

Impacts on malleefowl of land clearing associated with expansion of Carosue Dam TSF.

An assessment for Northern Star Resources Limited

Alexander Holm & Associates
Natural Resource Management Services

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Background:

Northern Star Resources Ltd (Northern Star) operates the Carosue Gold Mine and plans to expand the Tailings Storage Facility (TSF) requiring vegetation clearing within an 842ha area to accommodate the expanded TSF and associated infrastructure.

Alexander Holm & Associates were commissioned by Northern Star in June 2021 to revise and update previous environmental assessments in the area and conduct a systematic on-ground survey to locate, record and map evidence of malleefowl (*Leipoa ocellata*). This work was reported in Alexander Holm & Associates (2021). In light of findings from this survey Northern Star have now requested Alexander Holm & Associates to critically assess the likely impacts of the proposed development on malleefowl within and adjacent to the clearing envelope.

Malleefowl are regarded as a nationally threatened species and are listed as "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) whereby approval may be required for a proposed activity that significantly adversely affects their wellbeing.

Malleefowl are "Threatened" species under Western Australian legislation and listed as "Vulnerable" under the *Biodiversity Conservation Act (2016)*. Taking or disturbing threatened fauna requires authorisation from the Minister for Environment.

A "National Recovery Plan for Malleefowl *Leipoa ocellata*", published in 2007, sets out actions necessary to stop the decline of, and support the recovery of, malleefowl (Benshemesh 2007).

Evidence of malleefowl

The June 2021 malleefowl survey involved two operators searching along gridlines 40m apart covering the entire 842ha area whereby a total of 246km was traversed (Alexander Holm & Associates 2021). There were no sightings of birds or their tracks and minimal, isolated, non-species specific, litter disturbance. Twenty one malleefowl nesting mounds were found of which, ten mounds with shrubs and/or trees and likely to have been unused for more than 20 years, were classed "long-abandoned", three were little more than tentative scratchings ("recent failed"), four appeared to have been used within the past five to 10 years but were now abandoned ("recent abandoned") and four had been used within the past five years but were not currently occupied ("recent potentially active").

In February 2019, two operators searched along gridlines 25m apart for presence of the priority listed species *Eremophila arachanoides* subsp.*tenura* during which presence of malleefowl were noted (Alexander Holm & Associates 2019). Approximately 170ha were searched within the 842ha area of interest during which one "recent abandoned" nesting mound was found (MF3). There were no bird sightings.

In November 2012, operators searched along gridlines 50m apart for evidence of malleefowl within a 640ha area entirely within the 842ha area of current interest (Alexander Holm &

Associates 2012). Two adult birds were sighted, three "recent active" nesting mounds (MF11;MF13;MF21), and three "long abandoned" mounds located, two of which have been destroyed and one remains (MF20). Saracen Gold installed a continuous camera recorder at MF13 shortly after its discovery. No nesting activity was observed and the nest was subsequently abandoned.

Malleefowl preferred habitat

Malleefowl nesting mounds in the proposed development area were more abundant in foot-slopes of rocky basalt hills (land unit 2b) and plains supporting acacia shrublands (land unit 4a and 4b) (Alexander Holm & Associates 2019). Fire-prone sandplains were not preferred habitat and saline alluvial plains were avoided. Similar habitat preferences have been noted for the adjacent Great Victoria Desert (Department of Parks and Wildlife 2016).

Impact of proposed development on malleefowl

Locations of malleefowl nesting mounds in relation to the proposed TSF development are shown in Figure 1 and impact of this development on these mounds is assessed in Table 1.

Ten nesting mounds will be destroyed. Of these, four are "long abandoned", two are "recent failed", one "recent abandoned" and three (MF6; MF11; MF21) "recent potentially active". Two other nesting mounds are within 60m of the new haul road, one (MF8) is "recent potentially active" and the other "recent abandoned".

Of the 12 nesting mounds affected by the proposed development, destruction of eight abandoned and failed mounds will have no negative impacts on malleefowl. Of the remaining four nesting mounds, MF11 and MF21 were found to be active and occupied during the November 2012 survey, but not occupied in June 2021 and no evidence (fresh litter, egg shell) of activity over the past few years. MF6 and MF8 had not been found prior to the 2021 survey and neither were occupied in June 2021. There was no evidence of activity during the past few years at MF6. Litter material in MF8 appeared more recent than in any of the other "recent potentially active" nesting mounds.

Table 1: Malleefowl nesting mounds in the vicinity and impact of proposed development

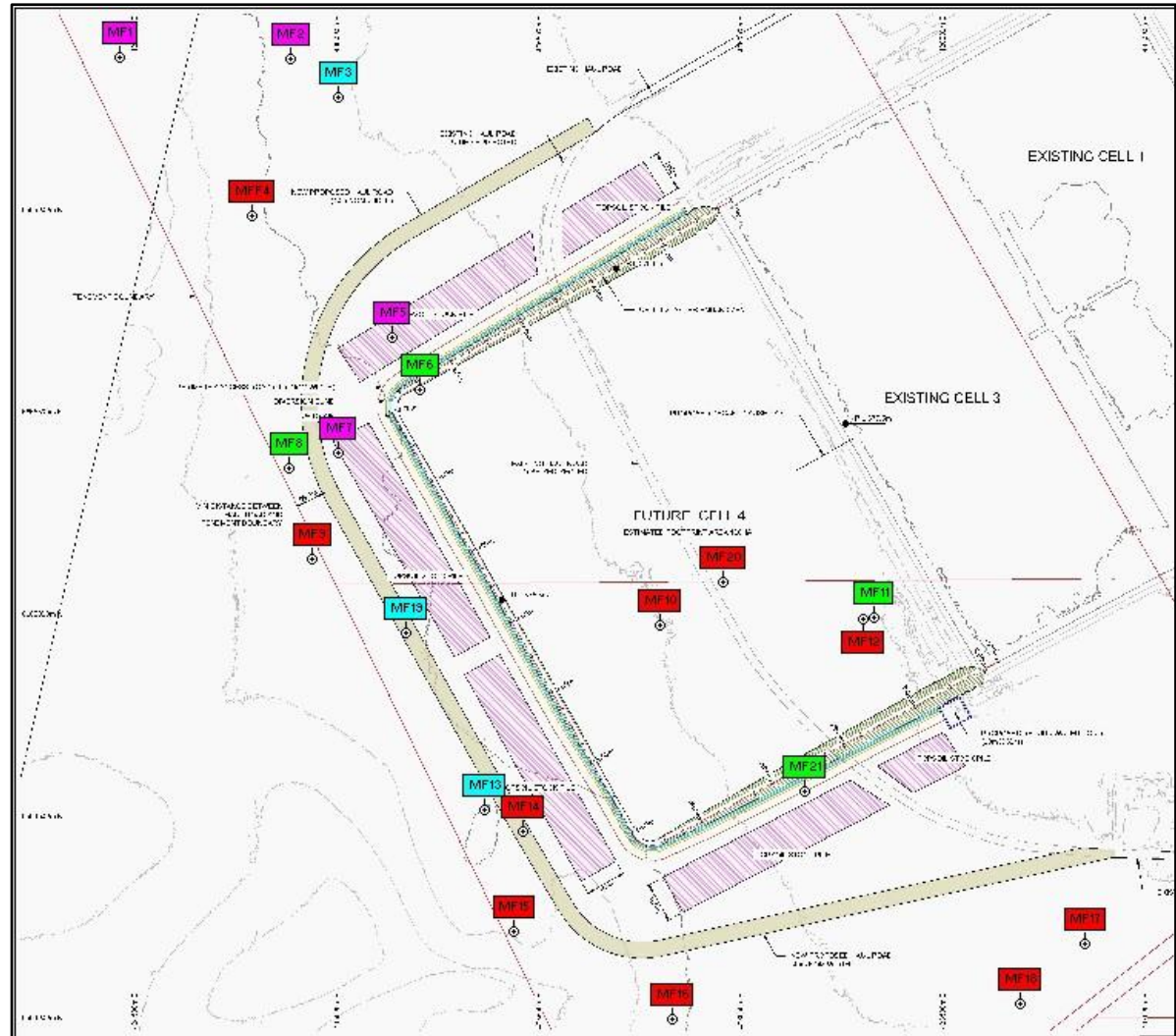
MF mound	Status	Impact
MF1	Recent abandoned	None
MF2	Recent failed	None
MF3	Recent abandoned	None
MF4	Long abandoned	None
MF5	Recent failed	Destroyed
MF6	Recent potentially active	Destroyed
MF7	Recent failed	Destroyed
MF8	Recent potentially active	55m west of new haul road
MF9	Long abandoned	None
MF10	Long abandoned	Destroyed

MF mound	Status	Impact
MF11	Recent potentially active	Destroyed
MF12	Long abandoned	Destroyed
MF13	Recent abandoned	37m west of new haul road
MF14	Long abandoned	Destroyed
MF15	Long abandoned	None
MF16	Long abandoned	None
MF17	Long abandoned	None
MF18	Long abandoned	None
MF19	Recent abandoned	Destroyed
MF20	Long abandoned	Destroyed
MF21	Recent potentially active	Destroyed

Approximately 90ha of preferred malleefowl habitat will be cleared during the proposed development consisting of roughly equal proportions of basalt hill foot-slopes and plains supporting acacia shrubland. Suitable Malleefowl habitat available in areas adjacent to the proposed disturbance is in excess of 2000ha (Alexander Holm & Associates 2019).

Figure 1: Location of mallee fowl nesting mounds and proposed land disturbance associated with cell 4 expansion of Carosue TSE.

Red tags: Long abandoned
 Purple tags: Recent failed.
 Blue tags: Recent abandoned.
 Green tags: Recent potentially active.



Referral under the EPBC Act

Malleefowl, classified as "vulnerable" and listed as a matter of national environmental significance under the EPBC Act, are known to be present in the general area of the proposed development. An action will require approval if the action has, will have, or is likely to have a significant impact on an "important population" of a vulnerable species (Department of The Environment 2013). An "important population" is a population necessary for the long term survival and recovery of the species where a "population of a species" is defined under the EPBC act as an occurrence of the species in a particular area including but not limited to a geographically distinct regional population, or collection of local populations, or a population or collection of local populations occurring within a particular bioregion.

In assessing if the proposed development of the TSF Cell 4 will have a significant impact on malleefowl, the following criteria are considered as to whether there is a possibility that the development will:

1. Lead to a long-term decrease in the size of an important population of a species.

Malleefowl, which may be impacted by the proposed development, are part of a sparse, widely-dispersed population of unknown extent. Malleefowl have been sighted and/or nesting mounds located throughout most of the tenements associated with Carosue Dam operations from around Deep South 70km north of the TSF (Alexander Holm & Associates 2011), 10km to the east (Alexander Holm & Associates 2020) and 6km SW (Alexander Holm & Associates 2017). Records of malleefowl extend in all directions beyond these locations (Department of Parks and Wildlife 2016). While this sparse, widely-dispersed population of malleefowl throughout the Western Australian arid zone can be considered an "important population" necessary for the long-term survival of the species in the region, Benshemesh (2007) states that no particular population or general area can be described as of greater importance for the long-term survival of malleefowl.

Factors affecting the long-term survival of malleefowl in the arid-zone include livestock grazing, broad-scale fire, drought and fox-predation (Benshemesh 2007). Localized impacts from mining, such as habitat destruction through clearing, are likely to be of lesser importance. Expansion of the TSF will have negligible impact on the widely dispersed malleefowl population in this region as there is extensive habitat in adjacent areas for malleefowl use in subsequent breeding seasons.

2. Reduce the area of occupancy of an important population.

While malleefowl have been previously sighted within the development envelope and active-occupied nests located in past surveys, there is no evidence that malleefowl are currently present. It is known that malleefowl in arid areas are verging on nomadic, having irregular or unpredictable home range (Department of Parks and Wildlife 2016). Nesting mounds, which appear to be un-occupied during poor seasons, occur mostly on foot slopes of basalt hills and in acacia shrubland on extensive plains (Alexander Holm & Associates 2021). Plains supporting acacia shrubland are widespread in the vicinity of the proposed development and occupy 36% or 1800ha while basalt hills occupy a more restricted area of 380ha (Alexander Holm & Associates 2019). Approximately 90ha of preferred habitat will be cleared during

expansion of the TSF which will have minimal impact on the area of occupancy of malleefowl due to the broad range of suitable habitat within the region.

3. *Fragment an existing important population into two or more populations.*

Malleefowl in this arid environment are part of a widely-dispersed, semi-nomadic population. The proposed clearing will not fragment an existing population.

4. *Adversely affect habitat critical to the survival of a species.*

Malleefowl in the vicinity of the TSF prefer plains supporting acacia shrubland and foot slopes of basalt hills for nesting sites. Similar habitat preferences are noted for the adjacent Great Victoria Desert (Department of Parks and Wildlife 2016) and are extensive throughout the region (e.g. Pringle, Van Vreeswyk et al. 1994). Clearing of 90ha of preferred habitat for the development of the TSF is not considered to be critical for survival of the species due to the availability of similar habitat nearby and throughout the region.

5. *Disrupt the breeding cycle of an important population.*

Malleefowl appear to occupy nesting sites only during favourable seasons and the four recently-active nesting mounds affected by this development are not currently occupied. Northern Star will ensure clearing is completed outside of the breeding season while nesting mounds are un-occupied. Malleefowl breeding cycle will not be disrupted while these nesting mounds are un-occupied.

6. *Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.*

Malleefowl nesting mounds in the proposed development area are more abundant in foot-slopes of rocky basalt hills and plains supporting acacia shrublands which are common in the vicinity of the TSF (Alexander Holm & Associates 2019) and extensive throughout the region (e.g. Pringle, Van Vreeswyk et al. 1994). The malleefowl population is unlikely to decline through impacts of this development due to the wide availability of preferred habitat throughout the region.

7. *Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.*

Mining activity has potential to increase feral predators of malleefowl especially fox and cat and to introduce weed species that may invade malleefowl habitat. Effective putrescible rubbish management and weed control hygiene is essential to minimise adverse effects. Northern Star have procedures in place to address and mitigate risks associated with invasive species, therefore it is unlikely that invasive species will significantly impact malleefowl populations or habitat due to the proposed development.

8. *Introduce disease that may cause the species to decline.*

Transmission of disease to malleefowl is unknown, however risk of transmission will be minimised through practices that minimise presence of feral predators or other non-native fauna. Northern Star have procedures and practices in place to control feral animals as

required throughout the project area through trapping and baiting programs, therefore the risk of introducing disease to malleefowl populations due to the proposed development is considered low.

9. Interfere substantially with the recovery of the species.

Malleefowl survival is threatened by vegetation clearing, predation by fox and cat, increased fire frequency, road mortality and competition with sheep, rabbit, cattle and goat (Department of Parks and Wildlife Fauna facts). Mining activity, such as the proposed expansion of the TSF, has cumulative effects on malleefowl survival particularly with clearing and road mortality. While the proposed development will not interfere substantially with the recovery or ongoing survival of malleefowl in the north eastern Goldfields it is difficult to assess the cumulative effect especially when other land users are also implicated.

In making a decision as to whether or not to refer an action to the Minister, the following are considered:

- 1. Are there any matters of national environmental significance located in the area of the proposed action (noting that 'the area of the proposed action' is broader than the immediate location where the action is undertaken; consider also whether there are any matters of national environmental significance adjacent to or downstream from the immediate location that may potentially be impacted)?*

Adult malleefowl were sighted in the development area in November 2012 when two active and occupied nesting mounds were found (Alexander Holm & Associates 2012). A recent intensive survey located three recently active, but not currently occupied, nesting mounds within the development area and another nearby. There were no sightings of birds or their tracks and minimal, isolated, non-species specific, litter disturbance (Alexander Holm & Associates 2021).

- 2. Considering the proposed action at its broadest scope (that is, considering all stages and components of the action, and all related activities and infrastructure), is there potential for impacts, including indirect impacts, on matters of national environmental significance?*

The proposed development will destroy three recently active, but not currently occupied, nesting mounds. There is no evidence of current malleefowl activity in the development area which is experiencing extended drought conditions. The proposed development will not directly affect the malleefowl population. It is likely that some of these recently active nesting mounds could be re-used when seasonal conditions improve. In this event, alternative nesting sites will be required following destruction of these three nesting mounds. There is extensive preferred habitat (more than 2000ha) in adjacent areas which would provide suitable locations for the development of alternative nesting sites.

- 3. Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance (and if so, is the effectiveness of these measures certain enough to reduce the level of impact below the 'significant impact' threshold)?*

Malleefowl have shown a habitat preference for low basalt hills and acacia shrubland which cover more than 2000ha in adjacent areas (Alexander Holm & Associates 2019). Alternative

nesting sites are therefore available thereby minimising the impact of destruction of three nesting mounds. One other recently active, but not currently occupied, nesting mound is approximately 55m from the proposed haul road. Disturbance in the vicinity of this mound will be avoided.

4. *Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts (important, notable, or of consequence, having regard to their context or intensity)?*

The proposed development and destruction of three un-occupied nesting mounds will not have a significant impact on populations of malleefowl in the Carosue Dam area. Northern Star will ensure clearing is completed outside of the breeding season while nesting mounds are un-occupied.

Action under the *Western Australian Biodiversity Conservation Act 2016*

Taking or disturbing threatened fauna requires authorisation from the Minister for Environment.

No malleefowl will be "taken" during the proposed clearing.

Development activity will destroy three recently active, but not currently occupied, nesting mounds and may impact one other nearby mound. There is no evidence of current malleefowl activity in the development area which is experiencing extended drought conditions. The proposed development is unlikely to directly disturb malleefowl while nesting mounds remain un-occupied.

Conclusions

Malleefowl, which may be impacted by the proposed development, are part of a sparse, widely-dispersed population of unknown extent throughout the Western Australian arid zone.

Of the 12 nesting mounds affected by the proposed development, destruction of eight abandoned and failed mounds will have no negative impacts on malleefowl. The remaining four nesting mounds have been used in recent years but are currently un-occupied and there is no evidence of malleefowl in the development area. Three of these un-occupied nesting mounds will be destroyed through clearing and one other is within 55m of the proposed haul road.

Nesting mounds, which appear to be un-occupied during poor seasons, occur mostly on foot slopes of basalt hills and in acacia shrubland on extensive plains. Approximately 90ha of preferred habitat will be cleared during the proposed development. Plains supporting acacia shrubland and basalt hills occupy more than 2000ha in areas adjacent to the proposed development and cover extensive areas further out.

Northern Star have undertaken to monitor malleefowl activity in the vicinity of the four affected nesting mounds and ensure clearing is outside malleefowl breeding cycles while nesting mounds are un-occupied.

Destruction of three un-occupied malleefowl nesting mounds and 90ha of preferred habitat is unlikely to have a significant effect on a matter of national environmental significance, being populations of "vulnerable" malleefowl, due to the extensive habitat available in areas adjacent to the proposed development, and therefore does not warrant referral to the Australian Government Department of the Environment. Similarly, the proposed clearing is not considered to be "taking or disturbing" threatened fauna and therefore does not trigger the requirement for authorisation from the Western Australian Minister for Environment.

References

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