



AdaptWest

Social and Community Resilience and Health
Research Paper
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Social and Community Resilience and Health

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Prepared for City of Port Adelaide Enfield
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1.0 Introduction

1.1. About AdaptWest

AdaptWest is a partner project between the Cities of Port Adelaide Enfield, Charles Sturt and West Torrens, the South Australian Government and the Australian Government to develop a Regional Climate Change Action Plan for Western Adelaide.

In 2013, an initial stage of work was completed comprising a social, economic and environmental profile of the Western Adelaide region, and collation of historical climate observations and future climate projections.¹

The current stage of AdaptWest builds upon this previous work and is being delivered through three main tasks:

- **Preparing the evidence base** - Identifying regional values and key decisions with potential to be impacted by climate change, and gathering information to better understand these values, decisions and impacts;
- **Undertaking the Integrated Vulnerability Assessment (IVA)** – Assessing the exposure, sensitivity, and adaptive capacity of the region to understand vulnerabilities and opportunities presented by climate change; and
- **Preparing the Adaptation Plan** – Identifying priority areas of focus and adaptation options, developing adaptation pathway maps, and determining key actions and roles and responsibilities.

AdaptWest has adopted five themes through which to consider the region and its vulnerability to climate change. These themes are:

- Assets, infrastructure and economy;
- Coastal management;
- Environment and open space;
- Social and community resilience and health; and
- Urban planning and development.

The project's methodology embeds the active participation of key stakeholders from the Western Adelaide region associated with each of the five themes. Specifically, this involves interactive stakeholder workshops associated with each project task, and direct stakeholder input to key project decisions relating to the focus of the project, the assessment of vulnerability, and preferred adaptation responses.

¹ SKM (2013) *Western Adelaide Region Climate Change Adaptation Plan – Stage 1*

1.2. Values and key decisions

Two important aspects of the AdaptWest project's approach to vulnerability assessment and adaptation planning are the consideration of regional values, and key decision lifetimes.

Stakeholder input has driven the development of seven AdaptWest regional values which will be used to focus the project toward those features or aspects of particular importance to the region, namely:

- Amenity and quality of life;
- A strong and connected community;
- Coastal and riverine water quality;
- Coastal environment;
- Infrastructure and essential services;
- Management and use of stormwater; and
- Regional productivity and economic contribution to the state.

These values and the process of their development is described further in Section 2.4, and the values provide a point of reference throughout this research paper.

An important aspect of planning for regional adaptation is to understand the relationship over time between key decisions the region's stakeholders will make, and climate change impacts. In this context, a decision lifetime is the time taken to make a decision (lead time) plus the duration of that decision's implications (consequence time).²

Some decisions made by individuals or organisations have lifetimes that are shorter than the timeframes over which the major effects of climate change will occur (e.g. < 10 years). In contrast, there are decisions made today that have longer lifetimes (e.g. > 70-80 years) that will converge with the expected timing of some of the more significant projected impacts of climate change.

Early stakeholder input to the AdaptWest project has led to development of Figure 1.1, which summarises key decisions to be made amongst various stakeholder organisations and the region as a whole, and their lifetimes. Several of these decisions will be relevant across multiple project themes and regional values.

Consideration of key decision lifetimes will occur throughout the AdaptWest project, particularly in development of the **Adaptation Plan**.

² Stafford Smith, M, Horrocks, L, Harvey, A, and Hamilton, C (2011) *Rethinking adaptation for a 4°C world* in Philosophical Transactions of the Royal Society A, 369, pp.196-216, p. 197

Figure 1.1: Western Adelaide key decision and decision lifetimes identified by stakeholders



1.3. Purpose of the research papers

A research paper has been prepared for each of the five AdaptWest themes as part of the task of **preparing the evidence base**.

The papers are intended to be a resource to support completion of the **IVA** and development of the **Adaptation Plan**.

Each paper provides **targeted** information about the region in relation to the theme topic and regional values and responds to the following IVA considerations:

- The current state of the region, in the context of regional values (Section 2.0);
- Exposure to climate hazards (Section 3.0);
- Sensitivity to climate hazards (Section 4.0); and
- The region’s adaptive capacity (Section 5.0);

Development of the research papers has drawn primarily upon the *Western Adelaide Region Climate Change Adaptation Plan – Stage 1* and additional relevant literature and interviews with key informants associated with the research paper theme where appropriate.

2.0 Social and community resilience and health in the Western Adelaide region

2.1. Overview

The social and community resilience and health theme within the AdaptWest project fundamentally relates to the region's people – the individuals and groups that live in, work in and visit Western Adelaide, and the relationships between them.

The notions of community resilience and community capacity are complex, and comprised of multiple factors relating to wellbeing, connectedness and access to resources and support.

Health amongst the community relates to physical and mental wellbeing, but also aspects of the environment and people's interaction with it, as well as safety and response to emergency situations.

These factors that contribute to social and community resilience and health have a relationship to:

- Demographic characteristics of the population such as age, income, employment, level of education, housing, household structure, cultural background and language and access to transport;
- The physical environment, facilities and infrastructure within the region; and
- The services and support available to the region's population.

Section 2.3 briefly describes each of these elements in relation to Western Adelaide currently. Unless indicated otherwise, all information in these sections is drawn from *Western Adelaide Region Climate Change Adaptation Plan – Stage 1*.³

2.2. Key stakeholders

Key stakeholders in Western Adelaide's social and community resilience and health are:

- **Local governments** that provide services and facilities that contribute to social and community wellbeing and public health (for example libraries, community centres, open space and recreation facilities, immunisation services, Home and Community Care services, public health initiatives, emergency preparedness support and planning) and provide opportunities for volunteering;
- **State government agencies** that provide services and facilities that contribute to social and community wellbeing and individual and public health for example hospitals, domiciliary care, housing and social support services for vulnerable members of the community and emergency response and planning;

³ SKM (2013)

- **Not for profit organisations** that provide community services and facilities and provide opportunities for volunteering, for example Meals on Wheels, Uniting Communities and Surf Life Saving South Australia;
- **Community groups and clubs** that provide services and facilities that contribute to social and community wellbeing and facilitate connection in the community, for example residents associations, local environmental groups and sports clubs;
- **Households and individuals**, who are members of the community and with the support of other stakeholders, are responsible for their own health, safety and wellbeing.

2.3. Existing conditions

2.3.1. Demography

At the 2011 census, the Western Adelaide region was home to 215,516 people, or 17% of the population of Greater Adelaide. The region's population grew modestly between 2001 and 2011, at a slightly lower rate than the greater metropolitan area.

The proportion of the region's population aged over 65 years is historically higher than for Greater Adelaide, but 2011 census data shows the gap narrowing. The population is ageing with 42% aged 45 years or over, and declining proportions over the last 10 years in the 5 to 14 years and in particular the 25 to 44 years age cohorts.

Within the region, the City of Charles Sturt has the largest proportion of people aged 45 years and over, while the City of West Torrens has comparatively more people aged between 15 and 44 years. Amongst the three Cities, Port Adelaide Enfield has higher proportions of children aged between 0 and 14 years.

Over the last 10 years Western Adelaide has consistently had a smaller proportion of residents born in Australia compared to Greater Adelaide, with the smallest proportion in the City of Port Adelaide Enfield. Since 2001 the number of residents born in Australia has declined and the number of residents born overseas has increased, with Port Adelaide Enfield experiencing the largest shifts.

Western Adelaide residents born overseas are most likely to have been born in the United Kingdom, Italy, Vietnam, India, Greece or China. Port Adelaide Enfield has particularly large Vietnamese, Indian, Chinese and Phillipino communities. Charles Sturt largely mirrors trends across the region, although is home to larger Italian community. West Torrens has large Greek, Indian and Chinese communities, but a very small Vietnamese population.

A range of languages are spoken across the region, and it has large numbers and proportions of Greek, Italian, Vietnamese and Chinese speakers. Low levels of proficiency in English are more prevalent in Western Adelaide than across the metropolitan area as a whole.

Western Adelaide has a higher proportion of Aboriginal people than Greater Adelaide, with Port Adelaide Enfield being home to larger numbers of Aboriginal people than other regional Councils.

In relation to health, Western Adelaide has a slightly above average proportion of the population requiring assistance with core activities, higher rates of self assessment of fair or poor health, lower rates of self assessment of good, very good or excellent health, higher incidence of at least one of four key health risk factors (smoking, harmful use of alcohol, physical inactivity or obesity) and higher incidence of chronic disease and psychological distress.

Within the region Port Adelaide Enfield has particularly high rates of chronic disease and an incidence of at least one of four key health risk factors 7% higher than for Greater Adelaide.

Other key demographic features of the region are:

Income

- Median income levels slightly lower than Greater Adelaide;
- Proportionally more people receiving income support (disability, single parent and unemployment payments), and particularly high rates in the City of Port Adelaide Enfield;

Education and employment

- A slightly lower than average proportion of people with school based qualifications;
- Lower than average unemployment across the region, but considerable variation amongst smaller areas within the region including some in the City of Port Adelaide Enfield above the Greater Adelaide rate of 6.1%;
- A lower employment participation rate than Greater Adelaide (in other words a greater proportion of people not seeking work);

Household structure

- Proportionately fewer households of couples with no children but more lone person households. Port Adelaide Enfield has a higher concentration of one parent families, while West Torrens has proportionally more group (share) households.

Housing

- A comparatively diverse housing stock with above average and increasing proportions of semi-detached, townhouse, unit and apartment dwellings;
- Rates of home ownership similar to across the State but in decline over the past ten years;
- Higher proportions of renters;

Aged care places

- Relatively few high care places across the region, and average proportions of low care places;
- A high concentration of high care places in the City of Port Adelaide Enfield;

Transport

- An above average proportion of dwellings with no or one motor vehicle;

Community participation

- A lower than average rate of volunteering, and high rates of involvement in school based activities amongst those who volunteer.

2.3.2. Physical environment, facilities and infrastructure

Facilities and infrastructure provided in Western Adelaide with a relationship to social and community resilience and health provided includes:

- 16 community centres, 5 surf life saving clubs and 10 libraries as shown in Table 2.1;
- The Queen Elizabeth Hospital in Woodville South in the City of Charles Sturt;
- Police stations at Henley Beach, Holden Hill, Netley, Ottoway and Port Adelaide;
- 94 public primary and secondary schools and 3 special schools;
- Public housing and schools as shown in Table 2.2;
- 32 waste management facilities;
- 6 recreational jetties and boat ramps for public use;
- 1,473 hectares of parks and reserves – 552 hectares in Port Adelaide Enfield, 559 hectares in Charles Sturt and 361 hectares in West Torrens. Eight of the ten largest open spaces in the region are golf courses, with the other 2 largest being Gepps Cross Reserve including the State Sports Park and reserves in West Beach including Adelaide Shores.
- Linear reserves such as Coast Park, the River Torrens Linear Park and the Westside Bikeway and on-road bicycle routes throughout the region;
- Formal and informal recreation and sport facilities at Adelaide Shores, State Sports Park, Santos Stadium, ETSA Park, Adelaide Arena and West Lakes;
- 23 km of beaches, and coastal access and open space at Barker Inlet and the Port River.

Table 2.1: Community centres, libraries and surf life saving clubs in Western Adelaide

	Charles Sturt	West Torrens	Port Adelaide Enfield
Community centres	Bower Cottages Cheltenham Findon Henley & Grange Seaton North West Lakes Youth Central	Camden Western Youth Reedbeds Hamra Centre Plympton Glandore Thebarton Hub	Enfield Hillcrest Holden Hill Kilburn Lefevre North East The Junction Wandana
Libraries	Civic Library Woodville Findon Library Henley Beach Library Hindmarsh Library West Lakes Library	Hamra Centre Library	Enfield Library Greenacres Library Port Adelaide Library Semaphore Library
Surf life saving clubs	Semaphore Grange Henley West Beach	-	North Haven Coast Guard SAF1 North Haven

Table 2.2: Social housing in Western Adelaide

	Western Adelaide	Charles Sturt	West Torrens	Port Adelaide Enfield
State owned housing	10,544	3,842	1,257	5,445
Housing co-op / community housing	1,602	467	371	764
Total dwellings	12,146	4,309	1,628	6,209

2.3.3. Services and support

Availability and use of health, community, educational, arts and cultural and emergency management services in Western Adelaide is relevant to the region’s social and community resilience and health.

Features of health and community service use in Western Adelaide are:

- A slightly higher rate of General Practitioner (GP) services offered than across metropolitan Adelaide, and higher again in the City of Port Adelaide Enfield;
- Use of psychologist services slightly lower than the metropolitan rate - preparation of mental health care plans by GPs significantly lower, and use of psychiatrist services slightly higher (highest in West Torrens and lowest in Port Adelaide Enfield);
- A lower rate of provision of social work services, and a higher rate of provision of occupational therapy services;
- A smaller proportion of the population holding private health insurance compared to metropolitan Adelaide; and
- A lower rate of older people having undertaken an annual health assessment, despite above average proportions of older people in the region.

In terms of service availability, key primary health care services in the region are provided at Woodville associated with the Queen Elizabeth Hospital and GP Plus Health Care Clinic that provides a range of services including child and youth health, dental, mental health, Aboriginal health and chronic disease management.

Other key mental health and community support services in the region include:

- Mental health, family support, youth, and housing services (e.g. as provided by UnitingCare Wesley Port Adelaide at numerous locations in the region);
- Support for young children and parents (at Seaton and Cowandilla);
- Training and skill development (e.g. as provided by Comskil in Thebarton/Bowden);
- Programs for culturally and linguistically diverse (CALD) residents (throughout the region);
- Rehabilitation services (at the Hampstead Rehabilitation Centre);
- Health, aged care and community support services provided by not for profit organisations with offices in the region (for example ACH Group, the Asthma Foundation of SA, Australian Refugee Association, Life Education, Life without Barriers, Overseas Chinese Association of SA Inc.);
- Local government provided services such as library and community centre programs, community buses, volunteering programs, grants and awards and delivery of the Home and Community Care (HACC) program for older people; and
- Services provided by community based groups and clubs and faith based groups.

The region's Councils and the State Government provide public health services in accordance with legislative requirements relating to food safety, environmental health and communicable disease, as well as initiatives to support active lifestyles and healthy eating.

In terms of educational services, there are 142 pre-schools, primary schools and secondary schools across the region. The majority of the region's 8 tertiary campuses are located in Port Adelaide Enfield, though the City of Adelaide's numerous tertiary institutions are accessible from the region. Other adult education is provided through Council community centres and not for profit organisations.

Arts and cultural facilities in the region include The Parks, The Port Community Arts Centre, Woodville Town Hall, Thebarton Theatre and Hamra Centre Auditorium Gallery. Other community centres, civic centres and libraries throughout the region provide spaces for performing and visual arts. Each of the region's Councils provides and maintain public art, and support local arts through events, grants and information provision.

A range of State and Commonwealth Government and not for profit emergency management initiatives exist in Western Adelaide. These include:

- Emergency response services such as the State Emergency Service (SES), the Families SA Emergency Management Program and The Red Cross;
- Emergency communications and information provision services such as Alert SA, Disaster Assist, and local government programs;
- A regional Zone Emergency Management Plan and Local Government Emergency Response Plans.

Ambulance, fire fighting and police stations are located across the region.

2.4. AdaptWest regional values, features and aspects

An important aspect of the AdaptWest project is the involvement of stakeholders to help identify, assess and prioritise the region's vulnerabilities to climate change and options to adapt.

The initial stage of this involvement was a workshop in which representatives of key stakeholder organisations identified those aspects of Western Adelaide that are important to their objectives and core functions and contribute to the vitality and functioning of the region and beyond.

The AdaptWest project team developed stakeholder input into a list of regional values with associated features and aspects that will form the basis of subsequent project tasks and in particular the IVA.

Table 2.2 describes the AdaptWest values, features and aspects that have a direct relationship to social and community resilience and health in the region.

Table 2.2: AdaptWest values, features and aspects relating to social and community resilience and health

What we value in the Western Region	Features or aspects that relate to this value	Relationship to social and community resilience and health in Western Adelaide
Amenity and quality of life	<p>Safety and health</p> <p>Sport, recreation, entertainment and tourism facilities</p> <p>Coastal /water based recreation</p> <p>Open and green spaces</p> <p>Natural and historical environments</p>	<p>A high level of amenity and high quality of life supports a robust, healthy community. Amenity and quality of life is achieved by:</p> <ul style="list-style-type: none"> - A safe and healthy physical environment including clean air and water; - Access to health and community support services for example the Queen Elizabeth Hospital and GP Plus Health Care Centre at Woodville; - Access to educational opportunities, arts and culture; and - Opportunities for physical activity and social connections through open and green spaces as well as facilities for recreation and entertainment. <p>Throughout the region heritage places contribute to regional character, visual amenity and quality of life. Port Adelaide is South Australia’s first state heritage area and contains the state’s most substantial and continuous group of colonial buildings.⁴</p> <p>The region’s Aboriginal heritage provides a link to the history, practices and beliefs of the Kurna people. A number of places in Western Adelaide have a significance for Kurna people including Karrawirraparri, Tardna-parr (River Torrens), Yerta Bulti (Port River Estuary), and Wongayerlo (Gulf St Vincent).⁵</p>

⁴ Department of Environment, Heritage and Natural Resources
http://www.environment.sa.gov.au/our-places/Heritage/Visiting_heritage_places/State_heritage_areas/Port_Adelaide

⁵ Telfer, K & Malone, G (2012) *The City of Charles Sturt Kurna Meyunna Cultural Mapping – A People’s Living Cultural Landscape*; Vivienne Wood – Heritage Consultant, Hemisphere Design, City of Port Adelaide Enfield and GHD (2007) *Kurna Cultural Heritage Survey*

Social and community resilience and health in the Western Adelaide region

What we value in the Western Region	Features or aspects that relate to this value	Relationship to social and community resilience and health in Western Adelaide
A strong and connected community	Diversity Equity and social justice Vulnerable members of the community	<p>Social connection supports individual physical and mental health, and strong networks increase the capacity of communities to withstand challenging circumstances.</p> <p>Access to formal and informal support is particularly important for vulnerable members of the community who may otherwise become isolated.</p> <p>This support can be in the form of targeted services to meet particular needs such as those provided by UnitingCare Wesley Port Adelaide, or facilities and environments that facilitate connection to programs and experiences such as Council libraries and community centres.</p>
Coastal and riverine water quality	Port River River Torrens Gulf St Vincent Water Sensitive Urban Design (WSUD) Stormwater capture and reuse	<p>Healthy coastal and riverine environments support safe recreation and enjoyment of areas such as the River Torrens Linear Park and the region's beaches that are used for swimming, water sports, walking, and socialising.</p> <p>Opportunities for outdoor recreation, activity, and social connection support community resilience and physical and mental health.</p>
Coastal environment	Environmental values Community and recreation Tourism Assets and infrastructure	<p>Healthy coastal environments support safe recreation and enjoyment of areas the region's beaches that are used for swimming, water sports, walking, and socialising.</p> <p>Opportunities for outdoor recreation, activity, and social connection support community resilience and physical and mental health.</p>

Social and community resilience and health in the Western Adelaide region

What we value in the Western Region	Features or aspects that relate to this value	Relationship to social and community resilience and health in Western Adelaide
Infrastructure and essential services	Port facilities Adelaide Airport Water and wastewater treatment Power generation Transport Open space Defence industries Community facilities	<p>Community infrastructure including the parks, walking and cycling paths, recreation facilities, community buildings and health buildings throughout Western Adelaide support the delivery of services and programs as well as opportunities for formal and informal physical activity, recreation, learning and social connection.</p> <p>Electricity, water, wastewater, communications and transport services underpin public health and safety, and contribute to the quality of life of the region's residents.</p>
Management and use of stormwater	Protection of homes Protection of infrastructure Water Sensitive Urban Design (WSUD) Stormwater capture and reuse	<p>Management of stormwater for flood mitigation supports community safety, health and resilience through protection of human life, as well as the homes, businesses, services and infrastructure that contribute to quality of life in the region.</p> <p>Capture and reuse of stormwater creates opportunities for maintaining or increasing the amenity of open spaces and recreational facilities such as ovals and playing fields, and contributes to water quality off local beaches.</p>
Regional productivity and economic contribution to the state	Infrastructure and industries of state significance: <ul style="list-style-type: none"> - Port facilities - Adelaide Airport - Defence industries - Gillman industrial area - Tourism infrastructure e.g. Adelaide Shores - Adelaide Entertainment Centre 	<p>Economic development and productivity is linked with employment and economic growth.</p> <p>Local employment has a relationship with key demographic indicators relating to health and wellbeing including income, employment, housing, educational achievement and physical and mental health.</p> <p>An economically prosperous region supports its community's access to a broad range of services and investment in social infrastructure that strengthens social and community resilience.</p>

2.5. Key decisions

Consideration of the relationship between climate impacts and key decision lifetimes is another focus of the AdaptWest project (refer Section 1.2).

At the same workshop described in Section 2.4, stakeholders identified the key decisions for the region relating to the social and community resilience and health theme. These theme-specific key decisions are set out in Table 2.3, and contributed to the broader regional key decisions summarised in Figure 1.1 (refer Section 1.2).

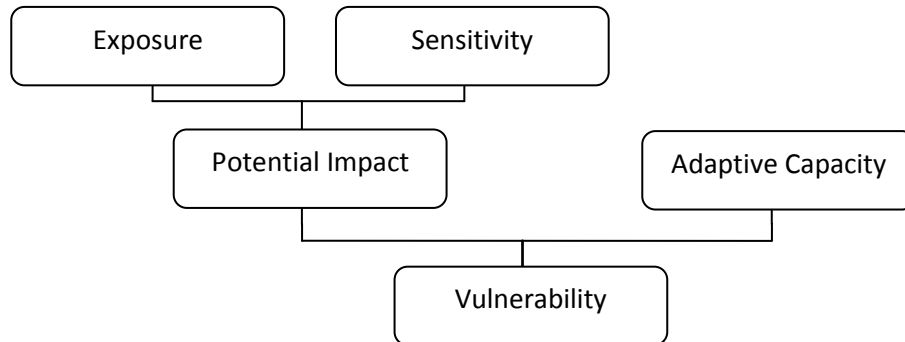
Table 2.3: AdaptWest key decision relating to social and community resilience and health

Decision lifetime	Key decision
Short lifetime decisions (0-10 years)	<ul style="list-style-type: none"> • Develop free wi-fi access in community places • Develop and implement community events and programs • All primary school children learn how to swim
Medium lifetime decisions (10-30 years)	<ul style="list-style-type: none"> • Developing and constructing community buildings/facilities • Develop and refurbish playgrounds • Develop and implement Open Space Plan
Long lifetime decisions (30+ years)	<ul style="list-style-type: none"> • Plan, develop and maintain stormwater coastal inundation infrastructure • Develop and implement social/lifelong learning policies • Develop and implement social policies • Determine future of levels of Government

2.6. Preliminary identification of IVA indicators

The AdaptWest research papers are a resource to support completion of an IVA for the region. The IVA will assign scores against a range of indicators in relation to their exposure and sensitivity to climate variables, as well as the region's adaptive capacity (refer Figure 2.1; adaptive capacity is further discussed in Section 5.0). An IVA is a tool that helps to identify areas of vulnerability to the impacts of climate change and assists with prioritising or identifying areas for focussing adaptation action.

Figure 2.1: Assessment of vulnerability in the IVA



Based on the existing conditions in the region and their relationship to values, a list of suggested indicators that could be used to assess the vulnerability of social and community resilience and health in Western Adelaide has been developed, and is included in Appendix A.

These suggested indicators will be considered further by the AdaptWest project team in development of a list of regional indicators that will assist to identify vulnerabilities across the project themes and regional values.

3.0 Exposure factors

This section outlines the climate hazards that the region may be exposed to as a result of changing climatic conditions. The exposure of Western Adelaide to climate hazards is summarised in Table 3.1.

Table 3.1: Exposure of Western Adelaide to potential climate hazards

Climate hazard	Exposure of Western Adelaide
Increasing average temperature	Entire region exposed
Increasing frequency, intensity and duration of heatwaves	Entire region exposed
Declining average annual rainfall	Entire region exposed
Increasing rainfall intensity	Entire region exposed
Coastal inundation caused by sea level rise /storm surge	Marine and coastal areas of the region exposed
Increased coastal recession due to accelerated erosion	Marine and coastal areas of the region exposed
Increasing temperature of Gulf waters	Marine and coastal areas of the region exposed
Increasing acidity of Gulf waters	Marine and coastal areas of the region exposed

Unless otherwise stated, the discussion of projected changes in climate below is based on a medium emissions scenario and median model outputs (often referred to as the “best estimate”). Baseline conditions refer to the period 1980-1999, which is the standard reference period identified by CSIRO and Bureau of Meteorology (BoM).⁶

3.1. Increasing average temperature

Temperatures in southern Australia have been increasing by about 0.2°C per decade since 1950⁷ and are expected to rise further over the coming decades. By 2030, average annual temperatures are projected to rise by 0.6-1°C and by 2070 by 1.5-2°C compared with baseline conditions (ranging from 1-3°C under low to high emissions).⁸ Mean maximum temperatures are expected to increase greatly,

⁶ CSIRO and BOM (2007-2014) *Climate Change in Australia*. www.climatechangeinaustralia.com.au

⁷ CSIRO and BOM (2007-2014)

⁸ CSIRO and BOM (2007-2014)

particularly during summer months.⁹ For example, average maximum February temperatures could increase from 28.2 °C to 32.7 °C.

3.2. Increasing frequency, intensity and duration of heatwaves

Heatwave typically describes a prolonged period of excessive heat, with common measures being the number of consecutive days over 35°C or 40°C. Three or more consecutive days where the average of daily maximum and minimum temperatures is greater than 32°C is a trigger used by the State Emergency Service for preparation of Extreme Heat Plans to mitigate the impact of extreme heat events on the community.¹⁰

The frequency of heatwaves with an average of the daily maximum and minimum temperatures of more than 32°C for 3 or more days is projected to increase from 1 in 20 years under current conditions to 1 in every 1 to 5 years (under high emissions or low emissions, respectively) by 2070. The duration of heatwaves will also increase by 2070, with projections suggesting that the region could experience periods of 5 to 6 days where an average of the daily maximum and minimum temperatures exceeds 32°C (1 in every 20 years).

With regard to intensity across each year, the number of days with maximum temperatures of 35°C or more is projected to increase from less than 15 to over 17 per year by 2030 and to over 35 by 2070 (high emissions, 50th percentile). Days with temperatures over 40°C are projected to increase from less than 2 per year to 2.5 per year by 2030 and over 10 per year by 2070 (high emissions, 50th percentile).

3.3. Declining average annual rainfall

Average annual rainfall is expected to decrease across the Western Adelaide region in the coming decades. Median projections are for rainfall to decline by 2-5% by 2030 and between 5-20% by 2070 throughout South Australia.¹¹

Using information from meteorological stations in Western Adelaide, the most likely outcome under a medium and high emissions scenario is for average annual rainfall to decline by about 60 to 75 millimetres per year by 2070.¹²

Seasonally, a greater decline in rainfall has been predicted for spring than for autumn, however observations imply that autumn to winter rainfall patterns have changed and may be attributed to climate change impacts on atmospheric circulation patterns.¹³

⁹ SKM (2013) p.36

¹⁰ SKM (2013) p.37

¹¹ CSIRO and BOM (2007-2014)

¹² SKM (2013) p.42

¹³ SKM (2013) p.42

3.4. Increasing rainfall intensity

Extreme rainfall events are forecast to become more intense by 2070, particularly during spring and summer. Historically, the total daily rainfall that is exceeded only once per year on average (i.e. a 1 year average recurrence interval (ARI)) is 27 millimetres. Under a medium emissions scenario, the daily rainfall totals exceeded for 10 year and 100 year ARIs are 50 millimetres and 75 millimetres, respectively.

Under a high emissions scenario there is an increase in rainfall intensity with the 10 year and 100 year ARI events anticipated to rise from 50 millimetres and 75 millimetres, to 58 millimetres and 90 millimetres (respectively) by 2070.¹⁴

3.5. Coastal inundation caused by sea level rise /storm surge

Global mean sea level rise for 2081–2100 relative to 1986–2005 will likely be in the range of 0.3 to 0.6 m for RCP4.5 and RCP6.0¹⁵ (equivalent to a low to medium emissions scenario).¹⁶ Tide gauging in the Western Adelaide region has found sea levels to be rising at a rate of 2.06 millimetres per year and 2.08 millimetres per year at the Inner Harbour and Outer Harbour areas respectively.¹⁷

Sea level rise could exacerbate exposure to non-climate specific threats such as land subsidence from natural causes and anthropogenic activities (e.g. landfill developments and large-scale groundwater extraction), and saline intrusion of aquifers.¹⁸

Sea level rise is also expected to intensify storm surge events. These are events where sea levels rise significantly above normal tide levels for a temporary period of time. Presently, the mean sea level at Outer Harbor is 0.13 m below the Australian Height Datum (AHD). However, the 100 year ARI water level for Outer Harbor based on current mean sea levels is 2.4 metres above AHD. This means that under a high sea level rise scenario, storm surge events could cause tides to reach areas that are presently 2.4 metres above AHD.¹⁹

3.6. Increasing coastal recession due to accelerated erosion

Coastal recession is defined as the landward retreat of a coastline. Coasts which are composed of erodible sediments (such as sand or mud) may retreat in response to sea level rise. The rate of change of coastal recession is dependent on many factors such as the rate of sea level rise, the resistance of the coast to erosion, effectiveness of any coast protective infrastructure, and longshore sediment movement.²⁰

¹⁴ SKM (2013), p.42

¹⁵ RCP = Representative Concentration Pathway, as referred to in: IPCC (2013) *Summary for Policymakers*, Cambridge University Press

¹⁶ IPCC (2000) *Summary for policymakers: Emissions Scenarios*, IPCC

¹⁷ DEH (2005) *Adelaide's Living Beaches: A Strategy for 2005-2025*, Department of Environment and Heritage, p.54

¹⁸ SKM (2013) p.60; DEH (2005), p.55

¹⁹ DEH (2005) p.101

²⁰ SKM (2013), p.61

Most of the coast in the Western Adelaide region is highly erodible as it is comprised mainly of sand and mud. Areas along the coast of St Vincent's Gulf are unprotected and are therefore more susceptible to wave action. Coastal recession in the Western Adelaide region could be between 50m and 100m in a high sea level rise scenario (i.e. 1m) if no control measures are implemented.²¹

3.7. Increasing temperature of gulf waters

The best estimate of changing sea surface temperatures are for a 1.5 to 2°C warming of oceans off South Australia by 2070.²² How this translates to changes in the shallower Gulf waters is yet to be seen. Past work found approximately equal rates of warming in the deep ocean waters of the Great Australian Bight compared with the mouth of Spencer Gulf (i.e. 0.11°C and 0.12°C per decade since 1950, respectively).²³

3.8. Increasing acidity of gulf waters

The Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report suggests that the earth's oceans will become more acidic under all scenarios assessed. Projections for decreasing pH range from 0.06 to 0.32 by 2100, with a best estimate more likely to be in the order of a 0.2 pH unit decrease.²⁴ This compares with a 0.1 pH unit decrease that has already been experienced since the beginning of the industrial era 250 years ago.

²¹ South Australian Coast Protection Board (1992), *Coastal Erosion, Flooding and Sea Level Rise Standards and Protection Policy*, Coastline, p.6

²² CSIRO and BOM (2007-2014)

²³ Suppiah *et al.* (2006) *Climate Change Under Enhanced Greenhouse Conditions in South Australia*, CSIRO Marine and Atmospheric Research, p.5-6

²⁴ IPCC (2013) *Summary for policymakers*, University Press, p.25

4.0 Sensitivity factors

This section describes the potential sensitivities of AdaptWest values relating to social and community resilience and health to climate hazards. Table 4.1 below summarises the values and climate hazards to which they are sensitive.

Table 4.1: Potential sensitivities of social and community resilience and health values to climate hazards

HAZARD	Increased temperatures	Increased heatwaves (IFD)	Increased temperature of Gulf waters	Increased rainfall intensity	Reduced average annual rainfall	Coastal inundation	Coastal recession	Increased pH of Gulf waters
VALUE								
Amenity and quality of life	X	X		X	X	X	X	
A strong and connected community	X	X		X	X	X	X	
Coastal and riverine water quality	X	X	X	X	X	X	X	X
Coastal environment	X	X	X	X	X	X	X	X
Infrastructure and essential services	X	X	X	X	X	X	X	
Stormwater management and use	X	X		X	X	X	X	
Regional productivity and economic contribution	X	X	X	X	X	X	X	X

4.1. Amenity and quality of life

The features and aspects of Western Adelaide relating to this value include safety and health, sports, recreation, entertainment and tourism facilities including coastal and water based recreation, open and green spaces, and natural and historical environments.

Data collected by the Department for Health shows that during periods between 2001 and 2012 where the temperature exceeded 35°C for three more consecutive days, emergency department presentations of residents of Western Adelaide were 3.1% higher, heat-related presentations were 4.3 times higher, renal health related presentations were 15% higher, mental health related presentations were 8.2% higher and average daily mortality increased by 0.3 deaths. Other research has noted that there are temperature thresholds for when mortality starts to dramatically increase in

metropolitan Adelaide - one study has identified maximum temperatures of at least 43°C for 3 or more consecutive days as one such trigger.²⁵

Older people are particularly vulnerable to heat, being at higher risk of dehydration and heat exhaustion, more likely to have restricted mobility that limits their ability to access services and heat refuges. The demand for community buses, home care services and mobile libraries is likely to increase in a hotter climate. Some older people are reluctant to use air conditioning due to concerns about electricity costs.

Heat may impact public health through heat induced algal blooms, increased vermin and mosquitoes, increased risk of asthma and respiratory illnesses due to reduced air quality and production of aero-allergens in some areas, higher demand for investigations into communicable diseases, an increased risk of immunisation products that require storage at low temperatures being compromised, faster food spoilage and people buying less fresh produce.²⁶

During heatwaves and extreme heat, opportunities for outdoor recreation and informal exercise are reduced, and formal sport and recreation may be cancelled, postponed or relocated indoors, putting additional pressure on indoor facilities. Infrastructure upgrades to sport and recreation facilities such as playing fields, recreation centres and walking paths may be required to maintain their usability in hot and dry conditions, for example lights to enable evening use, air conditioning of indoor facilities, heat tolerant playing surfaces, and shade structures in parks and playgrounds.

Effects of hot and dry conditions on trees and vegetation (drying, plant loss, introduction of disease) have flow on effects to amenity and people's quality of life. Urban heat island (UHI) effect may also exacerbate the intensity and impacts of heatwaves and extreme heat in built up areas, and particularly those at higher densities. UHI refers to the difference in air temperature between urban environments and surrounding rural environments, where urban environments experience warmer temperatures due to a larger impervious surface area as a result of urban development.

The occupational health and safety of staff and volunteers working outdoors is affected by a hotter climate, with the ability to impact on services that contribute to amenity and quality of life such as infrastructure maintenance, waste collection and revegetation.²⁷

Loss of beaches and public infrastructure on the coast through coastal recession or inundation will significantly impact upon recreational amenity and well being, reducing functionality and access to these spaces and assets. Fine-medium sand beaches which offer the highest recreational value of all beach types makes up around 20 km of the region's coastline from West Beach in the south to North Haven in the north. Community infrastructure potentially affected by the coastal impacts of

²⁵ SKM (2013) p. 111

²⁶ Resilient South (2013) *Stage 1 Stakeholder Engagement Report – Resilient South* prepared by URPS as part of the Resilient South consultancy led by URPS, for the Cities of Onkaparinga, Holdfast Bay, Marion and Mitcham in association with the Government of South Australia and the Australian Government, p.20

²⁷ Resilient South (2013) p. 18

climate change includes the region's numerous Surf Life Saving Clubs (refer Table 2.1), and coastal and foreshore walking paths, playgrounds and reserves including dunes systems at Tennyson Dunes Reserve and RB Connolly Reserve.

Access to and quality of recreational assets may also be lost through increased rainfall intensity, as playing fields and open spaces often serve as retention areas for flood mitigation. Increased rainfall intensity leading to flooding also puts homes and businesses at risk of damage, and is a risk to human life.

Extreme heat, heatwaves and increased rainfall intensity have potential to limit people's access to community programs and services, and have potential to impact on the buildings in which these programs and services are delivered.

Buildings, streetscapes and environmental assets with Aboriginal or non-Aboriginal heritage value that contribute to the region's amenity and quality of life can also be impacted by climate hazards such as flooding, sea level rise, and reduced rainfall.

4.2. A strong and connected community

The features and aspects of Western Adelaide relating to this value include diversity, equity and social justice, and vulnerable members of the community.

Equity and social justice encompasses access for all members of the community to a high level of amenity and quality of life, and as such the sensitivities described in Section 4.1 are equally relevant to this value.

Vulnerable members of the community are likely to be more sensitive to climate hazards than the broader population on the basis of factors such as limited mobility, limited capacity, social isolation and a lack of financial resources. Vulnerable members of the community may also rely heavily on services that are under pressure during extreme heat, heatwaves, and periods of intense rainfall and/or coastal inundation for example GP and hospital services, community buses, community centres and libraries, and in home support.

Extreme heat, heatwaves and increased rainfall intensity have potential to limit people's access to a range of services and opportunities for social connection. For vulnerable members of the community who may rely on public transport or walking (such as older people), access to basic amenities such as food shopping may also be reduced. The region contains above average proportions of dwellings with one or no motor vehicles.

Opportunities for physical activity and social interaction and connectedness have a key role in supporting mental health.²⁸ They types of impacts on community facilities and public spaces described in Section 4.1 have potential to reduce access to these opportunities and negatively impact mental health in the region. Physical discomfort caused by extreme heat has the potential to increase mental stress, as do extreme events such as flooding that may require emergency response or damage/threat of damage to property and personal safety.

²⁸ City of West Torrens (2014) *Public Health Plan September 2014*

4.3. Coastal and riverine water quality

The features and aspects relating to coastal and riverine water quality in the Western Adelaide region include the Port River, the Torrens River and the Gulf St Vincent.

The primary threat to coastal water quality in the Western Adelaide region is the activation of coastal acid sulfate soils (CASS). These soils are present over 2.5 square kilometres of the Gilman area, which encompasses parts of the Port River coastline, Port River estuary and Barker Inlet. Disturbances of the CASS from drainage and infrastructure development have previously caused the production of sulphides. The release of acid and metal ions in surrounding bodies of water deteriorates coastal water quality with potential impacts for public health, amenity and recreation.²⁹

A hotter climate combined with increased rainfall intensity may result in increased algal blooms and pollutants, restricting the safety and use of coastal and riverine areas for water-based recreation. This has occurred in the past with temporary closure of West Lakes on account of algal blooms.

4.4. Coastal environment

The coastal environment in the Western Adelaide region comprises the following assets:

- Port River coastline
- Estuaries, including the Barker Inlet and Port River Estuary
- Aquatic reserves (e.g. Torrens Island Conservation Reserve)
- Coastal reserves, such as the Torrens River Estuary
- Remnant sand dunes along the Gulf St Vincent coastline and Tennyson and West Beach²⁹

Community recreation values of assets such as the coastal and aquatic reserves could be affected directly by coastal recession and inundation through the loss of sand dunes, increased movement of sand and longer periods of beach inundation. This could lead to reduced beach access and use, and diminished landscape values of the region's beaches. Impacts of coastal recession and inundation on coastal recreational infrastructure such as walking paths, benches, playgrounds and picnic areas could be similarly affected, as described in Section 4.1.

Beaches are a primary source of recreation and leisure for the Western Adelaide region and beyond. Southern and central beaches in the region such as West Beach experience persistent erosion from rising sea levels, while northern coastline areas such as Semaphore experience coastal deposition due to the movement of sand from the south along the Gulf St Vincent coastline. As a result, many beach replenishment activities have taken place, with sand being trucked and pumped from beaches where sand has built up, to beaches with little sand.³⁰ Such activities

²⁹ SKM (2013) p. 121-122

³⁰ DEH (2005)

are likely to affect the amenity of beach use, and in some cases, may prevent use of the beaches during maintenance works.

A hotter climate combined with increased rainfall intensity may result in increased algal blooms and pollutants, impacting public health and safety and restricting recreational use of the coastal environment for swimming, walking, and watersports.

4.5. Infrastructure and essential services

Community infrastructure including parks, walking and cycling paths, recreation facilities, community buildings and health buildings throughout Western Adelaide support the delivery of services and programs, as well as opportunities for formal and informal physical activity, recreation, learning and social connection.

Likely climate change impacts upon public infrastructure include higher operational costs (energy, water and maintenance), unreliability of power and utilities, coastal erosion and loss of property, changes in visitation patterns and utilisation, and deterioration of structures and facilities such as buildings, marine infrastructure, roads and bridges caused by storms, heat, flooding and inundation.

4.6. Management and use of stormwater

Features and aspects relating to the management and use of stormwater in the Western Adelaide region include the protection of homes and infrastructure, Water Sensitive Urban Design (WSUD) and stormwater capture and reuse.

Four catchments make up the Western Adelaide region. These are:

- Port Adelaide – a highly urbanised catchment and water course, containing an artificial lake
- Dry Creek – an ephemeral watercourse
- Torrens River – a mix of urban and rural catchments with a water course partly lined with concrete, an artificial lake created by a weir and an artificial outlet to the sea
- Patawalonga Creek - a mix of urban and rural catchments with primarily natural watercourses³¹

Stormwater infrastructure in the Western Adelaide region comprises assets such as pipes, culverts, local and main drains, pits, open channels, junction boxes, pumping stations, wetlands and trunk drains. These are several features of the Western Adelaide region that provide protection to homes and infrastructure from major flooding and storm events. These features are at risk of direct seawater and/or subsequent stormwater inundation due to rising sea levels and increased rainfall intensity. For example, the existing stormwater network in the Port Adelaide catchment, of which a significant area of the catchment has been prone to

³¹ SKM (2013) p. 200-207

frequent flood inundation, is at risk of losing its ability to transfer stormwater out to sea efficiently due to high downstream runoff levels. Being a highly urbanised area at a relatively low elevation, this suggests homes and infrastructure alike are at an increased level of risk from damage.³¹

Parts of the Outer Harbor and Patawalonga Creek catchment are at risk of seawater and stormwater inundation respectively. However, studies have suggested that existing WSUD and stormwater reuse infrastructure, such as the Apex Park wetlands, play a dual role in that they also act as a buffer to prevent seawater from inundating surrounding residential areas. The Breakout Creek Weir, in addition to managing stormwater along the River Torrens provides protection from storm surge.

4.7. Regional productivity and economic contribution to the state

Likely impacts on assets associated with the regional economy include flooding and seawater inundation, damage to buildings and structures, and shut down periods during flooding or extreme heat events.

This may result in a number of flow-on impacts, including higher operating costs associated with power and insurance, increased capital costs associated with retrofitting and maintenance, supply chain disruptions, declining productivity associated with disruptions and delays, reduced safety of energy infrastructure, accelerated depreciation of assets, and redundancy of business models.

Such conditions influence the viability of local industries and businesses, which can in turn affect local employment which plays a role in community resilience and wellbeing. The occupational health and safety of employees working outdoors is affected by extreme heat, heatwaves, intensity of rainfall and coastal inundation.

5.0 Adaptive capacity factors

Adaptation is the process of adjustment to actual or expected climate and its effects, and in the case of human systems, seeks to moderate harm or exploit beneficial opportunities. Adaptive capacity is the ability to adapt - to adjust to potential damage, take advantage of opportunities, or respond to consequences.³²

In determining adaptive capacity, consideration is given to what extent a feature or function in its current form, with current practices in place, could continue to function and respond to the consequences and opportunities presented by expected future climate conditions (in the case of AdaptWest the projected climate in 2070).

In a regional context, adaptive capacity is complex and made up of a range of factors associated with systems, institutions, humans and other organisms. These factors can include natural attributes, physical infrastructure, technology, management plans and practices, funding, and governance arrangements. Social and cultural factors such as social capital, social networks, values, customs and perceptions also impact upon adaptive capacity, in for example the functionality of stakeholder relationships within governance arrangements, and whether barriers exist to implementing management practices on the ground.

A differentiation can be made between autonomous adaptation - an innate response to changes to systems, and planned adaptation - a conscious response to conditions that have or will change.³³ Adaptive capacity can be considered in a similar way, occurring 'naturally' (i.e. autonomously), or being deliberately developed (i.e. planned) to increase resilience to known and projected challenges.

The following discussion provides a brief overview of current features and conditions that contribute to Western Adelaide's adaptive capacity in relation to social and community resilience and health. Those living, working, providing services and doing business in the region are considered to be most knowledgeable about the region, and as such it is intended that this summary be tested, refined and built upon by the region's stakeholders as part of the collaborative IVA that will be undertaken in the next stage of the project.

Diversity in income and education exists across the region with pockets of high income households in some areas and concentrations of income support recipients in others. While this diversity is a strength of the region, it means that households have different capacities to make individual decisions regarding climate change adaptation, and varying levels of resources to draw upon in responding to climate hazards such as intense rainfall leading to flooding, heatwaves and extreme heat. For example, above average rates of renting limit the ability of some households to make changes to the homes in which they live, and lower income levels may reduce the availability of air conditioning to households. The proportion of the region's population with building and contents insurance is slightly lower than for

³² IPCC (2013) Glossary

³³ IPCC (2007)

Greater Adelaide, which has implications for the ability to recover from property damage resulting from climate change.

Above average proportions of the region's population are living with key health risk factors, chronic disease and high levels of physical stress that have potential to reduce adaptive capacity. At the same time, some health care and support services, particularly mental health services, are being provided at below average rates in some locations. While a range of services are provided in the region, some parts of the region (especially the south) have limited community support services. Delivery of State and Commonwealth funded health and support services is subject to significant resourcing pressures across metropolitan Adelaide, and Western Adelaide is likely to be one of many metropolitan regions experiencing unmet demand.

State and Local Public Health Plans under the *Public Health Act 2011* identify preparing for climate change as a priority public health issue. The Cities of West Torrens and Charles Sturt have developed Public Health Plans, and the City of Port Adelaide Enfield's Plan is in draft form. There is opportunity for the AdaptWest Adaptation Plan to align with strategies in these documents to build on existing adaptive capacity in the region around managing public health.

The study area contains high proportions of non-English speakers. While culturally and linguistically diverse communities enrich many aspects of the region's cultural life, they can present challenges for information provision and communication in the event of an emergency. In response to research into the effects of very hot weather on the wellbeing of migrants and refugees, SA Health has translated a number of fact sheets associated with staying healthy in the heat into multiple languages, including some simplified information specifically designed for CALD communities.

Research by the National Climate Change Adaptation Research Facility (NCCARF) found that "Community service organisations (CSOs) play a critical role in supporting individuals, families and communities experiencing poverty and inequality to build resilience and response to adverse changes in circumstances".³⁴

A wide range of community services are delivered in the Western Adelaide by public, private and not-for-profit organisations, often within existing partnerships. While a number of these services operate across the region from either one central or multiple dispersed points, targeted health and community support services are most concentrated in the north-west of the region, where there are higher proportions of residents requiring additional support.

A representative of a not for profit CSO in Western Adelaide interviewed for this research paper provided some insight into the ways in which such organisations currently contribute to adaptive capacity in the region. The organisation delivers support, assistance, care and social activities for the aged, unemployed, homeless, families, children and youth, people with mental health issues, people with a disability, and people of culturally and linguistically diverse backgrounds.

Heat is a significant impact on clients of this organisation, many of whom live in public housing that has no cooling and is not well designed for extreme heat. On or

³⁴ City of Port Adelaide Enfield (in progress) *Draft Public Health Plan*

leading up to forecasted very hot days, the CSO contacts its clients and provides information about staying cool and hydrated. The interviewee noted that clients with mental health issues and disabilities are particularly likely to need prompting about this kind of preventative health care in hot weather. The CSO also provides water and groceries to clients so they don't need to go outside, advises clients to go to air conditioned shopping centres and community spaces, and in some cases transports them to these locations by private vehicles. Rather than demand for services increasing per se during hot weather, this CSO adapts the usual program of service delivery to take a proactive approach to addressing the possible impacts of heat on people with a high need for assistance.

The CSO representative described high numbers of clients experiencing financial stress, and in the 2013/14 financial year more than 3,200 people presented to one of the CSO's centres seeking emergency financial assistance relating to utilities bills. This reflects a low adaptive capacity in some sections of the region's community, and highlights that even where people do have cooling, its use can exacerbate financial stress, especially given that affordable cooling units may have poor energy efficiency.

In terms of operation of the CSO itself, the risk of power and telecommunications outages during extreme weather was identified as the key risk that would compromise its ability to deliver services (through loss of computer access, telephones etc.), in turn reducing the region's adaptive capacity in relation to social and community resilience.

Community services throughout metropolitan Adelaide are subject to resourcing constraints. The region's socio-economic profile includes areas of recognised vulnerable communities which may be eligible for funding and support programs from State and Commonwealth Government to build capacity, including to support climate change adaptation. Conversely, the short term nature of funding regimes in the community sector creates uncertainty and difficulties in planning for the long term. This reduces adaptive capacity in relation to social and community health and wellbeing within Western Adelaide and more broadly.

A broad range of community infrastructure and services in the region - buildings, facilities, parks, footpaths, waste collection - are owned, maintained and delivered by local government. Local governments in the region as well as more broadly are facing increased resource constraints, along with continuing demand. This context has potential to reduce the adaptive capacity of this infrastructure, which if not maintained, in turn impacts the adaptive capacity of the region's population.

Depending on its form, location, and ability to be maintained under hotter and drier conditions, open space can contribute to adaptive capacity through amelioration of UHI effect and amenity benefits. Western Adelaide comprises a lower proportion of open space than other metropolitan regions (around 8%). Directions in *The 30-Year Plan for Greater Adelaide* that seek increased density of built form in some locations in the region also seek adequate provision of open space. How this vision is realised has potential to effect the proportion and quality of open space in the region, with implications for aspects of adaptive capacity associated with open space provision. Provision of water for irrigation of open space will link strongly with

WSUD strategies such as stormwater management and schemes such as Water Proofing the West.

A range of local policies, plans and strategies are in place in Western Adelaide that address various aspects of social and community resilience and health and potentially contribute to the region's adaptive capacity. These are summarised in Appendix B. National, state-wide and metropolitan-wide strategies, plans, policies also contribute to the region's adaptive capacity, for example South Australia's Disability Action Plan and the SA Department for Communities and Social Inclusion's Strategic Plan *Communities for all: opportunities for everyone*.

Governance plays an important role in adaptive capacity in all regions and sectors, influencing the ability of decisions to be made and implemented effectively.

The Resilient South project found that well-functioning and relevant governance tools such as charters, strategic plans, Terms of Reference, budgeting processes and risk management practices play a key role in the adaptive capacity of organisations in Adelaide's southern region. Conversely, governance arrangements can reduce adaptive capacity where they restrict the ability to allocate resources to long term challenges.³⁵

Governance challenges and opportunities including those relating to social and community resilience and health will be considered in future stages of the project, including through workshops with key stakeholders.

³⁵ Resilient South (2013) *Social & Institutional Mechanisms for Transitioning to Resilient Practices* prepared by URPS for the Resilient South consultancy led by URPS for the Cities of Onkaparinga, Holdfast Bay, Marion and Mitcham in association with the Government of South Australia and the Australian Government, pp. ii and 22

6.0 Summary of conclusions

The AdaptWest regional values, features and aspects identified by stakeholders have a relationship to social and community resilience and health in terms of the demographic makeup of the population, and the environment, infrastructure and services that supports the wellbeing of the community.

Western Adelaide's community is an ageing population, as well as a diverse community with a higher proportion of Aboriginal people, people born overseas, and people speaking languages other than English than Greater Adelaide as a whole. Demographic indicators of disadvantage relating to health, income, car ownership and employment participation are higher in Western Adelaide than metropolitan averages, and in some cases are concentrated in particular locations within the region.

The region's social and community infrastructure includes schools, community centres, libraries and a major public hospital. The region's recreational beaches are a major community asset, and while there are a number of community and recreational facilities, a lower proportion of the region is open space compared to other metropolitan regions.

A range of health and community services are delivered in the region by State and local government and the not for profit sector.

The role of social and community resilience and health in maintaining and enhancing the Western Region's values is likely to be sensitive to the range of future climate hazards the region will be exposed to. Members of the community experiencing disadvantage and who are reliant on public and community services are more likely to be vulnerable to a range of climate impacts including extreme heat and flooding. For the broader population, climate impacts on outdoor spaces and buildings that provide opportunities for physical activity, recreation and social connection as well as the delivery of health and community services have potential to affect social and community resilience and health.

The region's adaptive capacity in relation to social and community resilience and health is influenced by the characteristics of the population and the infrastructure and services available to support it under climate stress. The diversity of the region's community means that there will be variation amongst the population in ability to adapt. The community infrastructure and services provided in the region and the plans and strategies that govern them form a strong basis for adaptive capacity, although tempered by continuing demand and funding constraints.

The exposure, sensitivity and adaptive capacity of Western Adelaide, including in relation to social and community resilience and health, will be further explored in collaboration with regional stakeholders through the IVA process.

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Appendices

Appendix A: Suggested IVA indicators

Primary indicator	Secondary indicator	Social and community resilience and health values						
		A strong and connected community	Amenity and quality of life	Coastal and riverine water quality	Coastal environment	Infrastructure and essential services	Management and use of stormwater	Regional productivity and economic contribution
Biodiversity	Adverse impact on distribution and populations of marine fauna				X			
Biodiversity	Adverse impact on distribution and populations of marine flora				X			
Buildings	Increased urban density impact on individual wellbeing	X						
Buildings	Condition of public buildings (incl. Schools, libraries, hospitals)	X	X			X		
Buildings	Condition of public realm (street scapes, street trees, paving, drinking fountains, public art)	X	X			X		
Buildings	Condition of built cultural heritage (e.g. heritage buildings, bridges, monuments, public art)		X			X		
Buildings	Demand for emergency evacuation centres and facilities	X	X					
Buildings	Demand for heat refuges	X						
Communications networks	Percentage of down time for telecommunications infrastructure	X				X		

Primary indicator	Secondary indicator	Social and community resilience and health values						
		A strong and connected community	Amenity and quality of life	Coastal and riverine water quality	Coastal environment	Infrastructure and essential services	Management and use of stormwater	Regional productivity and economic contribution
Community planning and development	Demand for social support services	X						
Community planning and development	Frequency of public transport service interruptions	X						
Community planning and development	Quality of cycling and walking infrastructure (e.g. footpaths)		X			X		
Education	Ability to access educational and lifelong learning facilities	X						
Education	Internet access	X						
Education	School attendance	X						
Emergency management	Demand for emergency services	X						
Existing social capital	Level of support from family, friends and neighbours	X						
Existing social capital	Participation in organised sport, church or community group in local area	X						
Existing social capital	Rates of volunteerism	X						

Primary indicator	Secondary indicator	Social and community resilience and health values						
		A strong and connected community	Amenity and quality of life	Coastal and riverine water quality	Coastal environment	Infrastructure and essential services	Management and use of stormwater	Regional productivity and economic contribution
Land assets	Condition of natural cultural heritage (e.g. scar trees, heritage vineyard, springs, rivers, burial grounds)		X					
Land assets	Quality of active recreation and sporting sites (outdoor - ovals, courts, pools, lawn bowls)		X			X		
Land assets	Quality of open space (predominantly green space)		X			X		
Land condition	Beach erosion		X	X	X			
Pest plants and animals	Impact of pest plant and animal threats to the marine environment				X			
Pest plants and animals	Impact of pest plant and animal threats to the marine environment							
Physical health	Self assessed health	X						
Physical health	Impact on children < 12 years of age	X						
Physical health	Impact on people aged over 65 years and at risk	X						
Physical health	Impact on people who require assistance for core activities	X						

Primary indicator	Secondary indicator	Social and community resilience and health values						
		A strong and connected community	Amenity and quality of life	Coastal and riverine water quality	Coastal environment	Infrastructure and essential services	Management and use of stormwater	Regional productivity and economic contribution
Public safety	Levels of anti-social behaviour	X						
Quaternary sector	Impact on people choosing to live and work in the region		X					
Quaternary sector	Impact on people choosing to live and work in the region							
Social inclusion/exclusion	Impact on people geographically isolated from transport services	X						
Social inclusion/exclusion	Impact on people under financial stress	X						
Social inclusion/exclusion	Mental health	X						
Social inclusion/exclusion	Number of outdoor civic events held by Councils	X						
Social inclusion/exclusion	Number of outdoor civic events held by Councils	X						
Water	Condition of stormwater management infrastructure					X	X	
Water	Quantity of recycled water (treated wastewater and stormwater)						X	

Primary indicator	Secondary indicator	Social and community resilience and health values						
		A strong and connected community	Amenity and quality of life	Coastal and riverine water quality	Coastal environment	Infrastructure and essential services	Management and use of stormwater	Regional productivity and economic contribution
Water	Surface water quantity and quality						X	
Service networks	Delivery of potable water (condition of pipes and water quality)						X	
Sporting facilities	Quality of active recreation and sporting sites (indoor)		X				X	
Tertiary industries	GRP from tourism (accommodation and food service)							X
Tertiary industries	Tourist accommodation occupancy rates		X		X			X
Transport networks	Condition of jetties and boat ramps				X		X	
Transport networks	Condition of rail					X		X
Transport networks	Condition of roads					X		X

Appendix B: Policies and plans contributing to adaptive capacity

Local plans, policies and strategies contributing to adaptive capacity

Plans, policies and strategies	Port Adelaide Enfield	Charles Sturt	West Torrens
Annual Service Plans – City Assets, Community Services			X
Arts and Cultural Plan 2011-2015	X		
Asset Management Plans (For buildings, footpaths, roads, stormwater)	X	X	X
Climate Change Action Plan			X
Community Land Management Plans	X	X	X
Community Plan	X	X	X
Community Services Annual Service Plan 2014/15			X
Disability Discrimination Act Action Plan	X		
Emergency Response Plan	X		
Environmental Health Management Plan Stage 1	X		
Environment Strategy 2009-2014	X		
Living Green to 2020 Draft Environmental Plan		X	
Local Area Bicycle Plan 2008-2012	X		
Open Space/Public Place Plans	X	X	X
Plan for Working with and for the Aboriginal and Torres Strait Island Community	X		
Public Health Plan	X	X	X
Social Development Strategy 2008- 2012			
Transport Plan/Strategy			X