Spatial Vision

SECCCA Enhancing Community Resilience

Replicating Project Process: Overview

Final

8th December 2023

About this document

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Cover photo: Heatwave in South Melbourne

SECCCA and Spatial Vision respectfully acknowledge the Traditional Owners of the lands on which we work, and pay respect to their Elders, past, present and future. We appreciate and acknowledge the advice and guidance of the Bunurong Land Council in assisting with the consideration of potential climate change impacts on First Nations communities, which for this study began with a focus on the Frankston Local Government Area.

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Contents

1. Document purpose

This document provides an outline of how the vulnerability analysis can be leveraged and reapplied to different, defined geographic areas across Australia to support the prioritisation of climate change resilience-building initiatives. The document outlines the six key overarching steps to follow when considering a climate change hazard or extreme weather event scenario impacting a defined geographic community (for example, a township or suburb).

This document should be read in conjunction with the outputs across the South East Councils Climate Change Alliance (SECCCA) region that are provided in the form of Microsoft (MS) Excel tables, PDF maps, and spatial data, as well as the additional papers developed as part of this project to gain deeper understandings of the various components of the project:

Paper 1 – *Definitions and Approaches*: Outlines and introduces the key terms and definitions, and proposed conceptual framework by which community vulnerability and resilience to climate change are to be assessed.

Paper 2 – *Vulnerable Populations*: Describes the vulnerable groups within the community, identified by SECCCA councils, to be of concern in relation to the likely impacts of climate change.

Paper 3 – *Methods and Application*: Outlines the process used to identify and assess the vulnerability of sub-populations in the community to climate change. This report provides a detailed explanation of how inputs into the vulnerability assessment method, such as the role of community assets, can be used as an entry point for the building of community resilience.

Paper 4 – *SECCCA-wide Outputs: Findings and Guidance*: Provides an overview of the outputs prepared and findings from the SECCCA-wide evaluation. This report includes high-level guidance on how the outputs can be used to identify where there are likely to be groups or sub-populations in the community that are more vulnerable to climate-related events.

Paper 5 – *Case Studies*: Presents the findings of four case studies that apply the SECCCA-wide information for four separate geographic areas, where each case study considers a different climate-change-related event.

2. Project background

Climate change is significantly increasing risks such as fires, floods, coastal erosion and heat waves to local communities throughout Australia. Preparing communities for current and future changes to the climate is a critical task and requires protection of life, property and wellbeing. Proactively preparing communities to act prior to, during and after disasters builds community resilience to future impacts and minimises risks and their consequences.

The Enhancing Community Resilience Project will help prepare communities in the SECCCA region for current and future changes to the climate, by improving community preparedness through practical actions, tools, and resources. Project participants will be empowered with information and access to new or improved services, enabling them to make individual decisions to prepare for climate change.

Leveraging the outputs of the SECCCA Asset Vulnerability Assessment Project, the project will also assess the vulnerability of the SECCCA region's community to climate change.

Working with SECCCA council members and climate science experts, the project will identify and visualise the community services, demographics, locations, and communities that are exposed to the impacts of climate change. Councils' community planners are integral in understanding vulnerability across communities, including cohorts such as aged care, disability, those with non-English-speaking backgrounds (NESB) and youth.

A further stage of the project will develop, deliver and evaluate interventions to build community resilience to climate risk by working with expert community development practitioners, councils, emergency services, and communities.

The project outcomes and approach will be converted into a practical toolkit for councils and communities that can be applied in other regions throughout Australia to build community resilience to climate change in these areas. This toolkit will be developed using a parallel evaluation and collation of lessons learned throughout the project.

For further background information on this project, refer to *Paper 1 – Definitions and Approaches: Appendix A.*

3. Process for replication in a different area

Figure 1 shows the six steps described in this section. These steps provide a general guideline for an organisation, such as a local council, to follow to determine priority areas of higher vulnerability for building community resilience. The guideline is based on the idea of focusing on a geographic area of interest, or geographic 'community', that contains sub-populations that may be vulnerable to a particular climate hazard.

The first five steps provide guidance on the key concepts and factors to define when considering a geographic community's vulnerabilities. The final step integrates these factors to gain key insights and a deeper contextual understanding of the scenario. Depending on the focus of the study, defining the sub-populations and the climate hazards (Step 1 and Step 2) can be done independently of one another.

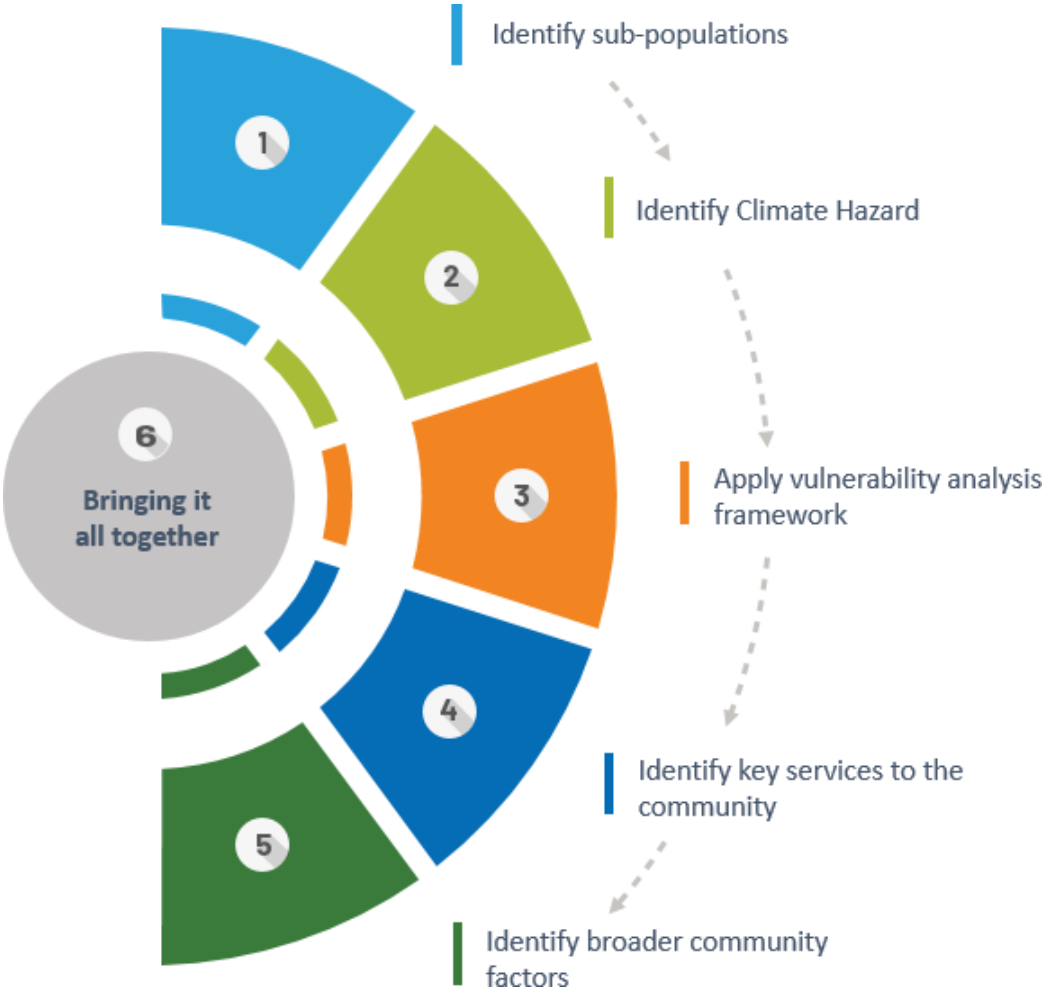

Figure 1. The six steps that guide an organisation to determine priority areas of higher vulnerability for building community resilience.

3.1. Step 1: Identify sub-populations for scenario focus

The first step of applying the climate change vulnerability framework is to identify the key vulnerable sub-populations of concern living or working in the defined township or geographic extent. These can include, but are not limited to, the nine broad sub-populations (or 17 detailed sub-populations) identified in this project (see Table 1).

Table 1. The 17 detailed sub-populations identified in this project.

Vulnerable populations	
Older people	
1	55 and over in age
2	65 and over in age
3	85 and over in age
4	Non-English-speaking background (NESB) – established populations
NESB – recent arrivals	
5	In the past 5 years
6	In the past year
7	Those on a bridging visa
8	Single mothers
9	Homeless or in insecure housing
10	High care or those with a disability
Youth	
11	Teens – between 15 and 19 in age
12	Young adults – between 20 and 24 in age
13	All – between 15 and 24 in age
14	Low income
First Nations	
15	Over 55 in age
16	Over 65 in age
17	High care or those with a disability

Through consultation with the nine SECCCA councils, the sub-populations were identified to be of greatest concern in relation to anticipated climate change impacts and events. This would be a good starting point for other organisations (such as councils) to consider when attempting to understand community vulnerability and build resilience to climate change hazards.

The nine broad sub-populations were determined in the context of aiming to reapply the process across Australian communities. They include key sub-populations that are well-known to experience higher vulnerabilities.

During this project, vulnerability modelling frameworks were developed for these nine broad sub-populations through extensive consultation with subject matter experts (SMEs) and statistical methods. Hence, vulnerability scores are easily determined by applying the framework to the geographic area of interest. Frameworks were not determined for other sub-populations, but Step 3 can identify new sub-populations to focus on along with the modelling framework determined by the user as part of Step 3.

Refer to Paper 2 – *Vulnerable Populations* for further details on each of the nine broad sub-populations.

3.2. Step 2: Identify the climate hazard or extreme weather event

The next step for reapplication of the project is to identify the key climate hazard or extreme weather event of concern for the region. Climate data in relation to historical events to inform current or future risk, or climate projection data, can be collated to inform risk and highlight areas of particular concern.

Potential extreme events include:

- overland flooding/flash flooding
- coastal inundation from sea-level rise and storm surge
- heatwaves and extreme temperatures
- bushfires
- landslips
- erosion
- extreme cold
- drought.

It is beneficial if these events can be spatially represented. However, an extreme event can be considered qualitatively if no data are available.

3.3. Step 3: Apply vulnerability analysis framework to identified sub-populations

Paper 2 – *Vulnerable Populations* outlines the frameworks used to determine vulnerability scorings for each of the sub-populations identified in Step 1. The frameworks form a multi-criteria analysis that incorporates key economic, health and social sensitivity factors for a particular sub-population, alongside the capacity considerations classified as environmental, economic, institutional and services, physical, or social. Each of the sensitivity and capacity components is weighted and results in an assessment and scoring of overall vulnerability for each sub-population at a geographic extent of Statistical Area Level 1 (SA1) across the focus area.

Figure 2 is an example of the modelling framework developed for the older people sub-population.

If a sub-population is identified in Step 1 that is not part of the final project list, Paper 3 – *Methods and Application* details the process of developing a framework for application to a new sub-population.

Step 3 involves the collation of spatial data and application of the framework to the focus sub-populations across the area of interest through geospatial analysis.

The results from Step 3 are the vulnerability scorings and rankings of each sub-population in tabular and spatial format (Figure 3). The findings of this step include identifying pockets of where the most and least vulnerable of each sub-population are located.

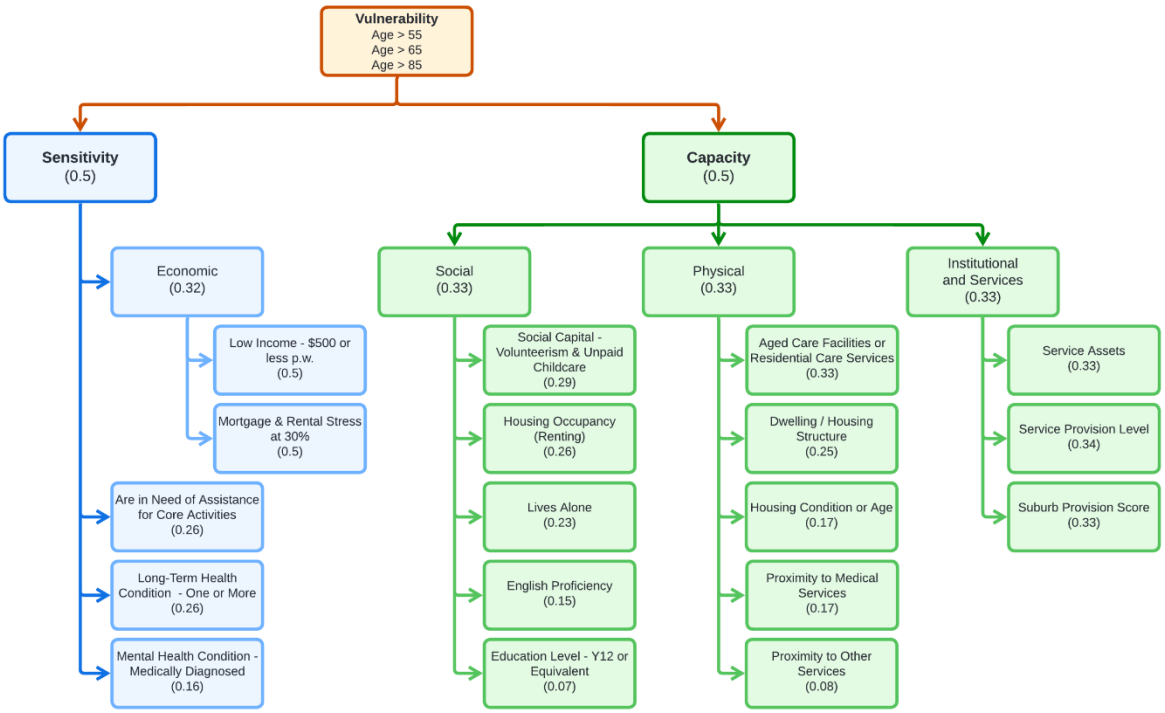

Figure 2. An example of the modelling framework developed for the older people sub-population.

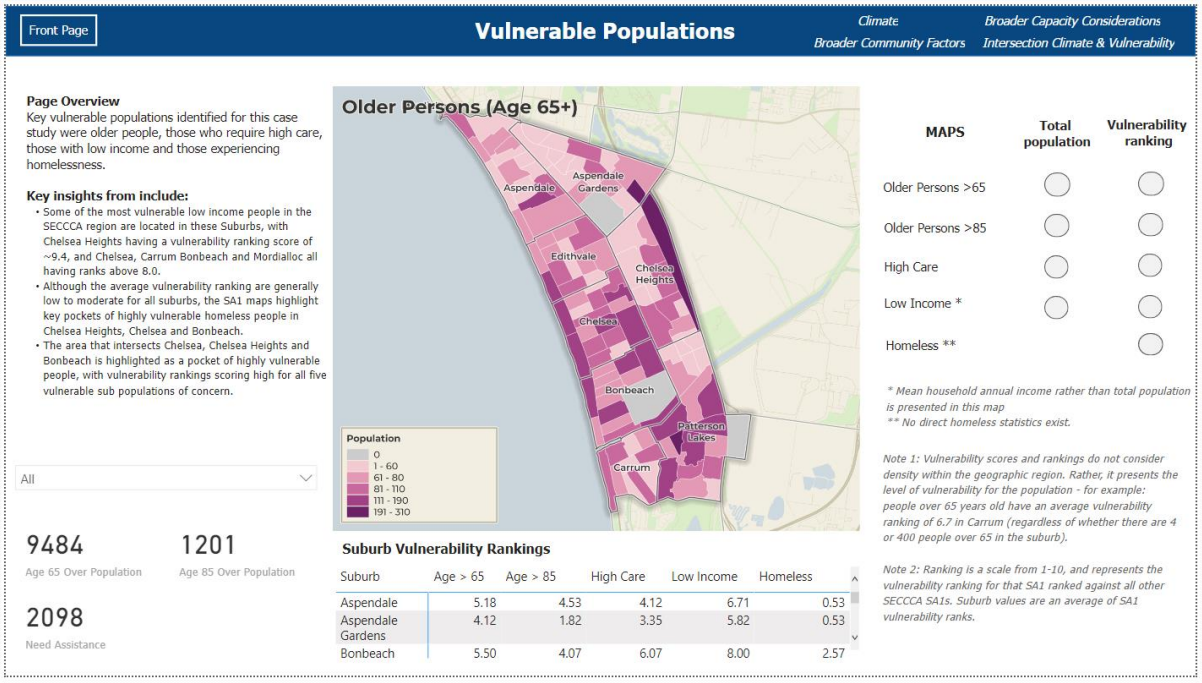

Figure 3. An example of results for the older people sub-population.

3.4. Step 4: Identify key services to the community (i.e. broader capacity considerations)

Key to the building of community resilience in a region is the identification of critical assets on which the community relies (and the services these assets provide).

These services can be those that mitigate the vulnerability of the community (or sub-populations within the community) to the impacts of climate change, or those that provide broad support to the general community and indicate a level of community resilience or vulnerability across a larger geographical extent. Recognising the location, coverage, distance or level of service of these critical assets provides a deeper understanding of the broader capacity considerations of a region.

While some assets and services may mitigate the impacts of an extreme event (for example, the coverage of telecommunications to support mobilisation of emergency services), the impact on some other assets may increase general vulnerability if the asset or service it provides is impacted (for example, the halting of home food provision or medical support services due to lack of road access).

As such, this next step of the process encompasses the identification of these key assets and services that support the community and vulnerable sub-populations identified in Step 1 (see example in Figure 4).

Examples of assets and services are provided below:

Providing sub-population services	Providing broad support to general community
Schools	Proximity to public transport, local shops, hospitals, or open space
Childcare	Number of certain assets within a given distance
Non-government community service centres	
Places of worship	

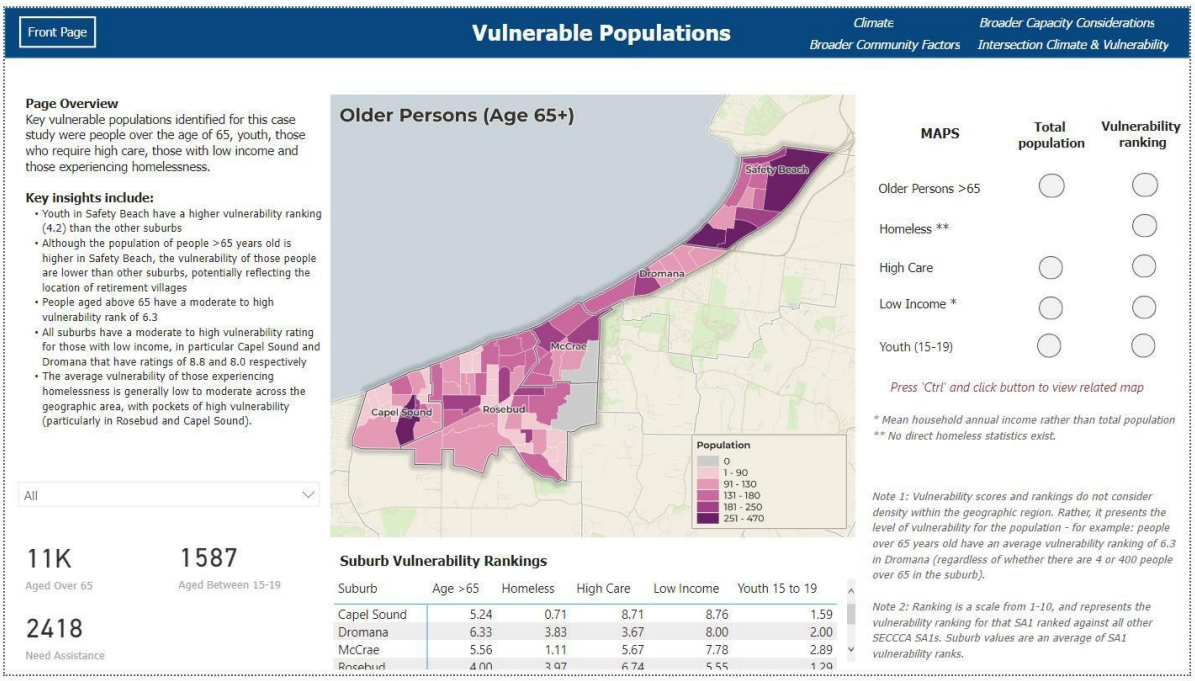

Figure 4. Identification of key assets and services that support vulnerable sub-populations.

3.5. Step 5: Identify broader community factors

Within a given geographic location, a number of additional factors may influence general vulnerability and self-sufficiency in light of an extreme climate event or disaster. This is not only within vulnerable populations but also the community as a whole.

These broader community factors (see Figure 5) can relate to how self-sufficient the given population is, what general health concerns may exist, and how well-connected or trusting the community is.

As such, Step 5 involves identifying a range of broader community factors that relate to the climate hazard scenario of concern. For example, in a bushfire scenario, understanding the locations of higher populations of people with respiratory conditions would be key to understanding the general profile of the region.

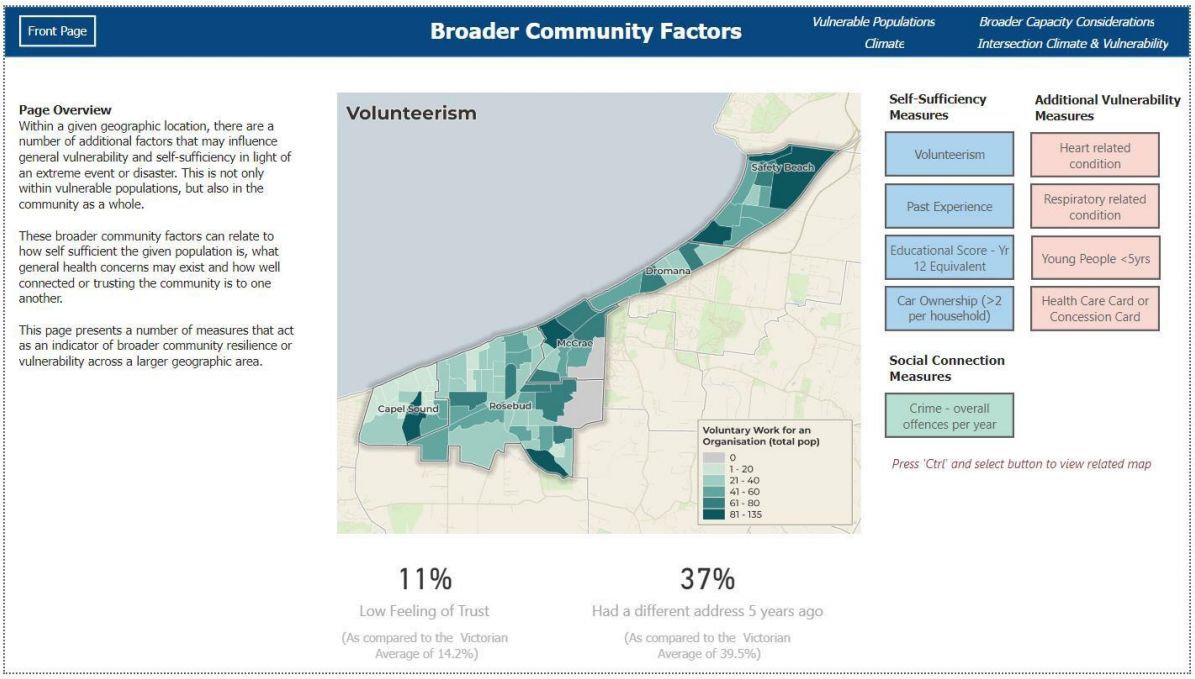

Figure 5. Identification of a range of broader community factors relating to a climate hazard.

3.6. Step 6: Bring it together in a visual representation

The final step of the reapplication process is to bring together all components from Steps 1 to 5 in a visually interactive format.

Step 6 is of critical importance to contextualise community vulnerability in relation to climate hazards of concern. Combining the findings from Step 1 and Step 2 can highlight areas of higher climate hazard exposure with pockets of high sub-population vulnerability. This is then contextualised with the broader community factors and capacity considerations that may further increase vulnerability or support resilience measures. Coalescing the information and findings from the previous five steps is a critical part of the reapplication process to attain insights that may not otherwise be available if the steps are viewed individually.

Outputs from each of the stages can be presented in spatial, tabular, map and textual format. Due to the multitude of different information layers derived in each of the five previous steps, it is important that this final step combines the information in an interactive and visual way. Power BI is one way to present this information; however, results can also be presented on a Geographic Information Systems (GIS) platform, such as Quantum GIS (QGIS), to allow for interaction.

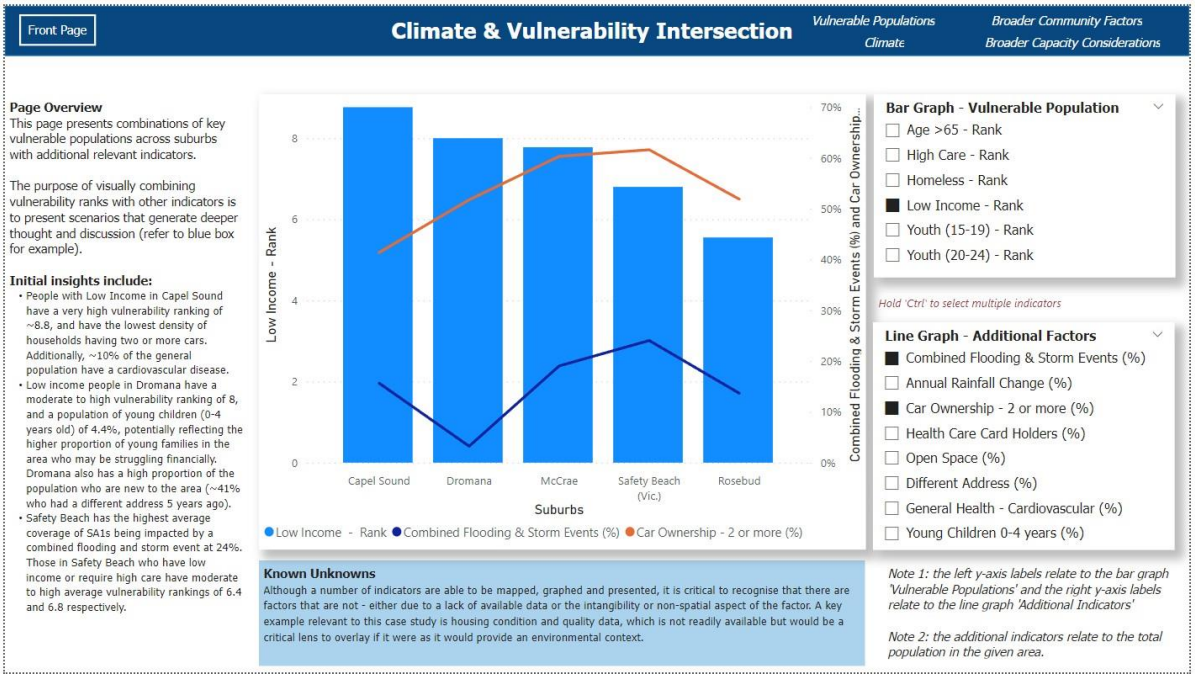

Figure 6. Example of view of combination visuals.

Appendix A: Acronyms

MS	Microsoft
NESB	non-English-speaking background
SA1	Australian Bureau of Statistics Statistical Area Level 1


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