EXECUTIVE SUMMARY

INTRODUCTION

Mt Grace Resources Limited (Mt Grace) propose to mine and process magnesite in a staged development at a site 4 km east of Batchelor, 90 km south of Darwin in the Northern Territory. This is a summary of the Draft Environmental Impact Statement (EIS) for the mine and processing plant of the Batchelor Magnesium Project. The EIS has been prepared for submission to the Northern Territory Government and the public, with information necessary to enable an informed evaluation of the environmental acceptability of the proposed project.

THE PROPONENT

Mt Grace is a wholly owned Australian company listed on the Australian Stock Exchange (code MGD). Mt Grace was first listed in 1994 and has operated as a mineral exploration company, principally within Australia. Mt Grace is primarily focused on the development of the Batchelor Magnesium Project, to which this EIS pertains.

PROPOSED PROJECT

The Mt Grace mining lease covers an area of 357 ha, located 4 km from Batchelor town site. The Winchester Magnesite Deposit lies beneath this site and Mt Grace proposes to mine magnesite ore and process it into magnesium metal at this site. There is currently a small trial mine pit filled with water and some survey lines that act as access tracks on the site. The remainder of the site is mid-densely vegetated primarily with savannah woodland. Currently the pit lies beside the Coomalie Creek (Right Branch) and this creek will be diverted for the expansion of the mine pit providing access to the magnesite resource. The proposal is to expand the mine pit progressively over the life of the mine in approximately three major stages and mine the ore on a ‘campaign’ basis each year. Ore will be transported to a processing facility on the same site and converted into magnesium metal by a thermic reduction process.

Construction summary

Construction will take approximately nine months, requiring a workforce of about 100. It is expected that site preparation will commence in September 2002 and construction will be complete by July 2003. The trial pit that exists on site and this will be expanded with a series of benches, to begin bulk extraction of ore. Most of the internal components of the processing plant will be constructed offsite, tested, then moved to the site for installation. All infrastructure will be built on site will primarily comprise office facilities, ablutions block and maintenance areas. Access and haul roads, and flood bunds will be constructed from overburden waste rock.

Operation summary

Operation is expected to commence in late 2003 and will involve the mining of 200,000t/a of magnesite ore for Stage 1 of the project for the production of 12,500t/a of magnesium metal. Stage 2 will increase production to 25,000t/a of magnesium and 50,000t/a in Stage 3. Ore will be mined in campaigns for 2 to 3 months each year and processed on site. Processing involves: crushing and screening the ore; calcination of magnesium carbonate (contained in the ore); metallo-thermic reduction in a DC arc furnace using appropriate fluxes and reductants; condensation of magnesium vapour; refining into pure magnesium; and casting into magnesium metal.

PHYSICAL ENVIRONMENT

Climate

The project area is located within the monsoonal tropics. There are two distinctive seasons: a hot, Wet Season and a hot, Dry Season. April and November are considered transitional months between the two seasons. Maximum temperatures are hot all year round with an average of 30^{o}C. The annual average rainfall for the area is 1372mm, the vast majority of which falls in the Wet Season. Humidity averages 30% in the Dry Season and 80% in the Wet Season. In the Dry Season prevailing winds are predominantly south-easterly and in the Wet Season mostly north-westerly. Tropical cyclones and tropical depressions occur on average once in every two years during the monsoonal Wet Season.

Geology, soils and hydrology

The Winchester Magnesite Deposit occurs within the Coomalie Dolomite, which is bound to the north by sandstones of the Crater Formation and to the south by black shales of the Whites Formation. The deposit occurs beneath the floodplain formed by the Coomalie Creek. Soils in the catchment area are shallow lithosols with rocky outcrops on the hills and steeper slopes and red and yellow earths in the low-lying areas near Coomalie Creek (Right Branch). The project area falls within the Adelaide River catchment, covering an area of about 82 km^2, and the mine site is located on the right branch of Coomalie Creek. Coomalie Creek (Right Branch) will be diverted for approximately 1.2 km of its length to enable expansion of the mine-pit for access to the ore resource.

BIOLOGICAL ENVIRONMENT

Flora

The flora of the project area was classified within 6 main vegetation communities. The majority of the site is vegetated with open mixed species Eucalypt woodland dominated by *Eucalyptus tetrodonta* and *E.miniata*. There is a defined riparian corridor flanking the Coomalie Creek, supporting diverse aquatic flora and grading into *Lophostemon* woodland. Isolated pockets of dry vine-forest occur on dolomite outcrops within the project area. There were no rare or endangered species found in the project area and no communities of conservation significance. The vegetation within the project area suggests frequent fire events and weeds are established in heavy infestations.

Fauna

A total of 122 native terrestrial vertebrate species were recorded during field survey work, comprising 6 amphibian, 21 reptile, 74 bird and 21 mammal species. Two of the mammal species, the Northern Quoll and Pale Field Rat are listed as ‘lower risk – near threatened’ (Territory Parks and Wildlife Act, 2001). Aquatic fauna in Coomalie Creek (Right Branch) includes freshwater fishes (16 species), freshwater crocodile, crustaceans (5 species), molluscs, prawns and insects.

Biting Insects

Biting midges were found in very low numbers and are not expected to be a significant pest problem and no specific control measures are required. Mosquitoes were found in greater abundance than biting midges, with a greater diversity of species present at and around the site. Management measures to minimise the impact of mosquitoes will focus on preventing the creation of suitable mosquito-breeding habitats.

SOCIAL ENVIRONMENT

Socio-economics

The Batchelor Magnesium Project will beneficially impact both local and regional economies. The Northern Territory economy will benefit primarily by increased employment opportunities and diversification of skill base within the existing workforce.

As well as enhanced employment opportunities Batchelor will experience an increased use of services, utilities, and local business. Local businesses and facilities will be utilised to service the construction workforce for a period of 9 to 12 months.

The long-term operation of the mine and processing plant will provide specialised employment and training for a local workforce. A localised growth in population will stimulate local business and industry with an expected long-term growth in the local economy. There will be a more sustained and feasible growth in local enterprise with the mine facilitating a major boost in local economy.

Archaeology and Anthropology

There are four Registered Sacred Sites and one Recorded Sacred Site existing in the project area, as identified by the Aboriginal Areas Protection Authority. Six archaeological sites have been identified within the project area, most relating to, and in proximity to the Sacred Sites. None of the archaeological artefacts have been attributed with a high level of significance but the *Northern Territory of Australia Heritage Conservation Act (1991)* will protect them from disturbance.

The project area is located within an area acknowledged as being the traditional country of the Kungarakany and Warai People who are thus considered the Aboriginal custodians of this area. There are areas of spiritual significance emanating from, and particularly associated with the recognised Sacred Sites. The Custodians consider all subsurface water and water courses to be of spiritual significance. The Custodians have an intimate understanding of the relationships between the regional subsurface hydrology (including Litchfield Park), and the surface drainage, and are particularly concerned about any activity that impedes or impacts these landscape features.

ENVIRONMENTAL IMPACTS

The potential environmental impacts of the proposed project are summarised in **Table 1,** which addresses environmental factors; the existing environment; potential impacts; environmental management; and predicted outcome.

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
SOIL				
Dust and noise *Refer Sections 4.9 and 5.2.9*	There is some dust generated during the Dry Season. The site is currently well vegetated with native and introduced species that act to stabilise soil and prevent excessive dust generation. There is currently no mining or industrial activity creating noise in the area.	Significant dust levels could be generated (especially from construction and mining activities in the Dry Season). Noise will result from construction, mining and blasting activity.	Dust will be monitored and water will be used for dust suppression. Areas will be progressively re-vegetated to minimise dust generation and erosion. Daytime blasting and construction will minimise noise nuisance value. The public will be notified of blasting schedules. Mining on a 'campaign' basis for a defined period of each year will ensure noise is limited. Noise will be monitored at the boundary of the project area.	Dust generated due to mining and processing activities will be kept at manageable levels. Noise levels will be maintained within appropriate guideline levels.
Soil erosion *Refer Sections 3.3.6, 4.8 and 5.2.8*	The site is currently subject to ongoing natural erosion and deposition processes.	Increased erosion from disturbed areas or stockpiles or as a result of concentrated surface water runoff. Increased turbidity of runoff water entering Coomalie Creek (Right Branch) within and downstream of the site. Siltation of Coomalie Creek downstream of the site.	Implement soil conservation measures, stabilise drainage outfall points, schedule construction work during the Dry Season where practical. Ensure flood waters are accommodated by the Coomalie Creek diversion channel and retain hydraulic characteristics of the original stream and floodplain.	Increased turbidity during construction however not likely to result in long term impact. Minimal risk of erosion/turbidity during operation.
WATER				
Lowering of groundwater table, recharge of water to aquifers, diversion of Coomalie Creek (Right Branch), runoff from plant and mine site, and water quality *Refer Sections 2.11.2, 3.3.7, 3.3.9, 4.6, 4.7, 5.2.6 and 5.2.7*	Water table is at a depth of less than 5m below the surface during the Dry Season. During the Wet Season the water table is at, or about, the ground surface. Natural recharge occurs during and after each Wet Season. No discharge waters are currently released into the environment at the site. Coomalie Creek (Right Branch) in the area of the proposed mine site flows intermittently during the Dry Season as a result of seepage from the local superficial aquifer. The existing creek line includes a small low-flow channel and a floodplain in the area of the proposed mine site. Runoff is currently seasonal; high runoff rates occur during the Wet Season; during the Dry Season flows are largely the result of seepage from the local superficial aquifer.	Dewatering of the pit will cause the water table outside the pit to lower, the effect diminishing with distance from the mine. Dewatering of pit will provide water that will be released to Coomalie Creek (Right Branch). Some of this water will recharge downstream aquifers. Course of Coomalie Creek (Right Branch) and associated floodplain changed; vegetation removed; stream cross-section and hydraulic characteristics changed. Erosion may occur until vegetation and final creek form is established. Runoff in Coomalie Creek (Right Branch) below the mine site increased, particularly during the Dry Season.	To minimise the need to treat dewater to remove suspended solids before release to the surface environment as much groundwater inflow as practical will be intercepted by pumping from shallow production bores (10m to 20m deep) outside the pit. Design of the diversion channel and floodplain aims to retain hydraulic characteristics of the original stream and floodplain. Implement soil conservation measures; dumps to be stabilised; sediment or pollutants in runoff water to be collected/intercepted in settlement ponds prior to discharge. Settling ponds will be used to limit the amount of suspended sediment in discharge water. Regular program of water quality monitoring of discharge water and water run-off from the waste dumps to ascertain effectiveness of settling ponds and alter treatment regime where required.	Based upon current data, groundwater drawdown within Coomalie Creek (Right Branch) beyond 2km of the pit should not exceed 1m. Water levels will return to pre-mining levels and pit will refill after first Wet Season following completion of mining. Local floodplain hydraulic characteristics will be irreversibly changed, however no noticeable effect is expected at the larger catchment scale. Increased flows not likely to adversely affect the environment as the stream already flows as a result of seepage. There will be negligible impact on the quality of groundwater resulting from dewatering the mine and minimal impact on water quality of Coomalie Creek (Right Branch).

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
		Potential for erosion from dumps, disturbed areas or drainage outfalls causing increased turbidity and siltation of the downstream environment; potential transport of pollutants to the downstream environment. Decrease in water quality as a result of increased sediment loads. Sediment in water may cause increased turbidity and siltation of the downstream environment; poor water quality may damage the downstream environment.		Risk of impacts from increased turbidity is small. No likely adverse effects from run-off from plant and mine site.
FLORA				
Vegetation clearing *Refer Sections 3.4.1, 4.1 and 5.2.1*	Extensive Eucalypt woodlands dominate the upland vegetation with open woodlands fringing a narrow riparian corridor along Coomalie Creek (Right Branch). Small patches of floristically distinctive vine-forest occur on dolomite outcrops. Evergreen monsoon vine-forest occurs upstream of the project area. No endangered plant species or special vegetation communities have been recorded in the lease area.	Loss of vegetation during construction will result in clearing of ~ 30% of the project area during Stages 1-3, with approximately 92 ha of woodland vegetation and 14 ha of drainage line communities cleared. Waste areas will largely be located within mixed Eucalypt woodland with the crusher, plant and storage located further up-slope in *E. tetrodonta/E.miniata* open woodland. Clearing of vegetation may encourage the spread and proliferation of weeds and increases in the distribution of Gamba Grass and Mission Grass would dramatically increase the fire hazard.	Mine layout is designed to minimise loss of vegetation and conserve areas of restricted distribution and of importance to fauna, such as vine-forest on rocky outcrops. As far as possible vegetation will be retained to: • reduce erosion and sedimentation; • maintain a visual buffer from the Batchelor Road; • reduce sediment loads in run-off; and • minimise the spread of weeds. Construction adjacent to riparian areas will be minimised where possible to protect riverine areas from negative impacts, including increased siltation and changes in drainage. Construction activities will be restricted to specified areas. Movement of construction vehicles will be managed to ensure minimal loss of trees.	The communities to be cleared are well represented elsewhere within the surrounding region. No significant adverse ecological impacts are anticipated as long as environmental management guidelines are adhered to eg, monitoring and control of weeds, sediment loads and pollution. The implementation of weed and fire management plans designed for the project area will reduce weed distribution and abundance and will result in protection of native vegetation respectively.
Diversion of Coomalie Creek *Refer Sections 2.11.2, 4.1 and 4.7*	Coomalie Creek (Right Branch) is a narrow, intermittent stream with, in places, a distinct, incised channel. Vegetation clearing will be required such that a 1.2 km section of the creek will be diverted, via a flood diversion channel to the south of the current alignment. Vegetation within the current drainage way and alluvial flats associated with Coomalie Creek will be cleared for siting of the proposed pit. Tracts of similar riparian habitat occur outside the boundary of the lease area and are represented in reserves elsewhere in the region.	Approximately 1.2 km of riparian vegetation will be affected by the creek diversion. Some areas of riparian vegetation not cleared prior to mine construction may survive if water table levels remain sufficiently high. The new creek alignment and floodway may provide habitat suitable for colonisation by native aquatic plant species and wetland communities.	Clearing will be kept to the minimum necessary for construction of the diversion bund. Clearing within drainage lines will be selective and minimised to prevent erosion and habitat loss. Regular surveys of lowland areas and the creek channel will be undertaken to control the introduction and spread of aquatic and floodplain weeds (eg: *Mimosa pigra*).	Initially, a loss of riparian and lowland habitat will occur and unless water quality is maintained, aquatic ecosystems will be adversely affected. New habitats will be created in which colonisation of riparian vegetation will occur. If the new flood channel is well designed, the loss of habitat should be balanced in the long term by expansion of new riparian areas.

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
Indirect vegetation changes *Refer Sections 4.1 and 5.2.1*	Native vegetation across the project area is in reasonably good condition. Disturbance from grazing and agriculture has resulted in high numbers of weeds and exploration for mining and extensive terrain disturbance around adjacent mines has led to major sources of weeds both within and around the project area. Upland vegetation is well drained and although drainage in lowland areas may be slow, with extensive waterlogging in the Wet Season.	Changes in patterns of drainage, seepage and sedimentation are expected to lead to loss of riparian vegetation immediately downstream of the diversion bund. Upstream monsoon vine forest vegetation may be affected if major changes in water retention or drainage occur. Gradual shifts in species composition will occur within the new flood channel and creek alignment with upland species diminishing and species requiring high soil moisture (eg: Paperbark and *Lophostemon* communities) increasing in these areas. Proliferation of weeds from increased disturbance may alter fire regimes – dramatic increases in fuel loads result from Gamba Grass infestations.	Development of the mine will be undertaken according to sound principles of environmental management and within the scope of an approved MMP. Ongoing monitoring during each stage of the development will be undertaken to detect and if occurring, monitor major indirect changes to flora within the project area and in upstream and downstream locations. Outcomes of monitoring will form an input to rehabilitation works completed.	Riparian vegetation and species characteristic of drainage ways are expected to colonise the new flood channel. Colonisation will be minor and regionally insignificant. No major indirect changes to vegetation are anticipated if environmental guidelines are followed and site monitoring is undertaken (particularly focussing on weeds and water quality).
Weeds *Refer Sections 4.3 and 5.2.3*	In the project area weed infestations are common in the major habitats but are particularly dense in disturbed areas. Sixteen introduced species were recorded, seven of which are declared noxious weeds (Class B), with the most important noxious weeds to control in the vicinity of the mine considered to be *Hyptis suaveolens*, *Sida acuta*, *Stachytarpheta* spp. and *Senna obtusifolia*. Although not a declared weed, Gamba Grass (*Andropogon gayanus*) represents the most serious environmental weed and fire hazard on the site.	Extensive clearing of native vegetation and terrain disturbance will create favourable conditions for the proliferation of weed species. Significant increases in weed species growth will increase the risk of high intensity fires. The new floodplain channel may provide suitable conditions for weed species such as *Mimosa pigra.*	Weed management and prevention measures will include preparation of a Weed Management Plan for the project area. Strategies will include: • earthmoving equipment washed-down prior to entering the lease area to prevent weed spread; • weed removal from selected areas; • control of class B weeds including select chemical control; • slashing of fire breaks; and • annual weed surveys/ monitoring.	Management of weed issues will reduce the risk of weed introduction and the extent of infestations, and will restrict the further spread of weeds.
FAUNA				
Terrestrial fauna *Refer Sections 4.2 and 5.2.2*	There are three broad habitat types in the project area, each supporting a different fauna assemblage. A total of 122 native and 4 introduced terrestrial vertebrate species were recorded during field survey works. The riparian corridor is an important habitat for animals. The Northern Quoll and the Pale Field-Rat are both listed as 'lower risk – near threatened' in the *Territory Parks and Wildlife Conservation Act, 2001*.	Vegetation clearing will reduce available terrestrial fauna habitats within the project area. Project development will also result in disturbance to terrestrial fauna habitat. Severance to the riparian corridor. Disturbance to significant species and their habitats.	Clearing of vegetation will be minimised where possible and consideration for significant habitats will be made. The riparian corridor will be re-established along the new creek diversion, to encourage use by fauna. The rocky outcrops and monsoon rainforest were the more significant habitats for the Northern Quoll and Pale Field Rat, and these areas will be avoided during development of the mine.	The Northern Quoll and the Pale Field Rat will not be significantly impacted by the proposed development. The design of the proposed site development footprint will minimise the requirement for clearing, disturbance and indirect impact to habitats that support a range of and diversity of fauna within the project area.

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
Aquatic fauna *Refer Sections 3.4.3 and 5.2.2*	Coomalie Creek (Right Branch) is an intermittent stream with some permanent refuge pools. The creek supports a relatively diverse assemblage of aquatic fauna.	Loss or disturbance of habitat, particularly permanent refuge pools. Reduction of habitat diversity along the creek. Change in species colonisations from resident habitat to transient habitat. Increase in flow/volume rates from pit dewatering that could affect nutrient levels and water quality downstream of the mine.	The creek diversion will be designed with inclusion of an excised creek channel, modelled from the existing creek channel to ensure the retention of permanent refuge pools along the creek. Soil conservation measures will be implemented to limit the amount of suspended sediment in water discharged to Coomalie Creek.	The creek will be temporarily disrupted, until the re-establishment of a riparian corridor to support the existing aquatic fauna community. Refuge pools will be maintained to support aquatic communities and the creek channel will be re-established over time. Flow rates and volumes will be significantly increased downstream of the pit resulting in a possible shift in aquatic community composition (to species better adapted to such conditions).
Feral Animals *Refer Sections 4.3 and 5.2.3*	Feral animals are present in low numbers across the project area.	The presence of humans and increased activity may result in a decrease in the numbers of feral animals.	Feral animals will be managed on an 'as required' basis.	Feral animals will not increase in numbers and they may decrease due to increased eradication effort.
BITING INSECTS				
Breeding sites for mosquitoes, Coomalie Creek and associated creek lines *Refer Sections 4.4 and 5.2.4*	Mosquitoes have been surveyed and, although found in relatively low number, certain species will periodically be present in significant numbers due to seasonal fluctuations in population.	Mosquito-breeding habitats may be created by alteration of the existing environment (via earthworks and ground disturbance). The settlement ponds and septic tanks are likely to provide suitable breeding habitats for biting insects. The diversion of Coomalie Creek could lead to small excised sections creating pooling and thus mosquito-breeding habitats. Prolific reed growth along the riparian corridor may result in creation of mosquito-breeding sites.	Management of biting insect will include: • drainage designed to prevent ponding of water in low-lying areas; • native fish populations maintained in settlement ponds to assist in control of larval mosquito numbers; • buildings positioned away from low-lying areas; • regular clearing of vegetation in vicinity of buildings; • clothing, repellents and antiseptic creams will be available to all personnel on site; • screening of staff facilities; and • staff induction. The creek diversion will be designed to recreate the defined nature of the central channel. Creek margins will be revegetated with trees to discourage marginal grass and reed growth. Any cut off sections of an altered creek created by a diversion will be filled and levelled to prevent pooling. Silt traps will be constructed in the upper arms of the major creek or its tributaries that are likely to receive silt from construction or operation activities.	Mosquitoes will be present on-site and will be more prominent during the Wet Season but not in such abundance so as to result in a significant nuisance. Designing the creek diversion to be similar to that already there will minimise impacts on the existing environment. If management measures are employed (such as silt traps) then mosquitoes will not be a significant problem.
FIRE REGIME				
Refer Sections 4.5 and 5.2.5	Frequent, extensive burning of project area and surrounds currently occurs. The presence of Gamba Grass decreases the effectiveness of early season, cool burns.	Reduction in frequency, timing and spread of fires if strict fire management plan is implemented. Frequent, high intensity fires if the spread of Gamba Grass around the project area is unchecked.	Development of a comprehensive Fire Management Plan in coordination with Bushfires Council. The plan will include: • fire break construction; • reduction of flammable fuel loads by slashing/chemical control of tall grasses; • protection of fire-sensitive flora; and • promotion of habitat heterogeneity.	A reduction in the frequency and intensity of fires will result in a shift in vegetation species composition towards a denser mid-stratum layer, including fire-sensitive monsoon forest species. Frequency, timing and spread of fires should be reduced due to site access restrictions, construction of fire breaks and safety regulations. This will have a positive impact on the protection of fire-sensitive vine-forest and riparian vegetation.

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
				Increased habitat heterogeneity through improved fire management practices may improve wildlife habitat quality.
ATMOSPHERIC EMISSIONS				
Air emissions *Refer Sections 4.10.1 and 5.2.10*	While there is no ambient air quality data available for the region, existing air quality is expected to be good given the rural nature of the area, and the lack of either urban population or industry. On occasion suspended and deposited particulate levels may be elevated due to windblown dust, agricultural activities or bush fires.	Some increase in airborne particulate matter is expected as a result of construction and operation activities. Maximum ground level concentrations of pollutants are anticipated to be well below ambient air quality guideline limits in most instances. The primary exception is in relation to short-term concentrations of particulates, as PM_{10}, where there may be the potential for elevated levels especially during intermittent mining activity such as drilling and blasting (to occur 17 days in the first year).	Water sprays would be used (as required) across work zones, stockpiles and unsealed areas to suppress dust. Areas of excavation or works would not exceed the capacity of the water spray units. Blasting or particularly dusty works will be scheduled under favourable meteorological conditions only. Earth moving activity will be suspended where wind speeds exceed 30 km/hr. All major access roads would be sealed and vehicle speeds on unsealed areas will be strictly controlled to minimise dust. Vehicles will not be loaded above the height of the side and tailboards. Dust controls will be provided on all exhaust points from transfer and handling of grain and other dry bulk product, and baghouses would be provided for drillers used in the pit. The conveyor belts will be covered to minimise dust emissions. Fines to be mixed with slag before disposal to minimise windborne emissions. Any long-term stockpiles will be stabilised using fast-seeding grass or synthetic cover spray. Windbreak for limestone stockpile in Stage 3. Exposed areas will be minimised through rehabilitation as soon as practicably possible.	Slight increases in background pollutant concentrations are expected, although levels are predicted to be well below health-based guideline limits at either of the two nearest residences or the Batchelor township. Potential elevation of downwind particulate concentrations, in particular during short-term intermittent drilling and blasting activities. These will be minimised through dust minimisation measures during construction and operation of the Batchelor Magnesium Project.
Greenhouse *Refer Sections 4.10.2 and 5.2.11*	No significant anthropogenic sources of greenhouse gas (GHG) emissions are currently present in the project area.	There will be no direct potential impact due to the emission of any GHG from the Batchelor Magnesium Project. The project will represent an extremely small contribution to global emissions of GHG.	Mt Grace will establish an inventory of emissions, develop an Action Plan to minimise GHG emissions, forecast expected reductions in GHG emissions, and monitor and report emissions on a regular basis as agreed with the Australian Greenhouse Office (AGO). The Action Plan will include capital projects that improve energy or chemical conversion efficiencies, such as: • operating procedures that improve energy or chemical conversion efficiencies; • management initiatives and improvement programs that make “small step” GHG benefits; • use of alternative or renewable energy technologies; and • research and development projects with the potential to reduce GHG emissions.	Insignificant local/regional impact as a result of construction and operation activities. The production of magnesium for use in other industries will contribute to weight reduction and hence to energy savings and consequent GHG emission reduction.
WASTE AND WASTE DISPOSAL				
Refer Sections 2.12, 4.11 and 5.2.13	No significant anthropogenic waste is presently generated at the site.	Potential impacts include: • reduced water quality of receiving waters from runoff from the waste dumps; • contaminated runoff from workshop/washdown areas;	Runoff from waste dumps will be collected in settlement ponds and periodically tested before release to Coomalie Creek. A triple interceptor trap will be installed to remove	There will be an increase of the quantity of waste disposed to local landfill. Minimal adverse effects on the receiving environment from on-site operations and waste disposal.

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
		• reduced air quality from waste gases produced during the operational phase; • increased volumes of waste deposited at the local landfill; and • waste removed offsite to inappropriate locations.	potentially oily discharge water from workshop/washdown area. The plant will be designed to adequately vent any dangerous gases during the operating phase. The plant design and management will be in accordance with Workhealth requirements. Waste tracking documentation will be kept and regularly reviewed.	
SOCIO –ECONOMICS				
Economic environment in Batchelor and the Northern Territory *Refer Section 4.12*	Batchelor is a small township of about 650 residents. The main industry is agriculture, horticulture, tourism and service industries. There are currently no operating mines in the area.	The mine will enhance the local economy primarily by creating employment opportunities and injecting a significant amount of money into the town through the purchase of goods and services. The mine will be the first magnesium mine and processing facility in the Northern Territory.	Local people will be employed where the appropriate skills and qualifications are available. Mt Grace will utilise local goods and services where possible.	There will be increased employment locally and an enhanced skill base regionally. The local goods and service industry will benefit from the proposed project and there will be opportunity for economic growth. The mine will add significant economic value to the Northern Territory economy, the effects of which will spread to a range of services, businesses and industries.
Employment *Refer Section 4.13*	There is currently a shortfall in employment opportunities in Batchelor and the wider Coomalie region.	The development of the mine will create 120-130 jobs during construction and about 73 permanent jobs during operation.	Workers will be sourced locally, from Darwin or from elsewhere according to availability of appropriate skills.	There will be a local and regional boost in employment and a diversification of skill base in the region.
Education *Refer Section 4.14*	Batchelor has one primary school and the main campus and administrative headquarters for Batchelor College.	The mine could be used as an educational resource with organised tours and educational activities focussed on the mining industry.	Mt Grace will help develop and facilitate the enhancement of education at the Batchelor Area Primary school and the Batchelor College related to the mining industry.	Educational opportunities of the local community will be broadened given the integral part the project will play in the area.
Tourism *Refer Section 4.12*	Batchelor township services the local tourist industry, incorporating Litchfield National Park.	There is potential for an adverse effect on the tourism industry due to a conflict with the natural value and aesthetics of the area.	Mt Grace will develop a community education program which will incorporate mine tours and public educational material providing tourism opportunities in the area.	The mine will be a significant development in the area but will not interfere with the natural value of areas such as Litchfield National Park. Benefit will be derived from the mine being used as an educational tool and a potential tourist attraction.
Housing and accommodation *Refer Section 4.14.3*	There is currently limited accommodation available in Batchelor for large, temporary workforces.	The construction workforce will total approximately 120 – 130 people, a significant proportion of which will require temporary accommodation. The ensuing permanent workforce may face housing shortages in Batchelor and with no current plans for expanding residential development areas.	A temporary accommodation facility will be established, possibly at a local caravan park. Some of the workforce may commute from Darwin and some new houses will be built in Batchelor.	A significant proportion of the workforce is likely to elect to reside in the Batchelor area and the township/environs is likely to experience consequent residential growth.
TRAFFIC				
Light vehicle and heavy vehicle traffic *Refer Section 4.15*	Currently Batchelor Road is well used by local residents of Batchelor and also by tourists accessing the Batchelor township and Litchfield National Park. Crater Lake Road is primarily used by local residents, for access to the Stuart Highway when travelling south, Crater Lake swimming hole and the privately operated concrete batching plant.	Batchelor Road will be utilised by the local workforce to access the site, with occasional transportation of heavy machinery anticipated. Crater Lake Road will be developed as the primary access road from the site to Stuart Highway for delivery and dispatch, resulting in an increased volume of passenger and heavy vehicle traffic.	There may be a requirement for minor roadworks (turning lane) or sign-posting on Batchelor Road to ensure safety with the increase in workforce traffic. It is anticipated that additional roadworks will be required at the Stuart Highway and Crater Lake Road intersection and on Crater lake Road at the site turn-off point to accommodate the increase in heavy vehicle movements.	There will be a significant increase in heavy vehicle movement on Crater Lake Road that will exert significant pressure on the existing road. Some roadworks will be required for its effective use. With the exception of a small amount of additional light vehicular movement, no significant impact to Batchelor Road is expected.

TABLE ES-1
SUMMARY: POTENTIAL ENVIRONMENTAL EFFECTS & MANAGEMENT MEASURES

Environmental Factor	Existing Environment	Potential Impacts	Environmental Management	Predicted Outcome
	Stuart Highway is the major arterial road linking Darwin and Batchelor and the Northern Territory with other national arterial roads. It is heavily trafficked by local, interstate and international travelers and by road trains.	Stuart Highway will not be significantly affected by workforce traffic.	Stuart Highway is subject to an ongoing program of upgrade between Darwin and Katherine to accommodate increasing traffic requirements.	Stuart Highway will support increased heavy vehicle movement on a daily basis. There are many double-lane sections of Stuart Highway and continued upgrade is scheduled minimising the potential for impact.
ARCHAEOLOGY AND ANTHROPOLOGY				
Aboriginal Custodianship, sacred sites and heritage sites *Refer Sections 3.5.12, 3.5.13, 4.18 and 5.2.14*	The Aboriginal custodians of the area encompassing the site are the Kungarakany and Warai People. There are four Registered Sacred Sites within the project area and one Recorded Sacred Site (refer to AAPA Certificate C2001/040). The local Custodians have indicated that surface water and groundwater hold a spiritual significance. There are six archaeological sites that have been identified at the site.	The banks of Coomalie Creek is a Sacred Site and will, in part, be disturbed as a result of the creek diversion. The diversion of Coomalie Creek (Right Branch) and pit dewatering will disrupt the natural hydraulic regime of the immediate area. One archaeological site (of low archaeological significance) is located 40m from the proposed open cut. It is not expected to be directly impacted but is considered "vulnerable". Construction/operation activities may result in the inadvertent disturbance of other archaeological sites. Isolated artefacts are likely to be destroyed in the area of the mine pit.	Permission from the Aboriginal Custodians will be sought in conjunction with the AAPA to access any Sacred Sites. The creek diversion will be designed to have minimal impact to the overall flow of water in Coomalie Creek (Right Branch). The sacred sites (where practical) and archaeological sites located within the lease area will be clearly marked and protected by Machinery Exclusion Zones. Alterations to surface water and groundwater regimes will, as much as practical, be minimised and pit dewatering undertaken at the minimum rate required to facilitate mining operations and worker safety.	Disturbance of a Sacred Site will result from the diversion of Coomalie Creek. No archaeological sites are expected to be disturbed as a result of site development.
VISUAL AMENITY				
Visual amenity *Refer Section 4.16*	The site is largely undeveloped with open *Eucalypt* woodland predominating. There is a rain-filled trial pit and survey tracks traversing the site.	Over the life of the mine the pit will reach a maximum size of approximately 24 ha. The pit will be in close proximity to Batchelor Road but should not be readily visible. The processing plant will be housed in a 20m high building. The upper section of this building will be visible from Batchelor Road, but not from Crater Lake Road. Stage 1 involves the installation of three emissions stacks, one 63 m high and two 15-20m high. These will be replicated to allow Stage 3 operations. The tops of the stacks will be visible from the Batchelor and Crater Lake Roads from up to 4km away. Visible emissions from the stacks is expected to be minimal, with colourless carbon dioxide and some water vapour (as steam) being the primary emissions.	A screen of trees will be maintained along Batchelor Road to obscure the mine pit and majority of the processing plant. This screen will be thickened over time to maintain good visual amenity. The building housing the processing plant will be constructed with khaki color-bond cladding.	The mine pit and plant will be prominently visible by air but not obvious from the major access roads (being Batchelor Road and Crater Lake Road). The emissions stack will be visible from the Batchelor and Crater Lake Roads from up to 4km away and will impact the visual amenity of the landscape.

ENVIRONMENTAL MANAGEMENT

The EIS includes a preliminary Environmental Management Plan (EMP), which will form part of a Mining Management Plan (MMP) to be developed after the commencement of mining. The EMP addresses the management of the environmental impacts based on the currently available project information.

The objectives of the EMP are to identify issues requiring management and proposing strategies and monitoring programs that will help minimise potentially adverse impacts from the development.

MONITORING PROGRAM

The monitoring programs are designed to test and validate the primary predictions of impact assessment. Monitoring allows for ongoing assessment in order that measures can be taken to reduce the potential for environmental impact. Monitoring also provides quantitative assessment of environmental impact and provides information and data upon which to make decisions regarding project activities. Major monitoring programs will include: flora and fauna; weeds and feral animals; biting insects; fire; groundwater; surface water; erosion; dust and noise; air quality; sacred sites and archaeological sites.

EMERGENCY RESPONSE

A preliminary Hazard and Risk analysis has been carried out and is presented in the EIS. All major risks have been identified and this will form the basis for developing emergency response plans before the construction and operation of the project commences. Identification of all risks and their arbitrary quantification allows response plans to be prepared that prioritise certain risk activities and events management.

DECOMMISSIONING

There is a predicted 25-year lifespan to the ore deposits at the Batchelor Magnesium Project site, if processing is in accordance with the predicted quantities and staged development. The processing facility will be disassembled and removed from site. The mine pit will be rehabilitated with vegetation and stocked with fish to emulate a natural environment. All infrastructure and facilities will be removed and the site will be revegetated to its natural condition, in consultation with relevant governing agencies.