LA TROBE UNIVERSITY

Gabra Biik Wurruwila Wutja
Indigenous Research Centre

Aboriginal Cultural Landscape Management Research Project

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Executive Summary

This report presents the findings of the Aboriginal Cultural Landscape Management (ACLM) Research Collaboration, conducted by the La Trobe University Gabra Biik Wurruwila Wutja Indigenous Research Centre with Transport for New South Wales (TfNSW) and iMOVE Australia. The project was established in response to the recommendations of the New South Wales (NSW) Bushfire Inquiry (2020) which called for greater integration of Aboriginal people and Aboriginal land management practices to build resilience in the state's transport network against natural hazards.

This research aims to determine how traditional and cultural land management can be used to enhance network resilience, support vegetation management and support Aboriginal communities in caring for Country.

Research was conducted over a two-year period beginning in September 2023. On-Country fieldwork was conducted in close partnership with three Aboriginal communities in NSW; Batemans Bay, Coonabarabran and Western Bundjalung. Through Indigenous-led research and extensive community fieldwork and consultation, this research foregrounded the voices, perspectives and aspirations of local Aboriginal Peoples on their preferred ways of protecting country and working with Government.

TfNSW have committed strongly to building resilience into the transport network and processes to embed Aboriginal practices and methods of land care across the state.

The research collaboration has operated in tandem with the broader TfNSW ACLM project, which serves to grow partnerships between key community decision makers, such as Local Aboriginal Land Councils (LALCs) and Native Title Corporations and TfNSW.

The outcomes of the ACLM and this research have transformed the readiness and skills of Aboriginal Ranger teams across the Pilot locations in relation to cultural land management and have created skilled professionals in both contemporary and cultural land management.

Through extensive literature reviews, this report includes findings on Government policy, academic papers and literature on cultural land care initiatives as well as providing pathways towards vegetation monitoring that supports an Aboriginal cultural land management model for TfNSW.

The research found that while there is strong evidence that Aboriginal cultural land management can improve ecological resilience and reduce wildfire risks, direct linkages connecting cultural land management, research and methods to its application to roads and transport infrastructure resilience are limited. However, findings demonstrate that early and sustained involvement of Aboriginal Peoples as leaders and decision makers leads to more resilient, culturally appropriate vegetation management outcomes across community entirely, including along transport corridors.

The findings also highlight the importance of place-based, community-led approaches, where respect and commitment to Indigenous Data Sovereignty principals lend to strong outcomes for community safety and preparedness, ultimately demonstrating the importance of meaningful collaboration between Government and community to build resilience and trust.

This report builds on these findings to propose a framework for TfNSW to build upon, centring opportunities, structures and collaborations tied to ACLM findings. This framework emphasises Indigenous community led strategies tied to research data can be embedded into TfNSW ACLM initiatives in the future and serves to present genuine ways in which community voices can be heard, and focusing on continued respect and prioritising these voices and perspectives, cultural knowledge and self-determination.

The ACLM Project includes recommendations arising from the research provided to TfNSW for sustaining partnerships, supporting Aboriginal Ranger programs, embedding cultural practices in vegetation management and ensuring that policy and practice remain aligned with the aspirations and rights of Aboriginal communities across NSW.

Supported by evidence from the research, the ACLM Project has demonstrated the potential of Aboriginal-led land management for building resilience in the transport corridor.

Statement from the Research Team

The ACLM research project investigates and builds on the voices, perspectives, legacy and aspirations of Indigenous Peoples across the three pilot sites of NSW. Their commentary, support and commitment to providing the ACLM research project with community and cultural knowledge and expertise has been integral to the success of this project. Indigenous-led research and community consultation has provided an avenue for community perspectives and voices to shape the ACLM research project and provide the grounding for Aboriginal and Torres Strait Islander knowledge to inform the ACLM research project and the Draft Framework.

Aboriginal communities are constantly changing, but their aspirations for community health, equitable access to services and opportunities and support all stem from the importance of self-determination in decision making done by the community and on behalf of the community.

The ACLM research project embeds the community knowledge and voices provided to the research team to support in producing a final draft framework which seeks to address the key concerns raised by community in the areas of natural disaster, transport and resilience.

The ACLM Pilot communities are strong and committed to working with Government to support the growth of their leaders and communities. We found that the communities are connected to their homelands and history despite colonisation. Additionally, Elders are a driving force, and they represent their communities and families. Their stories are unique to their country and local history of these places. The community know of sites that the research identifies as important and sacred. The community showed the research team sites and shared the history of the community; such important sites reflect their community knowledge and connection to country.

This research also looked at vegetation management in the context First Nations Peoples knowledge of cultural land practices. The research found that each community has specific knowledge relative to their country, and this knowledge is embedded in the land, water and sky through stories, art and teachings. Community holds this knowledge close for future generations and want it protected.

While views on research were varied, many participants expressed enthusiasm when discussing their community, activism, history, and families. It became clear that trust in research is still developing within the community. That trust is more likely to grow if community members are empowered to contribute their cultural knowledge and take on roles as advisors or leaders in research initiatives.

Each community has a connection to Aboriginal Missions, having connections to burials, housing, education, bush tucker and sacred sites. The research team found it easy to work within these communities because male and female roles were equal and they represented their families. The community held respect for each other's knowledge and protected their community and cultural boundaries.

Each community has a strong knowledge of how to care for Country, and what is needed to negotiate with Government bodies, however negotiation times are extensive. The governance structures of the community depend on the LALCs and/or Native Title Corporations. It was not the intention of the research to focus on the governance structures of these communities, but they are important to the success of ACLM in community and for maintaining long lasting project success.

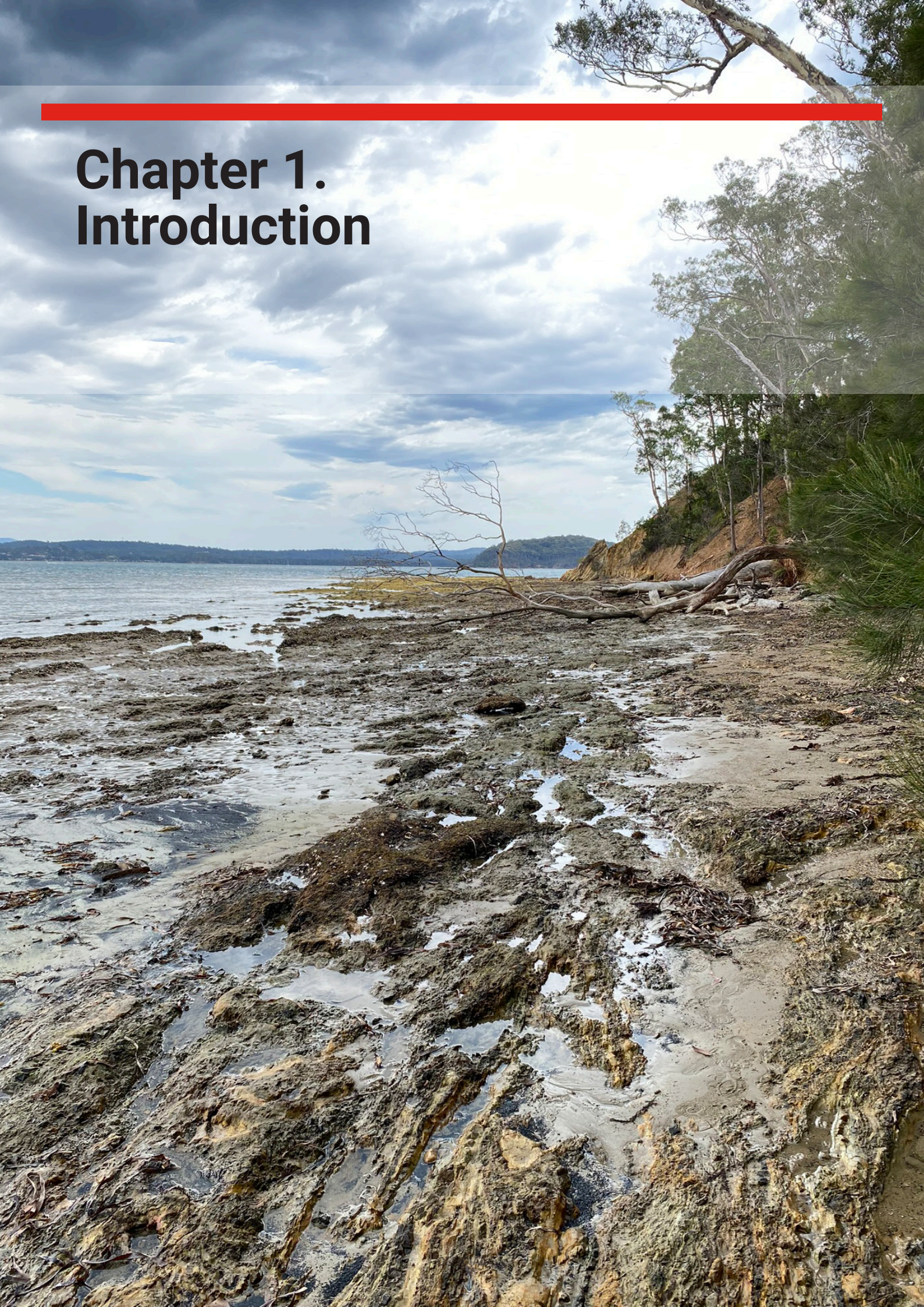
Ethics

This research project is guided by a strong ethical framework that reflects institutional, national and Indigenous research ethics standards. Following the protocols outlined by the La Trobe University Human Research Ethics Committee (HREC) and complying with the National Statement on Ethical Conduct of Human Research (NHMRC, 2023) and the Australian Code for the Responsible Conduct of Research. These standards ensure the ACLM research project has been completed with integrity, transparency and respect for all participants.

Our research has been fundamentally shaped by Indigenous-led research and ethical frameworks and standards, including the AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research (AIATSIS, 2020). This code emphasising self-determination, protection of cultural knowledge, data sovereignty and cultural safety of research participants. The Gabra Biik Wurruwila Wutja Indigenous Research Centre supported in the delivery of this research through embedding cultural competency practices throughout the research project.

In line with the outlined processes, the research team have embedded Indigenous data sovereignty practices in all aspects of this research, maintaining community control of data and information produced throughout the research project as Indigenous and participant owned.

Chapter 1. Introduction



1. Introduction

Aboriginal and Torres Strait Islander People have managed and cared for country for generations. Preparing healthy country in the face of natural disasters has been and continues to be an aspiration for Indigenous People across the country. However, these Indigenous systems towards managing healthy country and creating resilience landscapes for managing disasters, have not been fully recognised as a pathway for preparing and responding to disasters and managing important community and government assets, such as roads and highways along the transport corridor.

In response to the devastating fires of 2019-2020, the NSW Government published the NSW Bushfire Inquiry 2020 (New South Wales Government, 2020), outlining a set of recommendations for mitigating the danger of future bushfires in NSW. Within the Bushfire Inquiry, recommendations included avenues for Government agencies to explore the ways in which Aboriginal Cultural Land Management and Indigenous caring for country can be used to build resilience to natural hazards (New South Wales Government, 2020).

The TfNSW ACLM Project was borne from the recommendations in the NSW Bushfire Inquiry and TfNSW intent to support its application to build resilience to future natural disaster events and support social and economic outcomes for Aboriginal people and their communities.

This report, is situated as the catalyst for Government investigation into bushfire preparedness, including how TfNSW should investigate how Aboriginal Cultural Landscape Management by First Nations People in NSW can increase resilience of the transport network while embedding culturally responsive land care strategies across Country (refer to Recommendations 25, 26, and 72).[1]

[1] Recommendation 25: That Government adopt the principle that cultural burning is one component of a broader practice of traditional Aboriginal land management and is an important cultural practice, not simply another technique of hazard reduction burning.
Recommendation 26: That, in order to increase the respectful, collaborative and effective use of Aboriginal land management practices in planning and preparing for bush fire, Government commit to pursuing greater application of Aboriginal land management, including cultural burning, through a program to be coordinated by Aboriginal Affairs and Department of Planning, Industry and Environment working in partnership with Aboriginal communities. This should be accompanied by a program of evaluation alongside the scaled-up application of these techniques.
Recommendation 72: That, in order to ensure Aboriginal People can access appropriate support during evacuation, Resilience NSW work with Local Emergency Management Committees and Aboriginal Affairs to ensure: a) local Aboriginal Communities are included in emergency planning and preparation; b) all staff involved in evacuation centres and support services are culturally competent.

TfNSW partnered with the iMOVE Cooperative Research Centre (CRC), and the La Trobe University, Gabra Biik Wurruwila Wutja Indigenous Research Centre to identify and support the delivery of Aboriginal cultural land management practices that will improve resilience of the NSW transport corridor in the face of increasing catastrophic weather events.

A critical piece of that delivery is how Aboriginal cultural land and water management can be incorporated into management standards, policies, and practices while supporting the relationships needed to produce successful community outcomes as well as safe and respectful use of cultural knowledge and data.
TfNSW also seeks to take forward the key priorities of their Reconciliation Action Plan (RAP), including:

- Meaningful and collaborative community engagement in planning and designing Transport's infrastructure that values connecting to country and the unique lived experiences of Aboriginal people.
- implementing and embedding Transport's Aboriginal Cultural Learning Framework to enhance cultural safety, cultural awareness and learning outcomes, including truth telling.

Transport Reconciliation Action Plan 2022-2025

Within Transport for New South Wales, the 2022-2025 Reconciliation Action Plan has set key priorities that the ACLM Project has used as benchmarks in its deliverables. These priorities have included:

- **7 - Promote the principles of truth telling within Transport.**
- **10 - Increase Aboriginal and Torres Strait Islander supplier diversity to support improved economic and social outcomes.**
- **13 - Develop an evidence base to inform priorities for services provided to Aboriginal and Torres Strait Islander peoples and communities.**
- **15 - Develop an evidence base to inform priorities for services provided to Aboriginal and Torres Strait Islander peoples and communities.**
- **meaningful and collaborative community engagement in planning and designing Transport's infrastructure that values connecting to country and the unique lived experiences of Aboriginal people.**
- **Implementing and embedding Transport's Aboriginal Cultural Learning Framework to enhance cultural safety, cultural awareness and learning outcomes, including truth telling.**

Furthermore, the national agreement on Closing the Gap has been committed to by all States, Territories and Agencies to further support reform and outcomes, including through the NSW Governments Closing the Gap Implementation Plan 2025-2028 (New South Wales Government Aboriginal Affairs, 2025).

To provide a culturally informed evidence-base for developing this Framework, fieldwork was conducted by the La Trobe University research team with Aboriginal communities in three pilot sites: Batemans Bay, Coonabarabran and Western Bundjalung (Jubullum). These were all selected due to their prior engagement by TfNSW.

Conducted over 18 months, the field-based study was aimed at learning from these communities how they would like to keep transport corridors open and keep country healthy without jeopardising their self-determination, rights and cultural protection. These communities informed and guided the La Trobe Research team on how they would like to practice culture as it relates to land care and transport resilience and what they need for these aspirations to be achieved. The aspirations of Traditional Owners, LALCs and Native Title Aboriginal Corporations have been embedded into this final report while maintaining their Indigenous Cultural and Intellectual Property and data sovereignty on knowledge provided to the ACLM program.

The continued efforts of the TfNSW ACLM Aboriginal Senior Project Officers in growing trusting, responsive and respectful relationships in each of the pilot communities, and their readiness to participate in Aboriginal Cultural Land Management Research was key to successful community participation.

This report combines activity undertaken and provides guidance on the TfNSW Framework to embed community perspectives and needs, setting out strategic directions, outcomes and priorities in which TfNSW can drive resilience in the transport corridor network. It recommends ways of integrating Aboriginal cultural land management practices and the ACLM project into asset management processes of TfNSW and other stakeholders to achieve the dual aims of increasing resilience (decreasing vulnerability) of the transport corridor to natural hazards (notably bushfire) and incorporating Indigenous cultural values into management and practice more broadly.

The report also looks to explore the ways Indigenous communities can lead in the application of Aboriginal cultural land management to caring for country along Transport assets such as roads and highways, providing these Indigenous communities with leading roles in caring for country in partnership.

1.1. Overview

TfNSW is interested in understanding how culturally appropriate land management practices, through a 'Caring for Country" lens can contribute to resilience on the transport network across all TfNSW functions. The Project objectives were:

1. *To identify if and how traditional and cultural land and sea management can be used to build resilience into the transport network, and to natural hazards.*
2. *To enhance our understanding and approach to adopting traditional and cultural land and sea management to support vegetation management.*
3. *To identify, demonstrate or illustrate the opportunities, benefits, and tension in co-designing, accompanying and supporting Aboriginal people and communities in this work; and*
4. *To identify opportunities, structures, investment, and collaboration required for a future initiative within TfNSW in developing a draft Framework.*

TfNSW in collaboration with the iMOVE CRC prepared the basic project plan and engaged La Trobe University research team to deliver the project. TfNSW assisted with the gaining of community permissions, and participation in local workshops / yarning circles; provided guidance on work to date and known gaps and opportunities. Besides an extensive review of existing literature on Aboriginal cultural and other land management practice, La Trobe University conducted field studies including interviews with community, local workshops / yarning circles and prepared site reports.[2]

2 Quarterly Project progress reports were provided by La Trobe and TfNSW to iMOVE using the report template provided by iMOVE. The reports summarised activities for the preceding period and highlight any issues or risks. A Project Steering Committee was established consisting of senior staff from La Trobe, representatives from TfNSW and iMOVE. The Steering committee met quarterly in early stage of project, then bi-annually.

The approach taken in this Project included engagement, listening and collaboration with local Indigenous groups in each of the three pilot study areas to:

- Ascertain local aspirations for incorporating ACLM into vegetation management in the TfNSW transport corridor; and
- Develop a strategy (i.e., methodologies, structures and principles) for implementation of the ACLM (i.e. a Framework). based on the pilot study experiences and extensive literature reviews.

The project utilized the following staged approaches in development and preparation of materials throughout the project and ultimate delivery of the final report and draft framework.

Stage 1:

Explore community aspirations for incorporation of ACLM into vegetation management of TfINSW transport corridor.

Building on work already undertaken by TfNSW Aboriginal teams, and guided by TfNSW Aboriginal Senior Project Officers, La Trobe used culturally informed research methods to explore ways of supporting community to share, grow and re-remember knowledge. In the three pilot areas, La Trobe facilitated workshops/yarning circles to understand how to re-introduce and invigorate cultural practice into vegetation management in the transport corridor. The workshops involved local Indigenous community and other relevant stakeholders. These workshops and site visits included time for listening and learning from the local community and ample time for the local community to explore and share their aspirations and preferred ways of working.

Within each community, early in the ACLM Project, La Trobe, in consultation with TfNSW investigated the possibility of employing a local Indigenous person as a La Trobe Community Officer to engage directly with significant parties and to build community capacity through active participation in the Project. This process involved multiple site visits from the Project team to engage with and listen to the local community.

Stage 2:

Incorporating ACLM into vegetation management practices in the TfNSW transport corridor

La Trobe research team conducted an extensive literature review and interviews with relevant stakeholders and focus groups to prepare a state-of-the-art report on the relation between Aboriginal cultural land management and vegetation management practices particularly around building resilience. The tasks included:

- Conducting international and national literature scans on how Aboriginal cultural land management has been practiced and how it is achieving cultural, economic, environmental, biodiversity and transport corridor resilience outcomes,

- Conducting literature, policy, and regulatory reviews of current practices in vegetation management for network resilience in Australia, with particular focus on TfNSW policy and regulation,

- Conducting stakeholder interviews and focus group discussions with Subject Matter Experts from across TfNSW, National Parks and Wildlife Service, Reconstruction NSW, Regional NSW and Local Councils.

- Preparing a report, including recommendations for vegetation baseline measurements.

Embedding knowledge captured through these two stages 1 and 2, including academic literature and community research findings, a draft framework was developed which incorporates community needs and aspirations while addressing the outcomes of the NSW Bushfire Inquiry on supporting the delivery of cultural land care principles.

1.2. Purpose and Scope

The ACLM Project has been developing over a 24-month period, providing for detailed and culturally informed community engagement and fieldwork through to comprehensive academic research and review. The principles of Indigenous Data Sovereignty have been applied throughout the project, limiting and protecting shared cultural and personal information and returning produced research data to the communities and persons involved in their creation.

Comments in this report to the TfNSW ACLM Draft Framework represents a comprehensive synthesis of academic analysis, community and TfNSW perspectives, and vegetation management research. Its purpose is to outline practical steps and procedures for integrating Aboriginal cultural land management strategies into TfNSW transport and resilience initiatives. As the NSW Bushfire Inquiry outlines, the outcomes within the ACLM Draft Framework are intended to be utilised with the leadership and guidance of First Nations People across NSW. The success of any cultural land care systems at a Governmental scale must be led by First Nations People on the Country and any ownership of concepts, application and works being undertaken retained by Aboriginal people.

Chapter 2. Aboriginal Cultural Land Management and Resilience Literature Review

2. Aboriginal Cultural Land Management and Resilience Literature Review

This section provides review of literature related to Aboriginal cultural landscapes management and practice and its intersection with different aspects of resilience in relation to natural disasters, particularly bushfire. This review represents a synthesis of academic literature and best practice scientific vegetation management processes to generate an evidence base on the utility of Aboriginal cultural landscapes management practice within vegetation management, natural hazards resilience and transport network resilience contexts. The review consists of two parts: Vegetation literature Government policy and academic and grey literature to provide for consistent review and conclusions in these two essential components for the ACLM project. Both literature reviews are published in full and can be found here.

The review related to the use of vegetation management and Aboriginal cultural landscapes management in improving the resilience of transport infrastructure to natural hazards (primarily wildfire and floods) and was anchored around four key questions:

Q1 *What evidence is there that vegetation management, including ACLM, is increasing resilience to natural hazards in the wider landscape, drawing on examples from NSW and other states in Australia?*

Q2 *What evidence is there that vegetation management in the wider landscape confers increased resilience to the transport network?*

Q3 *What evidence is there that ACLM is increasing resilience to natural hazards (e.g., bushfire/flood) in the transport network?*

Q4 *What vegetation management is undertaken in NSW and for what purpose, with particular focus on resilience to natural hazards, transport networks and ACLM?*

Key findings from Literature Review on ACLM and Resilience

- **There are several examples where integration of Aboriginal cultural landscapes management in vegetation management has led to better bio-diversity outcomes. However, the direct connection between Aboriginal cultural landscapes management and resilience building is not firmly established.**
- **This review found very limited evidence for, or examples of, structures connecting Aboriginal cultural landscapes management with building resilience into transport networks and infrastructure.**
- **In several instances, agreements and consultative processes pertaining to Aboriginal cultural landscapes management are in place, but there is no evidence of active engagement in connection with transport infrastructure and resilience.**
- **While there are many practices of ranger programs undertaking cultural burns alongside National and State Park Services, and on private land, these do not prioritise the development and integration of Aboriginal cultural landscapes management for building resilience into transport networks and infrastructure.**

2.1 Traditional and Cultural Management: Land, Sea and Waterways

Terms such as 'landscape management' and 'environmental management' are rooted in the structured management practices and policy-driven approaches that have arisen in post-colonial land management frameworks. In contrast, Aboriginal land management practices are based on traditional knowledge systems that emphasise a place-based understanding of the land, integrating cultural, spiritual, and environmental dimensions. Aboriginal people "care for Country as part of Country, not as separate from it," (Suchet-Pearson et al., 2013, p. 186). The health and wellbeing of people and Country are closely intertwined (Burgess et al., 2009; Cresswell et al., 2021, p. 19; State of NSW & Department of Environment and Climate Change NSW, 2008). The term 'Aboriginal Cultural Landscape Management' recognises that Aboriginal connections to Country are culturally based, with knowledges embedded in cultural practices and interactions with Country. Those knowledges enable a nuanced, localised and intimate understanding of the relationalities, interactions, and responses of Country.

For tens of thousands of years Caring for Country is the continuing practice of Aboriginal people interacting and shaping the land, sky, and waterways. It is a view that is greater than vegetation management, it is an obligation to Country, and a belief system held by Aboriginal people that if we care for Country it will care for us. The description of Caring for Country as 'Aboriginal people's land and water management' logically draws attention to biodiversity, ecology, environmental and landscape management outcomes, but Caring for Country also has benefits for the social-political, cultural, economic, and physical and emotional wellbeing of Aboriginal people.

Cultural landscape management also acknowledges the authority of ancestral and current ownership of lands by Aboriginal people and organisations on which the landscape management activity is to occur. Traditional landscape management acknowledges that Aboriginal people are engaging in applying Caring for Country practice on lands on which ownership is vested in another party. Aboriginal cultural landscapes management offers an alternative or companion to established practices of land management used by most government agencies.

2.2 Vegetation Management

This section provides an overview of the relationship between vegetation management practices and resilience to natural hazards. In this review, we used resilience in relation to two concepts: ecosystem resilience being the capacity of an ecosystem to resist or recover from disturbance (bushfires, floods, storms) measured by biodiversity or functional metrics; and transport network resilience being the capacity of an the transport network to resist, absorb, accommodate, recover, transform, and thrive in response to natural hazards (Transport for NSW, 2023a).

Review of the relevant literature revealed the following vegetation management strategies that increase resilience of and support asset protection against disasters such as fire and flood. The efficacy of the strategies depended on the ecosystem they are being applied to and are not each universally applicable.

2.2.1 Vegetation Management Strategies for Wildfire Risk Mitigation

Wildfires are an inherent part of many ecosystems, and fire plays a crucial role in maintaining biodiversity, particularly in fire-adapted landscapes (Kelly et al. 2020; Haslem et al. 2024). In the existing literature, we found that the following strategies for managing vegetation helped in reducing wildfire risks while maintaining ecological integrity.

a) Fuel Reduction Through Prescribed Burns

Prescribed burning is practiced across the world with the intent to reduce fuel loads. Some studies suggest that prescribed burning can reduce the intensity and spread of subsequent wildfires, especially when burns are recent and conducted immediately adjacent to the assets requiring protection (Florec et al., 2020; Penman et al., 2014; Price et al. 2015). Others highlight that the benefits are often short-lived, heavily dependent on weather conditions, and may be outweighed by negative ecological impacts, such as loss of biodiversity or changes to soil and vegetation structure (Driscoll et al., 2024; Bennett et al., 2016; Flanagan-Moodie et al. 2018). Additionally, prescribed burns conducted at broad scales and high intensities (whether intentional or not) can conflict with ecological fire regimes and may fail to replicate the nuanced, place-based knowledge that underpins effective cultural burning practices. The mixed findings of prescribed burning highlight the need for more nuanced, landscape-specific fire management approaches that integrate both Western science and Traditional Ecological Knowledge.

The efficacy of prescribed burning in reducing fire occurrence, extent or severity has been demonstrated in some systems on some timeframes, but not universally. Burrows & McCaw (2013) and Sneeuwjagt et al. (2013) suggested that prescribed burning strategies proven effective in southwestern Australian forests could be applied to forests in southeast Australia.[3] However, ecological responses to fire vary by ecosystem.[4] Research in NSW and surrounding regions does not seem to favour prescribed burning. A landmark study following the 2019-2020 Australian bushfires, based on the largest known global dataset of post-fire responses (> 2,000 species across vertebrates, insects, molluscs and plants), found that the greatest biodiversity impacts of the bushfires were in areas that had experienced either frequent or recent fires (including prescribed burns), and in regions that were extensively burnt (Driscoll et al., 2024).

3 Research from Western Australia supports the effectiveness of prescribed burning in specific contexts: jarrah (Eucalyptus marginata) forests have shown resilience to altered fire regimes (Burrows et al., 2019); reduced fire frequency — driven by the invasion of WA peppermint (Agonis flexuosa) — threatens the fire-dependent Tuart (Eucalyptus gomphocephala) woodlands (Archibald et al., 2010); and food resources for the endangered Carnaby's cockatoo are better conserved under prescribed burning regimes compared to high-intensity wildfires (Densmore & Clingan, 2019).

4 For example, in semi-arid mallee woodlands, unburnt patches provide critical refugia for reptiles, enhancing overall species richness, especially where these patches are well-connected (Senior et al., 2023). In central Victoria, prescribed fire in dry sclerophyll forests did not display any clear improvement on tree survival during wildfires and instead reduced resilience by increasing small stem mortality, impacting forest regeneration (Bennett et al., 2016). Further, prescribed burning reduced the abundance of large trees and logs, important habitat for small mammals (Flanagan-Moodie et al. 2018), and other key structural attributes (Holland et al. 2016). In alpine heathlands, vegetation recovery is rapid and largely unaffected by fire severity. However, these systems are still vulnerable to frequent fires because the shrubs that are crucial for regeneration are obligate seeders that are slow to reach reproductive maturity, suggesting fire frequency and inter-fire interval will influence resilience (Camac et al., 2013). In grasslands, disturbance is necessary in high-productivity environments to maintain forb diversity, while in low-productivity semi-arid areas, active disturbance may not be essential (Lewis et al., 2010). Lewis et al. (2010) found that biomass reduction methods, including burning, had minimal effect in semi-arid grasslands on fertile clay soils. In grasslands, disturbance is necessary in high-productivity environments to maintain forb diversity, while in low-productivity semi-arid areas, active disturbance may not be essential. In temperate southeast Australian eucalyptus forests, fire severity may override the influence of previous fire regimes on vegetation structure, although overall impacts remain relatively weak (Haslem et al., 2016). Long-term studies (Rainsford et al., 2021) show that while prescribed burning influences understorey plant composition, bird and plant communities are largely resilient. Still, patchy burns and protection of moist gullies are recommended to maintain habitats for fire-sensitive species.

b) Fuel Reduction Through Mechanical Thinning and Logging

Mechanical thinning is the removal of vegetation using machinery (i.e. chainsaws, mulchers, harvesters). It is primarily used to reduce fuel loads, particularly the under- and midstory, and to modify forest structure either as an alternative to or in combination with prescribed burning. This practice differs from both fuel break creation and logging. Mechanical thinning in southeast Australian forests has been demonstrated as effective in combination with burning to reduce fuel loads and fire hazards (Furlaud et al., 2023; Volkova & Weston, 2019).

Disturbance (Fire, Logging) Suppression

Temperate southeast Australian eucalyptus forests are some of the most contentious ecosystems for fire management due to their fire-prone nature, history of extreme wildfires, and density of human settlements and thus they are at the centre of competing fire science paradigms. Both paradigms draw on elements of historic Indigenous fire management and are supported by elements of the scientific literature. However, the apparent contradiction between them may reflect differences in the ecosystems of application and the temporal scale of analysis. Emerging technologies such as heat-sensing drones and autonomous aerial water vehicles may help suppress ignition or dampen flammable patches during critical periods, enhancing the resilience of regenerating areas.

Green Firebreaks

Green firebreaks are a fire mitigation strategy that aim to restructure fuels rather than remove them. Instead of clearing vegetation, these designs reduce fire spread and intensity by altering the arrangement, connectivity, and flammability of plant communities. In essence, they are blocks of low-flammability plants arranged to reduce fire spread by inhibiting movement of the fire front and blocking ember travel and radiant heat. Green firebreaks have been used and recommended across the world, but have been particularly extensively implemented in China, with 364,000 km planted as of 2019 (Cui et al., 2019). Field based evidence indicates that green firebreaks are successful in reducing wildfire impacts in China (Cui et al., 2019), New Zealand (Curran et al., 2018) and the USA (Baijnath-Rodino et al., 2023). The effectiveness of green firebreaks for reducing wildfire risk in southeast Australia has been evaluated via simulations in one study by Marshall et al. (2024). The study simulated fire risk with a range of native and non-native planting designs, finding that green fire breaks increased biodiversity and carbon storage without increasing fire risk.

2.2.2 Vegetation Management Strategies for Flood Risk Mitigation

Some flooding is necessary for biodiversity resilience, especially in floodplain ecosystems. However, excessive flooding occurs and can have detrimental impacts on overall biodiversity as well as greatly impacting transport network function. Three strategies to reduce impacts of flooding can be identified.

a) Planting/Maintaining Riparian Vegetation

Vegetation can be strategically placed to ameliorate flood impacts in perennial and ephemeral riparian zones and wetlands. Croke et al. (2017) provided a framework identifying priority areas of vegetation placement to alleviate flooding impacts within the Lockyer Valley in southeast Queensland. They highlighted the most significant priority area for small to moderate floods as being immediately adjacent to the main waterway channel on lower elevation benches, and for the full floodplain or previous (i.e. not recent) flood zones to be revegetated to mitigate bigger flood impacts.

b) Urban Green Infrastructure

Strategic plantings of vegetation alongside grey infrastructure can increase flood resilience along with numerous social and environmental co-benefits (Green et al. (2021). These could be important solutions for flood impacted cities in Australia where green open space planning can be integrated with flood management to restore or maintain hydrological and ecological connectivity (Schuch et al., 2017).

c) Introduced Fauna Exclusion

In a participatory approach between researchers and Yolgnu Traditional Owners, feral ungulate (wild pigs and buffalo) exclusion in a culturally significant Melaleuca sp. floodplain led to improved ground cover vegetation and likely enhanced water infiltration into the soil and reduced excessive evapotranspiration (Sloane et al., 2024). The impacts of these changes are likely to increase the floodplain's resilience to sea level rise which threatens floodplain biodiversity and culturally significant freshwater hunting grounds.

In sum, there are several ways in which vegetation management can be used for increasing the biodiversity and ecosystem resilience. However, it remains to be seen if there is any evidence of a direct relationship between vegetation management and resilience of the transport network.

2.2.3 Vegetation and Transport Network

While the existing literature does not provide evidence of vegetation management strategies that are directly applied to reduce transport network risk from natural hazards, researchers can still find important relationships between transport network management, particularly of roadside verges, and environmental resilience.

Roadside reserves (or verges) can be key areas for conservation due to their inadvertent protection from landscape clearing, particularly in rural areas. They can foster rare species (Hogbin et al., 1998; Yates & Broadhurst, 2002) that can be just as genetically diverse as non-restricted populations (Hogbin et al., 1998). Minor rural roads are the most common road type in Australia and roadside verges provide key habitat and dispersal connectivity for threatened fauna and flora (Raymundo et al., 2023). Older roads have greater densities of hollow bearing trees, important features of habitat for many native and threatened fauna (Spooner & Smallbone, 2009). Roadsides reserves, such as those in eastern NSW in agricultural landscapes, support greater carbon stocks (above- and belowground), vegetation coverage, plant diversity, habitat complexity, tree recruitment and are less eroded/modified than surrounding paddocks (Ding & Eldridge, 2022).

Roadside reserves are also highly vulnerable to modification through roadworks, stock grazing and bushfire risk management. Due to the increased disturbance and high edge-to-area ratios, they are also highly susceptible to exotic weed invasion (Johnston & Johnston, 2004; Pickering & Hill, 2007; Wolf & Croft, 2014). Grassy weeds and higher vegetative biomass due to certain roadside management practices may lead to increased fire risk, further causing a grass-fire feedback loop. Many studies suggest that the impact of roadside reserve management and disturbance was ecosystem dependent, for example fire in grassland reserves increases native biodiversity however in woody ecosystems it can increase the prevalence of grassy weed species. Further, although fire is necessary for the lifecycle of some species, the interaction between high weed invasion and grazing after fire could negatively affect native plant survival (Milberg & Lamont, 1995).

In the existing literature, there is little or no evidence of direct relationship that shows if different strategies of vegetation management influence resilience of the transport network.

2.3 Resilience and Aboriginal Cultural Land Management

Indigenous peoples have played numerous vital ecological roles in Australian ecosystems including predation, seed dispersal and soil turnover (Bliege Bird & Nimmo, 2018). However, most literature related to Aboriginal cultural land management focused on fire related aspects. Many studies evaluated the impact of cultural fire on biodiversity resilience, with some also providing evidence that Aboriginal cultural land management practices suppress fire or reduce other fire characteristics. While few published studies sought to directly link Aboriginal practices to reduced fire risk, those that do provide strong evidence. The lack of studies is likely due to funding limitations as well as legal and social barriers preventing Aboriginal cultural land management (Costello et al., 2021; McCormack et al., 2024). Incorporating historical perspectives, studies have begun reconstructing Indigenous fire regimes to better understand landscape transformations.

2.3.1 ACLM for Risk Mitigation

Australian Aboriginal fire management has been recorded in colonial literature since Captain Cook sailed along the eastern coast. Intentional fire use in northern Australia is estimated to have started at least 11,000 years ago (Bird et al., 2024), whereas in southeast Australia it is more like 6,000 years ago (Mariani et al., 2024). Early colonial observations, documented in numerous sources, often describe the Aboriginal-managed landscapes, including those of southeast Australia, as impressive and expansive parklands, with lightly wooded open forests and vast fields of food plants such as murnong (Bliege Bird et al., 2008; Gott, 2005; Jones, 2012). Descriptions indicate that fire use was common in dry forests and grasslands of the region, with an early observation by Major Thomas Mitchell that “the omission of the annual periodical burning by natives of the grass and young saplings has already produced in the open forest lands nearest to Sydney thick forests of young trees” (Mitchell, 1848 in Gott, 2005).

According to historical observations, fire was commonly used but not applied universally and not uniformly across the continent. Cultural fire regimes were determined according to intimate local knowledge of phenology and climatic conditions, as well as for effectiveness in fostering and protecting favoured resources. For example, tall wet forests such as those dominated by Eucalyptus regnans (Mountain Ash) were unlikely to be burnt intentionally, reflecting their limited offering of food resources to the local people (Gott, 2005). Contemporary evidence for the historic use of fire in Australia often comes from pollen and charcoal records in lake sediment cores.

A pattern of fire use was identified by Fensham (1997) who showed that spatially, fires were concentrated in the coastal and subcoastal open vegetation types, declining along the aridity gradient that increases inland, reflecting Aboriginal population densities. Fires were also most infrequent in summer and spring, which can be partially related to rainfall as all regions experience maximum rainfall in the summer season. Thus, burning was more frequent in weather that was warm and dry. Ngugi et al. (2020, 2024) presented evidence of historic fire practices through analysis of age classes of fire-sensitive Bugari (Cypress Pine, Callitris columellaris) on Minjerribah (North Stradbroke Island). The authors found that most Bugari were aged between 63-521 years, indicating that past Aboriginal cultural land management would have been effective in protecting Bugari from severe mortality-inducing fires.

In comparing Country managed continuously by Traditional Owners in Arnhem Land with non-Indigenous managed land, Yibarbuk et al. (2001) present a unique case study of the ecological and ethnographic differences between the two approaches. This study, led by Dr Dean Yibarbuk, a Bininj man from Nangark of the Gurrguni clan, presented evidence for the ecological integrity (high diversity of plant and animal species, low abundance of exotic plants) of Country managed by traditional fire management practices which involve regular, small fires, lit throughout the year in a cooperative strategy developed with neighbouring clans. Further, fires lit in the traditionally managed land were of low intensity compared with late dry season fires reported elsewhere. The study highlighted the importance of skilled and local management by Indigenous communities for biodiversity and reduced fire intensity. Moreover, ecological consequences of the loss of Aboriginal fire management have put fire-sensitive communities and species under severe pressure (Russell-Smith et al. 2003).

Aboriginal hunting fires result in a patchier, pyrodiverse landscape mosaic as shown by Bliege Bird et al. (2012) in the case of arid northwestern Australian spinifex grasslands. They found that Aboriginal patchwork fires buffers against climate-driven fire variation, notably reducing fire patch size. They examined the size of fires implemented by the Martu people on their Native Title lands compared to unmanaged national park, finding that significantly less of the landscape burnt under Aboriginal management, with greater long-unburned habitat more evenly dispersed in the landscape. Martu fires were lit during cool, dry months in the middle of the year, and although men and women use fire differently, it is mostly used to forage for prey animals and increase habitat patchiness. The authors detail that the spatial pattern is determined by the mobility of the forager, where there is a tendency to burn in a region of ~10 km2 for several days before moving onto a new patch ten of kilometres away. In this way, fire-age heterogeneity at a tight spatial scale is maintained, which results in fragmentation of continuous fuels and thus limits the spread of large fires.

Aboriginal cultural fire use is “characterized by its selectivity rather than its ubiquity” as seen in the case of Great Western Woodlands which has highly fire sensitive and long-lived plant species (Prober et al., 2016, pg 1). Prober et al. (2013, 2016), reporting on outcomes of a collaborative project between the Ngadju people in southwest WA and CSIRO, found that practices used to protect resources such as rockholes, caves, sacred sites, habitat logs, big and water trees, fruit trees such as quandongs included fuel clearing by sweeping or carrying—in the case of larger dead wood—to remove the flammable vegetative material from around them. While most intentionally lit fires were cool and smoky, “creepy crawly” fires (Prober et al., 2016, pg 19), hot fires were necessary in thick scrub to restart the vegetative successional cycle and allow the reintroduction of a more regular burning regime. Although fire use is careful not to disturb fire sensitive resources, it has an important role in the Ngadju community, such as being used as signal fires, taming dingo pups, clearing dangerous fauna from around campsites such as bull ants, snakes and spiders, for preparing bush medicine, and for hunting, tool making and self-defence to name a few.

Culturally informed fire management has proven effective in the highly flammable savanna biome of northern Australia, reducing the frequency and extent of wildfires in the Kimberley region of WA (Vigilante et al., 2017, 2024), Arnhem Land in the NT (Evans & Russell-Smith, 2020) and Cape York in QLD (Perry et al., 2018) through the savanna burning methodology (Russell-Smith et al., 2013). The methodology is formally recognised under the Australian Government’s Emissions Reduction Fund, providing a framework for generating carbon credits through strategic and culturally informed fire management (Maraseni et al., 2016). Its primary purpose is to reduce greenhouse gas emissions while providing ecological and social co-benefits including support for Indigenous livelihoods and cultural practices (ALFA (NT) Limited Annual Report, 2020) and protection of biodiversity (Corey et al., 2020; Evans & Russell-Smith, 2020; Perry et al., 2016). The development of the savanna burning methodology was initiated as a collaborative project between senior Indigenous landowners from Arnhem Land and scientists with government and non-government funding (Russell-Smith et al., 2013).

There is further evidence of Aboriginal cultural land management successfully protecting fire-sensitive vegetation communities, such as Callitris intratropica (Bowman et al., 2022; Bowman & Prior, 2004) from northern Australia. Although cultural burning had limited impacts on the vegetation structure, the presence of fire sensitive Callitris intratropica and reduced tall grass biomass indicates that the fire risk in Aboriginally managed savanna is likely reduced (Bowman & Prior, 2004). Fire use in central Australia has also been described as used to protect important features such as fire sensitive ecological communities, camps and houses and back burning from roads when big fires threaten (Edwards et al., 2008). In South Australia, Adeleye et al. (2023) analysed pollen and charcoal from soil cores on Cape Barren Island (truwana), showing that frequent cultural burning likely facilitated the expansion of Eucalyptus woodlands. Though ecosystem resilience was not directly measured, the authors suggest that such cultural fire management practices supported biodiversity, wetlands, and habitat diversity across the landscape.[5] As shown in Figure 1 below, this review of literature spans across Australia exploring the different ways in which cultural land management regimes are being conducted.

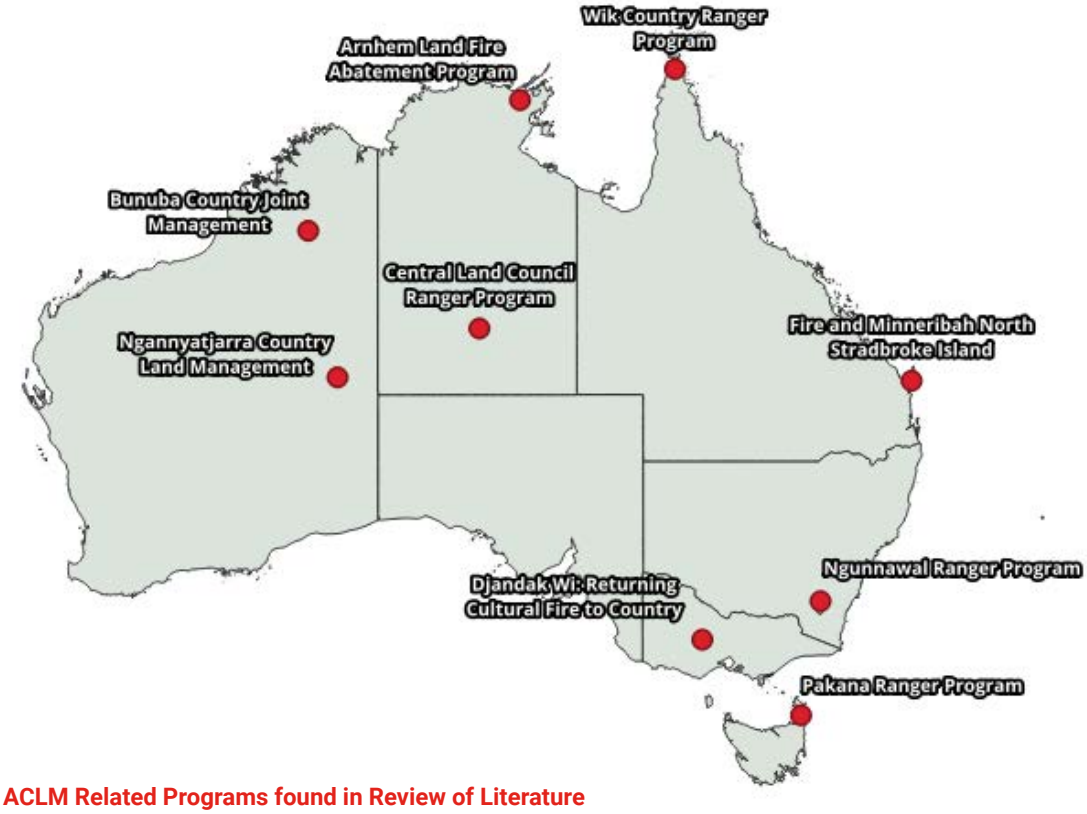


Figure 1 ACLM Related Programs found in Review of Literature

5 Switching to culturally informed early dry season burning has resulted in significant reductions in more extreme and extensive late dry season wildfires and is the most successful case of contemporary implementation of culturally informed fire management to reduce wildfire extent and severity in Australia (Edwards et al., 2021). However, implementation of the methodology has departed in key ways from traditional fire regimes, notably through the adoption of aerial incendiaries to set large fires at the loss of small-scale hand lit fires, and the replacement of intrinsic cultural motivators with financial and contractual obligations (Perry et al., 2018). As such, the savanna burning methodology does not constitute traditional cultural burning practice and thus does not necessarily offer all of the benefits. Further, cultural burning does not occur entirely within the earlier half of the dry season with burning documented as occurring more in the latter half of the dry season in Central Arnhem Land (Bowman et al., 2004).

2.3.2 ACLM For Flood Risk Mitigation

In this research, we did not find any scientific studies that connected Aboriginal cultural land management towards reducing flood risks in Australia except for a handful that aimed at informing water resource management and policy in northern Australia by examining Indigenous knowledge and values relating to the ecological needs of aquatic species (e.g. Liedloff et al., 2013; Woodward et al., 2012; Woodward & Marrfurra McTaggart, 2016).

Widening the search to international studies returned studies of Indigenous knowledge aiding flood risk reductions. A few studies from Africa and Asia indicated that Indigenous knowledge is used to both reduce the risk of flood on infrastructure as well as community wellbeing through:

- Requiring the adaptation of the physical environment such as through strategic construction of water channels, bridges and embankments,
- By adjusting the timing and nature of agricultural crops such as by planting early maturing crops to harvest before floods, and
- By relocation of the community to low-flood risk areas (Obi et al., 2021).

Indigenous knowledge is often used in these papers as knowledge that has developed gradually in the local environment, thus is tailored to the needs of the local people adapted to the local conditions.

In a case from Nigeria, Obi et al. (2021) presented a quantitative study of the efficacy of Nigerian Indigenous knowledge to prevent impacts of floods on coastal communities, as well as the qualitative aspects of changed environmental conditions that were used by community to predict flooding events. Knowledge included flood occurrence and magnitude forecasting, flood control, technical knowledge to prepare infrastructure, food security strategies and flood emergency preparedness. These strategies were found to be ~ 60% effective in reducing flood impacts on community. In South Africa, Indigenous knowledge has been used to map flood vulnerable regions (Membele et al., 2022). In Uganda, the development of Indigenous knowledge of floods and management techniques is systematic and place-based (Bwambale et al., 2022, 2023).

Summary of Key Findings from Review of Existing Literature

- **Current vegetation management strategies, particularly prescribed burning, are widely used for wildfire risk reduction but show variable effectiveness and mixed ecological benefits. However, variation among ecosystems in fire-sensitivity and flammability mean that the interaction between ecosystem resilience and ecological diversity, transport network resilience and wildfire risk will vary between landscapes and may not always align. That is, in some landscapes, there may be trade-offs between ecosystem resilience (incorporating ecological integrity and diversity), fuel loads (wildfire risk) and transport network resilience.**

- **The extensive literature on Indigenous fire management suggests strong potential to improve landscape resilience, reduce wildfire risks, and maintain ecological diversity—indirectly benefiting transport infrastructure. Building resilience into landscapes through use of cultural fire is not a reactive process, but instead one of ongoing interaction and regeneration.**

- **Evidence for flood risk mitigation through vegetation management was sparse and largely based on international case studies which demonstrated how Indigenous knowledge can support adaptive, localised responses to flooding. However, no strategies were identified as directly applied to transport infrastructure.**

- **A key gap identified is the lack of Indigenous-led research in this area. Strengthening Indigenous leadership in research, planning, and implementation is essential to realising the full potential of Aboriginal cultural land management. Place-based Indigenous knowledge systems offer deeply rooted ecological insights that can optimise biodiversity outcomes and build resilient landscapes.**

- **No case studies or projects were found that show direct implemented Indigenous collaboration into the development of the transport network for resilience. Thus, it is area of novel research opportunity for TfNSW.**

2.4 The Conceptual Model for ACLM and Resilience in the Transport Network

It is amply clear from the review presented above that Aboriginal cultural land management has demonstrated benefits for reducing wildfire risks and maintaining ecological health. Aboriginal cultural land management can both be effectively applied to protect critical transport infrastructure as well as to support Aboriginal communities when it is Indigenous-led and place-based. For success in programs like TfNSW ACLM, it is critical to incorporate processes that centre "cultural connections, alignment with the aspirations of traditional owners, inclusion of Indigenous knowledge and involvement of the Elders," (Weir et al., 2011, p. 4).

Building resilience through ACLM is multifaceted. At its core, resilience relates to one's ability to withstand and recover from hardship.

Within the NSW Disaster Mitigation Plan, resilience is defined as:

"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management."

For transport corridors, resilience is determined by its continued operability and safety during natural disasters both in its benefit as a community asset and as an operational and commercial asset. For Aboriginal Peoples, resilience takes on a new meaning, both within the community pilots within the ACLM research project and across Indigenous literature, Indigenous resilience is a complex phenomenon which relies on the positive adaption of the individual, the community and the environment to adversity. The review of literature suggest that Aboriginal community resilience is/can further strengthen/ed through the collective experience of adversity, such as through natural disaster in the context of Aboriginal cultural land management, resulting in the strengthening of support structures and shared resources developed and maintained through cultural practices and strengthening community bonds.

We propose a conceptual approach (Figure 2)to better explain Aboriginal cultural land management and resilience in a way that captures all the key ideas found from the above review. In this approach, the main activities of Aboriginal cultural land management including cultural fires, cultural landscape maintenance and harvesting foods and medicines, has direct influence on vegetation and on embedding and perpetuation of traditional knowledge in the communities. Aboriginal cultural land management is most effective when practiced using traditional knowledge systems that promote stewardship. Through embodied knowledge and cultural traditions, Aboriginal communities aspire for a Healthy Country. These interactive processes anchor the "Caring for Country" paradigm.

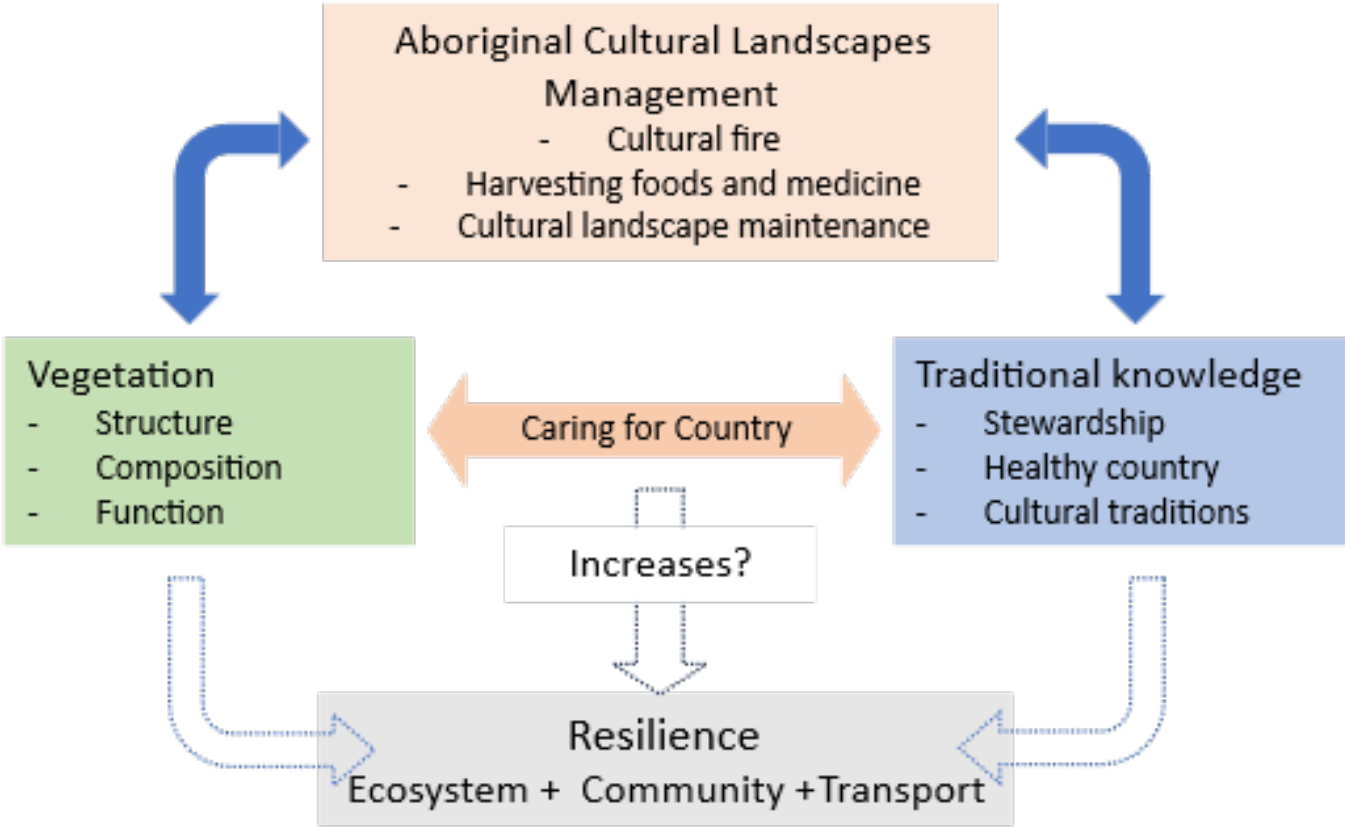


Figure 2 Conceptual Approach to Aboriginal Cultural Land Management

It is well-known that "Caring for Country" has the potential to build resilience in the ecosystem and communities. However, it remains to be seen if ACLM reduces the risk posed by vegetation to the operations and recovery of the transport network in the event of a natural hazard and whether ACLM increases ecosystem resilience, as measured by indicators of ecosystem integrity and recovery following natural hazards. Resilience is comprised of two parts: 'resistance' – ability to withstand shocks/disturbances, and 'recovery' – ability to recover from those shocks and disturbances. Building resilience through ACLM requires an ability to explore the connectiveness of these forms of resilience: Ecological resilience; Community Resilience; and Transport Network Resilience.

Resilience is comprised of two parts: 'resistance' – ability to withstand shocks/ disturbances, and 'recovery' – ability to recover from those shocks and disturbances. Building resilience through Aboriginal cultural land management requires an ability to explore the connectiveness of these forms of resilience: Ecological resilience; Community Resilience; and Transport Network Resilience.

Ecological resilience **means the capacity of an ecosystem to maintain its integrity (species richness, composition, structure and processes) under shocks or disturbances.**

Transport network resilience **refers to the ability of assets, infrastructure systems and services in the 'transport network to adapt and respond to disruptions.**

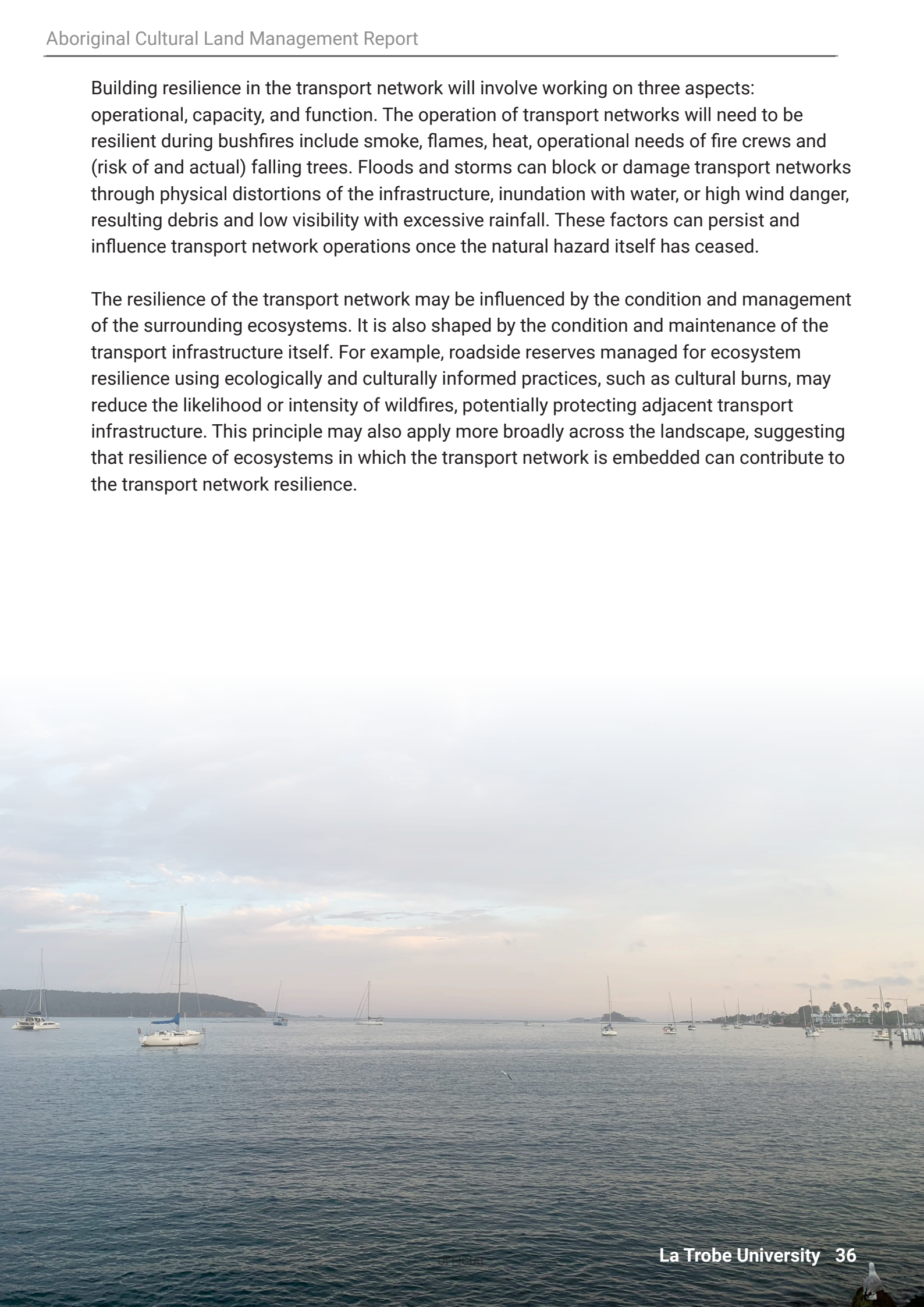
'Community resilience' **(Natural Hazards Research Australia, 2024) is strongly influenced by the way in which Communities and Aboriginal people have been treated, displaced, disadvantaged and evolved over time. The shocks and stressors of natural events and disasters in the past, and into the future, are influential because Community Resilience for Aboriginal people are influenced by Caring for Country, the built environment, critical infrastructure and human services that support a community. It is influenced by natural landscape, its proximity to their community, and the current and future risk(s) and benefits that the natural landscape will provide to the community.**

Another concept that captures this essence is 'Indigenous resilience' (Usher et al., 2021) which involves Indigenous ways of knowing, being and doing, widening the concept of resilience. It recognises that resilience is complex, depending on individual standpoint, and connections to Country, family and culture: "the notion of resilience must be made explicit, focusing on the individual, accessing land, family and culture and developing their identity, moving toward agency, determination and spirit, not to just survive, but thrive," (Usher et al., 2021, p. 15).

ACLM is positioned to facilitate the connection between Aboriginal community resilience and transport network resilience so that they can reliably benefit one another due to their shared goals and outcomes. It is clear that 'resilience' is multi-layered for transport and infrastructure purposes. In this context, resilience is a methodology that allows TfNSW to be prepared, agile, responsive, to transform objectives, practices and approaches where necessary.

Building resilience in the transport network will involve working on three aspects: operational, capacity, and function. The operation of transport networks will need to be resilient during bushfires include smoke, flames, heat, operational needs of fire crews and (risk of and actual) falling trees. Floods and storms can block or damage transport networks through physical distortions of the infrastructure, inundation with water, or high wind danger, resulting debris and low visibility with excessive rainfall. These factors can persist and influence transport network operations once the natural hazard itself has ceased.

The resilience of the transport network may be influenced by the condition and management of the surrounding ecosystems. It is also shaped by the condition and maintenance of the transport infrastructure itself. For example, roadside reserves managed for ecosystem resilience using ecologically and culturally informed practices, such as cultural burns, may reduce the likelihood or intensity of wildfires, potentially protecting adjacent transport infrastructure. This principle may also apply more broadly across the landscape, suggesting that resilience of ecosystems in which the transport network is embedded can contribute to the transport network resilience.



Chapter 3. Structures and Collaborations for Aboriginal Cultural Land Management

3 Structures and Collaborations for Aboriginal Cultural Land Management

This section focuses on identifying the structures that are in place to support the integration of Aboriginal cultural land management in enhancing resilience of biodiversity, infrastructure, and communities. The first part provides the global context by highlighting the international conventions addressing Aboriginal cultural land management and illustrating international best practices. The second part details the structures and collaborations that were found to be operational at the national level and state level in Australia. This broader policy review helps to contextualise how TfNSW can incorporate certain best practices in developing its own framework that integrates Aboriginal cultural land management for building resilience into the transport network.

3.1 Global Context: Aboriginal Cultural Land Management and Resilience

The call for including Aboriginal cultural land management for building resilience is becoming prominent globally. Some of the relevant international policy instruments are discussed in this section.

The Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework focuses on the adoption of measures to address the three dimensions of disaster risk (exposure to hazards, vulnerability and capacity, and hazard's characteristics) to prevent new risk, reduce existing risk and increase resilience. It is adopted by Australia to advance the goal of reducing disaster damage to critical infrastructure systems. To understand disaster risk, the Framework states that it is critical to:

> "ensure the use of traditional, Indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation of policies, strategies, plans and programmes of specific sectors, with a cross-sectoral approach, which should be tailored to localities and to the context," (United Nations Office for Disaster Risk Reduction, 2015, p. 15).

Global Methodology for Infrastructure Resilience Review

This widely adopted methodology, developed by the UN Office for Disaster Risk Reduction and the Coalition for Disaster Resilient Infrastructure, comprises five steps that encompass the mapping of institutional governance and key stakeholders, reviewing policies and regulations, detecting and testing for vulnerabilities, assessing current resilience levels through the Principles for Resilient Infrastructure, and developing an implementation plan (United Nations Office for Disaster Risk Reduction, 2023).

Indigenous Peoples' Resilience Framework

Developed by the World Bank, this framework seeks to promote the resilience of Indigenous Peoples by working to strengthen cross-sectoral policies and programs that impact the driver and enablers of Indigenous Peoples' resilience. The policy recommendations from this framework include (World Bank Group, 2024, pp. 7–8):

Indigenous Peoples' Resilience Framework

- **Ensuring secure tenure and access rights for Indigenous Peoples over their customary lands and natural resources, including recognition of collective land tenure systems.**
- **Recognition and support of Indigenous governance systems and self-determination as essential for: their management of natural resources, ability to address climate shocks, provision of social safety nets, and conflict resolution and cohesion.**
- **Recognition and protection of Indigenous knowledge, cultural practices and spiritual values for ecosystem management and collective well-being and promoting the transference of these across generations.**
- **Recognising Indigenous Peoples as critical partners in addressing climate change, ensuring that their voice and participation in policy, decision making, and benefits is commensurate to their contributions.**
- **Supporting Indigenous-led climate action initiatives that promote adaptation, mitigation, and resilience within Indigenous territories.**
- **Promoting social integrity and equitable benefit-sharing in climate finance and carbon markets by ensuring that Indigenous Peoples' rights to land, natural resources and self-determination are secured and that equitable benefit-sharing arrangements are in place.**

Sustainable Development Goals

Of the 17 Sustainable Development Goals (SDGs) outlined in the 2030 Agenda for Sustainable Development (Agenda 30), the notable ones that have some relevance for ACLM and building resilience are:

Sustainable Development Goals

SDG 9: Build resilient infrastructure, promote sustainable industrialisation and foster innovation.

SDG 13: Take urgent action to combat climate change and its impacts.

- **Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.**

SDG 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.

- **Target 15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species**
- **Target 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts**

It must be noted that the none of the policies and programs outlined above directly relate to transport networks, they may increase resilience in the broader landscape.

In the remainder of this section, we focus on two countries – USA and Canada – that have taken leadership in better integration of cultural land management in building resilience.

United States

In US, the California Wildfire and Forest Resilience Task Force (the Task Force) is working to remove barriers to First Nations Peoples engaging in land management practice. The Task Force forms a collaborative effort to align the activities of federal, state, local, public, private and tribal organisations to support programs and projects tailored to the priorities and risks of each region. The purpose of the Task Force is to deliver on key commitments within the California Wildfire and Forest Resilience Action Plan (the Plan), a comprehensive framework for establishing healthy and resilient forest and communities that can withstand and adapt to wildfire, drought, and a changing climate.

The California Wildfire and Forest Resilience Action Plan

The Plan acknowledges that the state of California encompasses a range of landscapes and vegetation types, and states that a standardised approach will not work: “state investments and programs must recognize and enable regionally and locally driven solutions in partnership with groups and leaders from these regions,” (California Wildfire & Forest Resilience Task Force, 2021, p. 5). The Plan identifies a restoration of forest health as an important driver of resilience, and highlights a diversity of knowledges as critical: “we must draw upon the practices of Native Americans, ranchers, and rural communities to rapidly expand the use of prescribed fire and bring these best practices to state lands,” (California Wildfire & Forest Resilience Task Force, 2021, p. 5). The Plan identifies strong partnerships and networks across government and community groups as critical to successful land management. It also serves as a roadmap for the implementation of the Agreement for Shared Stewardship of California’s Forest and Rangelands.

The Agreement for Shared Stewardship of California's Forest and Rangelands

Established in August 2020 between the State of California and the U.S. Forest Service, The Agreement for Shared Stewardship of California's Forest and Rangelands (the Agreement) represent a strategic partnership aimed at enhancing the management of California's diverse ecosystems. This agreement focuses on reducing wildfire risks by treating at least one million acres of forest and wildlands annually, restoring healthy forests and rangelands to improve climate resilience, and safeguarding water and air quality. By leveraging science-based approaches and fostering state-federal collaboration, the agreement seeks to address the challenges posed by climate change, historical fire suppression, and increasing human population pressures, ultimately promoting ecological health, and mitigating risk

The agreement acknowledges the importance of integrating the traditional ecological knowledge of First Peoples, recognising their role in fostering resilience and sustainable land management practices. While the use of fire tends to be prominent in land management practice, other expressions of ACLM are supported through the Agreement, as illustrated in the example in adjoining Box.

Klamath River Basin Restoration Project

Funded under the Bipartisan Infrastructure Law, the Klamath River Basin Restoration Project operates as a collaboration between the Karuk Tribe, Klamath Tribes, Yurok Tribe, and the Klamath Water Users Association.

The project aims to restore watersheds, implement erosion control measures, undertake cultural burns, reduce invasive species, and protect cultural sites of significance. Training programs and knowledge sharing form a central role within the project.

The project has achieved outcomes including improved water quality, regeneration of fish habitats and populations, revegetation and erosion control, and a reduction in sedimentation in the water (Resource Environment Solutions, n.d.).

Canada

In Canada, British Columbia experiences wildfires, flooding, and landslides and 'zombie' fires (Mccarty et al., 2021) that continue to burn underground in the peat layer, resurfacing to burn again after the winter snow has receded. The region considers itself at the frontlines of climate change, and as such, developed Climate Preparedness and Adaption Strategy (the Strategy) in 2022 to strengthen their capacity to be both resilient and agile in the face of climate change.

Through this strategy, the provincial government is collaborating with "Indigenous Nations and communities, local governments and other organizations to reduce risks from heatwaves, flooding and wildfire, as well as enhance the climate resilience of infrastructure," (British Columbia & cleanBC, 2022, p. 33). Articulating the importance of working closely with Indigenous Nations in resilience projects, the Strategy states that "collective knowledge of their territories built on generations of observing, relating to and living close on lands and waters, hold valuable insights on the impacts on climate change and adaptive solutions," (British Columbia & cleanBC, 2022, p. 33).

The Strategy is cross-governmental, with its functioning and funding delivered by multiple ministries and organisations (British Columbia & cleanBC, 2022, pp. 53–57). Indigenous Nations have partnered with the Province to engage in risk reduction programs designed to "increase resiliency on high-risk Crown land adjacent to communities and critical infrastructure," (British Columbia & cleanBC, 2022, p. 36).

This has occurred through Indigenous Fire Stewardship, or the application of cultural fire (Cultural Fire and Prescribed Burning, 2024). The Strategy details the Province's two-pronged approach to this work: while escalating the "delivery of partnership-based cultural and fire projects while it works with Indigenous partners to develop elements of a co-managed long-term program, inclusive of collaborative governance, integrated planning, policy and public education," (British Columbia & cleanBC, 2022, p. 36).

3.2 Structures and Initiatives for ACLM and Resilience in Australia

This section provides an overview of the existing structures and initiatives in Australia within which ACLM, and resilience can be considered. These are summarised in the following paragraphs.

National Level

State of Australia's Regions 2024

This document recognises an increasing severity and frequency of natural hazards as a direct consequence of climate change. In its National Climate Adaptation and Risk Program, the Australian Government is ensuring that "both the Risk Assessment and the Plan consider and integrate the perspectives of First Nations people […] Caring for Country through First Nations values, knowledges and cultural practices is critical to addressing the cumulative impacts of climate change," (Australian Government, 2024, p. 39).

Keeping Our Mob Safe Strategy

This is a national emergency management strategy for remote communities. The strategy's aim is to improve community safety in remote Indigenous communities through coordinated approaches to emergency management at local, state/territory and national levels ("'Keeping Our Mob Safe' A National Emergency Management Strategy for Remote Indigenous Communities," 2007, p. 1 of 2). It identifies priorities for establishing and maintaining emergency management in Aboriginal and Torres Strait Islander communities.

Emergencies range from natural disasters and hazards to public health emergencies. It states that emergencies must be defined and addressed at a community level, utilising local and traditional knowledges, while involving Aboriginal and Torres Strait Islander people at all levels and stages of planning, emergency prevention, preparedness, response and recovery. The strategy prioritises collaborative approaches to emergency management and response, and "states that the development of effective partnerships between remote Australian Aboriginal communities and emergency management-related agencies is the key to developing resilience," (Sithole & Campbell, 2022, p. 72).

Indigenous Land Use Agreements

An Indigenous Land Use Agreement is an agreement created by the Native Title Act 1993 (Commonwealth), forming "a voluntary, legally binding agreement about the use and management of land or waters, made between one or more native title groups and another party, including miners, pastoralists or governments. Indigenous Land Use Agreements are relatively common and occur in all states and territories but are primarily concerned with access for use and management of land by Indigenous people.

Principles and Protocols for Cultural Land Management Governance and Research

Developed by Natural Hazards Research Australia, this is a guide to the principles, process and protocols for working collaboratively within cultural land management governance and research.

Indigenous Protected Areas (IPAs)

An Indigenous Protected Area is a "contract for the management of environmental and cultural values between Traditional Owners and the federal government according to the agreed criteria that satisfy requirements of the International Union for the Conservation of Nature. They [are] made operational after a management plan has been agreed upon by the government and Indigenous partners, and when Traditional Owners deem that informed consent has been achieved," (Country Needs People, n.d., p. 8). IPAs "provide a framework for Traditional Owners to govern and manage their customary estate to the benefit of Indigenous people, the environment and the wider Australian Community," (Cresswell et al., 2021, pp. 142–143). There are now 80 Indigenous Protected Areas that collectively cover >84M hectares and account for nearly 50% of Australia's protected area network (Australian Government Department of Climate Change Energy the Environment and Water, 2022)

Indigenous Ranger Programs

First funded in 2007 through the Working on Country Program, Indigenous Ranger programs are at the frontline of caring for Country. These programs empower Indigenous rangers to "use traditional knowledge and cultural practices, combined with Western science, to manage land, river and sea Country and deliver environmental, cultural, social and economic development outcomes," (Australian Government National Indigenous Australians Agency, n.d., para. 1). While cultural burning may be the most prominent program, rangers also work to rehabilitate landscapes through erosion control and revegetation, habitat (land and water) rehabilitation, feral animal control, targeted programs to eradicate invasive weed species, and protection of endangered marsupials and other animals (Country Needs People, n.d.). On Warddeken Country, rangers have engaged in extensive controlled burns as part of the Warddeken IPA Plan of Management and annual fire plans, to manage vegetation along a "3,043 kilometre stretch of roads and tracks plus additional protection around buildings, outstations and infrastructure," (Country Needs People, n.d., p. 18).

Healthy Country Plans

A Healthy Country Plan is developed through a process of inclusive community consultation, whereby communities work together to determine the targets, threats to, and strategies to maintain or re-establish healthy country (South Australia Environmental Protection Agency, 2024, para. 3). Healthy Country Plans may be used to inform land management practice within park management plans, such as in the case of Far West Coast Healthy Country Plan (Far West Coast Aboriginal Corporation, n.d.). In this instance, 'right fire' regimes have been introduced, and signs have been installed to direct people away from sites of cultural significance or ecological vulnerability (Far West Coast Aboriginal Corporation, n.d., p. 24). A Healthy Country Plan has also been used to map and plan for the rehabilitation of glossy black cockatoo habitat in the Shoalhaven (Healthy Country Plan for Glossy Black-Cockatoo Aboriginal Advisory Group, 2022).

Infrastructure Australia

Infrastructure Australia's 2021 Infrastructure Plan seeks to engage with place-based outcomes for communities, and to build resilience into infrastructure (Infrastructure Australia & Australian Government, 2021, pp. 136, 140). Their pathway report states: "achieving resilience is not limited to the resilience of the asset itself, but also the ability of the asset to contribute to the overall resilience of the system in which it is placed". This reaffirms the importance of community consultation as set out within the ACLM Future Operating Model.

National Disaster Risk Reduction Framework

The National Disaster Risk Reduction Framework (NDRRF) was developed in 2018 to coordinate an approach to reducing disaster risk and enhancing disaster resilience. The plan proposed four priorities and strategies for action:

Priority 1: Understand Disaster Risk
Priority 2: Accountable Decisions
Priority 3: Enhanced investment
Priority 4: Governance, ownership and responsibility

Strategy F of Priority 1 supports long-term, solution driven research, innovation and knowledge practices and disaster risk education and highlights that a "greater variety of knowledge practices, including Indigenous knowledge practices, should also be better integrated in research and knowledge application," (Australian Government Department of Home Affairs, 2018, p. 13).

Council of Australian Governments' National Strategy for Disaster Resilience

In 2011, the Council of Australian Governments' National Strategy for Disaster Resilience (NSDR) established a national resilience-based approach to disaster management. Negotiated through the former Council of Australian Governments, the strategy forms the foundation of current federal disaster arrangements (Parliament of Australia, n.d., para. 16). The NSDR states: "there should be a greater focus on preparedness, mitigation and resilience […] this involves a collaborative approach to integrating natural environment considerations into infrastructure planning and development to enhance sustainability and resilience," (Select Committee on Australia's Disaster Resilience, 2024, p. 14). The strategy recognises that Indigenous people have intimate knowledge and understanding of Country, and that governments must "nurture Indigenous-led strategies that build the resilience of people and Country, including for land use planning, bushfire and flood mitigation, risk management, training and education, health and emergency planning," (Select Committee on Australia's Disaster Resilience, 2024, p. 15).

Besides these national level initiatives, two other reports refer to the intersection of ACLM with resilience.

Cultural Land Management in Southeast Australia

This report is based on a research project undertaken by Bushfire and Natural Hazards CRC (funded by Australian Government) in 2020. It made ten recommendations for action for researchers and research partners to support cultural land management and Indigenous-led and co-designed research programs. The recommendations emphasise the centring and valuing of Indigenous knowledge systems and voices and ensuring collaborative processes and partnerships through all stages of research, governance and projects. (Costello et al., 2021, pp. 5–6).

Strategies for Supporting Culturally Appropriate Responses to Natural Disasters

This 2022 report of an Independent Inquiry on Northern Rivers floods investigated a key question: "How can the NSW EPA support localised and culturally appropriate responses to natural disasters?" In response, the report highlighted five themes with corresponding recommendations developed to support the development of localised and culturally appropriate disaster responses. The recommendations encapsulate a commitment to Aboriginal self-determination, engagement and partnership with Aboriginal communities, developing capacity and capabilities, recognition that Indigenous knowledges are equal to Western science, and commitment to structural changes that support localised and culturally appropriate responses to natural disasters (Carolyn Hill et al., 2023, p. 5).

Table 1 provides a summary of all structures and initiatives at a National level. In the remainder of this section, state-wise structures related to ACLM, and resilience are discussed.

Table 1 National Policies

POLICY	DATE	SUMMARY
Black Summer Bushfire Recovery Grants Program - NEMA	2025	Grants program for supporting rebuilding efforts surrounding the 2019-2020 bushfires
National Indigenous Australians Agency Indigenous Rangers Program (IRP)	2025	A national program supporting First Nations peoples to manage Country using traditional knowledge alongside Western science. The program aligns with government policies promoting Indigenous-led land stewardship, strengthening community resilience to natural hazards, and expanding employment in land management sectors
National Closing the Gap Implementation Plan 2022-2024	2024	Supports Indigenous-led governance and community-controlled organizations, enabling leadership in land stewardship and cultural fire management. It promotes shared decision-making and improved access to data to support informed environmental and hazard management
National Indigenous Australians Agency Indigenous Protected Areas (IPA)	2025	IPAs are lands and seas managed by First Nations groups based on Traditional Owners' objectives, supporting biodiversity conservation, cultural heritage protection, and environmental resilience. The program blends traditional and contemporary knowledge, leverages partnerships, and is funded through multi-year agreements with supplementary income from other sources
National Indigenous Land and Sea Strategy 2023 - 2038	2023	Federal Strategy that supports self-determination and Indigenous-led land care- Strategic funding for Caring for Country, focus on economic development, cultural healing, and environmental stewardship
Savanna fire management - sequestration and emissions avoidance 2018 method	2019	This policy guides the use of early dry season burning to reduce late dry season fire intensity and greenhouse gas emissions, incorporating traditional Indigenous fire management. It supports carbon credit generation through emissions avoidance and carbon sequestration in savanna ecosystems

State Level

Australian Capital Territory (ACT)

The Ngunnawal Elders Council (UNEC)

This council provides advice to the ACT Government on matters relating to heritage and land management. The council consists of representative from various Ngunnawal family groups.

Caring for Dhawura Ngunnawal. A Natural Resource Plan for the ACT: 2022-2042

The ACT Government prepared this plan emphasising integration of Ngunnawal cultural traditional knowledges and perspectives to guide the sustainable management of natural resources over a 20-year period. The Plan addresses climate change, urban expansion, and bushfire risks, aiming to create a resilient and healthy environment. ACLM features in this Plan in two ways: a) for fire management, invest in cultural burning on rural lands in partnership with the Ngunnawal community; and b) for land management, ensure Ngunnawal people are involved in land management governance and decision making (ACT Government, 2022, p. 21). Joint Management Plans are also in place forming agreements between Ngunnawal people and the government.

Table 2 provides a summary of all structures and initiatives in the ACT.

Table 2 Australian Capital Territory Policies

POLICY	DATE	SUMMARY
Ngunnawal Ranger Program	2024	Led by Ngunnawal People, the Rangers manage invasive weeds, repair trails, rehabilitat wetlands, and support cultural burning and site care. They are a key part of broader ACLM efforts that include Government partnerships and community engagement.
Caring for Dhawura Ngunnawal: Natural Resource Plan 2022-2042	2024	A 20-year plan integrating Ngunnawal cultural knowledge into land and fire management, emphasizing cultural burning, co-management, youth leadership, and river health monitoring. While focused on natural resource resilience, it does not explicitly address transport infrastructure.

New South Wales (NSW)

NSW Bushfire inquiry (2020)

The Final Report of the NSW Bushfire inquiry (2020) presents 76 recommendations. Of these, two refer directly to Aboriginal land management practices:

Recommendation 25 That Government adopt the principle that cultural burning is one component of a broader practice of traditional Aboriginal land management and is an important cultural practice, not simply another technique of hazard reduction burning.

Recommendation 26 That, in order to increase the respectful, collaborative and effective use of Aboriginal land management practices in planning and preparing for bush fire, Government commit to pursuing greater application of Aboriginal land management, including cultural burning, through a program to be coordinated by Aboriginal Affairs and Department of Planning, Industry and Environment working in partnership with Aboriginal communities. (Owens & O'Kane, 2020, pp. xi–xii).

Strategic Plan 2023-2027

The importance of genuine engagement with Aboriginal communities is at the heart of the Aboriginal Affairs and NSW Government Strategic Plan 2023-2027. The plan outlines the three strategic priority areas of: community and culture, government accountability and collaboration, and transformation and influence. The associated goals are:

Goal 1: Community Voice. Empowering the voice of the community to; guide research, evaluation and policy; black excellence and expertise; and deliver on treaty.

Goal 2: Reform. Coordinate across NSW Government, to drive change informed by community, embedding self-determination, while we deliver culturally responsive reforms and evaluation.

Goal 3: Healing. Lead truth telling to embed healing, as we continue to uphold and celebrate culture," (NSW Government & Aboriginal Affairs, 2023, p. 16).

Crown Lands Cultural Burn Program

NSW Crown Lands has responded to the recommendations of the Final Report of the NSW Bushfire inquiry (2020) by developing and funding the Cultural Burn Program, with its first pilot situated in Batemans Bay and supported by the Local Aboriginal Lands Council and Walbunja Rangers (Crown Lands & NSW Government, 2024). Further to returning right fire to Country, the pilot has functioned to renew "culture and share knowledge with Crown Lands staff," (Crown Lands & NSW Government, 2024, para. 13). The aim of this program is that Traditional Owners will partner with Crown Lands across NSW to support and undertake cultural fire management.

NSW Closing the Gap Implementation Plan 2022-2024

This Plan outlines NSW's efforts to address disparities across various socio-economic outcomes between Aboriginal and non-Aboriginal people. Priority reforms focus on transforming government systems to better support Aboriginal communities. 17 socio-economic targets aim to improve outcomes in critical areas including housing, justice and education. (NSW Government & Aboriginal Affairs, 2022, p. 5). The most relevant is the Socio-economic outcome 15 which states that: "Aboriginal and Torres Strait Islander people maintain a distinctive cultural, spiritual, physical and economic relationship with their land and waters," (NSW Government & Aboriginal Affairs, 2022, p. 47). Specifically, the Plan identifies the need to work toward "improving joint-management arrangements for land, sea and inland water [and makes a commitment] to improve existing joint-management arrangements to meet the needs and goals of Aboriginal communities," (NSW Government & Aboriginal Affairs, 2022, p. 48).

NSW Government Local Land Services

Local Land Services (LLS) operate a range of programs that engage with Aboriginal Cultural Landscape Management. The programs are guided by the Aboriginal Engagement Strategy which "articulates the model for engagement, partnership and opportunities for co-design between Aboriginal people and communities and Local Land Services," (NSW Government Local Land Services, 2020a, p. 2). It is also guided by the State Strategic Plan which delivers services that support Aboriginal people to care for Country and share traditional landcare management and ecological knowledge (NSW Government Local Land Services, 2020b).

Aboriginal Ranger Program

The LLS Aboriginal Ranger Program (ARP) was launched in 2022, and delivered across the Central West, Murray, Riverina and North-West LLS regions. Objectives of the ARP include: training, delivery of the LLS Aboriginal Engagement Strategy, promoting and strengthening connections to culture and identity, recognising appropriate engagement and connection with Aboriginal people and Country as core of the service, and championing opportunities for Aboriginal people and communities to care for Country and incorporate contemporary land management practices (NSW Government & Local land Services, 2024, para. 3). A range of projects take place through ARP. These include Caring for Country programs, vegetation and habitat protection, erosion management, cultural burning and sustainable land management.

NSW Cultural Fire Management Policy

This policy supports Aboriginal community aspirations to care for Country through cultural fire management in National Parks. The policy foregrounds the importance of working with Aboriginal people in land management practice. The policy applies to all lands acquired or reserved under the National Parks and Wildlife Act 1974. The Aboriginal Partnerships Policy (internal NSW Government staff document) details working with and developing partnerships with Aboriginal communities. (NSW Government Environment and Heritage, 2024).

Cultural Fire Management Unit

The NSW Cultural Fire Management Unit (CFMU) was developed with the intention of integrating Aboriginal cultural land management into contemporary land management practices. The unit facilitates local Aboriginal communities getting on Country to undertake Aboriginal cultural land management on traditional land and waters (NSW Government Planning, 2024).

NSW Aboriginal Water Strategy

In collaboration with Aboriginal people, the NSW Government is developing a state-wide Aboriginal water strategy. The purpose of the strategy is to identify how water rights can be increased, while ensuring that Aboriginal people are involved in water management and planning decisions (NSW Government Water, 2024).

NSW First Nations Business Sector: A Return to Prosperity (Report)

A Return to Prosperity recognises insurance as an impediment to small to medium enterprise (SMEs), particularly those working in cultural land management. Where cultural burning is employed, multiple types of insurance are required, making premiums prohibitive. Some insurers are changing this stance, understanding the value of cultural burning. Specifically, insurer Suncorp Group has recognised the role of cultural burning in reducing bushfire risk. They have developed partnerships with the Firesticks Alliance to support training, assessment and certification of cultural fire practice to address insurance barriers faced by private and public landholders in the use of cultural burning to reduce wildfire risk (NSW Government & NSW Treasury, 2022, p. 50).

Healthy Country Plan for Black-Cockatoo 2022-2032, Shoalhaven

Across the Shoalhaven, large areas of black-cockatoo habitat were devastated by 2019-2020 bushfires. For local Dharawal and Dhurga speaking communities, strong cultural connections tie the black-cockatoo to "fire and rain, and to specific places on-Country that connect the story of the broader landscape," (Healthy Country Plan for Glossy Black-Cockatoo Aboriginal Advisory Group, 2022, p. 11). Beginning as a collaborative endeavour to survey impacts to black-cockatoo habitats, the project progressed to encompass intergenerational knowledge transfer and education, employment and training, and ecological restoration, monitoring and evaluation.

This project is collaborative and has multiple resourcing streams; support comes from NSW Government departments including the Department of Planning and Environment, Transport for NSW, and Local Land Services. Landholders and allies including Landcare and Birdlife also contribute. The NSW Forestry Corporation, the Department of Defence, and the Shoalhaven City Council are additional resourcing bodies. These organisations and departments have also worked to facilitate easier access to Country and land management opportunities (Healthy Country Plan for Glossy Black-Cockatoo Aboriginal Advisory Group, 2022, p. 6).

The overarching Healthy Country Plan, and the Healthy Country for the Glossy Black-Cockatoo Aboriginal Advisory Group guide the project and facilitate access to Country where healing and rehabilitation work takes place.

Table 3 provides a summary of structures and initiatives in NSW.

Table 3 New South Wales Policies

POLICY	DATE	SUMMARY
New South Wales Bushfire Inquiry	2020	The inquiry made 76 recommendations, including two key ones emphasizing cultural burning as a vital Aboriginal land management practice, urging government commitment to respectful, collaborative use of Aboriginal fire techniques in bushfire planning and response.
New South Wales Aboriginal Affairs Strategic Plan 2023-2027	2023	Focuses on empowering Aboriginal community voice, embedding self-determination in reforms, and promoting healing and cultural celebration, all foundational for integrating Aboriginal land management in environmental planning.
New South Wales Crown Lands Cultural Burn Program	2024	Developed in response to the 2019/2020 bushfires and NSW Bushfire Inquiry recommendations, this pilot program in Batemans Bay partners with Local Aboriginal Lands Council and Walbunja Rangers to restore cultural burning practices. It aims to renew culture, share knowledge with Crown Lands staff, and expand cultural fire management across NSW through partnerships with Traditional Owners.
New South Wales Closing the Gap Implementation Plan 2022-2024	2024	Aims to reduce disparities by prioritizing community-led approaches and partnerships with Aboriginal organisations. Supports Aboriginal connections to land and waters through improved joint-management arrangements, including for transport systems, to better meet community needs and goals.
New South Wales Government Local Land Services	2020	the NSW LLS runs programs engaging Aboriginal Cultural Landscape Management. Guided by an Aboriginal Engagement Strategy promoting partnership, co-design, and opportunities with Aboriginal communities. Supported by the State Strategic Plan to help Aboriginal people care for Country and share traditional ecological knowledge.
New South Wales Cultural Fire Management Policy	2024	Supports Aboriginal community aspirations for cultural fire management in National Parks. Applies to lands under the National Parks and Wildlife Act 1974. Emphasizes partnerships with Aboriginal communities. (NSW Government Environment and Heritage, 2024)
New South Wales Cultural Fire Management Unit	2024	Established after the 2019-2020 bushfires to integrate ACLM into land management. Facilitates Aboriginal communities conducting cultural burning on traditional lands.
New South Wales Aboriginal Water Strategy	2024	In collaboration with Aboriginal people, the NSW Government is developing a state-wide Aboriginal water strategy. The purpose of the strategy is to identify how water rights can be increased, while ensuring that Aboriginal people are involved in water management and planning decisions
New South Wales Framework for Valuing Green Infrastructure and Public Space	2023	Provides guidance on cost-benefit analysis for green infrastructure and public space projects, aligning with NSW Government funding policies. (Department of Planning, 2023)
New South Wales First Nations Business Sector: A Return to Propserity (Report)	2022	Addresses insurance challenges for SMEs involved in cultural land management, especially around cultural burning. Highlights insurer Suncorp's partnership with Firesticks Alliance to support training and certification to reduce insurance barriers for cultural burning practices

Northern Territory (NT)

In the NT, Aboriginal Rangers engage in ACLM, caring for more than 460,000 square kilometres of land (Northern Territory Government & Department of Environment, 2024, para. 4).

Northern Territory Aboriginal Carbon Industry Strategy

This Strategy supports abatement of greenhouse gas emissions and carbon sequestration activities on Aboriginal land (Northern Territory Government & Department of Environment Parks and Water Security, 2024). A significant component of the strategy is the emphasis on savanna burning projects which implement strategic fire management programs. This strategy is supported by the Emissions Reduction Fund (ERF) financial structure.

Central Lands Council

The Central Land Council manages the Katiti-Petermann Indigenous Protected Area covering a massive area of five million hectares.[7] The Kaltukatjara Rangers and Mutijulu Tjakura Rangers participated in the Australian Feral Camel Management Project, culling and removing feral camels from the IPA (Australian Government & National Indigenous Australians Agency, n.d.-a).

Table 3 provides a summary of structures and initiatives in the NT.

Table 4 Northern Territory Policies

POLICY	DATE	SUMMARY
Northern Territory Aboriginal Carbon Industry Strategy	2024	Supports greenhouse gas reduction and carbon sequestration on Aboriginal land, focusing on strategic savanna burning. Uses commercial carbon markets like the Emissions Reduction Fund (ERF) to fund and incentivize Indigenous fire management programs.
Northern Territory Central Land Council	2025	A 20-year plan integrating Ngunnawal cultural knowledge into land and fire management, emphasizing cultural burning, co-management, youth leadership, and river health monitoring. While focused on natural resource resilience, it does not explicitly address transport infrastructure.
Arnhem Land Fire Abatement (ALFA)	2025	The Arnhem Land Fire Abatement (ALFA) Organisation is an Aboriginal-owned, not-for-profit organisation in the Northern Territory, created by Traditional Owners to support Indigenous engagement in the carbon industry through large-scale, traditional fire management practices across Arnhem Land. Their programs include utilising cultural burning knowledge, controlled burns (patchwork and mosiac) aimed at reducing fuel loads and serving as a preventative measure for bushfires. It is recognised as best practice for combining Indigenous knowledge with modern science to address climate change, support cultural heritage and deliver benefits for community.

7 The Central Lands Council (CLC) was formed in the mid-1970s when the Aboriginal Land Rights Act (Northern Territory) 1976 allowed Traditional Owners to claim back approximately half of the land mass of the Northern Territory. This equates to 417,000 square kilometres of land that can't be sold (Central Land Council, 2023a). The Aboriginal Land Rights Act (Northern Territory) 1976 does, however, set out processes for leasing and licensing on Aboriginal Land.

Queensland

Queensland Bushfires Review

In the Queensland Bushfires Review, Cultural burning is acknowledged as important to mitigating the impacts of bushfire (Inspector General Emergency Management & Queensland Government, 2019). The use of fire in vegetation management on transport corridors is also referenced (2019, p. 30). This Review highlights the successes of the Quandamooka Yoolooburrabee Aboriginal Corporation who have developed the Minjerribah Bushfire Management Strategies that form "a cooperative, locally-led and state-facilitated approach to the development of township fire management strategies," (p. 82).

Strategy for Disaster Resilience 2022-2027

The Strategy for Disaster Resilience 2022-2027 provides guidance on how the State mitigates risk and develops resilience to natural disasters including bushfires, cyclones and floods. It has four objectives: to understand risk, to work collaboratively, to seek new opportunities by leveraging local and regional knowledges to enhance capability and build resilience, and to strive for continuous improvement. It recommends engaging Aboriginal and Torres Strait knowledges within planning for resilience within disaster management: "place-based targeted action to the specific circumstances of a place, including its environment and customs, and engaging local people in development and implementation," (Queensland Government, 2022, p. 24).

Planned Burn Guidelines. Southeast Queensland Bioregion

The Planned Burn Guidelines describes an open and diverse landscape and biota that was maintained by use of fire in the landscape. The suppression of fire in the landscape has contributed to an increase in the severity of bushfires, while also increasing the complexities involved with safely applying low to moderate intensity planned burning (Queensland Government Department of Environment and Science & Queensland Parks and Wildlife Service, 2022, p. 33). The Guidelines advise consultation with First Nations partners to determine management objectives and recommendations (p. 89), and states that "sustained, respectful and inclusive engagement of local First Nations people when preparing and implementing planned burns and fire strategies should be undertaken where relevant." (p. 17)

Firesticks Alliance

The Firestick Alliance is an organisation based in Cape York with the primary aim of "supporting communities to lead Indigenous land management projects across the country," (Firesticks Alliance, 2024). Firesticks has worked with 35 communities over ten years to deliver training in cultural fire and land management practice.

Wik Country

In the Cape York Peninsula, traditional and contemporary fire management practices have come together on Wik Country through Federal and State funded ranger projects. Here, ranger programs address "landscape-scale management of fire for biodiversity conservation…" (Perry et al., 2018, p. 24). A savanna burning methodology has been engaged, reinstating traditional burning in the early dry season to reduce the likelihood of large, intense fires in the late dry season.

This shift in fire management strategy generates a direct financial benefit through producing carbon credits (Perry et al., 2018, p. 28), and an environmental benefit through a reduction in methane and nitrous oxide emissions (Ansell et al., 2020). In addition to the ranger program, the Emissions Reduction Fund (ERF) is a structure that enables burning programs through financial benefit for burning (Australian Government, 2024a). While engaging a contemporary burning methodology with financial reward, Wik people see this as important to establishing ongoing fruitful livelihoods while also meaningfully caring for and connecting with Country (Perry et al., 2018, p. 29).

The program facilitates ranger's access to difficult to reach parts of Country by air, and landscapes are monitored and managed using modern methods such as aerial incendiaries.

Table 5 provides a summary of structures and initiatives in QLD.

Table 5 Queensland Policies

POLICY	DATE	SUMMARY
Queensland Bushfires Review	2020	Review of the states preparedness for responding to and recovering from major bushfires events after the 2019-2020 bushfires. Built on the 2018 Queensland Bushfire Review. Recommendations included early hazard reduction burning, stronger inter-agency coordination to assist with preparedness. links to the impact of heatwaves and bushfire along transport systems also noted but strategies for mitigation of transport impact are not listed.
Queensland Strategy for Disaster Resilience	2022-2027	Advocates for a cooperative, local led and state facilitated approach in guiding how the state mitigates risk and develops resilience to natural disasters including bushfires, cycles and floods
Queensland Planned Burn Guidelines - Southeast Queensland Bioregion	2022	outlines changes in forest and woodland structures pre and post colonisation. Describing diverse landscape that was traditionally maintained by use of fire in the landscape. Also confers that the supression of fire in the landscape has contributed to an increase in bushfire severity. Advises consultation with First Nations partners for determining management objectives, non specific in recommendations.

South Australia (SA)

Guidelines for the Management of Roadside Native Vegetation and Regrowth Vegetation

These Guidelines outline the processes for managing vegetation along roadsides. Section 10 explicitly states how fire is employed along roadsides to manage vegetation and create safer roadways. The Guidelines are informed by the Native Vegetation Act 1991 which relates to "the application of assistance and management of native vegetation [...] to allow the clearance of vegetation that is growing or situated on a road reserve or rail corridor," (Native Vegetation Council, 2020, p. 4)

Aboriginal Waterways Assessments

Aboriginal Waterways Assessments (AWA) is a collaborative partnership between the Department of Land and Water (DEW), the Murraylands and River Landscape Board, the First Peoples of the Murray River, and the River Murray Mallee Aboriginal Corporation (RMMAC). It has been used to facilitate discussion and planning of projects including the South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP), Pike and Katarapko floodplain environmental works and the Living Murray's Chowilla Floodplain program. have.

The AWA process facilitates two-way knowledge sharing that enable informed decision-making in management planning for healthy river systems (Government of South Australia & Department for Environment and Water, 2024). Importantly, the AWA provides a mechanism to assess the health of waterways across multiple Countries in a manner that is culturally safe, while capturing the unique needs and knowledges of each area and preserving localised knowledges of place (Australian Government & Murray-Darling Basin Authority, 2017, p. 8).

Ngarrindjeri Climate Yarning Circles

Facilitated by the SA Drought Hub, and funded through the Australian Government's Future Drought Fund, the Ngarrindjeri Climate Yarning Circles created a forum to increase ACLM through bridging cultural knowledges with scientific insights, "enabling the Ngarrindjeri community to articulate a clear stance on climate change, focusing on actionable mitigation and adaptation strategies that respect and incorporate Ngarrindjeri cultural values," (SA Drought Hub, n.d., para. 5).

Importantly, the project has set a precedent for community-led climate resilience models, with outcomes of the project including (SA Drought Hub, n.d., para. 8):

a) A greater understanding of the impacts of climate change on Ngarrindjeri lands and waters;

b) Insights into how Ngarrindjeri knowledges and practices may mitigate the impacts of climate change;

c) Creation of a framework for integrating First Nations knowledges.

Table 6 provides a summary of structures and initiatives in SA.

Table 6 South Australian Policies

POLICY	DATE	SUMMARY
South Australia - Roadside Vegetation Guidelines	2020	Guides fire use along roadsides to manage native vegetation and reduce bushfire risk. Recognises prescribed burning by Indigenous communities as part of cultural land management, emphasizing collaboration with the South Australian Country Fire Service.
South Australia - Aboriginal Water Assessments (AWA)	2024	Partnership between First Peoples, government, and regional bodies to integrate Indigenous knowledge into river and wetland health management. AWAs enable culturally safe, two-way knowledge sharing for water planning, helping Traditional Owners participate effectively in managing waterways across multiple regions.

Tasmania / Lutruwita

Procedure for Cultural Burning on land managed by the Tasmania Parks and Wildlife Service

This document from Tasmania Parks and Wildlife Service (PWS) presents a heavily mediated and controlled version of cultural land management practice. In this iteration, PWS staff are empowered to "define areas and conditions under which low risk cultural burning can occur," (Tasmanian Government & Tasmania Parks and Wildlife Service, 2023, p. 2).

Tayaritja Milaythina IPA / Pakana Ranger Program

In Tasmania, the Pakana Ranger team undertakes a range of ACLM projects. One project involves a partnership between the Pakana Rangers, Marine and Coastal Hub researchers, and researchers from the University of Tasmania, University of Queensland and Deakin University. The project involves mapping the extent of culturally significant seagrass beds. An important component of the work is investigating how the seagrass habitat is changing, and how Pakana Rangers can look after it into the future. The project also determines how carbon is being stored within seagrass beds and underlying sediments, and how accurately seabeds can be modelled through satellite imagery. The significant outcome of the project is that "new methods and understandings generated by this project will advance the capacity of Aboriginal-led management of those proposed Tayaritja Milaythina Muka IPA," (Tasmanian Government & Tasmania Parks and Wildlife Service, 2023, p. 10).

Table 7 provides a summary of structures and initiatives in Tasmania.

Table 7 Tasmanian Policies

POLICY	DATE	SUMMARY
Cultural Burning Procedures on Land Managed by Tasmanian Parks and WIldlife Services	2023	Outlines the Procedures for conducting and managing Cultural Burning initiatives on Tasmanian Parks and Wildlife Services Land.
Tayaritja Milaythina IPA / Pakana Ranger Program	2023	Cultural Ranger Program and initiative across Tasmania, including coastal and inland land management initiatives.

Victoria (VIC)

Inquiry into the 2019-20 Victorian Fire Season

The Inquiry into the 2019-20 Victorian Fire Season recommended a multi-pronged and reflexive approach to bushfire preparedness and response by building on prior commitments to integrate Aboriginal cultural land management practice into its overall fire strategy. It reiterated its commitment "to partnering with Traditional Owners in land management and [to working] closely with Traditional Owners" in implementing the recommendations from the Inquiry (Victoria State Government, 2020, p. 17)." Specifically, Recommendation 2 addresses fuel-load management. An immediate action listed here is that "DELWP[7] will continue to work with Traditional Owners to implement the Cultural Fire Strategy" (Victoria State Government, 2020, p. 30), while working to "identify any measures required to better enable Traditional Owners to carry out cultural fire," (p.31).

The **Cultural Fire Strategy** provides "a policy and practice framework for effective, Traditional Owner led cultural fire management in Victoria," with an intention to "reinvigorate cultural fire through Traditional Owner led practices across all types of Country and land tenure; enabling Traditional Owners to heal Country and fulfil their rights and obligations to care for Country," (The Victorian Traditional Owner Cultural Fire Knowledge Group, 2019, p. 5). The Strategy recognises "fire as a tool to manage landscapes [and] as crucial to maintaining a balanced ecological environment," (p.6). Narratives within the Strategy talk about the transition to returning to cultural fire practice as needing to happen over many years, while Country adjusts and heals through "a process of decolonising the land," (The Victorian Traditional Owner Cultural Fire Knowledge Group, 2019, p. 16).

In Victoria, the number of supported cultural burns during the period covering 2022-2023 totalled 23 across the state, with 418 hectares of land treated with cultural fire. 20 of these fires were supported by the Department of Energy, Environment and Climate Action (DEECA), with the remaining three supported by the Country Fire Authority (CFA) (Victorian Government, 2023, para. 13).

The Victorian Traditional Owner Cultural Landscapes Strategy

In its preamble, The Victorian Traditional Owner Cultural Landscapes Strategy (the Strategy) describes the concept of a cultural landscape as a means of ontologically bridging the "differences between Indigenous and 'western' world views, between Natural Resource Management (NRM) and caring for Country," (Federation of Victorian Traditional Owner Corporations et al., 2020, p. 7).

7 Previously the Department of Environment, Land, Water and Planning, DELWP is now known as the Department of Energy, Environment and Climate Action (DEECA).

The Strategy presents a non-exclusionary framework for the discussion, planning and negotiation of land management. While the Strategy does not discuss engaging Aboriginal cultural land management to build resilience into transport systems, it does address how to bridge the cultural elements of Aboriginal cultural land management with government policy, planning instruments and governance structures (Federation of Victorian Traditional Owner Corporations et al., 2020, p. 19).

Djandak Wi: Returning Cultural Fire to Country, Dja Dja Wurrung Country

This project was funded through the Victorian Government's **Cultural Fire Grants program** (now closed). The program was designed in a way that "Dja Dja Wurrung can continue to deliver fire in years to come, and better respond to fire risk and climate impacts on Country," (Djaara Balaki Wuka, 2023, para. 8).

Outcomes of the Djandak Wi include a reduction in invasive weed species, and a return of native vegetation species. Wider benefits of receiving funding through the Cultural Fire Grants program has been the ability to expand the cultural fire program, and to develop the Djandak Wi (Country Fire) Strategy by the Dja Dja Wurrung Clans Aboriginal Corporation.

The ten-year Djandak Wi Strategy meaning 'healing fire' in Dja Dja Wurrung language (Djaara Balaki Wuka, 2024b), emphasises the sharing of Dja Dja Wurrung knowledge, which "enables fire managers to understand a different way of looking at landscapes, and to adopt methods that minimise harm to Country while also reducing the risk of wildfire," (Carter in Djaara Balaki Wuka, 2024a).

The Strategy is aspirational, detailing focus areas and goals to reinvigorate culture and lore, ensure intergenerational learning, and return people to Country through an active cultural landscape approach.

Table 8 provides a summary of structures and initiatives in Victoria.

Table 8 Victorian Policies

POLICY	DATE	SUMMARY
Victorian Traditional Owner Cultural Landscape Strategy	2025	Grants program for supporting rebuilding efforts surrounding the 2019-2020 bushfires.
Victorian Weathering the Storm	2024	Strategic framework for adapting Victoria's infrastructure to climate change, focusing on reducing damage from extreme weather events through risk assessment, resilient design, and early investment in protective measures.

Western Australia

With just over 30% of Western Australia covered by Indigenous Protected Areas, it is important for the state to develop clarity around the access and use of land. As such, the Western Australian Government developed a guiding document entitled: Guide to the Government Indigenous Land Use Agreement and Standard Heritage Agreements (Government of Western Australia Department of Premier and Cabinet, 2014). Joint Management Plans, as detailed below, provide the framework for Traditional Owners and Parks and Wildlife Services to co-manage land.

Joint Management Plan

A Joint Management Plan (JMP) is a formal agreement between Western Australia's Parks and Wildlife Services, and Traditional Owners. Formal joint management starts when the two parties agree on a JMP which provides the framework and the details on how Country will be cared for and managed collaboratively.

A JMP enables Aboriginal cultural land management and western sciences to be used together in caring for Country, and for planning to occur through collaboration. As of the 30th of June 2023, 6.4 million hectares of parks and reserves are joint managed by Traditional owners (Government of Western Australia Department of Biodiversity Conservation and Attractions, 2024).

Aboriginal Ranger Program

The Western Australian Aboriginal Ranger Program (ARP) was launched by the Department of Primary Industries and Regional Development Royalties for Regions in 2017 to "help Aboriginal organisations manage country and protect the environment across the State, in partnership with the public and private sectors," (Government of Western Australia & Department of Biodiversity, n.d., para. 1).

Each ranger program is led by Aboriginal people, while the ARP is administered by the Parks and Wildlife Service of the Department of Biodiversity, Conservation and Attractions. The Aboriginal Ranger Program is in essence a state-funded version of the Commonwealth-funded Indigenous Ranger Program.

Ngaanyatjarra Country and Bunuba Country

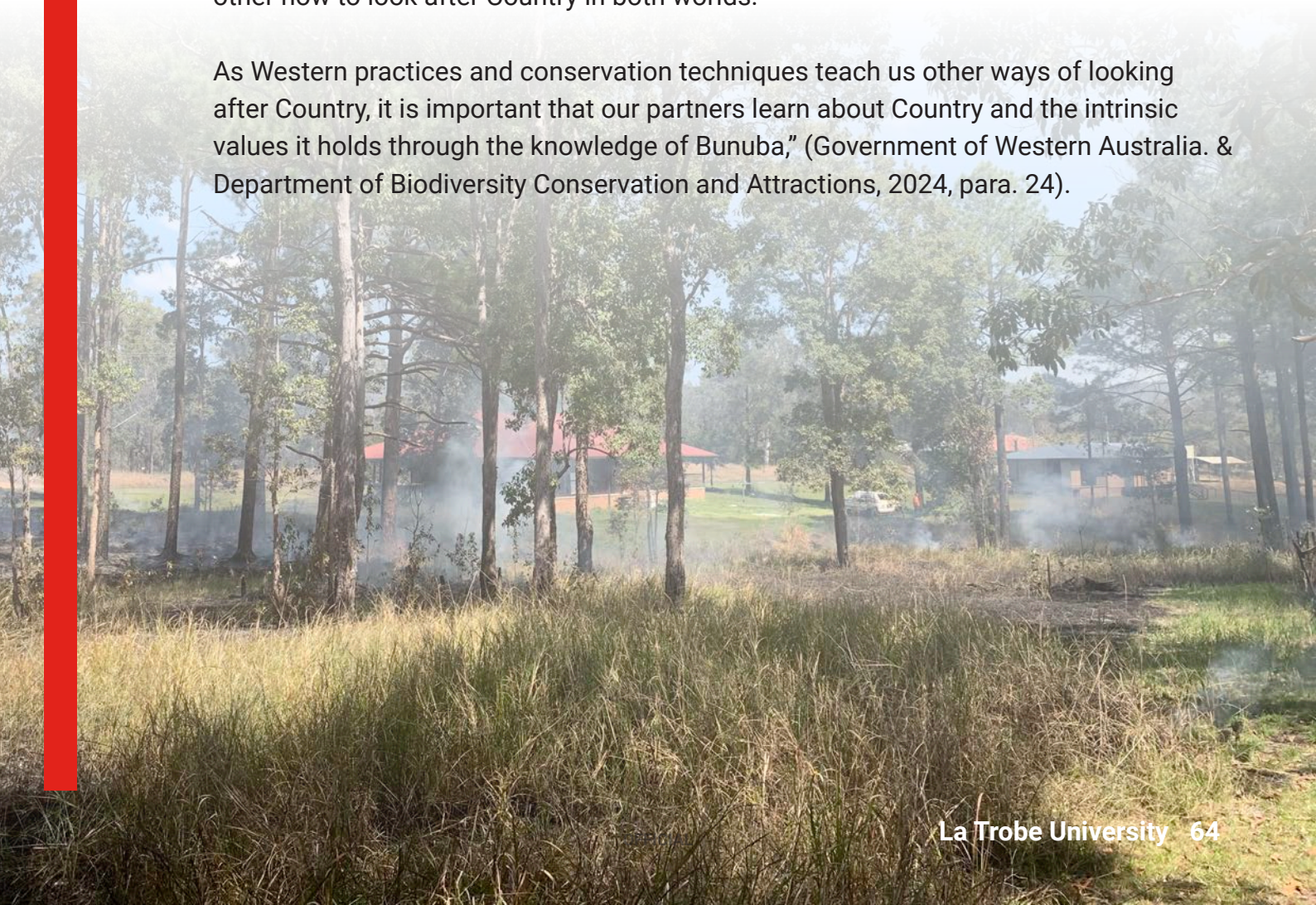
Two successful examples of ongoing traditional land management practices are found in Ngaanyatjarra Country and Bunuba Country.

On the Ngaanyatjarra Lands (about 9.8 million hectares), four ranger teams undertake Aboriginal cultural land management in diverse projects including cultural burning practice, managing feral camel populations, cleaning and maintaining waterholes to support fauna (Australian Government & National Indigenous Australians Agency, n.d.-b).

The Land and Culture Program works with community members across the Ngaanyatjarra Lands to manage land access by mining companies and government agencies for protection of cultural heritage. It also supports Traditional Owners to undertake cultural burns, and assists the transfer to traditional ecological knowledge to young people through Tjukurrpa (Dreaming stories), and supports visiting scientists (Ngaanyatjarra Council Group, 2024).

The Bunuba Dawangarri Aboriginal Corporation jointly manages seven National and Conservation Parks. Speaking of the nature and value of Joint Management and two way knowledge practice, a statement from the Bunuba Dawangarri Aboriginal Corporation explains: “partnerships are all part of Bunuba’s vision…We learn from each other how to look after Country in both worlds.

As Western practices and conservation techniques teach us other ways of looking after Country, it is important that our partners learn about Country and the intrinsic values it holds through the knowledge of Bunuba,” (Government of Western Australia. & Department of Biodiversity Conservation and Attractions, 2024, para. 24).



Local Level

There are several local initiatives as outlined in Table 9 below. Additionally, as seen in Figure 3, The federally funded National Indigenous Australians Agency (NIAA) Ranger Program supports the employment of Aboriginal and Torres Strait Islander Rangers across the Country.

Table 9 Nationwide Local Policies and Programs

POLICY	DATE	SUMMARY
Firesticks Alliance - Program	2025 Queensland	Organisation based in Cape York, supporting Indigenous-led management practices including bushfire and cultural fire strategies.
Wik Country - Ranger Programs	2025 Queensland	Wik Country ranger programs in Cape York combine traditional and modern fire practices. They manage fire for biodiversity, carbon credits, vegetation control, and transport safety—delivering cultural and environmental benefits
Ngarrindjeri Climate Yarning Circles	2024 South Australia	Ngarrindjeri Climate Yarning Circles bring together cultural knowledge and science to address climate risks. Outcomes include identifying threats like invasive species and restoring Country through planting and planning.
Ngunnawal Ranger Program	2024 Australian Capital Territory	Ngunnawal Rangers manage weeds, wetlands, trails, and cultural burns. Their work supports broader Aboriginal cultural land management and involves partnerships with government and community.
Caring for Dhawura Ngunnawal: Natural Resource Plan 2022-2042	2024 Australian Capital Territory	The Ngunnawal 20-Year Plan integrates cultural knowledge into land and fire management. It focuses on cultural burning, youth leadership, river health, and co-management, though it doesn't cover transport.
Tayaritja Milaythina IPA / Pakana Ranger Program	2023 Tasmania	Pakana Rangers work with researchers to map seagrass, monitor carbon storage, and use satellite data. This strengthens Aboriginal-led marine care and management of the Indigenous Protected Area.
Arnhem Land Fire Abatement (ALFA)	2025 - Northern Territory	The Arnhem Land Fire Abatement (ALFA) Organisation is an Aboriginal-owned, not-for-profit group in the Northern Territory. It supports Indigenous involvement in the carbon industry through cultural fire management, using traditional burning and controlled mosaic burns to reduce fuel and prevent bushfires. ALFA combines Indigenous knowledge with modern science to address climate change, protect heritage, and benefit communities.
New South Wales Aboriginal Ranger Program (Local Land Services)	2025 New South Wales	Launched in 2022 across Central West, Murray, Riverina, and North West LLS regions, the program focuses on training, strengthening cultural connections, and supporting Aboriginal people to care for Country. Projects include Caring for Country, vegetation and habitat protection, erosion control, cultural burning, and sustainable land management

POLICY	DATE	SUMMARY
Shoalhaven Healthy Country Plan for Black-Cockatoo 2022-2032	2022 New South Wales	A collaborative project launched after the 2019/20 bushfires aims to restore black-cockatoo habitat with Dharawal and Dhurga communities. It includes knowledge sharing, employment, ecological restoration, monitoring, and education, supported by NSW government departments and local organisations.
Djandak Wi: Returning Cultural Fire to Country	2023 Dja Dja Wurrung	A 10-year strategy to reintroduce cultural fire to Dja Dja Wurrung landscapes, building on DEECA partnerships that have integrated cultural fire into Victoria's planned burning for over six years. It aims to reduce fire risk, address climate impacts, and share Dja Dja Wurrung knowledge so fire managers adopt methods that minimise harm to Country.
Fire and Minerribah (North Stradbroke Island)	2018 Quandamooka	The strategy involves collaboration between the Quandamooka Yoolooburrabee Aboriginal Corporation and government agencies to deliver land care on North Stradbroke Island. Its bushfire management plan addresses community aspirations, safety, protection of life and property, and preservation of natural and cultural heritage.
Joint Management	2024 Bunuba Country	The Bunuba Dawangarri Aboriginal Corporation co-manages seven parks, combining Bunuba cultural knowledge with Western conservation to care for Country and protect its cultural and natural values.

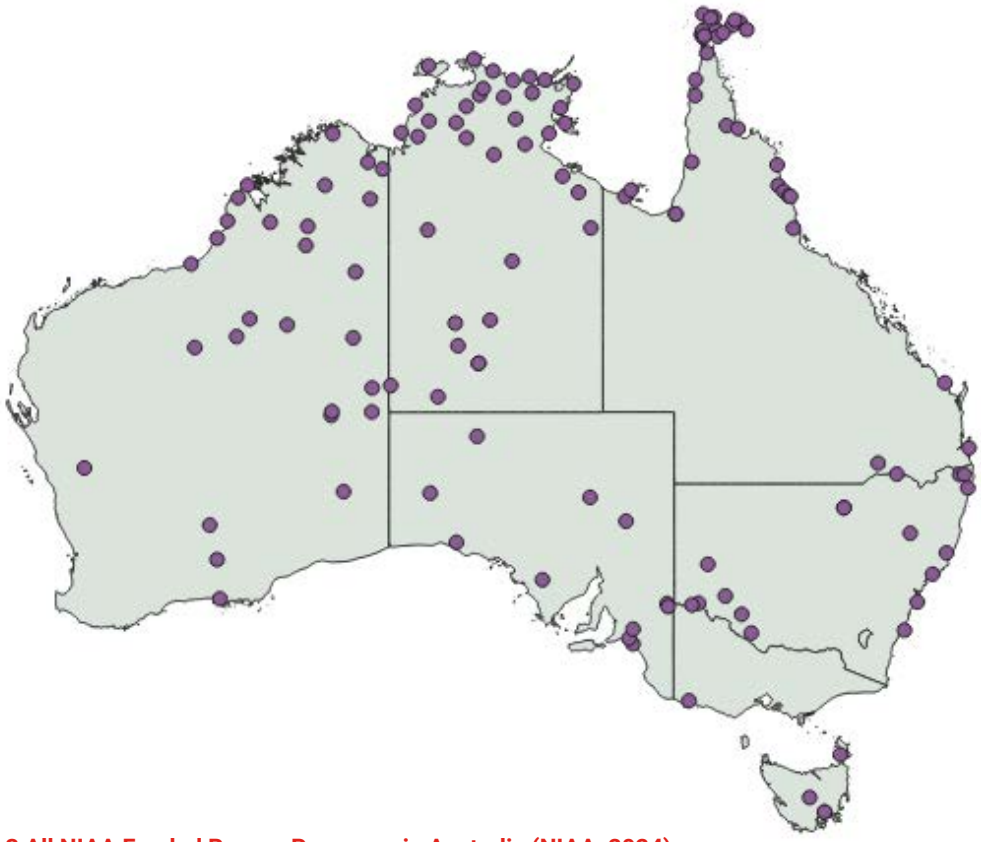


Figure 3 All NIAA Funded Ranger Programs in Australia (NIAA, 2024)

Summary of Key Findings from Review of Structures

- **Several strategies foreground the importance of incorporating and learning from knowledges of Aboriginal and Torres Strait Islander peoples more broadly rather than an explicit involvement in planning for the resilience of transport infrastructure.**

- **ACLM programs engaging in cultural fire practice are found across Australia. Aboriginal cultural land management extends across cultural landscapes that do not adhere to regulatory and administrative borders, meaning that collaboration and partnerships are critical.**

- **There are many examples of ranger programs and cultural burns alongside National and State Park Services, and on private land, but these do not prioritise the development and integration of resilience into transport networks and infrastructure. They may, however, increase resilience in the broader landscape, and thus, inadvertently or incidentally, increase resilience of the transport network.**

- **There are unique agreements and consultative processes, but no evidence of active engagement in Aboriginal cultural land management in connection with transport infrastructure and resilience. The scan has revealed instances of cultural burning along roadsides in SA through the Guidelines for the Management of Roadside Native Vegetation and Regrowth Vegetation (Native Vegetation Council, 2020). This expression of Aboriginal cultural land management is in the context of fire management and prescribed burning by Aboriginal people as part of cultural land practice.**

- **Increasing instances of cultural burning and culturally informed burning are emerging across NSW, with significant differences between the two practices. Cultural burning is planned, led, directed and practiced by Aboriginal people with cultural knowledge of Country. Culturally informed burning occurs in partnership with Aboriginal people, aiming to be respectful and inclusive of Aboriginal cultural knowledge and the health of Country. Importantly, while the objective may include hazard reduction, there must be genuine engagement and involvement with the Aboriginal community connecting to Country.**

- **The Network Resilience Program is aligning some of the principles in The Sendai Framework (United Nations Office for Disaster Risk Reduction, 2015) that focuses on the adoption of measures which address the three dimensions of disaster risk (exposure to hazards, vulnerability and capacity, and hazard's characteristics) to prevent the creation of new risk, to reduce existing risk, and increase resilience.**

As seen in this review, the embedding of ecological knowledge, or Indigenous land management practices into infrastructure planning is still not common practice in Australia. The associated risks, personnel and insurance costs have been considered prohibitive (Infrastructure Australia & Infrastructure NSW, 2021, p. 54). This stance is shifting, however, with an understanding of the resilience benefits of employing traditional land management practices to protect communities and infrastructure from hazards and shock events (Infrastructure Australia & Infrastructure NSW, 2021, p. 54).

The infrastructure planning phase presents the greatest opportunity to build resilience into transport networks, as "decisions made at this stage establish the trajectory of all the dimensions of the infrastructure lifecycle," (Infrastructure Australia & Infrastructure NSW, 2021, p. 58). This becomes increasingly important when the instances and frequency of natural hazards are not predictable; planning instead must move toward the mitigation of impacts, and the resilience of systems impacted.

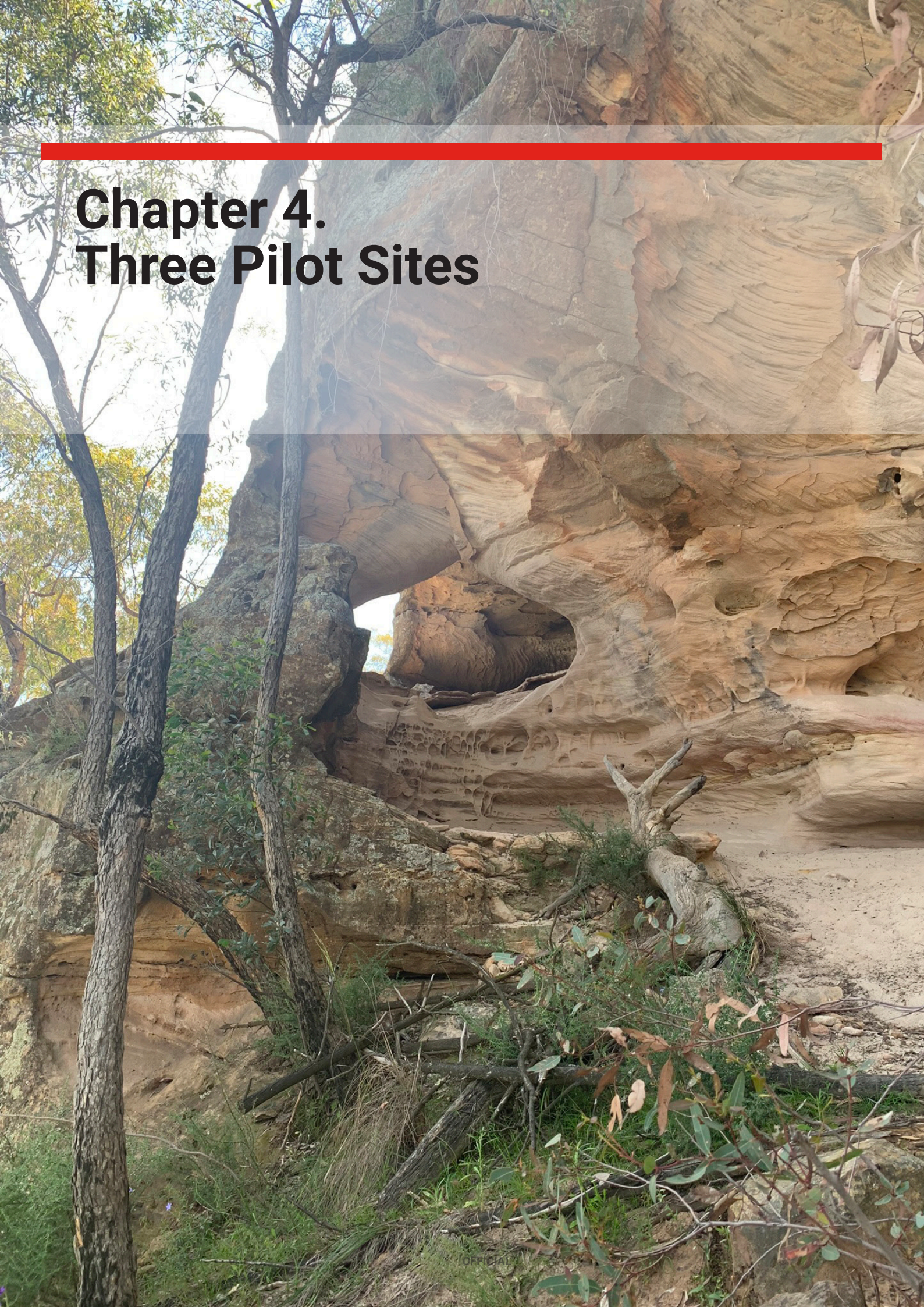
TfNSW can take a lead in this direction where the application of Caring for Country, traditional or cultural landscapes management could be part of factoring resilience into the operations and maintenance of existing and new assets for transportation. As found in this review, there are several structures that could be used for this purpose.

In its Framework, TfNSW should consider strategies such as Joint Management Plans, adaptation of Aboriginal Waterways Assessments, and continued expansion and roll-out of Indigenous Ranger programs. In all cases, these must be led by the Traditional Owners of the Country, informed by locally-relevant and culturally appropriate traditional knowledge holders, with contributions (i.e., co-design) from TfNSW and other government and land management agencies, where relevant. The combined expression of these structures is likely to result in a product that very closely resembles a Healthy Country Plan, but with an explicit focus on the transport network and the landscape in which all transport networks are embedded.

However, the final product is perhaps less important than the process and collaboration required to produce the Healthy Country Plan. Finally, it should not be assumed that Aboriginal cultural land management and the ACLM project will inevitably result in increased landscape resilience (and therefore, transport network resilience), even though this is the underlying premise.

Structures must be designed and implemented to monitor the outcomes of Aboriginal cultural land management in terms of the resilience conferred to the transport network.

Chapter 4.
Three Pilot Sites



4 The Three Pilot Sites

This section provides a comprehensive account of what the study found on Aboriginal cultural land management and resilience by conducting fieldwork in the ACLM three pilot sites. These sites were recommended by TfNSW because of their long-standing relationship with the communities involved in its ACLM project. The three pilot sites are summaraised in Table 10.

Table 10 Summary of Pilot Sites

Pilot	SUMMARY
Batemans Bay	This community is situated along the south coast of NSW, and has multifaceted cultural land management goals, objectives and practices. Here, the leading authority for cultural vegetation and land management are the Walbunja Rangers, a ranger group situated within the Batemans Bay Local Aboriginal Land Council (BBLALC). This group, consisting of 10-15 First Nations rangers were established by the BBLALC in response to the Black Summer Fires of 2019-2020, and operate within the Batemans Bay region and surrounding area. The Ranger's focus is on cultural burning, pest eradication and species monitoring and conservation, serving as a means of connecting community with cultural heritage protection.
Coonabarabran	The Coonabarabran community, situated within the Central-Western portion of NSW, serves as an important pilot for the ACLM project as a representation of its surrounding inland communities and their need for support in delivering on cultural practices and land management aspirations.
Western Bundjalung	The Jubullum Flat Camp Aboriginal Area demonstrates a significant shared interest between TfNSW and the local community. In its proximity to the nearby Bruxner Highway and Tabulam Village, cultural aspirations for management of the land align with the objectives of ACLM. As has been established, the area contains significant cultural areas that the community have an interest in managing and protecting, situated along and nearby the major highway.

The adjoining map (Figure 4) indicates the location of these three sites.

Figure 4 Location of the Three Pilot Sites

The purpose of pilot studies is to document and analyse the current state of Aboriginal cultural land management practices being conducted within the three communities, with specific focus on its potential role in enhancing resilience of transport corridors to natural disasters. This report aims to identify locally significant cultural and natural heritage components within the community as well as preferred ways of working on country to incorporate ACLM into vegetation management of NSW transport corridors.

It incorporates local histories, community data and cultural expertise from these pilot locations and communities to outline significant cultural and natural heritage components specific to the area, informed by Elders and knowledge holders and respectfully gathered by the La Trobe Research team.

Sensitivites of Cultural and Community Data

Within this report, cultural and community data has been collected from the communities in the pilot areas, of which sensitive data has been shared. The disclosure of sensitive data by research participants was outlined within Participant Information Sheet and Consent Forms (PICF) provided to research participants at the time of interview.

Categories of culturally sensitive information that have been limited or omitted throughout this report include:

- ***Family Trauma***
- ***Sorry Business***
- ***Cultural Conflicts (Native Title disputes, naming conventions, lateral violence)***
- ***Ceremonial Practices***
- ***Songlines***
- ***Sacred Sites***
- ***Men's business & Women's business***

Categories of community sensitive information that have been limited or omitted throughout this report include:

- ***Local economic conditions (employment, income disparities)***
- ***Personal information (name, occupation, age, address, religion)***
- ***Political affiliation or beliefs***
- ***Community conflicts***

The exclusion of sensitive information throughout this report reflects the high ethical standards to which this research upheld within the project, reflects the wishes of individuals involved and the community, where past histories of Government policies, racism and concerns of cultural protections have led to resistance from sharing sensitive information.

Fieldwork Methodology

In 2024 and 2025, the La Trobe research team conducted fieldwork trips to all the pilot sites, working closely with the Aboriginal community-controlled organisations, two Local Aboriginal Land Councils, and one Native Title Prescribed Body. These fieldwork trips served as the foundation for this report.

While attending fieldwork at the pilot area, the LTU research team were supported by the TfNSW ACLM Senior Project Officer for the region, who facilitated early outreach between the research team and community leaders. Through the inclusion of these TfNSW Aboriginal staff, the research team were able to create and maintain cultural safety throughout the research project. The inclusion of these Aboriginal project officers is integral to creating strong relationships with community and demonstrating cultural safety within the program.

Additionally, during the fieldwork, the research team were guided by the Aboriginal community-controlled organisation leadership and senior Elders of the communities, ensuring that the research was culturally informed. While conducting multiple site visits, the team gathered data on both the cultural and natural heritage of the region, as well as insights into how the community prefers to engage with and manage Country. Throughout the fieldwork, the research team also conducted several interviews with community members, including staff from the Aboriginal community-controlled organisations and Ranger groups.

4.1 Batemans Bay

4.1.1 Historical Context

Batemans Bay occupies land along the Clyde River and surrounded by countless beaches and coastlines. The Walbunja People of Batemans Bay are saltwater people, their country and cultural identity intersect between land and sea throughout their community and along their coastlines. Many of the cultural stories and histories surrounding the Walbunja People speak to deep spiritual connection through songlines between land and sea. The prominent eel dreaming of the Batemans Bay community demonstrates this balance.

Batemans Bay is known to contain six of the eight first contact sites documented within the broader Eurobodalla region between European and Aboriginal Peoples. One of these documented contact sites, recorded on April 23, 1770, has Captain Cook passing through the area and recording seeing five Aboriginal men on the northern shore of Batemans Bay (Dale Donaldson, 2006). The local bushland and creek systems were rich with wildlife, such as mud crabs, wallabies, kangaroos, rabbits, echidnas, bush pigeons (Wanga), eels (Gunyu), and other birds (Budjarn), which were hunted and collected.

Historical records from 1826 show the Walbunja People trading with European settlers, and the collection of resources continued throughout the settlement period (Dale Donaldson, 2006).

In 1902, the Batemans Bay Aboriginal Reservation was established. Recorded oral histories reveal that the Walbunja People disliked living on the reservation, preferring to stay near Joe's Creek. Shell middens in the Batemans Bay area evidence ongoing cultural practices, such as diving for 'muttonfish' (abalone) and gathering shellfish, including oysters. (Dale Donaldson, 2006)

Batemans Bay is situated within the South Coast People Native Title Claim, first filed in 2017. The claim, stretching across the breadth of the South Coast of New South Wales, covers the country of several different nations and the Local Aboriginal Land Councils.

4.1.2 Batemans Bay Aboriginal Community Profile

Batemans Bay is home to approximately 1,500 people, with Aboriginal and Torres Strait Islander People making up roughly 9% of that population (approx. 140). Batemans Bay is situated within the Eurobodella Local Government Area which has a population of 40,500, of which approx. 6% (2,400) are Aboriginal and Torres Strait Islander Peoples (Australian Bureau of Statistics, 2021c). The aging population in Batemans Bay is relatively higher: 52.3% aged 50 and above compared to the national average of 35.4%. Alongside this, economically, Batemans Bay is driven by both this senior population and the seasonal tourism industry, with 7.8% employed in Aged Care and hospital services and 11.1% employed in hospitality, retail and accommodation industries. (Australian Bureau of Statistics, 2021a)

4.1.3 Significant Cultural and Natural Heritage

Both through the community's anthropological work within Native Title research and data collection and through works conducted by the Eurobodalla Local Government, comprehensive mapping and heritage assessments have already been undertaken, and have either been deemed to be safeguarded for community access only or are actively unavailable through Native Title legislation. The Eurobodalla Aboriginal Heritage Study highlights an extensive list of heritage places as identified by local Aboriginal People. Along the south-coast, the Walbunja People of Batemans Bay have many areas of significance, continuing inwards into the bushland and creek systems flowing from the Clyde River (Dale Donaldson, 2006).[8] Rivers and ranges dictate the Eel Dreaming of the Batemans Bay region and hold many significant natural and cultural heritage features, including fish traps, scar trees, carved trees, directional trees, middens and traditional camping spots (Dale Donaldson, 2006). Many Dreaming stories associated with the Batemans Bay region extend far beyond these linear borders, stretching through other Aboriginal Nations along the South Coast (Edwards, 2017).

While conducting research with the community, it was decided and agreed that the scope of research within the ACLM project would not and should not be inclusive of all culturally significant places, nor should the community be expected to disclose these special sites.

TfNSW should have similar expectations.

8 This study summarises community-shared Aboriginal cultural knowledge and identifies 287 culturally significant places across the Eurobodalla region.

As seen in Figure 5, several key heritage and important cultural places have been highlighted by the Batemans Bay community. Of these, while only a small number appear directly along roadways, there are several that connect key songlines throughout community and further showcase cultural values that share significance with natural hazards and community survivorship.

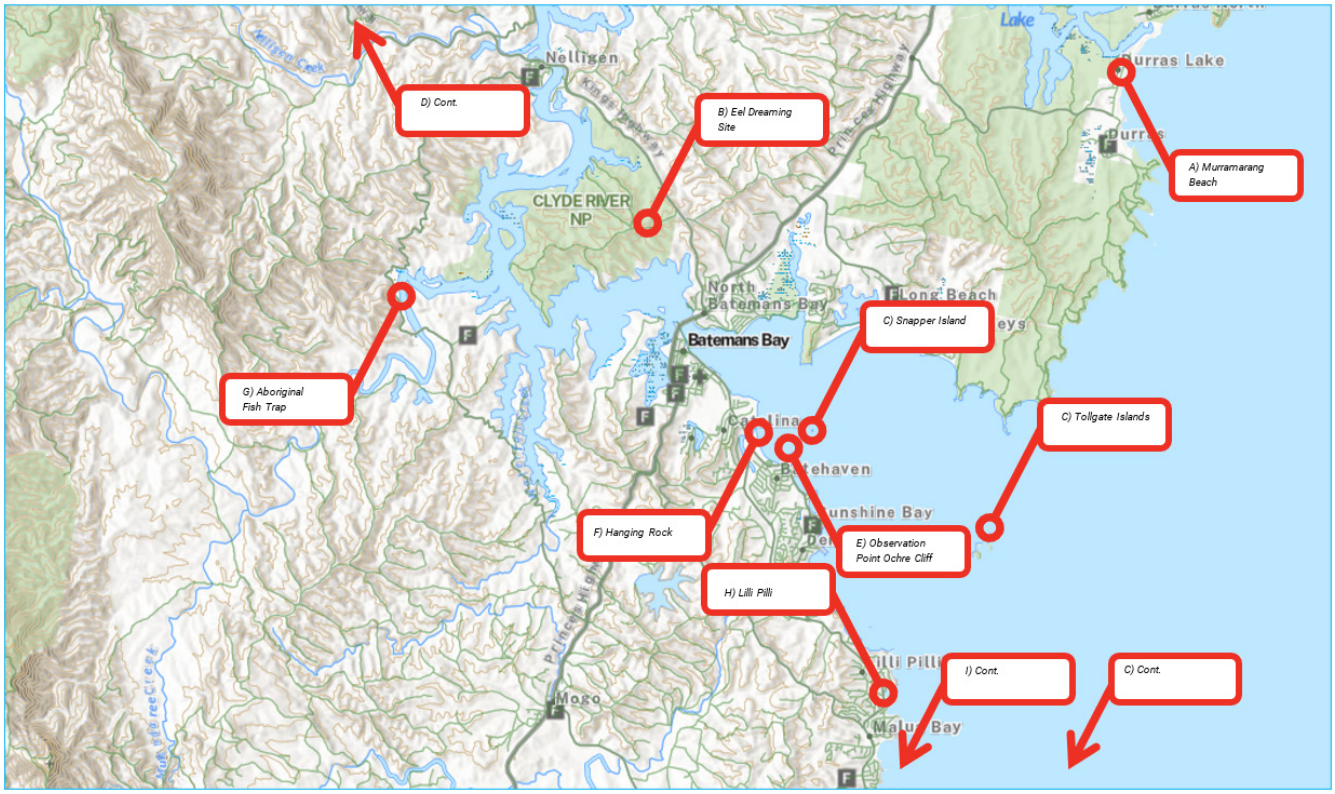


Figure 5 Annotated Map of Cultural Heritage Sites and Locations Visited During Fieldwork, Batemans Bay

(NSW Spatial Services, 2024)

Snapper, Tollgates & Montague Islands

Snapper and Tollgates Island, situated off the coast of Batemans Bay hold significant heritage value to the Batemans Bay community, including being the location of an Aboriginal burial site. Montague Island, situated south of Batemans Bay near Narooma, was the location of a mutton bird egg festival for the Walbunja People, in which boys and men would collect the eggs and bring them back to the coastal camping sites. One year while returning from the island, a large storm drowned the group of men and boys canoeing back from the island, with their bodies washing up on the beach (Montague Island, n.d.). These Islands situated along the coast of Batemans Bay and surrounds, demonstrate strongly the interconnected nature of Aboriginal Peoples in the South Coast region to country, both land and sea, and highlight the significant cultural pathways and songlines related to the Walbunja community and accompanying landscape.

"There is stuff here that's been hidden from all of them, from everyone. Culture has been broken here… I can teach my kids what I did as a kid, our job was to get the mutton fish…Walbunja People are saltwater people, definitely."

Trade Routes

Travelling routes and walking tracks are distinct throughout the Batemans Bay community, with key routes consisting along the entirety of the region's coastline. These tracks intersect with ceremonial sites along the coastline, including distinct men's and woman's sites, birthing and burial sites. With the purpose of these routes being food gathering, seasonal movement and ceremonial, discussions with community members often turned up the linkages between travelling these routes and burning on country. Participants repeatedly emphasised that burning was conducted along these dedicated routes allowing for healthy country for travel and food availability, in the form of plants and animals.

Corn Trail

Corn Trail was a trading route for Aboriginal People moving through the low and high country. It became prominent during early colonial industries as an extensive bullock trail for moving grain from western slopes and the Monaro Plains down the eastern side of mountains towards Nelligen, to be transported down river through Batemans Bay and shipped north to Sydney. This path intersects and operates along the Kings Highway. Peppermint Ironbark and Yellow Stringybark line the dense forest, heavily overgrown with black wattle in majority.

"it was the old way for the white fullas to get down from up over the mountain down to the river for the boats. They'd bring their stock and that down to send off to Sydney. Black fullas had to show them, they called it the corn trail because they'd bring their corn down from over the mountain. Black fullas had to show them how to get over the mountain, before the kings highway, it's a little bit off."

The Corn Trail serves as a significant component to the survival story of the local Walbunja People and situates itself as an integral piece of future ACLM work along the major Kings Highway transport corridor as a location of shared values and significance that can tangibly contribute to ACLM and TfNSW outcomes.

Figure 6 Corn Trail Site
(Google Maps, 2025)

Figure 7 Corn Trail
Photo: LTU Research Team

Observation Point Ochre Cliff

The Ochre Cliff, and subsequent shoreside are an important site for local Aboriginal people. The community use the ochre along the Observation Point cliff for ceremony and community events, painting themselves the different oranges, browns, whites and blacks found along the cliffside. In a pre-colonial context, resources such as these found at the ochre cliff would be expected to be transported and traded throughout the trade routes connecting the surrounding communities (Dale Donaldson, 2006).

"See down here, we would go down and get oysters. There are still artefacts here of what they would use to open them, our old people. They're still down there in bits and pieces. I go down there and get a feed, open them up, I take a bit of bread with me that's all… when its low tide, we come along from the beach way. The kids jump in and look for the Abalone."

Figure 8 Observation Point Ochre Cliffs
Photo: LTU Research Team

Hanging Rock

Hanging Rock is a key heritage site for the Walbunja People, in which their survival story in the time of segregation in the 1900s occurs.[9] During the time of the Batemans Bay Aboriginal Reservation in 1902 onwards, the Walbunja People opposed living there and instead established a meeting and camping site at Hanging Rock to better access country and gather food. As a Salt-Water People, gathering food most often included living off the sea and working nearby, but also entailed recreational activities such as the kids swimming in the nearby Joes Creek, which had many family camps along it (Dale Donaldson, 2006).

9 Originally, an Aboriginal man named Harry Chapman is said to have travelled with his family on a small boat traditionally called a Geebung from Bairnsdale Victoria to Hanging Rock. After landing at the site, he is said to have found fresh water at creek in Catalina and built a shelter for his family. From this, his family have continued to live in the area since (Dale Donaldson, 2006).

4.1.4 ACLM Practices

Harvesting Food

Throughout the entire south-coast region, the diving and collection of shellfish and crustaceans is a long-undertaken custom. Speaking to interview participants, they spoke of how environmental cues on land often informed them of the best times to go fishing for different foods. For example, a commonly known seasonal queue, "yellow on the trees, the crays are on the weeds" meaning that when the wattles are in flower, the crayfish are out of their caves and foraging on the seaweed, making them easier to catch. Similarly, different cues were used to guide the best time for fishing for snapper, mullet, bream, or abalone.

The traditional camping sites for the local Walbunja family groups were around the beaches including the Lilli Pilli beach, Melville Point, and surroundings.

These families would camp at the location due to its proximity to local employment as well as direct access to the sea for fishing and food gathering. The beachfronts were used for camping and family gatherings, with access to the sea for diving and fishing as well as nearby freshwater creeks for drinking and washing as well as gathering of inland food.

"If family went out and caught a big groper or something, they'd split it up with the rest of the mob in town. If we got fifteen or twenty yabs, we'd go give two or four yabs to another mob… Same with the lobsters, we used to drop the lobsters at the houses when we'd come home from diving…"What Unc taught us about when we were kids about indicators when the lobsters were around, the wattle would indicate when the lobsters were sitting on the reed and easy to get."

Fish traps along the creeks were another source of food and cultural assets. Recently, the fish trap at Runnyford Road has been rebuilt and reinforced with new local stone by the LALC as a cultural revitalisation project. Regarding the function of the fish-trap, the following process was described:

"We haven't activated it yet, we still need some more (stone) over (the far said of the trap). But then, all you need to do is get your roadkill and throw it in here, and the fish will smell it. They'll come up and jump it at high tide. And then at low tide they'll still be in here eating it. Then they'll go back and bump into something, saying 'Damn'. We load it up with kangaroo and roadkill, there's been plenty of roadkill around here; they're attracted to the food on the side of the roads. Kids and all would come in here and pick up the fish, flat head, mullet, bream, black fish, all in the river."

The team also heard of other fish traps along Cullendulla Creek, just north of Batemans Bay. Protection of cultural assets such as this fish trap is of extreme importance to the community, recovery of cultural assets after both being left to a state of disrepair and in the face of bushfire loss has meant that future protective efforts have needed to be drastic.

Cultural Fire and Cultural Burning

The Walbunja Ranger teams conduct burns frequently throughout the properties in the LALC owned land, or through contract work on private land sought out by landowners. They were established by the Batemans Bay LALC in response to the 2019-2020 Black Summer Fires and accompanying opportunities for support of Aboriginal Land Management outcomes within the Bushfire Enquiry. Senior Rangers within the group spoke of the benefit these small scale, LALC property burns have had in protecting ecosystems and animal life.

"The women and kids come [to burns], they start it sometimes, start them in a coolamon, starting it with the sticks proper way, traditional way. That's how we do our burns."

The outcomes obtained from the burning of the Nelligen property are a strong reflection of the significant skill and contribution capable by the Walbunja Ranger team. The indifferent understory, reflective of a significant growth period of several years in comparison to the lower overall crown scorch at the same time demonstrates a beneficial land care outcome in the ranger teams fire strategies that has protected and saved maturing and grown trees and their canopy.

This process and its outcomes demonstrate the significant landscape management practices being undertaken by the Walbunja Rangers which can be and has been applied to roadsides and transport corridors throughout Walbunja Country. Speaking to the outcomes they've seen from the Nelligen site, a member of the ranger group reiterated:

"We could fight [a fire today], with our fire methods to break it. We have the example out in Nelligen where we burned around that area and it was enough to break the fronts, so the canopy doesn't get scorched, it saved a few kilometres of vegetation behind our block, but it didn't stop it because there wasn't enough done"

Attending a recently burned LALC owned property revealed that, as a result of applied cultural burning at the site, areas with noticeably lower shrub cover after the 2019/2020 fires, particularly the Prickly Shaggy Pea (Podolobium ilicifolium) had regenerated profusely. The grasses had re-sprouted in the burn area and there was evidence of other small herbs emerging, all appearing as a direct result of this applied burning regime.

These outcomes of cultural burning are in line with the direction in which the Walbunja Rangers would like to see these country types returning to. the Rangers explained their aim for burning as a means to generate “trees and grass” and to remove the shrub layer almost entirely. The Rangers are confident the grass seedbank remains in most places and it just needs time (and fire) to recover but acknowledges some areas may have lost the seedbank and may need re-seeding.

A good relationship is building between the Ranger teams and NSW Parks and Wildlife. They are increasingly being invited or requested to conduct burns on Parks land, often in conjunction with Parks rangers. However, the relationship with Forestry is non-existent and no cultural burns have been conducted on Forestry lands.

Protecting Sacred Sites

Discussions for protecting sacred sites from natural disasters revealed concerns of the community about the use of Aboriginal Heritage Information Management System (AHIMS) in Government development and decision-making. AHIMS provides a key mechanism for protecting cultural heritage in NSW. Under various legislative frameworks, such as the National Parks and Wildlife Act 1974, developers and government agencies are required to assess the potential impact of proposed works on Aboriginal heritage using AHIMS. While this system provides high-level heritage mapping, it is not without its challenges.

For instance, a scar tree shown in Figure 9 which is included in the AHIMS database, situated next to a major road in Batemans Bay has been severely vandalised and damaged, almost to the point of rotting. It was found that the community often hesitates to include cultural sites in the state-wide AHIMS system.

This reluctance stems from concerns about damage, vandalism, or loss of sacred sites, with the community preferring to keep this knowledge local and only share it when necessary. This ensures that cultural knowledge is controlled by the relevant knowledge holders within the community and limits the access and use of AHIMS available to Governments and Developers. This reluctance is intended to protect sites from harm.

Figure 9 Scar Tree
Photo: LTU Research Team

4.1.5 Preferred Ways of Working on Country

The Community conveyed their preferred ways of working on the Country during the workshops. The idea of resilience in the community is connected to being together during the bushfires and strengthening their bond to bounce back.

> **"All the mob just come together and the big fires, hit, we all met out in Mogo pretty much, Hey, everyone all got together and made sure everyone was right... There was always someone just shooting through, just relaying messages... It was good. That was good communication with the mobs. But everyone knew everyone was right."**

Bouncing back and building resilience is an ongoing goal. And one way to achieve that is the practice of cultural burning.

> **"We just need to do more [burning]. More little strategic fire everywhere… You're creating resilience and resistance then and healthy country."**

For Cultural Burning to be carried out correctly, it must be conducted by the Walbunja People on Walbunja Country.

> **"We've never used water to put fire out. Never… By dry firefighting, all that is, is just mitigation and stuff."**

> **"We only, use trickle trick fire... You don't want the black in the trees at all. We don't."**

> **"We should be burning all year round… Majority of the grasses need that hot fire. And you need to, you need at the right time for them to germinate again. So… ours is not that cool burning either, it's traditional practice… that's all that indicators we look at. And, that's all been handed down and understood."**

The community leaders emphasised that they want to build and protect their Local Knowledge which is embedded in their cultural practices. It is them who embody such knowledge.

> **"The country tells you when it needs to be burned. That's it. Not, not the fire, forestry or the fire. It's the country. And the signs are there. And if we don't read them signs, we miss out for 12 months. We're going to wait until next year."**

The relevance of such embodied knowledge for transport corridors cannot be lost.

"We burn all year round through the heat of summer. But the reason we can do that is 'cause we understand what the country type's saying and how to apply fire directly... all these other countries that these highways are going to be cutting through, they need to be burned at different times of the year to prevent the disaster and promote a healthy environment."

The community is aware of the importance of vegetation management around transport corridors.

"But really what you want to do is, I presume, is not just have that buffer along the roadside. You want to try and dampen the whole landscape. And to do that, you've gotta work away from the roads… and that's hard when you can't… you haven't got that working relationship."

These highways have got to have buffer zones on them, if you never want them to be closed again… You gotta burn. Get your hundred meter buffers. Over 50 meter buffers over either side… So you're never gonna have to close the road again because of fire."

So they want to prevent these wild disasters from affecting the highways and such. Manage it the way we've been managing it, the country is going to respond better to that. So listen to the people of country and we'll be able to guide this down the right path for keeping the highway safe in disasters."

The community expressed a preference for having the rights and responsibilities associated with cultural burns and land management with the support of TfNSW in collaboratively working to protect these shared transport assets:

"What I want to see in twenty years is our traditional burn regime revitalised, and I'd like to see Transport as a big part of that, our roads are super important. So obviously there is a big input we'll have to put in as Traditional People. I'd like to see proper collaboration and cultural management of country, healthy country prevents disasters. It creates healthy people, simple as that."

Amongst the community, there is a desire for larger, dedicated groups within the ranger program to focus on specific elements of cultural land management to help build and reconnect culture:

"I know everyone says all these agencies work together, no they don't. One meeting, what's that going to do. It has to be strong community… with a water team, a bush team, and everything in between. So you have a team for different things, specialising in that. It's okay to have one or two crews doing all sorts of things, but you need one crew that is working on one thing. Specialise to get it back to its full effect."

The Batemans Bay community, while having several outspoken community leaders, faces challenges in passing on holistic cultural practices to younger generations.

"We're supposed to burn all year round, but obviously we have all this regulation and things in place because we have sick country. We have all those sorts of seasonal indicators… but we keep it in house."

During a group discussion with Walbunja Rangers, participants emphasised the need for increased involvement of female Elders in cultural activities, such as cultural burning and environmental assessments, to ensure that women's knowledge of sacred sites is properly shared and preserved across Batemans Bay:

"I'd love to see a lot more women involved in the ranger groups. I'm the only one in this crew, and down south there's two or three… We need more women Elders involved. For me for instance, the boys can go out with Uncle Les and learn all the men's sites, but I have no one in this Land Council."

Common barriers to the success of cultural burning in Batemans Bay were linked to the sourcing of cultural knowledge by government agencies from outside the region, and the use of external practices from organisations like the Fire Sticks Alliance and Jagun Alliance. The Batemans Bay community has been firm in asserting that cultural land management practices should be self-determined and led by the Walbunja People alone:

"There should be ways to get funding to repair those sites. When those roads were put in on top of Najanuga, those umbilical cords to mother Guluga. When they destroyed those, it was a complete disregard for all the mob saying not to cut through those. That was one major breakdown in communication. There was no reparation effort done, there was not attempt to try fix."

When asked what his aspirations are for managing Country in 20 years' time, Les replied that he would like his mob to be able to burn where and when they thought it was appropriate without having to go through bureaucracy for approvals, that is, to just be able to burn when they thought the country needed it then and there.

This aspiration was repeated in numerous conversations with the LALC Rangers and Senior Ranger. Exploring the Ranger teams preferred ways of working, it was reciprocated throughout the group that local people should be given the accessibility and responsibility for managing country:

"Hundreds of different country types exist in our community, and the roads and highways intersect them all"

The community has welcomed the idea of integrating Aboriginal cultural land management and the TfNSW ACLM project in building resilience of transport networks.

"We all felt it was a great idea that they came up with, because we had been trying to sell ourselves for ages that traditional burning can make things safer. We're happy that they'll carry on hopefully forever and that we can play our part. A lot of these roads and highways are on our traditional routes anyway."

The Walbunja Rangers are willing to engage with cultural land management along transport corridors. It is therefore up to TfNSW to implement and embed policy that provides growth and support to expanding the scale and capabilities of the community in cultural land management. As an aspiration of the young members in the ranger group, the ACLM program has the opportunity to incorporate these findings into developing future programs aligned with community growth and cultural practice along shared value outcomes, of which cultural fire regimes are at the forefront for protecting and healing country.

For TfNSW the role of the ACLM project in supporting communities preferred ways of working is clearly tied to the connectiveness of these major highways to areas of cultural significance, including the Princess Highway in relation to Murramarang Beach. Management of roadside ecological landscapes throughout the highway towards these areas of cultural significance allows for continued health of country and cultural revitalisation.

4.2 COONABARABRAN

4.2.1 Historical Context

The Gamilaraay people of NSW are a large language group, their nation stretching over 111,000 square kilometres of country, encapsulating a significant portion of the NSW region and inclusive of several key townships including, Moree, Gunnedah, Tamworth, Mungindi, Coonabarabran and more. Many of the cultural stories and histories surrounding the Gamilaraay people of Coonabarabran stem from their strong cultural ties to the surrounding Pilliga scrub and Warrumbungle ranges.

The first European record of Aboriginal people in this region comes from the journals of John Oxley in 1818 where he speaks of the Gamilaraay people. As squatters began moving into the country from the 1830s onwards, tensions between these pastoralists and the Gamilaraay people were recorded. In 1839, Governor Gipps established the Native Police to respond to the escalating violence of these frontier wars. The Aboriginal history of Coonabarabran is one of survival and perseverance in which “the threads of the story have been broken”, where traditional knowledge and customs were systematically reduced and removed (Margaret Somerville, 1994).

4.2.2 Current Profile of Coonabarabran Aboriginal Community

Coonabarabran is an inland township home to approximately 3,477 people, with an Aboriginal and Torres Strait Islander population of roughly 12.6% (approx. 438). In the broader context the Warrumbungle Shire has a population of 9,225 people, with an Aboriginal and Torres Strait Islander population of 10.7% (985). Demographically, the Coonabarabran community has an aging population, with 50.9% aged 50 or above when compared to the national average of 35.4%. Economically, the community is driven by local Government employment and farming industries, with 7.2% employed in Local Government Administration, 5.2% in aged care services and 4.3% in beef cattle farming.

Coonabarabran sits within the Native Title Claim of the Gomeroi People. This claim, first filed in 2011 covers an extensive region of central NSW all belonging to the Gomeroi People, was successful in establishing their Native Title rights in 2024.[10]

The Coonabarabran community have experienced a great deal of hardship in the face of natural disasters, including two devastating fires occurring within the last ten years. Known as the Black Sunday fires, the 2013 Warrumbungle bushfire decimated the Warrumbungle National Park, burning close to 90% of the park, destroying over fifty homes and killing hundreds of animals. In 2023, the Duck Creek bushfire again saw burning of over 130,000 hectares in the Pilliga State Forest, with lightning strikes causing the ignition of smaller grass fires. At the same time as these fires, and frequently throughout the Warrumbungle Shire, flooding has been seen as a result of immense rainfall. In the context of the Duck Creek bushfire, these heavy rains through heavily burnt country are known to cause trees to drop onto trails and roads as a major safety risk.

Within a cultural context, the impact of these natural disasters are significant. The loss of family homes is an immediate fear to the community, where single copies of priceless cultural artefacts, recordings, books or video tapes can be lost to an uncontrolled bushfire. Culturally significant sites, especially throughout the Warrumbungles and Pilliga are at risk of severe burning, destruction or loss in the face of these uncontrolled natural hazards. In the event of these fires, the Newell highway was seen to be closed as a protective measure, impacting the ability of services, family and economy to function through the community.

Additionally, seasonal cues and triggers as well as migrations of native species are a common risk in uncontrolled fires and floods, seeing the destruction of canopy and habitats and loss of animals. The cultural loss and fear experienced by the Coonabarabran community by these catastrophic events cannot be understated.

10 The name for the Aboriginal People of the Coonabarabran region has varied spellings and pronunciations, including Kamilaroi, Gamilaroi, Kamilroi, Gamilroi, Kamileroi, Gamilaraay, Gomeroi, and others. The Coonabarabran Aboriginal Community refer to themselves as Gamilaraay People.

4.2.3 Significant Cultural and Natural Heritage

Throughout Coonabarabran and its surrounding country, the Gamilaraay People have many areas of cultural significance, stretching far throughout the Warrumbungles and Pillaga and beyond. The Castlereagh River and the water systems throughout Coonabarabran, are sensitive women's sites and business. Bora Rings, Carving and cave features throughout the community are of high heritage significance. Many of the trade routes and dreaming sites throughout the region stretch into neighbouring nations and their creation stories.[11]

Around Coonabarabran, two distinct landscape types are defined by their soil characteristics. The volcanic soils, found in the undulating hills, are deep, fertile, and nutrient-rich, typically reddish-brown or black. These soils retain moisture well, support diverse vegetation like tussock grasses and open woodlands with scattered large trees, and are highly productive for cropping and grazing. In contrast, the sandy, nutrient-poor soils of the Pilliga forest, derived from weathered sandstone, are shallow, well-drained, and less fertile. These soils sustain dry sclerophyll vegetation adapted to low nutrients and are essential for biodiversity, aquifer recharge, and conservation efforts.

While volcanic soils are more heavily colonised, and the Pilliga soils act as a refuge for many culturally important plant species and sites, both landscapes hold significant cultural value to the community. However, the privatisation of fertile farming land has rendered many culturally significant places inaccessible, as they are located on private property. This includes extensive networks of springs that were places of meeting and fishing for community but now are often dammed for private purposes.

Due to the development of private property throughout the Coonabarabran region, traditional accessways to these cultural sites are fractured or lost, lending to the significance of the major roads of Coonabarabran, the Newell Highway, Oxley Highway and Baradine Road as significant cultural pathways.

11 While conducting research with the community, the research team made it apparent that the scope of research within the ACLM project would not and should not be inclusive of all culturally significant places, nor should the community be expected to disclose these special sites. TfNSW should not expect any project will be inclusive of all culturally significant places, nor should an expectation exist for the community to disclose these special sites.

Several key heritage sites of importance to the Coonabarabran community are indicated in Figure 10. Of these, only a select few are situated along major transport corridors. When exploring the significance of these sites, community highlighted the cultural values attributed to accessing their sacred sites, with particular focus on the health of country observed when travelling along these key highways.

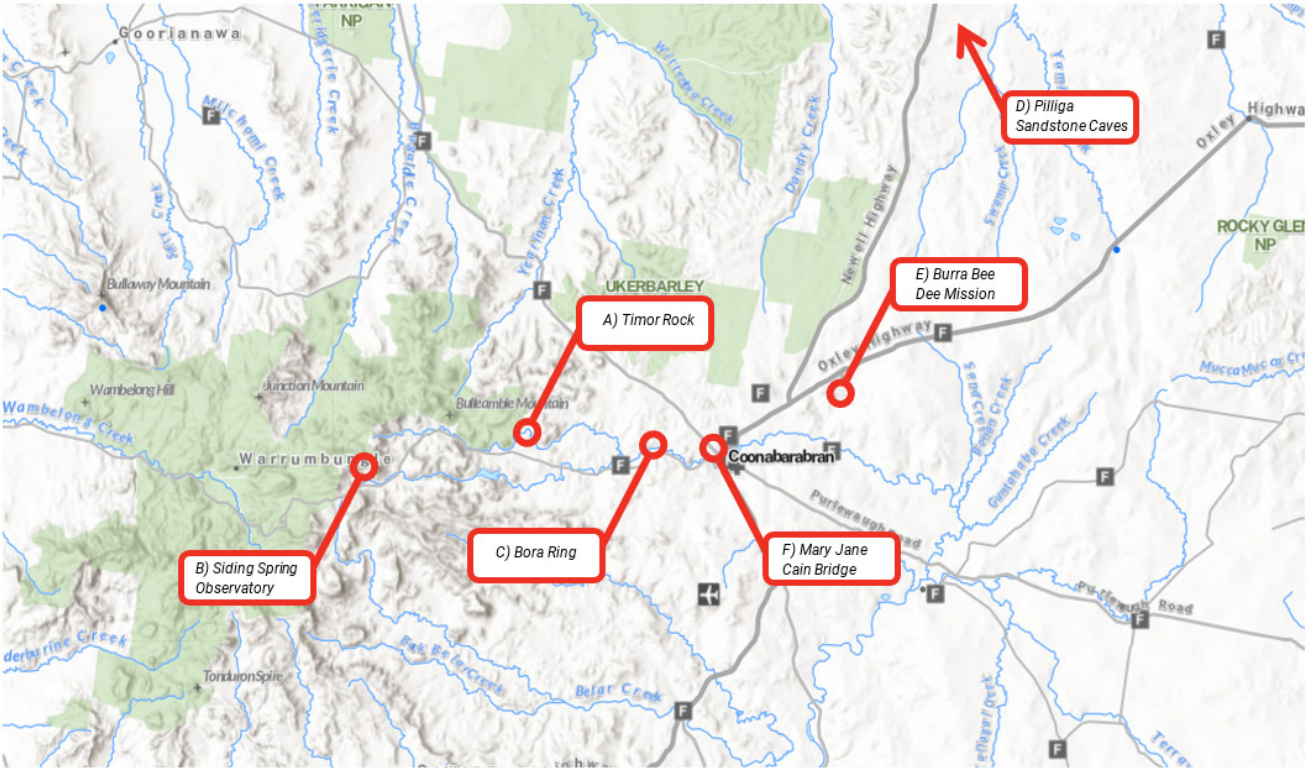


Figure 10 Annotated map of Cultural Heritage Sites and Locations Visited during Fieldwork, Coonabarabran *(NSW Spatial Services, 2024)*

Warrumbungles National Park - Timor Rock

Timor Rock in the Warrumbungles National Park is formed through volcanic activity in the region, which is responsible for many of the ranges and peaks of the area, and itself acting as a 'volcanic plug'. As local community members reminisced, Timor Rock was an important place for the community to bring their family and children to play along the riverbank when it was flowing (Warrumbungle Shire Council & Christison, 2006). The land around Timor Rock is managed by the Coonabarabran Shire Council. The site has many large 'mother' trees which hold deep cultural and ecological significance for Aboriginal People. Currently, there is no clear avenue for knowledge holders in the community to provide their cultural expertise in preserving and protecting these trees.

Siding Springs Observatory

Siding Springs is a unique location within the broader Coonabarabran community and is of significant cultural value to Aboriginal People of the Gamilaraay nation, acting as a look out point for Aboriginal People to observe the changing country types, neighbouring Aboriginal nations and keep track of people moving across their country. The Observatory was built in 2016 and further expanded in 2018 (Australian National University & Siding Spring Observatory, 2018). It is a significant research site because of its location within the Coonabarabran Dark Sky Preserve, which restricts light pollution and protects the natural dark night sky allowing for the Observatory to access the entire southern-hemisphere sky (Australian National University - Siding Spring Observatory, 2016).

"So there's a few story sites you can see from here, I'll only speak to the one. One is, we used to back in the day call it the hippo mountain, but I with my own decision call it the wombat mountain because we didn't use to have hippos. But if you look directly out straight from here [the observatory] you can see where it rises up, then you've got the back of the wombat, coming up to the head part, comes around and goes to the nose and down. There are stories actual stories attached to that one, and it's about sharing and looking after each other and not being greedy.... We have this in the geology and we also actually have wombats. It's a great continuity, and that's why stories such as this one are very, very important."

Nandi Common & Bora Ring

The Nandi Common and Bora Ring are a unique location within the Coonabarabran region and for this research. Bora Rings are incredibly significant cultural sites. Within the broader creation story of the NSW region, these sites are a location of Aboriginal men's business, where boys would be taken by the men of their communities and return men themselves. These practices are sacred and are of extreme importance to Aboriginal culture and customs. However, many of the sacred sites, including caves, rock art, songlines and even bora rings were not accessible to local Aboriginal People due to their location on private property.[12]

12 LALC CEO Brandon Nixon further elaborated that it is through the building of relationships with these private landowners that the Land Council have occasionally gotten access or have been able to organise getting access to these sites. Some property owners were said to have even commercialised access to these sites, running small scale tourist operations for people to go and look at them.

Sandstone Caves

The Sandstone caves, situated within the Pilliga scrub, north of Coonabarabran, were a site in which Aboriginal groups would live and rest while travelling throughout Gamilaraay country. Aboriginal People would gather here due to its strategic location in the landscape, offering shelter and safety from weather events and act as an observation point over the surrounding countryside. The Sandstone Caves site is managed by National Parks and has a co-management committee with several Aboriginal community leaders that assists in its protection (NSW National Parks and Wildlife Service, 2024).

The site itself, while having immense cultural value to the Coonabarabran community, is undermanaged, with an extreme overpopulation of feral goats in the area damaging and disrupting the cave sites. These goats, while being observed as a pest in the context of the sandstone caves, hold a significant place in the survival stories of the local Aboriginal community; having been raised and farmed by local Aboriginal People for business. The impact of fires throughout the Pillage in recent years have had a notable impact on vegetation and canopy up to the caves themselves, has the risk of cultural loss in the community and by extension worries for the integrity of flora and fauna within this significant environmental heritage location.

Burra Bee Dee Aboriginal Mission

Mary Jane Cain, often referred to as the "Queen of Burra Bee Dee," played a crucial role in the history of Coonabarabran and the Burra Bee Dee Mission (Sulter, 2019).[13] In 1892, she successfully claimed 400 acres of land at Forked Mountain for her family, marking the beginning of what would become the Burra Bee Dee Mission, meaning "flying mice," the totem of area. This land was not only a place for her family but also for other Aboriginal people from the surrounding districts who sought refuge and a better life under her leadership. (Sulter, 2019). Throughout the Burra Bee Dee site, there are several significant locations, including the Burra Bee Dee cemetery and nearby Forked (Forky) Mountain, all holding cultural significance and relating to the survival stories of the local Aboriginal people of Coonabarabran and beyond (Somerville & Dundas, 1994).

The Burra Bee Dee mission has served as the cultural hub of the community, where elders and community members have demonstrated their trust in Government agencies to map the site, assist in land care, support in burning regimes and provide space for cultural activities to return to country by Gamilaraay People.

Named after Mary Jane Cain, the Mary Jane Cain Bridge is a significant cultural landmark in the Coonabarabran community. Historically, it was a point of segregation for the community between Aboriginal and non-Aboriginal people, and relates strongly to the trade routes, songlines and survival story of the Coonabarabran community (Somerville & Dundas, 1994).

13 Born in 1844 on the property known today as "Toorawandi," she was the daughter of Jinnie Griffin, an Aboriginal woman, and Eugene Griffin, an Irish convict. Growing up, Mary Jane worked as a shepherd and developed a passion for reading, using her prayer book and old newspapers as her main sources of education (Jaworski, 2020).

4.2.4 ACLM Practices

Vegetation and Plant Knowledge

The community demonstrates a profound knowledge of culturally significant plants. These included bush tucker plants such as desert pineapple, five corners, slip stones, geebungs, bush blueberries, mistletoe, and more. The five corners is an especially significant plant to the local Aboriginal community; this plant, which requires an emu to aid its germination, is a cultural binding between all community members of Coonabarabran. The community also highlighted plants used by women for weaving fish traps, those with medicinal uses, and native hops for dyeing. Some plants, however, were intentionally not discussed to protect their cultural significance. The community also shared knowledge of complex food preparation processes for certain plants. The community hold knowledge of the importance of soil, habitat, animal interactions, and management practices for plant survival.

Elders and younger generations noted changes in local vegetation, such as the increasing scarcity of plants like five corners and mistletoe and shifts in flowering times, which they attributed to climate change and landscape alterations caused by colonisation. Large trees hold particular significance for the community. The loss of ironbark in the Pilliga after fires was seen as having cascading effects on other important species, such as mistletoe. The widening of the Newell Highway near Burra Bee Dee was regarded as a regrettable loss of habitat and large trees, with the community feeling excluded from the decision-making process. It must be noted that significant plants, animals, and habitats are not included in the NSW AHIMS, a key tool used to assess risk (NSW Government Department of Environment and Heritage, 2024).

An Elder described a vision for vegetation structure aligned with Aboriginal cultural land management. On the volcanic soils, she envisioned a landscape of widely spaced large trees, minimal mid-story, and abundant tussock grasses, creating an open view and reducing fire risk. The absence of mid-story scrub would allow low-intensity, fast-moving fires to move through country without the ability to climb into the canopy, a key goal for mitigating fire risks along transport corridors.

"Growing up I've been fortunate to be shown that. Its awesome to go out with the kids and say eat this and they'll go 'Ew I'm not eating that, what's that?' bush tucker you'll be right."... they [the plants] have always just been around since we've been kids and we've never really seen them be managed or been taught how to do it, manage them... as kids we've mucked pulled a five-corners bush out and tried to put it into the back yard, but it never grew."

Burning on Country

On country burning is a vital component to the incorporation of Aboriginal cultural land management strategies in the Coonabarabran region. Community members reflected their desire for the Murrunmala Dhawun Rangers to have the training and expertise to conduct burns on country and demonstrate this cultural practice to their community. This was showcased in a training demonstration conducted by the Rangers at the Burra Bee Dee Mission in late 2024. The demonstration, conducted with the NSW Rural Fire Service and Tamworth Rangers showcased their practical training in fire protocol, technical fire control and emergency procedures.[14]

Protecting Sacred Sites

A key mechanism to know about sacred sites is AHIMS. However, access to the AHIMS system was a limiting factor for Aboriginal People. The AHIMS system does accommodate a free search option though this process does not give specific information on sites. Pathways exist for LALCs to access recorded site and places of significance, such as through engaging with the NSW Aboriginal Land Council (NSW Aboriginal Land Council, 2020) and directly through applying within AHIMS (NSW Government Department of Environment and Heritage, 2024) which are available to remove the existing $60 search fee. but the process appeared arduous and unclear for the Coonabarabran LALC to engage with. Furthermore, while conducting an interview with a member of the Murrunmala Dhawun Rangers, they discussed with the research team the difficulties they've faced in both finding and protecting important heritage sites through the AHIMS system.

"They [RFS] were doing a burn or are going to be doing a burn and they've gone onto the AHIMS site and found that there was a registered site there, an oven or some sort of cooking place. We teamed up with Graham from the RFS to try and find it. But where the local council put a detour through there for when they build the new bridge it was right where it was. I've been out there four times, so it could've been planned over. They've just probably gratted it and its gone… I've spoken to TfNSW about how council go about and just grating roads and not coming to the local lands council and asking or checking if theres sites where they're going to put a detour through… Let alone trying to protect it, we can't even find it."

14 During discussion at the demonstration, the Prescribed Burn Plan for the Burra Bee Dee Mission was provided, outlining the significant and tangible processes and prescriptions a burn at the Mission would incorporate, including involving Elders, young people and cultural heritage specialists, providing opportunities for Elders and young people to visit the site and contribute to the plan and revitalising Gamilaraay People's connection to the Mission through cultural and knowledge sharing activities.

4.2.5 Preferred Ways of Working on Country

In the Coonabarabran community, young Gamilaraay people are eager to learn and practice culture reflected by Elders and community leaders. However, their ability to manage and work on land is heavily restricted. In their view, the Rural Fire Service (RFS) were contributing to significant barriers and red tape surrounding the ability of the Ranger group from practicing and conducting cultural burning on country. LALC CEO Brandon Nixon discussed the process and barriers to starting the Ranger team and the community's sentiment towards it:

"Even before these [ranger] positions were created, we knew the funding was coming about and it was community knowledge and everyone was ringing up going 'what's going on?' 'how long until their out?' and as soon as we put them out, we got nineteen applicants for rangers, we had to cull it. We only originally had four, but because we were impressed with all the people we got, transport allowed five… we've definitely got the people to do it, a lot of the young ones are keen to connect with country, and work on country. And that's why we're hoping that once this program, even if more funding comes in, these boys will be able to mentor these younger ones coming through. The biggest barrier that we identified was the women's side of culture. We had two that were interested that took the applications, but didn't put them in. Whether it was that ranger 'speak' or not it was one of the biggest barriers we saw."

Within this context, the work undertaken at the Burra Bee Dee site to facilitate cultural burning is significant and demonstrates the strong and continuous relationship needed to bring all parties together for these shared outcomes to be achieved. Furthermore, when discussing the significance of the program with a member of the Ranger team, they spoke of the cultural and community significance of participating in the program:

"This ranger thing has really helped because people can see whats happening and people will hopefully feel free to start talking and say 'well you know, they're going to start hopefully be looking after these things so maybe I will say something. I'll let it out, I'll tell them you know this story and I'll tell them where this is and I'll tell them where that is. Show them the right way so they can look after it.' Like I said, Coona has never had anything like this ever, especially in the local lands council so it means the world, it's awesome."

At the time of fieldwork, the Murrunmala Dhawun Rangers were completing TAFE courses to gain accreditation in Cultural Land Management, which includes vehicle and equipment use, cultural fire and burning practice and land stewardship. This Ranger group, consisting of 4-5 members, are newly employed through joint funding by NSW Government grants, alongside funding from TfNSW. In the context of Aboriginal cultural land management, these burning on country processes are in an early and developing stage, one in which the community and knowledge holders have had a limited but growing involvement in.

The Coonabarabran community are in an active stage of cultural and community growth, and this is reflective of their community protocols and process in engaging with their Aboriginal community. A member of the ranger team discussed their perspective on learning and integrating local knowledges alongside their fire training:

"We've been learning the seasons, when the temperatures right and moistures right to burn. I'm actually learning a fair bit from my brother and a mate that have learned it. So they're passing it on to me and I'm picking it up slowly as we go and hopefully once we do get trained up through the TAFE program there's room to integrate."

The community expressed desire for more consultation and engagement when it comes to roads and other projects. For example, Elders were disappointed with the lane expansions on the Oxley and Newell Highway, management of the roadside and clearing of vegetation clearing. They expressed concerns about the notable absence of ironbark trees along the highway and the accompanying mistletoe that these trees support. Local plants such as the five corners, fiery jacks, slip stones and foggy-oggs were in season late, with Elders speculating they may have been setting seed poorly or are generally less present than they have been previously.

Somewhat similar disappointment was expressed in case of the Siding Spring Observatory where their engagement was tokenistic and limited to once yearly public events.

The community also presented previous experiences where they were aware of conflicts arising from conducting a cultural burn between the RFS and cultural fire practitioners in the community:

"I spoke to my brother and he said he had a bit of trouble with the RFS. He said 'they were ready to burn.' They rung him, they wanted to burn so he went out to the site where they wanted to burn and he said no, not yet youre not burning yet it's not ready. And they got quite frustrated. When I asked 'what do you mean frustrated?' my brother said well I'm in charge of this cultural burn and its not ready to be burt yet, its not right, its not the right temperature. Its not the right time of year, nothing is right. But they wanted to burn it and he said no. He said they got quite taken onto the back foot because they had to sort of step back and listen to someone with no authority like 'who are you? Why are you telling us what to do?.' [We've only heard of that sort of interaction] with RFS at the moment."

The barriers that TfNSW must manage to successfully provide for Aboriginal Cultural Land Management in transports corridors are cultural upskilling and time, which is why the significant work being carried out by TfNSW and the Murrunmala Dhawun Rangers at the Burra Bee Dee Mission are so significant.

4.3 Western Bundjalung

The Western Bundjalung pilot was selected primarily to explore the relationship between TfNSW and a Native Title Corporation. A benefit of undertaking fieldwork to the Western Bundjalung community has been the ability to actively participate in the transport corridor along the Bruxner Highway, allowing the team to observe the land management restrictions based on the quality and type of country throughout. However, this pilot study has several limitations and the research team struggled to engage and prepare fieldwork material with the Western Bundjalung pilot. Based on the one field trip, the research team was able to discuss and report on the preferred ways of working with TfNSW and other Government bodies.

4.3.1 Historical Context

The Western Bundjalung People are situated along the norther border of NSW, where their Country encompasses over 5,000 square kilometres (Ballina Historical Society, 2024). The Western Bundjalung People have a strong cultural history, with their traditional languages practiced and protected by their Elders for generations (Ballina Historical Society, 2024). From the time of colonisation onwards, the Western Bundjalung People faced widespread dispossession and disruption to their lives and cultural practice, maintained today through strong efforts in resilience and survivorship by the community. The Western Bundjalung People were successful in achieving Native Title status over their traditional lands in 2017 providing for a continued pathway to self-determination and governance for the community (New South Wales Government, 2017).

The Western Bundjalung Nation covers several townships, including Malanganee, Tabulam, Kyogle, Baryugil and Tenterfield and is connected by the Clarence River running throughout Western Bundjalung Country, serving as an important place for songlines and important places throughout the community (Ballina Historical Society, 2024).

4.3.2 Current Profile of Western Bundjalung Community

The Western Bundjalung people are protective of their cultural identity, the family groups are strong and their relationality to one another are well known throughout the community. Different families speak for different parts of Western Bundjalung country, with custodianship and authority over decision making on country changing based on where discussions are taking place.

At present, the Western Bundjalung community has a multitude of parties involved in its Aboriginal affairs. The Ngullingah Jugun Aboriginal Corporation, being the lead in engagement in this research is the Native Title Corporation over the entire research site and Western Bundjalung as a whole. Within the communities themselves, there are individual LALCs involved in local Aboriginal affairs, with overlapping interests with the Native Title Corporation and are actively working together to produce local outcomes related to community readiness for engaging with Government agencies.

4.3.3 Significant Cultural and Natural Heritage

Throughout Western Bundjalung country there are many areas of significance, continuing all throughout the claim area, the many waterways and river systems encompassing deep cultural and natural heritage significance. The research team were limited in our access to the community and country which is reflective of the closed off nature of the Aboriginal communities throughout the Tabulam region.[15]

Assessments have been conducted privately through the Native Title Corporation and Government agencies using tools such as AHIMS to assess areas of significance throughout the local area, but these are limited to cultural sites, artefacts and stories the community are willing to be made publicly accessible.

15 In 2024, the La Trobe research team conducted one fieldwork trip to the Western Bundjalung region, working with the Ngullingah Jugun Western Bundjalung Native Title Corporation. During the fieldwork, the research team were guided by the Ngullingah Jugun CEO to areas of significance throughout the length of the Bruxner Highway surrounding the Tabulam township and surrounding communities. The team were advised to not engage in any research interviews or data gathering with community members during the fieldtrip and were restricted to peripheral research gathering methods.

Jubullum Flat Camp Aboriginal Area

The Jubullum Flat Camp is a special site located outside of the Tabulam township. The local Aboriginal community have requested that information shared with the research team related to the significance of the site not be included in this report but note the cultural significance of the site and its immediate location to the Bruxner Highway transport corridor.

Through desktop research, the Jubullum Flat Camp Aboriginal Area Plan of Management (NSW National Parks and Wildlife Service, 2010) was found to include significant information about the cultural importance of the Jubullum Flat Camp Aboriginal Area to the local community.[16] This report, while offering a tertiary overview of the areas of significant revealed by Western Bundjalung Elders, demonstrates strongly the cultural linkages of the Jubullum area as well as significant cultural areas situated along the transport corridor (NSW National Parks and Wildlife Service, 2010). An excerpt from the report demonstrates strongly the significance of the Jubullum Flat Camp site to the local community (NSW National Parks and Wildlife Service, 2010).

> ***Jubullum Flat Camp Aboriginal Area is an important area to the Bundjalung people of Jubullum. It is the site of burials and a place of return of their ancestors to Country. The reserve symbolises a period of independence of the Bundjalung people of Jubullum and is a place that realises their hopes of reconciliation with the wider community as well as regaining control over traditional lands….The Jubullum Flat Camp is a cultural teaching place and an important place for the Bundjalung people of Jubullum to maintain connection with Country where they can hand down knowledge and skills to their younger generations….. The native plant and animal values of Jubullum Flat Camp are intrinsic to its cultural values and provide opportunities for cultural teaching and for further regeneration. (NSW National Parks and Wildlife Service, 2010)***

The Jubullum Flat Camp holds particular significance to the ceremonial practices of the Bundjalung People, including their Flat Camp cemetery and former morgue site.[17] The morgue consisted of a bark shelter with hard earth flooring made from termite mound material, in which the funeral process would be undertaken (NSW National Parks and Wildlife Service, 2010). Overseen by nominated Elders and the Aboriginal Community, the funeral process was a significant ceremonial practice attended by Community without interference of Government authorities (NSW National Parks and Wildlife Service, 2010).

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16 The report, developed by the NSW Department of Environment, Climate Change and Water, was prepared by David Edwards of 'Eco-Connections' in close consultation with several Elders of the Bundjalung people of Jubullum.

17 The Jubullum Flat Camp is a significant example of the survival story of the local Bundjalung People. In 2003, the area was purchased by the NSW National Parks and Wildlife Service (NPWS) in order to protect its Aboriginal cultural and heritage values (NSW National Parks and Wildlife Service, 2010). A local Bundjalung Elder, Uncle Eric Walker (dec.) approached the NPWS in the mid-2000s wanting to enter into a cooperative management agreement, wanting the Flat Camp "to be used to help pass down cultural knowledge and practices to the future generations of Bundjalung people of Jubullum (NSW National Parks and Wildlife Service, 2010). The site was opened in July of 2007 and has since been a site of cultural reconnection.

Jubullum Village

Local Aboriginal People prefer to call Jubullum a village rather than a mission as there are negative connotations derived from living at missions historically. While in Jubullum, the research team were able to meet and discuss the impact of bushfires to the local community. Though no formal research interviews were undertaken, the team heard from community members on their experiences in the bushfires and their fear of its destruction of the community. The team also witnessed a recently completed cultural burning being conducted by the Jugun Alliance around the local area.

Tabulam Bridge

The Tabulam Bridge is a significant cultural and community heritage piece for the broader community around Tabulam. The bridge was built and completed in 1903 by Aboriginal and non-Aboriginal men of the Upper Clarence Light Horse Brigade (Tondorf, 2020). During the settlement period of the region in the 1800s by colonists and farmers, the local Bundjalung people were forcibly removed from their homes along the Clarence River (Marciniak, 2020). What the community call 'the long march' the Aboriginal people of the area were made to walk across the Tabulam Bridge to Jubullum mission outside of town (Marciniak, 2020). Despite this history of oppression and removal, the local Aboriginal community believe the bridge to be a symbol of unity, wanting to "use this bridge for education" (Marciniak, 2020).

Unfortunately, in late 2020 – early 2021 the new $48 million bridge over the Clarence River into Tabulam was finalised (Transport for NSW, 2023). The original bridge's timber was being repurposed into totemic carved structures outside the Tabulam Public School to memorialise the bridge and its legacy (Marciniak, 2020). However, this was not without controversy and protests.[18]

4.3.4 Preferred Ways of Working on Country

Within the local Jubullum community, knowledge of cultural land management is still strong. During the research team's fieldwork, community Elders attended the Jagun Alliance burn and actively participated in traditional fire starting and supported the group in controlling the burn as it began. It was noted during fieldwork that community members reflected on the benefit of having burns in this portion of the property, where they recounted on catching rabbits and other native species which were easily available when country was healthy.

18 In 2020, with demolition and rebuilding scheduled, the local community protested, initiating court action signed by 900 non-Aboriginal residents and 300 Aboriginal people from the Jubullum community (Tondorf, 2020). During the contest period, Bundjalung Elder Lewis Walker, who is related to Walter "Tracker" Williams, one of the earliest known Aboriginal Soldiers to serve with the Upper Clarence Light Horse, said this of the bridge: "Our mob want this bridge saved, this bridge is a story from when we grew up … and how our great-grandfathers taught Chavel's men to ride horses. These are stories that need to be out there (Tondorf, 2020)."

4.3.5 Preferred Ways of Working on Country

The Ngullingah Jugun Corporation are expecting to enter a large growth period over the coming years, with aspirations of the Corporation to expand and create jobs and employment opportunities for the local Aboriginal Community in roles such as ranger teams, local employment, and land care throughout the Western Bundjalung area.

Within the Corporation, the development of a ranger program is the preferred process for working on country, as it will allow for employment and training of local people.

A key aspiration of the Western Bundjalung Native Title Corporation was its focus on burning on country. When attending a burn being conducted by the Jagun Alliance on Aboriginal owned land behind Jubullum Village, young people from the Aboriginal community were employed to participate in the burn. This practical training included cutting fire control lines, managing fuel loads and controlling cool burns.

The inclusion of the Jagun Alliance into burns on Western Bundjalung country has been attributed to the shared outcomes both groups can achieve, with the Jagun Alliance getting to burn on Country, and the Corporation upskilling its young people to have the ability to burn for themselves in the future.

4.4 Key Findings from the Pilot Sites

Based on the discussions with community members and key knowledge holders in the three pilot sites, the following key themes related to Aboriginal Cultural Land Management and resilience have emerged.

A. **In ACLM, fire and Cultural burning are the most significant practices essential for healthy country**

With respect to ACLM, the term "vegetation management" was hardly heard from the community in the same way as implied in how government or experts in western science depict it. The community offered a different view of what they thought vegetation management was. Two quotes are sufficient to show their alternative view.

> "If you haven't got the right ecosystem, if you haven't got the right plants in the ecosystem, it makes the water quality go down. So if obviously you haven't got there's filter plants, clean the water, you're going to have back water. Water. It's not, so if you promote the right things in the environment using traditional management. And that's going to promote that health."

> "Seasonal for monitoring our native flora and fauna, native flora to make sure that it's out there and it's growing fauna to make sure they're out there and they're multiplying. And then they mix in together. Are there enough? Is there enough? Are there enough trees, things out there as habitat for the gliders, for instance? Or the possum? They working together. So we have to keep an eye on things as the seasons go through and make sure that those plants that should be coming through in autumn are coming through in autumn and for the other seasons as well, because. They all working together to keep going, to keep thriving."

Most of the discussion about ACLM or vegetation management eventually circled back to the idea of cultural burning. This was reinforced in many responses.

> "We should be burning all year round… We just need to do more [burning]… More little strategic fire everywhere… You're creating resilience and resistance then and healthy country."

The importance of fire and cultural burning in managing the country cannot be understated. It is an essential technique to restore a healthy country.

"In the sense that from cultural burns is, we, that would create corridors. That's the best way I can explain it. Like a vegetation corridor that would allow people movement, allow animal movement, but also looking at, food sources and resources, you know, looking at that."

The knowledge of cultural burning comes from being embedded in the country.

"Majority of the grasses need that hot fire. And you need to, you need at the right time for them to germinate again. So… ours is not that cool burning either, it's traditional practice… that's all that indicators we look at. And, that's all been handed down and understood."

By observing the land and nature closely, they have designed their fire regimes that help in maintaining the country.

"You see the fire went through, you see how black the trees are? It's, that's a sign of a hot fire. You'd never see that where we've done a culture burn…. We only, use trickle trick fire... You don't want the black in the trees at all. We don't."

B. Aboriginal Rangers are the bridge for building network between the community and the Government

It was repeatedly emphasised that preparing the country for the bushfire season is important for building resilience. And for doing this, Aboriginal rangers are the most equipped ones as they embody that knowledge.

"There's only a few people along the coast that really can put fire on country the right way. They are, and we are worried about just anyone going out putting fire on country. Something goes wrong, then house burn, kill someone."

An Aboriginal Cultural Burn is not guided by a prescription, it is guided by the close relationship that the Aboriginal Cultural Fire Practitioner has with Country and everything in it (Hooper, 2020). Many Ranger groups are helping the government and in doing so, they work as good bridges. This was demonstrated clearly in Batemans Bay by a senior Ranger:

"The Walbunja Rangers spotted the beginnings of the bushfires and were early in reporting it to the RFS. Earlier still, the senior rangers spoke to the team of the year leading up to the fire, explaining that they "knew country was ready for fire" and that "left untreated, a large-scale bushfire was inevitable". Acting on this information, the Ranger group set up small scale cultural burns on Aboriginal owned land on properties outside of Nelligen, and as the bushfires inevitably approached, these culturally burned sites were both a protective refuge for animals, of which an estimated 3 billion were either killed or displaced across the entire footprint of the 2019/2020 fires (REF).."

In the Batemans Bay community, supporting the success and development of ranger programs and Aboriginal cultural land management is key measure of success for the Walbunja Ranger group and Batemans Bay community.

"Mentoring in fire management is about letting people get on with learning and doing, not just instructing. Leadership in these camps means showing techniques and letting crew leaders and advanced firefighters mentor the new ones. This approach helps build resilience and capability in the community."

Aboriginal rangers are looking forward to cementing their ongoing relationship with the government.

"We've got a pretty good relationship with crew up and down the coast… Well, that's all the families anyway."

"I am pleased that they've got an Aboriginal, project set up at the moment to do traditional burning along the highways, which are pretty much based on our highways as well. So the staff in there are Aboriginal, may have an understanding of what we're about, but if they disappear, then we are going to be in trouble. Because we are going to be having to justify ourselves and explain ourselves to non-Aboriginal people."

Rangers also want a better appreciation of their work and transfer of agency and resources so that they can shoulder responsibility, ownership and authority in managing their own communities

> "When the bush needs us to be there, that's what we need. We need the firies to say, yes, we agree with this, let's do it… but they gotta be able to, they gotta be flexible enough to let us do what we have to do when we have to do it."

As found in Batemans Bay, the current Ranger team is near capacity and cannot be expected nor has the capacity to dramatically increase the area and number of burns to the level that would be required to have significant impact on risk mitigation across the TfNSW road network in that region without support to grow.

Additionally, as community face competing obligations, such as family, locational is-sues and job security, position uptake for young people into these Ranger programs ap-pears to be difficult. To this goal, the Elders in Batemans Bay also spoke of the need for more female rangers and senior female Elders to be involved in land management processes, to safely manage sacred female sites and offer cultural knowledge and pathways for young women in the community.

C. Need to Protect Cultural Heritage Sites and Traditional Knowledge for Recovery

Resilience also encapsulates the ways in which important places are impacted by disasters and how communities can respond in these times. For example, in Western Bundjalung, one Community member reflected on the aftermath of the bushfires and how much of a 'ghost town' Jubullum had become after the fires went through it. Other community members recalled their experiences with racism throughout the evacuation processes such as being refused entry to hotels based on their Aboriginality. When the community began returning to Jubullum Village, there were difficulties in getting access to basic human services for the Aboriginal residents.

> "We never had bushfires when I was growing up, and I think it's because of how we lived close to water and managed the land. We'd go down to the river, do all our washing, and have a bath before heading home. The land and water shaped our routines and kept us safe."

In the case of Batemans Bay, and the Eurobodella Local Government Area generally, several risks were identified including the numerous discrete Aboriginal communities and townships throughout the region, "one road in and out" communities and dwellings, cultural heritage assets such as scar trees, artefacts and others, and potential closures of the Princes and Kings Highway further isolating communities and towns.

"We are so lucky that a lot of our stories are archived in the landscape. It's like the modern day video—we saw this every day, and it helps us remember and pass on knowledge about resilience and connection."

Similar need for protection of cultural values on adjoining areas associated with the Flat Camp, including adjoining crown land on Deep Creek (Tabulam Rivulet) and the former mortuary site near the Bruxner Highway were identified in Western Bundjalung.

The community felt that TfNSW has a responsibility to align cultural land management objectives across transport infrastructure such as the Tabulam bridge and consult meaningfully with community in the planning of roads and bridges throughout country.

D. Preferred Ways of Working Through a two-way Approach: 'Whole to Part", "Part to Whole" in Government Initiatives

Overall, it was found that the community wanted more engagement than what is currently being practiced. As noted by an elder.

"Consultation is a big issue or lack thereof. It tends to be, they'll either inform council, inform the land council, but it doesn't get out to community often. Or they'll say, we're putting out a plan. And you have to go to the council to view that plan. And it's all done with technical jargon and, you know, which then, you know, people go, oh, you know, too hard."

Aboriginal people connect with the country in its entirety as a "whole". This may prove challenging for government initiatives which often involve specific projects to achieve specific goals. Consequently, there is a gap in achievements. A two-way approach can help: On one hand, government needs to invest in translating Aboriginal concepts of wholeness and then align their projects as achieving tangible outcome in "parts to the whole." On the other, communities need to be shown how smaller parts can help in their larger worldview of the country. This two-way conversation can be very helpful in building trust and relationship between the government and the community.

This approach also informs the need to have shared understanding of what "Resilience" is and how that is construed in relation to the "Transport network" by the community as indicated below.

Resilience: The term "resilience" did not appear directly during consultation with community, however, the intent and principles of resilience we're clearly in the minds of participants across each pilot.

"If you prepare early you get all the fish and the and the food earlier on if you do that. That back burning early on that cultural burning at the beginning. You've got your, your flora and your fauna. They're there, they're growing quick, they're coming back early, and you, you have that longevity. And that's, I think, is a really important part for transport to have, you know, up in their senior ranks in, in this sort of framework that, you know, it's not necessarily a natural disaster or a, you know, the same way that a white person might think it is. Knowledge. Exactly. It's a cycle. It's healthy."

Transport network: The community took a much broader view of transport and roads.

"Roads are the cultural pathways, and these are all the sites. For most people, it's really just a road, but for us, these corridors connect important places and stories."

This view differed considerably from how government's consideration of roads as asset. This was pointed out clearly.

"Prescribed burns around here are mostly for asset protection, not for cultural purposes. It's usually just about managing assets and protecting the roads or infrastructure, rather than traditional burning practices."

Moreover, community are aware of the challenges of maintaining and managing roadways.

"These corridors are becoming major pathways for spreading weeds such as tropical grasses, mostly due to slashing programs along the roads. Good management alongside the roads is important, but practical efforts are often thwarted by large fire events that diminish the scale of strategic fire management zones. We need to consider how roadside vegetation and fire intervals interact to support both ecological health and transport accessibility."

Even the fire management practices around these roads (assets) were criticised by the community.

"I don't call it cultural techniques at all—I call it nuanced fire management. If you put the word 'cultural' in, that means your objective is cultural, and that's black fella business; white fellas should stay well out of it. Smart burning means treating each land unit according to its needs, using techniques that respect the landscape's unique requirements."

Such views resonated with other communities as well.

"We burn all year round through the heat of summer. But the reason we can do that is 'cause we understand what the country type's saying and how to apply fire directly... all these other countries that these highways are going to be cutting through, they need to be burned at different times of the year to prevent the disaster and promote a healthy environment."

All communities want to see a more traditional approach to managing fire along the roads and transport network. Their advice is:

"So, they want to prevent these wild disasters from affecting the highways and such. Manage it the way we've been managing it, the country is going to respond better to that. So, listen to the people of country and we'll be able to guide this down the right path for keeping the highway safe in disasters."

"These highways have got to have buffer zones on them, if you never want them to be closed again… You gotta burn. Get your hundred meter buffers. Over 50 meter buffers over either side… So you're never gonna have to close the road again because of fire."

"But really what you want to do is, I presume, is not just have that buffer along the roadside. You want to try and dampen the whole landscape. And to do that, you've gotta work away from the roads… and that's hard when you can't… you haven't got that working relationship."

"If we can set up corridors along the highway so that there's no risk of the bigger fires coming through and jumping the highways. That's our job done."

A shared understanding of this approach is necessary to build trust with government so that participation can be enhanced in building resilience. The support that TfNSW and the ACLM program could contribute to the community, and inversely how the community could support delivery of cultural land management along transport corridors is significant, but it will take time.

E. Tensions Around Transfer of Cultural Knowledge

From the discussions with the community, two levels of tensions were identified.

First is the tension between Aboriginal communities and non-Aboriginal stakeholders including government agencies and research institutions that are interested in Aboriginal matters. In those cases, it is about the feeling of being "studied onto" rather than true engagement. For instance, the Ngullingah Jugun CEO shared how academics from a university had conducted research and recorded a senior Elder's speaking and sharing their language.

This itself was allowed culturally, but broader Western Bundjalung family groups felt as though their information had been stolen and manipulated outside of what was originally proposed by the University. It is speculated that these recordings had been used to produce Western Bundjalung language courses and material at that university. This experience, having occurred over 30 years ago, has left deep scars in the community and a reluctance to work with researchers or academia.

A second level of tension exists in the form of intergenerational knowledge gap and traditional culture between Elders and emerging members in the communities. A member of the ranger team discussed the barriers to being shared cultural knowledge by their Elders

> "its definitely not flowing through. It's a small community, not much gets said, very rarely heard of a trade route through here with significance, its really quite sad. No one ever really speaks about it with the elders, and the elders, they don't really share. Its been hard, since my Pop and Grandmother passed away its really sad that they didn't share anything and its affecting us now because we don't know anything. You don't think to ask what you don't know right? You just don't know, you're just trying to pick up bits and pieces and put it together."

> "Indigenous people have lost a lot of knowledge and there's a struggle to regain or redevelop it. You can't just pluck a system of management from somewhere else and apply it here"

In case of Coonabarabran, an Elder participant spoke of difficulties he faced but making efforts to pass on what they know:

> "Like I said, we never learned but my kids know where I come from. They know all my history, I have things written down now, when I die they just got to look it up where I was born all my husbands people their names who they've married, my mother and father. Its all down there, every time I think of something I write it down. I'm in my sixties, when a lot of people get to my age they get Alzheimer's. I'm lucky I can remember things… where the caravan park is it used to be all swamp."

> "Its good with the old people, the younger people are only starting to learn aren't they, that's like my grandson, he loves being out here (Burra Bee Dee) now. Got out here doing all this work. Them boys loving coming out here and working here."

Way Forward

In summary, the pilot studies confirmed some aspects of ACLM that were known through the literature reviews and revealed some that are contextual and essential to understand while designing a framework incorporating Aboriginal voice and knowledge in building resilience for a transport corridor.

All communities were appreciative of the ACLM project as a way of building a relationship with TfNSW and other Government agencies in the areas of working on country and with local Aboriginal People. However, there were degrees of reluctance in the sharing or gathering of any culturally significant data, stories or knowledge.

The success of an ACLM program for TfNSW must acknowledge and respect the ways in which community protocols are undertaken. TfNSW have an opportunity to foster this community outcome in developing stronger relationships and future transport outcomes to generate cultural land management objectives that protect shared areas of interest.

A shared priority of both the ACLM project and the Aboriginal Controlled Community Organisations should be the development of a ranger program for the community to have a pathway to improving employment and cultural knowledge locally. This mutually beneficial approach, underpinned by community upskilling, is one that the ACLM program will no doubt have the means to contribute to and support further. It will also strengthen the self-determination of Aboriginal People.

Chapter 5. Proposed Framework for Building Resilience of the Transport Corridor

5. Proposed Framework for Building Resilience of the Transport Corridor

This section presents an Aboriginal-led framework for building resilience of the transport corridor - one of the most important outcomes of the ACLM project. The framework outlines the multiple pathways in which TfNSW can incorporate Aboriginal cultural land management and the research findings into an ACLM Framework and projects in the future.

The proposed framework embeds community perspectives and needs, exploring strategic directions, outcomes and priorities. This framework serves as an evidence base of the structural implementation of research gathered within the ACLM research project, building on ways in which Indigenous communities can lead in the application of Aboriginal cultural land management to caring for country along Transport assets such as roads and highways.

5.1 The Context

The need to incorporate Aboriginal cultural land management by First Nations People for increasing resilience of the transport network in NSW has been gathering momentum in recent years. For TfNSW, a major driving factor were the set of recommendations from the NSW Bushfire Inquiry 2020, which outlines where possible for Government agencies to explore the ways in which Aboriginal cultural land management and Indigenous caring for country can be used to build resilience to natural hazards.

Closing the Gap is the national agreement designed to reduce systemic inequalities experienced by Aboriginal and Torres Strait Islander peoples across health, education, employment, and justice. The NSW Government's 2025–2028 Closing the Gap Implementation Plan commits over $200 million to 14 new initiatives and continues 31 existing programs, all co-designed with Aboriginal communities to ensure culturally responsive and accountable governance (New South Wales Government Aboriginal Affairs, 2025). Among these initiatives and programs include outcomes aimed at addressing cultural heritage protections, building on land use, planning and environmental goals as well as employment, economic empowerment and participation across multiple departments including Transport (Australian Government, 2020). See a breakdown in Table 11.

Table 11 Summary of Key Government Stakeholders to ACLM

INITIATIVE	FOCUS AREA	SUMMARY
Change and Transformation Strategy	Governance	Embeds accountability and cultural capability across NSW Government agencies
Aboriginal Data Sovereignty Program	Data & Evaluation	Supports Aboriginal-led data governance and improved access to community-controlled data
Community-Led Place-Based Partnerships	Local Empowerment	Funds local partnerships to design and deliver solutions tailored to community needs, which may include transport planning and infrastructure improvements
Aboriginal Employment and Career Pathways Strategy	Employment	Expands career opportunities and retention for Aboriginal people in public sector roles
Housing for Safety and Stability	Housing	Invests in culturally safe housing and homelessness services for Aboriginal families
Culturally Safe Justice Interventions	Justice	Supports diversionary programs and community-led justice initiatives
Aboriginal Child and Family Outcomes Framework	Families & Children	Aligns services with community priorities to improve outcomes for Aboriginal children
Health Equity Investment	Health	Enhances access to culturally safe health services and supports Aboriginal health workers
Education Pathways Program	Education	Strengthens transitions from early childhood to school and further education
Digital Inclusion for Aboriginal Communities	Technology	Improves access to digital infrastructure and skills training
Cultural Heritage and Language Revitalisation	Culture	Supports language programs, cultural education, and heritage protection
Economic Participation and Procurement Reform	Economy	Boosts Aboriginal business participation in government procurement
Climate Resilience and Land Management	Environment	Funds Aboriginal-led land care, cultural burning, and climate adaptation projects, which may also protect transport infrastructure and reduce disaster risks
Youth Leadership and Engagement Strategy	Youth	Builds leadership pathways and supports youth-led initiatives

A similar process is expressed in the TfNSW Stretch Reconciliation Action Plan (RAP), which recommends:

> **meaningful and collaborative community engagement in planning and designing Transport's infrastructure that values connecting to country and the unique lived experiences of Aboriginal people. (Transport for NSW, 2025)**

Within this policy context, and under the Network Resilience Program, TfNSW began working on developing a framework for the introduction of Aboriginal cultural landscapes management to build resilience in 2022.

TfNSW has adopted the following definition for resilience as articulated in the NSW State Disaster Mitigation Plan:

> **"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management." (NSW Reconstruction Authority, 2024).**

Using this broad definition, and following internal departmental research, TfNSW began to develop a "ACLM Future Operating Model". This model comprised of three inter-related elements and definitions:

> ***Structures:*** **The arrangements both within TfNSW and external to TfNSW that will support building resilience to natural disasters in and around the transport network and support Aboriginal people in the scaling of this work.**
>
> ***Opportunity:*** **A set of criteria or circumstances that make it possible to create, develop and scale locations with Aboriginal people and communities, and build resilience into the future.**
>
> ***Collaboration:*** **The action of working with other people or entities or organisations to complete this work. Collaboration is a deeper level of working together and it can involve a shared vision and objectives, it also comes with understanding that each collaborator is key to achieving the project goals.**

Simultaneously, TfNSW partnered with iMOVE CRC, and the La Trobe University, Gabra Biik Wurruwila Wutja Indigenous Research Centre to provide a culturally informed evidence-base for developing a framework.

The focus was on examining ways to incorporate Aboriginal cultural land management into vegetation management standards, policies, and practices while supporting the relationships needed to produce successful community outcomes as well as safe and respectful use of cultural knowledge and data.

5.2 Key Findings Informing the Development of the Framework

5.2.1 From the Literature Review

- There are many examples of Ranger programs and cultural burns alongside National and State Park Services, and on private land, but these do not prioritise the development and integration of resilience into transport networks and infrastructure. They may, however, increase resilience in the broader landscape, and thus, inadvertently or incidentally, increase resilience of the transport network.

- There are some unique agreements and consultative processes, but limited evidence of direct and active engagement of government agencies in Aboriginal cultural land management in connection with transport infrastructure and resilience.

- Early and continuous involvement of Aboriginal people and communities leads to more resilient and culturally appropriate vegetation management outcomes.

- Aboriginal cultural land management has strong potential to improve the resilience of landscapes to natural disasters. However, the type and timing of management interventions are highly place-based, reflecting local ecological needs and cultural practices. Effective management therefore relies on empowering local knowledge holders to lead activities that are appropriate to their Country.

- Place-based understandings and explanations of key terminology and determinants such as; resilience, risk management and vegetation management is required, as well as program longevity to develop long-term resilience.

Overall, the review has revealed the scarcity of structures connecting Aboriginal cultural land management with building resilience into transport networks and infrastructure. This means that this project and the proposed framework is the first of its kind.

5.2.2 Community Voices

The following points have emerged throughout discussions with each pilot community:

- Key transport roads are and were ancient songlines and trading routes for Aboriginal Peoples.
- Caring for Country, traditional and cultural landscapes management practices can be fruitfully applied for building resilience into the operations and maintenance of existing and new assets for transportation.
- Existing structures for identifying risks to cultural heritage sites and artefacts are insufficient and frequently exclude Aboriginal communities from the process or are conducted late in the process.
- Community owned and informed cultural mapping is not comprehensive meaning systems do not capture the extent of cultural assets and values.
- Communities often lack access to cultural mapping tools used in government assessments, and whilst consultation with the most appropriate knowledge holders is required, there are tensions with processes and actions as well as respect for timeliness. This means sometimes cultural assets and values are missed and local connections to the government requirement for cultural mapping remain weak.
- Some Aboriginal communities are ready and motivated to implement preparedness activities such as cultural burning and vegetation management on lands around key roads, and yet were denied access to the land required to undertake them. This represents a missed opportunity to strengthen both community and transport network resilience.
- The enablers of Aboriginal-led vegetation management vary across communities. In some locations, success depended on brokering dialogue and building mutual understanding between community and government actors. In others, the priority was facilitating community-led rebuilding of knowledge and connection to Country. Both pathways require sustained effort, clear guidance, and consistent support over time.
- Community aspirations, including cultural, plant, and animal values, are highly place-based and must be integrated into monitoring to ensure relevance and meaningful engagement.

> "We burn all year round through the heat of summer. But the reason we can do that is 'cause we understand what the country type's saying and how to apply fire directly... all these other countries that these highways are going to be cutting through, they need to be burned at different times of the year to prevent the disaster and promote a healthy environment."

- Cultural and traditional land management and access to land are connected. Where traditional owners do not have access to Country or are unable to participate in consultation processes, perceptions and threats of 'wrong fire' and inappropriate clearing and habitat loss increase. This was also noted in the Healthy Country Plan for Glossy Black-Cockatoo (Healthy Country Plan for Glossy Black-Cockatoo Aboriginal Advisory Group, 2022, pp. 32–33).

- Despite a persistent and recent threat of fire, communities lack the agency and or established relationships to approach government and begin conversations about preparedness. There is an urgency for Aboriginal people to engage with the government agencies in the design and delivery of landscape management projects. There is an urgency for government to align its objectives toward Aboriginal cultural land management to make this an easier pathway for communities.

- A lack of continuity in people, relationships, and funding was identified as a key barrier to sustained resilience outcomes. For instance, Ranger programs and other community-based initiatives often lost skilled staff and momentum when funding cycles ended, undermining both community trust and program effectiveness.

- Some Aboriginal communities' limited engagement in transport corridor and transport resilience planning is influenced by other more pressing priorities, such as mental health support, health care, and social services. Vegetation management or preparedness initiatives alone cannot address all community challenges. Acknowledging and exploring broader community aspirations creates opportunities for jointly designed solutions that integrate disaster resilience with other community needs. This broader approach supports the notion that community resilience can be strengthened by project frameworks like the ACLM and most certainly the ongoing involvement of Aboriginal people.

The aspirations of Traditional Owners, LALCs and Native Title Aboriginal Corporations have been considered into the design of the framework while maintaining their Indigenous Cultural and Intellectual Property and data sovereignty on knowledge provided to the ACLM program.

5.3 The Proposed Framework

Proposing a framework that connects Aboriginal cultural land management with resilience in transport networks is ambitious, as such a framework has not been identified to exist elsewhere and therefore no precedent can be found.

Such a framework will help governments as they increasingly recognising the resilience benefits of employing traditional land management practices to protect communities and infrastructure from hazards and shock events (Infrastructure Australia & Infrastructure NSW, 2021, p. 54).

5.3.1 Alignment to National and State Priorities

The proposed framework aligns with several policies and priorities articulated at national and state level.

TfNSW Network Resilience Program, and the framework supports principles outlined within The Sendai Framework (United Nations Office for Disaster Risk Reduction, 2015) that focus on the adoption of measures which address the three dimensions of disaster risk (exposure to hazards, vulnerability and capacity, and hazard's characteristics) to prevent the creation of new risk, to reduce existing risk, and increase resilience.

The application of cultural fire practice has attracted renewed attention after the 2019-2020 Australian bushfire season, and has since seen a proliferation of cultural burning programs in the country (refer to section 3 of this report). In NSW, the NSW Bushfire Inquiry provided the inspiration and impetus for the ACLM project focused on examining the contribution of Aboriginal cultural land management in building resilience in transport corridors.

5.3.2 Alignment to Communities' Preferred Ways of Working

For Aboriginal people, a large part of their Aboriginal cultural land and management practices revolve around fire management using cultural burning. However, Aboriginal cultural land management extends across cultural landscapes that do not align with the regulatory and administrative borders, including state owned transport corridors across NSW, meaning that collaboration and partnerships are critical.

This speaks to the diversity of Aboriginal cultural landscapes; leading to the conclusion that there may not be a standardised approach. A framework provides the guidance and relevance to any future TfNSW initiative however, it is the place-based voices and experiences of Aboriginal people and the acknowledgement of shared values and objectives with government that will ultimately determine the success of any approach.

Each area or landscape is ecologically, culturally and aspirationally different and thus requires a "place-based approach" that recognises the uniqueness of a community, its landscape, leadership etc. Therefore, it is important that emerging structures engage with Aboriginal cultural landscapes management in localised ways that are relevant and appropriate to the people and the area.

The lead taken by TfNSW in identifying ways of working with the community to increase resilience was unequivocally supported by community members in the pilot sites. One elder summed it up adequately:

> **"We all felt it was a great idea that they came up with because we've been trying to sell ourselves for ages that traditional burning can make things safer. So we're happy that they would continue on that way if hopefully forever. That we can play our part because as I said, a lot of these roads and highways are on our traditional routes anyway."**

The most relevant structure for engagement in transport corridors can be found in the South Australia's Guidelines for the Management of Roadside Native Vegetation and Regrowth Vegetation (Native Vegetation Council, 2020). This guideline serves to articulate a strategy for informed participation and ownership of cultural significance along South Australian roadsides, demonstrating an avenue of engagement in which TfNSW can pursue as a standard in cultural land care along its transport corridors.

5.3.3 Elements of the Framework

The framework proposed here builds on the TfNSW ACLM Future Operating Model. It includes the three inter-related key elements – Structure, Opportunity, and Collaboration as the building blocks.

This framework expands on their meaning based on the findings from the literature review and field-based information and serves as a body of work to be embedded into TfNSW ACLM outcomes in the future.

Opportunity

The proposed framework centres on 'opportunities' provided to TfNSW, emphasizing a broader interpretation of resilience. This approach should go beyond a narrow definition as merely "a set of circumstances" tied to the road network, natural hazards, and resilience.

Resilience comprises two parts: 'resistance' – ability to resist, adapt and withstand shocks/ disturbances, and 'recovery' – ability to recover from those shocks and disturbances.

TfNSW has adopted the definition for resilience in the NSW State Disaster Mitigation Plan that is:

> **"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management."**

Expanding the definition of 'Opportunity' and for operational purposes, the opportunities to build resilience in relation to natural hazards requires it to address the four key stages of disaster resilience within transport corridors:

Preparedness: Proactive measures such as risk identification, community engagement, and cultural burning to reduce vulnerability.

Response: Collaborative emergency management planning, including the involvement of Elders as cultural advisors and integration of Aboriginal knowledge in crisis response.

Recovery: Restoration of infrastructure and ecosystems, co-designed Healthy Country Plans, and support for community-led rehabilitation.

Mitigation: Long-term strategies to reduce future risks, including vegetation management, protection of cultural sites, and continuous monitoring of resilience indicators.

These key stages, derived from the four stages of the disaster continuum, outline the importance of proactive planning, community involvement, communications and adaptive management processes. In tandem with this, the resilience is also embedded in the structure of the framework, in which the role of ACLM seeks to address both event-driven management strategies and long-term system response and adaptability over time.

The resilience continuum seeks to address transformative change in Government and community responses to disasters outlined below:

Vulnerability: Exposure to risks or stressors with limited capacity to respond or adapt

Coping: Short-term, reactive responses to manage immediate impacts of disruption

Adaptation: Adjusting systems, behaviours and practices to better withstand future stressors

Transformation: Deep, structural changes that reduce vulnerability and enhance long-term resilience

Resilience: Sustained ability to anticipate, absorb, recover from and adapt to adversity.

In the context of road networks, transport corridors and ecosystems, each stage identified in both the disaster and resilience continuum offers unique opportunities for developing structures and collaborations to promote and manage certain actions.

'Incorporating or building resilience' to natural hazards and disasters into the transport network (Transport for NSW, 2022, pp. 83–85) means: factoring resilience into the operations and maintenance of existing assets and the design of new assets, increasing collaboration across government to minimise disruption and improve evacuations in emergencies, improving major regional highways and bridges to keep freight and logistics running, focusing on asset renewals and replacements, and on resilience. TfNSW has limited the incorporation of and or building of resilience to areas that are within its operational setting. There are also other long-term and cyclical contributions that can be made to 'improving resilience'. Simultaneously, specific to resilience, is the existence of Aboriginal People, traditions and culture, their capacity to maintain their independence and cultural identity in an evolving world, to Care for Country, and in the context of climate change.

Natural hazards and disasters, climate change, and other factors will continue to impact the transport network. The scope and application of the framework should be expanded to other transport modes and assets beyond roads, and defined or assigned land ownership for TfNSW to realise the benefit from incorporating such a new framework. In the ACLM project and the initial framework, most actions are to be seen in relation to the road formation and responsibilities rather than the totality of the transport network, or a much wider arena of operations that considers the operational landscapes of the transport modes and the communities they service.[19]

An example can be seen in Figure 11.

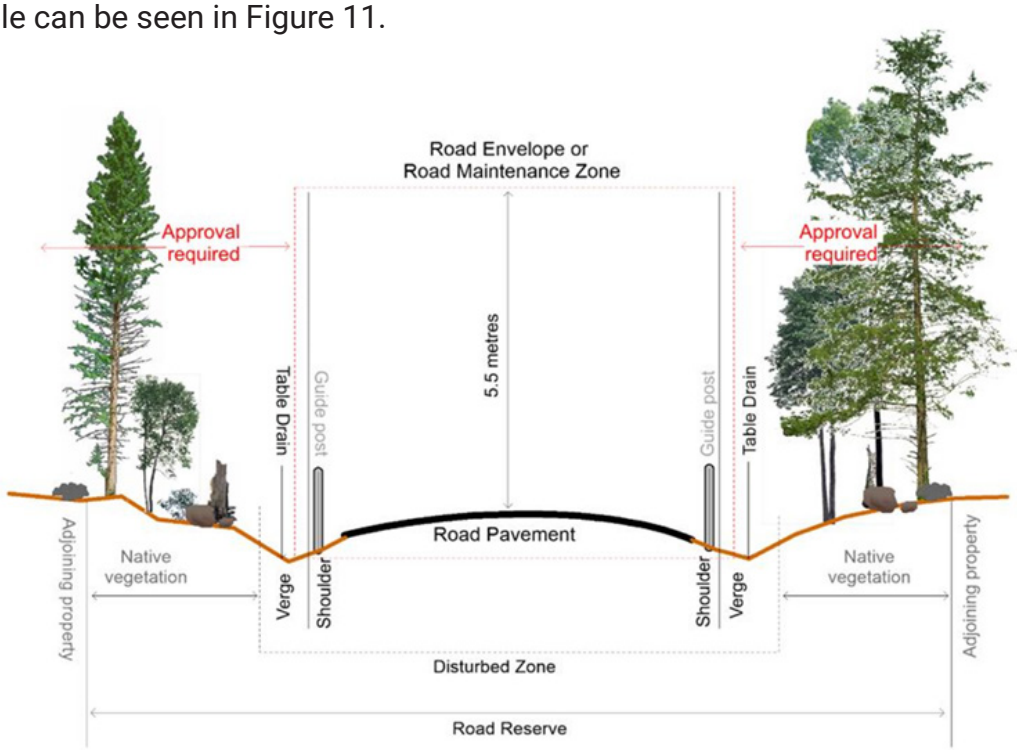


Figure 11 Road Reserve Diagram (NSW Spatial Services, 2024)

19 The road and rail networks in NSW, managed by TfNSW, intersect with a broader transport system, which includes travelling stock routes and waterways, further adding to the complexity of land management and governance. These components are overseen by a range of agencies, highlighting the multi-jurisdictional nature of transport infrastructure in NSW.

For the framework, at least three types of "Spatial Intersections" of the road network with Aboriginal communities can be identified:

- **Road verges** on the transport corridors: what can be achieved here depends on the land ownership on either side. The outcomes across different kinds of land ownership arrangement such as Local Government, Crown Land, Private land; or Land under Native Title, or land under Parks and Forestry, will vary depending on how Aboriginal communities engage in those lands.

- Where there are **single carriageways** providing the only access to Aboriginal community, the Aboriginal cultural landscapes practices, particularly cultural burning will play a very significant role.

- When **roads are near cultural sites,** they acquire a deeper meaning and therefore warrant a different approach to building resilience.

A road and its associated reserve is a defined land parcel. Roadsides and rail reserves often contain some of the last examples of remnant vegetation in agricultural landscapes due to their protection during European settlement for this purpose. Consequently, they have not been cleared for crops or pastures (Lunt & Spooner, 2005). Similarly, in forested landscapes, roadsides are often excluded from forest harvesting operations. Further, native vegetation on roadsides and rail reserves are often relatively undisturbed by livestock grazing, although they may be impacted by run-off of pollutants and nutrients from roads and adjacent farmland, altered fire regimes (either increased or reduced burning) and road traffic (Van Der Ree et al., 2011). Roadside reserves, which cover about 1% of the state's area, or roughly 1 million hectares, are managed by multiple agencies for different purposes, including transport infrastructure, conservation, fire management and utility services. About 50% of these reserves contain native vegetation (Transport for NSW, 2023b).

It is noted that the impacts of any Aboriginal cultural land management and actions may be influenced by the condition and management of the surrounding ecosystems. For example, roadside reserves managed for ecosystem resilience using ecologically and culturally informed practices, such as cultural burns, may reduce the likelihood or intensity of wildfires, potentially protecting adjacent transport infrastructure. This principle may also apply more broadly across the landscape, suggesting that resilience of ecosystems in which the transport network is embedded can contribute to the transport network resilience.

Structures

TfNSW plans, builds and operates transport systems for the movement of people and goods in NSW.

The framework builds on the core idea of structures as "the arrangements both within TfNSW and external to TfNSW that will support building resilience to natural disasters in and around the transport network" (Transport for NSW, 2024, p. 2) and the responsibility for asset, vegetation and land management within and around these transport corridors rests with various agencies and authorities depending on land tenure and purpose.

- The responsibility for the management of vegetation of State Road corridors is shared. The NSW Roads Act outlines ownership and powers for the management of roads.
- Most of the State Roads in NSW land on which the road sits, is vested to the local Council.
- For State roads (excluding Freeways), TfNSW uses powers under the Act to take on responsibility for the road formation (generally the pavement and shoulders 'table drain to table drain', or 4m from edge line where no table drain exists) for the purpose of controlling the part of the asset that meets the long-distance travel needs of the State.
- Under this arrangement Councils remain responsible for the part of the State Road corridor to the fence line adjacent to the road.
- Other landowners are responsible for maintaining and managing lands beyond the fence line to a road.
- For Freeways TfNSW owns the land and hence is responsible for the whole road corridor.
- Under Section 88 of the Roads Act TfNSW may remove or lop any tree or other vegetation outside of its responsibility area if in TfNSW's opinion it is necessary to do so for the purposes of carrying out road work or removing a traffic hazard. To undertake this responsibly and respectfully, TfNSW conduct extensive assessments and seek environmental and heritage approvals if required.
- Councils are responsible for managing risks associated with trees within the road corridor that may fall other than onto the trafficked area, noxious weeds, and maintaining designated fire breaks including any periodic controlled burning.
- TfNSW undertakes ongoing vegetation and road maintenance, in accordance with the M3 Specification. The M3 Specification sets out how often a road is inspected, and the intervention and response time requirements, this can also be the prioritisation of a defect or rectification. Council have a similar specification scope.

Within this premise, it is helpful to recap the responsibilities of various agencies in NSW that work with Aboriginal cultural landscapes management and communities and or resilience. This is summarised in the Table 12.

Table 12 NSW Departments and Their Role in Resilience

DEPARTMENT / AGENCY	KEY RESPONSIBILITIES	RELEVANCE	POTENTIAL ROLES WITHIN ACLM
NSW Rural Fire Service	Bushfire response and fire prevention	Vegetation Management, Fire	Collaboration with Aboriginal communities on fire mitigation strategies and incorporating cultural fire
Local Land Services	Regional land services, natural resource management, biosecurity, agricultural	Vegetation, Land Management	NSW Rural Landholding agency, an Aboriginal Engagement Strategy and Aboriginal Ranger Program; supports cultural burning and Caring for Country
NSW National Parks and Wildlife Service	Manage National parks and reserves, invasive species control and cultural site mainte-nance	Land Management, Cultural Land Care	Applies Cultural Fire Management Policy; works with Aboriginal communities through Joint Management and Aboriginal landscapes management
Department of Planning and Environment	Planning, housing, infrastructure, environment and heritage	Planning, Infrastructure, Cultural Land Care	Identification of bushfire prone land and green infrastructure policies
Heritage NSW	Manage and protect Indigenous and non-Indigenous Heritage sites	Cultural Land Care	Responsible for heritage protections; protections within land use, planning and development assessments
Crown Lands	Manage crown land across NSW	Land Management, Land Care	Cultural burn program and procurement of land management strategies
Forestry Corporation NSW	State forest management	Vegetation, Land Management	Involved in vegetation and habitat protection
NSW Department of Climate Change, Energy, Environment and Water	Environmental protection, biodiversity, water and climate	Environment, Water, Vegetation, Land Management	Policy leadership on conservation and climate resilience; supports Aboriginal involvement in environmental care
Aboriginal Affairs NSW	Interdepartmental work for improving Aboriginal outcomes in NSW	Cultural Land Care, Governance	Coordinates Aboriginal community engagement and co-design, including strategic plans and Closing the Gap frameworks
Environment Protection Authority	Regulates environmental risks, pollution and land contamination	Vegetation, Land Management	Vegetation management compliance and land health regulation

These stakeholders have overlapping responsibilities and values—particularly around land or landscapes management, hazard reduction, risk, safety, conservation, access or connectivity and in some cases Aboriginal cultural land management. By aligning these shared responsibilities, values and opportunities for more integrated land management across jurisdictions and with private landholders is possible.

Coordinated and joint land management approaches between various land management authorities and TfNSW could offer reciprocal benefits, including enhanced resilience of the transport network through vegetation management practices beyond the immediate TfNSW footprint, which could in turn maintain access to parks, forestry, state parks for conservation and recreation and enterprise areas for agriculture, tourism, recreation, and sustainable resource use.

With this in mind **'Structures'** should be considered as "in-principle" arrangements based on core responsibilities in terms of policies and procedures or permitted land use. Many of these stakeholders share similar values and overlapping goals for increasing resilience, and roads act as transport corridors suggesting that there is strong potential for cross-agency and stakeholder collaboration to manage vegetation for resilience to natural hazards beyond the transport corridor.

Collaboration

The framework uses a wide definition of collaboration to include a deeper level of working together on shared visions and objectives and acknowledges that each collaborator is key to achieving the project goals.

It is also necessary to recognise that the type of collaboration will differ across the stages of the emergency disaster and resilience continuums, as different institutions will be involved based on their institutional mandates and ability to lead and facilitate responses across each stage.

Any collaboration must involve working with Elders and knowledge holders. This can also help in achieving and communicating the benefits of cultural burning. For example, the 2014 National Bushfire Management Policy Statement for Forests and Rangelands—endorsed by the Council of Australian Governments—set a national goal to promote Indigenous Australians' use of fire, calling for the integration of traditional fire practices where appropriate (Forest Fire Management Group, 2014).

While legislation exists in NSW that relates to Aboriginal cultural land management as seen in Table 13, it is clear that none of these policies provides for the autonomy and involvement of Elders, nor facilitates or requires agencies to collaborate on Aboriginal cultural land management which as this research highlights is a key success indicator.

However, this also highlights the success of TfNSW ACLM project in that despite the absence of success drivers, this project (as evidenced in this report) has been able to achieve these indicators and has the support of Elders and Aboriginal people for its expansion.

Table 13 NSW Legislation Related to Aboriginal Cultural Land Management and Transfport for New South Wales

DEPARTMENT / AGENCY	KEY RESPONSIBILITIES
New South Wales Bushfire Inquiry, 2020	The inquiry made 76 recommendations, including two key ones emphasizing cultural burning as a vital Aboriginal land management practice, urging government commitment to respectful, collaborative use of Aboriginal fire techniques in bushfire planning and response.
New South Wales Aboriginal Affairs Strategic Plan 2023-2027	Focuses on empowering Aboriginal community voice, embedding self-determination in reforms, and promoting healing and cultural celebration, all foundational for integrating Aboriginal land management in environmental planning.
New South Wales Closing the Gap Implementation Plan 2022-2024	Aims to reduce disparities by prioritizing community-led approaches and partnerships with Aboriginal organisations. Supports Aboriginal connections to land and waters through improved joint-management arrangements, including for transport systems, to better meet community needs and goals.
New South Wales Crown Lands Cultural Burn Program, 2024	Developed in response to the 2019/2020 bushfires and NSW Bushfire Inquiry recommendations, this pilot program in Batemans Bay partners with Local Aboriginal Lands Council and Walbunja Rangers to restore cultural burning practices. It aims to renew culture, share knowledge with Crown Lands staff, and expand cultural fire management across NSW through partnerships with Traditional Owners.
New South Wales Government Local Land Services, 2020	The NSW LLS runs programs engaging Aboriginal Cultural Landscape Management. Guided by an Aboriginal Engagement Strategy promoting partnership, co-design, and opportunities with Aboriginal communities. Supported by the State Strategic Plan to help Aboriginal people care for Country and share traditional ecological knowledge.
New South Wales Cultural Fire Management Policy, 2024	Supports Aboriginal community aspirations for cultural fire management in National Parks. Applies to lands under the National Parks and Wildlife Act 1974. Emphasizes partnerships with Aboriginal communities. (NSW Government Environment and Heritage, 2024)
New South Wales Cultural Fire Management Unit, 2024	Established after the 2019-2020 bushfires to integrate ACLM into land management. Facilitates Aboriginal communities conducting cultural burning on traditional lands.
New South Wales Aboriginal Water Strategy, 2024	In collaboration with Aboriginal people, the NSW Government is developing a state-wide Aboriginal water strategy. The purpose of the strategy is to identify how water rights can be increased, while ensuring that Aboriginal people are involved in water management and planning decisions
New South Wales Framework for Valuing Green Infrastructure and Public Space, 2023	Provides guidance on cost-benefit analysis for green infrastructure and public space projects, aligning with NSW Government funding policies. (Department of Planning, 2023)
New South Wales First Nations Business Sector: A Return to Prosperity (Report), 2022	Addresses insurance challenges for SMEs involved in cultural land management, especially around cultural burning. Highlights insurer Suncorp's partnership with Firesticks Alliance to support training and certification to reduce insurance barriers for cultural burning practices

TfNSW also recognises 'Aboriginal Cultural Landscape Management' as "a custodial management practice or activities that are carried out by Aboriginal people, Aboriginal community-based or community-controlled organisation or group. Landscape management means the use and development of land and water management by these traditional custodians that involves caring for natural assets, and the management of threats such as weeds, pests, vegetation, and erosion," (Transport for NSW, 2023, p. 5).

The most promising mechanism for supporting collaborations seem to be Joint Management Plans, such as those adapted and based on Aboriginal Waterways Assessments, and those aligned to the roll out of Indigenous Ranger programs.

In all cases, any collaborative mechanism these must be led by the Traditional Owners of the Country, informed by locally relevant and culturally appropriate traditional knowledge holders, with contributions (i.e., co-design) from TfNSW and other government and land management agencies, where relevant.

5.3.4 Framework Purpose

The proposed framework is designed to embed research findings within TfNSW's existing paradigms of Opportunities, Structures, and Collaborations. It aims to articulate potential alignment and purpose for the research findings and indicators identified throughout the ACLM project.

The framework does not offer direct recommendations for implementing Aboriginal cultural land management or the ACLM project within TfNSW systems. Instead, it demonstrates how research findings can be disseminated to connect community priorities with TfNSW resilience opportunities.

5.3.5 The Framework

Table 14 The Framework

OPPORTUNITY		ACTIONS	COLLABORATIONS	IMPLEMENTATION INDICATORS	EVIDENCE FROM RESEARCH FINDINGS
Resilience as Preparedness	P1	Identify risks and provide treatment to critical road corridors, vacant lands and road and rail segments	• Contractual relationship between Transport for NSW (TfNSW) and Council on road treatments, • Reporting of incidents and risks by ACCO through voluntary action • Targeted treatments in high-risk areas with Aboriginal people	✓ Risk audits prepared ✓ Detail where vulnerability to natural hazards exists to roads ✓ Use of spatial tools to identify future opportunities and criticfal corridors for treatment ✓ Treatment contracts awarded to ACCOs ✓ Cultural burns conducted in high-risk areas ✓ Green firebreaks	Green firebreaks are successful in reducing wildfire impacts in China (Cui et al., 2019), New Zealand (Curran et al., 2018) and the USA (Baijnath-Rodino et al., 2023).
	P2	Identify and reduce vulnerability of 'high risk' communities	• Cultural burning and land care practices in vegetation management around high-risk communities • Coordination and inclusions of Aboriginal cultural, heritage and community inputs in Bush Fire Risk Management Plans developed with community • Hazard reduction approvals, collaboration on fire priorities, joining brigades	✓ Vulnerability Assessment reports prepared ✓ Risk Management Plans prepared with community engagement ✓ Cultural burning contracts awarded to ACCOs ✓ Community satisfaction surveys ✓ Green firebreaks ✓ Sustainability of Aboriginal Ranger groups	Crown Lands Cultural Burn Program, NSW Firesticks Alliance - training in cultural fire and land management practice Prescribed burning can reduce the intensity and spread of subsequent wildfires, when burns are recent and conducted immediately adjacent to the assets requiring protection (Florec et al., 2020; Penman et al., 2014; Price et al. 2015).

OPPORTUNITY		ACTIONS	COLLABORATIONS	IMPLEMENTATION INDICATORS	EVIDENCE FROM RESEARCH FINDINGS
Resilience as Preparedness	P3	Identify and protect cultural sites, artefacts	• Stewardship • Enable access • Prepare co-workplan and resourcing	✓ Protection of significant community assets and heritage ✓ Community engagement and involved ✓ Aboriginal Rangers Program included and involved	Utilisation of the Federal government's Indigenous Ranger Programs, (Australian Government, 2007) LLS Aboriginal Ranger Program (ARP) launched in 2022, and delivered across the Central West, Murray, Riverina and North-West LLS regions Tayaritja Milaythina IPA / Pakana Ranger Program, Tasmania
	P4	Include Elders as "Cultural Advisors"	• Relationship between Community, strong advocate and voice for Aboriginal people within TfNSW	✓ "Elders" designated as co-workers Preparedness and Emergency Management Plans ✓ Key cultural sites identified for protection ✓ Sustainability of Aboriginal Ranger groups	Ngarrindjeri Climate Yarning Circles created a forum to increase ACLM through bridging cultural knowledges with scientific insights Victorian Traditional Owner Cultural Landscapes Strategy

OPPORTUNITY		ACTIONS	COLLABORATIONS	IMPLEMENTATION INDICATORS	EVIDENCE FROM RESEARCH FINDINGS
Resilience as Response	R1	Prepare Emergency Management Plans co-designed with Community	• Readiness crisis and emergency management and functions • Engage community in emergency service functions	✓ TfNSW priorities embedded into Emergency Management Plans ✓ Capability building workshops for communities ✓ Support for Elders, community capture of knowledge ✓ Emergency Management plans prepared	The California Wildfire and Forest Resilience Action Plan, 2021 During fieldwork, the need for Indigenous community led emergency management plans was identified as a risk by community: *"We don't really, as s community, have a space where we can go if there was to be a natural disaster to just be with everyone"* *"My situation would be I know who I need to check on. But other people might not. Even just having the conversation just in there just makes you think, oh yeah maybe I should ring up Aunt and check on them all"*
	R2	Include Elders as "Cultural Advisors"	• Strong advocate and voice for Aboriginal people • TfNSW Aboriginal Outcomes incorporate the voices of Elders	✓ "Elders" designated and respected as leaders in Emergency Management Plans ✓ Key cultural sites identified and protected	Victorian Traditional Owner Cultural Landscapes Strategy (2023) Community identified the risks community faced during disasters, and particularly on the value of elders to community resilience: *"The Elders and to get this knowledge so that we can ensure that we don't have to rely on these big agencies to come from off country and force their practices on us."*

OPPORTUNITY		ACTIONS	COLLABORATIONS	IMPLEMENTATION INDICATORS	EVIDENCE FROM RESEARCH FINDINGS
Resilience as Recovery	I1	Replacement of damaged road infrastructure	• Collaborative contractual relationships around the supply of goods and services • Economic and social outcomes for Aboriginal people and Communities	✓ Continuous improvement and treatment of critical corridors and segments ✓ Road condition around vulnerable and remote Aboriginal communities ✓ Equitable access to schools, healthcare, services and employment	Research findings from literature reviews indicate limited involvement of Knowledge holders or Aboriginal Rangers in road infrastructure repair and maintenance: *"Where local council put a detour through there, that was right were [a site was], It's gone. They did not come to the LALC and ask or check if there's sites through where they put the detour through"*
	I2	Embed TfNSW into existing community Healthy Country Plans and objectives	• Community participation in rehabilitation • Community governance participation in program development	✓ Time from Impact to Recovery for Community i.e. for return to everyday life after disruptions due to disaster	A Healthy Country Plan has been used to map and plan for the rehabilitation of glossy black cockatoo habitat in the Shoalhaven, NSW (2022). Western Bundjalung Pilot site showcased their commitment to working on ACLM projects through connecting Western Bundjalung Initiatives and priorities to transport goals.

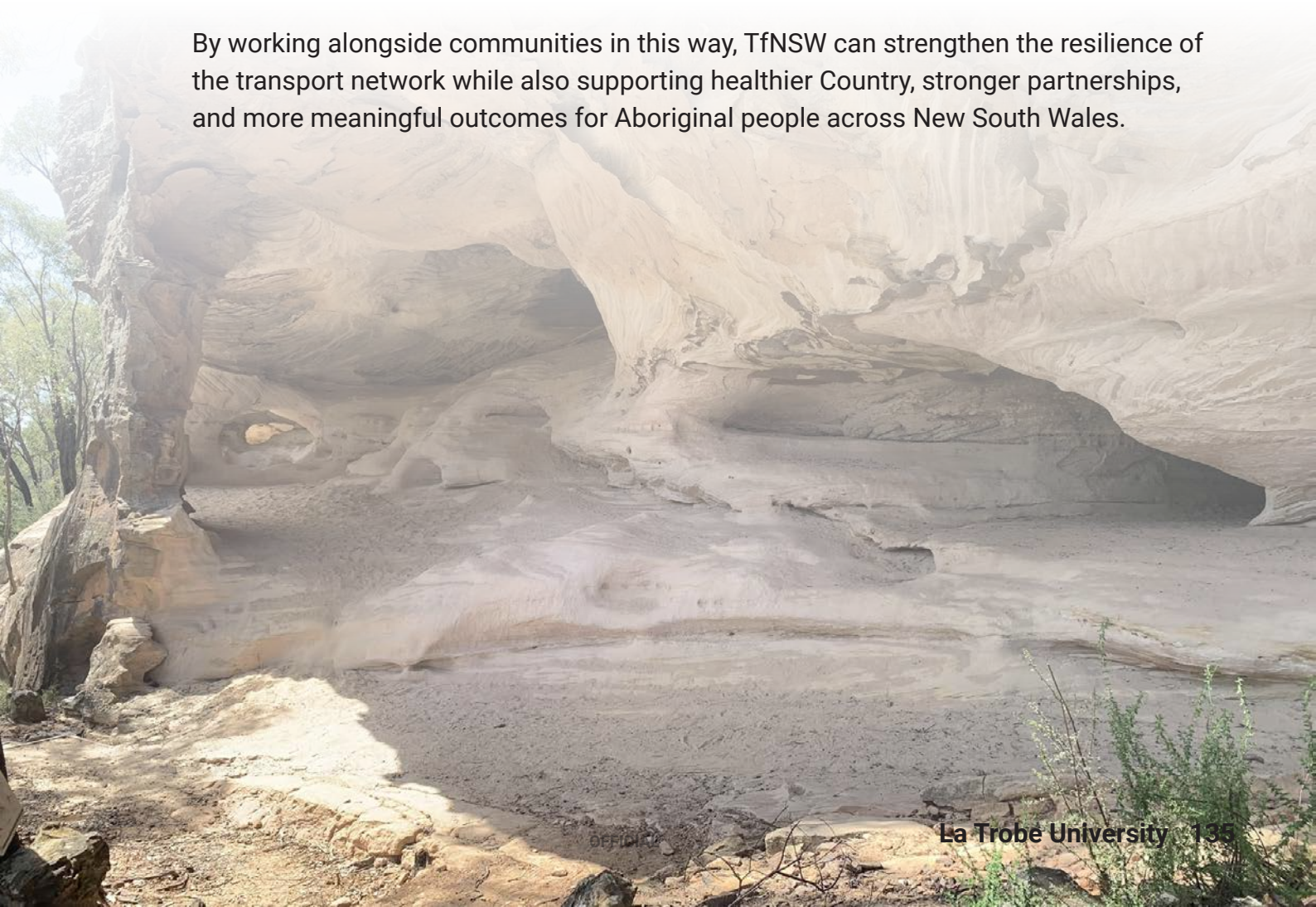
OPPORTUNITY		ACTIONS	COLLABORATIONS	IMPLEMENTATION INDICATORS	EVIDENCE FROM RESEARCH FINDINGS
Transport + Ecosystem Resilience	T1	Caring for Country in Asset Management	• Support for Aboriginal owned organisations to build capacity and capability to work with TfNSW and others • Closing the Gap • Self-determination for Aboriginal communities • Landscapes management and reinvigorating culture for Aboriginal people	✓ Increase Aboriginal economic participation ✓ Increased spending with Aboriginal businesses ✓ Projects designed for Community-led maintenance ✓ Increased Cultural outcomes observed (Healthy Country) ✓ Reduction in Bushfire intensity ✓ Increased alignment of culturally important places as assets ✓ Reduction in Emissions	Aboriginal patchwork fires buffers against climate-driven fire variation, notably reducing fire patch size as shown in the case of arid northwestern Australian spinifex grasslands (Bliege Bird et al., 2012). Culturally informed fire management has proven effective in the highly flammable savanna biome of northern Australia, reducing the frequency and extent of wildfires in the Kimberley region of WA (Vigilante et al., 2017, 2024), Arnhem Land in the NT (Evans & Russell-Smith, 2020) and Cape York in QLD (Perry et al., 2018) through the savanna burning methodology (Russell-Smith et al., 2013).
	T2	Amplify and listen to Aboriginal voices and meaningfully provide leading roles in resilience matters	• Amplify the voice of Aboriginal people • Support Aboriginal people and organisations to implement cultural landscapes management to build resilience to natural hazards.	✓ Increased Aboriginal businesses ✓ Improved pathways of Indigenous governance as a tool for self-determination ✓ Increased community investment into land care programs	The Coonabarabran Burra Bee Dee fire plan and site mapping exemplified the importance of Aboriginal leadership and voices in resilience matters, in which Elders, knowledge holders and community members met with RFS to discuss shared opportunities for land care.
	T3	Establish Transport Network Resilience monitoring system	• Strengthen community involvement in monitoring vegetation • Support capacity building of Aboriginal Rangers for monitoring roles	✓ Set resilience monitoring system including indicators and targets ✓ Embed resilience reporting in TfNSW reporting obligations	The California Wildfire and Forest Resilience Action Plan, 2021 Northern Territory Aboriginal Carbon Industry Strategy Research findings indicate a lack of transport focused resilience monitoring programs that incorporate cultural land care principles.

5.3.6 Conclusion

This report demonstrates that Aboriginal Cultural Landscape Management offers a practical and culturally grounded way to strengthen the resilience of NSW transport corridors while ensuring that self-determination and agency remain in the hands of Indigenous Peoples within each community. Where Aboriginal communities are supported to lead this work, particularly through ranger programs and Local Aboriginal Land Councils, outcomes are more responsive to local conditions, better aligned with community priorities, and maintain a lasting impact. Aboriginal Cultural Landscape Management must continue to recognise that Indigenous knowledge and communities are dynamic and evolving, and that collaboration must be built on respect rather than observation.

For Transport for NSW, this report provides a clear evidence base for continuing to embed Aboriginal-led approaches into transport planning, operations and resilience initiatives. The proposed framework offers a practical way forward that recognises roads as shared corridors of movement, culture and responsibility, rather than isolated assets. Its implementation will require long-term commitment, consistent relationships, and respect for Aboriginal decision-making, knowledge ownership and data sovereignty. To maintain long-term success, Aboriginal Cultural Landscape Management must empower Indigenous Peoples to lead cultural land care across transport corridors.

By working alongside communities in this way, TfNSW can strengthen the resilience of the transport network while also supporting healthier Country, stronger partnerships, and more meaningful outcomes for Aboriginal people across New South Wales.



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