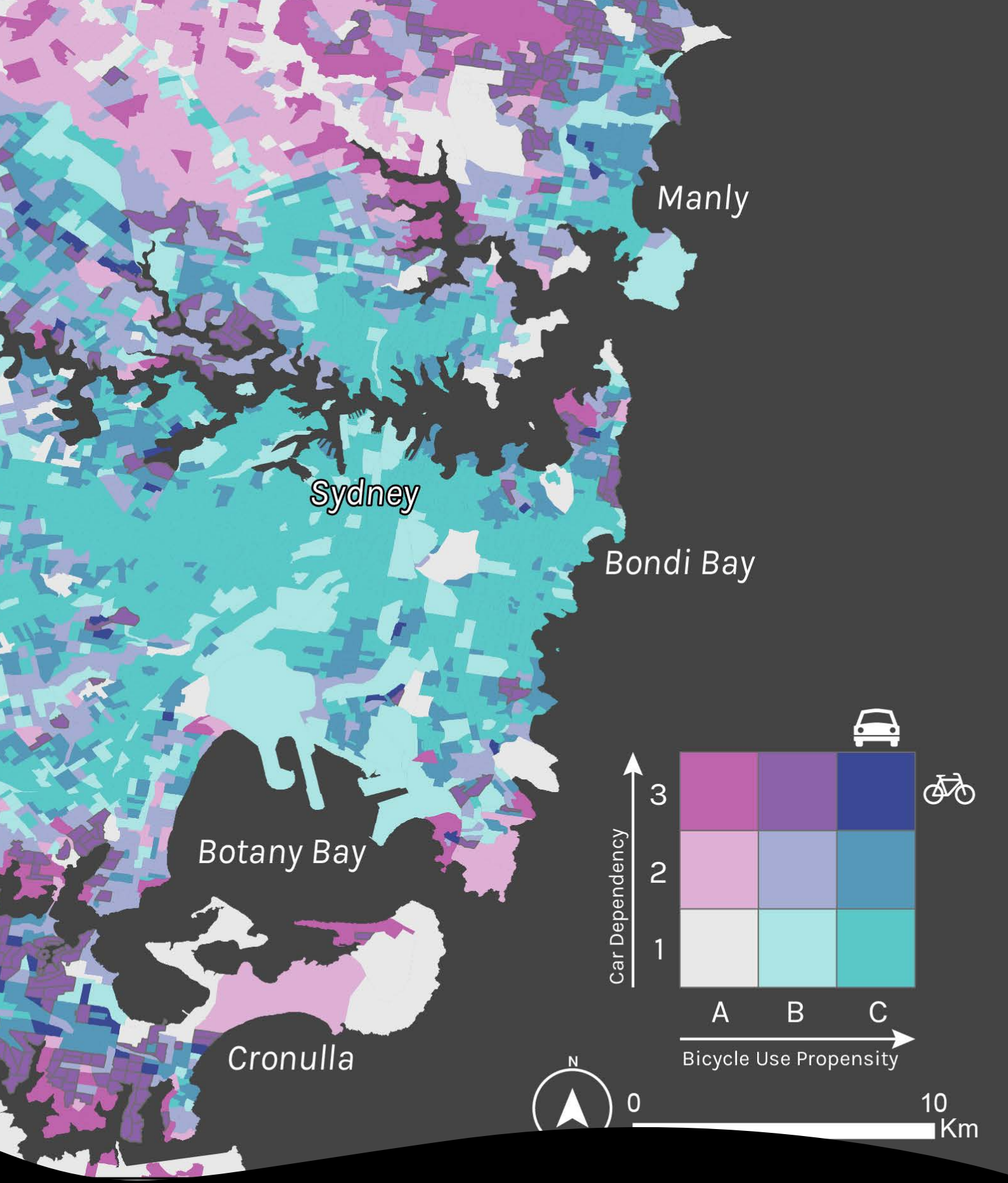

Understanding the spatial relationship between cycling propensity and car dependence

TfNSW Cycling Infrastructure Investment Program

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Institute for Sensible Transport

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Executive Summary

This report highlights the results of an examination of the spatial relationship between areas with high propensity for cycling with high concentrations of short distance car trips. This report has been developed as part of the Transport for NSW (TfNSW) Strategic Business Case for Cycling. Previous work developed a *Composite Index* of propensity for cycling and short distance car trips and this report recasts those results using a *bivariate choropleth* map. This helps to highlight areas that show an overlap of high latent demand for cycling (the cycling propensity index) *and* concentrations of car dependence. This is important, as a new cycling trip that replaces a trip formally done by car is more 'valuable' in terms of its positive impact on congestion, emissions, physical activity and transport affordability than a trip coming from another mode. To ensure map legibility, the results shown here are scored out of three, compared to scores out of 5 in the *Composite Index Report*.

The results in this report highlight a number of clustered areas that score highly in both indexes, indicating a high likelihood for mode shift away from cars. In particular, Newcastle is the standout city with a majority of the high scoring SA1s. Within Greater Sydney, the Northern Beaches area and Sutherland – Cronulla area both had clusters of high scoring SA1s, which much of the inner Sydney areas was only high in bicycle use propensity. The Wollongong CBD was high in bicycle use propensity, surrounded by SA1s high in both indexes. Gosford contained a strong hinterland of car dependent only areas, with some areas in the Gosford CBD and Woy Woy indicating higher propensity for bicycle use. The results of this analysis can assist in the prioritisation of cycling infrastructure projects.

1. Background

The objective of this report is to support the wider *Cycling Investment Program Strategic Business Case Modelling and Economic Analysis Services* project by providing an analysis of the logical sequencing of bicycle infrastructure contained in the Principal Bicycle Network (PBN). The rationale for this exercise is to help identify areas that are high in both bicycle use propensity and car dependency. Such areas are ideal for investment in bicycle infrastructure as they are likely to see higher mode shift away from cars compared to other areas.

This work partially relies on the results of previous work undertaken as part of the *Cycling Investment Program Strategic Business Case*. A number of GIS based products have been produced previously and are briefly identified below:

1. *Bicycle Use Propensity Index*: Using eight Census collected variables, the Index offers insights into how latent demand for cycling varies spatially across each of the study areas included in this project. Figure 1 provides a snapshot of the outcome of this exercise for each of the four study areas. See separate report *Bicycle Use Propensity Index* for more information.

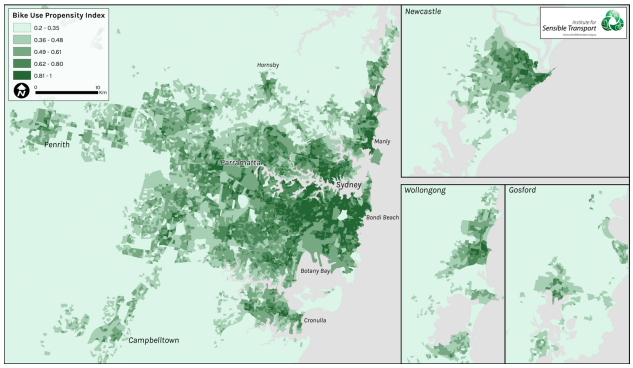

Figure 1 Bicycle Use Propensity Index

2. *Car Dependency Index*: Focusing on how the use of the car for short distance (1- 5km) car trips vary across the four study areas. This is designed to highlight areas that have trip distances within a comfortable cycling distance. Figure 2 highlights how the different study areas compare in terms of car dependence. See separate report *Car Dependency and Composite Indices* for more information.

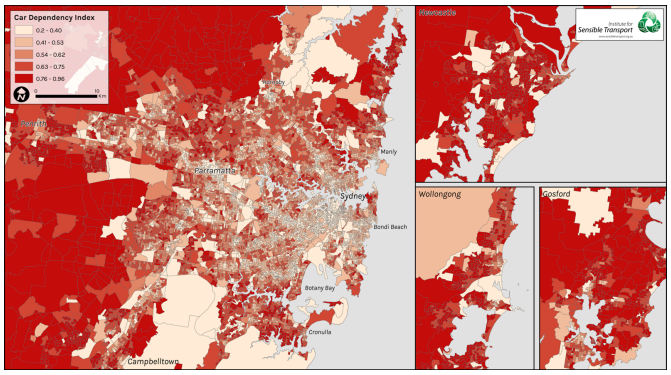

Figure 2 Car Dependency Index

3. *Composite Index*: The *Bicycle Use Propensity Index* and the *Car Dependency Index* were combined, to produce a *Composite Index*. The rationale for this exercise was to identify hotspots for both high latent demand for cycling *and* high concentrations of short car trips. This is important, as a cycle trip that replaces a journey formally undertaken by car is more *valuable*, from a benefits perspective, and offers a stronger strategic alignment with many of the strategic goals contained in *Future Transport 2056*. An illustration of how each of the different areas rank is shown in Figure 3.

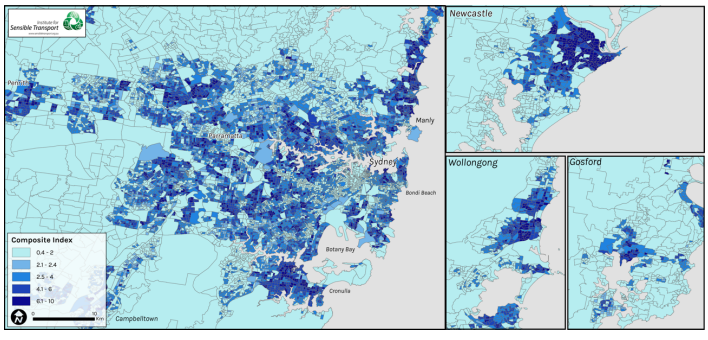

Figure 3 Composite Index

2. Methodology

This report was produced using a GIS-based analysis. The results from the *Composite Index Report* were used as the baseline to compare differences between SA1s within the study area of this project. Using the Composite Index scores, each SA1 in the study area was recast to provide a score out of 3 for both the *Bicycle Use Propensity Index* score and the *Car Dependency Index* score. Figure 4 shows the legend used in the following maps. Each SA1 is given a score out of 3 for Car Dependency and is scored A to C for Bicycle Use Propensity. The scores are then combined to show the relative relationship between the two rankings. Highest scores in both will provide a 3C score, indicating areas that are likely to see the greatest mode shift away from car use. Areas with high car dependency but low bicycle use propensity will be scored 3A. Conversely, areas with high bicycle use propensity but low car dependency will be scored 1C. Areas scoring low in both indexes will be scored 1A.

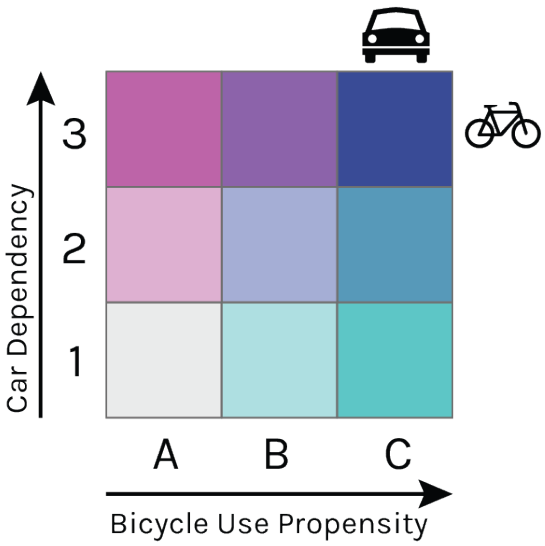

Figure 4 Bivariate Choropleth Legend

3. Results

3.1 Greater Sydney

Figure 5 shows the bivariate choropleth map for Greater Sydney. Much of inner Sydney ranks highly in *Bicycle Use Propensity*, though scores lowest in *Car Dependency*. Much of Greater Sydney's hinterland only ranks high in Car Dependency. Several areas are shown to rank highly in both Indexes including Manly and Sutherland – Cronulla.

Figure 5 Greater Sydney

To help identify the high scoring areas in Greater Sydney, Figure 6 removes all results except those scoring in the highest or second highest categories. Here we can more easily see the Sutherland – Cronulla and Manly areas have strong concentrations of high scoring areas, as does Blacktown and the residential area north of the Westlink M7.

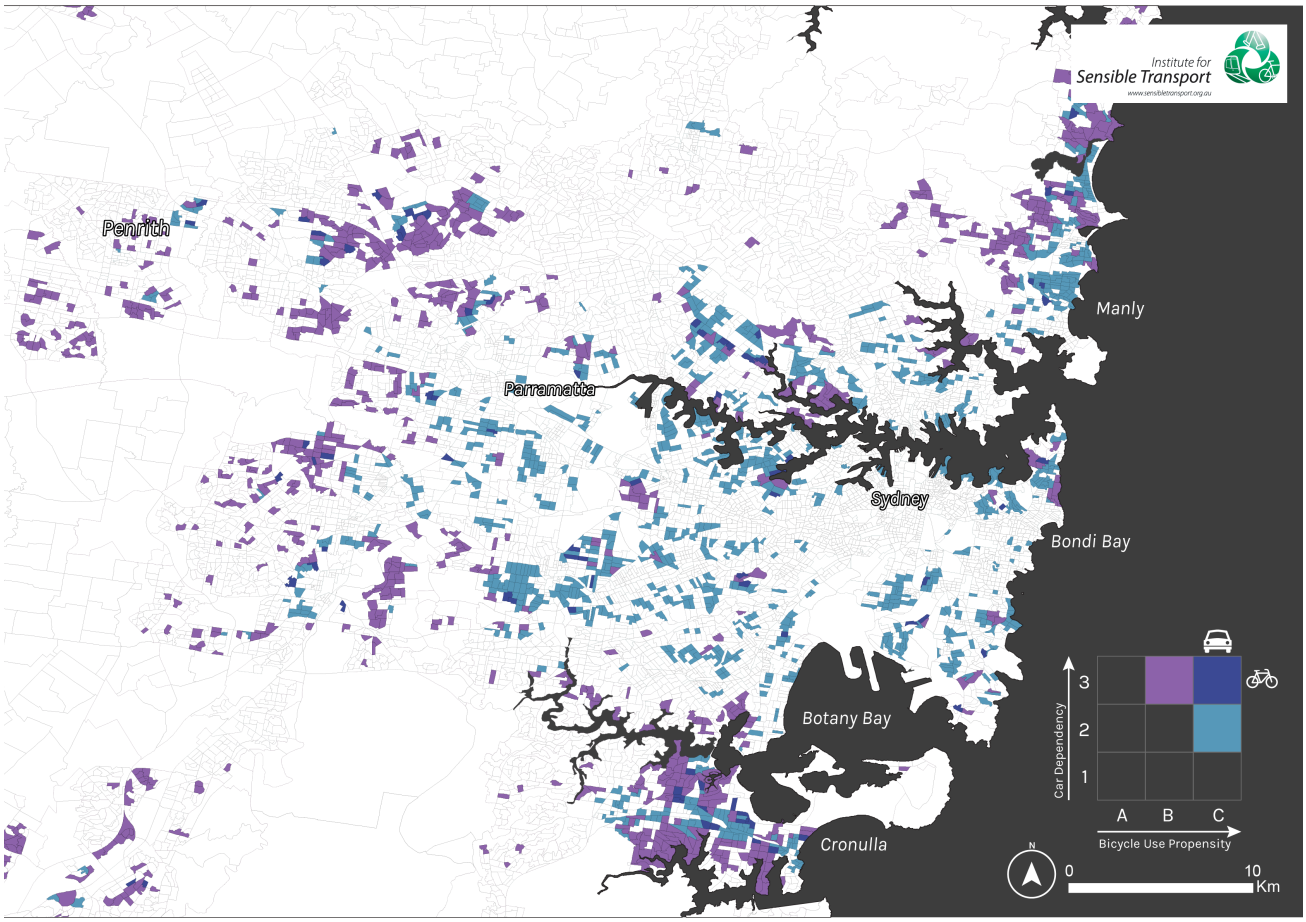

Figure 6 Greater Sydney - High Scores Only

3.2 Newcastle

Figure 7 shows the bivariate choropleth map for Newcastle. The city had the highest concentration of top scoring SA1s, with a strong clustering around the inner Newcastle area. The results from this exercise indicate that Newcastle would likely see the greatest mode shift away from car use following greater investment in high-quality bicycle infrastructure.

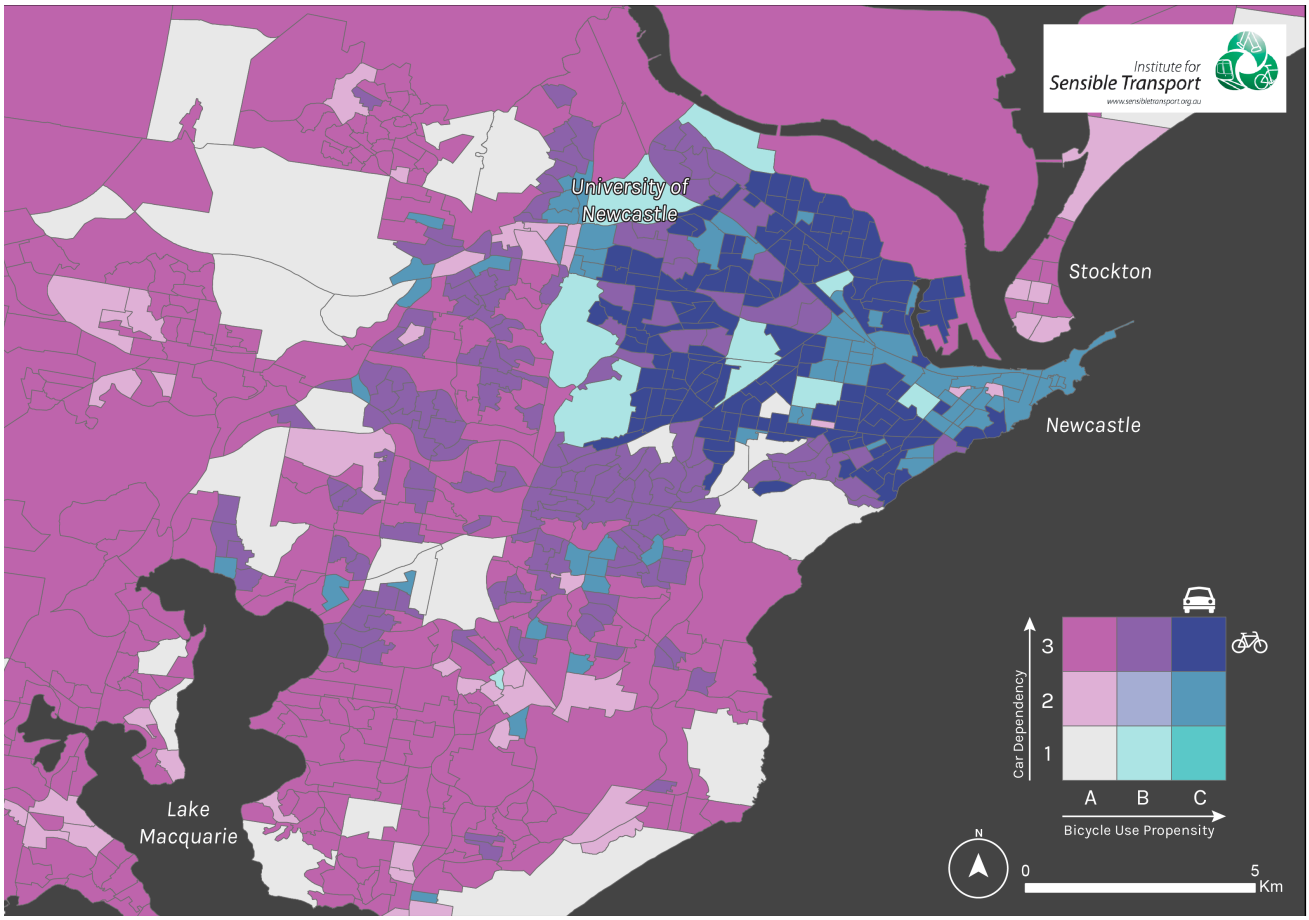

Figure 7 Newcastle

3.3 Gosford

Figure 8 shows the bivariate choropleth map for Gosford. The greater Gosford area is predominately car dependent, with pockets in the Gosford CBD and Woy Woy that also have high Bicycle Use Propensity. The results for Gosford indicate a lower likelihood for mode shift away from car use relative to the other study areas included in this project.

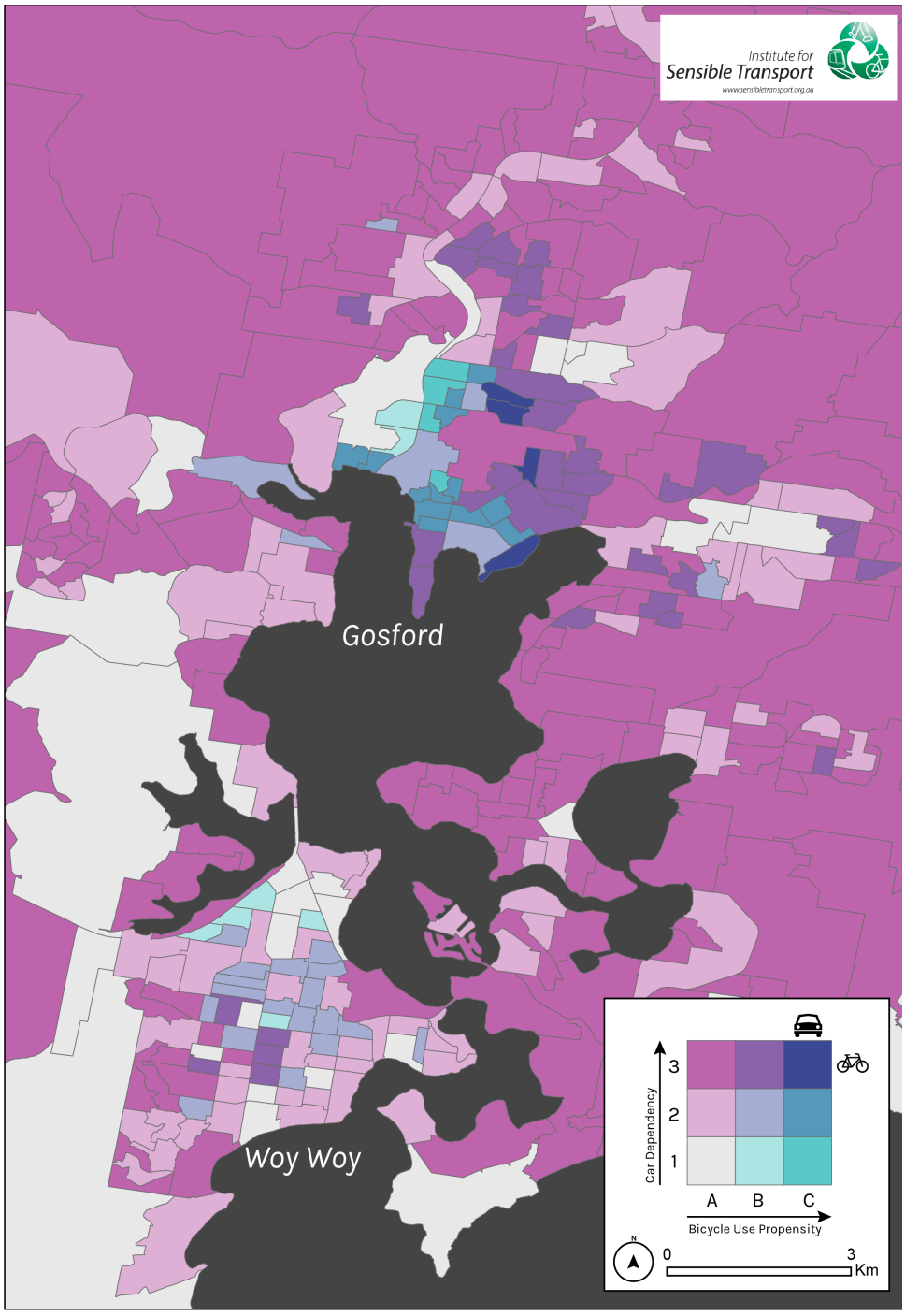

Figure 8 Gosford

3.4 Wollongong

The bivariate choropleth results for Wollongong are shown in Figure 9 and indicate that much of the Wollongong CBD area is either high in Bicycle Use Propensity or top scoring in both. SA1s just outside the CBD area skew slightly towards car dependency (3B scores). The concentration of high scoring areas around the CBD area indicate that most benefit could be realised through a bicycle network beginning in the core before stretching further north and south-west, into residential areas.

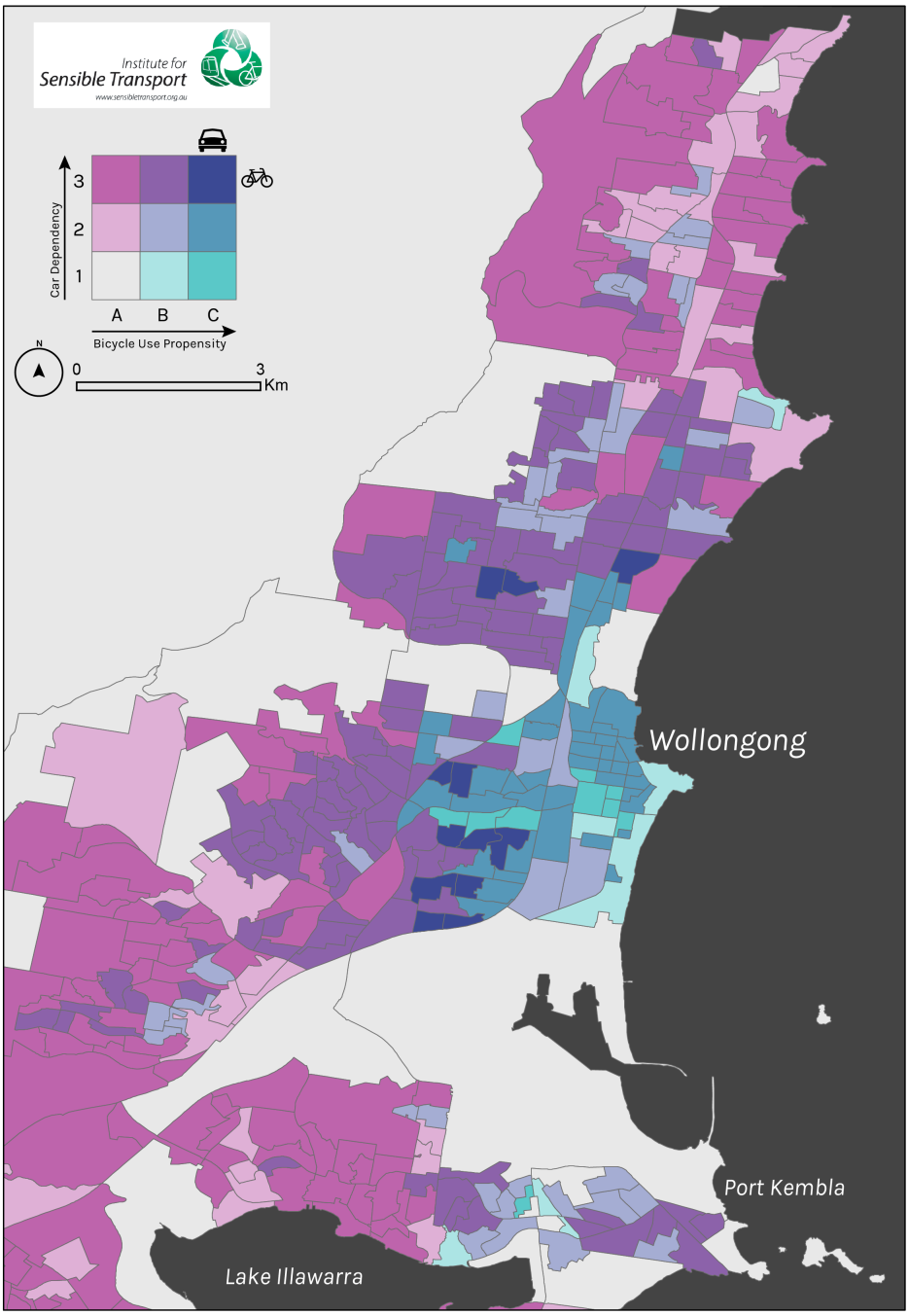

Figure 9 Wollongong

4. Conclusion

This report has used bivariate choropleth mapping to identify areas that feature as highly on both a cycling propensity index *and* a car dependency index. The maps for the four study areas provide insights into where cycling infrastructure investment can be made that hold strong possibilities of shifting short car journeys to cycling. The results of this analysis found that there are a number of distinct clustering of SA1s that score high in both indexes, indicating that they would see higher mode shift away from cars relative to the other areas. These clusters could be used for targeted investment in bicycle infrastructure and/or behaviour changes programs. Such areas could be used as trial areas for new programs, prior to a full roll-out across the study areas.

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