

# Northern Goldfields Water Resources Situational Analysis

Prepared for BHP Nickel West  
by Curtin University and Umwelt Environmental &  
Social Consultants

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## Acknowledgements

***We acknowledge the Traditional Owners of the Northern Goldfields and their continuing connection to Country and culture. We pay our respects to their Elders past and present and extend that respect to all First Nations Peoples who continue to live in a spiritual and sacred relationship with this country.***

We thank all stakeholders who participated in the engagement process and shared valuable insights with the project team.

This project was undertaken as a collaboration between Curtin University and Umwelt Environmental and Social Consultants. The team includes specialists in water resources, environment, Aboriginal studies, economics, stakeholder engagement, and geographic information systems.

The project, was an initiative funded by BHP in the context of its vision for a water-secure world by 2030, an aim consistent with the United Nations Sustainable Development Goals. This vision is for a world where water resources are conserved and resilient so they can continue to support healthy ecosystems, maintain cultural and spiritual values, and sustain economic growth. BHP Nickel West initiated this engagement process with many of the key stakeholders with a direct interest in water in the regions where BHP Nickel West operates. The aim of sharing the results of the WRSA is to stimulate opportunities for coordinated collective action on water, by helping build a common understanding of the shared water challenges and stakeholder priorities with other water users.

## Status of this document

This document will be used by BHP to inform a future engagement process with stakeholders. The process will seek to prioritise key shared water challenges and clarify possible collective actions in which the parties might jointly engage. Based on this engagement suitable mechanisms or platforms will be identified to take these actions forward and deliver meaningful outcomes.

## Contents

Introduction	1
What is a Water Resources Situational Analysis?	2
The Northern Goldfields: water, environment, people, and economy	3
Water resources	3
Cultural values	3
Environment	4
Climate	4
Population and economy	4
Stakeholder perspectives	5
Stakeholder-identified challenges, causes and drivers	5
Shared collective impact opportunities	7
Water resource values in the Northern Goldfields	8
Shared water challenges	9
Collective action opportunities	13
Appendix 1: Preparation of the WRSA	14
Key references	15



## Introduction

The arid zones of Australia, although remote and sparsely populated, experience a high level of activity. Increasingly there is potential for conflict between stakeholders for important natural resources – like water. The Northern Goldfields region of Western Australia is one such area where more focused attention is needed to ensure that water resources are looked after for current and future generations, for the environment and importantly in a way that respects the inherent cultural values around water and land of the traditional owners.

# What is a Water Resources Situational Analysis?

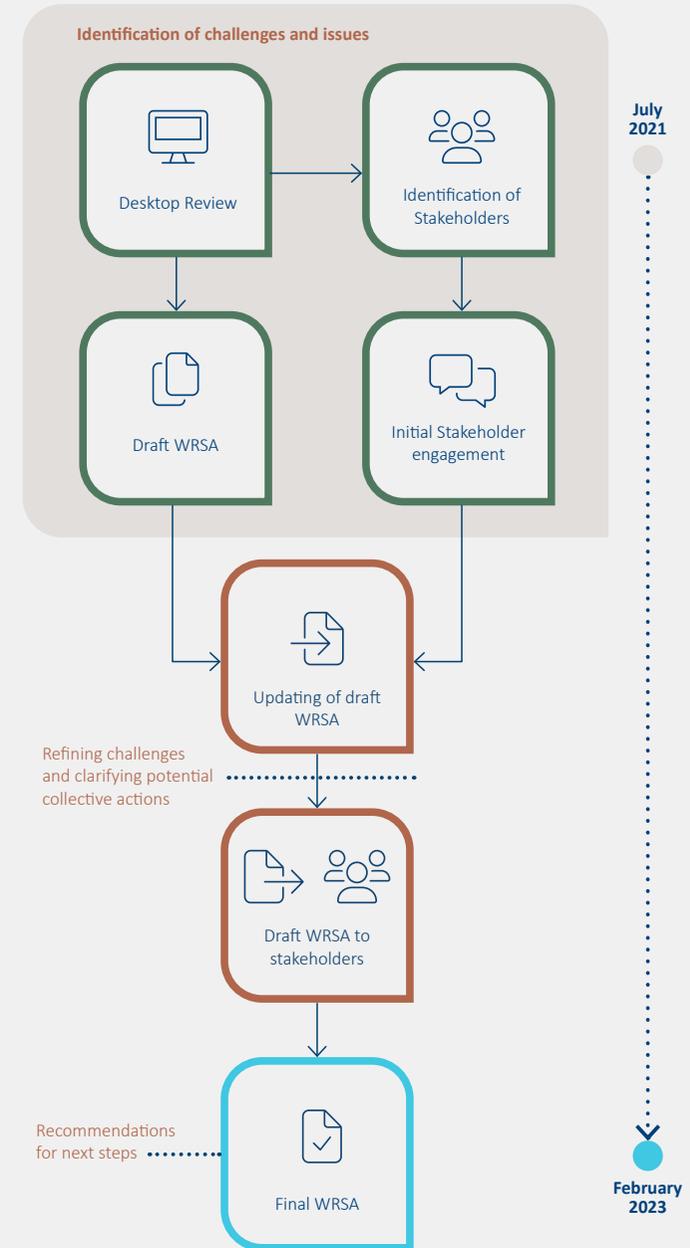
This document – referred to as a *Water Resources Situational Analysis (WRSA)* – identifies water challenges and potential collective impact opportunities. It is based on a review of available information, specialist knowledge, and interviews with key stakeholders. It is acknowledged that the engagement has been at a high-level and that there is ongoing dialogue with all stakeholders, especially with Tjiwarl Native Title Holders and other First Nations people in the region.

This is an initial step in a process of a longer-term journey to foster enhanced Water Stewardship across the region. It is a starting point for an on-going dialogue with stakeholders regarding collective action.

Water Stewardship means water use is “socially and culturally equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site-and catchment-based actions”<sup>1</sup>

“Good water stewards understand their own water use, catchment context and shared concerns in terms of water governance, water balance, water quality and important water-related areas; and then engage in meaningful individual and collective actions that benefit people, the economy and nature.”<sup>3</sup>

Shared water challenges may relate to a broad range of topics, such as access to water, cultural, social and economic values of water, flood risk, industrial, agricultural and domestic water demands, impacts on water quality and quantity, and effects on water-related ecosystems. WRSA are relatively new at both the global and Australian scales. The Alliance for Water Stewardship<sup>1</sup> and United Nations Global Compact CEO Water Mandate<sup>2</sup> drafted guidelines for developing a WRSA. The WRSA for the Northern Goldfields region draws on insights from these guidelines. Development of the guidelines followed the process shown in the diagram adjoining. Further details on the preparation of the WRSA are in Appendix 1.



Process used to develop the WRSA

<sup>1</sup> Alliance for Water Stewardship: 2022-2030 Strategy

<sup>2</sup> United Nations Global Compact CEO Water Mandate

<sup>3</sup> Alliance for Water Stewardship: 2022-2030 Strategy

# The Northern Goldfields

## Water, environment, people and economy



The WRSA's focus area encompasses a broad 'area of water interest' that stretches along the Goldfields Highway between the towns of Wiluna and Leinster. Wiluna is situated inside the northern boundary of the area and Leinster is inside the southern boundary. The town of Sandstone on the Agnew-Sandstone Road is within the south-west corner of the area.

The 'area of water interest' relates to the broader physical and social catchments in which BHP Nickel West and related operations operates. This is not a hard boundary but is a general area to focus this WRSA. The aim of the study has been to identify and gain insights into challenges and opportunities by exploring the range of perspectives of stakeholders engaged in this process.

### Cultural values

The relationship of Aboriginal people with water is complex. Waterways and waterholes are keeping places of story. Water is life, and water is living. Waterways are pathways to negotiate country. Water is a source of cultural exchange and food, such as invertebrates, fish and birds, depending on location. Water places are sites of birthing ritual and law. As story-places, water locations are places of learning and traditional knowledge. Both waterways and waterholes are created by Spirit Beings and are the homes of Spirit Beings. Waterholes and waterways are sources of hydration and there is a cultural responsibility of sharing between neighbours and those further downstream.

It is widely acknowledged that water sites are highly significant to the story and cultural values of Aboriginal people. Water is held as both sacred and mundane. The experience for Aboriginal people, however, is that even the mundane is held sacred. In other words, from the Dreaming realities there are repercussions, if water resources are not looked after. As children, Aboriginal people hear messages about the kinds of social responsibilities they must fulfil, including obligations to even the most ordinary of laws, and what happens if you break these laws. The ability to continue fulfilling duties and obligations in maintaining cultural values and laws from antiquity to the present day, is part of sacred, as well as the mundane responsibilities.

A number of significant and mythological sites are known within the wider study area. Most are related to water sources. Traditionally, some water was sourced by the Aboriginal people from gnamma holes and shallow springs in calcrete. Generally, the occurrence of these features and their cultural importance is poorly understood by non-Aboriginal people.

### Water resources

This region is dominated by poorly defined internal drainage systems that link into local ephemeral salt-lakes, with surface flows providing recharge to groundwater. The streams and creeks are ephemeral and generally flow only after major or sustained rainfall events.

The lakes in the region are typically hypersaline and dominate the landscape along the trunk surface drainage systems. The salt lakes are also discharge areas where vast amounts of water exit the system through evaporation.

Given the low rainfall and lack of permanent storage, groundwater is the most dominantly used water resource in the Northern Goldfields. Water quality is variable, ranging from fresh water in the tributary palaeochannels to hypersaline in the trunk palaeochannels. Transition from fresh to saline water can be sharp, where more dense hypersaline water underlies fresh water from recharge zones. The groundwater in the region exists in a number of hydrogeological settings, including the following:

- Alluvium/colluvium, which are widespread and form a shallow heterogeneous aquifer;
- Shallow calcretes, silcretes, pisolitic gravels and indurated iron-stones, which can form shallow aquifers of higher quality than much of the surrounding resource;
- Palaeochannel aquifers of sand and gravel, typically at the base of palaeochannels and can have larger yields;
- Weathered basement rock of the regolith, which are typically low-yielding; and
- Fractured rock aquifers throughout the crystalline basement rock of the Yilgarn Craton, which have localised yields.

Mining is the main user of water, with approximately 66 billion litres of groundwater licenced by the mining industry. Of this volume, approximately half of licences are from fractured rock aquifers, about one-third from palaeochannels, and the remainder from calcretes and shallow lake sediments. While this is the volume that is licenced for abstraction, the actual volume abstracted is likely significantly lower. As stock and domestic bores are not licenced, there are no data on the volume of pastoral water use. However, most of the water extracted for stock comes from shallower, fresher water resources. Much of the water extracted for minerals industry in this region is of lower quality, usually with very high levels of salinity.

## Environment

The area of water interest is within the eastern part the Murchison bioregion and is characterised by its internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt-lake systems in the subregion represent the surface expression of the closed palaeodrainage system.

The Murchison bioregion is known to have rich flora and fauna, with most species widespread throughout broader area. There are Commonwealth-listed threatened species and migratory birds that are associated with wetland features (including ephemeral salt-lakes, gnamma holes, fresh water mound springs, creek lines) or groundwater dependent ecosystems. Key threatening processes likely to affect wetlands are grazing pressure, feral animals, impacts from nearby mining operations, and climate change. A range of unique assemblages of subterranean invertebrates exist in the groundwater calcretes. They are either Threatened or Priority Ecological Communities and could potentially be affected by hydrological changes associated with groundwater extraction.

Vegetation is mainly low mulga woodlands (*Acacia aneura* complex) on plains, reduced scrub on hills, and a tree steppe of *Eucalyptus* and *Triodia* on sandplains. Saltbush (*Atriplex*) shrublands occur on calcareous soils, while saline areas are characterised by low samphire (*Tecticornia*) shrublands. The area of conservation reserves of all types in the area of water interest is currently considered to be inadequate. The Wanjarri Nature Reserve is within the area, as are the Kaluwirri, Lake Mason and Black Range areas, which are proposed for protection.

The environmental condition in the region is variable, with many areas being impacted by historical grazing and mining activities.

## Climate

The region has characteristically cool nights and high daily maxima, with average temperatures within the study area ranging from minimum of 0°C in winter to maximum of 50°C in summer. The typical range of mean daily maximum temperatures is 21°C in June/July to 38°C in January and mean daily minimum temperatures of 5°C in June/July to 25°C in January. The region has a low annual rainfall (typical mean rainfall in the area is around 250 mm per annum), with mid-latitude lows, fronts, and associated 'northwest cloud bands' bringing rain to the interior and south, particularly in the west.

Higher rainfall correlates with warmer temperatures, suggesting that summer storms dominate annual rainfall totals. Average annual potential evapotranspiration (transpiration and evaporation) far exceeds the mean annual rainfall, which is consistent with the classification the areas as desert. Since 1999-2000, there has been decreasing winter rainfall and increasing summer rainfall.

A range of climate modelling scenarios have been undertaken by CSIRO. This suggests that average temperatures will increase in all seasons in the region, and the number of extreme temperature events will also increase. Rainfall scenarios under climate change modelling suggest changes to summer rainfall are possible. However, winter rainfall is projected to decrease. Extreme rainfall events are projected to increase in frequency and intensity, although the magnitude of the increases cannot be confidently predicted. The modelling scenario suggest that by 2030, drought periods are projected to increase and there is expected to be a significance increase in evapotranspiration.

## Population and economy

The area is sparsely populated. In all, 1,255 residents lived in the area according to the 2016 census. Of the total, around 19% identified as Aboriginal or Torres Strait Islander. Around 80% of the local population live in the three towns of Leinster, Wiluna, and Sandstone. The Aboriginal population lives almost exclusively in Wiluna, where they represent around two-thirds of the population. Local towns and settlements in the area often have poor water quality and security.

Just over 2,000 people worked in the area in 2016, almost twice the resident population. Mining is the dominant industry, with many of the jobs being on a 'fly in fly out' basis. Based on 2016 figures an estimated total of around \$1.75 billion in annual value was generated in the region, with mining generating almost 95% of that output, at \$1.66 billion. Mining accounted for 61% of the jobs in the region, or 1,240 jobs.

While mining is the main economic activity in the region, grazing of native pastures is the dominant land use. However, many pastoral leases are considered low viability on their own. An increasing percentage of pastoralists expect to earn a significant proportion of their income off station, principally from supporting the mining industry.

Non-Aboriginal people have significantly higher levels of employment than Aboriginal people in the region, resulting in an economic disparity between these groups.



# Stakeholder perspectives

Outlined following are the findings from stakeholder interviews. Findings are separated into a combination of views around challenges, causes, and drivers, and shared collective impact opportunities. Unattributed and anonymised quotations are provided to emphasise the points raised.

## Stakeholder identified challenges, causes and drivers

The diagram below illustrates the mix of challenges, causes and drivers raised by stakeholders in the engagement process, with the larger circles representing the topics more commonly expressed by stakeholders. The words are based on raw data from quantitative analysis of interview transcripts.



### Declining volume of higher quality water

One of the strongest messages from the interview process was perceptions of declining volume of higher quality water in an already arid region. Reportedly, water levels in some groundwater bores are rapidly dropping. The cause is widely attributed to mining operations, as well as declining rainfall. This perception of declining groundwater is believed to be affecting the pastoral industry. The regional depletion of groundwater was raised as a concern by the Tjiwarl people. There is also a view that birdlife and native animals have been disappearing because of the drying of fresh water features.

“You would be aware that some of the Traditional Owner groups have a lot of interest around water and water management, and how it’s part of their management of country, and part of their native title”.

### Competing for water

Processes associated with allocation of water and contentions about competition over water resources was a key topic discussed. There were calls for greater equity and transparency in allocation, and it was not clear whether competition for water is real or perceived. However, an identified issue was allocation of water licences under water legislation that is perceived to be out-dated. There was a reported ongoing demand to secure supply, particularly by mining companies. Currently it is difficult to be confident in what the projected demand is from all users, what is an equitable allocation, and what is the gap.

“It seems to us that water is probably more valuable than minerals at the moment, because wherever we look, we see mining companies just chasing or applying for miscellaneous licenses for water all over the region.”

### Engaging First Nations People

Considerable dialogue focused on the necessity to include and engage First Nations People from the outset and across the mine lifecycle. It was noted that there is a need to establish and build stronger relationships between industry and First Nations People. Stakeholders acknowledged the need for greater acknowledgment of cultural heritage, specifically connection to water and the impacts of mining and associated infrastructure development on landscapes and song lines.

“There is a greater need to consult on surface water diversions and creation of artificial water bodies (such as pit lakes). All of this needs to be part of cultural heritage considerations and what that means to their song lines.”

## Limited publicly available information

Many stakeholders identified the opportunity for increased information sharing between stakeholders to aid regional water management.. The existing system and processes of data and information sharing hinder best-practice water management and create questions about equitable water allocation.

While there were calls for independent monitoring of water abstraction, use and impacts, a solution offered was to encourage proponents to be transparent in releasing their monitoring reports. It is noted that there needs to be care around the types of data shared, appropriate use of data, and ensuring that data that is shared is needed to progress collective water management outcomes.

“I think the area that would be worth exploring is the provision of information. ...But at the moment there is restrictions on the release of all kinds of data and report(s) (within government and industry). If monitoring data was more publicly available, it probably gives the industry a lot more credibility. It’s a topic that needs a whole lot more discussion to figure out what is workable and useful.”

## Perceived lack of stewardship

Some participants expressed a concern about inadequate water stewardship in the region. Lack of appropriate resources and competing priorities within Government were noted as contributing factors. For the private sector the commitment to water stewardship aligns with their intent to operate more sustainability and enhance social value outcomes.

“I don’t think the state government has the on-country perspective, can’t make it happen. Need the people on the land to make it happen. This initiative [BHP water stewardship] could very much drive change.”

## Water management planning

Stakeholders confirmed that there is currently no water allocation plan for the Northern Goldfields. Some stakeholders noted that an allocation plan might not be the most appropriate ‘tool’ or ‘approach’, but some form of ‘collective water management plan’ is warranted. Participants contended that the absence of an allocation plan did not reflect a lack of interest. Rather, it reflected a lack of resources or an agreed ‘stewardship framework’. The current regulatory approach focuses on managing water extraction on a case-by-case, application-by-application basis.

Governments at all levels are facing pressure to plan strategically for the longer term. However at an industry level the focus is generally directed to approvals and meeting regulatory obligations, rather than on longer term resource management. While it is undoubtedly important to align these two planning timeframes, it is also challenging from a broader planning perspective. Some stakeholders also identified the limited dialogue between mining companies and the regulator post approval.

“I think if we can move away from calling it an allocation plan, because it’s got different connotations. Certainly, there is value in considering a water resources management plan. ... Working with stakeholders is important in terms of going forward, making sure we’re all on the same page about what we’re trying to achieve is critical.”

## Cumulative impacts

Having some sort of ‘regional water management plan’ was seen as a potential way to help understand and manage the cumulative impacts associated with mining activities (and all water use), including past extraction, current extraction, continued extraction and growing extraction, all of which are relevant to the Northern Goldfields.

“One of the concerns is the regional depletion of groundwater resource in the area. Anecdotal feedback is pastoral bores that have been plentiful in the past, going back many years or decades. Mining operations are being seen to have an impact on those bores and groundwater in the area. So, we’ve always got to be very mindful of the cumulative impact of all of us in the area.”

## Climate change

While acknowledging significant uncertainty around the effects of climate change in the Northern Goldfields, recent observations suggest that rainfall patterns are changing. The area has experienced five years of drought conditions, whilst other areas in the Goldfields have benefitted from increasing rainfall. The lived experience is that winter rainfall has significantly declined, and rainfall appears to be increasing in summer. The view is that there are more extreme events and greater uncertainty.

The impacts of drought on pastoralism (and stock, in particular) were key concerns. Given these increasing uncertainties, some stakeholders emphasised the need for better data sharing and monitoring of water sources, particularly related to fresh water. Modelling to better understand the potential consequences of these uncertainties could be of value.



“Climate change provides additional uncertainties and emphasises the importance of monitoring and data sharing.”

## Shared collective impact opportunities

This section focuses on identifying potential collective impact opportunities identified by the stakeholders in terms of partnership arrangements and areas of focus for action.

Importantly, although commercial sensitivities are associated with sharing information in the mining sector (because of competition law rules and water licencing regulations and protocols), strong sentiment was voiced for more collaborative approaches and appropriate sharing of information. This would promote water stewardship in the region. The diagram below identifies key partnering and future opportunity themes identified by participants.



### Regional forum

The potential value of a regional forum focused on water management was widely discussed and supported by a wide cross section of stakeholders. In general, participants felt that such a forum could provide an ideal opportunity to address water management practices and issues. Such a forum could help provide a basis for a more transparent approach to water management. Terms such as being ‘meaningful’, ‘focussed’ and ‘collaborative’ were used to underline the intent of a forum.

“There doesn’t appear to be anything obvious that already exists. So, something along the lines of a Northern Goldfields Reference Group or mining reference group, especially if it had buy-in and leadership of the mining companies in the region as well as involving the regulators.”

### Sharing skills, infrastructure, knowledge and information

Further, interviewees explored other collaborative opportunities, including sharing skill sets, infrastructure sharing (as an example: sharing water resources for stock with a neighbouring pastoralist), and information exchanges.

“We’ve been working on what water we’ve got, what is the sustainable source of our water and starting to look more broadly, this has been the first time that we’ve really sat back and started looking more in terms of how we can work better together.”

### Trust as a requirement for collaboration

Many participants identified trust as an important factor in the success of any collaborative endeavour from various stakeholder viewpoints.

“Comes down to a trust-based system. Not going to share info if there is no trust.”

### Data sharing

Collaboration, monitoring and data sharing between industry/developers and government agencies is essential to inform the management of water resources at a regional scale.

For example, it would be ideal to find mechanisms that would allow relevant groundwater monitoring information to be more freely available to relevant stakeholders to assist with future management decisions. Further, it will be essential to overcome real and perceived limitations to data sharing from an anticompetitiveness perspective to resolve this challenge.

“A lot of stuff gets tied up in commercial in-confidence that probably needs to stay there. But there’s probably quite a bit that would be useful to state government and other organisations. And some of this information may well be actually held by certain parts of state government, but also not communicated across others. So, something that helps that planning cycle and understand the needs of the region is something we’ve been advocating for a while.”

### Carbon economy

There were divided views and uncertainty about the value and feasibility of carbon farming in the region. However, it is acknowledged that there are multiple potential benefits in terms of rangeland condition, water, biodiversity, decarbonisation, and diversifying the economy should carbon farming eventuate.

“... drier conditions across pastoral lands, all those sorts of things are a real concern, and something that everyone’s coming to terms with as well as the carbon economy and what that looks like, in terms of some of these land uses, and whether there’s opportunities in the region.”

### Water monitoring as a Traditional Owner enterprise opportunity

There may be enterprise opportunities to be explored with Traditional Owners in the area of water monitoring.

“The really obvious one for me is engagement with the Traditional Owners on their ranger program on things like monitoring [...] an enterprise in its own right. I just think about opportunities for Aboriginal people to work on country.”

# Water resource values in the Northern Goldfields

The information review and stakeholder engagement process highlighted several foundational high-level water-related values that underpin the views of different water users. To enhance a collaborative approach to managing water resources of the region, proponents will need greater understanding and appreciation of these values.

A value is something that is important, useful or has worth. A shared value emerges when multiple people, or groups of people, hold the same or similar values. In the context of water resources of the Northern Goldfields region, values about water-related matters outlined below are drawn from the information review and interviews with multiple stakeholders. Importantly, while these values are presented as shared values, stakeholders may align more closely with certain values.

*A value is something that is important, useful or has worth.*



## Water resource sustainability and security

We value the responsible management of water resources for present and future generations, for mining, pastoral stations, towns and communities, and for diversifying the economy.



## Appropriate use of variable quality water

We value the appropriate use of water of different qualities and the need to maintain fresh water sources, so that environmental values are preserved, and beneficial uses of water can be sustained.



## Respecting cultural perspectives

We respect the cultural connection of First Nation People to the water and water dependent environments so that enduring cultural, social and spiritual connections with water resources are maintained and restored.



## Environmental integrity

We value the water dependent natural ecosystems and wetland features – including ephemeral salt-lakes, gnamma holes, fresh water mound springs, and creek lines - that support the biodiversity of the region. We want to more effectively manage areas of environmental significance, rare and endangered species, and threatened communities.



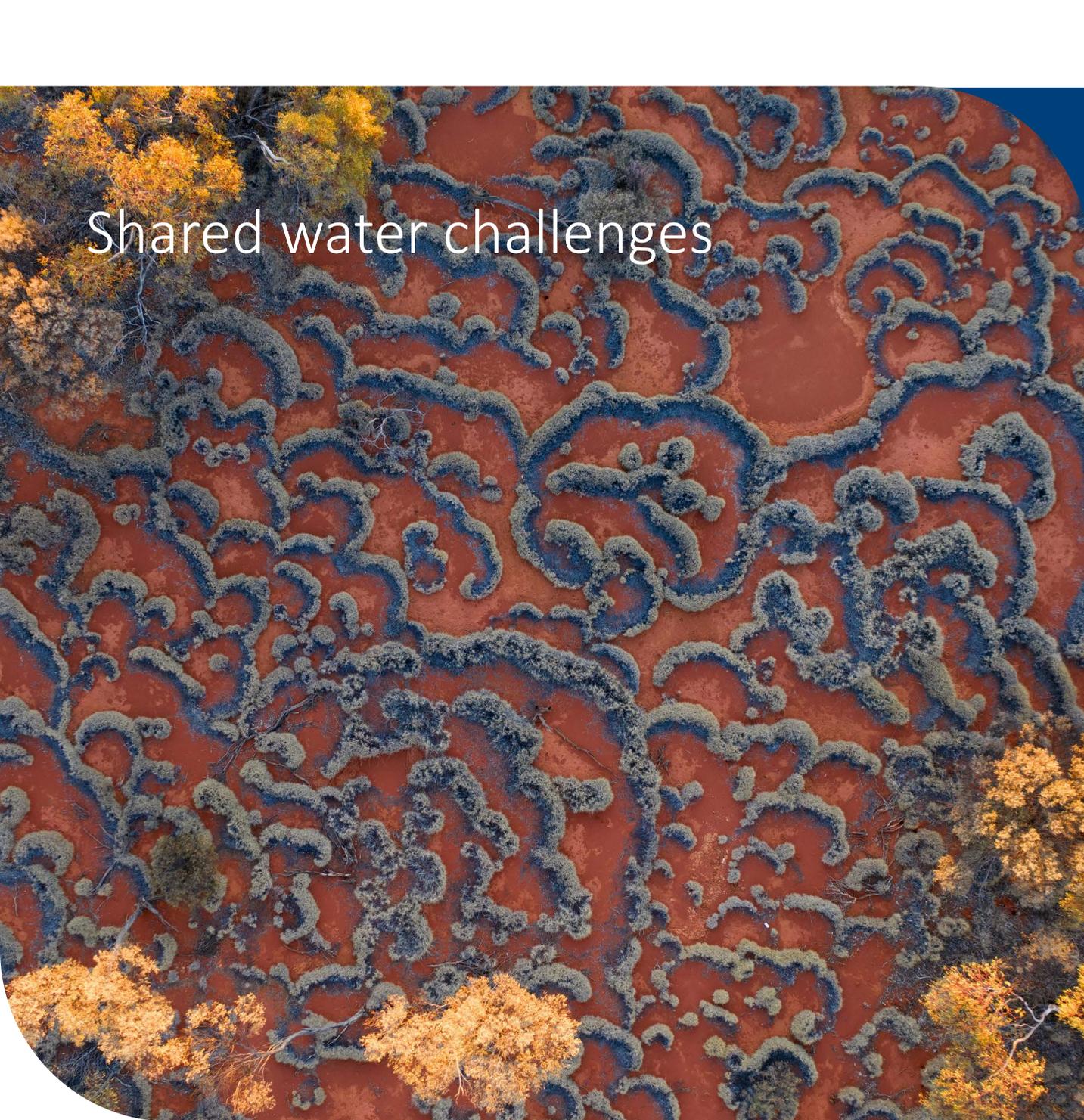
## Appropriate governance and long-term planning

We want a water resource management framework that enables fair and equitable water allocations for water users, while recognising the aridity of the landscape and uncertainty of climate change, considering environmental needs, acknowledging Aboriginal people's connection to country, and supporting business confidence.



## Diversifying economy beyond mining

We promote opportunities for alternative and sustainable economic uses of water to provide greater economic security to the Northern Goldfields community beyond mining.



# Shared water challenges

*A water challenge refers to a problem, concern, or threat related to water. A shared water challenge arises where there is a gap between current conditions and the shared water values, or when there is tension between or among competing values.*

The challenges described below relate directly to the “shared values” described above. This is intentional, as the challenges in the region are considered threats to the shared values identified in the analysis of stakeholder interviews and the relevant literature. Although the challenges are documented in what might be seen as a hierarchy, the interlinked nature of these challenges needs to be acknowledged.



## Water resource sustainability and security

### Challenge

Uncertain long-term security of water supply, with ever increasing competition for fresh water.

### Consequences

- Uncertain supply of appropriate quality water for stakeholders, now and in to the future
- Lack of confidence in investment decisions, resulting in stifled economic growth
- Competition leading to an environment of distrust (e.g. mining companies leases for water)
- Ecological degradation from cumulative impacts

### Causes

- Cumulative impacts of mine dewatering, supply, and infrastructure
- Significant demand for a limited resource in an inherently arid environment
- Inadequate shared hydrogeological understanding and monitoring to predict impacts
- Poor sharing of data and knowledge between and among stakeholders (in particular, industry and government)
- Lack of integrated long-term planning
- Climate change increasing uncertainty in future water availability and impacts

### Relevant stakeholders

Mining and industry, pastoralists, local government, state government, First Nations People

### Current collective action

Goldfields Voluntary Regional Organisation of Councils (GVROC) Regional Climate Alliance, which includes a focus area on water, aiming to *address water security risks across the region, given the predictions for reduced winter rainfall and a drying climate.*



## Appropriate use of variable quality water

### Challenge

Some stakeholders or industries do not have access to adequate quality, fit-for-purpose water, and there are concerns that the available volume of fresher water is declining over time.

### Consequences

- Lack of water of suitable quality for certain uses (e.g. potable, process)
- Health impacts for communities from use of poor-quality water, where treatment is lacking
- Increasing competition for limited fresh water resources
- Degradation of ecological integrity and environmental values from contamination

### Causes

- Inherent natural variability in water quality and limited volumes of fresh water
- Lack of understanding of water quality variability in the context of water resource management
- Changing climate reducing future fresh water availability through lower rainfall and higher evaporation
- Mining activities potentially degrading water quality – e.g. dewatering discharge, tailings, contamination, saline water intrusion, post-mining landscapes

### Relevant stakeholders

Mining and industry, pastoralists, local government, state government, First Nations People

### Current collective action

Goldfields Regional Organisation of Councils (GVROC) Regional Climate Alliance.



## Respecting cultural perspectives

### Challenge

There is a need to build trust between First Nations People and mining companies, and to ensure that the cultural connections of Traditional Custodians with water and water environments is respected and maintained.

### Consequences

- Erosion of cultural assets and loss of cultural assets and loss of Aboriginal cultural heritage
- Loss of connection to country and access to traditional food and water resources
- Impact to wellbeing of Aboriginal peoples
- Lack of trust and increased conflict between First Nations People and other stakeholders
- Risk to social licence to operate

### Causes

- Increased demands on water and impacts of mining
- Lack of understanding and consideration of traditional knowledge and perspective
- Inadequate involvement of First Nations People in water planning
- Existing legislative framework limits consideration of Aboriginal values
- Adequacy of resources to complete mapping to identify cultural assets
- Historic lack of dialogue between mining companies and stakeholders
- Historic imbalance of power

### Relevant stakeholders

Mining and industry, pastoralists, local government, state government, First Nations People

### Current collective action

Reclaim the Void – weaving country whole” aiming to create a wild, huge ‘dot painting’ across a mining pit on country in the spirit of offering of ‘sorry’. Initiative involving cultural custodian Kado Muir, artists, Department of Local Government, Sport and Cultural Industries, and LotteryWest.

Tjiwarl Aboriginal Corporation Ranger Program



## Environmental integrity

### Challenge

The natural environment in the region is deteriorating, with less wildlife, inadequate protections, concerns about long-term land health and productivity and uncertainty about the potential impacts of climate change.

### Consequences

- Impacts on vegetation, biodiversity, and natural landscapes
- Decline of protected/listed flora, fauna, and ecological communities, including subterranean fauna species
- Increased soil erosion and loss of soil productivity
- Loss of soil carbon

### Causes

- Increasing cumulative impacts of mining dewatering, supply and infrastructure
- Interruption of surface flows from mining and other infrastructure
- Inadequate shared hydrogeological understanding and monitoring to predict and assess impacts
- Relatively poor understanding of subterranean calcrete fauna species and assemblages
- Lack of integrated long term planing across all stakeholders
- Historical pastoral impacts on land condition
- Small representation of CAR conservation reserves (Comprehensive, Adequate, Representative)
- Climate change increasing uncertainty in future water availability and impacts

### Relevant stakeholders

Mining and industry, pastoralists, local government, state government, First Nations People

### Current collective action

None identified



## Appropriate governance and long-term planning



### Challenge

Deficiencies in regional and integrated water resource management and planning identified as a key contributing factor to environmental degradation, decline in availability of fresh water, and poor consideration of cultural perspectives.

### Consequences

- Inequitable access (or perception of inequitable access) to water for different stakeholders with different resources
- Lack of trust and increased competition for water among stakeholders
- Uncertainty of long-term water availability

### Causes

- No strategic level, adaptive, water management plan for the region
- “First-in, first-served” water licensing policy and regulatory framework does not promote system stewardship
- Policy framework does not promote water sharing or trading
- Limited sharing of information/data among stakeholders
- Disparity of financial and human resources among stakeholders
- Existing legislative framework limits consideration of Aboriginal values

### Relevant stakeholders

Mining and industry, pastoralists, local government, state government, First Nations People

### Current collective action

Goldfields Regional Organisation of Councils (GVROC) Regional Climate Alliance – proposal to develop a Strategic Water Plan to 2050



## Diversifying economy beyond mining



### Challenge

The economy of the region is highly dominated by mining, with concerns about developing a longer term, more diverse, sustainable economy for the region.

### Consequences

- Limited economic opportunities for local communities outside of mining
- Potential loss of opportunities for sustainable, post-mining economic activities
- Opportunities for cultural economy not being realised

### Causes

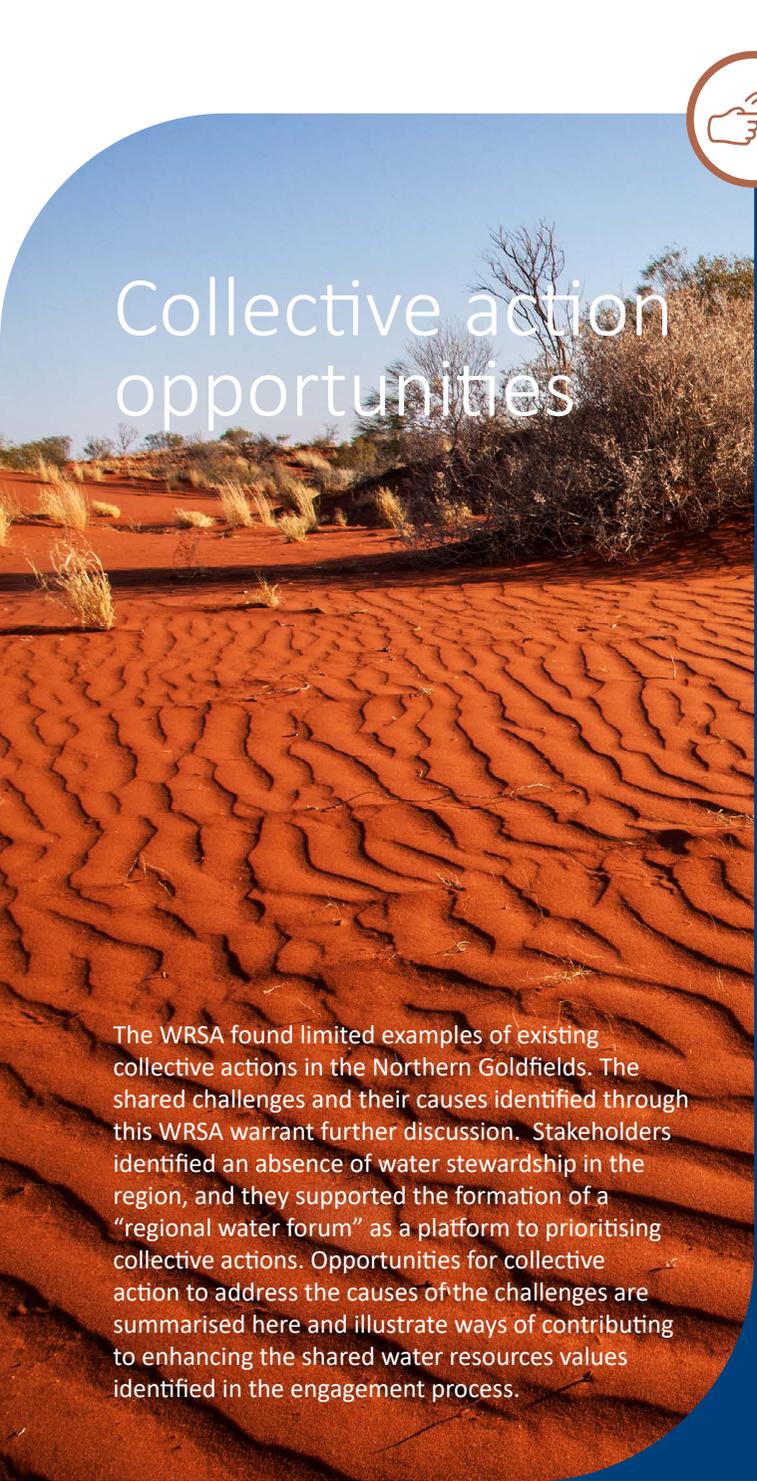
- Significant economic benefit of mining relative to other industries/activities
- Economic value of water not adequately quantified
- Difficulty establishing business case for alternative industries in the region (e.g., carbon farming, feedstock, horticulture)
- Currently, regionally integrated planning for post-mining landscapes and economies can be limited given the often long time until mine closure
- Uncertainty for future industries following cessation of mining and “uplift”

### Relevant stakeholders

Mining and industry, pastoralists, local government, state government, First Nations People

### Current collective action

There have been investigations aimed at exploring the integrated water solutions involving third parties. The Cooperative Research Centre – Transitions in Mining Economies (CRC-TiME) has the potential to provide a forum for identifying and evaluating opportunities in this space. Goldfields Voluntary Regional Organisation of Councils (GVROC) Regional Climate Alliance, which includes a focus area on water, aiming to *address water security risks across the region, given the predictions for reduced winter rainfall and a drying climate.*



# Collective action opportunities

The WRSA found limited examples of existing collective actions in the Northern Goldfields. The shared challenges and their causes identified through this WRSA warrant further discussion. Stakeholders identified an absence of water stewardship in the region, and they supported the formation of a “regional water forum” as a platform to prioritising collective actions. Opportunities for collective action to address the causes of the challenges are summarised here and illustrate ways of contributing to enhancing the shared water resources values identified in the engagement process.

Establish stewardship framework or forum for co-management involving government, industry and First Nations People to enhance collaboration, cooperation and knowledge sharing as a foundation for better water management

All stakeholders and industries work together to understand, evaluate and manage the cumulative impacts of water use and the potential impacts of climate change at the regional scale

Coordinate and share relevant hydrogeological knowledge and water monitoring data as it relates to collective outcomes, including climate, water level monitoring, water quantity and water quality data

Complete an audit of water supplies of different qualities within the Northern Goldfields, to better understand fit-for-purpose water supplies

Companies investigate options for improved efficiency of water use, and share information on non-commercially sensitive innovations

Stakeholders share information on best practice environmental management of water extraction, disposal, efficient use, and treatment that helps maintain or improve current environmental conditions

Explore model of First Nations People working with industry to undertake water monitoring and sharing of water monitoring data, potentially through existing ranger programs

Explore opportunities for First Nations People to work with other stakeholders on regeneration of degraded landscapes and alternative water economies

Identify areas of higher water related biodiversity value to add to the conservation estate, to increase the area of conservation in line with CAR principles

Stakeholders promote the development of a strategic water management plan for the Northern Goldfields region that accounts for the provision of water for cultural, environmental and economic opportunities

Industry and community advocate for legislative and policy reform that promotes stewardship

Investigate alternative economies for post-mining landscapes, for example exploring the beneficial use of pit lake water

Establish a framework to guide the economic development of the Northern Goldfields underpinned by the protection of Aboriginal cultural and heritage values

Water resource sustainability and security	Appropriate use of variable water quality	Cultural perspective	Environmental integrity	Appropriate governance and long-term planning	Diversifying economy beyond mining

# APPENDIX 1

## Preparation of the WRSA



The desktop review involved collating and reviewing the literature on water and related matters in the Northern Goldfields. This included both published and grey literature. Because of the limited amount of available literature, BHP Nickel West provided access to unpublished consultancy reports that drew together studies undertaken in the area. No limits were set as to the publication date of the source material. The main assessment criterion was the material's relevance to the preparation of the WRSA. The desktop review was compiled in the form of an unpublished desktop review report.

This review, along with specialist knowledge of the team, allowed identification of the challenges in an earlier draft WRSA table, which summarised the key water challenges and opportunities identified through the desktop review. Key issues identified in that process were shared with stakeholders engaged in the review.

The stakeholder engagement process for this review was not exhaustive. However, it focused on gaining insights from key stakeholders, including representatives of state government agencies, local government, mining companies, Tjiwarl Native Title Holders, and a pastoralist. Beyond this WRSA, deeper, ongoing engagement with Traditional Owners is required to understand and share their water values. Initially, this process would involve codesigning Traditional Owners involvement.

In all, 11 interviews were conducted, involving 20 interview participants from five stakeholder groups. Three interviews had more than one participant. Interviews were recorded and subsequently transcribed, coded, analysed, summarised and synthesised, along with interviewers' notes taken during the interviews. This process occurred between February and November 2022.



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