

A day in the life of Nabarlek mine rehabilitation

Report on 1 June 2023 visit to Madjawarr land



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Acknowledgments

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Cover image

Jabiru-based and Madjinbardi contingent at Cahill Crossing *en route* to Gunbalanya (photo: R Barnes).

¹ QS World University Rankings and Performance Ranking of Scientific Papers for World Universities, 2021.

² UQ ranks third in the world for mining and mineral engineering, 2021 QS World University Rankings by subject.

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Kunred karrimarnbu bu kabolkmakmen yiman kayime kabirrinahnan kunbolc kukku djang dja kunwale kadberre manbu kunredken kore kerngeghken bolkwarrewoni minj kunmak birrikurdyimeninj kore ngad Bininj kadberre.

We can help our country to heal by looking after our lands, our water, our sacred places and doing ceremony for country, especially those places which have been damaged or neglected on these, our traditional lands.

Jill Nganjmirra NAIDOC 2021 *Healing Country – Kunwinjku*, Video produced by Bininj Kunwok Regional Language Centre <https://www.youtube.com/watch?v=9a-i04xKU6Q>

Nabarlek

Nabarlek rock wallaby, *Peradorcus concinna* (also known as the little rock wallaby).

Bininj Kunwok Regional Language Centre Ltd, *Bininj Kunwok on-line dictionary*. Gunbalanya.

1. Introduction

On 1 June 2023, Bininj of the Madjawarr clan, traditional Aboriginal owners³ of the Nabarlek minesite, hosted a visit by a diverse group of 25 individuals to inspect the rehabilitation of the Nabarlek minesite.

The Northern Land Council (NLC) initiated the visit in collaboration with Gundjeihmi Aboriginal Corporation (Gundjeihmi), Mirarr Aboriginal landowners of the Ranger Mine, and Energy Resources Australia (ERA). A representative of the Office of the Supervising Scientist (OSS)⁴ and University of Queensland PhD scholar Katherine Harries who is sponsored by OSS were also present. Local Indigenous business, Kakadu Native Plants, which coordinates rehabilitation at Ranger Mine were also invited.⁵ Researchers from the University of Queensland's Centre for Social Responsibility in Mining (CSRМ) were invited as observers, and were able to attend through the generous support of ERA.

Organisation of the visit was facilitated by the Bininj Kunwok Regional Language Centre based in Gunbalanya.⁶ The visit was enabled and attended by Western Australian uranium explorer, DevEx Resources Ltd (DevEx), which holds the Nabarlek mining lease and surrounding exploration licences.

This report, prepared by CSRМ, documents the visit from the standpoint of university researchers engaged in the social aspects of mine closure more broadly and with a particular interest in mine closure on the Indigenous estate. The University of Queensland has applied for a research grant, *Mine Closure on the Indigenous Estate: Empowering Reconnection*, under the Australian Research Council (ARC) 2022 funding round. Report co-author, Dr Sarah Holcombe, is a Chief Investigator and instigator of the ARC project, which focuses on closed or closing mines in the Northern Territory's top end. The NLC, Bininj Kunwok Regional Language Centre, and ERA, are Partner Organisations to the ARC application.⁷

The overarching objective of the ARC project is normalising engagement with Indigenous landowners and Indigenous land managers through mine closure and to have at the fore Indigenous perspectives on

³ Defined under the *Aboriginal Land Rights (Northern Territory) Act 1976* as the Aboriginal descent group that holds traditional rights to land and controls access and use of the land, which is held under communal freehold title. Although typically shortened to traditional owners, 'Aboriginal landowners' is a more accurate rendering in this context and is used in this report forthwith.

⁴ The OSS is a Commonwealth research organisation tasked with providing scientific expertise relevant to preventing environmental impacts from uranium mining in the Alligator Rivers Region.

⁵ 'The relationship between ERA and local Indigenous business, Kakadu Native Plants began in 2005. The goal of the partnership is to propagate local seeds, collected with a permit from the mine lease and within Kakadu National Park, to be used to revegetate disturbed land on the Ranger Project Area in accordance with the Ranger Mine Closure Plan' (ERA website). NB. Kakadu Native Plants also supplied plants for the Nabarlek rehabilitation.

⁶ Bininj Kunwok was incorporated in 2018. <https://www.westarnhem.nt.gov.au/news/new-bininj-kunwok-regional-language-centre-west-arnhem-region>

⁷ Other partner organisations are Rio Tinto, Newmont, and two Canadian universities, Memorial University of Newfoundland and Queens University.

rehabilitation and post-mining land use throughout closure processes. Success of the application is yet to be decided and by no means certain. The NLC visit to Nabarlek, however, offered an exceptional opportunity to inaugurate the partner collaboration that is central to the ARC project.

Report authors (Barnes and Holcombe) do not claim to offer specialist expertise in mine rehabilitation at Nabarlek nor the Alligator Regions more broadly. The aim was to observe, learn, and gain insights first-hand into the enormous technical and social complexities presented by mine rehabilitation and how Aboriginal landowners can be involved through the process.

Our role is not to critique nor offer views on the rehabilitation at Nabarlek *per se*. Rather we bring an unencumbered outsider perspective informed by decades working with Aboriginal landowners in other parts of the Northern Territory (and Australia) on matters of land rights, human rights, cultural heritage, and exploration and mining. This experience engenders sensibility to the multi-layered complexities around mining on Aboriginal land throughout the mining life cycle, including rehabilitation and relinquishment. Our sustained focus is on promoting good practice in engagement between Indigenous and mining interests, and achieving the positive outcomes sought by industry and Indigenous peoples alike.

The report aims to gain insights from observing the visit to Nabarlek by Mirarr Aboriginal landowners of the Ranger Uranium Mine organised by the NLC and hosted by the Madjawarr family group members who have been working with Harries.⁸

2. Background and context to the visit

As mentioned, the visit to Nabarlek on 1 June occurred on the back of Harries' field research. Her PhD thesis focusses on rehabilitation of previously mined areas and is extensively supported by the OSS.⁹

Harries' research investigates the topic of monitoring desired ecosystem restoration trajectories on mined lands. Her's is an innovative approach that includes case studies on how legacy rehabilitation (Nabarlek is a key case study) can inform leading practice closure of the Ranger Mine. How definition of desired outcomes and assessment of trajectories towards those outcomes occurs and influences outcomes are central research questions.

Mine rehabilitation guidelines recommend that community stakeholders should be part of defining outcomes and assessing rehabilitation. However, Harries research suggests this is not a common practice. When on the Indigenous estate, where land will be returned to landowners, it is particularly important to ensure that Aboriginal landowners are integral to defining desired outcomes and that they are part of assessments of the trajectories towards those outcomes. Yet methods of achieving this are uncertain and little documented. Harries' research involves assessing ecosystem trajectories using typical scientific methods but also explores methods for Aboriginal landowner participation and inclusion that might contribute to more effective integration of landowners in defining and assessing restoration trajectories.

As part of her primary data collection, Harries conducted a series of ecosystem science assessments over the previous three years at Nabarlek where Madjawarr family members were engaged as cultural monitors.¹⁰ Through this work, in accordance with advice and a research permit from the NLC, Harries established a collaboration between Jill Nganjmirra the spouse of a senior Madjawarr Aboriginal landowner (deceased) and who holds in-depth knowledge of Nabarlek. This led to dedicated field work over the three days immediately prior to the visit that involved Dr Brady (NLC), Ms Nganjmirra, and several generations of the Madjawarr family and was facilitated by linguist and Bininj speaker Dr Murray Garde from Bininj Kunwok

⁸ As Dr Holcombe is an academic advisor to Harries, the authors are careful to separate understandings gained through discussions over Harries' PhD research from observations gained from participating in the visit to Nabarlek. Madjawarr aspirations and perceptions of the rehabilitation is the subject of Harries field work and in accordance with the university's ethics approval, Harries is bound to only report learnings following validation of her findings with Madjawarr informants. Only general aspirations and perspectives expressed by Bininj during the visit as observed by the authors are reported.

⁹ Academic advisors include ecosystem science experts from the OSS, Dr Renee Bartolo and Dr Mark Gardner, as well as Professor Peter Erskine, from the University of Queensland. The NLC's, Dr Chris Brady and Dr Holcombe are also part of Harries' advisory panel with respect to Indigenous perspectives.

¹⁰ Harries research with Madjawarr is conducted in accordance with NHMRC ethics guidelines.

Regional Language Centre. Their field trip was specifically aimed at documenting Madjawarr perspectives about indicators of desired ecosystem trajectories.¹¹

Dr Brady was assigned as an advisor to Harries PhD due to the subject matter overlap, as Dr Brady's role as Minerals and Energy Officer is particularly focused on managing NLC's responsibilities with respect to the closure of ERA's Ranger Mine. Since 2021, the NLC worked with ERA and Gundjeihmi to establish the ground-breaking Cultural Reconnection Steering Committee. The role of the steering committee is to incorporate the views, aspirations, cultural and ecological knowledge of the Mirarr landowners into the design of rehabilitation at Ranger Mine.

Already some impressive outcomes are evident from the combined expertise of the NLC officers, ERA ecologists, and Mirarr. Lessons learned so far include that communication is central to achieving outcomes meaningful to Aboriginal landowners and fostering connection to the resultant rehabilitation, successes and challenges alike. From working with Mirarr, ERA recognises the limits of a singular focus on ecosystem composition and function and that incorporating cultural closure criteria is equally vital to successful closure. Ultimately, '[w]e need to be creating an environment that works for the owners of the land that we are handing it back to'.¹²

With knowledge of Harries' fieldwork schedule at Nabarlek, Ranger's Cultural Reconnections Steering Committee spotted the opportunity for Mirarr to experience what rehabilitation may look like 25+ years along a comparative mine closure track. Permission from Madjawarr landowners, resourcing by the NLC and ERA, and cooperation of Gundjeihmi and DevEx enabled the historic coming together of Mirarr and Madjawarr Aboriginal landowners on Country at Nabarlek on 1 June.

The itinerary and logistics were planned by Dr Brady. Connecting the Aboriginal landowning groups of both Nabarlek and Ranger underscored the trip. The schedule for the day catered to Bininj interests, hence the first stop of the 'old village' where Bininj used to live.



Figure 1 Group photo (taken by Justin O'Brien)

Attendant organisations were in learning and listening mode. The intent was to facilitate exchange of knowledge around closure at multiple levels, including between Mirarr and Madjawarr, Indigenous knowledge holders and western ecologists, and air comparisons between experiences at Nabarlek and Ranger mines. The knowledge exchange was greatly enhanced through the valuable insights given Paulka, as well as, Peter Christophersen, principal of Kakadu Native Plant, both of whom worked previously on Nabarlek rehabilitation.

¹¹ Madjawarr aspirations for rehabilitated areas and re-connecting with the area were also documented by Dr Garde during this work and reported to DevEx.

¹² ERA 2022. Annual Report. p.16.

3. The day's itinerary

On Thursday 1 June, three vehicles departed the Gundjeihmi office in Jabiru around 10am. These included the NLC bus carrying Mirarr driven by Dr Brady, Paulka in an ERA vehicle who kindly carried the authors, and the Kakadu Native Plants vehicle driven by Christopherson, accompanied by ERA ecologist, Megan Parry. Departure time accounted for the tides that determine the passability of the East Alligator River at Cahills Crossing on the Arnhem Highway/Oenpelli Road.

First stop was Gunbalanya to rendezvous with the OSS vehicle, which included Harries and OSS officer Al Loughran, and where Madjawarr Aboriginal landowners and family members joined the convoy.

Leaving Gunbalanya, the first stop was the abandoned 'old village' where Bininj used to live, which is nearby but not within the Nabarlek mine lease. Here we were joined by DevEx on-site exploration geologist, Lieth Deselincourt, who escorted the group around the mining lease.

3.1 Old (Bininj) mine village

This first stop was culturally significant as senior Aboriginal landowners recalled memories of the village when it was flourishing and home to Aboriginal landowners and other Bininj (and their families) who worked for the Nabarlek miner, Queensland Mines Ltd (QML). We learned that the community consisted of about 10 houses, a primary school, swimming pool, laundromat, with an impressive sports field nearby. Built by QML to support its Indigenous workers during the operation, the settlement persisted beyond mining supported by Demed Outstations Resource Centre, based at Gunbalanya, until being destroyed by severe tropical cyclone Monica (category 5) in April 2006.

The remains of the settlement are several derelict asbestos-ridden houses, a dilapidated schoolhouse and play equipment, and concrete slabs that mark the foundations of several other houses. Aboriginal landowners shared with the group that the place was associated with the Morning Star (Venus) Dreaming and known as *Mankinhkinh Kani* 'The place of the Morning Star'. Here also is where the Merten's Water Monitor (*Veranus mertensi*) passes through on its travels from *Durrubu Wakeng* 'Where the Merten's Water Monitor Crawled' (Nabarlek airstrip location) on its way south-east to the nearby creek and the hills beyond.



Figure 2 Photos of old village, school on left, adobe house on right (taken by R Barnes)

Mirarr visitors expressed some sadness and mourning on arrival as people had not visited the place for many years. Senior Madjawarr who regularly visit the location called out – *kabirriwoknan* – to acknowledge and respect the ancestors and their elders buried there.¹³ The group was invited to pay respects to three Aboriginal landowners whose graves comprise a small, fenced cemetery adjacent one of the ruined houses with each grave marked with a white cross. These included the boss of this Country and grandfather to Madjawarr family members in attendance and a relative to Mirarr.

¹³ Rendering of the Kunwinjku term for 'calling out to ancestors' provided by Dr Murray Garde.

Returning from the graves site, the group gathered around the parked vehicles where Dr Brady outlined the business of the day. He emphasised that there was no strict agenda, that we were on Country not to make decisions or conduct a meeting as such, but rather he explained that the purpose was to allow families to reconnect with each other, reconnect with Country, and learn from each other by inspecting the various rehabilitation areas at Nabarlek. A key aspect was for Mirarr to see first-hand what rehabilitation has occurred at Nabarlek as a way to put into perspective the rehabilitation being conducted on their land at Ranger Mine. Dr Garde translated and at times translated the ensuing discussions in Kundjeyhmi and Kunwinjku for the benefit of the rest of the group.

3.2 DevEx exploration camp

The second stop was the DevEx exploration camp. DevEx is actively testing radiological anomalies in the vicinity of Nabarlek with consent of Aboriginal landowners under agreements negotiated by the NLC. Their camp is adjacent to the still intact (unrehabilitated) bitumen airstrip that defines the location of the Nabarlek mine. The airstrip represents a significant investment and was crucial to the mining operation as it was used, among other things, to transport the uranium ore from the site. The airstrip remains an important asset as it is in sufficient condition such that it could be for used as a commercial airport or otherwise support a further mining operation.



Figure 3 Photo of Nabarlek Narradkilel from the DevEx camp and airstrip (taken by K Harries)

The Bininj name for this area is *Durrubu Wakeng* 'Where the Merten's Water Monitor Crawled'. We also learned from Aboriginal landowners that *Nabarlek* is the name of the distinctive nearby hills, which constitute the rock wallaby site. The full name is actually *Nabarlek Narradkilel*, which means, 'The Small Leg of the Nabarlek' and is registered under the Northern Territory Sacred Site Act. Sacred Green Ants sites feature too in the surrounding sandstone outcrops and prominent ridges.

Following lunch, the non-Indigenous visitors introduced themselves. We each described what we were doing there, who we worked for etc, with Dr Garde translating. Consensus of Bininj was that this was an important day, where relationships between Aboriginal landowning groups are mended and respectful interest and support of Balanda (non-Indigenous) visitors was welcomed. That people and minds were coming together with Aboriginal landowner interests at the heart was an event that was said to be long overdue.

3.3 Radiological Anomalous Area

The third stop was the Radiological Anomalous Area (RAA), an area of approximately one-hectare immediately adjacent to the western side of the in-filled pit where elevated radiation levels have been detected. Investigations over 2017 and 2018 determined the best remediation option was to leave the radioactive material in-situ and undisturbed, and cover with a .5m rock layer surrounded by diversion drains and rock bunding to ensure the stability of the cover and prevent transport of fine materials to waterways.

This was achieved in 2021 by scraping material from the adjacent rehabilitated waste rock dump over the RAA, which disturbed the vegetation that had established there and left a large open area.



Figure 4 Photos of RAA and protective bund (taken by S Holcombe, left; R Barnes, right)

This stop therefore demonstrated a contrast between the approximately 1-year rock cover and adjoining areas of the WRD representing 25+ revegetation. Discussions centred on the unnaturalness of the recent disturbance and the duration that the bund would likely have to remain (which would be for at least two years) that landowners found particularly jarring. This was in area of dry woodland on mica rich schists that glisten in the sun. Harries communicated that this area was revegetated with a 'Schist' seed mix, which had less Melaleuca than the 'Dolerite' mix used in the vicinity of evaporation ponds. We saw that woodland species including Acacia, Eucalyptus and Melaleuca had established on the waste rock dump and that bare areas existed over the RAA and another water retention area below the waste rock dump. It appears the rehabilitation activities left areas prone to be more wet over the Pit and parts of the waste rock dump, which is where many Melaleuca have apparently self-seeded.

Discussions were led at times by Aboriginal landowners and addressed people's inquiries and perspectives, which appeared to be particularly concerned about restricted traversability and the unnatural appearance caused by features like the rocky bunds, as well as the bare areas left from scraping the Waste Rock Dump area.

Important insights from Paulka and Christopherson, drawn from their experience and expertise from three years working on the site, were pertinent for people at this and other stops. They were involved in a campaign of replanting around 2008 and 2009 that improved the revegetation here and across other parts of the Nabarlek site.

3.4 Evaporation pond no.2

The fourth stop was the number 2 rehabilitated evaporation pond (EP2). This area is characterised by large open areas dominated by weed grasses and has virtually no native understory species present. Dominant in the understory are Mission Grasses (annual and perennial) and Feathertop Rhodes Grass. There are some areas of EP2 with patches of trees (mostly Melaleuca) but some areas, especially in the vicinity of where we stopped at the northern end of EP2 was mostly bare of significant tree cover. Here we saw feral horses running wild, presumably attracted the pastured areas. Historical rehabilitation that followed the emptying of the evaporation ponds appears to have involved pushing the pond walls across the floor of the pond area resulting in a stony surface featuring a range of rock sizes from small to quite large. Apparently a final 'ripping' of the surface brought many of the larger rocks to the surface, which is a practice that would not be used today. Paulka and Christophersen were involved with weed reduction here in 2008 and 2009 using herbicide and burning targeting weed biology. This led to significant improvements that were unfortunately not maintained.

Recently DevEx have initiated a control program for weed grasses resulting in multiple tracks through the ponds area and a recent reduction in weed cover. Though we utilised one of these tracks transecting EP2, it

was noticeably difficult even for a 4WD vehicle to traverse. Walking across this landscape was only possible with care, as rocks of various sizes were scattered widely over the terrain. As such, this area was discussed in terms of practice that would no longer be recommended. As at the RAA, Aboriginal landowners also declared there was 'too much rubbish' in the area. In this case, rubbish referred to the array of rocks exposed across the surface, and described as 'not traversable'.



Figure 5 Photos of the group inspecting EP2 (taken by S Holcombe)

Noting the large rocks on the surface, it was said that in the modern era, this is not how industry would leave the surface. Though it would be better if the rocks were not on the surface, the advice was that it is was not wise to attempt to bury them through more ripping as such a process would bring more large rocks to the surface. It may be possible to break up or consolidate some of the larger rocks, however, attempting to remediate the rocky surface might also result in areas of successful revegetation being disturbed in the process.

The group gathered in the shade to listen to Dr Brady and Paulka speak about the dilemmas presented by EP2. One issue was the unsatisfactory vegetation cover. Options for improving revegetation include planting more *Melaleuca* and other plants like *Pandanus* as the surface irregularity promotes pooling of water following rain. Harries suggested other factors could be the underlying hydrogeology created by the pond structure and clay lining laid as the base. Waterlogging in parts could be exacerbating the extreme surface compaction that develops through the dry season leaving very little 'soil' for trees. Introducing species tolerant to residual salts might have to be considered as a remedial measure. The cause of the distinctive stretch along the northern edge of EP2 bare of significant tree growth, is something that still requires investigation. Possible causes might include excessive waterlogging due to the topography. Harries has documented that the northern edge of the pond was the 'deep end' of the pond structure where water resided for a longer duration, which may have contributed to higher salt concentrations linked to residual chemicals.

On understanding the complexities with this area, Aboriginal landowners contributed a list of plants species that could be used for further revegetation of this site. They were able to draw on their knowledge of varieties tolerant to waterlogging and salinity and communicate their relevance to this area having gained awareness of issues that might be constraining plant growth at this location.

3.5 Ancillary points of interest

During the drive between the four stops (above) we were fortunate to be in the company of Paulka who pointed out other aspects of interest with the Nabarlek rehabilitation, including some examples of past practice that would not likely be accepted according to modern standards:

- large diameter (at least 1m) **concrete pipes** standing 2m vertically at multiple sites are found across the mining lease. These were strategically placed at photographic monitoring points. While photographic monitoring is commendable, it is inconceivable that such industrial scale structures were used instead of

a star picket, which is typically sufficient. These concrete pipes now feature as foreign unnatural items that are unattractive and jarring for Bininj landowners.

- parts of the old processing plant remain on site including two extremely **large steel tanks**, which were the leach tanks for extracting the uranium from the ore and trucked in from the barge landing. They represent a considerable asset were they to be used by some other party in another processing plant. However, years ago NLC who took ownership of these on behalf of landowners but could not realise this value due to difficulties in removing them. There are also, several large concrete foundations of plant buildings remaining, some of which are re-utilised by DevEx as hardstands for its exploration drill cores. These items were also described by landowners as ‘rubbish’, which should be buried. It is clear that unnatural surfaces due to large rocks or infrastructure left on the site is an ongoing source of concern for landowners.



Figure 6 One of two processing tanks (taken by K Harries)

- patches of **mature trees** near the old plant area were pointed out that had been planted in subsequent rehabilitation work. Although their growth is impressive to the uninformed eye, they are apparently revegetation plantings that used non-endemic species. Though the concept was a good one (planting in a cluster) and the plants are healthy, they did not lead to spreading of vegetation. Perhaps this was because they were the wrong species for the location or due to some other constraints in this area.

4. Observations and lessons learned

As humble researchers from down south being on site at Nabarlek for the first time, the authors were not there to problem solve or delve into issues being discussed, nor weigh-up merits of ideas or suggestions being proffered. We were not privy to the detail of discussions or central to the knowledge exchanges that occurred during the visit, and nor were we expected to be.

Our role during the visit to Nabarlek was deliberately passive and confined to general observations that provide insights relevant to good practice in mine closure. For instance, the observation that such discussions were happening in a genuine, respectful way, on equal terms is sufficient to deduce a key lesson for good practice i.e., that authentic engagement increases the prospects for realising opportunities that mine closure presents. In this way, the opportunity to partake in the visit offered a valuable opportunity to be exposed to the actualities of mine closure on the ground.

4.1 Analytic framework

Our interest in mine closure on Aboriginal land stems from CSRM’s Research Consortium into the *Social Aspects of Mine Closure*.¹⁴ This was a major three-year university and industry research collaboration to

¹⁴ Consortium website: <https://www.mineclosure.net/>

examine the multiple facets of mine closure, including on the Indigenous estate. The project was spurred by the imminent closure of a series of major iconic long-life mines across northern Australia and the need to develop and promote good practice in mine closure.¹⁵

One of the research projects undertaken by the authors under the closure consortium was a 2019 scoping study into Indigenous groups' involvement in rehabilitation and mine closure across Australia.¹⁶ The study provided a rapid scan of Indigenous engagement in rehabilitation using four case studies that focused on how Aboriginal landowning groups, including local Indigenous Ranger groups, are participating. The analytic framework adopted in the scoping study is shown in Figure 7.

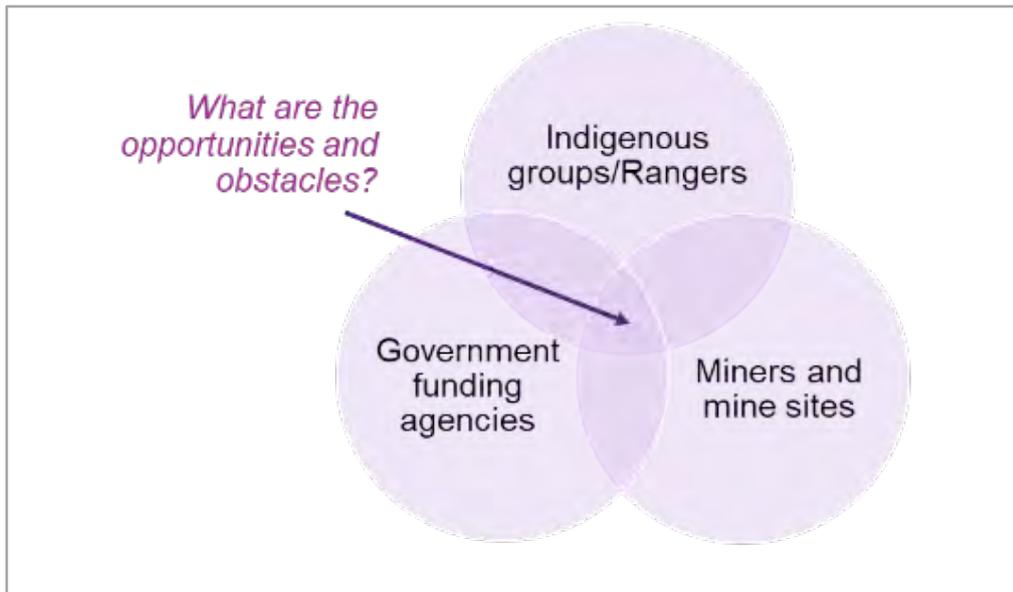


Figure 7 Conceptualising stakeholder interactions over mine closure

Conceptualising stakeholder interaction in this way allows each of the stakeholder's interest to be described and how those interests intersect to be examined. This provides a useful framing device for this report as it involves understanding the key drivers of the system and allows analysis of the key opportunities and constraints for achieving positive outcomes.

The domains of the three broad stakeholders' interests with respect to rehabilitation and relinquishment on the Indigenous estate are summarised below. Inherent in the summary is acknowledging that when the 'base case' is applied to a specific location, stakeholders' interests will be modified by the context and particulars of that case.

1. **Mining companies** – the holder of the mineral lease typically seeks to relinquish its mining titles and acquit liabilities associated with mine rehabilitation through compliance with the regulatory requirements of the respective government mines department. Mine production has ended so funding from rehabilitation funding represents a negative cashflow. In practice, the goal of relinquishment may not be so straightforward where interest persists (on the part of either the lease holder or other parties) in mineral resources or mine assets located on or proximal to the mineral lease and the company on-sells the lease in care and maintenance to another company.
2. **Government** – government interests are predominately represented by the state or territory mines departments. They are the lessor of the mineral lease and owner of the minerals mined. They are responsible for establishing closure criteria and ensuring that liability for rehabilitation remains with the

¹⁵ These include East Weipa bauxite mine NT, Gove bauxite mine NT, Ranger Uranium Mine NT, and Argyle Diamond Mine WA.

¹⁶ Report on the scoping project: Barnes, R., Holcombe, S., and Parmenter, J. (2020). 'Indigenous groups, land rehabilitation and mine closure: exploring the Australian terrain'. Centre for Social Responsibility in Mining. University of Queensland: Brisbane. <https://www.csr.uq.edu.au/publications/indigenous-groups-land-rehabilitation-and-mine-closure-exploring-the-australian-terrain>

mining company until such time closure criteria are met. The government interest is to ensure compliance with lease conditions and requirements imposed over rehabilitation of the mine.

- 3. Indigenous** – Indigenous interests are those of the Aboriginal landowners and their representative organisations. Rehabilitation of the mine site is of particular importance to the Aboriginal landowners as they ultimately live with the rehabilitation outcomes and experience the mine's legacy no matter what. For Aboriginal landowners, the mine is not a singular element but exists within social, cultural, and economic domains that constitute the Indigenous estate. Aboriginal landowners have obligations to look after Country, which means nurturing not only the biophysical environment but also acquitting spiritual and cultural obligations. These include cultural responsibilities to ancestors and responsibility for passing on knowledge to upcoming generations. This includes traditional management of the land and resources (plants, animals, and water), including cultural protocols and the importance of protecting sacred sites, at the same time as maintaining economic livelihoods.

At the fundamental level, this framing highlights one of the key aspects stakeholders share in common is an interest to avoid any residual liabilities from mine closure.

4.2 Applying the framework to Nabarlek

As mentioned, the 'base case' will be modified by the context of any case. Relevant particulars include the biophysical – commodities mined, style of mining, climate, and environment - as well as the political and institutional setting, and especially the quality of the relationship with Aboriginal landowners, history of engagement, and associated legacies.

At Nabarlek, the holder of the mineral lease is an exploration company, which is funding an active program to test radiological anomalies over adjacent exploration licences. While it holds certain responsibilities for the rehabilitation, the impetus to relinquish the mineral lease is likely lower as the company presumably wants to maintain control over access to the area of the mineral lease and airstrip. In the Nabarlek case, the company's interest has more of a dual focus, i.e., maintaining the mine rehabilitation, as well as maintaining a program of exploration. Decisions over expenditure must cater for on-going exploration at the same time as meeting any obligations to maintain the rehabilitation.

In this context the importance of positive relationships with Aboriginal landowners is a heightened imperative. Should exploration be successful, the consent of Aboriginal landowners to enter a mining agreement with the NLC will be required. While there is no provision to refuse consent, developing a new mine will need the support and goodwill of the Aboriginal landowners. Achieving satisfactory rehabilitation outcomes in this setting is therefore as much about maintaining good working relationships with Aboriginal landowners as it is about regulatory compliance.

In the Alligator Rivers Region, the Commonwealth's regulatory role is boosted through the OSS, which is dedicated to preventing environmental impacts from uranium mining in the region. The OSS brings extra scientific robustness and offers expert advice on measures to protect the environment. The greater government scrutiny and input of superior scientific expertise is over and above that which is typically afforded to non-uranium mining regions and specifically aimed at enhancing trust of the wider community.

The OSS engenders trust by working with stakeholders through multi-stakeholder forums such as the ARRTC,¹⁷ which includes the NLC. That there are ready-made forums available is another feature not typically found in other mining regions. Taking these particulars into consideration, we organise our observations in terms of how the intersecting interests of mining, government, and Indigenous stakeholders are either converging, or otherwise diverging:

- **converging interests** relate to those matters that are more or less shared by each stakeholder group and entail goals held in common. The matters of shared interests are assessed as likely to be enhanced through cooperation and collaborations between stakeholders.

¹⁷ Alligator Rivers Region Technical Committee.

- **diverging interests** relate to those matters that are not inherently shared by all stakeholders and relate to goals that may not be a priority for other stakeholders. The implication is that stakeholders will find the business case for cooperation and collaboration over diverging interests less clear cut. This does not imply that the diverging goals are adverse to other stakeholders. Rather, the point is that where goals diverge, they are less likely to be fulfilled through typical closure practice.

4.3 Converging interests

We observe the following, which offer lessons on good practice for mine closure on the Indigenous estate generally. These good practice examples are driven by interests held in common between the miners, government, and Aboriginal landowners, and readily supported by the existing processes and priorities.

4.3.1 Achieving good rehabilitation outcomes

The core converging interests of miners, government, and landowners is achieving good rehabilitation outcomes. Here lies the shared goal of reducing environmental liability through stable landforms and successful ecological restoration. Stakeholders are likely to concur over the need for effective monitoring and maintenance to be in place. Slightly divergent views over what criteria to use to measure the desired rehabilitation outcomes and the methods to assess ecological trajectories could exist. Resolving these to the satisfaction of each of the stakeholders remains a shared interest, otherwise there will be no end point, i.e., relinquishment for the company and return of Country to Aboriginal landowners.

Current rehabilitation practice is typically driven by the mining company using biophysical science methods to achieve desired outcomes negotiated with government - with limited input from Aboriginal landowners. At Nabarlek Aboriginal interests were managed under an agreement with the NLC that outlines a goal of restoration of vegetation similar to surrounds and returning to traditional uses. While there have been some discussions with Aboriginal landowners led by NLC over the years about the rehabilitated areas, this visit suggests that Aboriginal landowners have not had sustained engagement on restoration trajectories which could incorporate their views and perspective in a meaningful way. Using the framework, our analysis assesses meaningful involvement of Aboriginal landowners as crucial to success of mining restoration.

Nabarlek also demonstrates that it's better late than never to bring Aboriginal landowners into the rehabilitation discussion and decision-making. However, engagement early-on makes more sense because the Aboriginal landowners are ultimately the final determinator as the land is to be returned to the Indigenous estate. Practice that limits involvement of Aboriginal landowners simply increases the risk of disagreement over rehabilitation outcomes.

4.3.2 The efficacy of good Indigenous engagement

The visit to Nabarlek highlights the efficacy that can be brought to mine closure through good Indigenous engagement. Several key aspects were observed that contributed to the success of the day and Bininj marking the visit as positive.

Firstly, the visit was driven by an Aboriginal agenda. Mirarr saw value in visiting a mine-site rehabilitated decades ago and Madjawarr responded positively and agreed to host the visit and were open to learning from rehabilitation experts. Mining companies, Indigenous bodies, and government agencies collaborated effectively to mobilise people and resources to make the visit happen.

This contrasts with typical Aboriginal landowners meetings, which are driven generally by an external party's agenda, and mostly to advance the proponent's interest to meet a regulatory requirement (i.e., consultation would not necessarily occur if the proponent had the choice). Such Aboriginal landowner engagement is often transactional, whereby an offer/proposal is made, and a decision is expected. Pressure can be felt by attendees, particularly where key decision-makers and/or opinion-leaders are missing or where people feel they are not fully informed, or information is not adequately explained, or in a form that can be readily understood.

The visit to Nabarlek deviated from the norm by not seeking from Bininj specific outcomes or decisions. Rather, the emphasis of the visit was on the opportunity for Bininj to re-connect with each other and to

Country. That the agenda for Nabarlek visit was open and constrained only by the timing of lunch and state of the tides at Cahills Crossing presents as a key takeaway for effective engagement.

With Bininj in control and their rights and interests as landowners respected, the result was active engagement whereby Madjawarr proffered unsolicited views and aspirations, such as declaring the large rocks strewn across the surface of some of the rehabilitated areas as 'rubbishing my Country'. Madjawarr made clear their interest in taking a key role in decision-making over the rehabilitation, including their desire to be part of those works and being resourced to do so.

There were clearly important conversations between Bininj and scientists. The confidence on the part of Aboriginal landowners to discuss substantive matters was impressive, particularly given the complexity of the issues at hand. It appears that field trips to the site by Madjawarr with Harries, Dr Brady, and Dr Garde over the preceding three days, which involved explaining scientific concepts and introducing new concepts, contributed substantially to Madjawarr ability and confidence to engage over issues with the Nabarlek rehabilitation. Developing understandings based on such engagement allows Bininj to develop informed views, form realistic aspirations, and have them heard.

By continually engaging on this basis over time will establish an even deeper understanding of Aboriginal landowners' expectations and aspirations.

4.3.3 Power of effective inter-cultural communication

Firmly underpinning the positive engagement with Bininj and success of the visit was the impressive two-way language translation by Dr Garde. The value of such effective translation was on display during the visit and an aspect that would ideally be the norm in cross-cultural engagement generally. Where English is not the first language, this approach represents leading practice and is essential to accurately ascertaining Aboriginal landowners' aspirations and perspectives through mine closure and ensuring that they also understood scientific knowledge.

At a fundamental level, enabling people to engage using their own language is a sign of respect. Bininj spirits were lifted by the experience. At the time it was exuberantly declared by Bininj we travelled with that Bininj place names should replace the non-Indigenous names on sign and maps. This idea of reasserting prior names represents a call for 'counter mapping' and assertion of prior rights and interests over the colonial cartography. This form of cultural mapping would seek the 'proper names' of places such as those that were revealed for the old village, *Mankinhkinh Kani*, and the airstrip, *Durrubu Wakeng*.

Part of the value of live translation is the slowing down the information flow, as evidenced by lunchtime introductions by non-Indigenous visitors where Dr Garde translated each person's introduction. From gaining an understanding, Bininj actively engage by asking questions and commenting, including stating that such a visit as this should have happened long before.

Investing time and resources to explain issues and concepts in a person's first language is highly beneficial not just for Aboriginal people but also for mining companies and government. Effective translation and good communication empowers Aboriginal people to engage in complexities in way that is not afforded through discussions held in English, even when using plain English.

Where reasonable technical understanding is held by the interpreter, we see how scientific terms and technical jargon can be explained so that topics, usually the domain of geologists, chemists, physicists and ecologists, can be grasped by Aboriginal people. With good interpretation, common pitfalls can be avoided such as using analogies or examples from elsewhere to explain concepts, which risk confusing people by referring to apparently unrelated matters.

The power of good translation is particularly pertinent for uranium mine rehabilitation that feature complex processes of radioactive decay and isotopes, topics not well understood across mainstream society. Conveying understanding of scientific concepts such as chemical concentration, dilution, trajectories etc, allows Aboriginal landowners to engage in the grey areas of issues, as not all issues are binary. Greater understanding can reduce misgivings that arise where scientific concepts are not easily grasped. Where doubt exists over a question, a normal human reaction is 'I don't know' or more likely, 'no', if pressed. Clear

translation offers greater knowledge surrounding issues, impacts, and context, which reduces uncertainties and can ease fear and anxiety naturally felt over both real or imagined risks.

Establishing a level of understanding of technical issues enables Aboriginal people to offer their expertise and perspectives over complex questions. For example, we witnessed Aboriginal landowners eagerly sharing their expertise over which plants might grow at a particular location, their prospects of survival, and which animals such plants may encourage to forage.

Also on display was the practical stance Bininj may take once the scientific basis of rehabilitation challenges are explained and understood. In practice, achieving 'the perfect' is constrained by the complexities of the real world. Appreciating this means that discussions can extend to considering what limits can be tolerated and how best to apply effort and resources in the most useful way. This was evident through Madjawarr's apparent acquiescence over the pessimistic trajectory displayed in parts of EP2 availed from appreciation that past practices not being best practice. Theirs was not a disparaging response but rather they proffered their desire to be part of the on-going discussions and want to participate meaningfully in future monitoring and maintenance.

The translation observed during the visit is not routine practice across industry and Indigenous engagement but would certainly be good to emulate where such linguists/translators are available. It is unfortunate that such quality translators are not readily available in comparable settlements across Australia.

4.3.4 Economic benefits

At Nabarlek, not only do Aboriginal landowners seek to protect Country and maintain their cultural connections, they also seek economic benefits from allowing companies to use their land and resources. The economic benefit sought is evidenced by the active exploration licences granted to DevEx over surrounding areas. Being Aboriginal freehold land, such exploration licences must have the consent of Aboriginal landowners and consent to agreements entered into on their behalf by the NLC to allow DevEx to explore.

Whether or not exploration will be successful, it was apparent that opportunities are already being taken up by Madjawarr through Devex's exploration activities. Some people are being paid as 'cultural monitors', keeping track of exploration and ensuring protection of sacred sites. As well, some younger Madjawarr are employed in the exploration drilling and responsible for bagging drill samples. Not only economic benefits are derived from such engagement but also cultural benefits from Aboriginal landowners being on Country and maintaining their connections.

At Nabarlek we see the mining and Indigenous interests converging through direct employment on the exploration activities. This situation is peculiar to Nabarlek where new resources are being explored concurrent with rehabilitation of the old mine. This is not always the case for mine closure. More often the cessation of mining means the end of direct participation through employment and contracting. Attention turns therefore to what other economic opportunities need to be activated to replace mining.

4.4 Diverging interests

The analysis demonstrates the complexities with mine closure on the Indigenous estate and how those complexities can be addressed through good engagement and communication, which is in the interests of all stakeholders. The analysis also reveals there are mismatches between respective stakeholders' power, capacity, resourcing, and scope of interests.

4.4.1 Aboriginal landowner participation in mine rehabilitation

Mining company and government focus is mostly on the rehabilitation of the mining lease, with effort and resources directed to achieving the successful environmental restoration of the mined land. Aboriginal interests, however, extend beyond the mineral lease and invoke generational time frames.

For instance, Madjawarr demonstrate aspirations to live and to work on Country. Participation in mine rehabilitation may be an immediate focus but their remit is wider. The aspiration expressed publicly during

the visit was the notion of a Madjawarr Ranger group that would be established and primarily engaged in the rehabilitation monitoring and maintenance activities at Nabarlek. The viability of such a group would be augmented by taking-on caring for Country activities more broadly. This was expressed through suggestions that Rangers might manage weeds, protect sites from too frequent fire with perimeter burns, take measures to protect sacred sites, protect associated rock art by reinstating traditional land management and burning regimes across their land.

The reference to Rangers is likely inspired by awareness of well-functioning Ranger groups managed by the NLC operating across Arnhem Land. Rangers in the context of mine rehabilitation could be taken as shorthand for 'a well-resourced, organised, and fully trained group of Aboriginal landowners who are equipped to conduct monitoring and maintenance activities, as well as land management work on their land'.

Madjawarr aspirations for such a group appears contingent on organisational/institutional arrangements that were not evident from our one-day visit. We observed Demed grading the Nabarlek access road on the day of the visit and note it is an outstations resource centre operating out of Gunbalanya. Whether Demed or other candidates exists that could offer the organisational and wrap around support for Aboriginal landowners to undertake work at Nabarlek is not clear to the authors.

The point here is that is the institutional arrangements that oversee the Nabarlek rehabilitation are orientated to reaching optimal outcomes for ecological restoration. The system is not well tailored to meeting Aboriginal landowner aspirations outside the environmental rehabilitation remit. This brings into question where responsibility lays for pursuing the means to support Aboriginal landowners' aspirations. Though the company may not see pursuit of Aboriginal aspirations as their core business, certainly an astute mining company would use its power, resources, and influence to catalyse, lobby, and connect agencies whose responsibilities do.

4.4.2 Reconnecting family and Country

That the first stop of the visit was the old village was both symbolic and empowering for Bininj. Clearly, a first order issue was reconnecting with deceased family and ancestors, and remembering those who lived at the place and worked at the mine.

Aboriginal people map their affiliations to land and each other across a mosaic of connections to land and kin through intermarriage, shared Dreamings, and ceremony. One of the significant aspects of the visit was Mirarr and Madjawarr groups reconnecting with each other after apparently many years of limited interaction.

It may be that these interconnections were strained by the advent of mining at Nabarlek and perhaps competition between groups over the financial benefits arising from the agreement over mining at Nabarlek. The agreement featured sizeable up-front payments and disbursement of monies under the agreement, including the financial performance of the receiving body, Kunwinjku Association, that has been critiqued as being 'one of the worst in the post-land rights era'.¹⁸

The way the payments were made under the agreement suffered from lack of precedent and surfaced difficulties with well-intentioned policies to share receipts between 'project' landowners (including the Wunyu beach barge landing) and those in the surrounding area 'affected' by the project. Absence of guidance and clarity around 'who' received money and on what basis, led to inconsistencies and contestation. To quote Altman and Smith (1994):

*If mining monies are intended as compensation for adverse social and cultural impacts, then it is clear that these monies have not been used to alleviate perceived social impacts, or establishing an economic base from which to generate continuing income after the cessation of the Nabarlek mine.*¹⁹

In other words, legacy issues from the mine's operation may well manifest through closure and rehabilitation.

¹⁸ Altman, J. and Smith, D. (1994) 'The economic impact of mining monies: the Nabarlek case Western Arnhem Land'. *CAEPR Discussion Paper 63*. Australian National University.

¹⁹ *Ibid.*

Our impression was that being at the old village re-invigorated thoughts of revitalising an outstation and returning to Country. With the advent of mining at Nabarlek and following the demise of the old village it was said, 'the Country was left alone – but now it needs babysitting-up'. It is the responsibility of Aboriginal landowners 'to be checking on Country and helping it heal – that this Country needs people'.

From discussions with the NLC, the idea of resource hubs is an initiative being considered to support people's aspirations for living on Country across Arnhem Land. Where Nabarlek sits in this consideration was not clear. A company active in the locality such as DevEx, which has plant and equipment on site might be in a position to support establishment of a living place or resource hub, which would no doubt engender good relationships with landholders for whom being on Country is the highest priority. A living place would facilitate landowners in practical terms to engage with activities such rehabilitation monitoring and maintenance.

As with Aboriginal landowners' aspirations for being involved in on-going rehabilitation, Madjawarr's aspiration for an outstation on Country risks being sidelined by the existing institutional structures and processes. Again, there is need for stakeholders to agitate government and relevant Indigenous organisations to support Aboriginal landowners' post mining aspirations. If left unactioned, risks may emerge over Aboriginal landowners' continuing enthusiasm for overseeing the mine's rehabilitation. Where groups don't have resources to maintain regular access it will become difficult to sustain Aboriginal people's participation in on-going site activities. Pathways need to be built to facilitate robust governance and organisational capacity to support Aboriginal landowner participation.

5. Conclusions

The impetus for the visit on 1 June was for Mirarr to gain insights into what the future of Ranger Mine rehabilitation may hold by seeing Nabarlek's much further advanced rehabilitation. In some ways, Nabarlek represents an inadvertent guineapig on what to do, and what not to do, with mining and closure on the Indigenous estate. Nabarlek was the first mine established, and the first uranium mine, on Aboriginal land, with the mining agreement being one of the first made under the *Aboriginal Land Rights Act (NT) 1976*. Though a relatively short operation,²⁰ the advent of mining at Nabarlek left profound social, economic, and environmental impacts.

Included amongst Nabarlek's 'firsts' is it being the first example of a regulated requirement for restoration of native ecosystems on mined lands. Visiting a historically rehabilitated mine such as Nabarlek, reveals the limited inclusion of Aboriginal landowners over the course of rehabilitation and how that reflects closure practice at that time. Not only has restoration science expertise and mined land rehabilitation techniques developed since then, so too have community expectations for greater Aboriginal participation in rehabilitation and closure. More and more, notions of co-design are inching into the social impact lexicon. Whilst the involvement of Aboriginal landowners with rehabilitation experts at Nabarlek in this instance was spurred by doctoral research, it is likely regulatory requirements more broadly will eventually align with community expectations for meaningful Aboriginal landowner involvement.

Aboriginal landowner engagement as crucial to the success of mine closure

Our analysis assesses Aboriginal landowner engagement as crucial to the success of mine closure, as the Aboriginal landowners will be ultimately the final determinator of relinquishment on Aboriginal land. Practice that limits involvement of Aboriginal landowners increases the risk of disagreement over rehabilitation outcomes – at the end point of the process.

Nabarlek's limited Aboriginal landowner involvement illustrates the need for regular, on-going engagement, and how early engagement and sustained engagement makes sense. Through such engagement we see

²⁰ The Nabarlek orebody exceptionally rich. It was mined in a single campaign over several months. Ore was stockpiled while the plant was built. Subsequently processing allowed tailings to be placed back in the pit, thereby avoiding the problem of rehabilitating at tailings dam.

how Aboriginal criteria such as traversability emerge as a high priority i.e., how readily the landscape can be walked across. Such a perspective could easily be missed where focus is mainly on ecological restoration.

The engagement process as central

Recognising that Aboriginal engagement is important is one aspect, but how that engagement occurs in an effective way was also on display during the visit. From the history of Nabarlek, the mechanisms for Aboriginal landowners to be involved in rehabilitation and planning for closure in a systematic way were never developed. Aboriginal organisations were established to distribute royalties during the mining phase, however, the governance structures did not evolve into locally representative organisations, such as that the Mirarr have with Gundjeihmi at Ranger Mine. The inception of Ranger's innovative Cultural Connections Steering Committee was enabled by the existence of such an organisation.

Information sharing on scientific concepts

The visit to Nabarlek illustrates the value that comes from effective engagement with Aboriginal landowners. It highlights how knowledge is empowering and a shared understanding of the technical issues and willingness to learn facilitates discussions over the complexities or 'grey' areas. Establishing a level of understanding of technical issues enables Aboriginal people to offer their expertise and perspectives over complex questions. For instance, the potential to utilise Aboriginal landowners' knowledge in choosing more suitable plants arising from their understanding and appreciation of the constraints on ideal revegetation outcomes.

Effective translation as empowering

Underpinning the positive engagement with Bininj and success of the visit was the quality language translation by Dr Garde from Bininj Kunwok Regional Language Centre. The confidence displayed by Aboriginal landowners to proffer their views was clearly enhanced by the field trips to the site by Madjawarr with Harries, Dr Brady, and Dr Garde. The translation provided by Dr Garde enabled scientific concepts to be explained in language, which contributed substantially to Madjawarr ability to engage with the complexities of Nabarlek's rehabilitation.

The result was Madjawarr's constructive stance that reflected their appreciation of the scientific basis of the rehabilitation challenges and their meaningful engagement. They engaged over solutions and compromise.

Sustained and inclusive engagement

The value of sustained Aboriginal landowner engagement over the long term, in an on-going and meaningful way, emphasises the need for explicit mechanisms, organisational governance, and resourcing. A well-resourced organisation that protects Aboriginal landowners interests and promotes their views and perspectives is an essential ingredient to successful engagement. Madjawarr expressed this by wanting their own Ranger group. Other forms of governance could equally be considered, such as, being part of a broader 'Bininj rehabilitation maintenance monitoring group'. Such a group could seek support of the NLC, and could leverage funding from mining companies and government.

Need for mechanisms to support Aboriginal landowner aspirations

The absence of a devoted and well-resourced organisation presents a barrier, even where a mining company may be supportive of Aboriginal landowners conducting fee-for-service monitoring and maintenance. There is certainly room for both industry and government to agitate and catalyse such a model, which not only ensures Aboriginal landowner involvement, but can also serve to offset some of the economic loss that comes with cessation of mining.

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