WATER RESOURCES SITUATIONAL ANALYSIS

For the Central and Northern Arid Lands of South Australia, 2022

Acknowledgements

We acknowledge the Traditional Owners of the central and northern Arid Lands and acknowledge their continuing connection to Country and culture. We pay our respects to their Elders past, present and emerging. We also acknowledge all First Nations Peoples who continue to live in spiritual and sacred relationships with this country.

We thank the numerous stakeholders who participated in an interview or shared their valuable insights with the project team.

While a variety of stakeholders were consulted, engagement with Traditional Owners on water use and management as part of this process has been preliminary. This preliminary consultation highlighted the need to deliver shared decision-making on water use and management with Traditional Owners.

The 2022 Water Resources Situational Analysis for the central and northern Arid Lands of SA was prepared with funding support from BHP. The WRSA was developed by URPS and was based on research undertaken by the Goyder Institute for Water Resources which was documented in an Issues Paper (available on request).

URPS

GOYDER INSTITUTE FOR WATER RESEARCH

Cover Photo: Pirdali-nha (The Bubbler), Wabma Kadarbu Mound Springs Conservation Park (1)

CONTENTS

UNDERSTANDING THE BIGGER PICTURE

Water resources in the central and northern Arid Lands of South Australia are critical to the health of plants, animals and communities, maintenance of cultural values, and the viability of regional pastoral, mining and tourism industries.

Groundwater is the only reliable source of water in the arid outback as rainfall occurs sporadically and is highly variable[1]. After periods of heavy rain, surface water transforms the landscape, filling the large shallow lakes before evaporating or seeping back into the earth.

To ensure that water resources can continue to support our communities, ecosystems and industries into the future, they must be sustainably managed. This requires a collaborative approach between water users, natural resource managers, researchers and other stakeholders to continually improve our understanding of the resource condition and the values that water resources sustain and to identify options for sustainable and adaptive resource management.

To support sustainable water resource management in the central and northern Arid Lands of South Australia, BHP commissioned URPS and the Goyder Institute for Water Research to prepare a Water Resources Situational Analysis.

This Water Resources Situational Analysis describes the shared water values and challenges in the region and identifies opportunities for collective action to address shared water challenges and improve water management. This description was informed by a review of published information and confirmed through engagement with a range of cross-sectoral water resource stakeholders .

Collective water stewardship is essential in the central and northern Arid Lands, where water is the life force of the landscape. This Water Resources Situational Analysis (WRSA) identifies challenges and opportunities to maximise collective water management in the region, so the local community, culture, economy and environment can continue to prosper.

L-R: Thirrka (Blanche Cup) and Wabma Kadarbu (Hamilton Hill) Wabma Kadarbu Mound Springs Conservation Park (2) Sand dunes along the Birdsville Track (3), Lake Torrens (4)

THE CENTRAL AND NORTHERN ARID LANDS

The central and northern Arid Lands is defined as the area extending from around Pimba, north-west to Marla and the northern border with the Northern Territory and Queensland and east to the border with New South Wales and Queensland. It is a sparsely populated landscape dominated by sandy and gibber stone plains[2]. With only a few towns and settlements, the human population is small. Most towns were established around the mining and pastoral industries including Roxby Downs, Leigh Creek, Marree, Coober Pedy, Moomba, Innamincka and Oodnadatta (see Figure 1).

The area is located within the SA Arid Lands Landscape region and comprises the areas included in the district Landscape Groups of Kingoonya, Marla-Oodnadatta and Marree-Innamincka[3]. The area contains most of the Far North Prescribed Wells Area that covers all groundwater resources including the South Australian portion of the Great Artesian Basin (GAB).

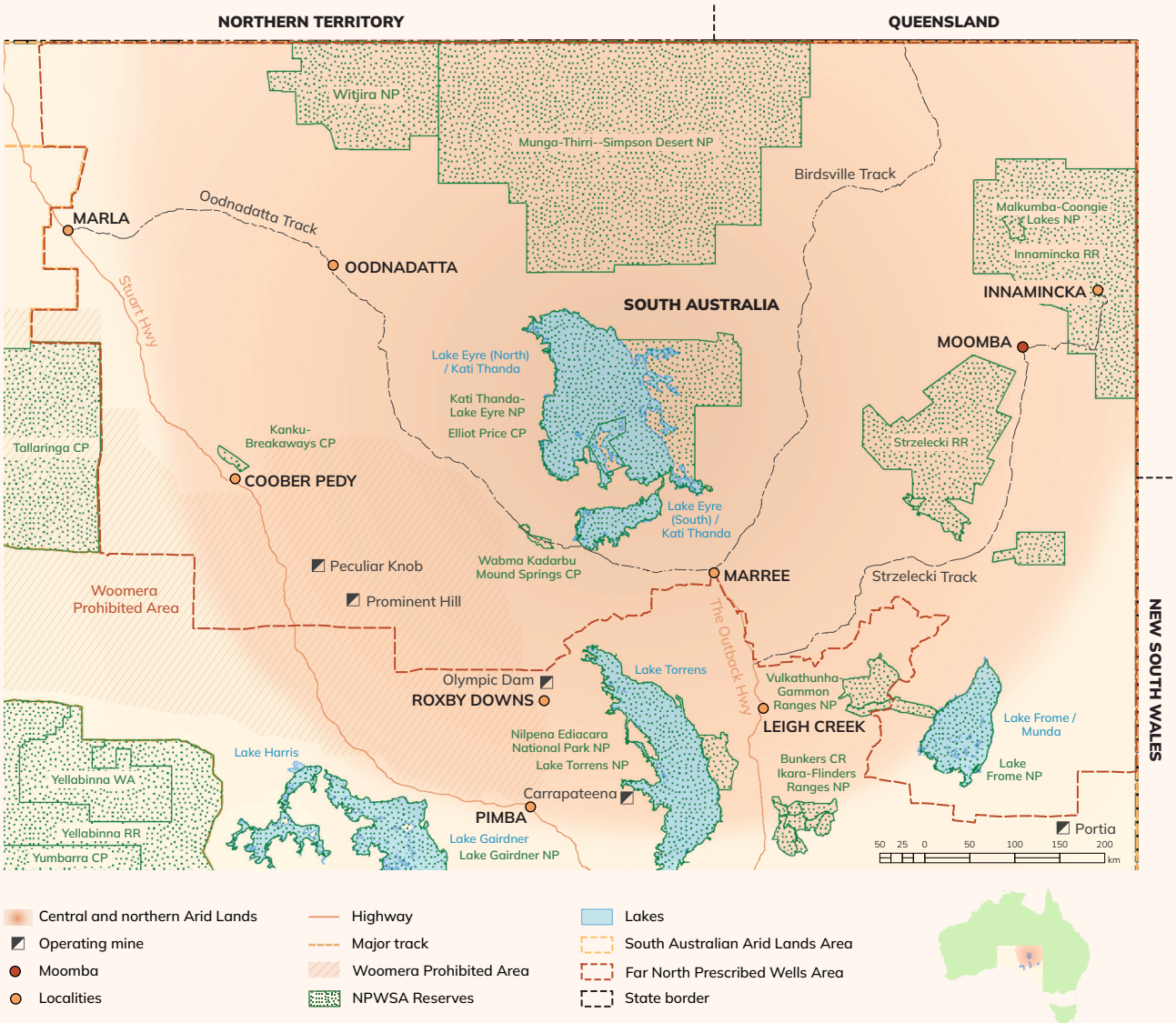


Figure 1: Central and northern Arid Land area

Large areas are protected in national parks, regional reserves and conservation parks proclaimed under the *National Parks and Wildlife Act 1972*. The Woomera Prohibited Area covers a large area to the west of *Woomera regulated by the Defence Act 1903* (C'th). Access restrictions vary across the Prohibited Area with public access and resource tenements prohibited in zones around Woomera.

Native Title determinations have been made across the area to the Adnyamathanha Traditional Lands Association, Antakirinja Matu-Yankunytjatjara, Arabana, Irrwanyere, Kokatha, Dieri, Walka Wani, Wangkangurru Yarluyandi, Yandruwandha Yawarrawarrka and Yankunytjatjara Aboriginal Corporations[4].

The area experiences an arid climate, with minimal rainfall and hot, dry summers. Maximum summer temperatures average between 30 and 39°C, and often rise above 50°C[5]. Maximum temperatures for winter average 16 to 24°C, while minimum temperatures can drop below zero[6]. Average annual rainfall in the region is less than 200mm; however, rainfall is sporadic and intense episodes can exceed annual average rainfalls in a single event and years can pass between significant rainfall events[7]. Local biodiversity has evolved to depend upon these high intensity rainfall events and groundwater accessible from permanent or semi-permanent springs. Average annual evaporation can be up to 3500mm, resulting in the rapid evaporation of surface water runoff[8].

Climate change is projected to result in increased temperatures across central Australia. Heatwaves and hot days are projected to be hotter and more frequent. Average annual rainfall is projected to decrease in the South Australian Arid Lands region. However, the frequency and intensity of extreme weather events, including high intensity rainfall events, are projected to increase[9].

L-R: Georgia Bore prior to bore capping, Etadunna Station (5), Mustering cattle, Etadunna Station (6)

WATER RESOURCES OVERVIEW

Groundwater

There are five main aquifer types in the central and northern Arid Lands region as described in the table below.

Aquifer type	Example aquifers in central and northern Arid Lands	Characteristics
Sedimentary aquifers of the GAB (Eromanga Basin)	Cadna-owie Formation and Algebuckina Sandstone aquifers	Artesian pressures to the east of the GAB spring line maintain tens of free-flowing bores. To the west pressures are sub-artesian or unconfined. Typically 200m to over 2000m below ground level. Fresher groundwater, generally less than 2,000mg/L.
Shallow Quaternary and Tertiary sedimentary aquifers, including the Lake Eyre Basin	Unconfined aquifers adjacent to major watercourses.	Shallow aquifers generally recharged by rainfall and surface flows from watercourses following high rainfall. Limited capacity.
Confined sedimentary aquifers of the underlying Permian basins (Cooper, Arckaringa and Pedirka)	Boorthanna aquifer (Arckaringa Basin)	Generally high salinity (6,000 to 50,000 mg/L) and low yielding. Generally hundreds of meters below ground level. Uses include industry, energy, pastoral and mining.
Stuart Shelf aquifers	Andamooka Limestone aquifer located to the north of Olympic Dam (Stuart Shelf)	Highly transmissive regional unconfined aquifer located between 10 and 50m below ground level. No springs associated with aquifer. Saline to hyper-saline (20,000 to 200,000 mg/L)
	Tent Hill aquifer (Stuart Shelf)	Low yielding confined fractured rock aquifer intercepted between 160 and 200m below ground level. No springs associated with aquifer. Saline to hyper-saline (35,000 to 100,000 mg/L) Uses include industry and mining including BHP's Olympic Dam operations.
Basement aquifers	Fractured rock aquifers of Adelaide Geosyncline formations	Widely variable yield and salinity. Used primarily by pastoralists.

Recharge to the GAB occurs through three mechanisms – diffuse recharge from direct infiltration at the margins of the basin (including the western margins in the central and northern Arid Lands Area), recharge from ephemeral rivers and mountain system recharge[10]. The shallow, fresher groundwater systems are generally recharged by localised rainfall. The Stuart Shelf aquifers are recharged via infiltration of surface water through the fractured rock.

Data on groundwater extraction is available for the Far North Prescribed Wells Area (PWA) that extends across most of the central and northern Arid Lands area. The majority of groundwater authorised for extraction in the PWA comes from the GAB (76%) (refer Figure 2)[11]. Extraction from the Stuart Shelf is included in the percentage for the basement aquifer and is a very small proportion of total volume of groundwater extracted in the region. South of the PWA within the central and northern Arid Lands area, extraction is not licenced and so there is no reporting of extraction. In this southern area there are limited groundwater resources in the non-artesian Eromanga Basin sediments which can be of reasonable quality (< 5000 mg/L), and there are also low-yielding and saline to hyper-saline (over 20,000 mg TDS /L) regional fractured rock aquifers in the Stuart Shelf and equivalent Adelaide geosyncline formations and underlying basement.

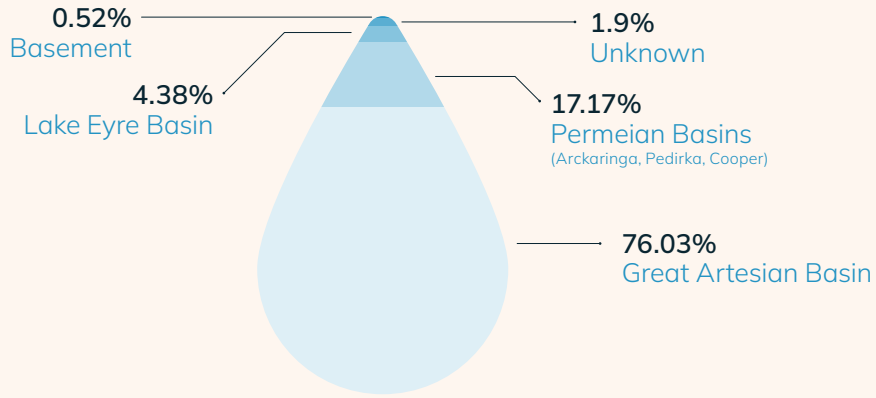
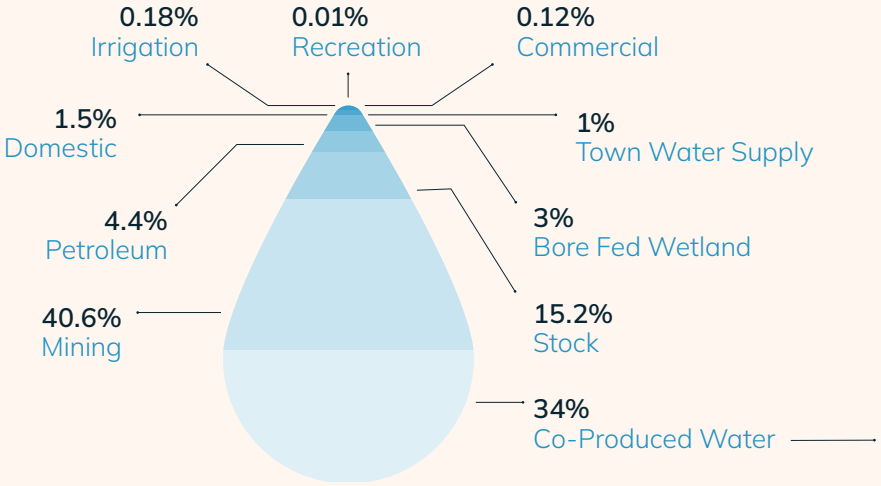


Figure 2: Percentage of water authorised for taking from the various basins/aquifers of the Far North Prescribed Wells Area as at May 2019[12]

In May 2019 just over 64,500ML of water was authorised for use from all aquifers (including water authorised for use by the Olympic Dam Mine via Special Water Licences issued persuant to the *Roxby Downs (Indenture Ratification) Act 1982*).[13]. Co-produced, mining and petroleum activities account for 79% of all authorised water use from the GAB (refer Figure 3).



Petroleum and gas extraction usually produces a mix of hydrocarbons and groundwater. This extracted groundwater is called **co-produced water**.

Figure 3: Percentage of water authorised for taking for various purposes from the Great Artesian Basin as at May 2019 (SA Arid Lands Landscape Board, 2021)[14]

Great Artesian Basin

Most of the water used across the central and northern Arid Lands is supplied by groundwater from the Great Artesian Basin (GAB)[15]. The GAB is one of the largest underground freshwater basins in the world[16]. It is Australia's largest groundwater basin and spans more than one-fifth of the Australian continent. It underlies parts of Queensland, New South Wales, South Australia and the Northern Territory and has an estimated total storage capacity of 65 million gigalitres[17].

Bores have been drilled into the GAB since European colonisation in the 1880s to provide water for livestock and settlements, and in recent times to support the mineral and energy industries[18]. Many of the bores were not capped and water flowed freely, soaking into the ground or lost to evaporation. Some of the bore flows led to the creation of (artificial) wetlands that supported native plants and animals such as at Coward Springs on the Oodnadatta Track. The large number of uncapped (free-flowing) bores drawing on the GAB caused many bores and springs to lose pressure, with some drying up.

A number of cooperative cross-government initiatives over the last two decades have resulted in investment in sustainable groundwater management across the GAB. A program to control free-flowing bores resulted in 51 bores in South Australia being capped to protect groundwater supplies for all users[19]. Open bore drains constructed to distribute groundwater long distances away from bores for stock watering resulted in substantial water losses through evaporation and seepage and were vectors for weed infestation and provided water for feral animals. Many of these drains have been decommissioned or replaced by pipes through the initiatives.

Monitoring data shows the water levels in the majority of GAB aquifers in the west of the central and northern Arid Lands were at average to highest on record levels in 2020. Water levels in the east and north-east were at average to lowest on record levels at the same time. Groundwater extraction for mining purposes has been stable over the past 20 years, while extraction for oil and gas has more than doubled over the same period[20].

Within the South Australian portion of the GAB, groundwater quality is relatively high with salinity less than 2000mg/L over most of the area[21]. Some areas of greater salinity exist along the southern margins of the artesian basin around William Creek and Lake Eyre South. In the last 10 years, the majority of monitoring wells have shown a trend of decreasing salinity along the margin[22].

Near Pirdali-nha (The Bubbler), Wabma Kadarbu Mound Springs Conservation Park (7)

GROUNDWATER DEPENDENT ECOSYSTEMS (GDEs) are ecosystems which require access to underground water on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services[23].

Springs

Groundwater springs across the central and northern Arid Lands of SA support groundwater dependent ecosystems. While most springs are associated with groundwater from the GAB, beyond the southern margin of the GAB there is a spring in the centre of Lake Torrens (Mountford Spring)[24].

The naturally occurring springs (often referred to as mound springs) fed by the GAB are environmentally and culturally important. Underground water pressure maintains upwards flow at these springs, providing a supply of water in an otherwise dry landscape. These range from substantial flows at Dalhousie Springs to smaller flows, seepages and vertical leakage at other locations. Over 5000 individual mound springs are estimated to exist in Far North South Australia[25]. Their permanent nature supports endemic flora and fauna including the endangered salt pipewort (*Eriocaulon carsonii*)[26]. The GAB spring ecosystems are listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*[27].

Traditional Owners have strong enduring connections with mound springs and their associated ecological communities and landscapes[28]. Springs are important cultural sites on trade routes and story lines leading across inland Australia. They are a source of healing and have spiritual and cultural significance[29].

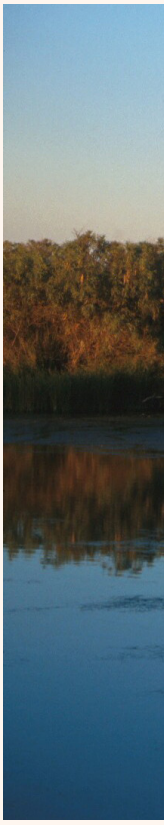
Surface water

The surface catchments of the central and northern Arid Lands are large, lowland interior basins[30]. Following large rainfall events, surface water flows down networks of minor waterways that join to form large, broad and often braided streams across extensive floodplains, to terminal surface water features such as clay pans, small fresh brackish lakes and ephemeral water holes, and the large salt lakes of Lake Torrens, Lake Frome and Lake Eyre.

The Lake Eyre Basin (the Basin) contains one of the largest unregulated river systems in the world[31]. The Basin is home to many rare, endangered and endemic species of plants and animals that have adapted to survive the floods and droughts that characterise the environment.

Although surface water is often very scarce and in many places highly saline, it does sustain native flora and fauna, which support the pastoral and tourism sectors[32]. Where local topography limits seepage, evaporation, or other water loss pathways, water sources such as rock holes and waterholes form. These rock and water holes are of cultural significance to Traditional Owners and would have provided a crucial source of water. They also provide critical sites of refuge for local fauna.

Across the central and northern Arid Lands, surface water is collected in numerous dams of varying sizes. Dams are commonly used to store stock water where local groundwater is too saline, including across the Stuart Shelf.



L-R: Clayton River in flood (8), Mound spring lake north of Freeling Springs, Peake Station (9)

Domestic water supply

Water in the remote towns is supplied by SA Water who source from groundwater and surface water. Historically Innamincka accessed surface water from a waterhole on the Cooper Creek while Marree, Oodnadatta and Marla accessed water from groundwater. The limited capacity of town holding tanks and dams had meant only a few days supply could be stored at any time[33]. SA Water has recently commenced a project to install new desalination plants at Marla, Marree and Oodnadatta to improve the quality and security of water supplied to the towns[34]. An alternative groundwater water supply for Innamincka is also being investigated[35].

Water for Roxby Downs, Andamooka and Olympic Dam is sourced from the GAB via wellfields located near the southern and eastern areas of Lake Eyre. Groundwater is extracted by BHP then pumped to the mine site primarily for use in processing. Some of the water is desalinated and stored for distribution by Roxby Water. The water supply dam at Roxby Downs is currently being replaced by tanks that will provide increased storage capacity[36].

Wastewater and stormwater

Across most of the central and northern Arid Lands, wastewater is treated near its source. At Roxby Downs, wastewater from the town and the Olympic Dam mine is treated and some of this treated water is used for irrigation around the town and at the golf course. Most stormwater generated in built up areas is diverted to flow away from built up areas and evaporates.

L-R: Black-winged Stilt Nest, Gosse Springs (10), Gosse Spring (11)

Tailings and co-produced water

At several mine sites, the waste materials remaining after the processing of ore, called tailings, are pumped to tailings storage facilities[37]. Tailings consist of water, crushed rock and a variety of potentially harmful trace metals and processing additives making their containment necessary to prevent environmental harm. In the energy sector, co-produced water generated from the extraction of oil and gas is placed in evaporation ponds. Once the water has evaporated, leftover residues are tested and disposed of appropriately in accordance with regulatory requirements.

Climate change impacts on water resources

Groundwater resources in the GAB in South Australia are largely dependent on the amount of groundwater in storage in the system and flowing across the state border from the north and east, rather than on recharge occurring in South Australia[38]. Climate change modelling indicates that the amount of groundwater available for extraction from the GAB in South Australia is not likely to be significantly impacted by any future reductions to the amount of contemporary recharge occurring within the recharge areas at the western margin of the basin, simply because the current rates of recharge are so low compared to the scale of the GAB aquifers[39].

Climate change is likely to have an impact on natural water flows as rainfall variability increases, rainfall intensity increases and evapotranspiration increases[40]. Surface water quality is also likely to be impacted as temperature and evapotranspiration increase, reducing flows, concentrating any pollutants present and creating suitable conditions for algal blooms.

Climate change is expected to increase water demand in the region, increasing competition for resources[41].

Water resource management

Groundwater

The Great Artesian Basin Strategic Management Plan (GABSMP) provides a framework to guide the actions of governments, Aboriginal and Torres Strait Islanders, water users, and other interests in their endeavour to achieve economic, environmental, cultural, and social outcomes for the GAB and its users[42].

The Central and Northern Arid Lands area includes most of the Far North Prescribed Wells Area (PWA) that covers all groundwater resources including the Great Artesian Basin. The 2021 Water Allocation Plan for the Far North PWA regulates the management of groundwater within the Far North PWA[43]. The Water Allocation Plan describes a licensing regime that aligns with and supports the desired outcomes of the GABSMP and is administered by the SA Arid Lands Landscape Board. Unlike other PWAs, stock watering does require a licence under the Water Allocation Plan. Water extraction associated with mining and processing activities at Olympic Dam is not subject to the licence provisions of the Water Allocation Plan, but instead is covered by the *Roxby Downs (Indenture Ratification) Act 1982* (Indenture Act). Water from both the GAB and Stuart Shelf Aquifers is extracted under this Act. The Water Allocation Plan accounts for the volume of water extracted under the Indenture Act in assessments of total demand.

Surface water

The *Landscape South Australia Act 2019* provides for regulatory control of activities that affect surface water resources. The primary instrument for this regulation in the SA Arid Lands region is the Water Affecting Activity (WAA) Control Policy administered by the SA Arid Lands Landscape Board[44]. The Policy aims to regulate water-affecting activities to ensure the sustainable use of water resources, protect natural ecosystems, cultural and social values, and provide for balanced development of community and economic activities. The WAA Control Policy is applicable for all regional surface water and any groundwater not covered by the Water Allocation Plan for the Far North Prescribed Wells Area.

Surface water within the Lake Eyre Basin Agreement Area is managed subject to the Lake Eyre Basin Intergovernmental Agreement which was established between the Australian, Queensland, and South Australian governments in 2000 and joined by the Northern Territory in 2004[45]. The purpose of the agreement commits the parties to collaborative cross-border management of the Basin and the conservation and protection of aesthetic, wilderness, cultural and tourism values.

SHARED WATER RESOURCE VALUES IN THE CENTRAL AND NORTHERN ARID LANDS

A collaborative and considerate approach to managing water resources in the central and northern Arid Lands is needed to optimise beneficial stakeholder outcomes. This requires a widespread understanding of the shared values and challenges that different water users hold in relation to water resources in the area.

A value is something that is important, useful or has worth[46]. A SHARED VALUE emerges when multiple people, or groups of people, hold the same values. In the context of water resources in the central and northern Arid Lands, a shared water value is a value about local water supplies that has been identified by multiple stakeholders.

The shared water resource values described below were identified through a review of published information and confirmed through engagement with stakeholders with an interest in the water resources.

Shared water values

Healthy ecosystems and species

We value healthy springs, wetlands, waterholes, rock-holes, waterways and lake ecosystems associated with the GAB and Lake Eyre Basin. These habitats support a diversity of endemic and endangered plants and animals, provide refuges for wildlife during periods of drought and are highly valued by Traditional Owners.

Cultural connections to water

Traditional Owners have strong enduring cultural, social and spiritual connections with water resources and the ecological communities and landscapes they support. Springs are important cultural sites, form part of story lines and are a source of healing. We value using cultural knowledge to inform water resource management.

Fair and equitable access to water and water rights

We value responsible, fair, and equitable water allocations for water users that also ensure that healthy ecosystems are maintained and water use is balanced and sustainable for the long term.

Recreational waters and amenity

We value the social amenity and recreational opportunities that are provided by water resources. Water resources provide opportunities to experience local natural and cultural features and biodiversity. These values are important to regional communities, visitors and tourists.

Pelicans on Kati Thanda - Lake Eyre (12)

Water for town supply, domestic use and stock water

Water supports our lives and livelihoods. We need safe and reliable drinking water for our towns, homes and stations/homesteads for locals and visitors. We also need water for our stock.

Water for the mineral and energy industry

Water is essential to support the regional mineral and energy industry. This industry supports the local, state and national economies and is a major employer in the Arid Lands of South Australia.

Mineral development in areas of rich deposits may be limited by the availability of a suitable source of water.

Water based tourism

We value the groundwater fed springs, waterholes, wetlands and salt lakes that make the area an increasingly popular destination for local, national and international tourists fascinated by their natural and cultural values.

SHARED WATER RESOURCE CHALLENGES

A SHARED WATER CHALLENGE is a problem, concern or threat related to water that exists for more than one stakeholder and can occur when shared water values are threatened, or when there are competing values among stakeholders.

The shared water resource challenges described below were identified through a review of published information and confirmed through engagement with stakeholders with an interest in the water resources of the central and northern Arid Lands.

Impact on ecosystems

Damage or destruction of groundwater dependent ecosystems (GDEs) associated with the Great Artesian Basin

Consequences

- Decline in the condition of habitats and ecological communities
- Loss of biodiversity
- Loss of endangered and endemic species and ecosystems
- Loss of cultural values and sites of significance
- Increased opportunities for pest plant and animal incursions
- Loss of economic opportunities through tourism
- Loss of social, recreation and amenity values

Causes

- Extraction of groundwater, particularly from the mineral and energy industry, causing a reduction in water pressure and water availability to GDEs
- Climate change impacts including extended dry periods and more frequent and intense heavy rainfall events
- Lack of groundwater pressure and GDE monitoring to inform an adaptive management approach
- Limited understanding of the aquifer pressure requirements of groundwater dependent ecosystems
- Capping of free-flowing bores influence on artificial (bore-fed) wetlands

Relevant stakeholders

- Traditional Owners
- Environmental & conservation groups
- Tourism operators and tourists
- Mineral & energy industry
- Pastoralists
- Legislators & government agencies
- Research & science
- Town residents

Current collective action

Development and implementation of the Far North Prescribed Wells Area Water Allocation Plan 2021.

Friends of Mound Springs projects that protect the springs and promote their conservation values.

COLLECTIVE ACTIONS are actions that can be undertaken collaboratively by stakeholders across the Central and Northern Arid Lands to address shared challenges.

Surface disposal of water produced by mining and energy and gas production

Consequences

- Impact of local contamination of surface water and non-artesian aquifers
- Adverse health and biodiversity impacts of contaminated water
- Loss of valuable water to evaporation
- Impact on reputation of mining and energy companies perceived to waste a valuable asset and damage the environment

Causes

- Disposal of co-produced water in evaporation ponds by the energy industry
- Potential leakage of mine tailings leading to contamination of surface water flows
- Disposal of brine from desalination plants
- Additional costs disincentivise treatment and reuse of contaminated water

Relevant stakeholders

- Mineral & energy industry
- Pastoralists
- Town residents
- Environmental & conservation groups
- Legislators & government agencies
- Research & science

Current collective action

Mineral and energy company water stewardship actions including monitoring and water reuse.

Damage to surface water ecosystems

Consequences

- Decline in the condition of habitats and ecological communities
- Loss of biodiversity and key species
- Increased opportunities for invasive species
- Decline in the persistence and connectivity of ecosystems
- Reduced water quality, increased sedimentation and contaminants

Causes

- Extended dry periods linked to climate change
- Potential contamination from mine sites
- Unsustainable stocking rates leading to degradation of surface cover, erosion and damage to surface water ecosystems
- Precieved risk that changes to the Pastoral Land Management and Consveraiton Act 1989 could have adverse impacts on land condition
- Installation of infrastructure or other activities that impact surface flows such as dams and road crossings

Relevant stakeholders

- Mineral & energy industry
- Environmental & conservation groups
- Tourism operators and tourists
- Traditional Owners
- Research & science

Current collective action

Commitment to the Lake Eyre Basin Intergovernmental Agreement 2000

Implementation of the SA Arid Lands Water-Affecting Activities Control Policy 2021

Conflict between water users

Perceptions of inequity in water allocation

Consequences

- Conflict or tension between water users and managers
- Lack of support for current water allocations and governance processes
- Concern about potential loss of water for cultural and environmental use
- Perceived lack of opportunity for regional economic expansion

Causes

- Variety of water-users
- Legacy culture of 'entitlement' rather than 'adaptive management'
- Lack of (reliable) monitoring data to inform stakeholders (especially regarding decisions to reduce size of 'consumptive pool')
- Licensing of regional water use occurs under multiple Acts
- Lack of community understanding of mining and energy operations and the rules and regulations that limit access to water
- Lack of publicly available information relating to water use in the mineral and energy industry
- Unwillingness of some pastoralists to pay for water and water meter infrastructure

Relevant stakeholders

- Traditional Owners
- Pastoralists
- Town residents
- Mineral & energy industry
- Environmental & conservation groups
- Legislators & government agencies

Current collective action

Development and implementation of the Far North Prescribed Wells Area Water Allocation Plan 2021

Implementation of the Great Artesian Basin Strategic Management Plan 2019

Cultural participation and trust

Traditional Owner influence and trust in water management and governance

Consequences

- Inability for Traditional Owners to directly influence water management process, particularly outside of the Water Allocation Planning process
- Lack of integration between Aboriginal water management and Eurocentric water management processes
- Lack of trust between Traditional Owners and government and mineral and energy industries
- Traditional Owners do not feel secure that their cultural values will be preserved

Causes

- Lack of recognition about the values of traditional knowledge in water planning
- Lack of culturally appropriate opportunities and processes for participation in water planning and sufficient time and resources to adequately undertake
- Traditional Owner engagement is a complex, time-consuming exercise that needs to be appropriately resourced
- Past destruction of cultural sites and values by mineral and energy companies and other industries across Australia
- Ongoing damage and destruction of culturally important mound springs and other sites through water use, particularly from the mineral and energy industry
- Legacy of legislation that does not require heritage protection and management in line with the *Aboriginal Heritage Act 1988*

Relevant stakeholders

Traditional Owners

Mineral & energy industry

Legislators & government agencies

Current collective action

Development and implementation of the Far North Prescribed Wells Area Water Allocation Plan 2021 with the inclusion of the Cultural Water Consumptive Pool

Implementation of the Great Artesian Basin Strategic Management Plan 2019

Cultural awareness training for businesses operating in the region

Ongoing work of the Aboriginal Corporations

NOTE - This draft WRSA is based on a review of publicly available information and an initial round of engagement with a selection of representative stakeholders. This initial phase has only achieved limited engagement with Traditional Owners, who have been advised of the process and invited to participate. It is acknowledged that moving forward deeper engagement with Traditional Owners is required.

Meeting future water demand

Uncertainty surrounding future water demand and supply

Consequences

- Availability of water for allocation limits future opportunities for economic development
- Reduced certainty for investment in mineral or energy industry expansion
- Reduced certainty for the viability of pastoralism in the region
- Reduced certainty for the quality and reliability of domestic water supply in the region
- Allocations do not meet cultural and ecological needs
- Potential for more water to be available for regional use if Northern Water Scheme is developed
- Large amount of ongoing resourcing necessary to maintain pipes and other water infrastructure

Causes

- Potential for climate change to affect demand for water and water availability (quantity and quality)
- Uncertainty around future growth or decline in industry and agricultural water demands, influenced by global markets for outputs
- Lack of knowledge about the impact of extraction on natural and cultural values
- Lack of monitoring and public accountability to inform an adaptive approach to managing regional water resources
- Unpredictable economic and societal change, inconsistent with assumptions used in modelling demand
- Low volume of water available from Stuart Shelf aquifers to support mining and energy expansion in the Gawler Craton
- Uncertainty about development of Northern Water Scheme
- Impact of tourist numbers on limited town water supplies

Relevant stakeholders

- Mineral & energy industry
- Pastoralists
- Town residents
- Legislators & government agencies
- Traditional Owners
- Environmental & conservation groups

Current collective action

Investigations into Northern Water Scheme, supported by Infrastructure Australia, to bring desalinated sea water to the region as an additional resource

Economic Growth and Investment Strategies developed by Regional Development Australia Far North SA

Quality, reliability and security of town water supply

Quality, reliability and security of town water supply

Consequences

- Lack of secure and quality drinking water supply in some towns
- Water security and cost risks for town residents and businesses that support locals and visitors
- Missed opportunity to reuse wastewater and stormwater for irrigation of open space and public realm

Causes

- Aging infrastructure and inadequate maintenance
- Reliance on untreated groundwater for town water
- Lack of investment

Relevant stakeholders

Legislators & government agencies

Town residents

Tourism operators and tourists

Current collective action

SA Water installation of new desalination plants

BHP and Roxby Water collaborating on water management including water recycling

Flowing bore along the Birdsville Track (13)

OPPORTUNITIES FOR COLLECTIVE ACTION

Collective actions are actions that can be undertaken collaboratively by stakeholders across the central and northern Arid Lands to address shared challenges. While many collective actions are already being undertaken, this Water Resource Situational Analysis has identified opportunities to work together on new or expanded projects to improve water management in the region.

Opportunity for collective action	
Protection of groundwater ond surface water dependent ecosystems	› Progress a culture of adaptive management where people and organisations understand the necessity of monitoring and accept the possibility of changing water entitlements. › Work with pastoralists to manage stocking rates that do not lead to adverse impacts on landscape condition or water dependent ecosystems, and undertake regular land cover monitoring. › Support additional fencing and fence maintenance, particularly around mound springs. › Investigate deterrent mechanisms and technologies to minimise avian interations with evaporation ponds. › Investigate future management of artificial (bore-fed) wetlands.
Increasing knowledge to inform adaptive management	› Implement a coordinated and consistent program of monitoring and evaluation to inform decision-making, in particular monitoring of water dependent ecosystem condition and groundwater pressure. › Explore alternatives to GAB sourced water for regional use, for example desalinated seawater, and publicly report on their viability.
Ensuring transparency of water allocation and use	› Develop and progress strategies to enable greater coordination and collaboration between stakeholders on water management issues. › Improve understanding and transparency of water allocation mechanisms, particularly in relation to water use by the mineral and energy industries that occurs outside the *Landscape South Australia Act 2019*. › Investigate the potential to reuse co-produced water for industrial purposes, as a substitute for other groundwater sources. › Improve reporting of monitoring data and other water management action by mineral and energy industries by consolidating information into user-friendly formats which are easy to find and understand.

Opportunity for collective action	
Building relationships between stakeholders	› Support transparent reporting about water allocation and extraction. › Demonstrate use of adaptive management responses. › Establish a regular 'Arid Lands water forum' with representatives of water users, water managers and key stakeholders.
Facilitating genuine cultural participation	› Advance engagement with Traditional Owners to truly incorporate the traditional knowledge of different groups of Aboriginal people in water planning. This will involve building trust and putting in place measures that ensure cultural values are securely protected and not put at risk by any existing regional activity or future development. › Investigate opportunities to better consider and protect cultural and natural heritage through legislative reform.
Meeting future water demand	› Explore opportunities for an inclusive and participatory assessment of vulnerability and risk to future water resource supply and demand. › Continue to engage with communities and business across the area to increase awareness that the GAB is a declining and finite resource. › Develop adaptive management approaches to respond to changes in groundwater pressure. › Advance research to improve understanding of the impact of extraction on the condition of groundwater resources. › Consider the impacts of climate change in all relevant strategic and management plans, in particular impacts on recharge and water demand. › Investigate opportunities to improve water efficiency through initiatives such as using floating solar panels on open dams to reduce evaporation. › Use a holistic, risk-based approach to assess the impact of proposed mineral or industrial development such as hydrogen or agriculture, including impacts and opportunities for local communities. › Continue to work to improve the quality and security of town water supplies.
Increase use of alternate water supplies	› Investigate opportunities for additional reuse and recycling of water, especially for co-produced water, stormwater and wastewater.
Support innovation and research into water management in arid environments	› Support research by universities and research institutions that seeks to increase knowledge and understanding of regional water resources. › Investigate the viability of an arid land water research and innovation hub in the central and northern Arid Lands.

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