

McPhillamys Gold Project

Key's Matchstick Grasshopper Survey



October 2022



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Executive Summary

LFB Resources NL (a wholly-owned subsidiary of Regis) lodged a Development Application for the McPhillamys Gold Project (the Project) under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) in 2019. The Project will include the development and operation of an open cut gold mine and a water supply pipeline.

A targeted survey was undertaken for Key's Matchstick Grasshopper (*Keyacris scurra*) in September 2022, across approximately 45.84 ha within the proposed mine surface disturbance area. While weather conditions were favourable for grasshoppers in general, no *Keyacris scurra* were recorded. A combination of high disturbance due to a history of grazing and a lack of suitable host plants throughout the area surveyed indicates the potential habitat present is unsuitable to sustain populations of the Key's Matchstick Grasshopper (*Keyacris scurra*).

1. Introduction

1.1 Background

LFB Resources NL (a wholly-owned subsidiary of Regis) lodged a Development Application for the McPhillamys Gold Project (the Project) under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) in 2019. The Project will include the development and operation of an open cut gold mine and a water supply pipeline.

EMM (2022) prepared a Biodiversity Development Assessment Report (BDAR) for the Project. The Key's Matchstick Grasshopper (*Keyacris scurra*) was identified as a relevant candidate species for survey as a result of recent updates to the Department of Planning and Environment (DPE) (2022a) *Threatened Biodiversity Data Collection* (June 2022).

EMM prepared a species polygon for the Key's Matchstick Grasshopper at the mine site (Figure 1) and along the proposed water supply pipeline based on assumed presence of the species. Approximately 45.84 hectares (ha) of Key's Matchstick Grasshopper potential habitat was mapped within the proposed mine surface disturbance area. EMM (2022) describe the potential habitat as Plant Community Type (PCT) 1330 - *Yellow Box - Blakely's Red Gum Grassy Woodland on the Tablelands, South Eastern Highlands Bioregion*. This is the only PCT mapped by EMM (2022) that is recognised as associated with the species (DPE, 2022a).

BugsEd was commissioned by Regis to undertake a targeted survey for the Key's Matchstick Grasshopper within the mapped potential habitat in the proposed mine surface disturbance area.

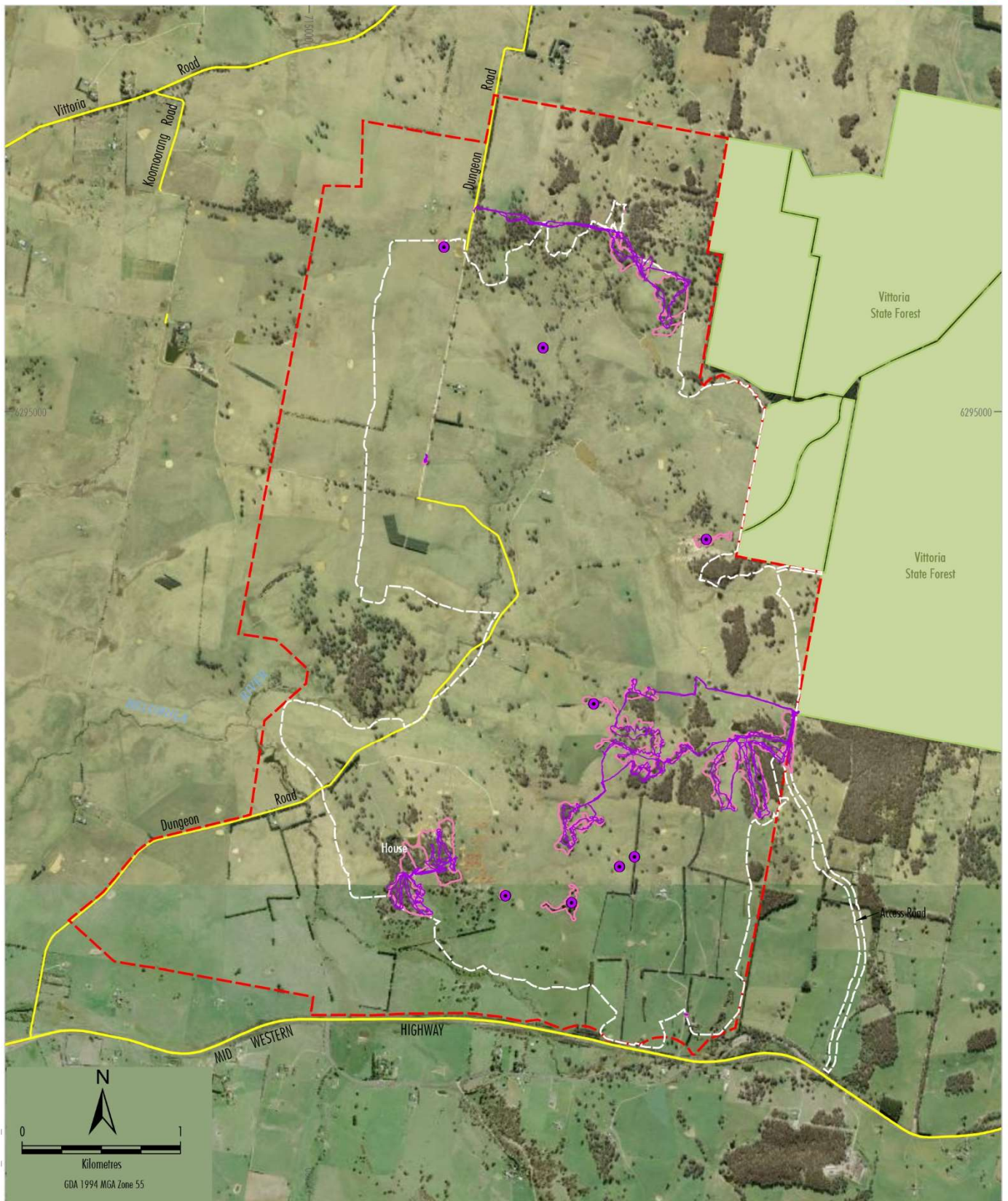
1.2 Species Description and Habitat

Keyacris scurra is listed as Endangered under the NSW *Biodiversity Conservation Act, 2016* and has recently been listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*.

Key's Matchstick Grasshopper is a small (females ~25 millimetres (mm), males ~18mm), slender, wingless grasshopper, belonging to the Subfamily Morabinae, which is endemic to Australia. It is readily identified by its slanted face, splayed hind femora (the longest section of their back legs), lack of wings or wing buds and sword-shaped antennae. *Keyacris scurra* occurs in several colour forms. Males and females may be grey, brown or buff and have stripes or other markings, and bright green females, with or without a buff stripe down their back, have also been recorded (White 1956).

Females bury their eggs in the soil and the nymphs emerge from December to January. While most males reach maturity by May, female nymphs overwinter and do not mature until Spring. Mating occurs from September to November, with most adults dying out by late Spring. There is only one generation per year and fecundity is low.

McPhillamys Gold Project - Key's Matchstick Grasshopper Survey



- LEGEND**
- NSW State Forest
 - McPhillamys Gold Project
 - Mining Lease Application (MLA 574)
 - Disturbance Footprint
 - Key's Matchstick Grasshopper Species Polygon (Prepared by EMM)
 - Survey Locations
 - Location Assessed Unsuitable

Source: NSW Spatial Services (2020); Regis (2020, 2022); EMM (2022)



McPHILLAMYS GOLD PROJECT

Key's Matchstick Grasshopper
Survey Locations

Figure 1

Key's Matchstick Grasshopper originally had a wide distribution across New South Wales, Victoria and the ACT in pre-European times, but land clearing for agriculture and other land uses has reduced its distribution (Department of Climate Change, Energy, the Environment and Water [DCCEEW] 2022; NSW Threatened Species Scientific Committee [TSSC] 2020a and b). Recent (2009-2019) credible records have identified *Keyacris scurra* at 31 well-dispersed sites in NSW, ACT and VIC (NSW Threatened Species Scientific Committee, 2020a). Targeted surveys between 2017-2019 found *Keyacris scurra* at a total of 23 sites: 11 from known sites documented through molecular research on the grasshopper in the 1950s and 1960s; and 12 new sites which were surveyed based on the presence of suitable habitat (e.g. tall grass in the genus *Themeda*) and food plants (NSW Threatened Species Scientific Committee, 2020a). These locations extended from as far north as Boorowa NSW, several sites in the ACT and south to Omeo in Northern Victoria. This species does not disperse large distances (<10 metres (m)) as it is flightless (DPE, 2022a).

Key's Matchstick grasshopper is typically recorded in native grasslands and grassy woodland, but has also been found in other vegetation associations containing a native grass understory (especially Kangaroo Grass [*Themeda triandra*]) and known food plants (particularly Asteraceae [daisies]) (DPE, 2022a). The Common Everlasting daisy (*Chrysocephalum apiculatum*) is an indicator species (DPE, 2022a).

Keyacris scurra feeds on a range of plant species, including everlasting and native daisies (e.g. *Chrysocephalum* or *Helichrysum* spp.), groundcovers such as clover (*Trifolium* spp.), sedges (*Scirpus* sp.), small herbaceous and flowering plants (e.g. *Acaena ovina*, *Cerastium glomeratum*) and grasses (e.g. *Aira caryophyllea*) (Blackith and Blackith 1966). While this grasshopper is often associated with areas that contain Kangaroo Grass (*Themeda triandra*), it appears to use this plant as shelter and not as a source of food (White, 1956). DPE (2022a) states that the species has been observed to feed on a range of additional species including *Wurmbea dioica* (Early Nancy), *Bulbine bulbosa* (Native Leek), *Calochilus paludosus* (Red Beard Orchid), *Rumex crispus* (Curled Dock), *Acetosella vulgaris/Rumex acetosella* (Sorrel), *Ranunculus lappaceus* (Common Buttercup), *Rosa rubiginosa* (Sweet Briar), *Trifolium subterraneum* (Subterranean Clover), *Trifolium arvense* (Haresfoot Clover), *Poranthera microphylla*, *Stackhousia monogyna* (Creamy Candles), *Hibbertia sericea*, *Lavandula stoechas* (Lavender), *Salvia verbenaca* (Vervain), *Verbascum thapsus* (Great Mullein), *Sherardia arvensis* (Field Madder), *Galium tricornatum* (Rough Fruited Bedstraw), *Ozothamnus retusus* or *O. scaber*, *Helichrysum bilobum* (Rough Everlasting), *Podolepis jaceoides*, *Podolepis acuminata* (Showy Copper-wire Daisy) and *Craspedia uniflora*.

Keyacris scurra appears to be absent from sites that are disturbed during the species lifecycle (DPE, 2022a). Recognised threats to *Keyacris scurra* include loss of habitat, small colony size, weed invasion, cultivation, and pasture improvement (NSW TSSC 2020a).

1.3 Broad Description of the Study Area

The study area is approximately 8 kilometres (km) north-east of Blayney within the South Eastern Highlands Interim Biogeographic Regionalization of Australia (IBRA) region and Orange IBRA sub-region. The study area is bordered by the Vittoria State Forest to the east. The study area is located in the former distribution of *Keyacris scurra*. The closest known recent record of *Keyacris scurra* was from an area of open woodland in Boorowa, approximately 120 km south-west of Kings Plains (Hoffman *et al.* 2021).

The study area has experienced historical pastoral use and is mainly open paddock with fragmented patches of grassy woodland, with a sparse, low canopy of Blakely's Red Gum and Yellow Box. Mid-storey species were sparse or absent, often with introduced Blackberry (*Rubus* spp.) and Briar

Rose (*Rosa rubiginosa*). All of the grassland is mapped by EMM (2022) as exotic grassland (not native). EMM (2022) describe that these areas are dominated by exotic grasses such as Harding Grass (*Phalaris aquatica*), Creeping Bentgrass (*Agrostis stolonifera*), Rye Grass (*Lolium rigidum*), Prairie Grass (*Bromus* spp.), Tall Fescue (*Festuca arundinacea*), Soft Brome (*Bromus hordeaceus*), Windmill Grass (*Chloris truncata*) as well as exotic forbs such as Burclover (*Medicago polymorpha*), Flatweed (*Hypochaeris radicata*) and White Clover (*Trifolium repens*).

The sites surveyed were in areas of active farming/grazing land. Large sections of woodland had been cleared for grazing and many felled trees lay throughout the fields. Cattle or sheep were either physically present, or there was evidence of their presence (e.g. dung, erosion from hooves, worn tracks through vegetation to access water or gates).

2. Methods

The targeted survey for *Keyacris scurra* was undertaken by Michelle Gleeson and Dr Kathy Ebert, entomologists with experience in sampling invertebrates across a range of habitat types.

DPE (2022a) indicates that *Keyacris scurra* can be surveyed in March, April, May, August, September, October, November and December. The targeted survey for *Keyacris scurra* was carried out from 26-28 September 2022, to coincide with the optimal timing to detect the presence of mature males and mature/maturing females (White 1956).

The weather conditions during the survey were favourable for finding *Keyacris scurra*. Temperatures during the day were up to 17°C, there was little to no wind and conditions were mostly sunny. Surveys were undertaken during the warmest part of the day.

Transects with separation distances of 5 meters (m) were surveyed within the mapped potential habitat in the proposed mine surface disturbance area. EMM (2022) describe that PCT 1330 (*Yellow Box - Blakely's Red Gum Grassy Woodland on the Tablelands, South Eastern Highlands Bioregion*) is largely in medium to poor condition with a high cover of introduced plant species due to past and current cattle grazing activities. The survey locations are shown on Figure 1. A few locations were assessed as unsuitable for targeted survey due to absence of suitable groundcover.

Entomological sweep nets were used to gently disturb understory vegetation in order to flush out grasshoppers. More vigorous sweeping was used in areas where vegetation was thick (e.g. in thick clumps of grasses). In areas where sweep nets could not be used (e.g. around thorny vegetation such as wild blackberry and thistles), the handle of the net was instead used to probe vegetation. Large patches of thistles made some small sections impenetrable.

Close-up photographs were taken of all grasshoppers encountered over the three days in the field. The presence of fully-formed wings or wing buds, which are absent in wingless grasshoppers such as *Keyacris scurra*, were examined. Morphological features of the head, antennae and thorax were used to identify the grasshoppers found to Family level.

3. Results

No *Keyacris scurra*, or any other species of wingless grasshoppers, were recorded during this survey. The location and conditions were favourable for grasshoppers in general, with the survey finding nine different species of small grasshoppers (see Attachment A) within the species polygon for *Keyacris scurra*. However, all of these species possess either fully-formed wings or wing buds, which are absent in wingless grasshoppers such as *Keyacris scurra*. The nine grasshopper species found also lacked key taxonomic features of the head and thorax that are characteristic of the Morabinae.

The habitat across the species polygon for *Keyacris scurra* was not representative of the habitat required to support populations of this grasshopper. Disturbance is a key factor in the distribution of this species ((NSW Threatened Species Scientific Committee, 2020a). Evidence of grazing, erosion and disturbance by livestock (cows and sheep) was present in all areas surveyed (see Plate 1). The understorey vegetation was dominated by weeds and introduced grasses (see Plate 2) and only one known associated plant, Red Grass (*Bothriochloa macra*), was recorded within PCT 1330 by EMM (2022).



Plate 1 - Example of Grazing Livestock



Plate 2 – Example of Weeds in the Groundcover

4. Conclusion

The survey sites were highly disturbed by grazing and dominated by an understorey of introduced grasses and weeds, resulting in an unsuitable habitat to sustain populations of *Keyacris scurra*. The presence of other small grasshoppers during the survey suggests that the weather conditions were favourable for grasshoppers in general and that repeating the survey at a different time of year is unnecessary.

5. References

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ATTACHMENT A - LIST OF GRASSHOPPERS RECORDED



Plate A1 – Acrididae species 1



Plate A2 – Acrididae species 2



Plate A3 – Acrididae species 3



Plate A4 – Acrididae species 4



Plate A5 – Acrididae species 5



Plate A6 – Acrididae species 6



Plate A7 – Acrididae species 7



Plate A8 – Acrididae species 8



Plate A9 – Acrididae species 9