



**NORTHERN STAR**  
RESOURCES LIMITED

**FARRANDS HILL PROJECT**

**GR183-11 GROUP REPORT**

**FOR THE PERIOD 1 JANUARY 2021 TO 31 DECEMBER 2021**

**Compiled by** Emma Cohen, Land Administration Geologist

**Date** February, 2022

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<b>Project Name</b>	Farrands Hill
<b>GR Number</b>	GR183-11
<b>Licence Operator</b>	Northern Star (Tanami) Pty Ltd
<b>Licence Holder</b>	Northern Star (Tanami) Pty Ltd (50%) and Tanami (NT) Pty Ltd (50%)
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### **ABSTRACT**

This report describes exploration activities primarily for gold undertaken by Northern Star (Tanami) Pty Ltd ('Northern Star') over the Farrands Hill Project (EL22061 and EL9843), between 1 January 2021 and 31 December 2021. The Farrands Hill Project forms part of a larger Joint Venture agreement (Central Tanami Project), between Tanami Gold (NT) Pty Ltd and joint venture partner and manager Northern Star (Tanami) Pty Ltd, a wholly owned subsidiary of Northern Star Resources Ltd. The terms of the JV agreement were renegotiated and executed late in 2021. The licences are located approximately 650 km northwest of Alice Springs, Northern Territory, along the Tanami Road. The target commodity sought is gold and mineralisation appears to occur at the top of the Dead Bullock Formation, similar to the gold deposits of The Granites and some of the Dead Bullock Soak deposits. Most of the project area is covered by alluvial and aeolian sand. The Gardiner Sandstone outcrops in very few places. The interpreted basement geology comprises the Dead Bullock Formation and Killi Killi Formation of the Tanami Group. On ground work was sporadic, due to access difficulties associated with government enforced COVID-19 pandemic travel restrictions, public road closures and a protracted heavy wet season hindering the ability to mobilise Northern Star personnel and contractors. Work completed during the period consisted of rehabilitation of aircore drill holes and tracks on EL9843 and EL22061, bottom of hole multi-element geochemical analysis, and a review of the CSIRO stratigraphy and geochemistry project.

## 1 INTRODUCTION

This report describes exploration activities primarily for gold undertaken by Northern Star (Tanami) Pty Ltd ('Northern Star'), on the Farrands Hill Project ('The project'), GR183-11 (EL22061 and EL9843), between 1 January 2021 and 31 December 2021.

The Farrands Hill Project is part of Northern Star's larger regional Central Tanami Project. In 2010, Tanami Gold (NT) Pty Ltd ('Tanami Gold') acquired the Central Tanami Project as part of a divestment package from Newmont Mining Corporation ('Newmont'). In early 2015, Northern Star entered a Joint Venture with Tanami Gold to explore for and mine gold at the Central Tanami Project and surrounding regional tenure. On 15 September 2021, Northern Star acquired an additional 10 % joint venture interest from Tanami Gold, resulting in both parties now holding a 50 % joint venture interest.

The COVID-19 pandemic, declared by the Australian Government in March 2020, saw unprecedented travel restrictions implemented and the closure of public roads in the Northern Territory. Northern Star's company directive in response to the COVID-19 pandemic saw all surface exploration activities suspended for a period in 2020 to help mitigate the risk of potential COVID-19 cases at all its operations. These COVID-19 challenges persisted throughout 2021. Additionally, the beginning of 2021 saw a protracted wet season limiting access to licences due to flooding and boggy ground conditions. These factors have hindered the ability to mobilise Northern Star personnel and contractors causing delays for on ground exploration activities in the Farrands Hill Project.

## 2 LOCATION, PHYSIOGRAPHY AND ACCESS

The Farrands Hill Project is located approximately 330 km southeast of Halls Creek, Western Australia, and 550 km northwest of Alice Springs, Northern Territory (Figure 1). Access from Alice Springs can be gained along the Tanami Road to the former Rabbit Flat Roadhouse, then 18 km northeast via exploration tracks. The project is also located approximately 42 km east-southeast of Northern Star's Central Tanami Project.

The climate is semi-arid with rainfall averaging approximately 400 mm per annum. Most rainfall occurs as summer storms associated with the monsoon season between November and March. Daily temperatures range from winter minima of near zero to summer maxima of about 48<sup>o</sup> C. The mean maximum temperature ranges from 26<sup>o</sup> C in June/July to 39<sup>o</sup> C in November/January. The area is devoid of surface water except in small soaks after heavy rain. The licences are located in the Tanami Desert which is typically dominated by smooth plain lands widely covered in aeolian sand with a vegetation cover described as tall open acacia scrubland with a hummocky grass (spinifex) understory.

The project sits on land owned by the Warlpiri People for which the Central Land Council acts as a representative body corporate. All personnel and vehicles entering Aboriginal Land are recorded through the Central Land Council, with the Central Land Council also forming a major part of the approvals process for exploration and mining activities/proposals.

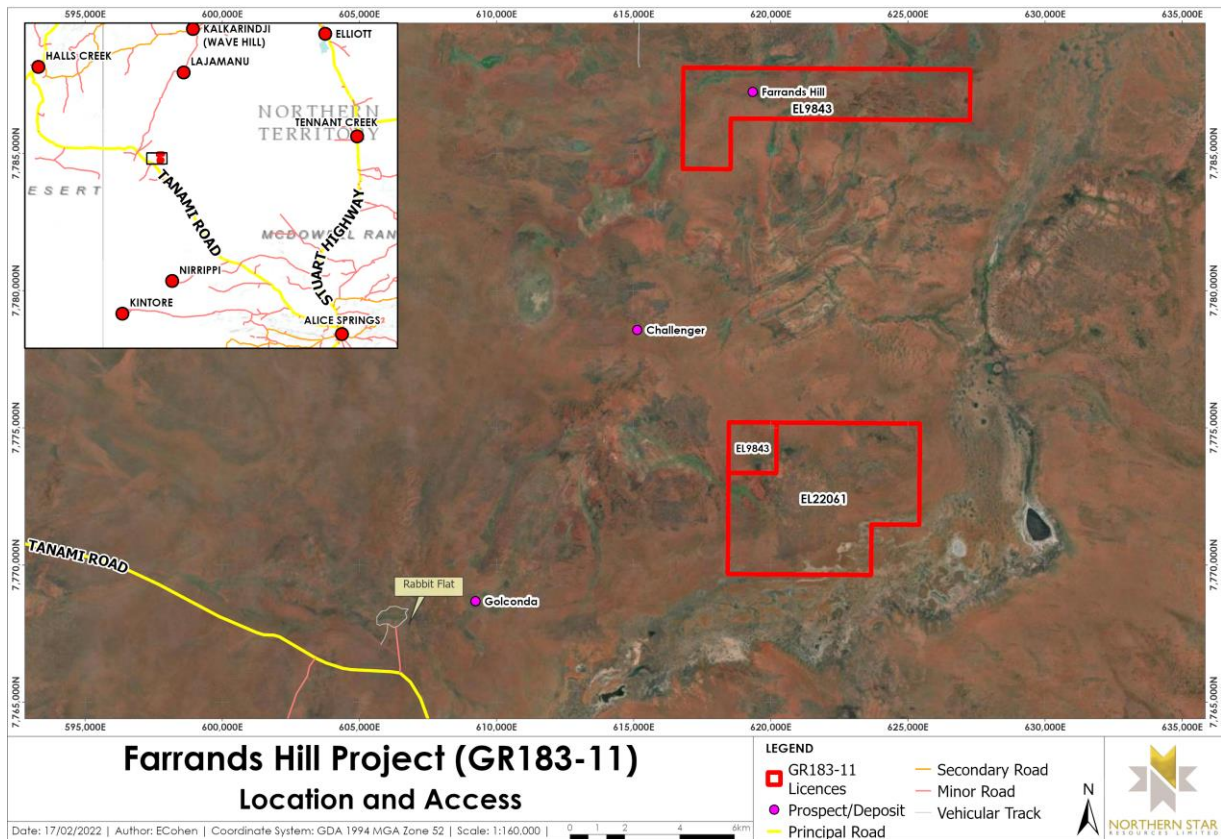


Figure 1. Farrands Hill Project location and access.

### 3 TITLE HISTORY

The Farrands Hill comprises two exploration licences, the details of which are shown in Table 1.

Table 1. Farrands Hill Project licence details.

Licence	Area (blk)	Grant date	Expiry date
EL9843	8	27/03/2006	31/12/2021
EL22061	10	27/03/2006	31/12/2021

EL9843, comprising 39 blocks, was granted to Otter Gold Pty Ltd ('Otter') on 27 March 2006 for a period of six years. Partial surrenders were granted on 2 January 2008 (22 blocks retained) and on 1 April 2014 (21 blocks retained). A partial cancellation notice was issued in 2016 and six blocks were cancelled on 3 June 2016 (15 blocks retained). A partial surrender was approved on 16 January 2017 (8 blocks retained) and the licence is due to expire on 31 December 2021.

EL22061, comprising 17 blocks, was granted to Otter on 27 March 2006 for a period of six years. Partial surrenders were approved on 1 April 2014 (13 blocks retained), and on 16 January 2017 (10 blocks retained), and is due to expire on 31 December 2021.

Group reporting status was granted on 31 January 2011 and assigned GR183-11.

On 30 March 2010, the licences which comprise the Central Tanami Project (including the Farrands Hill Project) and surrounding tenure were acquired by Tanami Gold (NT) Pty Ltd, a wholly owned subsidiary of Tanami

Gold NL from Otter. Otter is a wholly owned subsidiary of Newmont Asia Pacific. Transfer of the titles were registered on 2 November 2010.

In February 2015, a Heads of Agreement was executed between Tanami Gold (NT) Pty Ltd and Northern Star (Tanami) Pty Ltd, whereby Northern Star (Tanami) Pty Ltd agreed to progressively acquire a 60 % joint venture interest in the licences (of which the Tanami Mine Project licences are a part), by sole funding all expenditure required to bring the Central Tanami Project back into commercial production which shall be achieved once the processing plant has been refurbished and is operated for a 30 day period or has produced 5,000 oz of gold.

Under the Heads of Agreement Tanami Gold (NT) Pty Ltd exercised their right of the First Put Option where Northern Star (Tanami) Pty Ltd purchased an additional 15 % interest in the Central Tanami Project licences with completion effective 14 September 2018. Northern Star's settlement of the option thus increased Northern Star's equity position in the Central Tanami Project to 40 %.

On 15 September 2021, Northern Star acquired an additional 10 % joint venture interest from Tanami Gold, resulting in both parties now holding a 50 % joint venture interest. Following the transaction, a new 50/50 joint venture (Central Tanami Project Joint Venture; CTPJV) has been formed with the establishment of the CTPJV Management Committee.

#### **4 GEOLOGICAL SETTING AND EXPLORATION RATIONALE**

The geology of the Tanami region comprises a sequence of folded Palaeoproterozoic metasediments and minor meta-mafic volcanic and intrusive rocks unconformably overlying Archaean basement. Much of this is hidden beneath thin unconsolidated cover. Its relationship to the surrounding tectonic units is poorly known. The contacts with the Arunta Province to the south and the Tennant Inlier to the east are not exposed but appear to be major shear zones in the magnetic data (Hendrickx et al, 2000).

The known Archaean basement is restricted. Limited dating (SHRIMP zircon U-Pb) of the supracrustal rocks is consistent with an Archaean protolith (2500 Ma), with high grade metamorphic activity ascribed to the Barramundi event at 1880 Ma (Hendrickx et al, 2000).

The basal part of the Palaeoproterozoic stratigraphy is the Tanami Group, comprising the lower Dead Bullock Formation and the upper Killi Killi Formation. The Tanami Group is inferred to have been deposited in a transgressive passive marginal environment following the cessation of major extension and faulting associated with rifting (Hendrickx et al, 2000). The locally extensive mafic volcanic bearing Stubbins Formation and Mount Charles Formation are laterally correlated with the Dead Bullock Formation (Bagas et al, 2008).

Folding and low to middle greenschist facies regional metamorphism affected the Tanami Group at approximately 1840 Ma. The metamorphic grade tends to increase from the northwest to the southeast and adjacent to the local granites that accompanied this event, which has been denoted as the Tanami Orogenic Event (Vandenberg et al, 2001).

Unconformably overlying the Tanami Group is the complex Ware Group. This was deposited over the Tanami Group in a series of small extensional basins. The Ware Group includes the Mount Winnecke Formation, the Nanny Goat Volcanics and the Wilson Formation (Crispe et al, 2002).

Granitic lithologies constitute approximately 60 % of the geology of the Tanami region, and predominantly comprise 'I-type' biotite ± hornblende monzogranites and granodiorites (Dean, 2001). The granite suites are believed to represent overlapping igneous events between approximately 1840-1790 Ma with the Winnecke Suite (1820-1830 Ma), the Coomarie Supersuite (1810-1820 Ma) and the Frederick Suite (1790-1810 Ma) defined by Dean (2001). The Grimwade Suite intrusives of the Farrands Hill Project area remain undifferentiated and undefined.

The age of gold mineralisation in the Tanami region is poorly constrained and is inferred by geological relationships that can be confusing and sometimes contradictory. Overall, most geochronological data point to an age of circa 1800 Ma for late (D5) gold in the Tanami region. The age of the apparently earlier gold event (D1 or D3 at The Granites) is not constrained (Huston et al, 2006).



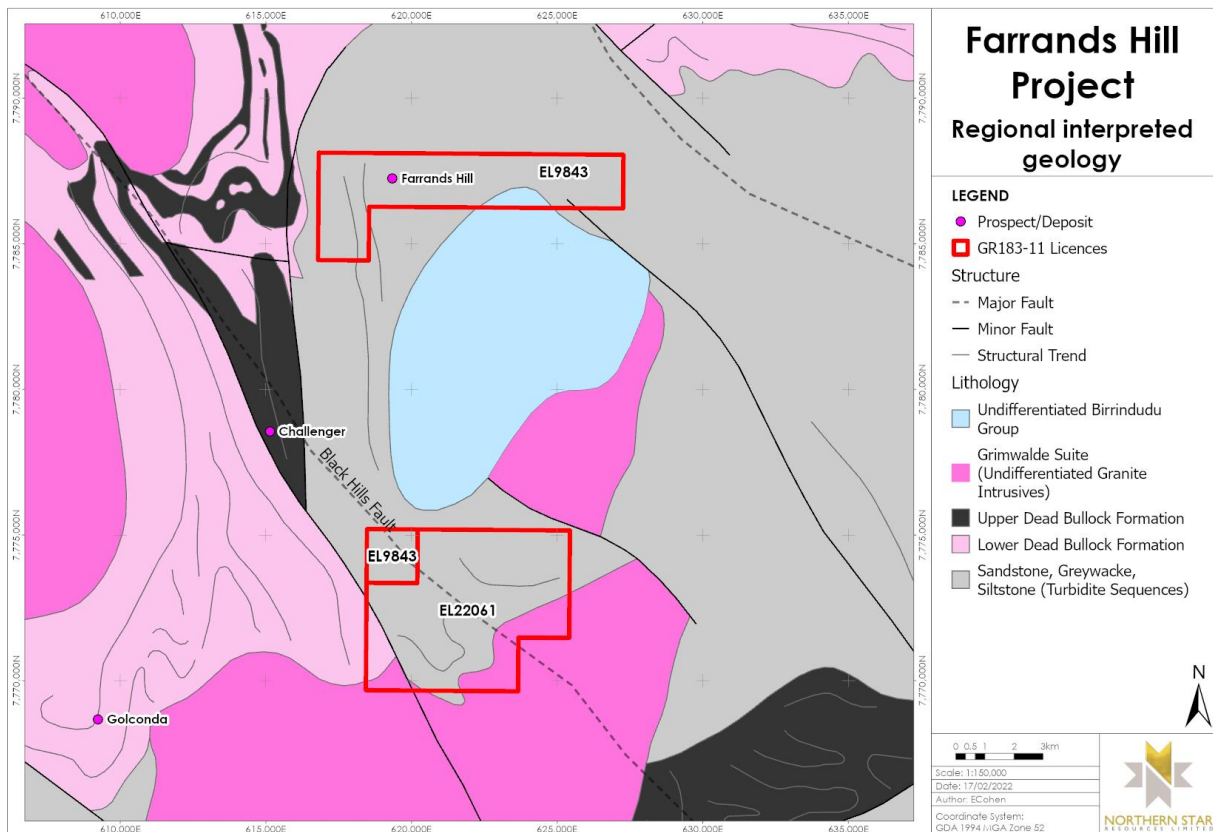
The post gold mineralisation Birrindudu Group has an interpreted Neoproterozoic age and unconformably overlies the other components of the Tanami region. The exact age is unconstrained but must be less than 1800 Ma owing to field relationships with the granites. The Birrindudu Group is interpreted as representing shallow marine platform sediments and comprises the Gardiner Sandstone, Talbot Well Sandstone and Coomarie Sandstone (Blake et al, 1979). Local exposures of the Cambrian Antrim Plateau Basalt also occur through the Tanami region (Hodgson, 1975).

Most of the project area is covered by variable thickness of unconsolidated alluvial and aeolian deposits with only sparse outcropping bedrock, except on the flank of Farrands Hills in the south of EL9843 where there is extensive outcropping Gardiner Sandstone. The southern part of EL22061 is commonly covered by salt flats.

Bedrock is predominantly interpreted by using magnetic and gravity characteristics and drill hole lithology. The highly magnetic Dead Bullock Formation is interpreted in the southwest of EL22061 with a granite intrusion in the southeast corner. The northern portion of EL9843 is interpreted to be poorly magnetic Killi Killi Formation.

Although widespread exploration is at an early stage, gold mineralisation appears to occur at the top of the Dead Bullock Formation, similar to The Granites and some of the Dead Bullock Soak deposits.

Figure 2 shows interpreted bedrock geology.



**Figure 2. Interpreted bedrock geology.**

### 5 EXPLORATION/MINING HISTORY

Work completed prior to 2015 can be sources from various reports on STRIKE. A summary of work completed by Northern Star since 2015 is detailed below.

Upon entering the joint Central Tanami Project Joint Venture in 2015, work by Northern Star focused on reviewing results from the entire licence package. In addition to significant office-based reviews, a geological reconnaissance trip was conducted with both Northern Star and Tanami Gold geologists.

In December 2016, geological consultants Mira Geoscience, Perth, were commissioned to complete a depth of cover map and to categorise the regolith across the entire Northern Star tenure.

During 2017, data validation and compilation of Tanami Gold's original database was incorporated into a new corporate acQuire database. Collation of historic GIS geochemical and geophysical datasets was completed to facilitate regional targeting exercises and to support field reconnaissance geological and structural mapping. A regional targeting exercise identified 144 zones of interest with two ranking methodologies applied to the results, which identified several key areas for future exploration. Airborne magnetic and radiometric surveys were conducted over EL22061 and a portion of EL9843. A vacuum sampling program was completed, however only 37 samples were collected as the method was unable to successfully penetrate the calcrete horizons below the transported cover material. Geological mapping and reconnaissance were also completed, with several vehicle and helicopter assisted transects over EL22061. Two rock chips were collected, with no significant mineralisation identified. A regional environmental study to better understand the potential impacts of further exploration work was undertaken, with recommendations implemented and included in subsequent MMP applications. A variation to the incumbent MMP was submitted to include 150 air core drill holes over EL9843 and 70 over EL22061 with associated access tracks and camp areas. Authorisation for the variation was received on 19 January 2018.

Work completed in 2018 comprised geological interpretation of the 2017 aeromagnetics and radiometrics survey data. A northwest trending structure was identified within the Dead Bullock Formation in the southern part of EL22061 which warranted further investigation. A 150-hole air core drilling program was designed and pre-clearance environmental inspections were completed, with no significant flora or fauna identified. Drill site preparations commenced but were postponed due to unfavourable monsoonal weather conditions.

In 2019, the proposed 150 hole aircore drilling program was completed to test for anomalous horizons and structural zones. This program encountered granite and pegmatite in the west and a folded interbedded basalt-sedimentary sequence in the east, with a best result of 4 m at 37 ppb Au from EL22061. A lithogeochemical classification and revised basement interpretation was completed, which proved successful in identifying several lithologies based on geochemistry. Utilising lithogeochemical classification and aeromagnetics, a basement geological map was generated which showed a greater extent of granite intrusion than originally anticipated. A total of 21 rock chip samples were collected from EL22061 as part of a regional reconnaissance and stratigraphic mapping project, but no significant results were returned.

During 2020, the CSIRO regional Tanami stratigraphic and geochemistry project was completed, and analysis of preliminary results commenced. A collation and review of targets was completed across the project.

Further details can be found in previously submitted Northern Star reports (Mukherji, 2017; Annison and Mahon, 2018; Turnbull, 2019; Abello, 2020; Pellatt, 2021).

## 6 CURRENT EXPLORATION

Exploration during the tenure period is shown in Figure 3 and comprised:

- regional Tanami stratigraphy and geochemistry project
- bottom of hole multielement geochemical analysis
- rehabilitation.

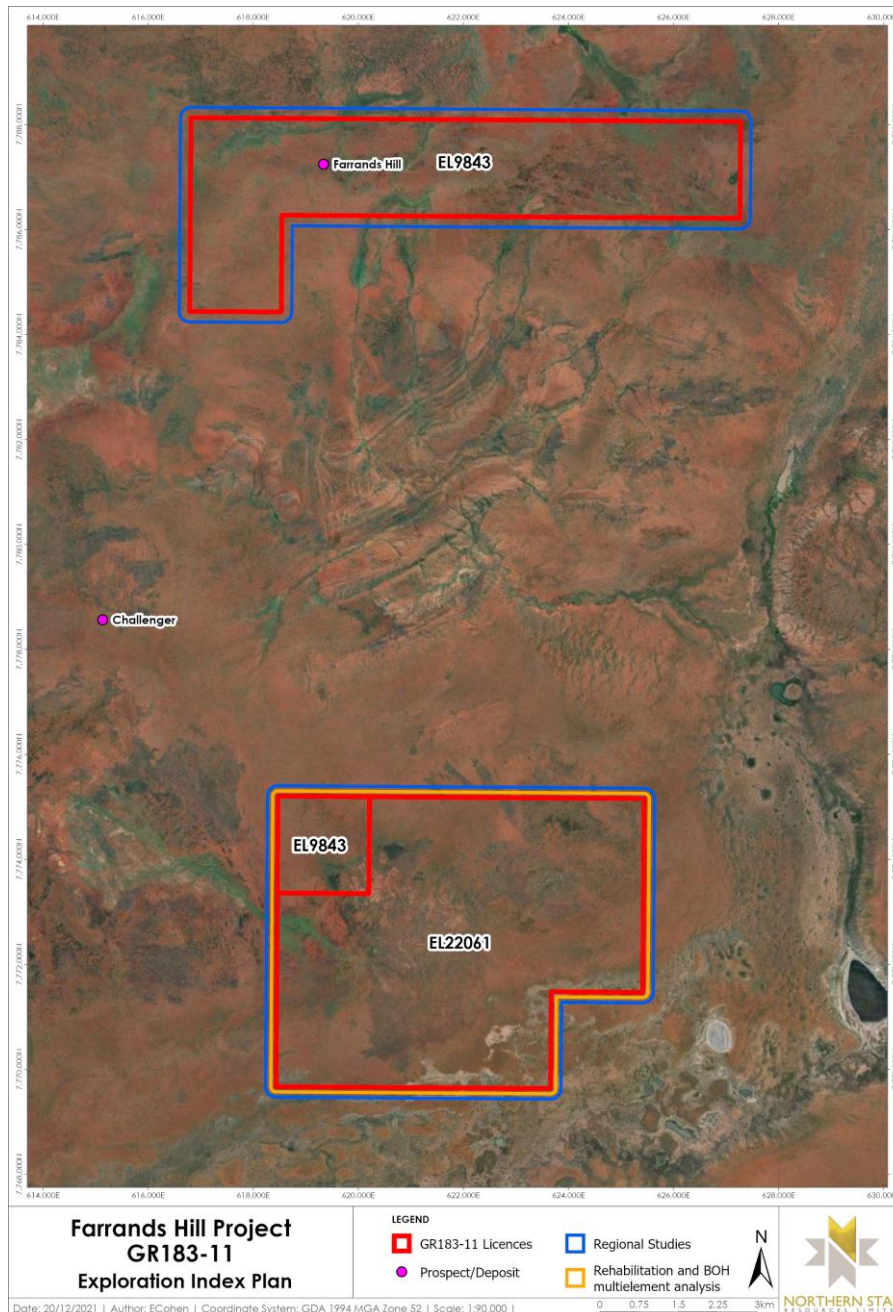


Figure 3. Farrand Hill Project exploration index plan.

### 6.1 Geological Activities and Office Studies

#### 6.1.1 Regional Tanami Stratigraphy and Geochemistry Project

In early 2019, Northern Star entered into an agreement with CSIRO to undertake a regional project evaluating the application of geochemical data to identify and map stratigraphy in the Tanami region. This scope included the review of potential alteration or mineralisation system indicators and how the knowledge could be applied to early-stage reconnaissance exploration.

The aim of this project was to develop an exploration tool for identification of prospective host units for gold mineralisation, based on their geochemistry, mineralogy, and sedimentology. The project focused on geochemical and mineralogical classification of Tanami Group sedimentary and volcanic rocks and their alteration. It also considered the interpretation of depositional environment. This project commenced on 3 June 2019 and was completed 30 November 2020, with the final report delivered in April 2021.

The project included geochemical analysis of aircore drill samples drilled by Northern star in 2019 over the Project. A review of the report commenced in May 2021 and the integration of key findings into further exploration targeting is ongoing. Due to the subject of confidentiality and intellectual property, CSIRO have requested that data not be released.

#### 6.1.2 Bottom of Hole Multielement Geochemical Analysis

Further assessment of the 2019 aircore drill program results and analysis of multielement results from bottom of hole ('BOH') drill chips was completed. The analysis was used predominantly for lithological determination. A strong spatial correlation with geochemistry and aerial magnetic images confirmed the lithological interpretation. The review also identified several geology logs that require reviewing and updating to standardise all logging.

Generally, pathfinder element results were not anomalous, however two structural areas were identified with coincident pathfinder anomalism (As, Bi, Mo, and Sb). These two areas were identified for future follow up work.

### 6.2 Rehabilitation

Rehabilitation of all outstanding ground disturbance was completed. A total of 151 aircore drill holes were rehabilitated (eight on EL9843 and 143 on EL22061), including all sumps filled in. Approximately 21 km of track (1.5 km on EL9843 and 19.5 km on EL22061) and the remote camp area were fully rehabilitated.

## 7 CONCLUSIONS AND RECOMMENDATIONS

Mandatory government enforced travel restrictions associated with the COVID-19 pandemic, continued to hinder exploration. Additionally, the beginning of 2021 saw a protracted heavy wet session resulting in ground access being limited due to flooding and boggy ground. These factors resulted in limitations on exploration activities in the Central Tanami Project, including on the Farrands Hill Project.

The final report for the collaborative CSIRO regional Tanami stratigraphic and geochemistry project was delivered mid-2021. The integration of key findings into exploration targeting across the Project is ongoing. Further analysis of BOH geochemistry was also completed which highlighted two coincident pathfinder anomalies in the south of the Project. Rehabilitation of all outstanding ground disturbance was completed.

The work conducted by Northern Star during the ongoing COVID-19 pandemic is testament to Northern Star's commitment to the Tanami region. Further targeting is underway to develop an appropriate targeting model for future drilling of the Farrands Hill Project.

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