



Exploration Operations Mining Management Plan and Public Report

NORTHERN STAR (TANAMI) PTY LTD
TANAMI REGIONAL EXPLORATION PROJECT (TRE)
VARIATION: JANUARY 2019

Document Distribution List: NT Department of Primary Industry and Resources
Central Land Council
Northern Star Resources Ltd

I, MICHAEL MULRONEY – CHIEF GEOLOGICAL OFFICER declare that to the best of my knowledge the information contained in this Mining Management Plan is true and correct and commit to undertake the works detailed in this plan in accordance with all the relevant Local, Northern Territory and Commonwealth Government legislation.

SIGNATURE: 

DATE: 18TH JANUARY 2019

Contents

1. AMENDMENTS	3
1.0 Operator Details	4
1.1 <i>Executive Summary</i>	5
2.0 Project Details	6
2.1 <i>Proposed Activities</i>	11
2.1.1 <i>Air Core (AC) / Rotary Air Blast (RAB) Drilling</i>	11
3.0 Current Project Site Conditions	17
3.1 <i>Environment</i>	17
3.1.1 <i>Recommendations</i>	17
3.1.2 <i>Sites of Significance</i>	21
3.2 <i>Aboriginal and Heritage Sites</i>	21
4.0 Exploration Rehabilitation	21
4.1 <i>Exploration Rehabilitation Register</i>	21
4.2 <i>Completed Rehabilitation</i>	21
4.3 <i>Costing of Closure Activities</i>	23

Table of Figures

Figure 1 Cave Hill.....	7
Figure 2 Farrands Hill.....	8
Figure 3 Gardiner, Boulder Ridge and Browns Range.....	9
Figure 4 Central.....	10
Figure 5 Freefall and Groundrush West Work Areas.....	13
Figure 6 Molech Work Area.....	14
Figure 7 Cave Hill Work Area.....	15
Figure 8 Stubbins Work Area.....	16

List of Tables

Table 1 Variation Summary.....	3
Table 2 Work Program Summary.....	12
Table 3 Summary of relevant environmental management measures.....	20
Table 4 Completed Rehabilitation.....	22
Table 5 Disturbance summary.....	24
Table 6 Security Calculation Summary.....	25

1. AMENDMENTS

A Mining Management Plan (**MMP**) for the Tanami Regional Exploration Project (**TRE**) submitted by Northern Star (Tanami) Pty Ltd (**NST**), a wholly owned subsidiary of Northern Star Resources Ltd (**NSR**), was approved by the Department of Primary Industry and Resource (**DPIR**) on 2 May 2017 under Authorisation 0916-01.

A Variation to this MMP was lodged in September 2017 with approval being received in January 2018.

A 2nd Variation to this MMP was lodged in March 2018 with approval being received in April 2018.

This document forms a 3rd Variation to the approved Authorisation 0916-01 to include Northern Star's 2019 Work Program.

All previous approvals remain current unless stated otherwise in this Variation. A summary of the variations contained in this document can be found in Table 1 below.

Table 1 Variation Summary

3rd Variation	Details
Work Programs	Appendix 25 - Work Programs on tenements EL26926, EL28282 and MLS168. Appendix 22 - Spatial Datasets for the 2019 Work Programs
Environmental	Appendix 1 - Details of the latest Environmental survey and changes implemented due to findings/recommendations.
Security	Appendix 10 - Updated Security calculation to reflect the new proposed work programs. Reduction in the number of Mechanised Geochemical Samples to 2,000 due to re-evaluation of the technique as an effective exploration tool.

1.0 Operator Details

Operator name: Northern Star (Tanami) Pty Ltd
(ABN: 88 603 860 831)

Address: Level 1, 388 Hay St
Subiaco. WA 6008

PO Box 2008
Subiaco. WA 6904

Contact details: Tel +6 8 6188 2100
Fax +6 8 6188 2111
Email info@nsrltd.com
www.nsrltd.com

Key contacts:

Dale Annison
Senior Exploration Geologist – Tanami
Tel +61 8 6188 2132
Email dannison@nsrltd.com

Jamie Rogers
Exploration Manager
Tel +61 8 6188 2191
Email jrogers@nsrltd.com

Michael Mulroney
Chief Geological Officer
Tel +61 8 6211 2606
Email mmulroney@nsrltd.com

Kathryn Todd
Senior Land Officer
Tel +61 8 6211 2610
Email ktodd@nsrltd.com

1.1 Executive Summary

This Mine Management Plan (**MMP**) 3rd Variation details the additional proposed work activities over the Tanami Regional Exploration Project (**TRE**) NST wish to undertake for the 2019 Work Programs. Within this MMP, several sources or associations may be observed between the Central Tanami Project (**CTP**) and TRE. The CTP is a Northern Star (Tanami) Pty Ltd mine site and is a permanent facility. Some documents referenced in this MMP also relate to the CTP, these documents may be generic procedures, management plans or otherwise which NSR utilises for all work activities across the Northern Territory.

Only details or appendices which have been amended or added have been included in this Variation submission, all previously submitted documentation remains current under Authorisation 0916-01.

2.0 Project Details

Authorisation No:	0916-01
Project Name:	Tanami Regional Exploration
Location:	The Project is located approximately 650km northwest of Alice Springs and 850km southwest of Darwin.
Site Access:	The Project is accessible from the public Tanami Road that passes through MLS153 within 2km of the CTP camp and treatment plant. Access to the Groundrush pit is via a sealed haul road from the Central Tanami mine site. All site supplies and plant are transported to site via the Tanami Road. Access to other parts of the project area, is via well formed, and in part sealed, private mine haul roads, pastoral station roads and exploration tracks.
NST Mining Interests:	No change to current Authorisation held by the Department
Title Holders:	Tanami (NT) Pty Ltd 60% (ACN 141 658 933), a wholly owned subsidiary of Tanami Gold NL (" TGNL ") and Northern Star (Tanami) Pty Ltd 40% (ACN 603 860 831) (" NST "), a wholly owned subsidiary of Northern Star Resources Ltd (" NSR ")
Nomination of Operator Form:	Nomination of Operator form has previously been submitted for the TGNL/NST tenure, nominating Northern Star (Tanami) Pty Ltd as the operator under the original MMP approval, this is currently held by the Department.
Location Maps and Site Plans:	<p>Cave Hill (Figure 1),</p> <p>Farrands Hill Tenure (Figure 2),</p> <p>Gardiner, Boulder Ridge & Browns Range Tenure (Figure 3)</p> <p>Central (Figure 4)</p> <p>Freefall and Groundrush West Work Areas (Figure 5)</p> <p>Molech Work Area (Figure 6)</p> <p>Cave Hill Work Area Figure 7)</p>

Figure 1 Cave Hill

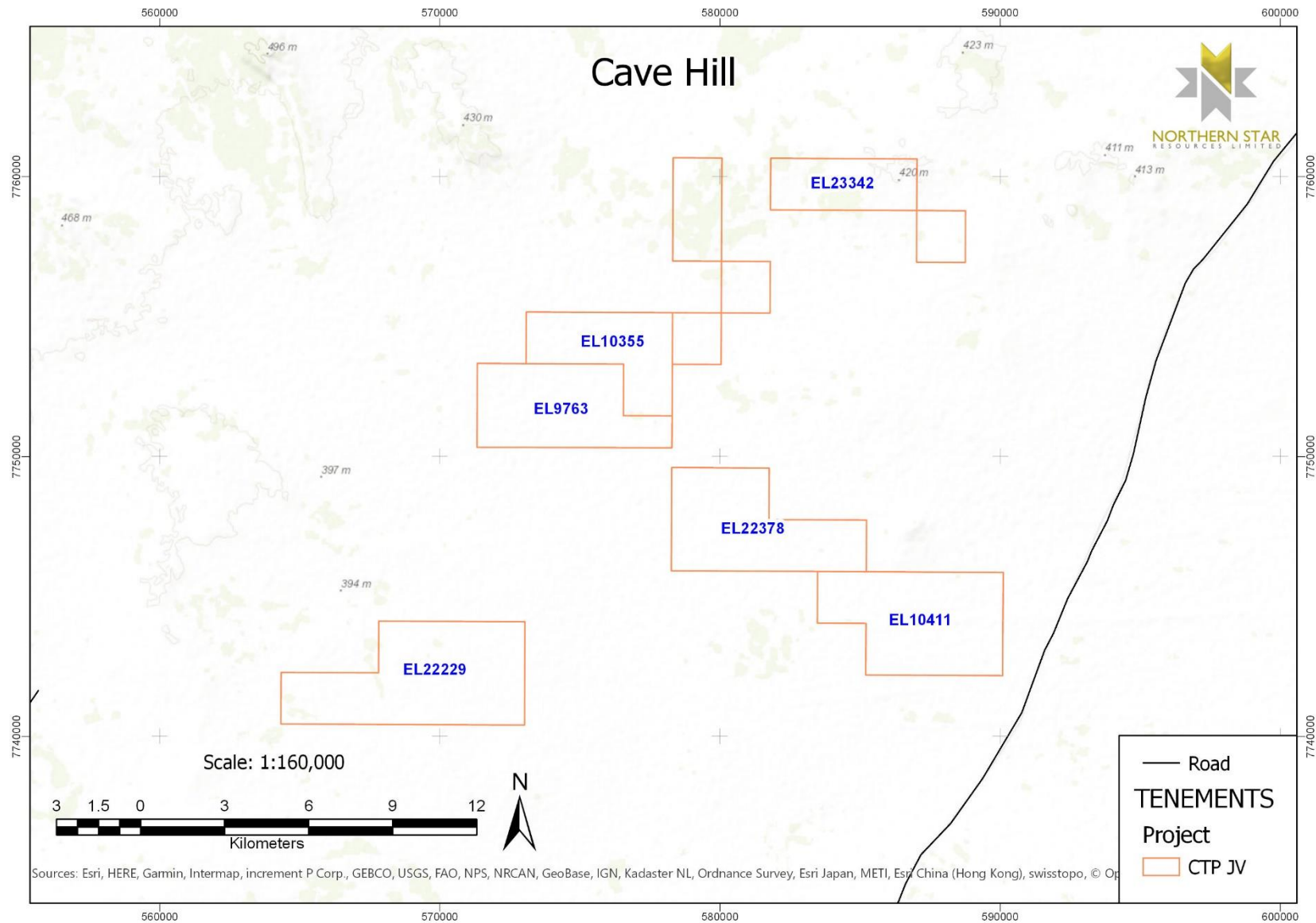


Figure 2 Farrands Hill

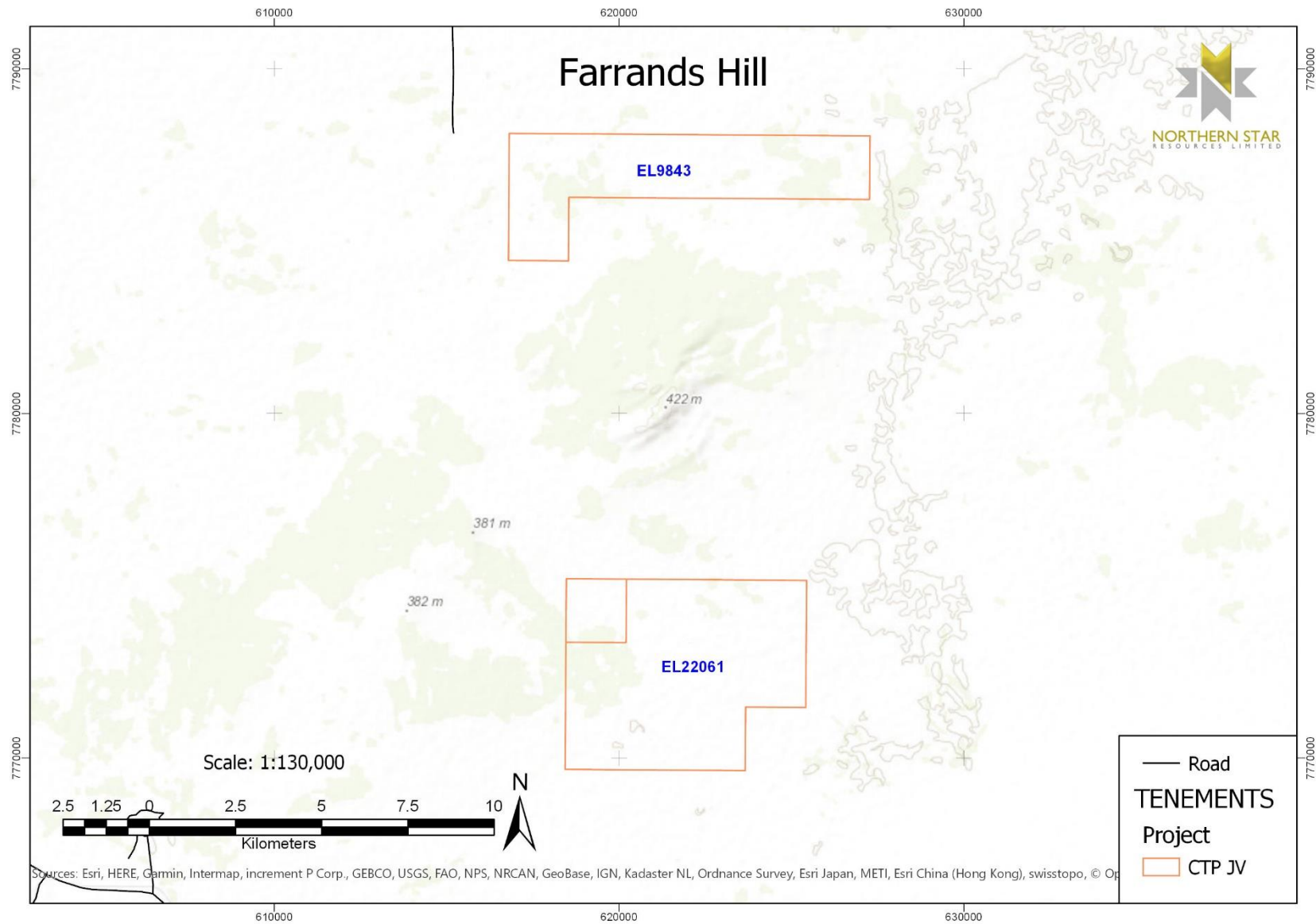


Figure 3 Gardiner, Boulder Ridge and Browns Range

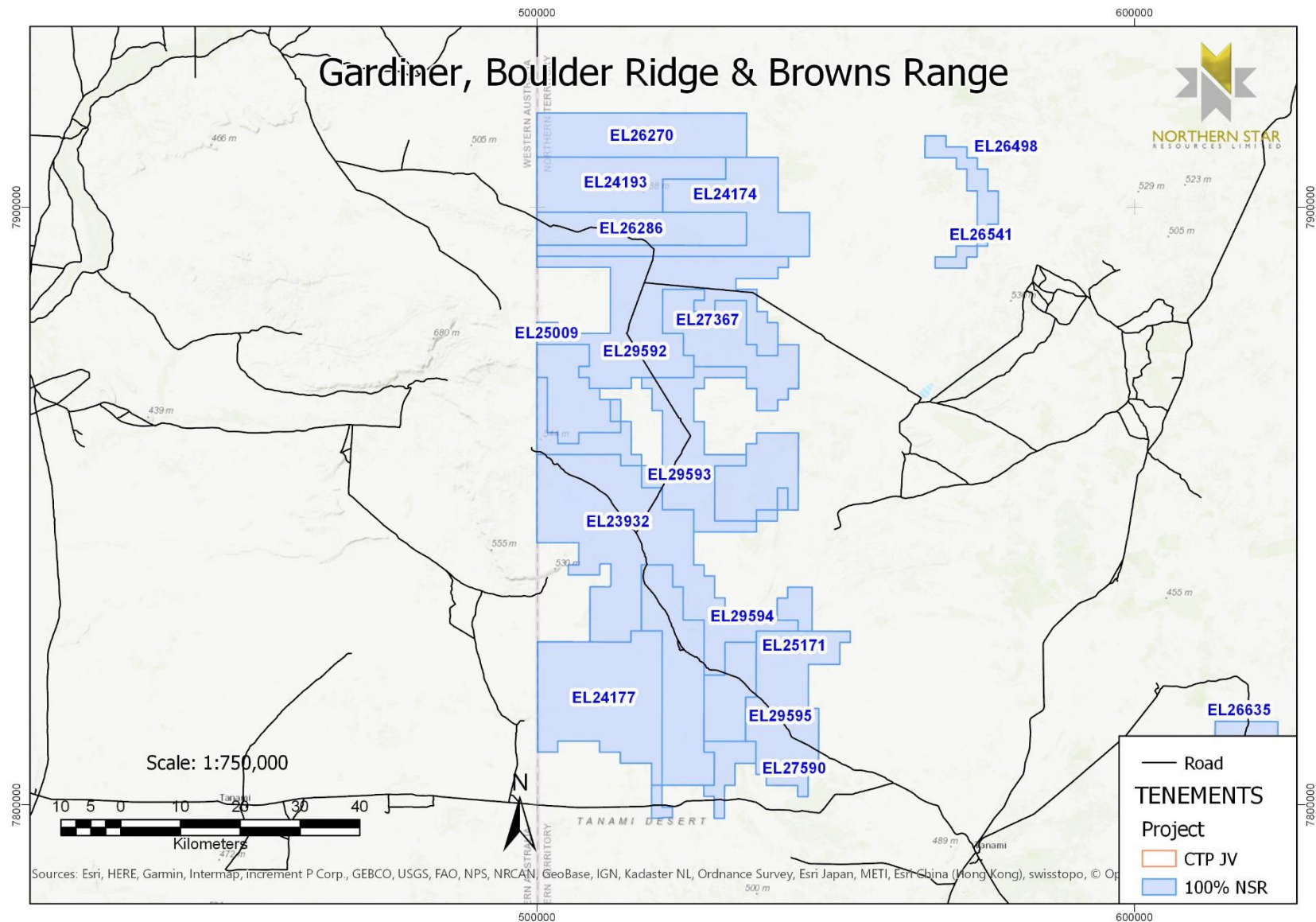
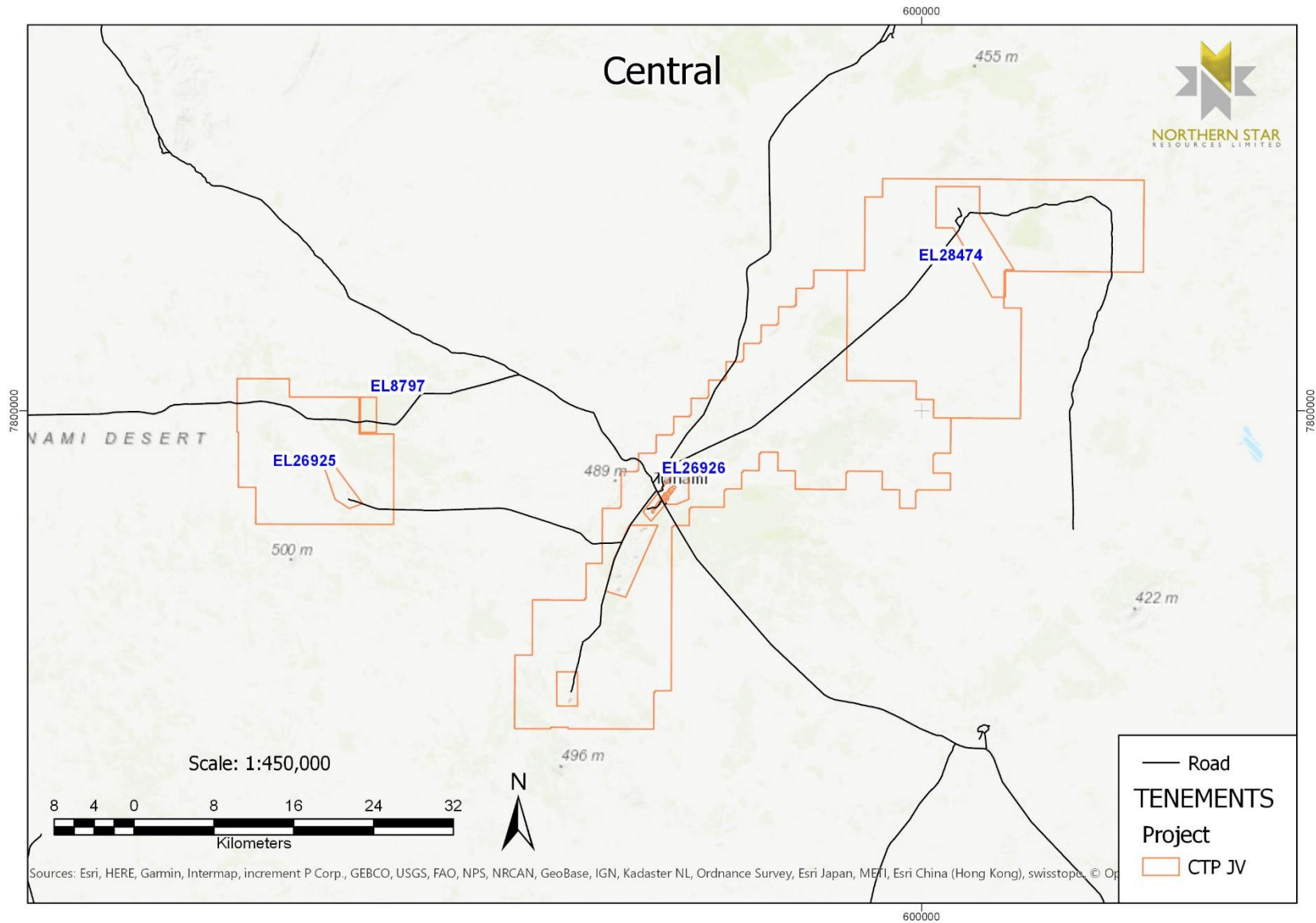


Figure 4 Central



2.1 Proposed Activities

As part of Northern Star Resources Ltd 2019 exploration strategy for the Tanami regional tenure, several drilling programs are proposed to test the region's prospectivity for gold mineralisation and assist in constraining lithological and stratigraphic interpretations. The following is a summary of the proposed work, with specific program details provided in Table 2.

2.1.1 Air Core (AC) / Rotary Air Blast (RAB) Drilling

Air Core (AC) drilling is a technique employed to test sub-surface material beneath transported cover where conventional manual soil or auger sampling is ineffective. Drilling can achieve depths up to 150m using a bladed drill bit usually constructed of hardened steel or tungsten to cut through the unconsolidated material of the regolith profile. Compressed air is used to transport drill cuttings up through the inner tube to surface for analysis.

NSR utilises AC drilling techniques as an initial, reconnaissance exploration method over areas with deep weathering profiles and with the proposed programs below aims to:

1. Assess concealed bedrock for Au mineralisation and prospectivity.
2. Analyse and record the regolith profile.
3. Validate and improve, existing government and private geological mapping from the region.

Due to the reconnaissance nature of this drilling method, drill holes are typically designed on geometric grids with tracks connecting neighbouring holes in a common orientation to keep track distance to a minimum. AC drilling is proposed to be undertaken on a variety of grid dimensions, ranging from prospect scale 40m x 80m, to regional scale 400m x 400m. NSR conducts AC drilling activities on raised blade-cleared, <4m single-use bush tracks to reduce the total amount of disturbance. A 4m x 5m sump is dug adjacent to the drill collar location to capture any ground water that may be intersected. Drill samples are placed beside the track adjacent to drill holes, this typically requires an area approximately 4m by 5m in dimensions. A standard drill collar will therefore have a 40-square metre disturbance area.

Access to work areas is generally good, via pastoral tracks and established bush tracks, however in some cases temporary bush tracks will need to be established to access the drill areas as outlined above (<4m width). All relevant guidelines and procedures determined by Northern Star and the Northern Territory Government will be utilised before and during the installation of these tracks. Planned tracks will provide NSR and its contractors the ability to efficiently and safely access sample sites whilst also reducing the likelihood of incidental tracks being established within the work areas. Following drilling and final use of tracks, scarification and rehabilitation will be undertaken as per NSR procedures. This work will be carried out in adherence to Northern Territory rehabilitation guidelines and its commitments under the Tanami Regional Exploration Mining Management Plan and the relevant Deeds for Exploration.

NSR is proposing AC drilling at two areas within EL 28474 (Figure 5), one area within EL 22378 (Figure 1), one area within EL 26925 (Figure 6) and a single work area which covers portions of tenements EL 25009, EL23932, EL29592 and EL29593 (Figure 8). High-resolution maps of each target area can be found in Appendix 25. These areas have been proposed as polygons in lieu of specific collar point locations, and total disturbance area will be adhered to within the polygons. The use of polygons will assist NSR in achieving the best possible collar locations as further geological knowledge becomes available. Being able to correctly locate drill lines and adjust collar locations along those lines as the program is carried out will significantly enhance the prospect of success at each drill target and prevent the unnecessary disturbance of ground in the case that an area becomes unsuitable for drill testing. Spatial datasets of the proposed areas of disturbance have been provided in electronic format (ESRI), they can be found in Appendix 25.

Table 2 Work Program Summary

Tenement	Group	Work Area	#AC Drill Holes	Drilling disturbance (ha)	Access Track Length (km)	Access Track Area (ha)	Total Disturbance (ha)
EL 28474	Central	Freefall	220	0.88	0	0	0.88
EL 28474	Central	Groundrush West	100	0.4	17	6.8	7.2
EL 26925	Central	Molech	280	1.12	25	10	11.12
EL 22378	Cave Hill	Cave Hill	150	0.6	14	5.6	6.2
EL 25009	Gardiner	Stubbins	190	0.76	27	10.8	11.56
EL 23932	Gardiner		0	0	9	3.6	3.6
EL 29592	Gardiner		20	0.08	1	0.4	0.48
EL 29593	Gardiner		120	0.48	8	3.2	3.68
Total			1,080	4.32	101	40.4	44.72

Proposed AC drilling at the Freefall prospect utilises the previously approved work area extent, however an additional 220 holes are requested, no additional track approvals are required.

In addition to the proposed drilling polygons, additional track clearance is requested for access to the Groundrush West and Cave Hill work areas. This disturbance totals 7.5km and is included in the attached Security Calculation.

Figure 5 Freefall and Groundrush West Work Areas

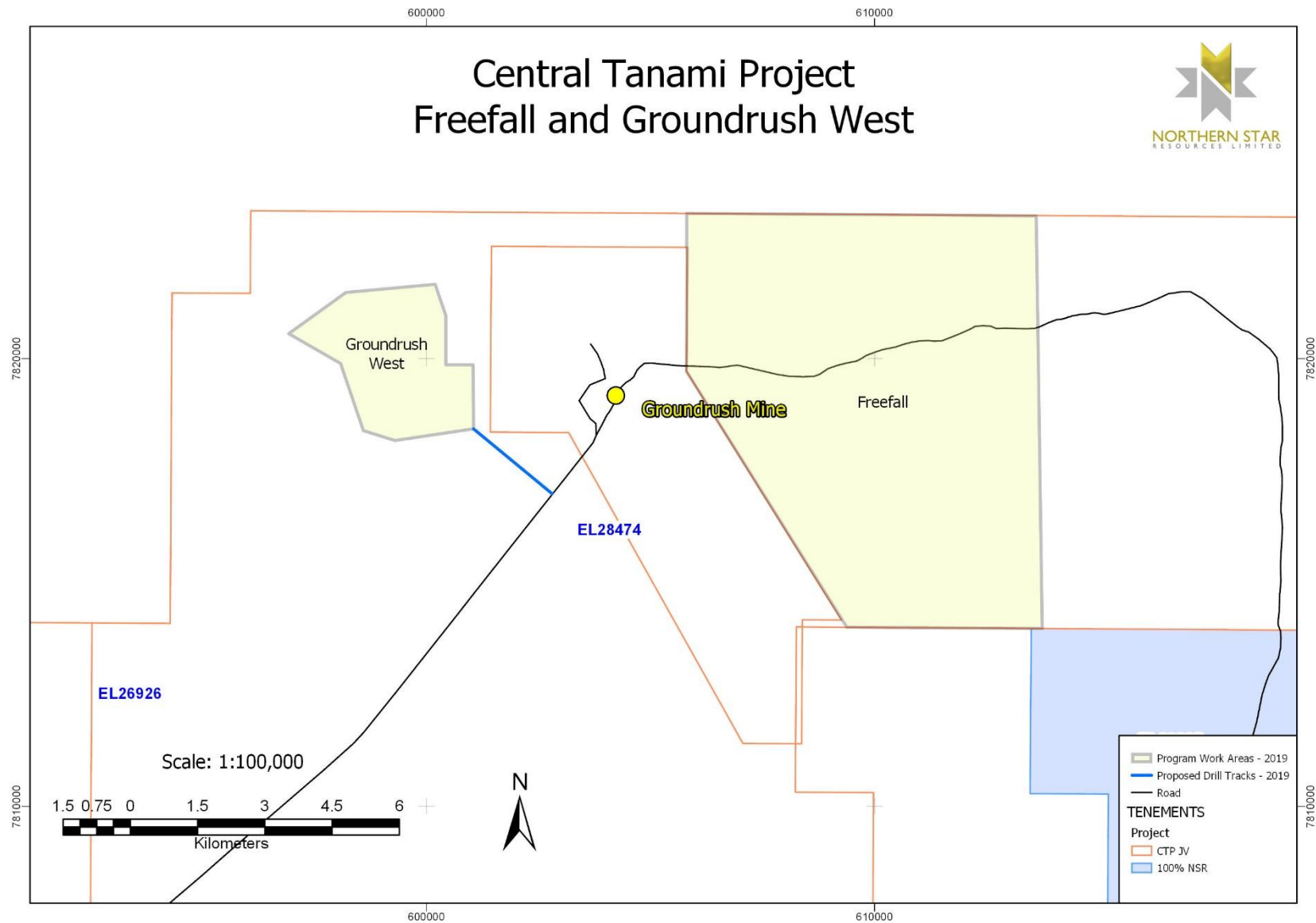


Figure 6 Molech Work Area

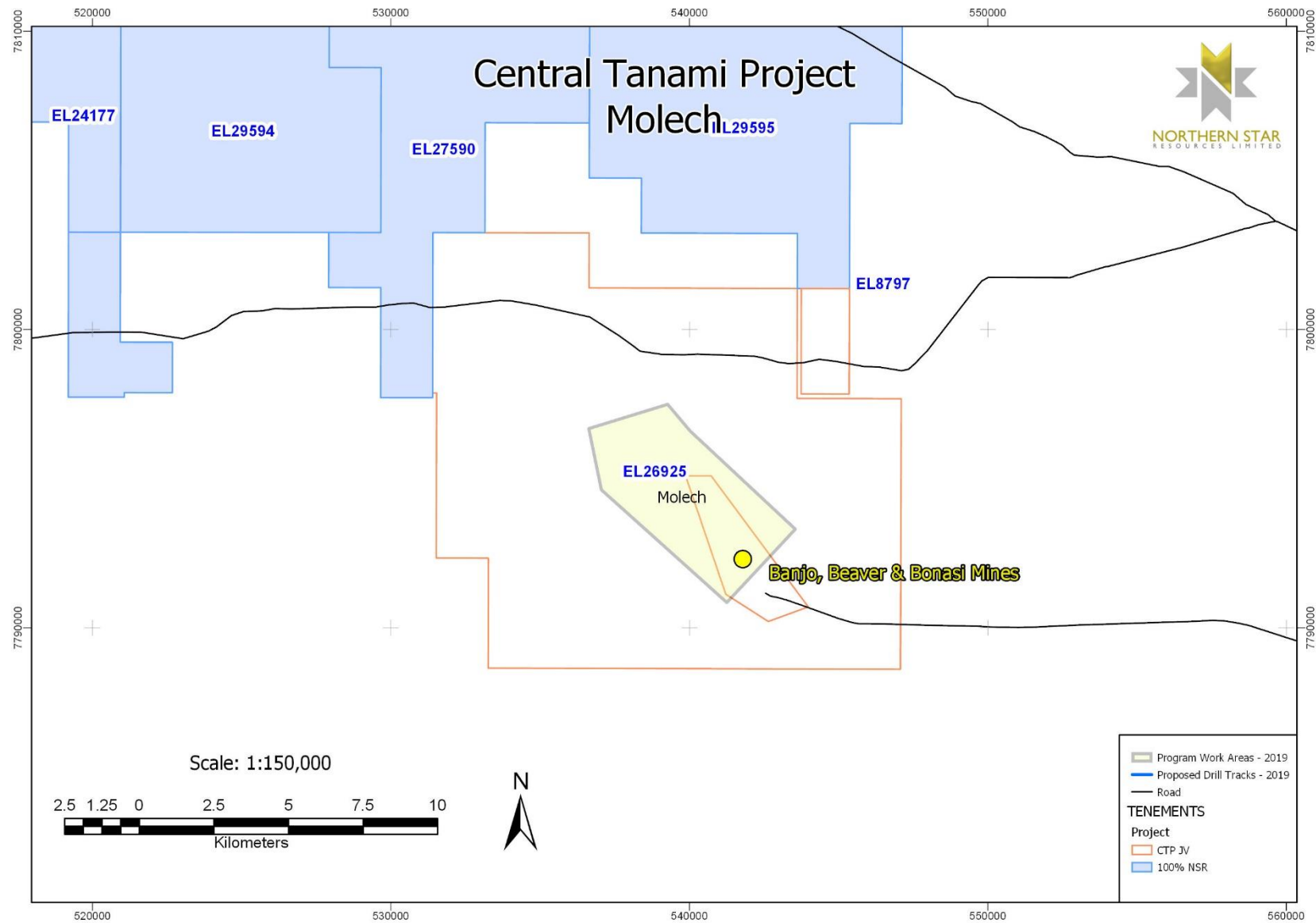


Figure 7 Cave Hill Work Area

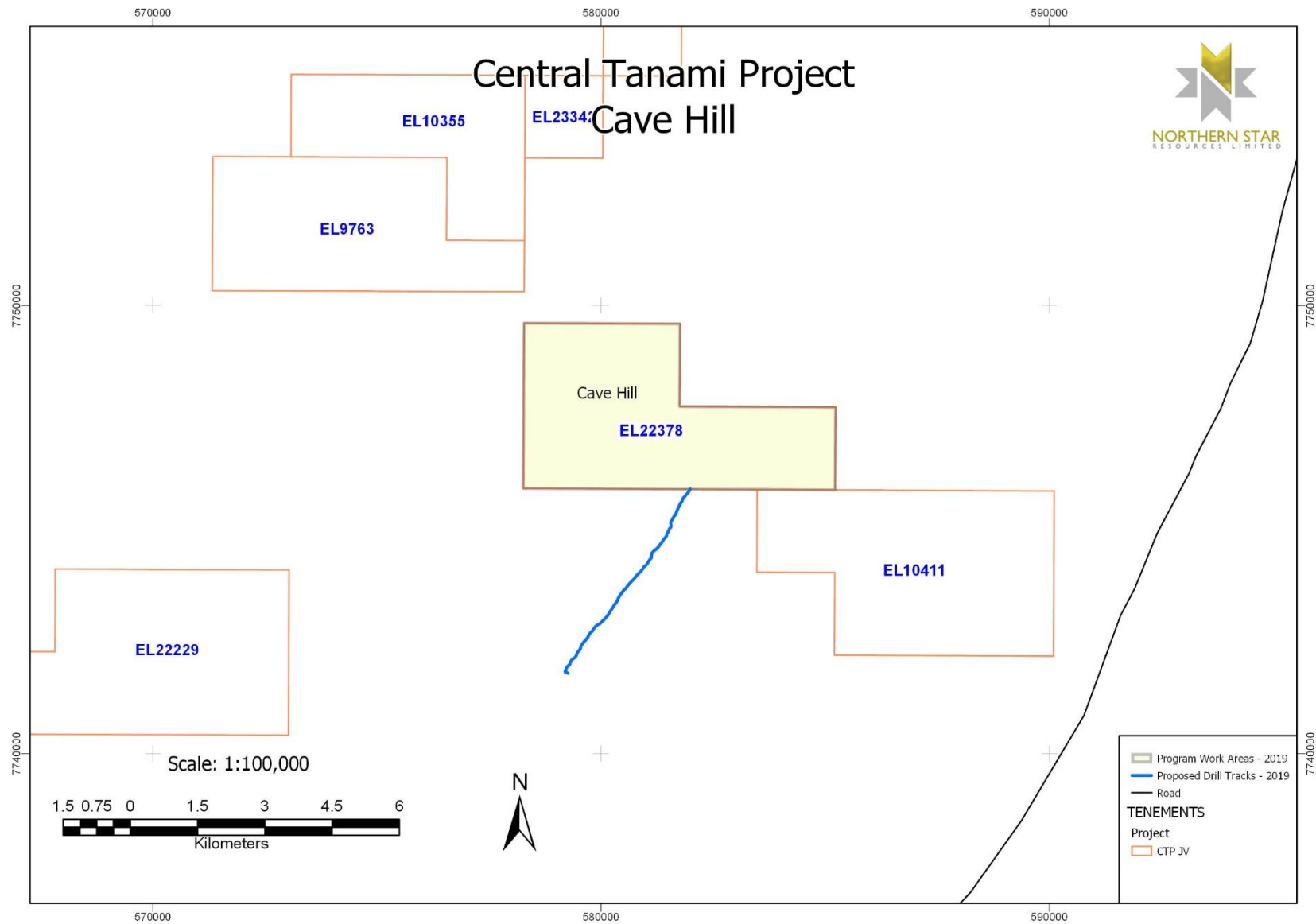
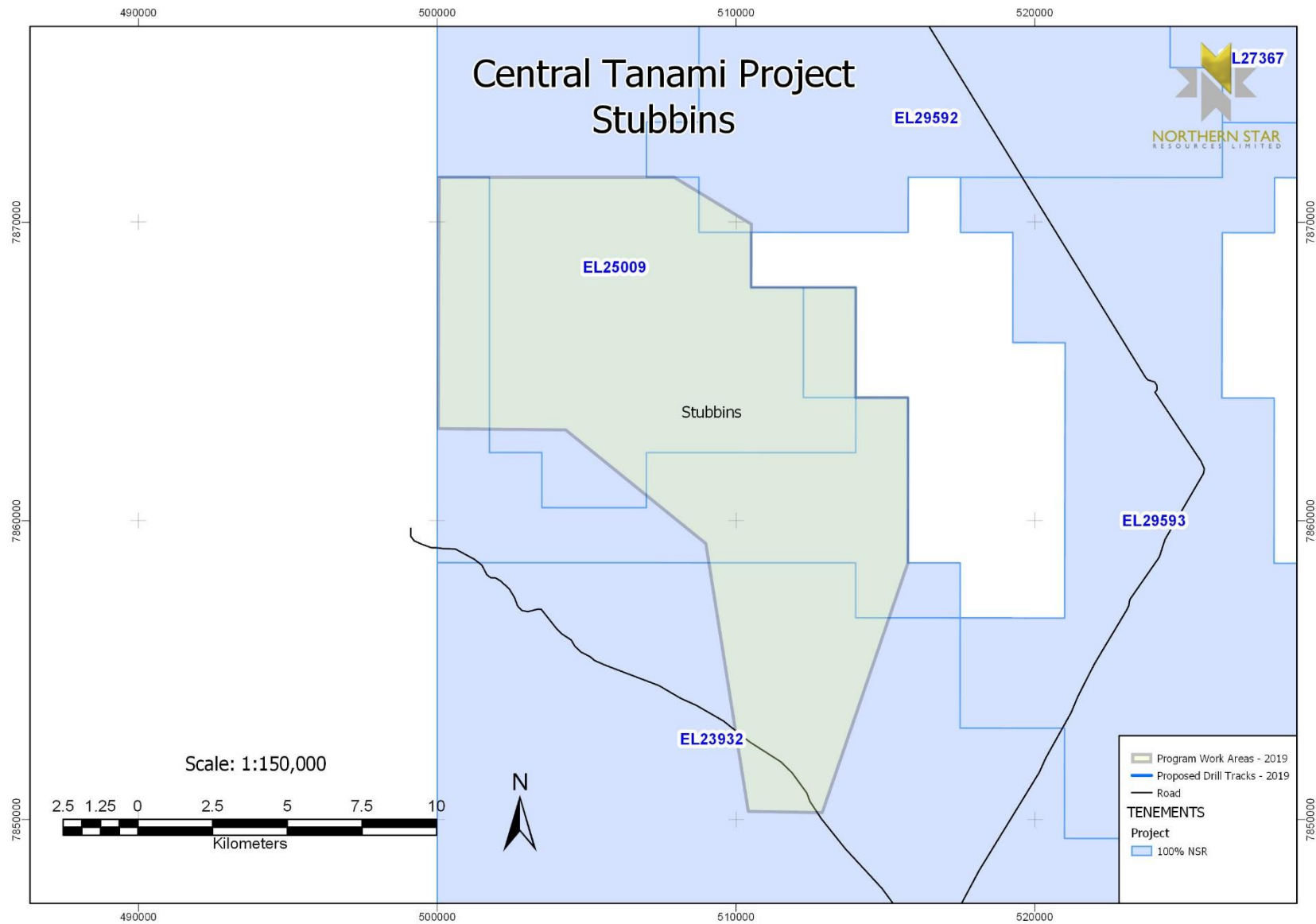


Figure 8 Stubbins Work Area



3.0 Current Project Site Conditions

3.1 Environment

Previous Environmental surveys conducted by NSR (Biota 2017) include the bio-regions for which the proposed work under this variation is located in. NSR will continue to adhere to and implement all recommendations from these surveys. These Environmental surveys have previously been reported in earlier variations to Authorisation 0916-01.

3.1.1 Recommendations

Biota (2017) provided ten key recommendations based on the results of previous surveys. Changes to processes and procedures that NSR have undertaken to address these recommendations have been included below.

While a range of key ecological attributes and related land units occur across the TRE tenure, summarised in Table 3, many of the potential impacts of exploration activities remain similar in nature. Consequently, appropriate environmental management measures are also common across the regions including;

1. **Avoidance of key ecological attributes:** the known locations of flora species of conservation significance, and the landform types that support these species, should be considered in the design of exploration programmes, and avoided wherever practicable.

Broad, pre-clearance inspections will be completed prior to disturbance to identify any species of conservation significance. The intensity of these surveys will be in accordance with the type and intensity of planned disturbance activities. Any identified conservation significant populations will be avoided where practicable. The avoidance of conservation species may result in a higher disturbance profile as deviations are made around areas.

- Landform type summaries and their respective significant flora/fauna have been added to the NSR Disturbance Permit Procedure (Appendix 17) to ensure individuals understand the key features they must observe during pre-clearance inspections.
- Pre-clearance inspections added to Disturbance Permit Procedure

2. **Pre-clearance targeted threatened fauna surveys and management:** targeted searches for Bilby, Mulgara and Great Desert Skink evidence should be undertaken once planned track access and exploration programmes have been designed. Searches for Grey Falcon nesting sites should also be included. Should evidence of the species' occurrence be recorded, then the design of that part of the sampling programme should be revised to avoid ground disturbance in the area. Should this not be possible within the constraints of the project, a fauna management plan, will need to be developed and implemented prior to the commencement of ground disturbance.

- Specific reference to the Bilby, Mulgara, Great Desert Skink and Grey Falcon have been added to the Disturbance Permitting Procedure and permit document (Appendices 17 and 16), specifically with regards to exploring for evidence of habitat.
- Pre-clearance inspections added to Disturbance Permit Procedure

3. Pre-clearance targeted weed management: Should planned track access and sampling for the exploration programme require ground disturbance in the locations of these known weed records, it would be advisable to control the existing infestations prior to commencing ground disturbance to minimise risks of spreading the weeds.

- This has been added to the standard Weed Management Plan.
- Pre-clearance inspections added to Disturbance Permit Procedure

4. Minimum footprint access planning: all clearing of vegetation for track access and sampling for the exploration programme should be kept to the minimum possible for safe vehicle and plant movement.

- This is already incorporated into the Drill Site Preparation Procedure (previously provided).

5. Minimum soil disturbance for temporary access: wherever feasible within each land unit, consideration should be given to the use of scrub-rolling or other low-intensity methods to create access where conditions permit, or the blade depth on mobile plant should be kept to a minimum.

- This is already incorporated into the Drill Site Preparation Procedure (previously provided).

6. Weed hygiene protocols: existing weed hygiene protocols identified in Northern Star's Mining Management Plan (Northern Star (Tanami) Pty Ltd 2017) should be implemented for all activities.

7. Vegetation clearing controls: Prior to the commencement of ground disturbance, these should be demarcated in the field, by means of GPS or other surveying equipment to ensure spatial and extent accuracy.

- This is already incorporated into the Drill Site Preparation Procedure (previously provided).

8. Vehicle speed limits: reduced speed limits should be enforced on any tracks traversing land units containing habitat for Bilby. These should be in force from one hour prior to dusk until one hour after dawn.

- Speed limits and restrictions are already covered under the CTP Induction; however, they have also been added to the recently developed NSR HSEC Booklet, further details are contained herein.

9. Fire risk management and contingency response: measures to reduce the risk of bushfires commencing because of the exploration programme should be developed and implemented.

- Fire and associated risks are already covered by the CTP Induction, however additional information has been provided in the HSEC booklet.
- Remote Site Inductions have been developed for temporary field camps and are designed to educate all personnel about the risks associated with those specific work programs.

10. Environmental inductions: all aspects of management measures 1 to 9 above that are relevant to the wider on-site workforce should be incorporated into site environmental inductions.

- All the above recommendations are hereby addressed through the CTP Site Induction, the recently developed HSEC Regional Exploration booklet and the Remote Site Induction.

The Biota Survey report (Appendix 20) includes maps showing the location of land units throughout each of the five regions within the TRE project. Table 4 summarises management measures in relation to the various land units.

Table 3 Summary of relevant environmental management measures

Management Measure	Applicable Land Unit						
	Low Lateritic Rises	Stony Hills and Slopes	Colluvial Plains	Isolated Mulga Stands	Drainage Systems	Alluvial Floodplains	Ephemeral Wetlands & Saline Flats
1. Avoidance of key ecological attributes	X		x	x	x	x	X
2. Pre-clearance targeted threatened fauna surveys and management:	X		X				X
3. Pre-clearance targeted weed management					X		X
4. Minimum footprint access planning	X	X	X	x	X	X	X
5. Minimum soil disturbance for temporary access	X	X	X			X	X
6. Weed hygiene protocols:			X	x	x	X	X
7. Vegetation clearing controls:	X	X	X	x	x	X	X
8. Vehicle speed limits	X		X				X
9. Fire risk management and contingency response	X	x	X	x	x	X	X
10. Environmental inductions	x		x	x	X		x

3.1.2 Sites of Significance

All work programs in this MMP variation are on tenure that was previously appended to Authorisation 0916-01. NSR has earlier identified the locations of this tenure in relation to Sites of Botanical Significance and Sites of Conservation Significance, all prior commitments and obligations under this Authorisation remain relevant.

3.2 Aboriginal and Heritage Sites

NSR is currently awaiting confirmation of several Sacred Site Clearance Certificate (**SSCC**) applications, submitted for proposed work contained in this MMP variation. No work under this MMP variation will be undertaken until the Central Land Council provides approval for the proposed work programs. The information in respect of Exclusion Zones advised in the Sacred Site Clearance Certificates is provided on a strictly confidential basis and the CLC have advised that NSR do not have approval to include any information, co-ordinates or plans provided by the CLC in our MMP.

It is noted that Sacred Site Clearance Certificates do not indemnify the operator from prosecution under the Northern Territory Aboriginal Sacred Sites Act.

4.0 Exploration Rehabilitation

All rehabilitation of exploration disturbance will be undertaken in accordance with the processes and procedures previously submitted under this MMP authorisation.

4.1 Exploration Rehabilitation Register

NSR maintains records of all drill holes drilled by NST on the Tanami leases within its drilling and GIS databases. The Rehabilitation Data Files provided in *Appendix 1* details the rehabilitation status of all drill sites, the rehabilitation methods used and evidence of rehabilitation (before and after photos).

4.2 Completed Rehabilitation

Rehabilitation completed since the prior Authorisation Variation approval is detailed in Table 4. This rehabilitation was of work completed in 2018 and prior and is ongoing at the date of this variation. Only completed stages of rehabilitation have been removed from the Security Calculation, with the exception of post-closure weed monitoring.

Table 4 Completed Rehabilitation

Prospect	Tenement/s	Drill Method	Drill Hole Plugged below surface	Sample Piles Scarified	Grid Peg Removed	Drill Pad Scarified	Comment
Cave Hill	EL23342 EL22229	AC	108	108	108	108	Legacy exploration
Channel 4 Solaris Terminus Jims Return	EL26926	AC	176	176	176	0	Drilling completed 2018 Rehab ongoing