Vista Gold Australia Pty Ltd

Mt Todd Gold Draft EIS Supplement

Gouldian Finch

October 2013

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Scope and limitations

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1. Yinberrie Hills Gouldian Finch Population and Potential Impacts

1.1 Yinberrie Hills Gouldian Finch Population

1.1.1 Population Size

There are a wide variety of estimates of the population size of Gouldian Finches in the Yinberrie Hills site. This is a function of the difficulty in accurately estimating populations of small, highly mobile and seasonally variable bird species in largely inaccessible areas without a thorough and systematic trap, band and release program. Due to the concentration of research and survey activity at this site a range of estimates have been posited, though with recognition that these are imprecise. For example, if adult numbers are quoted, it should be recognised that Gouldian Finches can breed 2-3 times a year, produce clutches of 3-8, and often juveniles can comprise up to 80% of the population (Garnett *et al.* 2011; Tidemann *et al.* 1999). Regardless, the numbers give a confidently incontestable range of population size, which in the nature of tropical savanna biota, is probably quite variable over time. The estimates therefore at the Yinberrie Hills are as follows:

- 150-250 adults birds (O'Malley 2006);
- A population of >6000 birds (unpublished NT DLRM banding data from 1986-2000);
- 100-250 adults and 90-500 juveniles for 12 waterholes from 1996-2004 (O. Price, unpubl. data);
- 5376 captured and release (with only 457 recaptures) (Lewis 2007);
- 576 individuals captured, with mark-recapture analysis estimating 1368 individuals (Woinarski and Tidemann 1992); and
- 0.26 birds per ha for the 35 ha at Yinberrie Hills (Woinarski and Tidemann 1991), extrapolated to a core breeding area (Dostine *et al.* 2001), suggesting 1500-5500 individuals.

Recognising that the Gouldian Finch populations will change over time, depending on seasonal conditions and distribution of resources; it seems reasonable to conclude that the population at Yinberrie is very large and consistently present, and that the population is likely to number many thousands rather than many hundreds.

1.1.2 Population Trends

As with the estimates of population size, the understanding of population trends is likely to be equally imprecise. As such, detailed re-evaluation and interpretation of the data will not provide any clear information on population change due to mining activities or land management at Yinberrie Hills; unless there was a thorough, long-term and consistent monitoring program that continued unabated over the life of the mine. It seems some monitoring programs commenced but were abandoned after four years, which is unfortunate.

In the most general sense there is some consensus that the Gouldian Finch population in Australia is stable and not declining (Garnett *et al.* 2011; Woinarski *et al.* 2007), and limited data with very little power to detect clear statistically significant trends also suggest that the population at Yinberrie Hills has not declined (O. Price unpubl. data).

Historically dramatic declines that have occurred in the past are the reason for the listing of Gouldian Finch as threatened on national and state conservation legislation. The species is still susceptible to existing threatening processes such as trapping for the aviary trade, habitat degradation via changing fire regimes and pastoralism, habitat clearing, and potentially the endoparasitic air-sac mite in environmentally stressed populations (Garnett *et al.* 2011).

There is little reason to predict that populations will remain stable into the future, that is to say the population is likely to increase or decrease in response to environmental changes (natural and anthropogenic).

There has been ongoing water hole monitoring by the Northern Territory Government for a number of years, and reviews of the power and sensitivity of the data suggest that it would require 16 years of continuous monitoring in order to detect an actual species decline of 10% per year (O. Price unpubl. data). By this time, substantial real changes in the population might have occurred. Long term changes in weather patterns, and subtle spatial and temporal variability in habitat across the landscape may also make it very difficult to assess change, and apportion a cause for any change.

The two most recent monitoring surveys at Yinberrie Hills provide more detailed trend data from 2009 to 2013 (Ward 2013; Ward and Voukolos 2009). In 2009 eight of the twelve waterholes in the Yinberrie Hills were surveyed and 375 Gouldian finches were counted (203 adults and 172 juveniles). This total was the second lowest total in surveys since 2003, although this was confounded by heavy rain that was encountered during the surveys, which would have provided alternative small water sources in the area (Ward and Voukolos 2009). In 2013 the total numbers of Gouldian finches counted were 235 (113 adults and 122 juveniles). This was one of the lowest counts since surveys commenced in 1996, the average number of birds per water hole being the lowest in any count other than 2000. One reason was thought to be the possible reconfiguration of physical structure and vegetation around the waterholes after a large flood in December 2011, causing some wetlands to be less attractive to Gouldian Finches, with other, currently not surveyed wetlands becoming more preferable (Ward 2013).

A number of recent publications have suggested that long term monitoring is important for management of complex ecological systems, evaluating responses to disturbances, and evaluating change, causes for change and therefore how management should be altered (Lindenmayer and Likens 2009).

The concept of adaptive monitoring aims to resolve many of the problems that have undermined previous attempts to establish long-term research and monitoring by recommending a sensible framework for monitoring. There are four key elements: (i) the requirement to pose tractable (flexible and evolving) questions; (ii) the need to employ rigorous statistical design at the outset; (iii) the use of a conceptual model of the ecosystem or entity being examined; and (iv) acknowledgment that humans (land managers and management agencies) need to know about ecosystem change.

This framework is ideal as an overarching framework for on-going and future monitoring. Regardless, it is not contestable that if habitat availability is limited for the species (especially for breeding) and it is removed or degraded over time, there will inevitably be a negative effect on the population.

Effective long-term, rigorous monitoring of the population, run under an adaptive monitoring paradigm, with clear trigger levels for management change, should be continued. This will remove some uncertainty regarding population trends within the Yinberrie Hills.

1.1.3 Diet

The foraging ecology of many finches is complex because they are dependent on an annual source of seeds; yet grass seed availability varies substantially across the landscape and over time, depending on the phenological patterns of the preferred seed species. Both climate (timing of annual rainfall and length of dry season) and management (fire and grazing effects for example) create subtle shifts in food availability. Finches are required to move to different parts of the landscape over time, and small patches of seed resources can become critical, particularly at times of high food scarcity near the end of the dry season and the beginning of the wet (Liedloff *et al.* 2009). As such it is difficult to identify exactly which components of the preferred habitat are more important than others, as shifts over time will cause some areas to ebb and flow in importance; protection of entire areas of suitable habitat is important.

Four key grass species are known to comprise most of the seed resources for Gouldian Finches in the Yinberrie Hills area – *Alloteropsis semialata*, *Chrysopogn fallax* (and *C. latifolius*), *Sorghum intrans* (*Sarga timorense*) and *Triodia bitextura* (Liedloff *et al.* 2009). Modelled probability of occurrence of these species over time, based on substantial field testing of the relationship between landscape and environmental variables and the grass species presence, indicated that lowland foraging areas adjacent to the mine contain substantial areas of *Alloteropsis semialata* and *Sorghum intrans (Liedloff et al. 2009).* Cockatoo grass *(Alloteropsis semialata)* is a particularly important early season (and post-fire) food resource for Gouldian Finches (Dostine *et al.* 2001) as it is for other endangered finch species in the tropical savannas such as the southern subspecies of the Black-throated Finch (DEWHA 2009b).

1.1.4 Breeding

The Gouldian Finch breeding areas generally occur in open tropical savanna woodlands in hilly terrain. Nests are built in hollows of Eucalypts such as snappy gum (*E. brevifolia*) or salmon gum (*E. tintinnans*) (Tidemann *et al.* 1999). A cup shaped nest of grass is built in hollows created by termite activity, and clutches of 3-8 eggs are laid between January and August, with a peak in April (Tidemann *et al.* 1999). Breeding coincides with peak resource availability (Dostine *et al.* 2001) and up to three clutches can be produced per season, with an average annual recruitment of 2.5 birds per adult (Tidemann *et al.* 1999).

There are over 30 known nest sites abutting and directly adjacent to the existing disturbance area from the mine (Liedloff *et al.* 2009). The draft EIS identified a possible nest site in the vicinity of the existing Batman Pit, with a pair of Gouldian Finches observed repeatedly visiting and entering a tree hollow in a *E. tintinnans* (GHD 2013).

1.2 Clearing

Clearing and fragmentation of habitat has a greater impact on wildlife when only a small percentage of native vegetation remains (Mac Nally *et al.* 2009). Where clearing and fragmentation is a small proportion of the landscape, the effects have been less frequently examined (Price *et al.* 2005).

In northern Australian tropical savannas there has been some investigation of small scale clearing and fragmentation on fauna (Hannah *et al.* 2007; Kutt *et al.* 2012b; Price *et al.* 2005). Significantly, bird species richness and abundance is most affected, with cleared areas demonstrating a higher turnover of species and a predominance of disturbance tolerant species (Kutt *et al.* 2012a; Kutt *et al.* 2012b). In the north-eastern tropical savannas there are a number of finch species that have severely declined in distribution and abundance, and have become locally extinct. The primary cause for the threatened status is habitat clearing and degradation by cattle grazing and other agricultural practices (Garnett *et al.* 2011).

Habitat clearing is the corollary of vegetation clearing, but results in the specific loss of fauna habitat features such as hollow-bearing trees and hollow logs. This reduces the availability of perching, foraging and den/nesting resources for native species. Clearing also results in an increase in competition for resources such as food and shelter in remaining habitats, and as there are a finite number of these resources in remnant vegetation there is often little migration into, or population stability or increase, as a result of adjacent habitat loss.

Gouldian Finch are known to breed in areas containing *Eucalyptus tintinnans*, while the surrounding areas of lowland woodland are regarded as important wet season feeding habitat. Potential breeding habitat proposed to be cleared is calculated at 157.47 Ha, whilst potential wet season foraging habitat proposed to be cleared is calculated at 451.85 Ha.

A total area of 609.33 hectares of native vegetation is proposed to be cleared, as shown in Figure 1. Table 1 outlines the area of each of the vegetation communities to be cleared and also indicates whether this is foraging or breeding habitat for the Gouldian Finch.

The total area of 609.33 Ha to be cleared represents 0.68% of the total Yinberrie Hills SOCS (total area of 90,294.28 Ha). Based on vegetation communities across the Yinberrie Hills SOCS, mapped at 1:250,000, this clearing will impact 0.21% of all possible Gouldian Finch breeding habitat (i.e. *E. tintinnans* communities) and 0.03% of all possible foraging habitat (non *E. tintinnans* communities).

Intensive survey of the Yinberrie Hills Gouldian Finch population over many years has recorded nesting sites immediately west of the Batman Pit. This area is shown inFigure 1 as Gouldian Finch breeding habitat, an area containing all breeding records provided by the NT DLRM, surrounded by a 500 m buffer. Proposed clearing will remove approximately 0.55 Ha of this Gouldian Finch breeding habitat.

Table 1 Areas of Vegetation Communities proposed to be cleared

Vegetation Community	Veg code	Possible Gouldian Finch habitat	Area to be cleared (Ha)
E. bigalerita Eucalyptus spp. open-forest	2	Foraging	89.85
E. tintinnans Eucalyptus spp.*Erythrophleum chlorostachys* woodland	4	Breeding	57.10
E. tintinnans Eucalyptus spp.*Erythrophleum chlorostachys* woodland (Disturbed)	4B	Breeding	24.69
E. tintinnans C dichromophloia woodland	6	Breeding	75.68
E. tectifica woodland	9	Foraging	294.47
E. latifolia E. bigalerita open-woodland with areas of grassland	11	Foraging	67.53
TOTAL AREA			**609.33**

1.3 Dust Effects on Fauna

Research and knowledge with respect to airborne pollutants, and in particular dust effects on wildlife, are mostly restricted to effects of concentrated population of domestic animals such as chickens in restricted environments; or more general studies on the effects of infrastructure such as roads and mines on adjacent bird populations (Collins and Algers 1986; Spellerberg 1998).

The understanding of the toxicological effects of air pollution on wildlife is limited mainly to symptoms observed in the field and extrapolated from studies on livestock and laboratory animals (Newman and Schreiber 1988). Current air quality standards cannot be assumed to protect wildlife from the effects of air pollution due the lack of direct evidence or research for most taxa (Newman and Schreiber 1988).

The anatomy, physiology and mechanics of the avian respiratory system differ significantly from that of mammals (Brown *et al.* 1997; Härtle and Kaspers 2011). High loads of dust and pathogens in the environment may pose a particular stress to the unique respiratory system of birds (Härtle and Kaspers 2011). Airborne dust is thought to be a carrier for gases, microorganisms, endotoxins, and various other substances (Collins and Algers 1986; Lai *et al.* 2009) and can provide a vector for horizontal disease transmission between birds (Richardson *et al.* 2003).

Reviews of the dose-related pathophysiology of a spectrum of orally administered toxicants to a range of domestic animals suggested that, in general, birds (most research has been completed using domestic fowl) were not automatically and predictably more sensitive to orally administered toxicants than comparably sized mammals (Brown *et al.* 1997). Domestic birds may have a higher or lower sensitivity, depending on the specific intoxicant, to an orally administered toxicant or environmental contaminant relative to comparably sized mammals. Not only is the sensitivity often not predictable as to differences in sensitivity between mammals and birds in regard to a specific toxicant, but there are differences among related avian taxa (Brown *et al.* 1997; Härtle and Kaspers 2011).

1.3.1 Potential Direct Dust Effects on the Gouldian Finch

There is no specific dust criterion (i.e. acceptable level of exposure that will not cause a negative health effect) for fauna. It would be anticipated that small birds like the Gouldian finch would require a lower dust criterion (Newman and Schreiber 1988) as they have higher rates of inhalation per unit body mass than do humans, and are capable of take up of approximately twice the volume of gas from its ventilator system of that of a mammal (Brown *et al.* 1997).

Effects on individuals from dust are critically influenced by inhalation rates. The United States Environmental Protection Agency recommended equation for calculating active inhalation rates for passerine birds (of which Gouldian Finches are included) is conservative in that the equation used is derived from non-passerines, which have a lower inhalation rate. The equation yields an inhalation rate of 125,705 cm^3/kg body weight/h, compared to that of a 23-30 year old male human of 9,621 cm^3/kg body weight/h (i.e. the Gouldian finch's rate is over 13 times that of the human) (Sample *et al.* 1997).

Dust modelling was completed for the area of the mine lease and the immediate surrounds, predicting the maximum 24-hour average ground level concentrations of PM_{10} across the local area (Figure 2) and regionally (**Error! Reference source not found.**) and average dust levels for predicted ground level concentrations of PM_{10} for the period 1st April to 31st July (Figure 4 and Figure 5), the period of the year when Gouldian Finch nesting occurs and the species is known to be concentrated in the Yinberrie Hills area immediately west of the Batman Pit and the mine site.

The Yinberrie Hills area (incorporating all of the known Gouldian Finch breeding habitat) is predicted to have the highest concentrations of dust, with the potential for a very large area to be exposed to predicted maximum 24-hour ground level concentrations of PM_{10} of greater than 50 µg/m³ (the Impact Assessment Criterion upper safe limit for humans) across all of the mine lease, and extending well to the north, west and south, but limited by the extent of the modelling.

This area of significant elevated dust levels incorporates all of the known Gouldian Finch breeding habitat (provided by NT DLRM), with some areas of this known breeding habitat receiving greater than 1,000 µg/m³ (more than 20 times the acceptable level for humans), more than half of the area receiving over 300 µg/m³, and almost all of this area receiving greater than 200 µg/m³.

Modelling of average dust levels during the dry season breeding months of April to July (inclusive) also indicates that dust generated by mining activities will travel in a northwest direction, impacting much of the Yinberrie Hills area of known Gouldian Finch breeding habitat Figure 4), but at much lower levels than the predicted maximum. Figure 2 indicates that a small area of the known Gouldian Finch breeding habitat will be exposed to an average PM_{10} of greater than 300 µg/m³, almost half the area will exceed a PM_{10} of greater than 100 µg/m³, and more than half of the known breeding habitat is predicted to be exposed to a PM_{10} of greater than 50 µg/m³ (the Impact Assessment Criterion upper safe limit for humans).

1.3.2 Potential Indirect Dust Effects on the Gouldian Finch

Historically an air-sac mite *Sternostoma tracheacolum* was thought to have increased mortality in wild populations, with examples of 62% of infection in trapped animals (Tidemann et al. 1992), and though the infection was not thought to be directly responsible for the species decline in northern Australia, it was thought to make the Gouldian Finch more susceptible to other environmental stresses (Garnett et al. 2011). Given the link between airborne dust as a vector for carrying microorganisms, and high rates of avian inhalation per body mass, there could be an increased risk to the species health via higher infection rates of birds to air-sac mite, with the decreased air quality.

Other threats to Gouldian Finch populations include the typical effects of poor land management (increasing intensity of fire regimes) and intensification of grazing which can reduce body condition and health of the birds during periods of low seed availability, by reducing seed yield and abundance directly through removal or indirectly via long term changes to grass composition (Garnett et al. 2011). Fire can also effect the availability of nesting hollows (Tidemann et al. 1999).

1.4 Process Water in Tailings Dams

The creation of tailings storage dams is required for CIL/CIP gold extraction. In simple terms, gold extraction is undertaken by using sodium cyanide to dissolve the gold from crushed ore, leaving residue slurry that contains the fine ore particles, as well as toxic cyanide residues in various forms. This slurry is then pumped on the tailings storage where the particles settle out and the supernatant water is recycled for various processes (Hudson and Bouwman 2008). The temporary ponds of standing water attract wildlife, particularly birds (Read 1999), leading to reported mortality. Taxa reported to be effected include migratory birds, mammals, frogs and reptiles (Donato *et al.* 2007; Griffiths *et al.* 2009; Henny *et al.*1994; Read 1999). Vista Gold has included a cyanide destruction circuit in order to lower the WAD cyanide to less than 10 ppm prior to pumping to the tailings dam.

The links between use of tailings dams and poisoning in waterfowl and other species of avifauna is well documented in the Australian literature (Ryan and Shanks 1996). Recent critical reviews of wildlife mortality in Australian tailings dams due to cyanide suggest that patterns of poisoning in birds from weak-acid-dissociable cyanide (WADCN) is complex, is not related to bird body size or bio-accumulation and is likely due to skin absorption rather than consumption (Donato *et al.* 2007; Donato *et al.* 2008). What constitutes a lethal dose, particularly susceptible wildlife, and factors that encourage wildlife use of tailing dams is also not well known (Donato *et al.* 2007; Donato *et al.* 2008). The concentration of WADCN that is associated with wildlife mortality is also quite variable, and 50 mg/L is considered a threshold, and an interim benchmark, above which where bird deaths may begin to occur (Donato *et al.* 2007; Donato *et al.* 2008). Bird mortality is very low where concentrations of WADCN are less than 50mg/L (NICNAS 2010) and this level is in keeping with the international guideline on the release of cyanide containing tailings water (ICMI 2006).

Vista Gold will treat the majority of WAD cyanide in tailings water prior to release. This will be undertaken using the air-sulfur dioxide process. Trial treatments have yielded WAD cyanide concentrations of 39.8 mg/L (TetraTech 2013). Concentration of some metals e.g. arsenic, copper and lead in trial tailings dam water are higher than the Australian and New Zealand industry levels (ANZECC & ARMCANZ 2000) recommended for release into the environment (TetraTech 2013), hence the development by Vista Gold of a closed circuit to ensure no release to the environment

1.4.1 Tailing Dam Water -Impact on Gouldian Finch

Past reports of bird use of, and bird mortality associated with, contaminated water include predominantly waterbirds and waders, but do also include some records of passerine species including finches (Donato and Smith 2006). There are also observations and anecdotal reports of granivorous bird species drinking from tailings dams and suffering mortalities (Donato 1999).

The general absence of smaller passerines from mortality could be due to a number of reasons including;

- many insectivorous small passerines do not require daily access to water;
- small passerines drink at water sources for brief periods and move away, unlike waterbirds that remain at the dams; thus mortality observations might be biased to waterbirds that suffer mortality *in situ*;
- smaller passerines are less observable either drinking or as carcasses due to the size of the tailings dams;
- small carcasses are scavenged by predators, covered by tailings sediments, or sink into the liquid or supernatant (Donato *et al.* 2007),
- smaller passerines such as finches, prefer to drink from smaller water bodies, and large dams are not typically utilised by Gouldian Finches (Dostine *et al.* 2001).

Gouldian Finches are unlikely to use tailings dams; but during periods of resource bottlenecks, where smaller, ephemeral water sources have dried out, there is no reason to suggest that finches and other small bird would not use these water sources. The susceptibility and limits of tolerance of finches to drinking at these water sources is unknown, though there is clear evidence that birds do use these facilities and there is a risk of mortality from wildlife use of the contaminated water (Donato *et al.* 2007). Bird density and use of tailings dams can be increased by the size of the dam, and the provision of microhabitat features associated at the dam site, such as shallow flats, trees in the water or on the water's edge, islands, or other vegetation overhanging the water (Donato *et al.* 2007).

1.5 Vehicle Traffic and Roadways

There is substantial literature and reviews on the effect of roads and vehicle traffic on adjacent biota (Forman and Alexander 1998; Forman and Deblinger 2000; Johnston and Johnston 2004; Lugo and Gucinski 2000; Pagotto *et al.* 2001; Trombulak and Frissell 2000; Walker and Everett 1987) and more recently the topic of road ecology has been considered a research discipline in itself (Coffin 2007). The history of the development of road ecology (Forman 1998) is well described in this publication. There can be both biotic and abiotic effects of roads on ecosystems (Coffin 2007) and these include;

- changes to hydrology and water quality, both increases and decreases (Forman and Alexander 1998);
- erosion and sediment transport (Jones *et al.* 2000);
- the introduction of chemical pollutants, including toxic contaminants (Forman 2003);
- noise effects (Bayne *et al.* 2008);
- direct mortality (Erritzoe *et al.* 2003);
- barriers to movement (Shepard *et al.* 2008);
- the creation of new habitat types, especially in agricultural landscapes (Bellamy *et al.* 2000);
- the creation of corridors and conduits of species movement or invasion (von der Lippe and Kowarik 2008); and
- fragmentation and edge effects (Hawbaker *et al.* 2006).

1.5.1 Vehicle Traffic Impacts on Gouldian Finch and Threatened Fauna

Most of the effects of vehicle traffic and roads listed above have the potential to impact on the Gouldian Finch.. The most significant impact is likely to be mortality through vehicle strike, noise effects on breeding behaviour, the dispersal of chemical pollutants in road dust. There might also be some indirect effects of habitat degradation via vehicle facilitation of exotic plant species into relatively undisturbed habitat (e.g. Gamba grass) which might change the quality and extent of habitat in the area.

There may also be some perverse benefits in the construction of new roads; granivorous birds often feed in road verges, as some seeding grasses are encouraged in these microhabitats due to changes in hydrology and accumulation of water in verges encouraging graminoid growth. This might however be counteracted by the increased probability for vehicle strike of birds, especially if the feeding birds are flushed by passing traffic.

Though these threats might have some effect, vehicle traffic and roads are not considered in the Recovery Plan (O'Malley 2006) or in recent reviews of the conservation status of the species (Garnett *et al.* 2011). It is possibly a diversion from more significant actions such as clearing habitat, dust and toxic water quality. The only caveat to this is the spread of fire-promoting exotic grass species by vehicles which, if unmanaged, could also pose significant risks to the Gouldian Finch population.

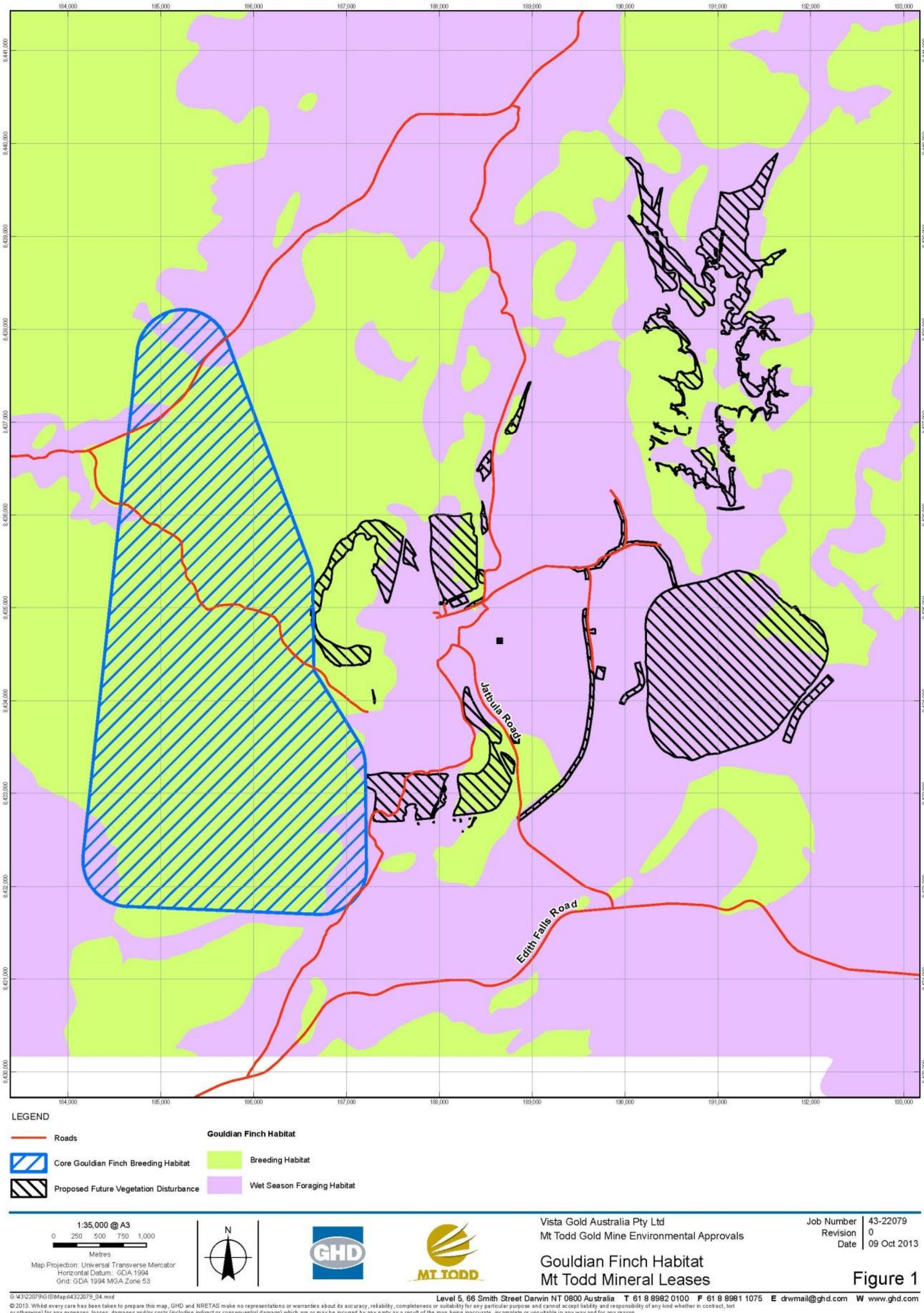

Figure 1 Gouldian Finch habitat, Mt Todd mineral leases

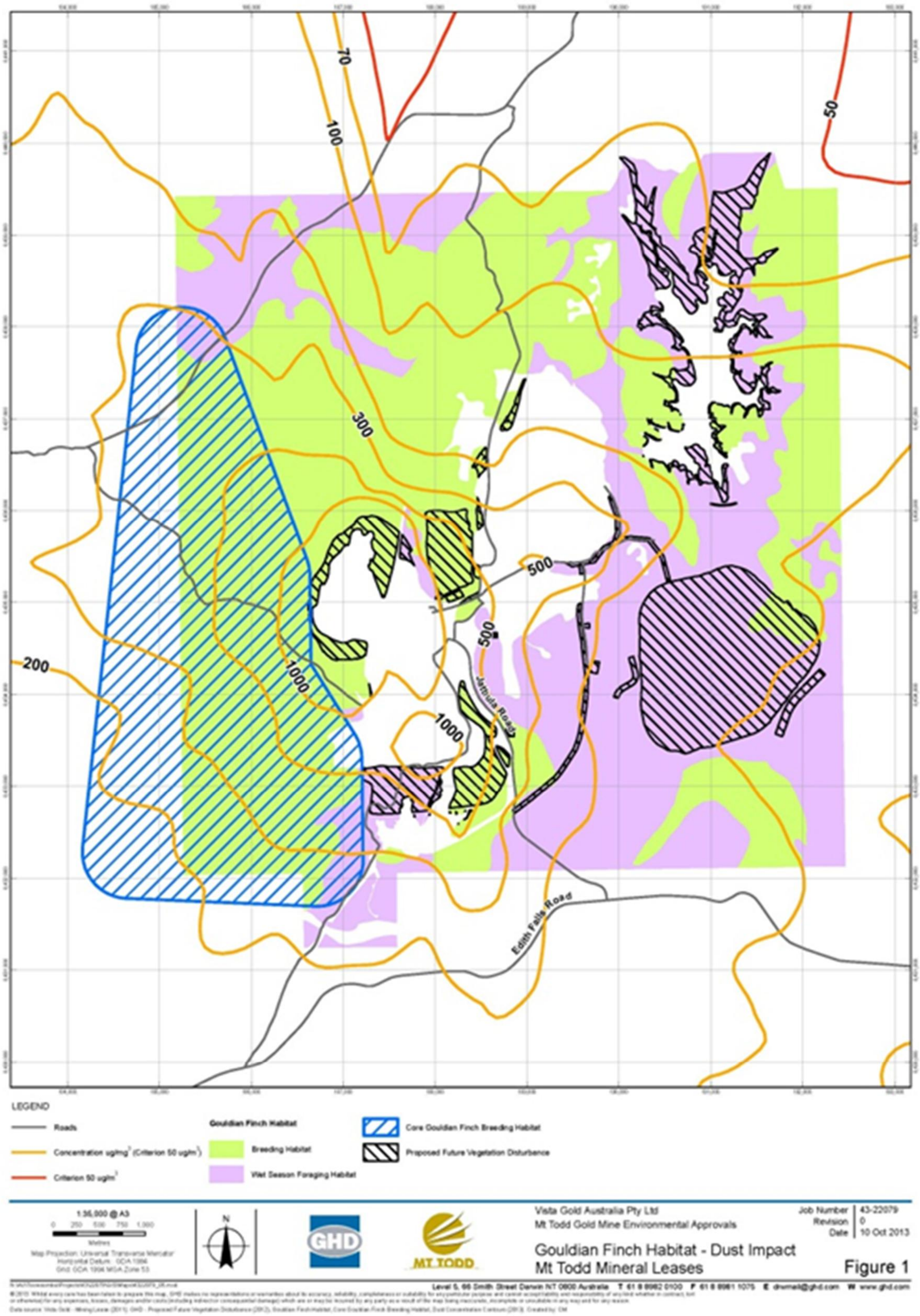

Figure 2 Predicted maximum 24hr average GLC of PM_{10} – localised dust impact

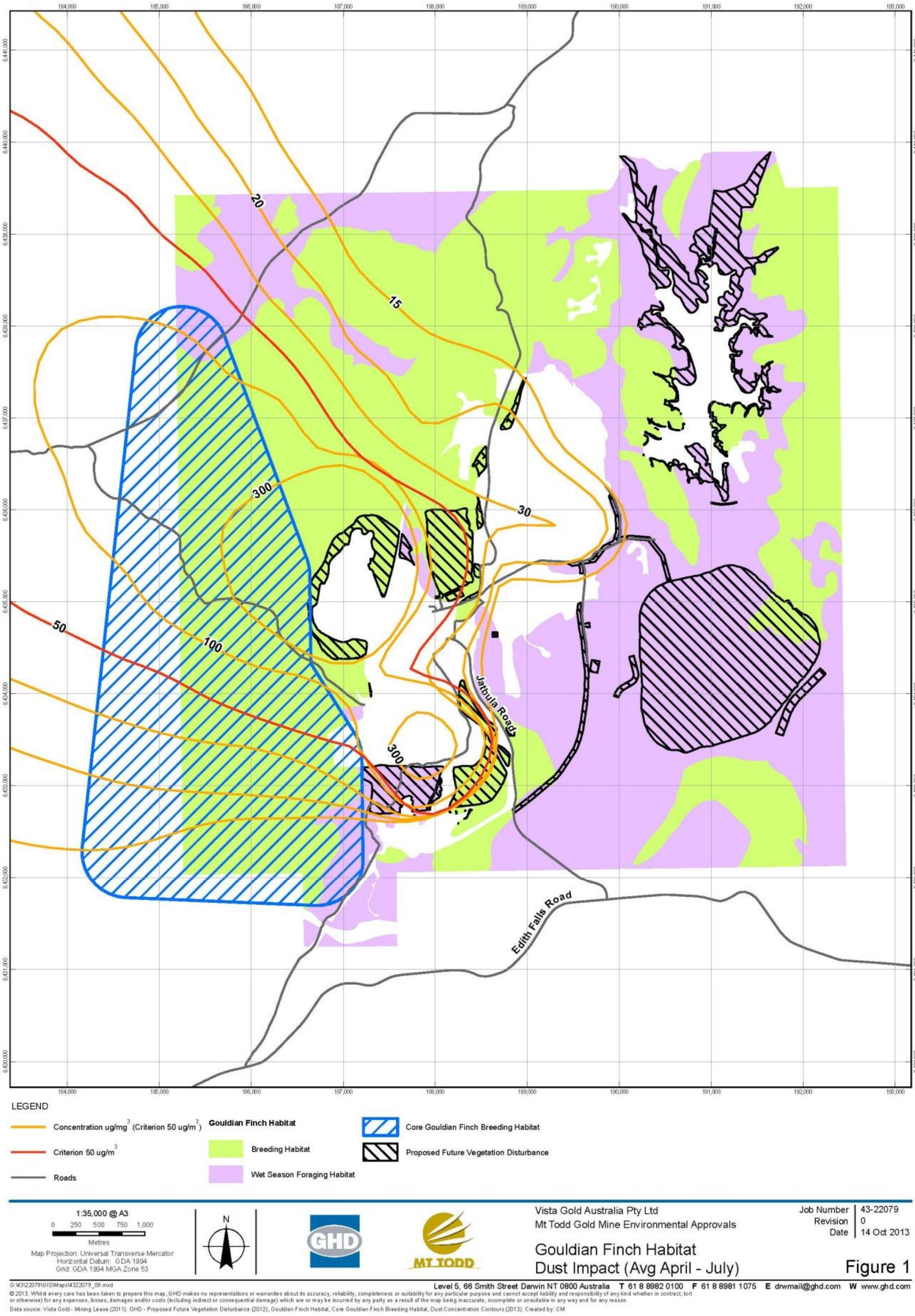

Figure 3 Predicted maximum 24hr average GLC of PM_{10} – regional dust impact

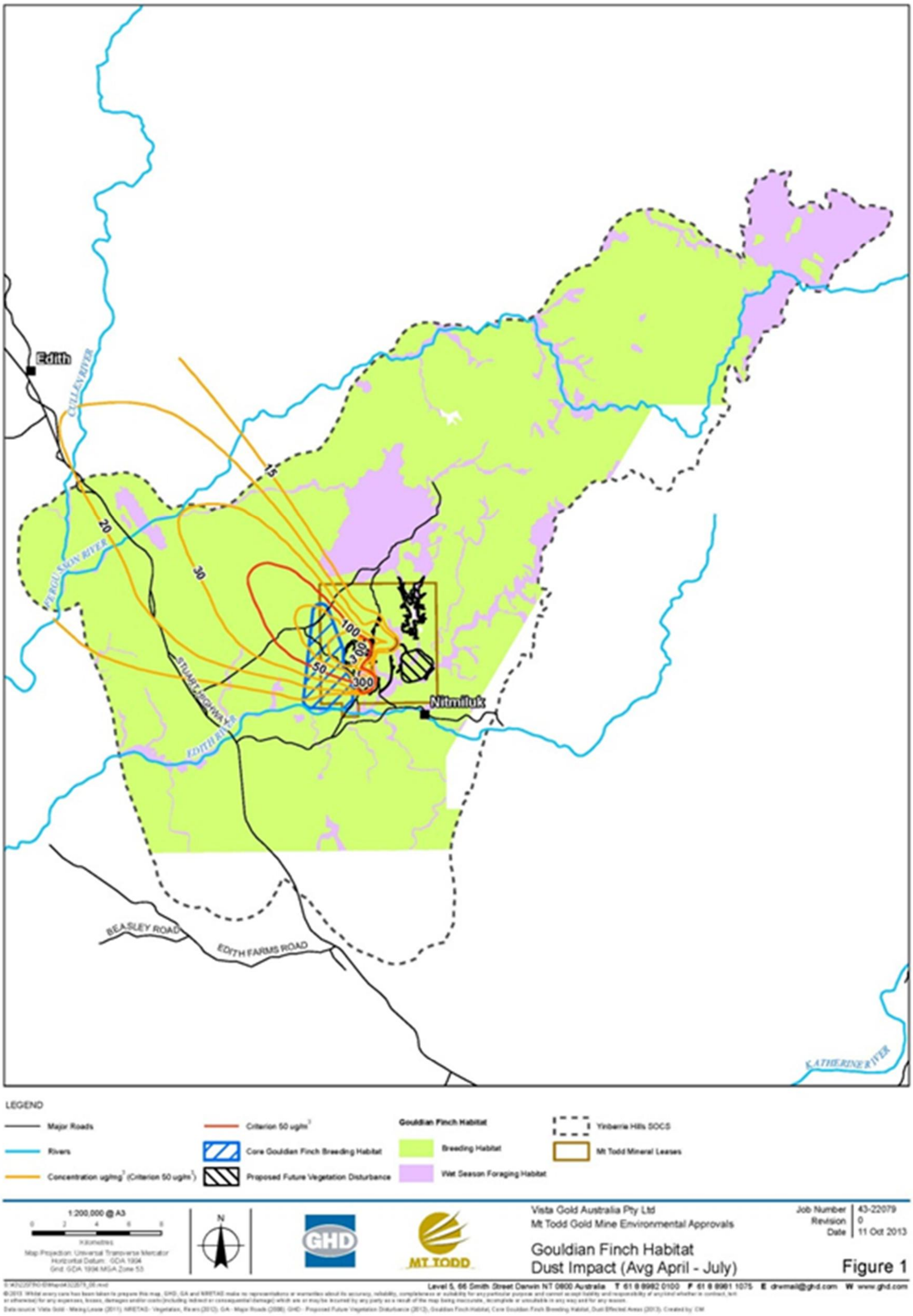

Figure 4 Average dust levels during the dry season months April to July - localised impact

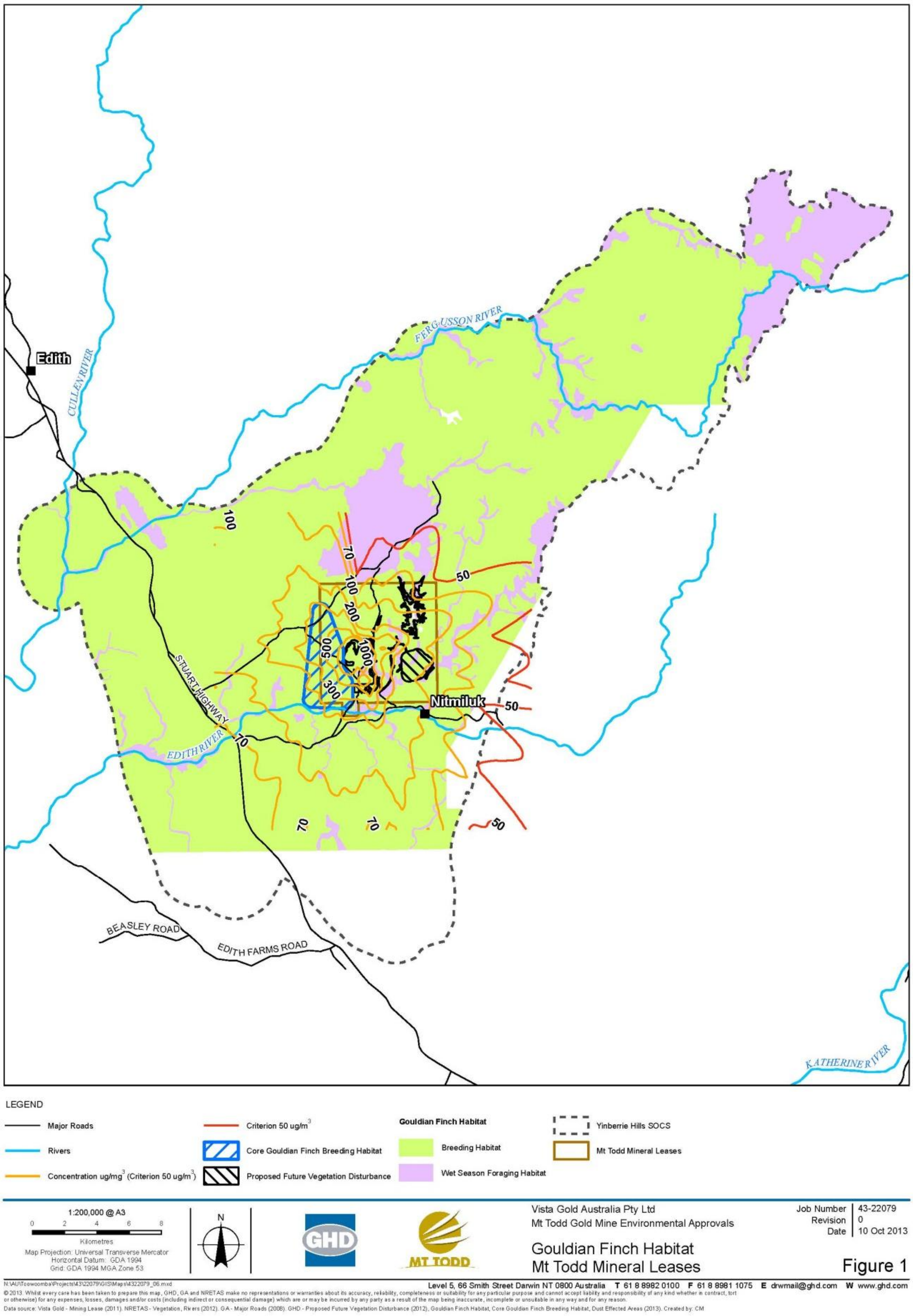

Figure 5 Average dust levels during the dry season months April to July - regional impact

2. Control Measures

Measures to control the environmental impacts follow a hierarchy of key principles, based on the opportunity to effect the control actions, severity of impact and the residual level of risk. The level of control measures are;

- avoiding direct and indirect adverse impacts on environmental values including MNES;
- minimising and mitigating adverse environmental impacts and enhancing environmental benefits associated with project activities, products or services; and
- managing direct and indirect adverse impacts to minimise cumulative adverse impacts on environmental values, including MNES.

2.1 Clearing

As outlined previously, a total area of 609.33 hectares of native vegetation is proposed to be cleared (Figure 1). It has been calculated that this area is comprised of 157.47 Ha of potential Gouldian Finch breeding habitat, and 451.85 Ha of potential Gouldian Finch wet season foraging habitat.

2.1.1 Avoidance Actions

To avoid a negative effect on Gouldian Finch populations, including breeding (nesting) habitat and wet and dry season feeding habitat, this would require the resiting of the proposed mine expansion. This is not considered to be an available option.

Notwithstanding the fact that the entire mine cannot be relocated, particular attention has been paid to the location of all infrastructure so that it is away from the Yinberrie Hills habitat areas. Specifically the waste rock dump, process plant and tailing storage facilities have all been located to the east of the Yinberrie Hills habitat area.

2.1.2 Minimising and Mitigating Actions

To minimise and mitigate clearing effects on the Gouldian Finch populations, in known breeding (nesting) habitat and wet and dry season feeding habitat the following actions have been considered:

- preliminary design and -siting of all infrastructure to minimise loss of key breeding and feeding habitat;
- precise delineation of the areas to be cleared for the expansion of the mine;
- clearing during non-breeding periodstraining construction and operations staff to undertake clearing effectively, strict vehicle hygiene protocols to prevent new weed incursion and spread, including a vehicle wash down facility on site;
- fire management protocols to reduce the impact on Gouldian Finch habitat during clearing activities;
- pre-clearing fauna surveys for nest sites, and breeding activity;
- focus of the edges abutting Gouldian Finch habitat to remove weed species, and maximise the presence of wet and dry season food species as part of an onsite weed management program;

- installation of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources (Brazill-Boast *et al.* 2013) on a one to one basis (i.e. one nest box installed to replace one cleared hollow).

2.1.3 Management Actions

To following management actions for the Gouldian Finch, with respect to the proposed expansion of the mine, are recommended;

- the production of a dedicated Gouldian Finch Species Management Plan that includes a section on clearing management and integration with all other known Gouldian Finch programs by others;
- the production of a Vehicle Weed Hygiene Procedure and a Weed Management Plan that defines actions for weed control during and after clearing and construction activities;
- the production of a Fire Management Plan that defines actions for fire control during and after clearing and construction activities;
- the production of a Construction Management Plan, that includes, but is not limited to, a commitment and methodology for training of construction contractors regarding clearing protocols, a timetable for clearing to minimise impacts to potential breeding (including the possibility of translocation), the requirement for pre-clearing Gouldian Finch surveys for identification of nest sites, the use of a fauna spotting during clearing activities;
- the production of a Rehabilitation Plan that defines the actions for native vegetation condition management on the edges of the new clearing and infrastructure where it abuts Gouldian Finch habitat;
- support for the existing monitoring program currently conducted by the Northern Territory Department of Land and Resource Management;
- the development and instigation of an in house monitoring program focussing directly on the area adjacent to the current mine and mine expansions. This monitoring program must be robustly designed, peer-reviewed and undertaken on at least a bi-annual basis, and include water hole counts, camera trapping at water points and habitat, feeding habitat condition assessment surveys, and nest count and population monitoring. The monitoring program needs to follow adaptive monitoring protocols (Lindenmayer and Likens 2009) and identity key trigger points for changed or remedial management actions with respect, but not limited to, to clearing, dust, water quality, vehicle traffic, fire impacts;
- investigate the potential use of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources using the design detailed in (Brazill-Boast *et al.* 2013). A density for nest box establishment and an area for establishment would need to be determined and agreed with the DLRM. This approach would be used to supplement existing naturally occurring known nesting resources only, to potentially enhance breeding rather than a direct replacement of cleared nests if required.

2.2 Dust

As outlined previously, dust modelling has indicated that the Yinberrie Hills area to the west of the Batman Pit (incorporating known Gouldian Finch breeding habitat) is predicted to have the highest concentrations of dust, with the potential for a very large area to be exposed to predicted maximum 24-hour ground level concentrations of PM_{10} of greater than 50 µg/m³ (the Impact Assessment Criterion upper safe limit for humans) across all of the Mineral Lease, and extending well to the north, west and south. This area of significant elevated dust levels incorporates all of the known Gouldian Finch breeding habitat (provided by NT DLRM), with some areas of the known breeding habitat receiving greater than 1,000 µg/m³ (more than 20 times the acceptable level for humans), more than half of the area receiving over 300 µg/m³, and almost all of this area of habitat receiving levels of more than 200 µg/m³. The same area is predicted to have the highest deposition rates of dust, due to the prevailing south-easterly winds, during the dry season, when Gouldian Finch are present within this area engaging in breeding and nesting activity.

Areas of habitat likely to be impacted by specific levels of dust cannot be accurately calculated due to the limited data available for the dust plume modelling (Figure 1), although this appears to indicate that areas of the Yinberrie Hills, including all confirmed Gouldian Finch breeding habitat, and additional areas of habitat regarded as suitable for dry season breeding and wet season foraging will be affected by dust A more detailed comment can be found in Appendix H

2.2.1 Avoidance Actions

To avoid a potential negative effect of dust on Gouldian Finch populations, breeding (nesting) habitat and wet and dry season feeding habitat, this would require the resiting of the proposed mine expansion. This is not considered to be an available option.

Notwithstanding the fact that the entire mine cannot be relocated, particular attention has been paid to the location of all infrastructure so that it is away from the Yinberrie Hills habitat areas. Specifically the waste rock dump, process plant and tailing storage facilities have all been located to the east of the Yinberrie Hills habitat area.

2.2.2 Minimising and Mitigating Actions

To minimise and mitigate the effects of dust on the Gouldian Finch populations, breeding (nesting) habitat and wet and dry season feeding habitat the following actions are recommended.

- The minimisation of dust emission controls as defined in a Dust Management Plan that includes, but is not limited to;
    - crusher dust controls to industry standards, via watering, emission screens, road sealing, chemical applications, covering of exposed loads where practicable.
- Minimising mining, hauling and vehicle travel in the dry season when prevailing winds and strength of winds reach a particular trigger level that would results in spatially extensive and heavy dust deposition in the Gouldian Finch habitat area where practicable.
- The identification of clear trigger levels for dust deposition on Gouldian Finch habitat, Gouldian Finch population decline, and vegetation health monitoring (see Section 2.2.3), that would result in cessation, change or limitations of mining activity where practicable.

2.2.3 Management Actions

To following management actions for the Gouldian Finch, with respect to the proposed expansion of the mine, are recommended.

- The production of a dedicated Gouldian Finch Species Management Plan that includes a section on management with respect to dust impacts.
- The development and instigation of an expanded Gouldian Finch monitoring program (see Section 2.1.3), that includes sites that are situated with the main area of the

predicted dust plume, and at increasing distances from the mine site.. This monitoring would investigate Gouldian Finch health (i.e. population, breeding, condition) and the direct relationship between dust deposition and finch populations.

- The development and instigation of Vegetation Condition monitoring program that includes sites that are situated with the main area of the predicted dust plume, and at increasing distances from the mine site. This monitoring would investigate vegetation health (i.e. finch food sources, and nesting trees) and the direct relationship between dust deposition and condition.

2.3 Processing Water

As stated previously, during periods of resource bottlenecks, when smaller, ephemeral water sources have dried out, there is no reason to suggest that Gouldian Finches would not use these water sources on an irregular basis. The susceptibility and limits of tolerance of these birds to drinking at these water sources is unknown, though there is clear evidence that birds do use these facilities and there is a risk of mortality from use of the contaminated water. Bird density and use of tailings dams can be increased by the size of the dam, and the provision of microhabitat features associated at the dam site, such as shallow flats, trees in the water or on the water's edge, islands, or other vegetation overhanging the water.

2.3.1 Avoidance Actions

To avoid the increased effect of the consumption or absorption of toxic water on Gouldian Finches this would require either;

- Surface areas of tailings dams to be kept to a practicable minimum, and 'up not out' principal applied to the design of additional facilities
- The maintenance of the weak-acid-dissociable cyanide (WADCN) levels at a consistently low level below that considered poisonous to wildlife; and

2.3.2 Minimising and Mitigating Actions

To minimise and mitigate the effects of Processing Water from the tailings on the Gouldian Finch populations the following actions are recommended;

- The minimisation of weak-acid-dissociable cyanide (WADCN) via the standard elimination and reduction control methods (oxidation, biological, electrochemical treatment);
- The reduction of the attractiveness of the dam landscape for wildlife via design that includes, but is not limited to, the reduction of the dam surface area, removing dam bank vegetation, creating steep dam walls, providing alternative adjacent Gouldian Finch friendly water sources, and avoiding the creation of islands in the dam;
- The identification of clear trigger levels of WADCN where remediation action regarding water quality must immediately occur.

2.3.3 Management Actions

To following management actions for the Gouldian Finch, with respect to the proposed expansion of the mine, are recommended;

- The production of a dedicated Gouldian Finch Species Management Plan that includes a section on tailings dam management;
- The production and application of a Water Quality Monitoring and Management Plan for the tailings dams, with specific reference to wildlife health;

- The production and application of a Tailings Dam Wildlife Monitoring Program that includes the best currently acceptable practices for auditory, visual or chemical repellents, screening and habitat modification. This program would include weekly monitoring of the tailings dam banks for sick or dead wildlife, and toxicological assessment of dead wildlife.

2.4 Vehicle Traffic

As outlined previously, the effects of roads and vehicle traffic on wildlife has been well documented, and have the potential to impact on the Gouldian Finch population at the project site. The most significant consequences are likely to be the direct effect of mortality through vehicle strike, noise effects on breeding behaviour, and the dispersal of chemical pollutants in road dust. There may also be some indirect effects of habitat degradation via vehicle spread of exotic plant species into relatively undisturbed habitat which might change the quality and extent of habitat in the area.

While there will also be some perverse benefits in the construction of new roads, such as granivorous birds feeding in road verges, as seeding grasses may be encouraged in these microhabitats due to changes in hydrology and accumulation of water in verges encouraging graminoid growth. However this might be counteracted by the increased probability for vehicle strike of birds, especially if the feeding birds are flushed by passing traffic.

Though these threats might have some effect, vehicle traffic is not considered in the Recovery Plan or recent reviews of the conservation status of the species, and are possibly a diversion from more significant actions such as clearing habitat, dust and toxic water quality. The only caveat to this is the increase in fire-promoting exotic grass species by vehicles which, if unmanaged, could also pose significant risks to the Gouldian Finch population.

2.4.1 Avoidance Actions

To avoid any negative effect of increased road traffic on Gouldian Finch populations, there should be no further increase in the current road network or the vehicle traffic at the mine site in areas adjacent to the Gouldian Finch habitat.

2.4.2 Mitigation Actions

To minimise and mitigate the effects of increased road traffic or increased road network on the Gouldian Finch populations the following actions are recommended;

- Reduce extent of proposed new road network, particular in areas adjacent to feeding and nesting sites where practicable;
- Reduce speed limits and install speed reduction infrastructure such as whoa-boys and speed humps;
- Install information and warning signs at key areas of key Gouldian Finch feeding and nesting areas;
- Provide road safety and awareness training to all staff and contractors with respect to safe driving in areas where native wildlife occurs; and
- Seal all roads to reduce further dust emission or deposition where practicable.

2.4.3 Management Actions

To following management actions for the Gouldian Finch, with respect to the proposed expansion of the mine, are recommended;

- The production of a dedicated Gouldian Finch Species Management Plan that includes a section on vehicle traffic management;

- The production and application of a Traffic and Road Safety Management Plan, including training, for the mine site, that includes a specific section on Gouldian Finches;
- The production and application of a Weed Hygiene Procedure and provision of on-site wash down facilities to prevent the spread of new exotic species, particular fire prone high biomass grasses;
- The development and instigation of an expanded Gouldian Finch monitoring program (see Section 2.1.3), that includes sites that are situated near and along new roads. This monitoring would investigate any changes in Gouldian Finch abundance and the direct relationship between roads, vehicle traffic and associated dust deposition.

3. Revised Risk Assessment

3.1 Risk Assessment Process and Methodology

This revised risk assessment for the Gouldian Finch follows the methodology used in the Mt Todd Gold Project Draft EIS. Risk relates to the effect of uncertainty on objectives. These objectives relate in this case primarily to environmental goals within the Draft EIS. Risk is expressed and assessed in terms of a combination of the consequence of an event and the associated likelihood of occurrence.

The initial levels of risk and determination of residual risk (after avoidance, mitigation and management actions have been applied) have been undertaken using standard qualitative risk assessment procedures consistent with AS/NZS ISO 31000:2009 ‘Risk Management – Principles and guidelines’, with the exception of economic risk which is not addressed in the guidelines (Table 2).

Assessment of risk has been conducted through consideration of the circumstances around risks, identifying necessary controls to address potential impacts and assuming effective implementation of planned and committed mitigation of potential impacts. Avoidance, mitigation and management actions are proposed in an attempt to reduce residual risk (risk after actions) where possible to below “Extreme” or “High” risk outcomes to the extent reasonably practicable as part of reducing the overall project.

The depth of focus on risk controls is linked to the level of risk and opportunity for reduction to meet organisational commitments and goals linked to an environmentally and socially responsible operation, and those requirements are part of the regulatory obligations and impact assessment guidelines.

Table 2 provides a summary of the qualitative risk matrix adopted and the levels of risk for the various consequence and likelihood combinations and a brief description of each risk classification and the likely responses for Gouldian Finch is provided in Table 3.

Table 2 Qualitative Risk Analysis Matrix

		Severity of Consequence				
		Critical (5)	**Major (4)**	**Significant (3)**	**Moderate (2)**	**Minor (1)**
Likelihood of Consequence	**Almost Certain (5)**	Extreme	Extreme	High	High	Medium
	Likely (4)	Extreme	High	High	Medium	Medium
	Possible (3)	Extreme	High	Medium	Medium	Low
	Unlikely (2)	High	Medium	Medium	Low	Very Low
	Rare (1)	Medium	Medium	Low	Low	Very Low

Table 3 Project Risk Assessment

Source of Impact	Comments	Minimising, mitigation and management actions	Likelihood	Consequence	Residual Risk	Reference
Long term decrease in size of population						
Clearing – breeding habitat	0.5 ha of known breeding habitat and 157.47 ha of possible breeding or foraging habitat will be cleared. This could cause a long term decrease in the size of the population via the loss of nest sites and/or foraging habitat. This clearing will impact 0.21% of all possible Gouldian Finch breeding habitat (i.e. E. tintinnans communities) and 0.03% of all possible foraging habitat (non E. tintinnans communities).	– Minimise impact via actions in Section 2.1.2-2.1.3 – Produce and apply dedicated Gouldian Finch Species Management Plan and ensure appropriate Construction, Weed, Weed Hygiene, Fire and Rehabilitation Management Plans attempt to minimize and mitigate clearing effects on Gouldian Finch population size – Develop long term adaptive monitoring program for Gouldian Finch populations and identify critical trigger points that require changes in management – Installation of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources (Brazill-Boast *et al.* 2013)	3	3	Medium	Section 1.4 Section 2.1
Clearing – wet and dry season foraging habitat	0.5 ha of known breeding and dry season foraging habitat, 157.47 ha of possible breeding and dry season foraging habitat and 451.85 ha of possible wet season foraging habitat will be cleared. This could cause a long term decrease in the size of the population via the loss of preferred feeding areas.	– As above	3	3	Medium	Section 1.4 Section 2.1
Dust	It is predicted that during operation of the expanded mine there will be an elevated and significant dust increases in the area used by Gouldian Finches, and this may impact on the health of individual finches within the dust plume, and the health of vegetation in preferred breeding and feeding areas.	– Refer to Section 2.2.2-2.2.3 – The minimisation of dust emission controls as defined in a Dust Management Plan – Produce and apply dedicated Gouldian Finch Species Management Plan – Develop long term adaptive monitoring program for Gouldian Finch populations, that investigate the association between finch health and dust, and identify critical trigger points that require changes in management – Develop and instigate a Vegetation Condition monitoring program	3	3	Medium	Section 1.5 Section 2.2
Processing Water	It is predicted that the Weak Acid Dissociable (WAD) cyanide in onsite water storage facilities may be at levels sufficient to cause wildlife mortality and that there may be impacts from ingestion by Gouldian Finches.	– Refer to Section 2.3.1-2.3.3 – Avoid the possibility by maintaining WAD cyanide levels below levels poisonous to wildlife, and prevent wildlife access to new tailings dams – Minimise WAD cyanide levels via elimination and reduction control methods, and access and attractiveness of tailings dams – Produce and apply a Water Quality Monitoring and Management Plan and a Tailings Dam Wildlife Monitoring Program	2	3	Medium	Section 1.6 Section 2.3

Traffic mortality	It is predicted that there will be some mortality from collisions with vehicles due to increased traffic that may impact the Gouldian Finch breeding populations.	– Refer to Section 2.4.1-2.4.3 – Reduce extent of new road network, in particular near nesting and feeding sites, reduce speed limits and traffic, install warning signs, provide road safety and awareness training to all staff and contractors, seal all roads to reduce roadside dust emissions – Produce and apply a Traffic and Road Safety Management Plan, a Weed Hygiene Procedure and provision of on-site wash down facilities – Develop long term adaptive monitoring program for Gouldian Finch populations, that includes sites adjacent to that are situated near and along new roads near key nesting and feeding habitat	2	1	Very Low	Section 1.7 Section 2.4
Adversely affect habitat critical to the survival of a species						
Clearing – breeding habitat	0.5 ha of known breeding habitat and 157.47 ha of possible breeding habitat will be cleared. This could cause an adverse effect on habitat critical to the survival of Gouldian Finch via the loss of nest sites. This clearing will impact 0.21% of all possible Gouldian Finch breeding habitat (i.e. E. tintinnans communities) and 0.03% of all possible foraging habitat (non E. tintinnans communities).	– Minimise impact via actions in Section 2.1.2-2.1.3 – Produce and apply dedicated Gouldian Finch Species Management Plan and ensure appropriate Construction, Weed, Weed Hygiene, Fire and Rehabilitation Management Plans attempt to minimize and mitigate clearing effects on Gouldian Finch population size – Develop long term adaptive monitoring program for Gouldian Finch populations and identify critical trigger points that require changes in management – Installation of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources (Brazill-Boast *et al.* 2013) one for one	3	3	Medium	Section 1.4 Section 2.1
Clearing – wet and dry season foraging habitat	0.5 ha of known breeding and dry season foraging habitat, 157.47 ha of possible breeding and dry season foraging habitat and 451.85 ha of possible wet season foraging will be cleared. This could cause an adverse effect on habitat critical to the survival of Gouldian Finch via the loss of preferred feeding areas.	– As above	3	3	Medium	Section 1.4 Section 2.1
Dust	It is predicted that during operation of the expanded mine there will be an elevated and significant dust increases in the habitat used by Gouldian Finches, and this may have an adverse effect on the health of vegetation in preferred breeding and feeding areas.	– Refer to Section 2.2.2-2.2.3 – The minimisation of dust emission controls as defined in a Dust Management Plan – Produce and apply dedicated Gouldian Finch Species Management Plan – Develop and instigate a Vegetation Condition monitoring program that links into a long term adaptive monitoring program for Gouldian Finch populations	3	3	Medium	Section 1.5 Section 2.2
Processing Water	No effect is predicted.	– Not applicable				
Traffic mortality	No effect is predicted.	– Not applicable				
Disrupt the breeding cycle of a population						

Clearing – breeding habitat	0.5 ha of known breeding habitat and 157.47 ha of possible breeding habitat will be cleared. This could cause a disruption to the breeding cycle of the population via the loss of nest sites. This clearing will impact 0.21% of all possible Gouldian Finch breeding habitat (i.e. E. tintinnans communities) and 0.03% of all possible foraging habitat (non E. tintinnans communities).	– Minimise impact via actions in Section 2.1.2-2.1.3 – Produce and apply dedicated Gouldian Finch Species Management Plan and ensure appropriate Construction, Weed, Weed Hygiene, Fire and Rehabilitation Management Plans attempt to minimize and mitigate clearing effects on Gouldian Finch population size – Develop long term adaptive monitoring program for Gouldian Finch populations and identify critical trigger points that require changes in management – Installation of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources (Brazill-Boast *et al*. 2013)	3	3	Medium	Section 1.4 Section 2.1
Clearing – wet and dry season foraging habitat	0.5 ha of known breeding and dry season foraging habitat, 157.47 ha of possible breeding and dry season foraging habitat and 451.85 ha of possible wet season foraging will be cleared. This could cause a disruption to the breeding cycle of the population via the loss of preferred feeding areas.	– As above	3	3	Medium	Section 1.4 Section 2.1
Dust	It is predicted that during operation of the expanded mine there will be an elevated and significant dust increases in the area used by Gouldian Finches, and this may have an adverse effect on the health of individual finches within the dust plume, and therefore the breeding cycle.	– Refer to Section 2.2.2-2.2.3 – The minimisation of dust emission controls as defined in a Dust Management Plan – Produce and apply dedicated Gouldian Finch Species Management Plan – Develop long term adaptive monitoring program for Gouldian Finch populations, that investigate the association between finch health and dust, and identify critical trigger points that require changes in management – Develop and instigate a Vegetation Condition monitoring program	3	3	Medium	Section 1.5 Section 2.2
Processing Water	No effect is predicted.	– Not applicable				
Traffic mortality	No effect is predicted.	– Not applicable				
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline						
Clearing – breeding habitat	0.5 ha of known breeding habitat and 157.47 ha of possible breeding habitat will be cleared. This could affect the availability or quality of nesting habitat to the extent that the species might decline. This clearing will impact 0.21% of all possible Gouldian Finch breeding habitat (i.e. E. tintinnans communities) and 0.03% of all possible foraging habitat (non E. tintinnans communities).	– Minimise impact via actions in Section 2.1.2-2.1.3 – Produce and apply dedicated Gouldian Finch Species Management Plan and ensure appropriate Construction, Weed, Weed Hygiene, Fire and Rehabilitation Management Plans attempt to minimize and mitigate clearing effects on Gouldian Finch population size – Develop long term adaptive monitoring program for Gouldian Finch populations and identify critical trigger points that require changes in management – Installation of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources (Brazill-Boast *et al*. 2013)	3	3	Medium	Section 1.4 Section 2.1

Clearing – wet and dry season foraging habitat	0.5 ha of known breeding and dry season foraging habitat, 157.47 ha of possible breeding and dry season foraging habitat and 451.85 ha of possible wet season foraging will be cleared. This could affect the availability or quality of feeding habitat to the extent that the species might decline.	– As above	3	3	Medium	Section 1.4 Section 2.1
Dust	It is predicted that during operation of the expanded mine there will be an elevated and significant dust increases in the habitat used by Gouldian Finches, and this may have an adverse effect on the health of vegetation and therefore the availability or quality of feeding habitat to the extent that the species might decline.	– Refer to Section 2.2.2-2.2.3 – The minimisation of dust emission controls as defined in a Dust Management Plan – Produce and apply dedicated Gouldian Finch Species Management Plan – Develop and instigate a Vegetation Condition monitoring program that links into a long term adaptive monitoring program for Gouldian Finch populations	3	3	Medium	Section 1.5 Section 2.2
Processing Water	No effect is predicted.	– Not applicable				
Traffic mortality	No effect is predicted.	– Not applicable				
Interfere with the recovery of the species						
Clearing – breeding habitat	0.5 ha of known breeding habitat and 157.47 ha of possible breeding habitat will be cleared. This could cause an interference with recovery of the species via the loss of nest sites. This clearing will impact 0.21% of all possible Gouldian Finch breeding habitat (i.e. E. tintinnans communities) and 0.03% of all possible foraging habitat (non E. tintinnans communities).	– Minimise impact via actions in Section 2.1.2-2.1.3 – Produce and apply dedicated Gouldian Finch Species Management Plan and ensure appropriate Construction, Weed, Weed Hygiene, Fire and Rehabilitation Management Plans attempt to minimize and mitigate clearing effects on Gouldian Finch population size – Develop long term adaptive monitoring program for Gouldian Finch populations and identify critical trigger points that require changes in management – Installation of nest boxes in known Gouldian Finch nesting habitat to supplement existing naturally occurring nesting resources (Brazill-Boast *et al*. 2013)	3	3	Medium	Section 1.4 Section 2.1
Clearing – wet and dry season foraging habitat	0.5 ha of known breeding and dry season foraging habitat, 157.47 ha of possible breeding and dry season foraging habitat and 451.85 ha of possible wet season foraging will be cleared. This could cause an interference with recovery of the species via the loss of preferred feeding areas.	– As above	3	3	Medium	Section 1.4 Section 2.1
Dust	It is predicted that during operation of the expanded mine there will be an elevated and significant dust increases in the area used by Gouldian Finches, and this may have an interference with recovery of the species.	– Refer to Section 2.2.2-2.2.3 – The minimisation of dust emission controls as defined in a Dust Management Plan – Produce and apply dedicated Gouldian Finch Species Management Plan – Develop long term adaptive monitoring program for Gouldian Finch populations, that investigate the association between finch health and dust, and identify critical trigger points that require changes in management – Develop and instigate a Vegetation Condition monitoring program	3	2	Medium	Section 1.5 Section 2.2

Processing Water	It is predicted that the Weak Acid Dissociable (WAD) cyanide in onsite water storage facilities may be at levels sufficient to cause wildlife mortality and that there may be interference with recovery of the species.	– Refer to Section 2.3.1-2.3.3 – Avoid the possibility by maintaining WAD cyanide levels below levels poisonous to wildlife, and prevent wildlife access to new tailings dams – Minimise WAD cyanide levels via elimination and reduction control methods, and access and attractiveness of tailings dams – Produce and apply a Water Quality Monitoring and Management Plan and a Tailings Dam Wildlife Monitoring Program	3	1	Low	Section 1.6 Section 2.3
Traffic mortality	It is predicted that there be some mortality from collisions with vehicles due to increased traffic that may have an interference with recovery of the species.	– Refer to Section 2.4.1-2.4.3 – Reduce extent of new road network, where practicable in particular near nesting and feeding sites, reduce speed limits and traffic, install warning signs, provide road safety and awareness training to all staff and contractors, seal all roads to reduce roadside dust emissions – Produce and apply a Traffic and Road Safety Management Plan, a Weed Hygiene Procedure and provision of on-site wash down facilities – Develop long term adaptive monitoring program for Gouldian Finch populations, that includes sites adjacent to that are situated near and along new roads near key nesting and feeding habitat	3	1	Low	Section 1.7 Section 2.4

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