23 April 2019
Attention: Marc Morris
Environment Approvals
Iron Bridges Operations Pty Ltd
Level 2
87 Adelaide Terrance
EAST PERTH, WESTERN AUSTRALIA 6004

North Star Expansion Subterranean Fauna Desktop Impact Assessment

Dear Marc,

As discussed, the purpose of this subterranean fauna desktop environmental impact assessment (EIA) is to evaluate the potential impacts to subterranean fauna within the Glacier Valley Study Area of the proposed North Star Expansion Project (the Project), operated by the Iron Bridge operations Pty Ltd (IBO). This desktop EIA is to support the Section 45C application that includes the development of two satellite pits and associated waste dump infrastructure to the south of the current active North Star Magnetite Project. The primary document that the desktop EIA will review is the previous Level 2 subterranean fauna assessment (Subterranean Ecology 2012) that was completed for the environmental assessment and approval of the original North Star Project.

Yours sincerely

Dr Nicholas Stevens
Principal Environmental Scientist
Subterranean Fauna Technical Lead
Stantec Australia Pty Ltd

1. Introduction

1.1. Project Background

Iron Bridge Operations (IBO) are proposing to develop the Glacier Valley deposit as part of the North Star Expansion Project (the Project), in the Pilbara region of Western Australia, approximately 110 km south of Port Hedland (**Figure 1-1**). The proposed Project comprises two open-cut pits and associated waste dump landform, haul road and stockpile (**Figure 1-2**). The Glacier Valley deposit occurs approximately 4 km south of the current North Star mine, within the north-south trending BIF ridge landform that hosts both the North Star and Glacier Valley iron ore deposits.

The subterranean fauna values present along and around the north-south trending George Creek Banded Iron Formation (BIF) ridge landform that hosts both the North Star and Glacier Valley iron ore deposits, have been previously assessed as part of the environmental approvals for the North Star Project (Subterranean Ecology 2012). The findings of the subterranean fauna work conducted revealed that stygofauna values are not present along the elevated BIF ridge hosting the North Star and Glacier Valley deposits. Stygofauna were shown to occur lower in the landscape within surrounding alluvial aquifers. In contrast, the elevated BIF ridge was shown to host troglofauna values, with 11 species recorded, including 5 species from within the Glacier Valley Study Area.

1.2. Scope and Objectives

The main objectives of this desktop EIA were to evaluate the diversity and distributions of subterranean fauna taxa previously recorded from the Project Study Area and to ensure that they are adequately understood in the context of the proposed project footprint and surrounding areas. The specific objectives were:

- document the diversity and distribution of subterranean fauna species within the Study Area;
- assess the conservation significance of subterranean fauna species occurring within the Study Area;
- identify potential risks to obligate subterranean fauna recorded; and
- provide an EIA in relation to the proposed Project development.

The principles, objectives and survey methodology are aligned with relevant regulatory guidelines. These include, but are not limited to:

- Environmental Protection Authority (EPA) (2016a) Technical Guidance – Subterranean Fauna Survey (equivalent to EPA 2013 EAG 12 Environmental Assessment Guideline for Consideration of subterranean fauna in environmental impact assessment in Western Australia); and
- EPA (2016b) Technical Guidance – Sampling Methods for Subterranean Fauna Survey (equivalent to EPA 2007 Guidance Statement No. 54A Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia).

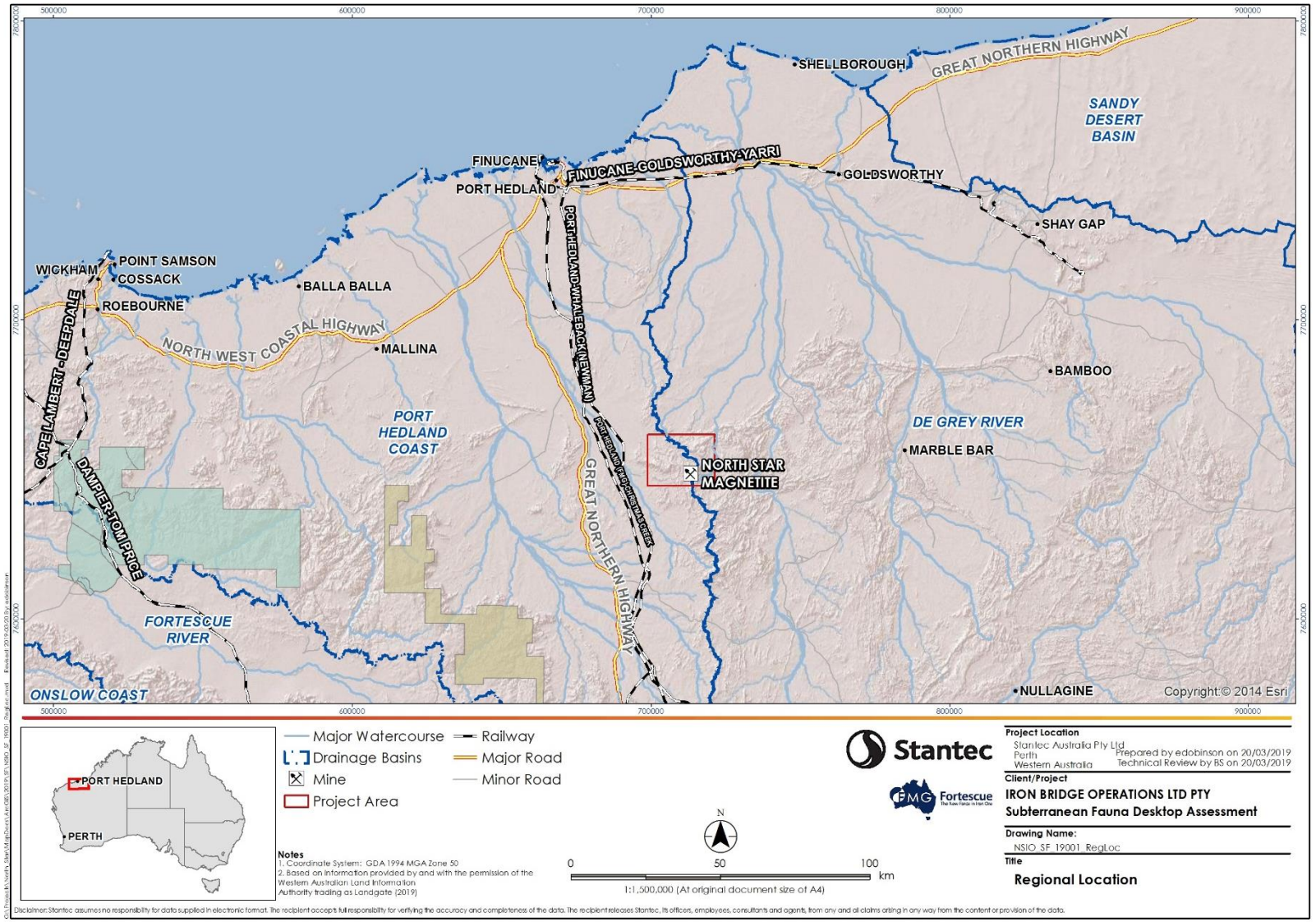

Figure 1-1: Regional location of the Project.

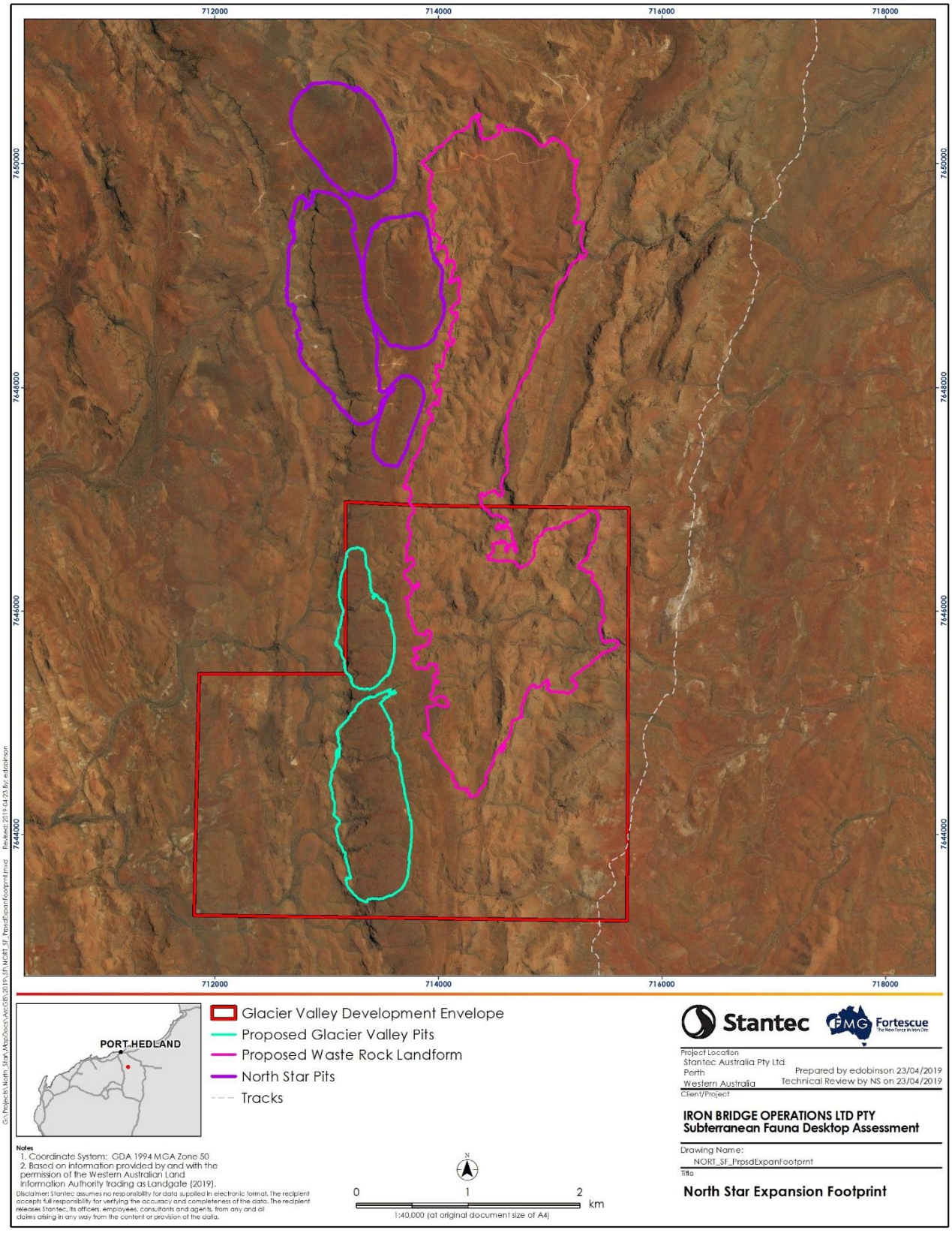

Figure 1-2: Approved North Star Project footprint and proposed North Star Expansion Project footprint.

2. Methods

The sample and identification methods used to assess the subterranean fauna values within the Study Area are clearly detailed in Subterranean Ecology (2012). The sample methods and survey design are consistent with both EPA Technical Guidance Subterranean Fauna Survey (2016b) and the Technical Guidance Sampling Methods for Subterranean Fauna Survey (2016a) that outline considerations and sampling methods for subterranean fauna in Western Australia. The troglofauna and stygofauna survey timings did occur over at least two seasons, including both the late wet and early dry seasons.

Troglofauna scrape samples are not considered in either EPA (2016a, b) technical guidance documents. Scrape sampling has become well regarded as an efficient collection technique for troglofauna, often out performing litter traps in terms of diversity of troglofauna material recorded. The EPA (2016b) guidelines do make provision for using new sample methods, such as scrape sampling, stating that to maximise survey effectiveness, the most contemporary techniques and standards should be used.

The sample effort and locations are outlined below to provide easier reference for the environmental impact assessment. The identification of stygofauna and troglofauna species used specialist taxonomists as well as genetic analysis.

2.1. Sample Effort

1.1.1. Stygofauna

Subterranean Ecology (2012) collected 47 stygofauna net haul samples across three periods (March 2011, May/June 2011, and July 2011) spanning the late wet to early dry seasons (**Table 2-1**). The surveys followed an above average wet season (Subterranean Ecology 2012).

No stygofauna samples were collected from the BIF habitat within the Glacier Valley Study Area as exploration drill holes did not intercept the groundwater table (**Figure 2-1**Error! Reference source not found.). To the north of the Study Area, within the North Star deposit area, 31 stygofauna net haul samples were collected from 12 sites from BIF habitat that did intercept groundwater.

The sample effort undertaken is considered sufficient in providing a reliable assessment of the stygofauna values present along the BIF ridge landform that hosts both the North Star and Glacier Valley iron ore deposits.

Table 2-1: The subterranean fauna sample effort completed as part of the North Star 2012 assessment by Subterranean Ecology (2012).

Deposit Area		Troglofauna Samples			Stygofauna Samples
		Litter Traps	Scrapes	Total	Net Hauls
Glacier Valley	Inside Pit	44	0	**44**	0
	Outside Pit	6	0	**6**	0
North Star	Inside Pit	56	12	**68**	12
	Outside Pit	5	2	**7**	2
Reference		15	7	**22**	33
Total		**130**	**21**	**147**	**47**

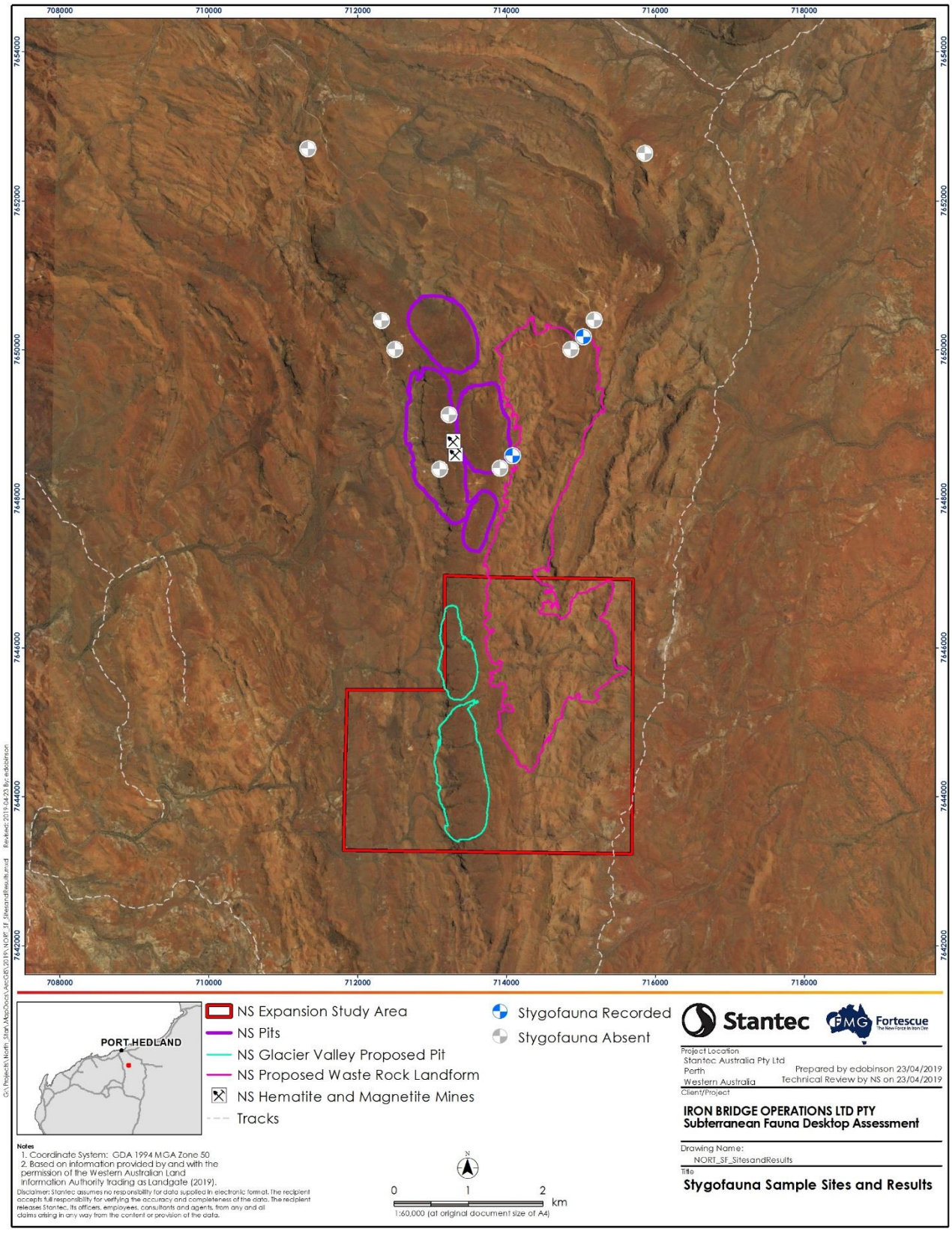

Figure 2-1: Stygofauna sample sites.

1.1.2. Troglofauna

Subterranean Ecology (2012) collected a total of 130 troglofauna litter traps and 21 troglofauna net scrape samples across three periods (March 2011, May/June 2011, and July 2011) spanning the late wet to early dry seasons (**Table 2-1**). The surveys followed an above average wet season (Subterranean Ecology 2012).

Troglofauna sampling has been undertaken along most of the BIF ridge landform hosting both the North Star and Glacier Valley iron ore deposits (Error! Reference source not found.). A total of 50 litter trap samples were collected from the Glacier Valley Study Area.

The sample effort undertaken is considered sufficient in providing a reliable assessment of the troglofauna values present along the BIF ridge landform that hosts both the North Star and Glacier Valley iron ore deposits.

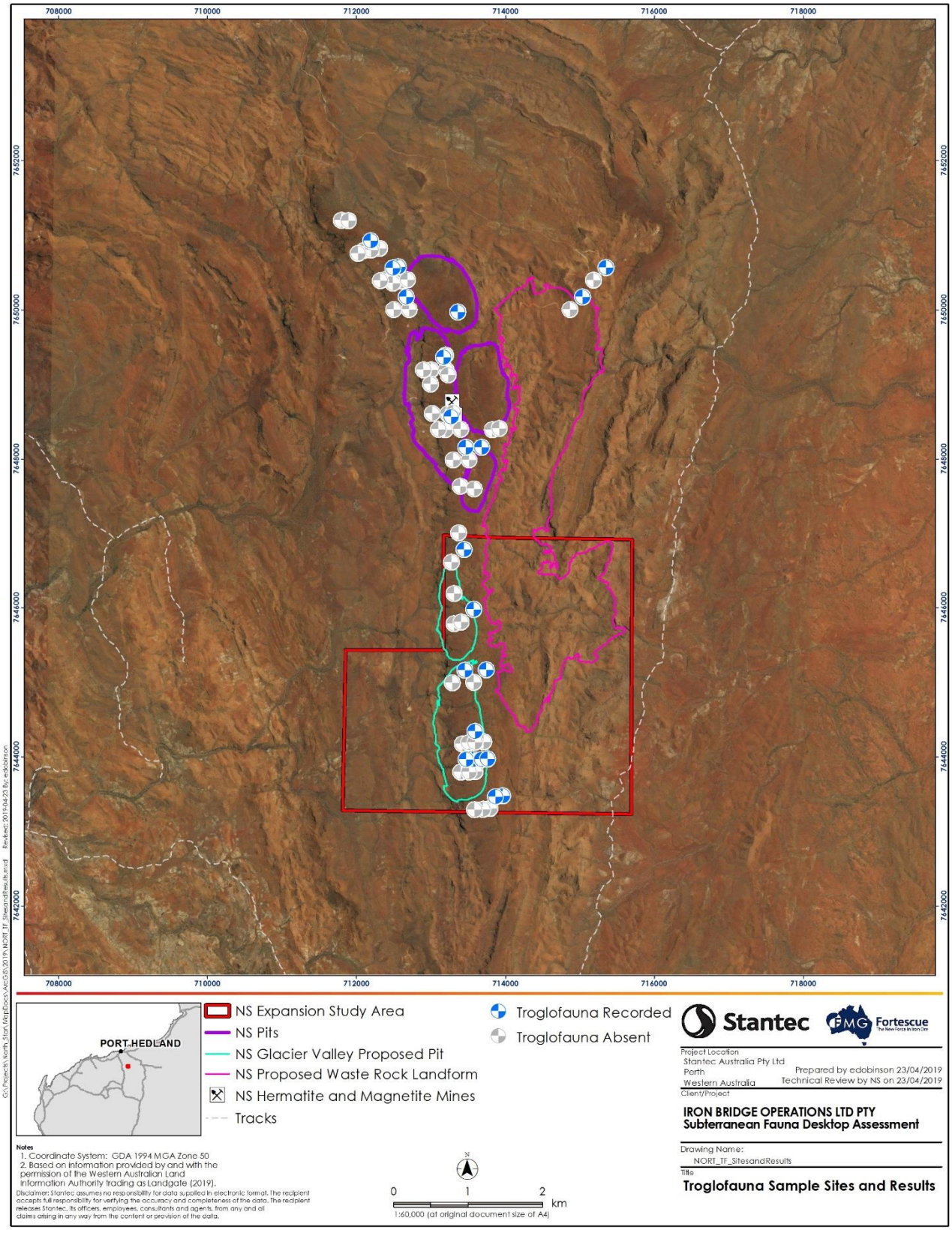

Figure 2-2: Troglofauna sample sites.

3. Survey Findings

3.1. Stygofauna

No stygobitic taxa were recorded from the BIF ridge habitat sampled in and around the North Star deposit (Subterranean Ecology 2012). Stygofauna were recorded from reference sites lower in the landscape associated with alluvial aquifers within the main drainage systems. Populations of two stygobitic species, Elaphoidella humphreysi (Copepoda) and Parabathynellidae sp. NS (Bathynellacea), were recorded from alluvial aquifers within the North Star Project footprint, however, both species were also collected from regional reference sites outside of the Project Area (**Figure 3-1**).

3.2. Troglofauna

Eleven troglofauna species were collected in the 2012 subterranean fauna assessment (Subterranean Ecology 2012). Nine of these species were recorded from along the BIF ridge, including 5 species from within the Glacier Valley Study Area (**Table 3-2**,**Figure 3-2**, **Figure 3-3**). The remaining two species, Chthoniidae sp. NS and Symphyla sp. NS, were recorded from separate landforms to the main BIF ridge that hosts the North Star and Glacier Valley deposits. Three of the five species recorded from the Glacier Valley Study Area, Blattidae sp. AB NS, *Nocticola* sp. NS2 and *N*. sp. S5 NS1, have been collected from within the proposed pit boundaries. However, all three species have been shown to have distributions that extend well beyond the proposed Glacier Valley pits.

The distribution records of the troglobitic carabid species, Anillini sp. NS, indicate that the species is not confined to the BIF habitat or the main BIF ridge landform. This is also true for the cockroach species, Blattidae sp. AB NS, *Nocticola* sp. NS2 and *N*. sp. S5 NS1, however, these species belong to groups known to usually possess relatively widespread distributions.

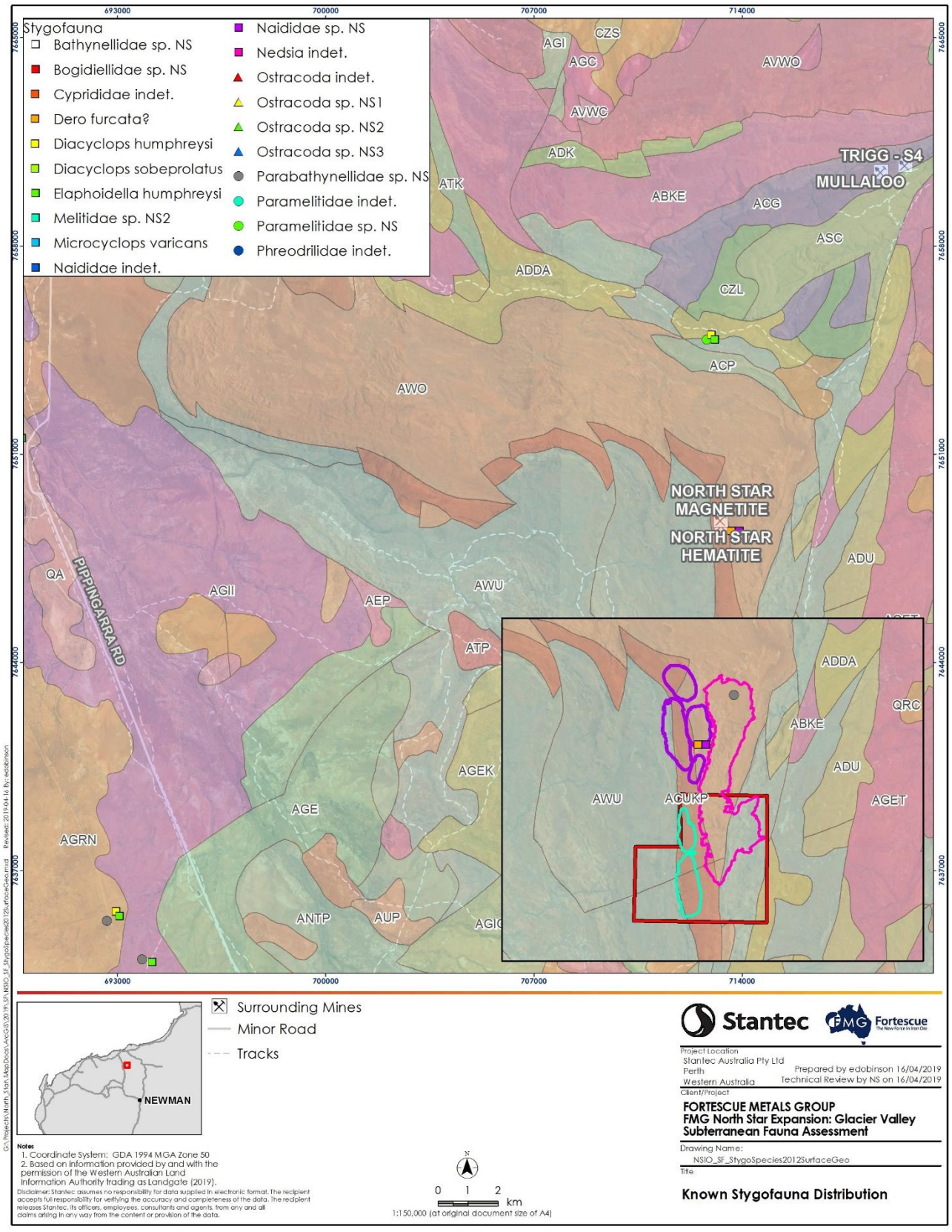

Figure 3-1: Recorded stygofauna distributions in relation to subsurface geology.

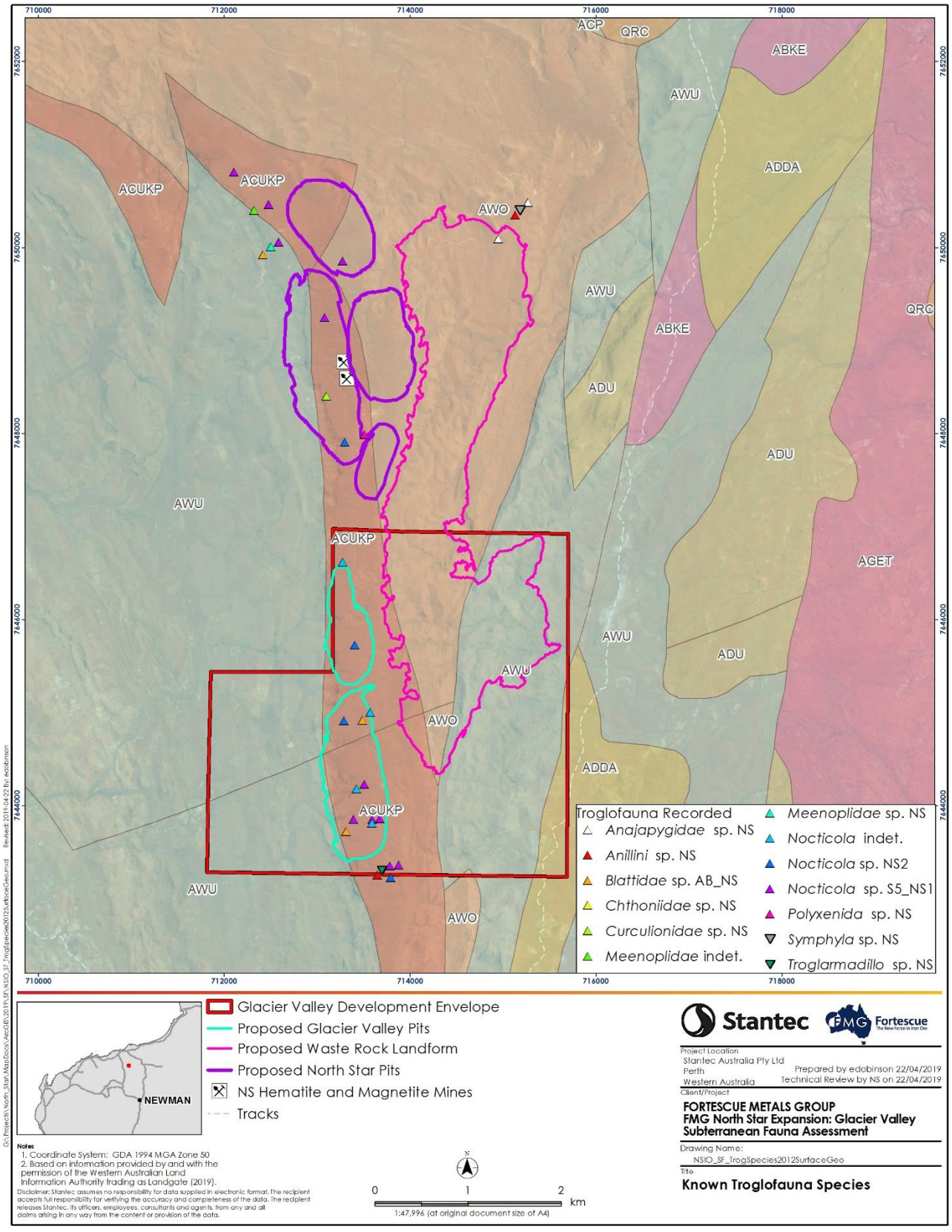

Figure 3-2: Recorded troglofauna distributions in relation to subsurface geology.

Table 3-1: Description of surface geology codes relevant to Study Area in Figures 3-1 and Figure 3-2.

Code	Unit Name	Description
ABKE	Euro Basalt	Igneous mafic volcanic, sedimentary; Basalt, chert, dolerite, komatiitic basalt, komatiite, amphibolite, basaltic fragmental rock, gabbro, ultramafic to mafic schist, carbonate rock, felsic tuff, shale, sandstone, quartzite, metapyroxenite, serpentinite
ACG	Gorge Creek Group	sedimentary non-carbonate chemical or biochemical, sedimentary siliciclastic; Chert, ferruginous chert, banded iron formation, jaspilite; minor siltstone, shale, sandstone, pebbly sandstone, quartzite, polymictic conglomerate, felsic volcaniclastic rock, basalt, ultramafic schist, mafic schist
ACP	Chert 74258	Sedimentary non-carbonate chemical or biochemical; Chert, some as tectonic dykes
ACUKP	Pincunah Member	Sedimentary non-carbonate chemical or biochemical, igneous volcanic; Banded iron formation (BIF), chert, tuff, shale, siltstone
ADDA	Dalton Suite	Igneous mafic intrusive, igneous ultramafic intrusive; Gabbro, dolerite, dunite, peridotite, serpentine-chlorite schist, serpentinite, metaleucogabbro, metapyroxenite, ultramafic schist; metamorphosed
AGE	Cleland Supersuite	Igneous felsic intrusive; Undivided, unnamed intrusions in the Cleland Supersuite; leucogranite, granodiorite, monzogranite, tonalite, granite, pegmatite, mixed granites, minor gneiss
AGET	Strelley Monzogranite	Igneous felsic intrusive; Monzogranite and subvolcanic layered granitic intrusions
AGII	Pincunah Monzogranite	Igneous felsic intrusive; quartz(-feldspar)-phyric hornblende-biotite monzogranite with foliation and phenocryst alignment
AGRN	Numbana Monzogranite	Igneous felsic intrusive; Porphyritic to equigranular muscovite-biotite monzogranite, leucogranite; weakly foliated to massive; contains xenoliths and rafts of greenstone, granodiorite and other granitoids
ASC	Croydon Group	Sedimentary siliciclastic, argillaceous detrital sediment; Siltstone, shale, iron formation, sandstone, pebbly sandstone, pebble to boulder conglomerate; metamorphosed
AWO	Soanesville Group	Sedimentary, igneous volcanic; Conglomerate, arkosic sandstone, greywacke, lithic arenite, BIF, shale, silicified shale (chert), sandstone, siltstone, quartzite, schist, basalt, mudstone, dacite, tuff, quartz-sericite schist; mafic schist
AWU	Sulphur Springs Group	Sedimentary, igneous volcanic; Felsic to mafic volcanics and volcaniclastic rocks, chert, volcaniclastic sandstone, greywacke, shale, basalt, komatiitic basalt, amphibolite, mafic and ultramafic schist, banded iron formation, quartz-carbonate rock, siltstone
CZL	Ferruginous duricrust 38498	Regolith; Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite
QA	Alluvium 38485	Alluvial regolith; Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted
QRC	Colluvium 38491	Colluvial regolith; Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite

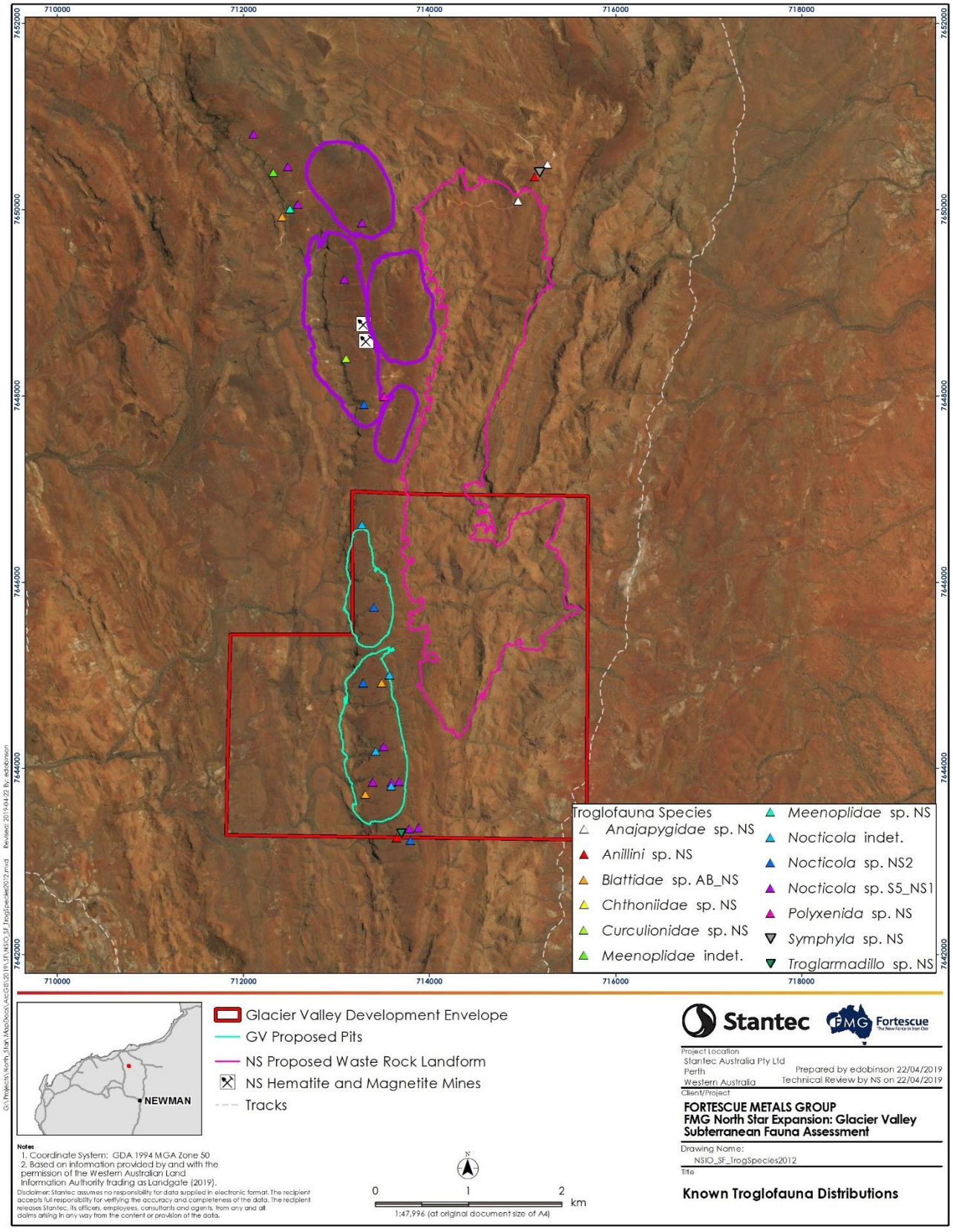

Figure 3-3: Recorded troglofauna distributions.

Table 3-2: Troglofauna diversity and distribution in relation to Project areas. All taxon were included in genetic analyses (Subterranean Ecology 2012).

Taxon	North Star Project Area		Glacier Valley Project Area		Reference Area	Regional Pilbara Records	Comments
	Inside Pit	Outside Pit	Inside Pit	Outside Pit			
Arachnida							
Chthoniidae sp. NS					•		Recorded on separate landform greater than 4 km north of North Star Project area. Species considered to be troglobite and short range endemic (SRE). Not of conservation concern.
Diplopoda							
Polyxenida sp. NS	•					?•	Genetic analysis showed distinct species from Abydos material. Polyxenids generally not considered SREs as DNA has shown several species to have widespread distributions, ranging hundreds of kilometres from the Pilbara to the northern Goldfields region of Western Australia (WA) (MWH 2014b, Outback Ecology 2011, 2013, Stantec 2017b). Considered a troglophile and not SRE. Not of conservation concern.
Diplura							
Anajapygidae sp. NS		•			•		Diplurans often recorded in subterranean fauna assessments from cavernous habitats (Subterranean Ecology 2010) and alluvial soil profiles (Outback Ecology 2011). A dipluran taxonomist considered most diplurans collected in WA are likely soil dwelling species (A. Sendra pers. comm. in Subterranean Ecology 2011b). Not of conservation concern.
Insecta							
Blattidae sp. AB NS		•	•			•	Genetic analysis showed widespread distribution across the Pilbara. Not an SRE and not of conservation concern.
Nocticola sp. S5 NS1	•	•	•	•		?•	Genetic analysis demonstrated distribution extends to Abydos, 10 km to NE of North Star Project Area. Not of conservation concern.
Nocticola sp. NS2	•		•	•		?•	Species known only from North Star area. Unpublished genetic studies have indicated that some *Nocticola* species in the Pilbara can be relatively widely distributed. Not of conservation concern.
Curculionidae sp. NS	•						Species recorded from BIF within North Star pit boundary only. Considered troglobite and SRE. Genetic analysis has shown distribution of troglobitic curculionid species to extend for over 3 km along BIF ridges in the Pilbara (MWH 2016). Distribution of this species considered to extend along much of the contiguous BIF landform.

Taxon	North Star Project Area		Glacier Valley Project Area		Reference Area	Regional Pilbara Records	Comments
	Inside Pit	Outside Pit	Inside Pit	Outside Pit			
Anillini sp. NS				•	•		Genetic analysis showed species distribution not confined to main BIF ridge landform that hosts both North Star and Glacier Valley deposits. Species distribution shown to extend greater than 7.2 km, from 2 km east of North Star deposit, not on main BIF ridge or habitat, to south of Glacier Valley deposit within main BIF ridge. Considered troglobite and SRE. Distribution of this species considered to extend along much of the contiguous BIF landform as well as associated neighbouring landforms. Not of conservation concern.
Meenoplidae sp. NS		•					Species considered troglophile with blind juveniles confined to the hypogean environment feeding on plant roots and the adults representing the epigean dispersal stage. Adult material from Robe Valley mesas have wing and eye development and clearly not troglobites. Not of conservation concern.
Isopoda							
Troglarmadillo sp. NS				•			Species known from single record from south of Glacier Valley deposit, outside of the proposed pit boundary. A species recorded from fractured rock and colluvial regolith habitats in northern goldfields region found to have distribution extending for greater than 5 km (Stantec, unpublished data). Considered troglobite and SRE. Not of conservation concern.
Symphyla							
Symphyla sp. NS					•		Species recorded from 2 km east of North Star deposit, not on main BIF ridge or habitat. Symphyla, like diplurans, are known to include many soil dwelling (edaphofauna) species as well as some troglobitic species (Scheller 1996). It can be difficult to establish the troglobitic status of symphylan taxa as all species have evolved to be unpigmented with no eye development and rely on highly specialised antennae for sensing their environment. Documented troglobitic symphylans do display distinctly elongated appendages, however, the evolution of such adaptations may not have occurred for all potential troglobitic species. Potential troglobite and likely SRE. Not of conservation concern.

4. Impact Assessment

4.1. Proposed Impacts

1.1.3. Direct Impacts

The two main direct potential impacts on subterranean fauna associated with the development of the Project are:

- removal of habitat through excavation of the proposed mining pits; and
- drying out of habitat through the lowering of the groundwater table associated with mine pit dewatering.

The removal of habitat through mining excavation poses the greater risk to the conservation of stygofauna and troglofauna species relative to the lowering of the groundwater table only. Groundwater drawdowns are considered to have greater impacts on stygofauna compared to troglofauna because lowering of the groundwater table can directly reduce the extent of habitat available for stygofauna. Groundwater drawdown of 0.5 mbSWL is considered to represent the extent of the groundwater drawdown impact for both stygofauna and troglofauna. However, in the case of troglofauna, the lowering of the water table by less than 5 mbSWL is less likely to reduce the relative humidity of the overlying inhabited strata to such an extent to render them uninhabitable. In addition, troglofauna can migrate downwards to avoid uninhabitable conditions, provided suitable habitable voids are available for colonisation. Therefore, it is considered likely that troglofauna habitat would remain beyond the modelled groundwater drawdown of 5 mbSWL.

1.1.4. Indirect Impacts

Potential indirect impacts posed by proposed mining developments that can impact subterranean habitats and lead to reduced abundance of include:

- Reduction in influx of resources (e.g. nutrients, oxygen) through clearing of vegetation (reduced organic inputs) and changes to hydrological regimes as a result of mining associated landforms (e.g. pits, waste rock landforms, access infrastructure, etc);
- Contamination through chemical seepage or fuel spills; and
- increase in sediment load in run-off from mining activities that could reduce surface-subsurface water exchange during flow periods (e.g., lessen input of resources) and alter groundwater chemistry (Marmonier 1991).

These potential indirect impacts to groundwater quality are not considered further here as part of this risk assessment because they can be greatly reduced or avoided through project design and best practice environmental management procedures. For example, limit clearing of vegetation to immediate areas of planned development footprint, avoid significant changes / diversions to main drainage flow paths present, and reduce sediment run-off from roads and landforms. In addition, the indirect impacts are considered difficult to assess, and likely to lead to the reduction in the abundance of subterranean fauna species but less likely to reduce the species richness present. Appropriate management and mitigation measures will need to be addressed in the relevant approvals documentation and related environmental management plan in relation to potential indirect impacts.

4.2. Stygofauna

The stygofauna findings and habitat assessment of Subterranean Ecology (2012) has indicated that there will be no risk to the long term conservation of any stygofauna species due to the proposed development of the Glacier Valley deposit. The stygofauna findings and habitat assessment indicated that the BIF ridge habitat present in the Glacier Valley Study Area is not prospective for stygofauna. Instead, stygofauna occurred primarily in reference sites lower in the landscape associated with alluvial aquifers within the main drainage systems. No stygofauna were recorded from within the groundwater of the BIF ridge. This

result is common for distinct BIF ridge landforms, with stygofauna values shown to be associated with the surrounding alluvial aquifers (Eco Logical 2013, MWH 2014a, 2016, Stantec 2017a, Subterranean Ecology 2011).

4.3. Troglofauna

The proposed development of the Glacier Valley deposit is not considered likely to pose a significant long term conservation risk to the troglofauna assemblage recorded from the main BIF ridge landform hosting the North Star and Glacier Valley deposits. No troglofauna species have been found to be restricted to within a proposed direct impact zone. The distribution patterns of the troglofauna assemblage recorded indicated the broader extent along the BIF ridge system of suitable and contiguous habitat adjacent to and outside proposed mining impact areas. A sufficient expanse of habitat is considered to remain within the main ironstone ridge system, as well as broader habitat present within the adjacent landforms that was demonstrated by limited sampling to host members of the troglofauna assemblage.

5. Conclusion

The overall findings of this desktop EIA, based on the Subterranean Ecology (2012) Level 2 subterranean fauna assessment, indicate that the proposed North Star Expansion Project, involving the development of the Glacier Valley deposit, will meet the relevant EPA objectives in that the proposal does not pose a significant threat to maintaining subterranean fauna representation, diversity, viability and ecological function at the species, population or assemblage level.

6. Glossary

alluvium – sediment deposited by a stream or river

aquatic – relating to water

aquifer – a body of permeable rock or sediment capable of storing groundwater

arid – a region characterised by a severe lack of available water, to the extent that the growth and development of biota is hindered or prevented

bedrock – consolidated rock attached to the earth's crust

biodiversity – the diversity of biota in a particular environment or region

calcrete – carbonate deposits that form in arid environments, as a result of groundwater evaporation

cave – a subsurface cavity of sufficient size that a human could enter

dissolved oxygen – a measure of the amount of gaseous oxygen dissolved in a solution; oxic = > 3 mg/L; dysoxic = 0.3 to 3.0 mg/L; suboxic = < 0.3 mg/L levels

distribution range – the overall geographic area that a species is known to occur in

divergence – degree of separation from a common ancestor

diversity – a combination of species richness and abundance

drawdown – the lowering of the adjacent water table or piezometric surface as a result of groundwater extraction

ecotone – zone of transition among different ecosystems

electrical conductivity – an estimate of the total dissolved salts in a solution, or salinity

endemic – having a distribution restricted to a particular geographic region

epigean – pertaining to the surface zone

fractured rock – a rock formation characterized by separation or discontinuity, usually as a result of geological stress (e.g. faulting)

geological ages (e.g. Cainozoic) – distinct time periods within the geological history of the earth

groundwater – water occurring below the ground surface

habitat – an ecological or environmental area that is inhabited by a particular animal or plant species

hypogean – pertaining to the subterranean zone

hyporheic zone – spatially fluctuating ecotone within the bed of a river or stream between surface and groundwater. Considered important component of groundwater ecosystems and involved in the 'interstitial highway', forming hyporheic corridor linking associated aquifers.

invertebrates – animals lacking vertebrae

karst – a region of limestone or other soluble rock, characterized by distinctive features such as caves, caverns, sinkholes, underground streams and springs

lineage – a group of organisms related by descent from a common ancestor

molecular – pertaining to the genetic characteristics of an organism or group

morphology – the specific form and structure of an organism or taxon

morphospecies – a general grouping of organisms that share similar morphological traits, but is not necessarily defined by a formal taxonomic rank

palaeoriver, palaeochannel, palaeodrainage – a remnant of a stream or river channel cut in older rock and filled by the sediments of younger overlying rock

pH – a measure of the hydrogen ion concentration of a soil or solution (values below pH of 6.5 are 'acidic', and those above pH 7.5 are 'alkaline')

relictual – having survived as a remnant

salinity – the concentration of all dissolved salts in a solution. The salinity level classification *sensu* Hammer (1986): freshwater = salinity less than 5 mS/cm (3 ppt); hyposaline = salinity ranging from 5–30 mS/cm (3–20 ppt); mesosaline = salinity ranging from 30–70 mS/cm (20–50 ppt); hypersaline = salinity equal to or greater than 70 mS/cm (50 ppt)

semi-arid – a climatic region that receives low annual rainfall (250 – 500 mm)

species – a formal taxonomic unit defining a group or population of organisms that share distinctive characters or traits, are reproductively viable and/or are otherwise identifiable as a related group

species richness – the number of species present in a particular habitat, ecosystem or region

species accumulation curve – a model used to estimate species diversity or richness

standing water level (SWL) – the depth to groundwater from a particular reference point (e.g. in a monitoring bore)

stygal – pertaining to groundwater habitat or biota

stygobite – an obligate aquatic species of groundwater habitats

stygobiont – another term used to describe obligate inhabitants of groundwater systems

stygofauna – a general term for aquatic groundwater fauna

stygophile – an aquatic species that temporarily or permanently inhabits groundwater habitats

stygoxene – an aquatic species that has no fixed affinity with groundwater habitats, but may nonetheless occur in groundwater habitats

sympatry / sympatric – two or more species that are considered to exist in the same or overlapping geographic area and may regularly interact with, or encounter, each another (without interbreeding)

taxon (singular), taxa (plural) – an identifiable group of organisms, usually based on a known or inferred relationship or a shared set of distinctive characteristics

troglobite – an obligate terrestrial species of subterranean habitats

troglofauna – a general term for terrestrial subterranean fauna

troglomorphic features – morphological characteristics resulting from an adaptation to subterranean habitats (e.g. a reduction in pigment)

troglophile – a terrestrial species that temporarily or permanently inhabits subterranean habitats

trogloxene – a terrestrial species that has no fixed affinity with subterranean habitats, but may nonetheless occur in subterranean habitats

void – a pore space in the rock or stratum

Yilgarn – pertaining to the Yilgarn Craton, a 65,000 km2 body of the earth's crust in south-western Australia that dates back to the Archaean period, 2.6 to 3.7 million years ago

7. References

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