line project, since its introduction in early 2016, and especially since its implementation in November 2017, has received both criticism and acclaim from a variety of stakeholders. With any major project, it is difficult to meet the demands of current stakeholders as well as all future stakeholders in ensuring overall sustainability. In this report, the author has investigated the impact of the project on the three spheres of sustainability. While travel times were lessened overall, many residents had their commutes lengthened through the discontinuation of local services. The author agrees with the general consensus that some variety of these local services should be reinstated to provide the necessary travel links whilst not degrading the community identity of those communities north of Mona Vale. Economically, the program increased growth overall, increasing access to the two major commercial hubs for Northern Beaches residents, although the effect of project's various infrastructure on local businesses was less beneficial. Finally, environmental wellbeing was improved across the board, with traffic congestion decreased and several initiatives successfully undertaken to ensure sustainability of the program.

The investigation was limited through the surveying of a specific sample group (their clustered location is seen in Figure 5) and data could have been improved by increasing the quantity and range of respondents. Also, although the Covid-19 epidemic restricted such activity, interviews and primary data in regard to local businesses and passenger numbers would allow for a better understanding of all perspectives. Whilst there remains a sense of opposition to the B-Line project as a whole, analysis of its intricacies and impacts upon stakeholders reveal its beneficial effects upon the three facets of sustainability. Indeed, 80% of survey respondents agreed that the B-Line has been a worthwhile transport

implementation, showing that the attitude of the people aligns with the outlook the data presents.

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