REPORT
ATTACHMENT 7: SITTING AND LOCATION

DATE: 30 DECEMBER 2023

DATE	NAME	CHANGE	APPROVED	REVISION

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1. INTRODUCTION

This report focuses on Part 10: Siting and Location, which is a critical component of the environmental assessment process for the proposed activities and delves into various aspects related to the siting and location of the prescribed premises. The objective is to evaluate the potential impact of the proposed activities on sensitive land uses, nearby environmentally sensitive receptors, and the surrounding environmental context.

1.1 Sensitive Land Uses

Sensitive land uses, such as residences or other vulnerable areas, can be adversely affected by emissions or discharges associated with prescribed activities. Part 10 of the application identifies the distances to the nearest sensitive land uses from the Cosmos Tailings Storage Facility Expansion (TSF3). Understanding these distances is essential for assessing the potential risks and implementing necessary mitigation measures.

1.2 Environmental Siting Context Details

To gain a holistic understanding of the environmental context, the report delves into the topography, climate, geology, soil type, hydrology, hydrogeology, and biodiversity at the premises. This assessment provides information that helps in evaluating the environmental suitability of the proposed location and its potential impact on the surrounding ecosystem.

2. ENVIRONMENTAL AND CLIMATE CONTEXT

2.1 Climate and Environmental Conditions at the Project Site

The project site is situated within the Murchison bioregion, characterized as semi-arid with distinct climate patterns. The nearest meteorological reference point is the Leinster Aero Weather Station (Station Number 012314), which provides climate data for the assessment. The prevailing climate exhibits hot, dry summers and cooler to milder winters. The mean annual max temperature is 28.2°C, with mean annual minimum temperatures at 14.7°C. It is notable that daily maximum temperatures exceeding 30°C are common between the months of October and March.

Rainfall in this region is variable, primarily occurring during summer, stemming from thunderstorms, and occasionally decaying tropical cyclones from the northwest. The mean annual rainfall stands at 264.5mm, with 80% of it falling between December and July. On average, rainfalls exceeding 1mm occur approximately 32.4 days per year.

Annual rainfall records over the past 25 years have demonstrated a range between 102.6mm as a minimum and 439.4mm as a maximum. In the year 2021, below-average rainfall was recorded from January to July (158.4mm), while the mean rainfall for the same period is typically 167.7mm. Long term trend data shows a decreasing linear trend in overall annual rainfall (R2=0.0378)

Winds predominantly originate from the east in the mornings, increasing to northerly directions during the afternoon. Average wind speeds vary from 16.0 to 21.4 km/hr in the morning and 15.6 to 19.4 km/hr in the afternoon. It is noteworthy that annual evaporation rates range from 3000 to 3200mm, surpassing the annual rainfall totals.

Climate change projections indicate that temperatures are expected to rise by approximately 1°C by 2030, leading to increased evapotranspiration. Additionally, there is a likelihood of a 5% reduction in summer rainfall, potentially exacerbating water availability challenges in the region. Looking further

ahead to 2070, temperatures are projected to increase by 3%, accompanied by further decreases in rainfall. These projections suggest that the future climate in the area will be hotter and drier.

Table 1 provides climate statistics obtained from the Leinster Aero Station 12314.

Table 1 – Climate Statistics from Leinster Aero Station 12314 (1994-2023)

Month	Mean Max. Temp (oC)	Mean Min. Temp (oC)	Mean Rainfall (mm)	Decile 5 (median) rainfall (mm)	Mean no. rain days ≥ 1mm	Mean 9am temp (oC)	Mean 9am relative humidity (%)	Mean 9am wind speed (km/h)	Mean 3pm temp (oC)	Mean Relative Humidity (%)	Mean 3pm wind speed (km/h)
JAN	37.3	23.2	36.9	22	3.5	28.8	34	21.4	35.9	20	18
FEB	35.5	22.2	41.3	32.8	3.8	27.3	42	21	33.8	27	18.9
MAR	32.2	19.4	35.1	21.4	3.3	24.2	45	20.6	30.7	28	17.5
APR	28	15.4	23.9	16.4	3.2	20.9	52	17.7	26.7	34	15.6
MAY	23.2	10.4	14.1	5	2	16.7	55	17.4	22.6	34	15.7
JUN	19.3	7.2	13.5	8.9	2.5	12.8	62	16.3	18.6	40	16.4
JUL	19.1	6.2	15	9.6	2.6	12	62	16	18	38	16.6
AUG	21.8	7.8	8.5	4.8	1.6	14.2	49	18	20.6	28	17.9
SEP	25.8	10.9	4.1	2	1	17.9	41	19.8	24.5	22	19.4
OCT	29.8	14.9	11.7	3	2	22.1	33	20.8	28.6	18	19.2
NOV	32.8	18.3	16	9.1	2.5	24.7	34	20.8	31.1	19	19.2
DEC	35.7	21.3	23.1	16.8	2.5	27.2	32	20.6	33.8	18	18.9
ANNUAL	**28.4**	**14.8**	**243.5**	**227.6**	**30.5**	**20.7**	**45**	**19.2**	**27.1**	**27**	**17.8**

2.2 Humidity Levels

Humidity levels exhibit variations both on a daily and yearly basis within the project area. The mean monthly 9am relative humidity fluctuates from lows of 32% in December to highs of 62% in July. Conversely, the mean monthly 3pm relative humidity experiences lows of 20% in October and highs of 40% in June. Notably, humidity reaches its peak during June and July, highlighting the seasonal dynamics of humidity levels in the region. Understanding these humidity patterns helps evaluate potential impacts on the proposed activities and the surrounding environment, as it can influence factors such as evaporation rates, plant growth, and human comfort.

2.3 Considerations

2.3.1 Environmental Challenges in the Semi-Arid Murchison Bioregion

The project site is situated within the semi-arid Murchison bioregion, characterized by hot, dry summers, cool winters, and limited rainfall. Evaporation rates surpass annual rainfall, and there is a discernible decreasing trend in annual rainfall over the years. These environmental factors influence water resource management, infrastructure design, and overall project resilience in the face of changing climate patterns. Understanding these implications is important for informed decision-making.

2.3.2 Humidity Variations and Their Influence on Project Factors

Variations in humidity levels throughout the year carry implications for environmental conditions and can influence various aspects of the project. Notably, the project area experiences fluctuations in

humidity, with mean monthly relative humidity varying seasonally. These humidity levels can affect factors such as evaporation rates, plant growth, and human comfort. Recognising these humidity patterns allows for better planning, especially regarding water management, progressive rehabilitation, and worker conditions during different seasons, contributing to project efficiency and environmental sustainability.

2.3.3 Managing Dust Emissions for Environmental Quality

Winds can lead to dust emissions from exposed areas with minimal to no vegetative cover. The strength of wind required to cause dust liftoff can vary depending on several factors, including the type of soil, moisture content, and the size of dust particles. In general, light winds with speeds of around 8 to 16 km/hr can initiate the lifting of fine dust particles from dry, loose soil surfaces. Stronger winds, greater than 32 km/hr can lead to more significant dust storms. These are approximate wind speeds as the actual threshold for dust liftoff can vary under different conditions. Additionally, the presence of vegetation or ground cover can reduce dust liftoff by stabilizing the soil. By addressing dust emissions proactively, the project can mitigate potential environmental and health concerns associated with airborne dust particles.

2.3.4 Addressing the Impact of Reduced Rainfall on Water Resource Management

A decline in rainfall due to predicted climate change could potentially affect local drinking water borefields, and so it becomes imperative to underscore the critical importance of water resource management and proactive planning. This emphasis is essential to effectively address potential water scarcity challenges and to secure the long-term sustainability of water supply, serving both the pastoral station and the mining operation. Anticipating and proactively mitigating the impacts of reduced rainfall will play a pivotal role in ensuring the continued availability of this vital resource, essential for the success and environmental responsibility of the project.

3. GEOLOGICAL

3.1 Geomorphology

The Cosmos project is located within the Agnew-Wiluna portion of the Norseman-Wiluna greenstone belt, situated in the Northeastern Goldfields province of Western Australia. This region is renowned as Australia's premier nickel sulphide producing district, hosting significant mines like Mt Keith and Leinster. The geological setting within this belt is characterized by distinct features, including large-scale faults, complex folding, and steep dips in the greenstone sequence, which is flanked by substantial granitoid bodies to the east and west. These geological characteristics can have implications for mining operations and environmental assessments, warranting thorough geological studies. The intricate geological features, such as faulting and folding, necessitate precise geological mapping and structural analysis which inform mine plans and environmental safeguards effectively.

3.2 Regional Geology

The Cosmos project site is situated at the convergence of two significant geological features: the northwest-trending Keith-Kilkenny Tectonic Zone and the northward-trending Miranda Shear. This junction is characterized by intense shearing and deformation, leading to substantial structural complexities in the local geology. Recognizing and understanding the structural complexities aid in developing effective mining strategies and environmental protection measures.

3.3 Local Geology

The project area has been divided into three distinct geological zones: the Western Zone, the Eastern Zone, and the Central Zone, each characterized by unique geological features. The Western Zone

comprises northeast-striking and southeast-facing tholeiitic lavas, differentiated gabbroic sills, and ultramafic chloritic schists, metamorphosed to upper greenschist facies. The Eastern Zone consists of north-striking, east-dipping felsic, mafic, and ultramafic volcanics and sediments, displaying upper greenschist to mid-amphibolite metamorphic grades. The ultramafics in the Eastern Zone contain nickel sulphide deposits at Leinster, Yakabindie, Mt Keith, and Honeymoon Well, historically attracting extensive nickel exploration efforts. The two zones are separated by the Central Zone, which is a heterogeneous mix of rocks, including the Jones Creek Conglomerate, felsic and mafic volcanics, volcanoclastic sediments, and intrusives like doleritic and felsic porphyry. Delineating these distinct geological zones within the project area is important for understanding the distribution of mineral resources, assessing geological hazards, and planning mining activities. The Central Zone, where the Cosmos deposits are hosted, requires detailed geological analysis for informed mining strategies and environmental management.

3.4 Considerations

Geological mapping and structural analysis are essential due to the presence of intricate geological features, such as large-scale faults, folding, and steep dips, which require precise assessment for mine plans and environmental protection. The understanding of structural geology is essential in addressing the complexities arising from the convergence of the Keith-Kilkenny Tectonic Zone and the Miranda Shear, aiding in thorough geological assessments and risk mitigation. Additionally, the division of the project area into three distinct geological zones, including the identification of nickel sulphide deposits in the Eastern Zone, aids in understanding resource distribution, directly influencing mining operations and environmental management.

4. SOILS

Several soil sampling assessments have been carried out at the Cosmos site to inform and support approvals, with the most recent assessment conducted by SoilWater Group in 2018 (Appendix 1). In this assessment, a total of 20 soil samples were collected from various locations, including the proposed Underground WRD footprint and the existing WMP8 and WMP9 topsoil stockpiles. These samples exhibited a circum-neutral pH range between 5.3 to 8, along with varying salinity levels. Macronutrient concentrations were generally low, a characteristic commonly observed in Western Australian arid environments. A significant proportion of the samples contained substantial gravel content, typically ranging from 20% to 35%.

Furthermore, the finer fractions of these samples, measuring less than 2.36 mm, were predominantly composed of medium to fine sand, with minimal silt and clay fractions. Notably, all the samples exhibited complete slaking when re-wet, suggesting macro structural instability, which could potentially lead to surface crusting, reduced infiltration, diminished plant available water, and increased runoff and erosion during rehabilitation efforts.

The presence of potentially dispersive soils, as indicated by a high exchangeable sodium percentage (ESP), requires specific management considerations. These soils may necessitate limitations on mechanical soil disturbance and the addition of organic matter, where feasible, to mitigate issues related to dispersion and soil stability. These findings underscore the importance of careful soil management to ensure the environmental sustainability of mining operations at the Cosmos site.

4.1 Considerations

4.1.1 Soil Characteristics and pH Range

The soil sampling assessments indicate a circum-neutral pH range between 5.3 to 8, with varying salinity levels and generally low macronutrient concentrations. Low macronutrient concentrations may

affect vegetation and ecosystem health. Effective soil management strategies, such as soil amendments or tailored planting techniques, may be required to support vegetation growth and ensure soil health in areas affected by mining operations.

4.1.2 Gravel Content and Soil Fraction

A significant proportion of the soil samples contained substantial gravel content, typically ranging from 20% to 35%. The finer fractions were predominantly composed of medium to fine sand, with minimal silt and clay fractions. The presence of gravel and specific soil fractions can impact soil permeability, drainage, and erosion susceptibility. Soil with high gravel content may require specialized erosion control measures, and soil permeability will be considered in stormwater management to minimize runoff and erosion risks during rehabilitation efforts.

4.1.3 Soil Dispersion and Stability

The soil samples exhibited complete slaking when re-wet, suggesting macro structural instability, which could lead to surface crusting, reduced infiltration, diminished plant available water, and increased runoff and erosion during rehabilitation efforts. Macro structural instability in soils can have adverse effects on vegetation establishment, water retention, and erosion control. It indicates potential challenges for ecological restoration. Specific soil management practices, such as limiting mechanical soil disturbance and adding organic matter, may be necessary to address dispersion issues and ensure soil stability during rehabilitation, contributing to successful environmental sustainability.

4.1.4 High Exchangeable Sodium Percentage (ESP)

The presence of potentially dispersive soils, as indicated by a high exchangeable sodium percentage (ESP), requires specific management considerations. Dispersion-prone soils can impact soil structure and stability, potentially leading to erosion and reduced soil quality. Managing these soils is important for rehabilitation success. Management strategies will include limitations on mechanical soil disturbance and the addition of organic matter, where feasible, to mitigate dispersion issues and enhance soil stability.

5. HYDROGEOLOGY

5.1 Groundwater Monitoring and Quality Assessment at the Cosmos Project

Groundwater monitoring activities are presently undertaken at the Cosmos project site in accordance with various licenses and regulations, including prescribed premises license L7404/1999/9, the Rights in Water and Irrigation Act, and the Groundwater Licence Operating Strategy.

These monitoring activities encompass multiple aspects, including weekly measurements of groundwater levels around the on-site water storage infrastructure. Additionally, quarterly, and annual groundwater quality testing is performed to assess the condition of the groundwater resources. These monitoring efforts are vital for tracking changes in groundwater levels and quality, ensuring compliance with regulatory requirements, and proactively addressing any potential environmental impacts associated with mining activities.

The ongoing groundwater monitoring regime demonstrates the commitment to responsible environmental stewardship and compliance with regulatory standards. This comprehensive approach to monitoring enables early detection of any groundwater-related issues and facilitates informed decision-making to protect the groundwater resources in the project area.

Groundwater in the vicinity is typically characterized as brackish to hypersaline, with total dissolved solids (TDS) levels ranging from 1000 mg/L to 100,000 mg/L. Groundwater quality within the Cosmos

mine area is primarily influenced by chloride and sodium content, while the recovery water exhibits dominance in chloride and significantly higher dissolved calcium and hardness levels as calcium carbonate. The groundwater at the Yakabindie borefield is categorized as brackish and is primarily characterized by elevated levels of chloride and sodium.

Groundwater quality is a critical factor in the assessment of environmental impacts and the sustainable management of water resources at the Cosmos project. The recorded baseline groundwater parameters are presented in Table 2, offering an understanding of groundwater quality within the project area. These observations underscore the need for careful consideration of water quality management strategies to mitigate potential adverse effects on the environment and safeguard the integrity of other groundwater resources that may be of better quality.

The pronounced variations in groundwater quality, including elevated salinity levels, highlight the importance of implementing effective water quality management practices. This may involve measures to mitigate salinity impacts and minimize potential environmental consequences associated with mining activities. Maintaining the quality and availability of better-quality groundwater resources, like Yakabindie borefield, is critical for both environmental protection and the sustainable development of the Cosmos project.

Table 2 – Baseline groundwater quality recorded at the Cosmos Project				
Parameter	**Groundwater Bores**			
	JCD123	**COS8P**	**COS7P**	**COS4P**
Depth of sample (M)	>350	47-119	40-88	26-86
pH	7.4	6.1	7.3	6.8
Electrical conductivity at 25°C (µS/cm)	190,000	320,000	120,000	190,000
Total dissolved solids (grav) (mg/L)	110,000	180,000	63,000	110,000
Total alkalinity as CaCO3 (mg/L)	260	28	97	81
Hardness (equivalent CaCO3) (mg/L)	9,400	NA	NA	NA
Soluble iron (mg/L)	85	<0.5	<0.5	<0.5
Sodium (mg/L)	39,000	63,000	22,000	37,000
Potassium (mg/L)	1,400	2,000	670	1,100
Calcium (mg/L)	460	770	530	830
Magnesium (mg/L)	2,000	3,500	1,500	2,300
Chloride (mg/L)	68,000	100,000	37,000	60,000
Sulfate (mg/L)	9,100	14,000	5,200	7,900
Nitrate (mg/L)	0.8	15	0.7	12
Bicarbonate (mg/L)	320	35	120	100
Carbonate (mg/L)	<1	<1	<1	<1
Fluoride (mg/L)	0.1	0.1	0.2	0.3
Manganese (mg/L)	2.7	1.8	0.8	0.9
Silica (mg/L)	64	22	22	42
Ryznar stability index (values >7 suggest corrosive water)	6	9	7	7

5.2 Hydrological Units and Groundwater Modelling

The hydrological framework of the Cosmos area is defined by distinct hydrological units, as detailed in Table 3, "Hydrological Units of the Groundwater Catchment." Groundwater modelling has been

conducted as a fundamental component of water management at the Cosmos Nickel Operation, aiming to determine the sustainable operation of water management facilities.

The hydrological units identified within the catchment encompass several key elements. Bedrock formations primarily constitute the ridges along catchment divides, serving as an aquitard with low primary permeability. However, localized high secondary permeability zones, often associated with faults or joints, create fractured rock aquifers with considerable yield potential. Notably, high yielding fractured rock aquifers have been identified in the Cosmos open pit and underground mines, yielding significant inflows during past operations.

Saprolite, derived from weathered bedrock, comprises sandy and gravelly silt and clay. While its permeability varies across the domain, it is generally considered an aquitard. Saprock, forming a transitional zone between fresh and weathered rock, exhibits moderate permeability, and serves as a conduit for groundwater flow, influencing drawdown impacts from the Cosmos pit and aiding under-drainage of overlying saprolite.

Additionally, the catchment includes alluvial channel deposits characterized by silt and sand, displaying moderately high permeability, supported by hydraulic testing and salinity observations. There are areas of unknown higher permeability conditions, notably around the southwest corner of WMP6, possibly linked to extreme weathering of felsic rocks and the development of residual quartz sand.

The conduct of groundwater modelling reinforces the commitment to responsible water resource management, ensuring the sustainable operation of water management facilities and the protection of the surrounding environment. The recognition of higher permeability zones highlights the importance of considering local geological variations in groundwater management strategies to achieve optimal outcomes.

Table 3 – Hydrogeological Units of the Groundwater Catchment

UNIT	DESCRIPTION
Bedrock	Forms the ridges along the catchment divides and underlies saprolite and saprock over the remainder of the domain. It generally has low primary permeability and is considered an aquitard (restricting flow from one aquifer to another). High secondary permeability zones can occur and are typically associated with faults or joints. They are dilated and form discrete fractured rock aquifers. High yielding fractured rock aquifers have been identified in the Cosmos open pit and underground mines. These have resulted in large inflows during previous operations.
Saprolite	Formed from weathered ultramafic, mafic and felsic bedrock. Comprises of sandy and gravelly silt and clay. In the northern part of the domain (north of WMP1) the unit has low permeability, based on hydraulic test results). Testing completed in the southern part of the domain suggests slightly higher permeability, although still generally low, which is supported by earlier modelling. The saprolite across the model domain is considered an aquitard. The thickness of the saprolite is highly variable but averages about 25m.
Saprock	Forms a thin transition zone between fresh and weathered rock. The saprock horizon commonly has moderate permeability and is associated with minor groundwater intersects. As such it forms a conduit for groundwater flow propagating drawdown impacts from the Cosmos pit and under-draining the overlying saprolite.

UNIT	DESCRIPTION
Alluvial Channel Deposits	Alluvial channel deposits have been identified in the conceptual model domain and comprise of silt and sand. These include a linear feature identified from geophysical survey results and extends south from the southeastern corner of WMP7, trending immediately east of the TSF and WMP1- 5. Hydraulic testing indicates the deposits have moderately high permeability. This is consistent with earlier modelling results and the higher salinity pond water seepage in these areas.
Unknown	A second area of potentially higher permeability was identified around the southwest corner of WMP6. This is based on geophysical survey results. The reasons for the higher permeability conditions are unknown but may relate to extreme weathering of felsic rocks resulting in the development of residual quartz sand.

5.3 Understanding Groundwater Recharge, Flow Dynamics, and Discharge Patterns

5.3.1 Purpose of Source-Pathway-Receptor Model

A high-level quantitative model was developed to assess potential source-pathway-receptor scenarios associated with the proposed new tailings storage facility (TSF3). TSF3 is an extension of the existing TSF, located close to a designated terrestrial groundwater-dependent ecosystem (GDE Atlas), making this area the primary concern for potential environmental receptors. This model facilitates the evaluation of potential environmental impacts by taking into account specific contaminants of concern and identifying the pathways through which they can potentially impact groundwater-dependent ecosystems, if present in the local area.

5.3.2 Contaminants of Concern

Nitrate, salinity (measured as total dissolved solids - TDS), metals (aluminium, boron, cadmium, copper, manganese, nickel, zinc), and chloride are identified as contaminants of concern for potential environmental receptors. These contaminants have been observed in environmental assessments at similar mine sites in the region, highlighting their relevance in assessing potential environmental impacts. The Odysseus tailings was geochemically tested to provide information for its safe storage and management. Major/Minor elements were found to be similar to soil, regolith, and bedrock compositions in non-mineralized terrain. Modest enrichments were identified in Ni, Cr, and Mo, typical of tailings-solids from ultramafic-ore nickel operations in Western Australia. This implies that these enrichments are not exceptionally high or extreme. Instead, they are within a reasonable or expected range, especially when considering tailings derived from ultramafic ores. The results suggest that the tailings should not pose environmental concerns during management and TSF operation. IGO intends to undertake further testing of the ex-mill stream following commissioning of the mill to confirm initial findings and continue to monitor surrounding bores for water quality.

5.3.3 Potential Contaminant Pathways

Contaminants can reach shallow alluvial deposits and the deeper saprolite aquifer through groundwater flow, surface water flow, and seepage from the TSFs. Proper management of these pathways is essential to minimize potential environmental risks. According to modelling, all groundwater flows will direct towards the Cosmos open pit sink during and post closure.

5.3.4 Site Infrastructure and License Requirements

The site currently manages mine dewatering through surface water management ponds and TSFs. The proposed TSF3 extension overlaps with the location of an existing water management pond (WMP1). Groundwater management is regulated by the Groundwater Licensing Operating System (GLOS) and

the Cosmos Prescribed Premises Licence L7404/1999/9. Compliance with these regulations and infrastructure management is vital for preventing environmental impacts.

5.3.5 Groundwater Impacts (Drawdown and Mounding) from Mining Operations

Groundwater modelling predicts groundwater conditions and seepage rates over an 11-year period, assessing the impacts of mining activities at the Cosmos Nickel Operation. Various scenarios, including the effectiveness of existing dewatering infrastructure, trigger level breach analysis, and the impact of TSF3 expansion, were evaluated. The likelihood of vertical seepage causing groundwater mounding leading to license breaches is assessed as low. Most groundwater impacts are influenced by discharge into adjacent water management ponds (WMP6-8), particularly WMP8. Numerical groundwater modelling results indicate minimal impacts from seepage from the tailings facility expansion. These findings suggest that groundwater recovery management measures will be effective in preventing environmental harm.

Mining operations, including dewatering and disposal have impacted groundwater levels, leading to drawdown cones and groundwater mounding in some areas. Recovery bores and trenches have been implemented to control rising groundwater levels and mitigate impacts in specific areas. Continued monitoring and management of groundwater levels are necessary to address these impacts effectively.

5.3.6 Underdrainage System and Seepage Control

An underdrainage system is proposed to control seepage from TSF3, significantly reducing water levels and the risk of groundwater interaction. The system collects and manages seepage, ensuring environmental compliance and sustainable mining practices. Implementing the underdrainage system is a proactive approach to safeguard groundwater and surface water while minimizing environmental impact.

5.4 Considerations

5.4.1 Groundwater Monitoring and Regulatory Compliance

Groundwater monitoring activities are conducted in compliance with various licenses and regulations, including weekly measurements of groundwater levels and quarterly/annual groundwater quality testing. These monitoring activities are essential for tracking changes in groundwater levels and quality, ensuring compliance with regulatory requirements, and proactively addressing potential environmental impacts associated with mining activities. Adherence to comprehensive groundwater monitoring demonstrates a commitment to responsible environmental stewardship, providing early detection of groundwater-related issues and informed decision-making to protect groundwater resources and the environment.

5.4.2 Groundwater Quality and Variability

Groundwater in the Cosmos area is characterized as brackish to hypersaline, with varying total dissolved solids (TDS) levels. Groundwater quality is influenced by chloride and sodium content. High salinity levels and specific ion concentrations can have adverse effects on ecosystems and require mitigation. The pronounced variations in groundwater quality, particularly elevated salinity levels, emphasize the importance of implementing effective water recovery management practices to mitigate potential adverse effects on the environment from associated mounding.

5.4.3 Hydrological Units and Groundwater Modelling

The Cosmos region presents a diverse hydrological landscape, comprising distinct hydrological units such as bedrock formations, saprolite, saprock, and alluvial channel deposits, each characterized by varying permeabilities. To ensure sustainable water management, we employ groundwater modelling

techniques. A comprehensive grasp of this hydrological framework is imperative for the effective stewardship of vital water resources and the prevention of potential issues like unsustainable groundwater depletion and Yakabindie borefield contamination.

Furthermore, recognizing areas with high secondary permeability, as exemplified by the southwest corner of WMP6, underscores the critical necessity of tailoring groundwater management strategies to account for local geological variations. This approach ensures the attainment of optimal results while upholding environmental protection standards. It is worth noting that the proposed expansion of the tailings facility is not anticipated to impact the Yakabindie Borefield. Any lateral seepage water from TSF3 will naturally flow toward the Cosmos open pit due to the dewatering drawdown cone.

5.4.4 Groundwater Recharge, Flow Dynamics, and Contaminant Pathways

Contaminants of concern, including nitrate, salinity, metals, and chloride, can potentially impact ecosystems through various pathways, including groundwater and surface water flow and seepage from the tailings storage facilities. Proper management of these pathways is essential to minimize potential environmental risks and protect sensitive ecosystems. As previously mentioned, the tailings should not pose environmental concerns however additional testing has been recommended to verify results.

Mounding associated with operations has been identified as a potential risk due to the hypersaline nature of the groundwater and is currently managed via a recovery system. Modelling suggested re-equipping RB04 and installing an additional recovery bore between WMP6/7 and TSF1. Continued environmental monitoring and mitigation efforts will focus on preventing the migration of contaminants into ecosystems, emphasizing the importance of regulatory compliance and infrastructure management. IGO will re-equip available recovery bores for appropriate mounding control however, IGO expects that an additional recovery bore will not be necessary based on the proposed location (adjacent to WMP6/7) being presently cleared and devoid of vegetation. To ensure the implementation of appropriate management strategies to meet licensing obligating, IGO will maintain ongoing monitoring and assessment of the recovery situation.

5.4.5 Likelihood of Groundwater Impact and Mine Dewatering

The likelihood of vertical seepage causing groundwater mounding leading to license breaches is assessed as low, but historical mine dewatering and disposal has impacted groundwater levels, leading to drawdown cones and groundwater mounding in some areas. Continued monitoring and management of groundwater levels are necessary to ensure compliance with regulatory requirements. Groundwater management measures, including recovery bores and trenches, are essential to mitigate impacts from mining operations effectively, safeguarding sensitive ecosystems and minimizing environmental harm.

5.4.6 Underdrainage System and Seepage Control

An underdrainage system is proposed to control seepage from TSF3. Implementing the underdrainage system is a proactive approach to safeguard groundwater and surface water while minimizing environmental impact. The proposed underdrainage system demonstrates a commitment to environmental protection and responsible water resource management, enhancing the sustainability of mining practices at the Cosmos project.

6. HYDROLOGY

6.1 Purpose of Hydrological Study

The hydrological study conducted by Groundwater Resource Management (GRM) serves to evaluate the potential impacts of the project's expansion on surface water flow processes at the Cosmos site. This comprehensive study considers various factors, including the extended development of

underground operations, the introduction of new infrastructure, and the proposed expansion of the Tailings Storage Facility (TSF3). The hydrological study plays a pivotal role in understanding how the project's expansion will affect surface water flow, facilitating informed decisions for flood management.

6.2 Existing Surface Water Control Measures

The existing surface water control measures, designed by Dames and Moore in 1999, include flood protection bunding, runoff diversion drains, and culverts. These measures have been in place to manage surface water flow and mitigate flood risks at the Cosmos site since 1999. Evaluating the effectiveness and condition of these existing measures provides a baseline for assessing the impact of the project's expansion on flood management.

6.3 Study Objectives

The primary objectives of the hydrological study were to evaluate hydrological changes resulting from new infrastructure for various storm events during operational and post-closure stages. This assessment encompasses factors such as flood extent, peak discharge rates, and flow velocities to comprehensively understand the potential impact of the project. These study objectives ensure a thorough examination of how surface water flow patterns may change throughout the project's lifecycle, aiding in effective flood management planning.

6.4 2D Hydrological Model

A 2D hydrological model, developed using HEC-RAS software, forms the core of the study, with separate models for existing and proposed infrastructure. This modelling approach incorporates computational mesh, roughness coefficients, outflow boundary conditions, and equations for simulating flow, allowing for detailed analysis. The 2D hydrological model enables precise estimation of peak discharge rates for different storm events, providing critical data for flood risk assessment and infrastructure design.

6.5 Flood Potential

Model results indicate that specific areas on the site could experience flooding during heavy rainfall events, with water levels potentially exceeding 1 meter in depth. These areas prone to flooding are primarily located to the west of the site, particularly along a prominent north-south drainage system. Identifying flood-prone areas is essential for implementing protective measures and ensuring the safety of personnel and site assets during extreme weather events.

6.6 Minimal Impact of Proposed Infrastructure

Overall, the hydrological model results confirm that the proposed TSF expansion will have minimal impact on surface water drainage patterns. The modelling data supports the notion that TSF3 can be carried out with careful planning and management to mitigate potential flooding risks effectively. This finding underscores the project's environmental sustainability and the effectiveness of recommended surface water drainage infrastructure in managing flood risks.

6.7 Considerations

The hydrological study results validate the effectiveness of the proposed infrastructure enhancements in minimizing disruptions to surface water drainage patterns. These results provide assurance that the project's expansion can proceed with confidence in flood management. Implementing the recommended surface water drainage infrastructure (now completed) is key to ensuring the project's environmental compliance and safeguarding site assets from flooding risks.

7. FLORA AND VEGETATION

7.1 Vegetation Complexes

The Cosmos project area, situated within the Austin Botanical District of the Eremaean Botanical Province, is primarily characterized by mulga low woodland dominated by Acacia aneura on plains, transitioning to scrub on hills. Comprehensive surveys and vegetation monitoring within the project area have been consistently conducted since 1999.

The vegetation units are broadly categorized into regional scale descriptions that align with topography and landforms. Specifically, the project area includes various vegetation associations, such as Mulga (Acacia aneura) and associated species, Wattle, teatree, and other species (Acacia spp., Melaleuca spp.), Hummock grassland with scattered shrubs or mallee (Triodia spp., Acacia spp., Grevillea spp., Eucalyptus spp.), and Tecticornia spp. communities in saline areas. A total of 16 distinct vegetation communities have been identified within the Cosmos Nickel Operation area, encompassing Acacia woodlands, low to open shrublands, and salt-lake communities. Please see Appendix 2 for the Vegetation Assessment Report.

The recognition of diverse vegetation communities and their long-term monitoring underscores the commitment to environmental stewardship and biodiversity conservation within the project area. These efforts align with responsible land management practices and contribute to the understanding and preservation of the unique botanical diversity present in the Austin Botanical District.

7.2 Conservation Significant Flora

The Cosmos project site does not encompass any threatened flora listed under the Environment Protection and Biodiversity Conservation Act 1999 or the Biodiversity Conservation Act 2016. However, a single species of Priority Flora, *Grevillea inconspicua* (P4), has been recorded nearby at Kathleen Valley, though none have been recorded within the Cosmos site itself.

The assessment of conservation significance extends to both threatened and potentially threatened flora species. Threatened Ecological Communities (TECs), recognized as Environmentally Sensitive Areas (ESAs) under Part V of the EP Act, are diligently assessed. Notably, no TECs are documented within the local project area. Ecological communities that do not meet TEC criteria but are deemed potentially threatened are included in the Priority Ecological Community (PEC) list, categorized by importance levels 1-3. Priority 4 communities are considered near threatened, while conservation-dependent ecological communities fall under Priority 5. The project does fall within the buffer zone of the Violet Range (Perseverance Greenstone Belt) vegetation assemblages (banded ironstone formation), Priority 1. Threats to this PEC are clearing for mining and given that the proposed TSF expansion will remain within the current disturbance footprint, its impacts are anticipated to be minimal and manageable.

The absence of threatened flora within the immediate Cosmos project area signifies a positive environmental aspect, indicating the low risk of significant impacts on endangered plant species. However, the presence of a Priority Flora species in the vicinity emphasizes the importance of vigilance in environmental management and the need to consider potential impacts on this species in any project-related activities.

7.3 Groundwater and Sheet Flow Dependent Vegetation

Groundwater Dependent Ecosystems (GDEs), characterized as complex dynamic ecosystems reliant on groundwater access, play a vital role in an environmental context. These ecosystems are influenced by temporal groundwater flow variability, influenced by climate, geology, and land-use factors.

The Cosmos project area intersects two designated terrestrial Groundwater Dependent Ecosystems with low to moderate potential as per the national assessment (GDE Atlas). These two ecosystem types are described as:

- **Low Potential:** Hardpan plains with ironstone gravel mantles and occasional sandy banks supporting mulga shrublands.
- **Moderate potential:** Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga.

Within the local area, specific vegetation types situated within ephemeral drainage lines are observed, containing Acacia aneura, a species typically displaying low potential for groundwater dependency. These vegetation units include Low Woodland of Acacia aneura var. aneura, Tall Shrubland of Acacia aneura var. intermedia, Low Woodland of Acacia aneura var. aneura, and Open woodland of Acacia aneura var. aneura, which are associated with red loams, sandy loams, and drainage lines.

While shallow alluvial aquifer systems may exist in these areas, it is unlikely that these vegetation types are dependent on groundwater. Recharge from rainfall and sheet flow events contributes to fresher groundwater in the upper parts of the shallow aquifer, with increasing salinity along palaeochannels. Mulga (Acacia aneura), commonly found in low open woodlands and shrublands, is shallow-rooted and contributes to soil moisture interception and nutrient availability.

Understanding the groundwater dependency of specific vegetation types is pivotal for responsible land management and environmental conservation. The recognition of Acacia aneura's role in intercepting sheet flow and enhancing soil moisture underscores the ecological significance of this species and its potential contributions to the local ecosystem.

7.4 Considerations

7.4.1 Vegetation Complexes and Biodiversity Conservation

The Cosmos project area is characterized by diverse vegetation complexes, including mulga low woodland, scrub on hills, and various vegetation associations. Comprehensive surveys and monitoring of 16 distinct vegetation communities have been consistently conducted within the project area since 1999, demonstrating a commitment to environmental stewardship and biodiversity conservation. The recognition of diverse vegetation communities and their long-term monitoring aligns with responsible land management practices and contributes to the understanding and preservation of the unique botanical diversity in the Austin Botanical District. This is already undertaken through vegetation monitoring via the prescribed premises license.

7.4.2 Conservation Significant Flora and Communities

The Cosmos project site does not encompass any threatened flora listed under environmental protection acts, but a single species of Priority Flora, Grevillea inconspicua (P4), has been recorded within the nearby Kathleen Valley. The assessment of conservation significance extends to both threatened and potentially threatened flora species, and no Threatened Ecological Communities (TECs) are documented within the project area. While the absence of threatened flora signifies a positive environmental aspect, the presence of a Priority Flora species in the local vicinity emphasizes the importance of vigilance in environmental management and considering potential impacts on this species in project-related activities. It is not expected that this species will be impacted by the proposal by any means.

The project is located within the buffer zone of the Violet Range (Perseverance Greenstone Belt) vegetation assemblages, designated as Priority 1. The main threats to this PEC involve clearing for mining activities. However, it is noteworthy that the proposed TSF expansion is planned to remain within

the existing disturbance footprint, which suggests that its potential impacts are expected to be minimal and well within the scope of effective management.

7.4.3 Groundwater and Sheet Flow Dependent Vegetation

Groundwater Dependent Ecosystems (GDEs) are influenced by temporal groundwater flow variability, climate, geology, and land-use factors. Specific vegetation types within ephemeral drainage lines, including Acacia aneura species, are observed within the project area. While shallow alluvial aquifer systems may exist in these areas, it is unlikely that these vegetation types are dependent on groundwater.

8. TERRESTRIAL FAUNA

8.1 Conservation Significant Fauna

The Cosmos project area hosts various fauna habitats, including Creekline mulga, Open mulga, Rocky slope mulga, Sandplain mulga, Rocky ridge mulga, Washplains, Pediment, and Rocky outcrop, each characterized by specific vegetation and substrates. No habitat within the project area is considered critical for Conservation Significant Fauna.

Detailed descriptions of the identified fauna habitats reveal their ecological characteristics, from the density of mulga stands to the presence of understorey vegetation and soil types. Notably, searches within the project area have not identified any habitat deemed critical for Conservation Significant Fauna. However, database searches have identified conservation-significant fauna species and assessed their presence, risk ratings, and habitat preferences within the wider local area (Table 4).

The extensive documentation of various fauna habitats within the project area illustrates a comprehensive understanding of the local ecosystem. While the absence of critical habitats for Conservation Significant Fauna is positive, the presence of potentially conservation-significant species highlights the importance of continued monitoring and responsible environmental management.

The Terrestrial Fauna Report is provided as Appendix 3.

8.2 Summary of Conservation Significant Fauna Assessment

An assessment of Conservation Significant Fauna species has been conducted within and nearby the Cosmos project area. While searches within the project area have not identified critical habitat for these species, several fauna species of conservation significance have been recorded within or near the project.

The summary of Conservation Significant Fauna Assessment highlights specific fauna species categorized by their conservation significance, habitat preferences, and risk assessments. Notably, species such as the Grey Falcon, Malleefowl, Night Parrot, Great Desert Skink, Princess Parrot, Chuditch (Western Quoll), Grey Wagtail, Yellow Wagtail, Common Sandpiper, Sharp-tailed Sandpiper, Pectoral Sandpiper, Oriental Plover, Red-necked Stint, Black-tailed Godwit, Brush-tailed Mulgara, Striated Grasswren (inland), and Peregrine Falcon have been evaluated (Table 4).

Table 4 – Summary of Conservation Significant Fauna Assessment

Species	Conservation Significance	Habitat Preference	Cosmos Project Area Records	Risk from TSF Expansion
Grey Falcon (Falco hypoleucos)	Vulnerable (EPBC) Vulnerable (BCA)	Occupies lightly timbered lowland plains intersected by tree-lined watercourses and frequents grassland and sand dune habitats.	Not previously recorded but could possibly occur on occasion.	Negligible
Mallee Fowl (*Leiopa ocellata*)	Vulnerable (EPBC) Vulnerable (BCA)	Dominant in arid and semi-arid woodlands, primarily featuring mallee eucalypts on sandy soils with less than 430mm annual rainfall. Occasionally inhabits Mulga, Acacia aneura, and other sclerophyllous plant communities.	Not previously recorded but records known within the nearby local area.	Negligible
Night Parrot (Pezoporus occidentalis)	Endangered (EPBC) Endangered (BCA)	*Triodia* dominated breakaways and samphire covered margins of salt lakes.	Not previously recorded, nearest records 300km from the project.	Negligible
Great Desert Skink (*Liopholis kintorei)*	Vulnerable (EPBC) Vulnerable (BCA)	Spinifex (Triodia spp.) grasslands on sandplains and in areas between sand dunes.	Not previously recorded. Single historical record trapped at Kathleen Station.	Negligible
Princess Parrot (Polytelis alexandrae)	Vulnerable (EPBC) Priority 4	Shrublands and savannah woodlands amongst Triodia dominated sand dunes. Vegetated riverine and littoral areas.	Not previously recorded and considered highly unlikely to occur.	Negligible
Chuditch, Western Quoll (Dasyurus geoffroii)	Vulnerable (EPBC) Vulnerable (BCA)	Woodlands, dry sclerophyll forests, riparian vegetation, beaches, and deserts. Utilise hollow logs and burrows.	Not previously recorded and considered highly unlikely to occur.	Negligible
Grey Wagtail (Motacilla cinerea)	Migratory Terrestrial (EPBC) Migratory (BCA)		Not previously recorded.	Negligible
Yellow Wagtail (*Motacilla flava)*	Migratory Terrestrial (EPBC) Migratory (BCA)		Not previously recorded.	Negligible

Species	Conservation Significance	Habitat Preference	Cosmos Project Area Records	Risk from TSF Expansion
Common Sandpiper (*Actitis hypoleucos*)	Migratory Wetland (EPBC) Migratory (BCA)	Coastal or inland wetlands, both saline and fresh. Utilises muddy edges or rocky shores. Breeds in Europe and Asia.	Not previously recorded but may occur on occasion at Lake Miranda.	Low
Sharp-tailed Sandpiper (Calidris acuminata)	Migratory Wetland (EPBC) Migratory (BCA)	Grassy edges of shallow inland freshwater wetlands. Also found at flood fields, mudflats, mangroves, rocky shores, and beaches. Breeds in Siberia.	Not previously recorded but may occur on occasion at Lake Miranda.	Low
Pectoral Sandpiper (Calidris melanotos)	Migratory Wetland (EPBC) Migratory (BCA)	Coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. Breeds in Russia and North America	Not previously recorded but may occur on occasion at Lake Miranda.	Low
Oriental Plover (*Charadrius veredus*)	Migratory Wetland (EPBC) Migratory (BCA)	Sparsely vegetated plains, flat edges of lakes and lagoons as well as seashores across much of northern Australia.	Not previously recorded but may occur on occasion at Lake Miranda.	Low
Red-necked Stint (*Calidris ruficollis*)	Migratory Wetland (EPBC) Migratory (BCA)	Coast in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. They may also be seen in salt works, sewage farms, saltmarsh, shallow wetlands including lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks, and pools in salt flats, flooded paddocks or damp grasslands. Breed in the Arctic regions	One opportunistic sighting recorded during the migration season.	Low
Black-tailed Godwit (*Calidris ruficollis*)	Migratory Wetland (EPBC) Migratory (BCA)	Estuarine mudflats, beaches, and mangroves. Common in coastal areas around Australia. Breeding in Iceland, Europe, and Central Asia.	One opportunistic sighting recorded during the migration season.	Low
Brush-tailed Mulgara (*Dasycercus blythii*)	Priority 4	Triodia dominated sandplain and dune field. Burrows constructed in dune swales and slopes.	Not previously recorded.	Negligible

Species	Conservation Significance	Habitat Preference	Cosmos Project Area Records	Risk from TSF Expansion
Striated Grasswren (Amytornis striatus subsp. striatus)	Priority 4	Open mallee over a sparse layer of shrubs and a ground layer dominated by spinifex (*Triodia spp*), though they are sometimes found in other vegetation types.	Not previously recorded, likely to occur within Triodia-dominated habitat on sandy to loamy plains is present.	Negligible
Peregrine Falcon (*Falco peregrinus*)	Specially Protected (BCA)	Widespread; coastal cliffs, riverine gorges, and wooded watercourses.	Several opportunistic sightings at the Cosmos open pit.	Negligible

8.3 Considerations

8.3.1 No Impact on Conservation Significant Fauna

The project's redevelopment is not expected to result in the direct loss of fauna habitat, as it will primarily occur on pre-disturbed land. This is anticipated to have minimal residual impact on Conservation Significant Fauna. The habitat types within the mine activity areas are well-represented in the landscape, and there are no previous records of Conservation Significant Fauna utilizing these habitats, except for occasional migratory birds using water management ponds during their migratory flights.

8.3.2 Habitat Preservation and Management

The proposal will not result in clearing of drainage lines and rocky ridges. Opportunistic fauna sightings will be documented in a Fauna Sightings Register. Education materials, including inductions, posters, site notices, and fact sheets, will be used to inform personnel about the importance of preserving these habitats.

8.3.3 Human-Induced Changes

The area has a history of mining and human activities since the late 90s, which can lead to altered natural regimes and behaviours of native fauna. These changes may include bush fires, breeding patterns, and foraging behaviours. Additionally, human activities can attract feral animals that pose a threat to native populations. Mitigation measures include feral animal control and proper waste management practices to minimize these impacts. Feeding of native or feral animals on site is prohibited to discourage interactions.

8.3.4 Vehicle Interactions

Vehicles operating within the area may interact with fauna crossing transport corridors, potentially resulting in animal strikes and loss of individuals. Signage and speed restrictions will be implemented to minimize these interactions. Education programs during elevated animal activity periods will also help reduce the risk of vehicle strikes.

8.3.5 Fauna Entrapment Mitigation

There is a risk of fauna becoming entrapped within pond facilities, trenches, and sumps on-site, which could lead to drowning or heat stress. To address this risk, egress mechanisms will be installed along sloped and lined embankments where it is deemed fauna require it i.e. plastic lined facilities. The TSF will be inspected daily and reports for fauna distress will be made to the environmental department to determine rescue efforts.

9. SUBTERRANEAN FAUNA

The drawdown resulting from mine dewatering operations at Cosmos is not anticipated to have any adverse impact on subterranean fauna communities. This is primarily attributed to the absence of suitable habitat and conditions for these species within the proposed impact area.

The assessment (Appendix 4) concludes that the identified habitat outside the proposed impact area will remain unaffected by the dewatering activities at the Cosmos mine. Moreover, the likelihood of the proposal leading to the extinction of any subterranean fauna species is considered highly improbable.

This assessment underscores the minimal impact of mine dewatering on subterranean fauna communities within the project area. The absence of suitable habitats, coupled with the expectation that surrounding habitats will remain undisturbed, further supports the conclusion that extinction risks to subterranean fauna are exceedingly low.

9.1 Considerations

9.1.1 Absence of Suitable Habitat for Subterranean Fauna

The absence of adverse impacts on subterranean fauna communities is primarily attributed to the absence of suitable habitat and conditions for these species within the proposed impact area. The assessment indicates that the proposed impact area lacks the necessary habitat and conditions to support subterranean fauna. This highlights that the project area does not provide a conducive environment for subterranean fauna, reducing the potential for adverse effects.

9.1.2 Unaffected Habitat Outside the Proposed Impact Area

The assessment concludes that the identified habitat outside the proposed impact area will remain unaffected by the dewatering activities at the Cosmos mine. The evaluation suggests that surrounding habitats, which might be suitable for subterranean fauna, will not be disturbed by the mining operations. This indicates that while there may be suitable habitats outside the impact area, these habitats are expected to remain intact, further reducing the potential for adverse impacts on subterranean fauna.

9.1.3 Highly Improbable Extinction Risks

The likelihood of the proposal leading to the extinction of any subterranean fauna species is considered highly improbable. The assessment provides confidence that the dewatering activities are not expected to result in the extinction of subterranean fauna species. This highlights the minimal impact and low extinction risks to subterranean fauna, reinforcing the conclusion that the proposed mining activities are unlikely to have a significant adverse effect on these species.

10. SHORT RANGE ENDEMIC FAUNA

The local area surrounding the Cosmos project encompasses three potential habitats that could harbor Short-range Endemic (SRE) invertebrate species, including mulga woodland along drainage lines, Acacia shrubs on undulating plains, and rocky outcrops. Within the project area, two species in the order Geophilomorpha, specifically soil centipedes, have been recorded and may qualify as SRE due to their localized presence within the mulga woodland along drainage channels.

The desktop review conducted to assess conservation significance identified two species, Idiosoma nigrum (Shield-backed Trapdoor Spider) and Kwonkan moriartii (Moriarti's Trapdoor Spider), as species of conservation significance. Idiosoma nigrum is typically found in deep red sand, spinifex, and mulga habitat, although the nearest records are located north of the project area. Kwonkan moriartii is an extremely rare species, with only one known collection dating back to 1962 within the Wanjarri Nature Reserve. Its preferred habitat type is uncertain but may include herbaceous graminoids or sparse hummock grassland, and no subsequent records have been documented since 1962.

The conservation significance of these potential SRE habitats emphasizes the importance of minimizing and mitigating habitat disturbances during project execution. Since the proposed TSF expansion area has already been previously disturbed, direct impacts are negligible.

10.1 Considerations

10.1.1 Potential SRE Species in Mulga Woodland

The mulga woodland along drainage lines in the local area could harbor SRE invertebrate species, and two species in the order Geophilomorpha, soil centipedes, have been recorded within the project area. The presence of these soil centipede species, with their localized distribution within the mulga woodland along drainage channels, suggests the potential for SRE species to inhabit this habitat. The proposal will not result in any disturbance to these habitat types.

10.1.2 Species of Conservation Significance

Two species, Idiosoma nigrum (Shield-backed Trapdoor Spider) and Kwonkan moriartii (Moriarti's Trapdoor Spider), have been identified as species of conservation significance in the desktop review. These species are recognized as having particular conservation importance due to their rarity or limited known habitat. The presence of these species within the proposal is highly unlikely.

10.1.3 Importance of Habitat Preservation

The conservation significance of potential SRE habitats emphasizes the importance of minimizing and mitigating habitat disturbances during project execution. To protect potential SRE habitats with species of conservation significance, it is essential to avoid or minimize disturbances to their habitats. The proposal will involve disturbance within the mine footprint and is highly unlikely to result in impacts to preservation of important habitat.

10.1.4 Negligible Direct Impacts from TSF Expansion

Since the proposed TSF expansion area has already been previously disturbed, direct impacts on potential SRE habitats are considered negligible. The fact that the expansion area has already undergone disturbance suggests that potential SRE habitats in this specific location have been altered, reducing the likelihood of direct impacts. While direct impacts are minimal, this underscores the importance of careful habitat assessment and potential mitigation measures in other areas where indirect impacts may occur.

11. ABORIGINAL HERITAGE

The Cosmos project area falls within the Tjiwarl Native Title Determination Area, and IGO has established a collaborative relationship with the Tjiwarl community to conduct archaeological and ethnographic heritage surveys. The objective is to identify and protect places of heritage significance in line with various Deeds of Agreement. IGO's commitment is to work closely with the Tjiwarl people to incorporate their input and knowledge into the project design, with a primary goal of minimizing and mitigating impacts on heritage sites deemed significant by the Tjiwarl.

The collaboration involves ongoing consultations with the Tjiwarl community on various aspects of the project and its planning, ensuring their valuable insights are considered in decision-making processes. Notably, the proposed TSF3 is situated entirely within areas that have been pre-cleared for existing infrastructure. Consequently, no sites of significance to Aboriginal heritage exist in the immediate vicinity of TSF3.

IGO's commitment to a collaborative, consultative approach with the Tjiwarl community underscores the significance of respecting indigenous heritage and culture in the project's development. By working closely with the Tjiwarl people and proactively avoiding heritage sites, the project aims to uphold the principles of cultural preservation and responsible resource development.

11.1 Considerations

11.1.1 Indigenous Heritage Preservation

The Cosmos project area falls within the Tjiwarl Native Title Determination Area, highlighting the presence of indigenous heritage and culture in the region. This indicates the rich cultural heritage associated with the area, which holds profound significance to the Tjiwarl community. The project's commitment to collaborating with the Tjiwarl community reflects the importance of preserving and respecting indigenous heritage and culture.

11.1.2 Heritage Site Identification and Protection

The objective is to identify and protect places of heritage significance through archaeological and ethnographic heritage surveys in accordance with various Deeds of Agreement. This signifies the commitment to identifying and safeguarding heritage sites deemed important to the Tjiwarl community, ensuring their preservation for future generations. The project's dedication to protecting heritage sites aligns with responsible environmental and cultural stewardship.

11.1.3 Collaborative and Consultative Approach

The collaboration involves ongoing consultations with the Tjiwarl community on various aspects of the project. This underscores the importance of actively engaging with the indigenous community to incorporate their knowledge and input into the decision-making processes of the project. The consultative approach reflects the project's commitment to respecting indigenous perspectives and ensuring that their valuable insights are considered.

11.1.4 TSF3 Location and Heritage Sites

The proposed TSF3 is situated entirely within areas that have been pre-cleared for existing infrastructure, and no sites of significance to Aboriginal heritage exist in the immediate vicinity of TSF3. This suggests that the project has taken measures to avoid heritage sites and cultural disturbances in the location of TSF3. The proactive avoidance of heritage sites in the TSF3 area demonstrates the project's commitment to minimizing impacts on indigenous heritage.

11.1.5 Cultural Preservation and Responsible Development

IGO's commitment to a collaborative, consultative approach with the Tjiwarl community aims to uphold the principles of cultural preservation and responsible resource development. This reflects the project's recognition of the importance of balancing resource development with the preservation of indigenous culture and heritage. By working closely with the Tjiwarl people and actively avoiding heritage sites, the project aims to set a positive example for cultural preservation and sustainable resource development.

APPENDIX 1 – COSMOS TOPSOIL ASSESSMENT REPORT

APPENDIX 2 – COSMOS VEGETATION ASSESSMENT REPORT

APPENDIX 3 – COSMOS TERRESTRIAL FAUNA ASSESSMENT REPORT

APPENDIX 4 – COSMOS SUBTERRANUAN FAUNA REPORT