Section 7

Glossary of Technical Terms, Acronyms, Symbols and Units

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Technical Terms

A horizon – the top layer of the soil profile containing decomposed organic materials. Commonly referred to as 'topsoil'.

A2 horizon – part of soil profile immediately below the topsoil.

A-weighted – an electronic filter having the frequency response corresponding approximately to that of human hearing.

AADT – Annual Average Daily Traffic.

ABS - Australian Bureau of Statistics.

absolute levels – the actual concentration of a substance measured at a given time, as distinct from relative variations in concentrations measured over time.

absorption – the characteristic of a substance of taking up, assimilating or incorporating water, fluids or gases.

abundance of a species – the number of individual animals of a species.

acceleration lane – a lane used for increasing speed before merging with the through lanes.

access bund – a bund capable of carrying vehicles, constructed to assist access to an area.

accretion – growth of sedimentary body through addition of new material.

acid – substance with a pH less than 7.0; the lower the pH, the higher the corrosive ability of the substance.

acid formation – the process whereby acid is formed by the oxidation of minerals (particularly sulfides) exposed to air and water.

acid rock drainage (ARD) – runoff of acidic water, typically from mine waste rock, following acid formation within the rock.

acid-or-water soluble – those constituents of a material that are soluble in either water or diluted acid.

acid-base results – data generated from test work investigating acid-generating and acid-neutralising properties, generally of mine waste rock and soil.

acidic – having a pH less than 7.0.

acoustic barrier/bund wall – an earthen wall or bund formed to reduce noise and visual impact of quarrying and processing activities.

acoustical shielding – a natural or artificial structure (e.g. a hill or a bund) that inhibits the transmission of sound.

acoustics – the science of sound and vibration.

activated carbon – granular carbon that has been treated to improve its ability to adsorb a particular substance.

active life (of a mine) – the period after mine construction and prior to final decommissioning.

active project areas – those areas of the project which are in use.

active residue cells – residue cells currently receiving residue.

acute – short term (health risk assessment).

ADGC – Australian Code for the Transport of Dangerous Goods by Road and Rail.

adsorption – the attraction and adhesion of a layer of ions from an aqueous solution to the solid mineral surfaces with which it is in contact.

adsorption – the adhesion of one substance to the surface of another.

advection – the process by which solutes are transported by the motion of moving groundwater.

adverse weather conditions (in respect of noise and dust) – conditions, such as high wind, that assist the movement of dust or propagation of noise away from the mine towards receptors.

AEMR – Annual Environmental Management Report – to be referred to in the future as an "Annual Review".

AEP – Annual Exceedance Probability. The probability of exceedance of a given discharge within a period of one year.

aerial photographs – photographs of landscape taken from a plane (typically areas several kilometres across) used for the surveying and interpretation of vegetation type, geology, land use, etc.

aerial survey – survey of a landscape from an aeroplane, typically involving aerial photography, to determine specific characteristics (e.g. mineral potential or land use).

aesthetic significance – an item/area having visual or sensory appeal, landmark qualities and/or creative or technical excellence.

agglomeration – the binding of fine particles to coarser material using cement.

aggregates – fragments of crushed rock with a defined size.

agricultural resources – the land on which agriculture is dependent and the associated water resources (quality and quantity) that are linked to that land.

AHD – Australian height datum (in metres).

airblast overpressure – a shock wave from the blast transmitted through the air, normally measured in dB(Linear).

air-dry – to dry naturally via exposure to the atmosphere.

air pollutant – a substance in ambient atmosphere, resulting from the activity of man or from natural processes, causing adverse effects to man and the environment (also called "air contaminant").

air pollution – presence of air pollutants.

air pollution emissions inventory – all information, collection and processing system containing data on emissions of, and sources of, air pollution from both man-made and natural causes.

air quality criteria – quantitative relationship between a pollutant's dose, concentration, deposition rate or any other air quality-related factors, and the related effects on receptors, e.g. humans, animals, plants, or materials. Air quality criteria serve as the scientific basis for formulating ambient air quality standards or objectives.

algae – a group of chlorophyll bearing plants. Many are aquatic, often being single cells (microalgae) but some can be large (macroalgae).

algorithm – a mathematical equation devised to solve a particular type of problem.

alkaline – having a pH greater than 7.0.

alkalinity – in water analysis a measure of the carbonates, bicarbonates, hydroxides and occasionally the borates, silicates and phosphates in the water.

alluvial – pertaining to material, such as sand or silt, deposited by running water (e.g. a creek or river).

alluviation – the build-up of alluvial material over time.

alluvium – a general term for stream-deposited sediment (sand, silt, gravel, etc.) within stream beds or on flood plains or alluvial fans.

ambient – relating to conditions outside the active project area.

ambient air – outdoor air to which people, structures, plants and animals are exposed.

ambient air quality – the quality of the ambient air near ground level, expressed as concentrations or deposition rates of air pollutants – also expressed as existing air quality.

ambient air quality criteria – quantitative relationship between a pollutant's dose, concentration, deposition rate or any other air quality-related factors, and the related effects on receptors, e.g. humans, animals, plants, or materials. Air quality criteria serve as the scientific basis for formulating ambient air quality standards or objectives.

ambient level – existing level of a phenomenon without the influence of the proposal.

ambient monitoring – monitoring of conditions outside the active project area (e.g. noise levels, water quality parameters).

amenity – the desirability of an area.

amphibians – animals (such as frogs) adapted to live both on land and in water.

anabranch – a stream that leaves and re-enters a larger stream.

anaemometer – an instrument for measuring the speed of wind.

analysis of variance (ANOVA) – statistical test conducted on the variance of two sets of data to determine if they are significantly different used, for example, to detect significant environmental change.

analytical accuracy – the ability of an analytical procedure to determine the true value of a variable in a sample (e.g. copper concentration in water).

ANC – see acid-neutralising capacity.

ancestral channel – the remnants of an old river channel, now covered by sediment.

anecdotal evidence – informal, oral or written evidence of an event.

anion – a negatively charged ion that migrates to an anode.

anisotropic – exhibiting different properties, such as compressibility in different directions.

anode – positively charged conductor (electrode) used in electrolysis.

ANOVA – see analysis of variance.

anthropogenic – affected by, or relating to, human beings.

anti-seepage membrane – layer of natural or artificial material (e.g. clay or plastic) placed on the ground to prevent seepage (e.g. from a residue storage).

Annual Review – a report submitted to the Director-General of DP&I identifying environmental performance for the previous period including activities, monitoring results (with evaluation), compliance, non-compliances and responses, discrepancies between actual and predicted impacts and measures to improve performance over the ensuing reporting period.

ANZECC – Australian and New Zealand Environment and Conservation Council.

Applicant – person, organisation or company proposing to carry out an activity / seeking development consent (i.e. EMC Metals Australia Pty Ltd).

approx. – approximately.

aquatic – living in or on water, or concerning water.

aquifer – rock or sediment capable of holding and transmitting groundwater.

aquifer recovery – re-entry of groundwater into an aquifer from which water has been removed.

aquitard – rock strata, layers or other areal features (generally horizontal, but may be vertical such as a dyke) which prevent the transmission of water flow through them; barrier to flow; impermeable or impervious.

arboreal – pertaining to tree habitats.

archaeology – the scientific study of human history, particularly the relics and cultural remains of the distant past.

ARD – see acid rock drainage.

area source – a group of pollutant-emitting facilities on surfaces which are evenly distributed across a well-defined region.

ARI – see average recurrence interval.

artefact – anything made by human workmanship, particularly by previous cultures (such as chipped and modified stones used as tools).

artesian water – water contained in an aquifer.

AS – Australian Standard.

asphaltic concrete – road capping material which is a blend of crushed rock and sand, bound by bitumen to provide a road seal and wear surface.

assay – a chemical analysis.

association – an aggregation of botanically-related types which also have similar structure.

At Grade Intersection – Junction of roads that form an intersection at grade.

atmospheric stability – a measure of turbulence which determines the rate at which the effluent is dispersed as it is transported by the wind.

attenuation – reduction in sound pressure levels between two locations.

audio-visual bund – an earthen wall or bund formed to reduce noise and visual impact of quarrying and processing activities.

AusIMM – Australasian Institute of Mining and Metallurgy.

auxiliary turn lane – an additional lane approaching an intersection to allow vehicles intending to turn across traffic to wait while allowing through traffic movements to continue uninterrupted.

average annual daily traffic (AADT) – unit of assessment of traffic flow along a road.

average annual flow (river) – the average volume of water to flow through a river over the period of 1 year.

average annual rainfall – the average amount of rain to fall at a specific location over the period of 1 year (measured in millimetres).

average crustal abundance – the estimated average concentration of an element (e.g. gold or arsenic) in the earth's crust.

Average Recurrence Interval (ARI) - statistical period in years for a design storm event.

avifauna – birds.

B horizon – material located below the A horizon material and above the parent rock. Commonly referred to as 'subsoil'

backfill – material used to fill created void.

background – the conditions (e.g. noise levels, bird populations) already present in an area before the commencement of a specific activity (e.g. a mining operation).

background level – the concentration (deposition) level of a pollutant which must be added to the concentration (deposition) level of the modelled sources in order to obtain a total.

background dust level – dust level in the absence of mining and processing activities..

background noise levels – the level of the ambient sound indicated on a sound level meter in the absence of the sound under investigation (e.g. sound from a particular noise source; or sound generated for test purposes).

backhoe – a machine designed for small-scale excavation work.

ball mill – plant for fine grinding of ore using metal balls.

banding – spreading seed and fertiliser in the one operation in separate but adjacent bands.

bank cubic metre (bcm) – a volume of $1m^3$ in the ground prior to disturbance.

basalt – fine-grained, dark volcanic igneous rock.

base-course – road material placed on sub-base to receive bitumen seal.

baseline data – a body of information collected over time to define specific characteristics of an area (e.g. species occurrence or noise levels) prior to the commencement of an activity (e.g. a mining operation); baseline data allows any impacts arising from the activity to be identified by comparison with previously existing conditions.

baseline monitoring – monitoring performed prior to site development.

basement rock – unweathered rock lying below the soil and weathering profile.

basic – having a pH greater than 7.0.

basin – the drainage area of a river and its tributaries or of a groundwater system.

bathymetry – surface morphology.

batter – 1. An engineered slope of soil or rock fill on either side upslope or downslope of a road, embankment or mine waste storage; the sloping banks of cut earth separating different levels in an open-cut pit.

bcm – bank cubic metre – a volume of 1 m^3 in the ground prior to disturbance.

beach – a deposit of residue solids lying exposed to the atmosphere in a residue storage.

bed level – elevation of the base of a stream bed at a particular point.

bedload – the sediment that moves by sliding, rolling or bounding on or very near the bed of a stream channel.

bedrock – unweathered rock lying below the soil and weathering profile.

bench – a step in the face of a quarry or mine which could be up to 25m high.

benchmark site – a site that serves as a scientific reference point from which the extent of changes to natural systems as a result of human activity can be measured.

benthic organism – the organisms of the bottom of lakes and rivers.

berm – a low bank or steep slope built onto a slope to improve its structural stability and reduce erosion.

best management practice – the most effective actions which minimise human impact on the environment.

bifurcated – forked, divided into two branches or chutes.

bioaccumulation – the uptake and concentration of contaminants in the living tissue of biota.

biological diversity/biodiversity – a concept encompassing the diversity of indigenous species and communities occurring in a given region; biological diversity includes genetic diversity, which is the diversity of genes and genotypes within each species; species diversity, which is the variety of living species; and ecosystem diversity which is the diversity of the different types of communities formed by living organisms and the relations between them.

biomass – the quantity of living material present at a given time within a given area. Synonymous with standing crop, stock and standing stock.

biophysics – the study of the impact of physical processes on living things.

biota – living components of a habitat.

biotic communities – particular sub-sections within an ecosystem (such as waterbirds, fish, mammals, etc.).

bioturbation – disruption of sediments by biological activity.

blank (sample) – a sample in an analytical program containing a negligible concentration of the variable of interest, used to determine levels of contamination.

blasthole – hole drilled into rock to position explosive for blasting.

blasting – the operation of breaking rock by means of explosives.

bore – a well, usually of less than 20cm diameter, sunk into the ground and from which water is pumped.

borrow area – an area of shallow excavation used to provide material (soil and rock) for nearby construction.

brackish – a term for water that contains noticeable proportion of salt but far less than salt water.

breakthrough – erosional scour in neck of meander along which channel waters flow.

breeding population – that proportion of the population of a species that is mature enough to breed.

breeding range – the geographical distribution of habitat suitable for a particular faunal species to breed in.

broadleaf – pertaining to trees that have broad, as opposed to needle-shaped, leaves. Generally, broadleaf trees produce hardwood.

buffer – a physical barrier / structure or width of land that encloses, partially encloses, or defines a particular environment. A buffer serves to minimise the impacts of non-desirable external influences on the adjoining environment.

buffering – the chemical process by which some substances or mixtures can resist or retard changes to their pH.

bulk density – for aggregate is the mass in the air of surface-dry particles divided by the saturated by surface-dry volume.

bulldozer – an item of tracked mobile earth moving equipment fitted with a front blade and with rear rippers used for pushing and ripping soil and rock.

bund - embankment of clay or weathered rock emplaced for visual or acoustic screening.

bund wall – a man-made earth mound used to visually and acoustically screen nearby receivers.

burin – a small blade-like artefact from which a small, distinctive spall or chip has been removed from one end.

c./c.a. – abbreviation for about or proximity.

canopy – the highest vegetation layer of a plant community, in the case of forests, it is formed by the crows of trees.

capped (drillholes) – drillholes sealed after use to prevent infiltration of water or soil and to protect livestock and native fauna.

car equivalent – unit of assessment for trafficability or traffic density.

catch drains – drains used to intercept and redirect runoff.

catchment – the entire land area from which water (e.g. rainfall) drains to a specific water course or waterbody.

catchment area – the area determined by topographic features within which rainfall will contribute to runoff at a particular point.

catenary – the natural bending or curving shape of a line strung between two fixed points, such as the shape of power lines between power poles.

cathode – the negative electrode of the electrolytic cell.

cation – an ion having a positive charge and characteristically moving toward a negative electrode.

channel – river or irrigation channel, includes bed and bank.

chemical surveillance – monitoring of selected chemical parameters of the environment, such as metal concentrations in a lake.

chemically inert – a chemical substance that does not easily react with other substances.

chemically stable – a chemical substance that does not readily decompose.

chert – hard, very fine-grained silica rock.

chloride – the univalent negative iron of the element chlorine.

chronic – long term (health risk assessment).

chronic effects – the effect on an organism of a continuous abnormal condition applied over 10% or more of its lifespan.

Class A pan evaporation record – Bureau of Meteorology standard method of measuring evaporation.

clay – very fine-grained sediment or soil (often defined as having a particle size less than 0.002 mm (2 microns) in diameter).

claystone – a non-fissile rock of sedimentary origin composed primarily of clay-sized particles (less than 0.002 mm).

clear day – day when cloud covers less than two eighths of the sky.

climatic water deficit – the condition where average annual evaporation at a location exceeds average annual rainfall (both measured in millimetres).

cloudy day – day when cloud covers more than six eighths of the sky.

coagulant - clotting agent which causes the gelling or becoming solid of a suspension of particles in liquid.

coarse ore – ore that has been crushed but not ground.

coarse sand – sand predominantly >0.6mm.

colluvial – unconsolidated sediment deposited by surface runoff.

colluvial deposit – deposit of weathered material (soil and rock) transported by gravity.

colluvium – unconsolidated soil and rock material moved largely by gravity, deposited on lower slopes and/or at the base of a slope.

colonial species – plant species that are the first to grow in a disturbed area.

colonise – to establish a species in an area in which it was not previously found.

comfort criteria – controlling limits of ground vibration and airblast overpressure from blasting above which they may be harmful, offensive or interfere with the comfort or response of the person.

comminution – the mechanical breakdown of coarse particles (e.g. rock fragments) into finer particles.

community – a combination of plants that are dependent on their environment and influence one another and modify their own environment. They form together, with their common habitat and other associated organisms, an ecosystem, which is also related to neighbouring ecosystems and to the macroclimate of the region.

compaction – the process of close packing of individual grains in a soil or sediment as a response to pressure.

compaction curve (clay) – curve showing the relationship between increasing pressure and degree of compaction.

compactor – an item of steel wheeled earth-moving equipment usually fitted with a front blade, used to spread and compact soil and rock.

company-owned land – land either owned or under an agreement to purchase by the Applicant.

competent rock – rock having substance strength characteristics requiring significant energy to dislodge or fracture.

compliance monitoring – monitoring to determine whether standards are being complied with (e.g. whether particulate concentrations in a river or lake are less than, or equal to, an agreed level).

compressed air – pressurised air used to operate instruments and pneumatic tools or to add air to a process.

compressed or liquefied gases – gases held under great pressure (e.g. in a gas cylinder), often to the point where the gas forms a liquid.

compressible – able to be reduced in volume by the application of pressure (e.g. a gas or a soil).

concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

concentration of runoff – the channelling of runoff over a wide area into a narrower flow with greater depth and/or velocity.

concrete – mixture of gravel, cement, etc. for use in building.

concrete aggregate – gravel and sand mix combined with cement and water to make concrete.

conductivity – the measurement of the ability of a substance (either a measure of solid, liquid or gas) to transmit electricity; used to determine the amount of salt in a soil sample.

cone crusher – a type of crusher for reducing rock fragment size by means of appropriately positioned and spaced rotating or oscillating cones.

cone of depression – a depression of the potentiometric surface which has the shape of an inverted cone that develops around a well from which water is being withdrawn. It defines the area of influence of a well.

confined aquifer – an aquifer bounded by an impermeable upper surface. If the impermeable bounding layer is breached the water is under sufficient pressure to cause it to rise above the confining contact. The level to which the water rises is called the potentiometric or static water level or head.

confined aquifer – a saturated aquifer, overlain by a relatively impervious formation in which the pressure of the water at the top of the aquifer is greater than atmospheric pressure.

confluence - junction of streams.

conformable strata – strata or groups of strata lying one above another in parallel order indicating no disturbance or denudation has taken place while their deposition was occurring.

conglomerate – sedimentary rock consisting of poorly sorted grains (typically pebbles surrounded by finer material, such as sand or silt).

connate – coeval in origin, congenitally united.

conservation – the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations, while maintaining its potential to meet the needs as aspirations of future generations.

consolidation – the process whereby loose or soft sedimentary material (e.g. an alluvial deposit) becomes a compacted, harder sedimentary material (e.g. a sandstone).

contained waters – waters contained within the project area (e.g. runoff from the internal face of the perimeter bund).

contaminant – a chemical compound or element which has been introduced as a result of human activity. It is noted, however, that some chemical compounds and elements also occur naturally in water and sediments.

contingency procedures – procedures put in place to handle an event considered unlikely to occur.

contour bank – an earth bank constructed across a slope parallel to contours.

contractor – specialist brought in to perform a specific task, such as the construction of mine infrastructure or the excavation (mining) of the open pit.

control sites – in a monitoring program, a control site is a site unaffected by any of the impacts being monitored (e.g., changes to bird populations as a result of mining activity) and is thus chosen to provide comparison with sites that may be affected by impacts.

conversion factor – a factor used to convert one quantity (e.g. conductivity) into another quantity (e.g. salinity).

conveyor – a device fitted with an endless rubber belt used for moving crushed rock within the processing plant.

core – 1. (archaeology) a piece of stone from which flakes have been removed; cores often show distinctive flake scars indicative of certain production techniques, such as blade or adze production.

2. (geology) rock brought to the surface by drilling for the purpose of geological interpretation.

corrosion – the destructive conversion of a metal to a metallic oxide through exposure to air, moisture, or chemicals.

cover depth – the depth of a seam below the surface averaged over the extraction panel.

critical area – the area of panel which causes the maximum possible subsidence of one point on the surface. The area which causes S_{max} to reach its maximum value.

critical path items – an activity in a project's schedule with no individual timing flexibility and upon which the overall timing of the project is therefore dependent.

critical storm – storm of a duration that will result in the peak discharge for a given recurrence interval.

crop out – be exposed (e.g. rocks exposed above the surface of the surrounding landscape but still embedded in the land area said to crop out).

cross-section – a two-dimensional diagram of an object presented as if the object had been cut along its length.

crown – the portion of a tree above the main trunk, made up of branches, twigs and leaves.

crown cover – the area of ground covered by projecting the outline of the tree crown vertically to the ground; often expressed as a percentage for the combined crown cover of trees in a defined area.

crown-timber lands – Lands for which SFNSW has responsibility under the Forestry Act. Includes State forests, unoccupied Crown lands, lands held in specified Crown tenures that have timber rights reserved.

crusher – that part of an ore-processing plant where the ore is mechanically crushed into smaller pieces.

crusher fines – material finer than 3mm produced in the crushing plant.

crushing – the mechanical process of reducing rock size usually by pressure or impact.

culvert – large pipe or channel carrying water underneath a structure (e.g. a road or railway track) or underneath the ground.

cumulative – increasing by successive additions.

curtilage – the area of land occupied by a dwelling and its yard and outbuilding, actually enclosed or considered as enclosed.

cut-off drains – drains constructed to divert upslope runoff around disturbed areas.

cut-off grade – the lowest grade of mineralised material considered in the calculation of grade in a given deposit.

cut-off trench – trench placed underneath and parallel to an embankment or dam wall and filled with material of low permeability (e.g. compacted clay) to prevent seepage underneath the embankment or wall.

cyclone – a conical shaped vessel designed to separate particles from a moving stream of either air or water.

cyclone battery – a series of cyclones.

"dalmatic" type dust collection system – dust collection system which collects dust and, in pulses, places the collected dust under the crushed ore on the discharge conveyor belt.

damage criteria – controlling limits of round vibration and airblast overpressure from blasting to minimise the risk of threshold or cosmetic surface cracks or window breakage respectively.

Darcy's Law – the rate at which a fluid flows through a permeable substance per unit area is equal to the permeability, which is a property only of the substance through which the fluid is flowing, times the pressure drop per unit length of flow, divided by the viscosity of the fluid.

day time period – the period from 7:00am to 6:00pm Monday to Saturday and 8:00am on Sundays and Public Holidays (where relating to noise).

daylighting – a point on a void where a road or bench meets the natural surface on the perimeter of that void.

dB – decibel, unit used to express sound intensity.

dB(A) - unit of measurement of human appreciation of noise level.

dB(A) – decibels, A-weighted scale; unit used for most measurements of environmental noise; the scale is based upon typical responses of the human ear to sounds of different frequencies.

decant pond – a central pond, formed in a residue storage by runoff of residue supernatant liquor, from which water is pumped (decanted) from the pond and fed back to the processing plant as process water.

decant riser pipe – vertical pipe placed in residue storage decant pond to enable removal of pond water by pumping.

deceleration lane – a lane used for decreasing speed before leaving the road.

decibel – unit expressing difference in power between acoustic signals.

deionised water – water that has been treated with ion-exchange resins to remove metals and other impurities.

density – 1. The mass of a substance (e.g. sediment) divided by its volume; water has a density of exactly 1 kilogram per litre; 2. The coverage of vegetation (e.g. trees) per unit of distance (along a linear transect) or unit of area (in an area transect).

depauperate – containing fewer species than would be expected for that vegetation or faunal community or habitat.

deposited cyclically – deposited at regular or semi-regular intervals.

deposition – laying down of particulate material (e.g. sediment in a lake or residue solids in a residue storage).

deposition zone – area of net accumulation of sediment over tie (e.g. a lake bed).

depressurisation operations – removal of groundwater to reduce pressure in an aquifer.

desiccation – the process of becoming dry or dehydrated.

detection limit – the smallest concentration of a substance that an analytical procedure can accurately and precisely detect.

detonator – a device that triggers an explosive.

detoxified – rendered non-poisonous.

detritus – accumulation of fragments of rock or organic material removed from a source by disintegration.

development application – an application to the local council for approval of an activity deemed to require an approval prior to commencement.

dewatering bay – enclosure into which sand is pumped for removal, by draining, of excess water.

diamond core – cylindrical-shaped drilling samples obtained by use of a diamond surfaced drilling bit.

diamond drill hole – drill hole constructed by equipment using rotary fluid flushing and a diamond faced bit to obtain core from the rock being drilled.

digitised topographic mapping – computerising the ground contours enabling automatic generation of cross-section between any two nominated points.

dinoflagellate – a type of alga.

dip – the angle that rock strata make with a horizontal surface measured at right angles to the strike.

dispersibility – a characteristic of soils relating to their structural breakdown in water into individual particles.

dispersion/diffusion – a mixing process in which air motions mix a pollutant plume over an ever increasing volume, thereby diluting the concentration of the pollutant in the ambient air.

dispersion model – a set of mathematical equations relating to the release of air pollutant to the corresponding concentrations in the ambient atmosphere or deposition on the surface.

dispersion parameters – the parameters which describe the growth of the dimensions of a Gaussian plume as a function of travel distance of travel time. The dispersion parameters are classified according to diffusion turbulence conditions in the atmospheric boundary layer on the dispersion.

disseminated – spread widely, diffused.

dissociated – the temporary, reversible, decomposition of molecules in a compound or of ions and ligands in a complex.

dissolution – the process by which a substance dissolves in a liquid.

dissolved oxygen – the amount of gaseous oxygen dissolved in water and available for a biochemical activity (e.g. breathing in by fish).

distilled water – water that has been evaporated (turned into a vapour) and then condensed (turned into a liquid) to remove impurities (such as dissolved salts).

distributary – a branch or outlet that carries water away from a main river or lake (particularly during flooding episodes) and does not return to it.

distribution of species – the entire area in which a population of a species, subspecies or other taxon is found.

diversion bank – an earth bank constructed to divert water away from disturbed areas.

DRE – Division of Resources and Energy.

domed surface – surface landscaped into the shape of a shallow dome.

drainage grading works – earthmoving and levelling activities to carefully regulate drainage (e.g. from topsoil stockpiles).

drainage line – a passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain.

drainage structures – artificial structures to control and direct drainage and prevent erosion or flooding.

drawdown – the difference between the water level observed during pumping and the non-pumping water level (static water level or static head).

drill core – the cylindrical sample of rock recovered by means of diamond drilling.

drill hole cuttings – fine rock material brought to the surface during blast hole drilling.

drilling – the action of boring holes (usually less than 30cm in diameter and up to several kilometres deep) into the ground, typically to establish a water bore or to investigate the geology found at depth.

drum scrubber – a cylindrical machine which uses water to reduce the size of ore material.

dry blasthole – blasthole set up for operation under dry conditions.

dry density – the density of a substance (e.g. a soil) after it has been dried.

dry processing plant – a plant designed to separate unwanted size materials without water.

dry sclerophyll – sclerophyll forest with xeromorphic shrubs (which tolerate dry conditions).

dry screen – material separated into various sizes without water.

dS/cm – decisiemens per centimetre; a measure of conductivity.

dS/m – decisiemens per metre; a measure of conductivity.

dump operations – the deposition of waste rock or soil on a waste emplacement.

dumping face – the face of a waste emplacement currently being used for waste rock deposition; the face of an embankment currently being used for construction material deposition.

duplex soils – soil profiles with a significant contrast in texture between the upper and lower horizons.

duplicate sample – two samples collected for analysis in exactly the same manner and at the same time and place to test the repeatability and accuracy of analytical tests.

dust – particles of mostly mineral origin generated by erosion of surfaces and the mining and handling of materials.

dust collector – machine designed to capture dust produced during ore processing.

dust concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

dust deposition – dust particles that settle out from the air – measured in grams per square metre per unit month (g/m^2/month).

dust deposition gauge – instrument set up to record the rate of deposition of dust.

dust gauge – instrument set up to record the rate of deposition of dust.

dust suppressant – any substance used to prevent dust disturbance.

dynamic equilibrium – when two opposing processes are occurring at the same rate in a system and the system maintains an overall uniformity over time.

dynamic system – a system (such as a lake subject to cycles of flooding and drying) that is continually changing.

EC – electrical conductivity.

ecology – the relationship between living things and their environment.

ecologically sustainable development (ESD) – using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future can be increased.

ecologically sustainable development (ESD) – development that improves the quality of life, in a way that maintains the ecological processes on which life depends.

ecosystem – the totality of biological processes and interactions within a specified physical environment.

ecosystem – a functional unit of energy transfer ad nutrient cycling in a given place, it includes all the relationships within the biotic community and between the biotic components of the system.

ecotone – a region of transition between two plant communities, characterised by a transition between either the floristic components of the communities or the structures of the communities.

ecotourism – nature–based tourism that involves education and interpretation of the natural environment.

effective clearing area – a term used for the area of low condition vegetation in the proposed impact area that has been adjusted to account for reduced canopy cover according to the BioBanking Assessment Methodology.

effective extracted seam thickness – the extracted seam thickness, modified if required, to account for unmined pillars (modification based on the percentage of extraction within the panel).

electrical conductivity (EC) – the ability of a substance (either solid, liquid or gas) to transmit electricity.

electrode – a conductor by which an electric current enters or leaves a solution during electrolysis.

electro-submersible pump – small electric pump that will operate underwater.

element – a substance consisting entirely of atoms of the same atomic number (e.g. oxygen, carbon, scandium).

elemental composition – the composition of a substance (e.g. a rock) in terms of its component elements (e.g. aluminium, silicon, copper).

elevated concentration – a concentration of an element that substantially exceeds the average crustal abundance of that element.

Elliot trap – a baited cage used in faunal surveys to capture small animals.

elution – washing process.

elutriate – the solution obtained after particles have been washed by suspension in water.

eluvial – an eluvial deposit consists of weathered material which is still at, or near its point of formation.

embankment lifts – an embankment is constructed by the placement of a series of progressively higher and narrower earth or rock layers; each separate layer is called a lift.

Emerson Class No. – ranking given to a soil or clay according to the Emerson crumb test.

Emerson crumb test – test to rank the physical characteristics of soil or clay when immersed in water, particularly its tendency to disperse.

emission – a discharge of a substance (e.g. dust) into the environment.

emission factor – an expression for the rate at which a pollutant is generated as a result of some activity, divided by the level of that activity.

emissions inventory – an information, collection and processing system containing data on emissions of, and sources of, air pollution from both man-made and natural causes.

empirical evidence – evidence based on, and verifiable by, observation and experiment.

emplacement sealing – the sealed on a waste emplacement (e.g. by the compaction of its surface) to limit infiltration of air and water.

emulsion – a relatively stable suspension of minute droplets of one liquid in another liquid in which it is not soluble.

end-of-test pH value – the pH value recorded after all chemical reactions have finished and the resultant solution has reached a state of equilibrium.

end-tipping fill – progressive construction of an embankment, bund or cofferdam.

en echelon – stacking in an array with depth.

enrichment (of element) – enriched elements are those (in a particular rock type or a specific location) with concentrations substantially exceeding the average crustal abundance.

environment – a general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists.

environmental capacity – environmental capacity can be defined as the maximum volume that a section of roadway can carry without exceeding accessible levels of noise, air pollution, vibration, interference with local movement and road safety (hazard).

environmental constraints – limitations on a project by components of the environment.

Environmental Impact Statement (EIS) – a formal description of a project and an assessment of its likely impact on the physical, social and economic environment. It includes an evaluation of alternatives and an overall justification of the project. The EIS is used as a vehicle to facilitate public comment and as the basis for analysing the project with respect to granting approval under relevant legislation.

environmental officer – person at a mine in charge of environmental compliance and monitoring.

environmental planning – planning (e.g. of a mining operation) that places emphasis on the possible environmental impacts of a development.

EPA – Environment Protection Authority – the successor to the SPCC.

EP&A Act – Environmental Planning and Assessment Act 1979.

ephemeral – lasting only a short time.

ephemeral – not permanent, e.g. a stream that flows only seasonally or after rainfall or a lake that periodically dries out.

ephemeral creek – creek in which flow is intermittent, usually short term following rainfall.

ephemeral stream – a water course that flows intermittently.

epicentre – the point on the surface of the earth above the focus of an earthquake.

epidemiological study – study of the patterns, causes and effects of health and disease conditions in defined populations.

epiphyte – a plant which lives on another plant but is not parasitic.

equilibrium – state of balance between opposing forces or effects.

erodibility – the tendency of soil, earth or rock to erode.

erosion – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice.

erosion hazard – the susceptibility of a parcel of land to the prevailing agents of erosion. It is dependent on a combination of climate, landform, soil, land use and land management factors.

erosion risk – the intrinsic susceptibility of a parcel of land to the prevailing agents of erosion. Note that determination of erosion risk differs from that of erosion hazard in that land management factors are ignored.

erosivity – potential ability to cause erosion. The amount of erosion at a site is dependent on the erosivity of the eroding agent (rainfall, running water, wind, etc.). The term is commonly applied to rainfall.

ethnography – the branch of anthropology that deals with the regional distribution and characteristics of the human race.

eutrophication – excessive plant growth caused by high nutrient levels in water.

eutrophication – an increase in the nutrient status of natural waters that causes accelerated growth of algae or water plants, depletion of dissolved oxygen, increased turbidity, and general water quality degradation.

evapo-concentration – increasing the concentration of a solution (e.g. a salt solution) by the evaporation of water from it.

evaporation – the loss of water as vapour from the surface of a liquid that has a temperature lower than its boiling point.

evapotranspiration – loss of water from a land mass through transpiration from plants and evaporation from the soil.

evening period – the period from 6:00pm to 10:00pm (when relating to noise).

excavate – to dig into natural material or fill using an excavator or other machinery.

excavator – item of earth moving equipment fitted with a bucket on an articulated boom and used for digging material from a face in front of, or below the machine. An excavator would be used around the perimeter of the lakes.

exceedance probability – statistical probability that a given value will be exceeded by sample values.

existing air quality – the quality of the ambient air near ground level, expressed as concentrations or deposition rates or air pollutants – also expressed as ambient air quality.

exotic – introduced or foreign, not native.

exploration licence (EL) – a licence issued by the Department of Mineral Resources for exploration in a defined area.

exploration program – a program set up by a company to explore for mineral deposits (typically involving aerial survey, ground survey, drilling and geophysical assessment).

explosive column – the explosive in a blasthole which is initiated by the primer.

external face – the side of an embankment facing away from the project area.

extinction – the extinction of a species occurs when the entire population of the species (across the world) has died out.

extraction – a term synonymous with quarrying.

extracted seam thickness – the thickness of seam extracted, averaged over the panel.

face – sub-vertical quarry feature generally forming limits of benches.

face geometry – the plan dimension of the vertical wall of rock to be blasted.

fallout – the sedimentation of dust or fine particles in the atmosphere.

fallow land – agricultural land left unused for a period to allow the soil to improve.

fault – a fracture in rock along which there has been observable displacement.

fauna – animals including birds, mammals, fish, etc.

fauna – a general term for animals (birds, reptiles, marsupials, fish etc.) particularly in a defined area or over a defined time period.

fauna impact statement (FIS) – document detailing the impact of a proposed project on the local fauna and their habitat.

fauna inventory – list of faunal species observed in a particular area.

feasibility study – a preliminary technical and economic study to assess the viability of a project.

feed hopper – a storage area which dispenses feed material using gravity.

feed preparation circuit – a processing circuit in which feed material is physically prepared.

feldspar – a group of abundant rock forming minerals of general formula $MAl(Al,Si)_3\ O_8$ where M can be K, Na, Ca, Ba, Rb, Sr and Fe.

feral – domesticated animals that have become wild.

ferromagnesian mineral – a general classification for minerals that are silicates of iron and magnesium – the most common examples are pyroxene, hornblende and biotite.

Fick's Law – the rate of diffusion of matter across a plane is proportional to the negative of the rate of change of the concentration of the diffusing substance in the direction perpendicular to the plane.

field density – the density of deposited residue as recorded on-site at the residue storage.

field infiltration – the rate of water infiltration through deposited residue as recorded on-site at the residue storage.

fill – material imported and emplaced to raise the general surface level of a site.

filterable material – dissolved metal able to pass through a filter, normally having a pore size of 0.45 micron.

filter strip – a strip of vegetation retained along each side of a drainage line or along the banks of a watercourse to retard the lateral flow or runoff water, and filter out and deposit sediments transported in the runoff, and thereby reducing sediment movement into the drainage lines.

fines – material such as clay or silt sized particles.

fire regime – the history of fire at a particular place expressed in terms of frequency, intensity and season of occurrence; may relate to wildfires or prescribed burning.

FIS – Fauna Impact Statement.

fixed stacker conveyor – a conveyor which is in a fixed position from which material is discharged onto the ground to form a stock pile of product.

flake – a piece of stone detached from a core, displaying a striking platform, bulb of percussion and flake scars on the ventral surface.

flaked piece – stone that has flake scars on its ventral surface but has been broken so it does not display other characteristics of a flake, i.e. the striking platform and bulb of percussion.

flocculent – additive to fine material suspended in water which causes fine particles to agglomerate together resulting in a larger "flocculated particle" which will naturally settle out of the suspension to result in clean water.

flocculation – the water treatment process by which suspended colloidal or very fine particles are aggregated into larger masses (as a result of the addition of coagulant chemicals), which eventually settle out of suspension.

flood mitigation – measures undertaken to reduce the frequency, extent and impact of floods (such as the construction of levee banks or diversion channels).

flood runner – overflow channel which flows intermittently, during floods.

flora – plants including trees, shrubs, grasses and herbs.

flora – a general term for plant, particularly those found in a defined area or characteristic of a defined time period.

flow path – the direction followed by seepage (under an embankment or through soil).

flowsheet – diagram representing the sequence of events and decision-making logic of a particular process.

fluvial – pertaining to or produced by a river.

fluvio lacustrine – pertaining to river or lake.

flyrock – rock that is propelled into the air by the force of an explosion. Usually comes from pre-broken material on the surface or upper open face.

foliation – the laminated structure occurring in rocks.

forest – plant community dominated by trees having a mature height exceeding 5 metres and whose crowns shade more than 30 per cent of the ground.

formation (or unit) – a (named) succession of sedimentary beds having some common characteristics.

formation – a large stratigraphic sequence of rock beds (sandstone, shale, limestone, etc.) generally deposited over a distinct geological period (e.g. during a glacial period).

fragmentation – the extent to which rock is broken into small pieces by primary blasting.

freeboard – the vertical distance between a dam spillway or overflow and the top of a dam's embankment.

free digging – material soft enough to be excavated without the need for ripping or blasting (e.g. soil or highly weathered rock).

"free digging" material – ore and waste which can be excavated without prior blasting.

free face blasting – form of blasting in which the blast pattern has free faces on one or more sides.

fresh rock – rock unaffected by natural weathering processes.

friable – easily crumbled as in poorly cemented rocks.

front-end loader – machine used to lift and place soil, earth, rocks, etc. on a construction site.

froth – material (e.g. sulfides and flocculant) that has floated to the surface during the process of flotation.

fugitive emissions – emissions not entering the atmosphere from a stationary vent (stack). Examples of fugitive dust sources include vehicular traffic on unpaved roads, handling of raw materials, wind erosion of dusty surfaces, etc.

gabbroic plug – pipe-like feature formed from intrusion and subsequent exposure by weathering of gabbro – a dark, coarse grained igneous rock.

gabion – a wire basket filled with coarse rock - usually used to prevent erosion.

gabion wall – a wall constructed of large wire baskets usually filled with rocks.

gale-force – extremely strong wind, usually above Force 7 on the Beaufort scale.

gangue – minerals associated with an ore, such as quartz, that do not contain the metal(s) being extracted.

gaussian plume model – an approximation of the dispersion of a plume from a continuous point source. The concentration distribution perpendicular to the plume axis is assumed to be Gaussian. The plume travels with a uniform wind velocity downwind.

genetic diversity – a term to describe the variety of gene pools within an ecosystem.

genset – generator set.

geochemical – chemical aspects of the composition on the earth's crust.

geochemistry – the study of the chemical composition of the earth or of the chemical interaction of elements, molecules, or particles derived from the earth.

Geographic Information System (GIS) – computer technology that can store, manipulate and display information in a spatial context.

geological reserves – the measured total quantity of in-situ mineralisation in a deposit, prior to consideration of mining parameters.

geological time – the time periods over which geological processes such as sedimentation or erosion occur (generally from tens of thousands to hundreds of millions of years).

geomechanical – the materials engineering of rock properties and behaviour when forces or loads are applied to the rock mass.

geomorphology geomorphic – resultant change in surface or sub-surface shape due to geological (orogenic) forces.

geophysical – physical (as in physics) aspects of the composition and behaviour of the earth's crust.

geophysical survey – a survey of the physical characteristics of a landscape (such as the shape of river valleys) and the change of these characteristics over time.

geophysical techniques – investigate techniques used in a geophysical survey.

geotechnical – technical or engineering aspects relating to soil, rock and other materials.

germination – the time at which a seed sprouts and the embryonic plant begins to grow.

gilgai – pockmarked soil consisting of mounds or ridges known as puffs and depressions or valleys termed shelves; the scale of puffs and shelves may vary from a few centimetres to two or three metres.

graben – a block of the earth's crust generally with a length much greater than its width, that has dropped relative to blocks on either side.

grade – the concentration of scandium either in an individual rock sample or averaged over a specified volume of rock; scandium grade is usually given in parts per million.

grade separated intersection – intersection where the traffic movements are separated by an overpass/underpass and the movements join the major movement via an acceleration lane and merge movement.

grader – an item of earthmoving equipment, rubber tyred and fitted with a centrally mounted blade and rippers used to shape and trim the ground surface.

gradient – rate of change of a given variable (such as temperature or elevation) with distance.

granite – a coarse grained crystalline igneous rock comprising quartz, orthoclase feldspar and small amounts of biotite mica and/or hornblende.

grassland – an extensive area of largely treeless land covered mainly by natural grasses.

gravel – particles with a maximum diameter exceeding 2mm.

gravitational fall – the downward settling of particles in the atmosphere due to the effects of gravity. The rate of descent of a particle depends on the balance between the aerodynamic drag and the gravitational acceleration (Stokes law). For particles with approximately the density of water and a diameter of less than 20 microns the fall velocity is small compared with the vertical velocities in the atmosphere, so that these particles can remain aloft.

gravity decant – a decant system that uses gravity to remove water.

grazing capability – the maximum amount of stock able to be maintained on a given area of land.

Greenhouse effect – the heating of the earth's surface because outgoing long-wavelength radiation from the earth is absorbed and re-emitted by the carbon dioxide and water vapour in the lower atmosphere and eventually returns to the surface.

gneiss – a coarse grained metamorphic rock in which bands of different colour and composition alternate.

grinding – a process used to reduce the particulate size of a mine rock or soil, typically occurs after crushing.

grindstone – sandstone slab displaying evidence of having been ground; used for sharpening artefacts, grind ochre, and grinding seeds.

grizzly screen – a static structure generally with parallel bats spaced sufficiently to retain rock at a size suitable for processing. Smaller sized materials (often of lesser quality) are easily removed.

ground debris – twigs, logs, and other organic material along with rock fragments.

ground level concentration – applied to the concentration, calculated or observed, in the neighbourhood of the ground surface.

ground vibration – oscillatory motion of the ground caused by the passage of seismic waves originating from a blast.

groundcover – vegetation that grows close to the ground (such as grasses and herbs) providing protection from erosion.

groundwater – water contained in voids such as fractures and cavities in rocks and inter-particle spaces in sediments.

groundwater – all waters occurring below the land surface; the upper surface of the soils saturated by groundwater in any particular area is called the water table.

groundwater dependent ecosystems – ecosystems that use groundwater as part of survival, and can potentially include wetlands, vegetation, springs, base flows, cave ecosystems, river pools and hanging swamps.

groundwater depression – localised lowering of the regional water table.

groundwater discharge site – a low place in the landscape that intersects a groundwater aquifer, allowing it to discharge to the surface.

groundwater inflow curve – the relationship between the rate of groundwater inflow into the mine pit and the water level in the pit.

groundwater mound – localised raising of the water table due to seepage from an overlying waterbody.

groundwater surface – the upper surface of the water table.

grouting – sealing with cement to make watertight.

gully erosion – a complex of processes whereby the removal of soil is characterised by large incised channels in the landscape. Such channels are generally more than 30 centimetres in depth.

gypsum remediation – applying gypsum to soil to improve its engineering properties.

habitat – native environment.

habitat – the place where an organism normally lives; habitats can be described by their floristic and physical characteristics.

hammer stone – a stone displaying percussion damage (pitting or splitting) indicating its use as a hammer to detach flakes from cores.

hard oxide – weathered, but still competent ore.

hardwood – trees belonging to the angiosperm group of plants, generally having broad leaves and including eucalyptus and wattles; also wood produced by such trees regardless of species.

haul road – road used in a quarry for haulage of rock from the active face to the crusher and for general site access.

haul truck – a truck specifically designed for hauling and tipping soil or rock within the quarry or similar situation.

hazard quotient – ratio of concentration to the ambient air guideline value (health risk assessment).

head (hydraulic head) – energy contained in a water mass, produced by elevation, pressure or velocity.

headings – roadways forming the openings in the direction of development of the panel. Heading direction parallel to cleavage direction.

heavy metals – metals of high density.

heavy metals – normally trace metals which occur in ore deposits which, depending on their concentration may be environmentally hazardous e.g. copper, lead and zinc.

heavy vehicle – a motor vehicle or trailer that has a gross vehicle mass greater than 4.5 tonnes. Also includes motor vehicles with seats for more than 12 adults.

heritage – the things of value which are inherited.

heritage significance – of aesthetic, historic, scientific, cultural, social, archaeological, natural or aesthetic value for past, present or future generations.

heritage study – a conservation study of an area. The study usually includes historical context report, an inventory of heritage items within the area and recommendations for conserving their significance.

high-level epithermal system – low-temperature hydrothermal process involving igneous activity and heated or superheated waters, located at shallow depths.

high pressure acid leach – a process involving the application of concentrated sulphuric acid onto leach slurry inside an autoclave.

high quality rock – rock of suitable mechanical properties particularly high strength and durability, for use in such applications as road materials and concrete.

highly weathered rock – rock affected by considerable weathering to the extent that it is friable.

highwall – exposed wall of excavation designed to stand open for mine life.

holding pond – a structure in which runoff or residue decant water is held before disposal or re-use.

homogeneous – composed of parts all of the same kind or nature.

hornfels – high temperature, low pressure metamorphic rock of uniform grain size showing no foliation. Usually formed by contact metamorphism.

host rocks – the surrounding rock into which igneous magma is injected or mineralisation forms.

human comfort threshold value – the value above which it is predicted that discomfort will be experienced by humans.

hydraulic boundary – structural feature of a rock mass (e.g. a fault) that impedes the movement of groundwater.

hydraulic conductivity (k) – the rate of flow of water in an aquifer through a cross section of unit area under a unit hydraulic gradient, at the prevailing temperature. Usually expressed in units of metres per second or metres per day.

hydraulic drill – an item of mobile mechanical equipment fitted with a hydraulically operated drilling apparatus for drilling 75-150mm diameter holes in rock.

hydraulic gradient – the direction of flow of groundwaters.

hydraulic link – fractures or porosity that allow the transfer of water between two surface water or groundwater bodies.

hydraulically separate – where no transfer of water is possible between two surface water or groundwater bodies.

hydrocyclone – a cyclone specifically designed for wet applications.

hydrogeology (geohydrology) – the study of groundwater and the related geologic aspects of surface waters.

hydrology – the study of water, particularly its movement in streams, rivers, or underground.

hydroseeding – the application of a mixture of seed, fertiliser and mulch in water to disturbed surfaces.

hydrostatic head – the potential energy of a liquid reservoir that can be used to move that liquid to another reservoir or point.

hydrothermal systems – a system comprised of heated or superheated water drive by pressure through networks of rock fissures; the water is typically rich in dissolved elements (such as silica or gold) that can precipitate to fill fissures and form economic mineral deposits.

hydroxides – an oxide compound derived from water by the replacement of one of the hydrogen atoms by another atom or group (e.g. sodium hydroxide, NaOH).

hypothesis – a supposition put forward in explanation of observed facts.

igneous intrusion – a body of igneous rock that has forced itself when in molten state into a body of pre-existing rock.

igneous rock – rock formed from molten material that has cooled and solidified either at the earth's surface (volcanic rock) or within the earth's crust (plutonic rock).

ignimbrite – a pyroclastic rock characterised by welding and banding of tuff layers.

impact crushing – the process whereby a mechanical device, which is usually electrically powered, which applies impact to rock and thus reduces the rock's size – most of these employ a high speed rotary action.

impervious – a layer (e.g. a bed of rock) that does not allow water to pass through.

in-fill drilling – exploratory drilling in a specific area of interest conducted at a closer drillhole spacing than initial drilling of the area.

in-pit drainage system – drainage system to remove water from the pit.

in-pit shielding – shielding of surrounding environment from pit operation sound by the walls of the pit.

in-situ – a term sued to distinguish material (e.g. rocks, minerals, fossils, etc.) found in its original position of formation, deposition, or growth, as opposed to transported material.

incompetent material – construction material, such as soil or rock, that is too weak to support overlying materials.

indicator – any physical, chemical, or biological characteristic of the environment used to assess (i.e. indicate) environmental condition.

indigenous – belonging to, or found naturally in, a particular environment (see also exotic).

infiltration – the process of surface water soaking into the soil.

infiltration rate – tests to determine infiltration rate.

infiltration tests – tests to determine infiltration rate.

Inflection point – the point on the subsidence profile at which strain changes sign and subsidence is half S_{max}.

inflow – flow directed into a particular feature, such as a lake or a mine pit.

infrasound – sound below the audible range (<20Hz).

infrastructure – the necessary buildings, roads and equipment associated with a quarrying operation.

infrastructure – the supporting installations and services that supply the needs of a project.

input/output analysis (I/O Analysis) – method used to assess the regional economic effects of a particular activity or industry by use of a model of the economy. The model is based on flows of goods and services bought and sold by all sectors of the economy during a specified period.

intanal – a computer program which analyses operating conditions and capacity of intersections controlled by traffic signals; roundabouts and give way/stop sign or priority control.

inter-generational equity – the principle that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

interbedded – two or more types of sediment rock deposited alternately to build up a sequence.

intermediate pond – pond collecting water from the secondary leach cycle.

intermittent – flows periodically, irregularly.

internal drainage – drainage confined to the project area.

internal faces – the sides of the perimeter bund, residue storage embankments and waste emplacements, etc. that face towards the project area.

intra-species genetic diversity – genetic variation within the population of a particular species.

intractable waste – industrial organic chemical wastes which are characterised by their environmental persistence, toxicity and carcinogenicity. Examples of these are PCB's and dioxins.

intruded – geological term for (igneous) rock formed by the injection of molten magma up into the earth's crust and its subsequent cooling and crystallisation.

inversion – weather term for surface defining boundary between two layers of air or different temperatures.

inversion – generally used in meteorology with respect to an increase of temperature with height in contrast with the usual decrease of temperature with height in the troposphere. An inversion layer is distinguished by its large stability, which limits the turbulence and therefore the dispersion of pollutants.

invertebrates – commonly, animals without a backbone (jellyfish, worms, molluscs, etc.).

ion – an atom or compound that has gained or lost an electron, so that it is no longer electrically neutral but carries a positive or negative charge.

ion exchange – a process by which an ion in a mineral lattice is replaced by another ion that was present in an aqueous solution.

jaw crusher – a crusher which uses the pressure applied to the rock between the fixed and moving plate to reduce rock size.

jointing – planes of discontinuity in rockmass which exhibit no evidence of relative movement.

kaolinite – clay mineral formed by the weathering of feldspars in granite type rocks.

katabatic – topographically generated wind; flow of cold air downslope onto valleys at night.

laccolith – igneous intrusion with dome-like roof and flat floor generally parallel to sedimentary bedding.

laminate – a sedimentary rock comprising alternate layers (lamallae) of sand and clays.

land condition – the present (compared with the historical) capacity of the land to support vegetation or agriculture).

landform – a specific feature of a landscape (such as a hill) or the general shape of the land.

lateritic – pertaining to ferruginous soil formed in tropical regions by the decomposition of underlying rock.

laterite – a soil or rock layer composed mainly of hydrated iron oxide and formed as a product of weathering.

launder – drain.

leach – to dissolve metals or minerals out of ore.

leach – dissolution and removal of a soluble substance from a soil or a rock, e.g. the leaching of salt (by water) from a soil or the leaching of scandium (by sulphuric acid) from ore.

leachate – the liquid which has percolated through solid waste and has dissolved soluble components.

leach preparation circuit - a processing circuit in which ore is mixed with a leach solution to form a slurry.

leach residue – waste minerals or rock left after acid leaching of scandium has occurred.

leached pulp – the rock and water slurry remaining after leaching.

leaching depth – the depth in a soil or rock profile to which leaching is evident.

leaching profile – the part of a soil or rock profile that has been subject to leaching.

LEP – local environmental plan.

let-down area – a structure on slopes where water is directed into areas stabilised by gabions or large rocks.

levee – a natural or artificial bank running alongside a waterway (e.g. a river); a natural river levee is formed as a result of deposition during flooding.

leveeing – artificial construction of a levee to control the flow of water along a waterway.

lift – each separate layer placed in the construction of an embankment or waste rock emplacement.

ligand – a molecule or ion that binds with a metal ion to form a single, larger molecule or ion or complex.

light vehicle – a vehicle that has a gross vehicle mass of 4.5 tonnes or less.

lignotuber – a woody swelling, partly or wholly underground, at the base of a tree or plant.

limestone – sedimentary rock consisting of carbonates.

limonific – pertaining to brown, amorphous, naturally occurring hydrous ferric oxides.

lineament – a large scale, straight line fracturing expressed on the surface; generally observable from satellite imagery.

linear shrinkage – a measure of the shrinkage that occurs in a soil sample prepared and dried under laboratory conditions.

line source – a pollutant producing activity which is uniformly spread out along a narrow band.

liquid limit – the maximum water content possible in a clay soil before it becomes fluid.

lithic – sediments and rocks in which rock fragments are more important proportionally than feldspar grains.

lithic sandstone – sedimentary rock of sand grade in which rock fragments are proportionally more important than feldspar grains.

lithology – refers to the general characteristics of sediments.

lithosol – one of a group of azonal soils having no clear soil morphology and consisting of a freshly and imperfectly weathered mass of rock fragments.

loam – loose soil composed of clay and sand, especially a kind containing organic matter and of great fertility.

Local Environmental Plan (LEP) – a plan developed by a council to control development in part or all of their shire or municipality.

long-term – a period of time associated with annual air quality standards. Long-term models usually address pollutant concentrations over several seasons to one year.

loose cubic metre (lcm) – a volume of $1m^3$ of material following disturbance and bulking effects. 1bcm generally yields approximately 1:2 – 1:3 lcm.

Los Angeles Abrasion test – a standard test used to measure the relative abrasion resistance to rock.

low-grade – a mineralised deposit with uneconomic or only marginally economic metal concentrations.

low loader – is a trailer which has a relatively low carrying deck and used to transport large items of equipment such as bulldozers or scrapers.

low-yielding – an aquifer which yields water at a low rate.

macro-economic pressure – a factor resulting from consideration of the national and international economics.

macroinvertebrate – animals without backbones and visible to the naked eye.

macrophyte – vascular plant.

macrophyte – a plant that can be seen by the unaided eye.

magma – molten rock beneath the earth's surface, formed in the hot mantle below the crust.

magnetite – a common black iron oxide of composition Fe_3O_4.

maingate – roadway adjacent to longwall panel, intake airway and contains panel belt.

malachite – Cu_2 (CO_3) $(OH)_2$. Bright green, copper carbonate secondary mineral.

mammal – animal of the class mammalia, distinguished by the presence of hair and mammary glands.

management strategy – a policy or direction that assists in actions required to address issues.

marine regression – fall in sea level.

massive – (geology) of homogeneous structure, lacking bedding, stratification, etc.

massive sandstone – sandstone lacking sedimentary structures.

matrix – fine grained constituent of some sedimentary rocks containing coarser grains and fragments.

maximum instantaneous charge (MIC) – the maximum amount of explosives detonated during each delay during a blast.

mesic – characteristic of moist conditions used to describe habitats and associated species.

Mesozoic – a geological time era from 230 to 70 million years before present.

metallurgical – relating to mode of occurrence and method of extraction of metals from ores.

metamorphic rock – rock type such as shale changed to rock type such as slate and phyllite by earth forces (heat, pressure, fluids, etc.).

metamorphic zone – zone where changes to rock structure (due to heat and pressure) have occurred.

metamorphosed rocks – rocks changed from their composition and/or texture by heat and pressure.

metasediments – sedimentary rocks which have undergone some degree of metamorphism without significant alteration to appearance.

metasediments – slightly metamorphosed sedimentary rock.

meta-volcanics – volcanic rocks which have undergone some degree of metamorphism without significant alteration to appearance.

meteorological episode or event – a short period of time, varying between one hour and a few days, over which a single class of weather conditions is dominant.

method detection limit (MDL) – the minimum concentration of a substance that can be accurately and precisely detected by an analytical method.

microcrystalline – composed of microscopic-sized crystals.

microinvertebrate – animals without backbones and invisible to the naked eye.

microlith – literally a small stone, but used generally to refer to small artefacts (such as backed blades and points) belonging to a stone tool tradition dating to the last 4,000 years.

micro-organisms – organism such as bacteria not visible to the naked eye.

migratory – passing, usually predictably (based on aquatic species), from one region or climate to another, for purposes of feeding, breeding, or other biological purposes.

mill – ore processing plant.

mine aquifer – an aquifer intercepted by the mine pit.

mineralisation – the process by which minerals are introduced and concentrated within a host rock, and the product of this process.

mine water – all water used in mining and processing (for dust suppression, in leach tanks, etc.).

mining, rehabilitation and environmental management plan (MREMP) – report prepared under the auspices of the NSW Department of Mineral Resources as a vehicle for government agency control of the environmental management of a mining project from construction through operations to decommissioning, final rehabilitation and relinquishment of the mining lease.

mitigation measures – measures employed to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce sound emissions).

mixing height – the vertical depth of the atmosphere through which air pollutants can be dispersed.

MLA – mining lease application.

mobile equipment – wheeled or tracked self-propelled equipment such as trucks and front-end loaders.

mobilised metals – metals that are soluble in water or acid and therefore can be transported through the environment.

mobility – the capacity of an element or compound to move through the environment; usually determined by the chemical and physical properties of the contaminant (such as its reactivity) and ambient environmental conditions (such as pH).

monitoring – the regular measurement of components of the environment to establish environmental standards are being met.

monitoring – systematic sampling and, if appropriate, sample analysis to record changes over time caused by impacts such as mining.

morbidity – the rate of incidence of disease or health implication.

mortality – a measure of deaths within a population due to specific cause.

motor control centre – electrical control panel.

mottling – multi-coloured effect in soils - grey and yellow-brown is common.

mudstone – sedimentary rock formed from the consolidation of silt and clay.

mulch – straw, leaves, loose earth, etc. spread on the ground or produced by tillage to protect the roots of newly planted trees, crops, etc.

muscovite – a common mineral essentially $KA1_3Si_3O_{10}(OH)_2$.

Mycelium – cellular filamentous spawn of fungi consisting of whitish filaments spreading like a network.

national park – an area set aside for the protection of flora and fauna and for public recreation.

native title – Aboriginal land title which has survived European settlement.

natural – existing in, or formed by, nature (generally excludes anything obviously modified by human beings).

natural degradation – deterioration occurring due to natural circumstances (such as extreme weather conditions).

natural environmental extremes – extreme conditions (highs and lows of temperature, rainfall, etc.) existing independently of human influence.

natural heritage – is the dynamic ecological processes, ongoing natural evolution and the ability of ecosystems to be self-perpetuating.

natural succession – natural replacement of an animal or plant species with another in the same habitat.

nature reserve – an area set aside for the protection of flora and fauna with limited public access – designed more for scientific interest and research than National Parks.

nature reserve – an area set aside for the conservation of flora and fauna and managed by the National Parks and Wildlife Service.

net acid-generating capacity – capacity of a rock to generate acid upon exposure to air and water as determined by NAG testing.

net acid-producing potential (NAPP) – potential of a material (e.g. mine waste) to generate acid upon exposure to air and water as predicted by 1) its total sulphur content (indicative of its acid-forming capability) and 2) its reaction with hydrochloric acid (indicative of the acid-neutralising capacity of other minerals within the rock).

neutral – neither acidic nor basic (e.g. a pH equal to 7.0).

neutral atmosphere – the atmospheric condition for which the vertical temperature profile is equal to the adiabatic lapse rate over the whole boundary layer. Vertical air motions are neither enhanced nor suppressed. The turbulence intensity is moderate.

neutral weather conditions – weather conditions that neither particularly exacerbate nor mitigate the dispersal of pollutant emissions (dust, noise etc.) from the project area.

night-time period – the period from 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am on Sundays and Public Holidays (when relating to noise).

noise contours – theoretical lines connecting points of equal noise value.

non-combustible residue – dust residue that cannot be burnt (i.e. free of organic litter).

non-perennial – refers to streams which do not flow the whole year through - also known as intermittent streams.

noxious – introduced species considered to be harmful to native species or to the habitat of native species.

nuisance dust – relatively large dust particles which settle out – not detrimental to health.

nutrient status – state of nutrient (nitrogen and phosphorus) concentration of a waterbody.

nutrients – generally refers to nitrogen and phosphorus, which are essential for biological growth.

observation bore – a bore or piezometer tapping a selected aquifer to allow monitoring of its water level or water quality variations.

off-road dump truck – a truck specifically designed for hauling and tipping soil or rock within the quarry or similar situation.

offset strategy – a method of providing for disturbance of native vegetation attributable to the project through additional or compensatory measures.

old-growth forest – an unlogged area of forest that is ecologically mature and characterised by relatively large old trees with extensive hollows, no significant increase in biomass, stable nutrient cycle, high litter levels, and slow rates of change in composition, structure and function.

open cut mining – mining carried out on, and by excavating, the earth's surface but does not include underground mining.

open pit – large hole excavated in an open-cut mining operation to remove the ore.

operational buffer – an area surrounding an operational quarry within which statutory performance criteria for impacts such as noise cannot be satisfied. Conversely all statutory performance criteria can be satisfied beyond the boundary of the operational buffer.

operational constraints – limitations upon a project by equipment or machinery.

operations phase – that period of the mining project, after construction and prior to decommissioning, during which pit excavation and metal extraction takes place.

ordivician – a period of geological time from 500 to 435 million years ago.

ore – a mineral or mixture of minerals containing a metal in sufficient amounts for its extraction to be profitable.

ore processing – the mechanical and chemical process by which a metal is extracted from an ore.

ore pulp – a water and ground (or crushed) ore slurry.

orebody – a solid mass of ore (both high and low grade) that is geologically distinct from the rock that surrounds it and that is commercially extractable.

organic carbon – carbon derived from the decomposition of biological organisms.

orogenic – process of mountain building and large scale earth crust movement (viz. continental drift).

out-bye – refers to places away from the mine working area or relative direction "looking out" of the mine.

outflow – flow directed away from a particular feature, such as a lake or a mine pit.

overburden – subsoil and decomposed rock overlying the main rock body that is not suitable for use in the final product.

overburden (waste rock) – in the mining context refers to non-economic material to be removed to allow access to the resource.

overflow pond – the pond collecting any overflow that may occur from the barren, intermediate, raw and pregnant ponds.

overstorey – the tallest structural layer in a plant community.

oxidation – the process of combining with oxygen.

oxidation – the process by which an element or compound undergoes a chemical reaction involving the removal of electrons; often involves reaction with oxygen to form an oxide (e.g. the rusting or iron).

oxide ore reserve – that component of the ore reserve composed of weathered (oxidised) rock.

oxide (ore) zone – the portion of a mineral deposit which has been affected by meteoric waters causing, for instance, the alteration of sulphides to oxides and carbonates.

oxidising agent – a chemical species in an oxidation reaction that accepts the electrons from another chemical species (and thereby causes the oxidation of that species).

"paddock blasting" – the form of blasting in which the blast pattern is entirely surrounding by solid or previously blasted rock.

palaeo channel – a former river or stream course now infilled by deposits of sand and gravel.

paleo-topography – the topography that existed in a previous geological time.

panel length (L) – the longitudinal distance along a panel measured in the direction of mining.

panel width (W) – the transverse distance across a panel, usually equal to the face length plus the widths of roadways on two sides.

participation rate – percentage of those people aged 15 and over who wish to participate in the labour force.

particle size distribution – the relative proportions of particles (e.g. in a sediment) that fall within specific size categories.

particulate matter – small solid or liquid particles suspended in or falling through the atmosphere - sometimes expressed by the term particulates.

passive – performing a function without electrical or mechanical action or movement (e.g. a jar-and-funnel rain gauge).

pavement deformation – the change in road surface from the intended construction profile. This may include corrugations, depressions, wheel rutting or shoving.

peak airblast – the maximum level of the airborne shockwave resulting from the detonation of explosives.

peak particle velocity (ppv) – a measure of ground vibration reported in millimetres per second (mm/sec).

peak vector sum (PVS) – the maximum sum of the concurrent levels of the three mutually perpendicular components of ground vibration.

ped – an individual, natural soil aggregate.

pedal – a soil in which some or all of the soil material occurs in the form of peds in the moist state.

perched groundwater table – groundwater level in rocks or sediment existing above and separate from the true groundwater table.

percussion drill hole – drill hole performed by equipment using the repetitive impact of tungsten tipped bit onto rock; rock cuttings are usually returned uphole by flushing with compressed air.

percussion reverse circulation – a method of drilling in which cuttings are returned to the surface up the drill stem rather than up the annulus between the drill stem and wall of the drillhole.

perennial – refers to stream which has flow throughout the year.

perimeter – outer boundary.

perimeter bund – embankment constructed from soil and/or weathered rock to surround the Project Site.

perimeter bund – embankment acting as an acoustic, visual and hydrologic barrier that surrounds and contains the pit, waste dumps, ore stockpiles and process plant.

peripheral dewatering – reduction of the water entering the pit by dewatering the aquifers intercepted by the pit using a series of bores placed around the edge of the pit.

permeability – a material property relating to the ability of the material to transmit water.

Permian – the geological period of time from 280 to 225 million years.

permutations – different combinations in the order of events.

petrography – that branch of geology dealing with the description and systematic classification of rocks especially by means of hand specimen examination and the microscopic examination of their sections.

petrological – relating to the study of rock composition at hand specimen or microscopic scale.

pH – a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acid, 7 is neutral acid, and 14 is most basic (alkaline).

photomicrograph – photograph taken through a microscope.

physical morphology – physical size and shape.

physical removal process – a series of events which lead to the direct depletion of an air pollutant in the ambient atmosphere without chemical transformation. Several physical mechanisms include settling of heavy particles, impaction on vegetation and structures, and rainout.

picrite – a rock type containing 90 per cent or more ferromagnesian minerals and up to 10 per cent feldspars.

piezometer – a core drilled specifically for the monitoring of groundwater levels and water quality.

piezometric surface – water table surface.

piezometric surface – the level to which a confined aquifer would rise if the confining pressure was released (e.g. in a piezometer).

pinhole dispersion test – geotechnical test of propensity of a soil to disperse in water.

pit protection bund – bund constructed to keep the lake from inundating the pit.

pit top – area on surface designated for storage of equipment and materials.

pit water – water inflow into the pit from incident rainfall or groundwater seepage from pit walls.

PLA – prospecting licence application.

plant communities – groupings of plants that inhibit the same area.

plant site – the site of the ore-processing plant.

Pleistocene – earliest epoch of the Quaternary Period, between 2 million and 10,000 years ago; the epoch was characterised by four major glacial periods and also by the rise to dominance of modern humans.

pliocene – geological time period covering 7 – 2.5 million years ago.

plume – visible trail of resuspended material in water column.

plutonic – plutonic rocks are massive unstratified crystalline rocks formed at great depth beneath the earth's surface.

plutonic rocks – rocks formed from molten material that has cooled and solidified deep within the earth's crust.

PMF – Probable Maximum Flood.

PMP – Probable Maximum Precipitation.

pneumatic tools – tools operated with compressed air.

podzolic – soil descriptive term for soils that are strongly acid and highly differentiated.

point bar – convex side of a river bank in a meander loop.

point source – a single activity that causes the release of a pollutant plume from a stationary vent. Large smoke-stack emissions are modelled as a single point source.

pollution – the alteration of air, soil, or water as a result of human activities such that it is less suitable for any purpose for which it could be used in its natural state.

polymictic – a lake that mixes from top to bottom more than once during a twelve-month period.

population – a group of organisms all of the same species occupying a particular area.

porosity – the porosity of a soil or rock is its property of containing cavities that can hold liquid (e.g. between grains of sand).

porous – containing voids, pores, interstices or other openings which may or may not be interconnected.

porphyritic – a textural term describing rock containing relatively large crystals set in a finer-grained "groundmass".

potable – water suitable for human consumption.

potential mobility – the potential of a metal or an ion to be solubilised and transported.

potential reactivity test – a test to determine the susceptibility or cement aggregate combination to expansive reactions involving alkalies.

potentiometric surface – equilibrium standing groundwater level.

pozzolanic – natural hydrating phenomenon of some materials resulting in sealing and increased strength.

precautionary principle – a principle of ESD which states that decisions about any proposed development should be guided by careful management to avoid serious and irreversible damage to the environment.

precautionary principle – the principle that, if a threat of serious or irreversible environmental damage exists, lack of full scientific certainty that the damage will occur should not be used as a reason to postpone measures to prevent that environmental damage.

precipitation – natural water phenomena producing quantities of water measurable by standard methods (e.g. rainfall, snow).

pregnant – in an acid leach context refers to solution containing dissolved scandium.

pregnant pond – pond containing pregnant process solution.

prescribed burning – the planned application of fire to a given area under specified conditions to reduce the volume of combustible material on the forest floor. Used primarily to reduce risk and intensity of wildfires, but also used to encourage regeneration following logging.

prestripping – the removal of waste or overburden, before mining, to expose an orebody.

primary blasting – blasting of bulk overburden.

primary crusher – the first crusher through which the rock passes in the processing plant.

primary ore – unweathered mineralised rock.

privately-owned residence – an occupied dwelling not owned or under an option to purchase by the Applicant or another resource company, or the subject of a purchase or lease agreement with the Applicant or by any other resource company – referred to as receptors when considered with the predicted noise and/or air quality impacts.

proactive – anticipating a situation and reacting to it before it occurs.

process aeration – the bubbling of air through a process to improve its effectiveness.

process liquors – solutions used and produced in ore treatment.

process method – the method used to extract scandium from the ore.

process reagents – the chemicals and solutions used in the process method.

process residue – material rejected from an ore-processing mill once most of the valuable constituent has been removed.

processing plant – a group of equipment used to clean and grade sand.

processing screen – the screen used for separate various sizes of material for further crushing or product screening.

product screen – used in the final size of the product.

product truck – a registered truck used for the delivery of products from the quarry to the customer.

progressive rehabilitation – rehabilitation of mine or disturbed areas as soon as practicable after they are released during the life of the mine.

project area – the total area covered by the project, including pit, processing plant, residue storage, waste emplacements, stockpiles, bunds, ponds, etc.

Project Site – the area of land which corresponds with the area of application for development consent and containing the Mining Lease Application area.

propagation – reproduction of plants by the natural or artificial germination of seeds or cuttings.

Protected Lands – land with slopes greater than 18^{o}.

protection strip – a strip of vegetation retained along both sides of a drainage line to protect its banks (if present) and drainage bed from machinery disturbance.

provenance – place or nature of origin.

pumice – a very light and porous volcanic rock.

pump test – the systematic pumping of water from a bore to test the response of an aquifer.

pyrite – the most wide-spread sulphide material FeS_2. Found in many geological settings.

pyroclastic rocks – formed from fragmental volcanic material from an explosive event.

pyrophyllite – a soft mineral resembling talc.

quadrat – a square survey area.

qualitative test – a test that indicates the nature of, rather than produces a measure of, an impact.

quality assurance – procedures built into a sampling and analytical program to maintain the quality of the results obtained.

quantify – to determine the quantity or amount of a component in a substance.

quarry – the area from which rock is extracted.

quarry – an open pit from which construction materials are excavated.

quartz – the most common form of silica (SiO_2), usually clear or white.

quartzite – metamorphosed sandstone.

Quaternary – geological period of time from 2 million years before present to present.

radial stacker conveyor – a conveyor that can be rotated which discharges onto the ground to form a crescent shaped stockpile of product.

radius – distance from the centre of a circle to its perimeter.

rail basalt – crushed rock product usually 25mm to 75mm in size used to stabilise railway line and sleepers.

rainforest – a closed, moisture-loving community of trees, usually containing one or more subordinate storeys of trees and shrubs; frequently mixed in composition; the species typically, but not invariably, broadleaved and evergreen.

random point load test – a test used to measure the relative strength rock.

Rating Background Level – the overall single-figure background noise level representing each assessment period (day / evening / night) over the whole monitoring period.

raw feed – material from the active extraction area – of a size suitable for processing.

raw feed stockpile – a stockpile of rock which has been taken from the blast face and positioned adjacent to the processing plant in preparation for processing.

raw water pond – storage pond for makeup process plant water.

reagent – substance used to produce or control a chemical reaction.

recent – geological time period representing the last 5000 years.

receptor – a designated place at which an impact may occur (e.g. a dwelling).

Receptor – A privately-owned residence, community facility or enterprise at which noise and/or air quality is predicted as a result of modelling of the Proposal.

recharge – addition of water to the zone of saturation; also, the amount of water added.

recharge – the addition of water to an aquifer, directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems.

reclaim pond – a pond containing water reclaimed from the residue storage prior to its recirculation back to the process plant.

recolonise – the process of animal and plant species re-establishing themselves in a disturbed area.

recovery – the difference between the observed water level during the recovery period following pumping and the maximum drawdown when pumping stopped.

regeneration kiln – kiln for re-activating carbon by heating.

Regional Environmental Plan (REP) – a plan prepared by the State Government Department responsible for planning where controls on development are considered on a regional and/or statewide basis.

regrowth – a forest stand established by natural regeneration after major disturbance of the previous forest canopy by wildfire, windthrow or logging.

rehabilitation – the preparation of a final landform after quarrying and its stabilisation with grasses, trees and shrubs.

relative humidity – the ratio of actual moisture in the air to the amount the air could hold if saturated, at a given temperature.

relief – the variation in landscape elevation over a region.

remnant bushland – native bushland remaining after widespread clearing has taken place.

remnant regrowth bush – previously cleared and regrown bushland remaining after further clearing has taken place.

remnant woodland – native woodland

replicate samples – samples taken as close to each other in time and space as possible to test analytical accuracy.

reptiles – cold-blooded vertebrates, including lizards, snakes, turtles, and crocodiles.

reserves – in the mining context refers to those parts of a resource where sufficient information is available to undertake mine planning.

residual environmental impacts – impacts from an activity (e.g. mining) that remain after mitigation measures.

residue – a slurry consisting of fine reject and water.

residue – by-product of the metal extraction process consisting of crushed rock from which the metal has been extracted (the solid fraction or portion) and a liquid fraction or portion composed of water and residual chemicals used in the extraction process.

residue cells – an individual deposition cell that, combined with other cells, forms the residue storage.

residue supernatant – the liquid portion of a residue slurry after the solids have settled.

resilient – able to survive disturbance.

Resource company-owned residence – an occupied dwelling owned or under an option to purchase by the Applicant or another resource company, or the subject of a purchase or lease agreement with the Applicant or by any other resource company.

respirable dust – dust that is capable of being breathed in.

retardation – a general term for the many processes that act to remove the solutes in groundwater; for many solutes the solute front will travel more slowly than the rate of the advecting groundwater.

retardation factor – the ratio between the velocity of groundwater and the velocity of the solute.

return period – a statistical term in years to describe the likely recurrence of an earthquake of a given magnitude.

revegetated – an area that has been planted with trees, bushes and grasses after being disturbed.

revegetation – replacement of vegetation, principally grasses and legumes on areas disturbed by quarrying activities.

rill erosion – the removal of soil by runoff from the land surface whereby numerous small channels, generally up to 30 centimetres deep, are formed. Typically occurs on recently disturbed soils.

rilling – soil descriptive term for the process of erosion in small channels downslope.

rill tower – a slotted hollow tower fed centrally with milled ore, which is distributes evenly into a stockpile around the tower.

riparian – pertaining to or situated on the bank of a river or creek.

riparian flows – the natural flow in a creek.

rip rap – armour rock protection for water retention structures.

ripping – breaking up of ground with a bulldozer using an action similar to a rake.

risk-weighting – quantifying hazard and risk.

road base – road pavement usually made up of densely graded crushed rock in varying sizes.

road grades – the longitudinal slope of the road surface commonly expressed in per cent gradient (i.e. 10 per cent is a gradient of 1 vertical in 10 horizontal).

road watering – use of water to prevent or reduce dust generation from roads.

rocky salients – protruding sections of rocky hills and ridges.

roller sizer – a machine which separates differently sized materials using spaced cylindrical bars.

roof control – controlling the rate at which the roof is allowed to collapse.

routine monitoring – monitoring performed on a regular basis, with the same observations and tests conducted each time.

runoff – that portion of the rainfall falling on a catchment area that flows from the catchment past a specified point.

runoff pond – containment structure for water which runs off the leach heaps.

run-of-mine (ROM) – ore or overburden in condition as loaded from open cut.

rutile – a mineral of composition TiO_2.

saline – water with elevated salt concentrations.

saline seep – a place where saline groundwater has reached the surface.

salinity – the dissolved content of water expressed in terms of milligrams per litre.

salinity – the total content of dissolved solids in groundwater, commonly expressed as parts of dissolved solids per million parts of solution, or milligrams of dissolved solids per litre of solution (mg/L); the significance of salinity depends on the nature as well as the amount of the dissolved solids.

salt balance – the net inflow or outflow of salt to or from a waterbody.

salt flux – the flow of salt into and out of a system, e.g. a lake or river.

sampling period – range of time over which samples are taken.

sand – sediment comprising particles in 0.063mm to 2mm size range.

sand and gravel horizon – soil layer composed of sand or gravel.

sand slurry – sand mixed with water.

sandstone – general term for sedimentary rock with grain size from 0.063mm to 2mm - grains may be minerals or rock fragments.

saprolite – a soft, thoroughly decomposed rock formed by diagenetic chemical alteration of an igneous rock.

satellite imagery – computer-generated information obtained from orbiting satellites produced as photo-like mosaics (e.g. infra-red response, magnetic intensity).

saturated permeability – the rate at which water will flow through a soil or clay when it is saturated.

saturation extraction – a test involving the extraction of a component of interest from a soil sample by dispersing the sample in distilled, deionised water.

scalping – the removal by screening of fine material from the raw feed prior to presenting it to the crushers. This material is a combination of fine material from the blast and decomposed material.

scalps – the material removed by screening the raw feed prior to presenting it to the crushers. This material is a combination of fine material from the blast (where used) and decomposed material.

scarify – to stir the soil without altering its form, or disturbing its sequence of layers.

scarred tree – tree with cuts in its bark or wood made by Aborigines.

Schedule 12 species – fauna species listed in Part 1 (Threatened) or Part 2 (Vulnerable and Rare) of Schedule 12 of the National Parks and Wildlife Act, 1974.

scraper – irregularly shaped artefact that has been modified in a manner that suggests use in scraping activities, notably woodworking.

schistosity – a form of foliation that occurs in coarser-grained metamorphic rocks.

sclerophyll – any type of various plants, typically found in low rainfall areas, having tough leaves which help to reduce water loss.

sclerophyll – hard, leathery-leafed plants (e.g. eucalyptus).

scour – erosional feature.

scree – a sheet of coarse debris mantling a mountain slope.

screened bore – a bore in which screens with openings of selected size are located opposite aquifers to support them and, at the same time, provide favourable conditions for water to enter the bore.

screening – a process which separates crushed rock into various size fractions – this usually involves a mechanical vibration of the rock over a series of decks fitted with steel mesh, steel plate or polyurethane or rubber mats with fixed sized apertures.

sealing aggregate – crushed rock usually of uniform size bonded by bitumen on the surface of the road to form a wear surface.

secondary crusher – the second crusher from which rock passes to be further reduced in size.

sediment basin – a small excavation designed to trap the coarse material washed from disturbed areas.

sedimentary rocks – rocks formed from material derived from pre-existing rocks or by chemical precipitation.

sedimentation – process or rate of depositing of sediment.

sedimentation dam – an earth embankment constructed so as to catch surface runoff and thus allow sediment carried to be deposited by reduction in runoff velocity.

sedimentation pond – containment structure for sediment-laden runoff.

seepage – 1) subsurface movement of water. 2) emergence of subsurface flow at the ground surface.

seepage monitoring bore – a bore constructed to monitor the quality of groundwater that may contain seepage from the residue storage.

seepage monitoring trench – a trench dug to monitor the quality of groundwater that may contain seepage from the residue storage.

seepage paths – the path that seepage water takes through the ground.

seepage recovery – a process whereby seepage is collected and returned to its source (e.g. a residue storage).

seismic investigation – an investigation of rock properties through the measurement of responses to the propagation of seismic waves through the earth's surface.

seismic refraction survey – a geophysical field method for assessing depth of soil or weathered rock or sound bedrock – interpretation of the field results is critical.

seismic survey – geophysical survey method used to map sub-surface geology.

semi-autogenous grinding (SAG) mill – a revolving mill where coarse rock fragments are ground partly under their own weight and partly with the aid of stainless steel balls.

sequence (geological) – layers of (predominantly) sedimentary rocks sourced from a common geological environment or period.

sericite – a fine-grained variety of mica.

setting pond – an artificially constructed pond designed to allow particulate matter to settle out of water.

settling velocity – speed at which particles settle out of a solution.

shale – fine grained sedimentary rock types such as siltstone or mudstone which part readily along well-defined bedding planes.

shear zone – geological feature where adjacent areas of the earth's crust have moved in opposite directions, creating a zone in between that is characterised by severe rock deformation and the generation of new minerals.

sheet erosion – the removal of a fairly uniform layer of soil from the land surface by raindrop splash and/or runoff. No perceptible channels are formed.

sheet flood – a flood of substantial lateral extent.

sheet flow – runoff that is of substantial lateral extent and relatively uniform depth (rather than concentrated in channels).

shock wave – a very narrow zone of high pressure and temperature in which air flow changes from subsonic to supersonic (i.e. air accelerates to faster than the speed of sound).

short-term – a period of time associated with air quality standards for pollutant exposures ranging between one hour and twenty four hours.

siderite – iron carbonate ($FeCo_3$); in mineral form usually white to brown with hardness of 4.

sight distance – the distance along the road visible to the driver. It is measured along the normal travelled path of a roadway from the driver's location (such as at an intersection) to a specified height above the roadway when the view is unobstructed by traffic.

significance level (e.g. of 0.05) – there is a 5% probability of having incorrectly predicted the outcome of an environmental impact.

significance test – statistical procedure used to decide whether a parameter (e.g. a mean or variance) of a population is different from that of some other population or from some standard value.

silica – silicon dioxide (SiO_2).

silica flour – finely ground silica.

siliceous – having a high silica (quartz) content.

silicified – to be converted into silica (SiO_2) or to have silica added.

sill – a horizontal tabular intrusion of igneous rock with planar contact that follows the bedding of the country rock.

sill level – the elevation at which a water surface is high enough to flow over a bank or other confining structure.

silt – a classic sediment, most of the particles of which are between 0.063mm and 0.004mm in diameter.

siltstone – general term for sedimentary rock with grain size from 0.004 mm to 0.063 mm – individual grains not discernible with unaided eye.

silt-stop fencing – fine mesh fencing normally installed downslope of a sediment source, designed to trap silt and sediment and allow the water to pass through.

silt-traps – structure designed to trap silt and sediment.

Siluran – a period of geological time from 435 to 395 million years ago.

slag – synthetic waste cooled after manufacture of iron or steel.

slake – breakdown of soil particles in water due to the swelling of clays and air expulsion.

slope ratio – a bank that has a vertical component of one unit for every horizontal component of two units (e.g. a slope of 1:2 is approximately a 20^o slope).

slug – an adze reduced to a convex, slug-shape before being discarded.

slurry – mixture of fluid and solid (e.g. residue water and solids).

smelting – extraction of a metal from its ore at great heat.

social capital – the expected collective or economic benefits derived from the preferential treatment and cooperation between individuals and groups.

social cohesion – the bonds and relationships people have with their family, friends and the wider community.

social infrastructure – community facilities, services and networks which help individuals, families, groups and communities meet their social needs, maximise their potential for development and enhance community wellbeing.

sodic – having a high Na content.

soft oxide – weathered, physically incompetent ore.

soft waste – waste sourced from weathered rock.

soil coherence – the degree to which material is held together at different moisture levels.

soil erosion hazard – the susceptibility of an area of land to erosion and includes rainfall erosivity, slope, soil erodibility and cover.

soil organisms – plants and animals that live in soil, including worms, bacteria, insects, and other invertebrates.

softwood – trees belonging to the gymnosperm group of plants, including pines and cypresses; also wood produced by such tress regardless of species.

solodic – soil descriptive term for soils that are mildly leached.

solubility – the ability of a substance (such as copper) to dissolve in a solvent (such as water); solubility depends on such factors as temperature and pH.

soluble salts – salts that are capable of being dissolved.

solvents – organic liquids that will dissolve solids (e.g. benzene or toluene).

source – the place where pollutants are emitted into the atmosphere. Sources may be point, area or line sources. Often the term "source" is used for a whole plant or an installation. In air pollution modelling, the terms "continuous source" and "instantaneous source" are used:

continuous source: source which emits pollution continuously over a time period much larger than the travel time to a point where the concentration is considered. Usually it is assumed that during this time period the emission is constant.

instantaneous source: source which emits pollution over a time period much short than the travel time of the emission to a point where its concentration is considered.

spatial – related to areal extent.

speciation – the distribution of a mineral between different forms (e.g. free ionic copper and copper complexed with an organic liquid).

species – a taxonomic grouping of organisms that are able to interbreed with each other but not with members of other species.

species diversity – a measure of the number of different species in a given area.

specific gravity – the weight of any body or substance considered with regard to the weight of an equal bulk of pure water.

sphalerite – zinc-containing ore, ZnS (zinc sulfide).

spigot offtakes – the discharge lines from the residue slurry pipe around a residue dam.

spiked sample – a water, sediment, or biological sample to which has been added a known amount of a chemical; the sample is then analysed to determine the percentage of the added chemical that can be recovered.

spoil – overburden material.

stable – used with respect to the atmospheric boundary layer, when the vertical temperature gradient is greater than the adiabatic lapse rate. Vertical air motions are suppressed. The turbulence intensity is low resulting in poor dispersion conditions.

stakeholder – person, group or organisation or company with an interest in an activity or outcome.

standard reference sample (SRM) – a material that has been analysed by a large number of laboratories and contains chemicals and compounds for which the mean concentration and confidence limits are accurately known; also known as standard reference material or certified reference material.

standing water – water that is pooled and still.

stands of vegetation – trees and bushes that are grouped together.

station – a specific location established for repeated sampling, gauging, weather measurements, etc.

statistical analysis – mathematical analysis of data undertaken to test hypotheses.

statistical confidence – an assessment of the variance inherent in estimating statistical variables (e.g. a 95% confidence interval means that 95% of the results would be expected to occur within this interval).

statistically analysed – analysis performed to determine the trends of confidence and variability in a set of data.

stemming – the fine material placed in a blast drill hole after the explosive to ensure blast force is directed laterally.

sterilise – to make physically unavailable.

stockpile – a pile used to store material (such as low-grade ore) for future use.

storage capacity – the maximum volume of liquid able to be retained in a container (e.g. a reservoir or lake).

stored topsoil – topsoil displaced due to construction activity, but stored for use in future rehabilitation.

stormwater – surface water runoff immediately after rainfall.

stratigraphy – the succession and age of strata of rock and unconsolidated material.

stream gauging – determination of water level and velocity in a stream or river for the purpose of calculating the volume of flow.

stream order – defined by the Strahler steam order used to define stream size based upon a hierarchy of tributaries.

- **first order streams** – the smallest streams in a drainage network that have no tributary streams.
- **second order streams** – two first order streams unite to form a second order stream.
- **third order streams** – have second and first order streams as tributaries.
- **fourth, fifth, sixth, etc. orders** – reflect a similar approach to second or third order streams.

As the order of the stream increases, the discharge increases, the gradient decreases and the channel dimensions increase to accommodate discharge.

strike – the direction of trend or run of geological strata.

strike – a measure used to define the orientation of a geological feature, such as a sedimentary layer or fault line.

strike direction – geological term used to define the direction of the line of intersection between a horizontal plane and the plane of a geological structure.

strip mining – a sequential advancement of a mine involving the direct placement of overburden into mined-out areas.

stripping – removal of vegetation and topsoil.

structure (soil) – the physical texture of the soil arising from the interrelationship between the grain size, composition, and organic nature of a soil.

Study Area – a defined area for the purposes of a specific area of environmental study.

Study Locality – A general area surrounding the 'Study Area' encompassing any important surrounding features.

stygofauna – aquatic invertebrates living within the groundwater systems. This includes 'obligate stygofauna' that represent endemic species that relate to particular regions or ecosystems only.

subaerial – exposed to the atmosphere.

sub base – road material between natural surface and base-course gravel.

subcatchment – a smaller area within a catchment drained by one or more tributaries of the main waterbody.

sub-critical area – an area of panel smaller than the critical area where S_{max} is developed.

submerged – below the surface of water.

subsidence – the settling down or compaction of sediments, soils or rocks under their own weight.

subsidence activities – activities where food is grown, hunted, or gathered for personal consumption rather than for trade or sale.

subsoil – see B horizon.

subsoil – the layer of soil lying below the topsoil; usually contains less organic matter and is less fertile.

substrate – an underlying layer (e.g. of sediment under water).

suction dredge – a dredge which wins sediment by sucking the sediment through a hollow tube connecting the dredge head to the sea floor.

sulfate sulfur – sulfur contained in the sulfate ion (SO_4^{2-}).

sulfide concentrate – a concentration of sulfide minerals, derived from ore by grinding and flotation.

sulphate – a bivalent negative ion of sulphur and oxygen (SO_4).

sulphate soundness test – a test to determine the resistance of rock to disintegration by solution of sodium sulphate.

sump (surface) – a dam within the lowest point of an open cut or processing plant site designed to collect the first runoff or aggregate nuisance flow.

super-critical area – an area of panel greater than the critical area S_{max} developed.

supernatant – ponded process water after settlement of residue solids.

supernatant pond – a central pond formed in a residue storage by runoff of residue supernatant liquor.

surface current – the movement of the surface layer of a body of water, usually generated by wind.

surface waters – all water flowing over, or contained on, a landscape (e.g. runoff, streams, lakes, etc.).

surface-to-volume ratio – a ratio of the exposed surface area of an object to the volume of that object; deep objects have a small surface-to-volume ratio.

surge box – part of processing plant that regulates flow from dredge.

surge stockpile – a stockpile of semi-processed rock used to feed later stages of the process often used to compensate for variations in feed rate of a plant.

survey transect – a path along which one records and counts occurrences of the phenomenon of study (e.g. plants).

suspended solids – analytical term applicable to water samples referring to material recoverable from the sample by filtration.

suspended solids – solids held in suspension by the turbulent flow of a fluid.

sward – vegetated land surface.

syncline – a fold in the form of a trough.

synclinorial zone – a regional fold system with the overall shape of a syncline.

tailgate – roadway on opposite side of longwall panel - normally return airway.

taxon – a group of one ore populations of organisms.

tectonic stress – stress inherent in the earth's crust having both vertical and horizontal components.

temperature – an increase in air

temperature gradient – the rate that temperature changes with distance, expressed in degrees per unit length.

temperature inversion – an increase in air temperature with height.

temporal – related to time.

tenure – the ownership status of a tract of land.

terracetting – the characteristic pattern formed by numerous gently inclined steps or ledges traversing a hillslope.

terrestrial – of the land as distinct from water.

terrestrial – of or relating to the land, as distinct from air or water.

Tertiary – geological time period, 2 – 60 million years ago, comprising Palaeocene and Pliocene epochs.

tertiary crusher – the third crusher through which rock passes to be reduced in size.

testpits – shallow pits dug to test composition or engineering properties of soil.

texture (of soil) – variations in composition, grain size distribution, and structure.

threatened species – a species specified in Part 1 or 4 of Schedule 1, Part 1 of Schedule 1A or Part 1 of Schedule 2 of the TSC Act 1995 or listed in the categories as defined in Section 179 of the EPBC Act 1999.

throughput – quantity of material (ore, chemicals, etc.) moving through a system (e.g. an ore processing plant).

thyristor – a type of switch used to regulate current.

tipping face – the face of an embankment, dump, or stockpile at which placement of new material is occurring.

tipping station – the receival location for ore to be dumped prior to crushing.

topography – landform.

topography – the physical relief and contour of a region.

topographic maps – maps that show the variation in elevation of a landscape.

topsoil – the surface layer of a poorly-developed or well-developed soil profile containing the main percentage of organic material.

topsoil – the upper layer of soil, usually containing more organic material and nutrients than the subsoil beneath it.

topsoil salvage – the stockpiling of topsoil for later use in rehabilitation.

tor – a large boulder of rocks such as granite formed by spheroidal weathering.

total hydrocarbons – an analytically determined measurement of the amount of hydrocarbons in a sample.

total metal – the total mass of filterable and non-filterable metal in a sample.

total sulfur – the total mass of all forms of sulfur in a sample.

total suspended particulates (TSP) – the mass of all particulate matter suspended in air.

total suspended particulate matter (TSP) – the mass of all particulate matter suspended in a solution.

total suspended solids – a common measure used to determine suspended solids concentrations in a waterbody and expressed in terms of mass per unit of volume (e.g. milligrams per litre).

tourmaline – a complex borosilicate mineral containing Na, Li, Mg, Fe and Al.

toxic – poisonous to a specific organism, sometimes resulting in death.

toxicant – a substance that is poisonous.

toxicity – effect of any substance that produces a harmful effect on living organisms; described as acute (short term) or chronic (long term).

tramp iron – miscellaneous pieces of metal encountered during the crushing and screening process – are often remnants of previous mining activity or pieces such as bucket teeth broken from excavation equipment.

transect – a fixed line along which observations are made of flora and fauna.

transect – a line across a study area along which observations are made and changes can be observed (e.g. changes in vegetation).

transmissivity – the rate at which groundwater is transmitted at a specific hydraulic gradient through rock of a specified width.

trapezoidal channel – a drainage channel constructed with no parallel sides.

trapezoidal drain – a drain with a horizontal base and inclined walls.

trenching – excavation of trenches to test for presence of mineralisation in an area.

trial blast – a scaled down version (in physical dimensions) of a designed production blast which usually initiate the same maximum instantaneous charge as the production blast.

Triassic – a geological period extending from 245 to 208 million years before present.

tributary – a stream or river that flows into a larger river or lake.

trommel – an inclined rotating cylindrical screen designed to remove trash and oversize material.

tubestock – tree seedlings supplied with roots enclosed in soil.

tuff – see pyroclastic rock.

turbidity – discolouration of or suspension or particles in water resulting in a reduction in clarity.

turbidity – the optical property of water that prevents light from being transmitted; turbidity or muddiness is caused by the presence of very fine suspended matter such as clay or organic matter.

turbulence – any irregular or disturbed flow in the atmosphere that produces gusts and eddies.

unconfined aquifer – a permeable formation only partly filled with water overlying a relatively impermeable layer. It contains water which is not subjected to any pressure other than its own weight.

unconfirmed compressive strength test – the relative strength of the rock subjected to compressive loading between two parallel plates.

unconsolidated – loose or soft, not compacted (particularly soil or sediment).

underdrainage – artificial drainage that removes infiltration or seepage water from underneath a structure (e.g. a residue storage or a stockpile).

underdraining medium – the material (e.g. coarse gravel) acting as the underdrainage channel.

underflow – the volume of groundwater that flows through an aquifer through a cross-sectional area. It depends on permeability and the prevailing gradient.

understorey – the layer of forest vegetation between the overstorey (or canopy) and the ground layer.

undulation – the gentle rise and fall or wave-like structure of a landscape.

uniform – similar or unvarying.

unit train – a combination of like wagons not intended to be separated.

unity – less than one (health risk assessment).

unweathered – fresh rock, unchanged by either mechanical or chemical weathering processes.

up-dip mining – mining up hill on the gradient of the seam floor.

upcast – a shaft where air is drawn up by fans mounted over the surface outlet. Air is drawn through the mine and exhausted through the upcast outlet.

validation surveys – inspection or examination to confirm validity of prior deductions.

variability – degree or amount of change.

variable – not constant, subject to change (e.g. temperature, rainfall or population).

variance – statistical measure of the variation within a set of data, equal to the square of the standard deviation.

vegetated – covered with plants.

vehicle movement – a one-way trip.

velocity – speed in a given direction.

vertebrate fauna – animals with a backbone or spinal cord, includes mammals, birds, reptiles, amphibians and fishes.

vertical leakage – water passing directly to an underlying structure.

vibration – oscillating movement.

vibrocore drilling – method of drilling in unconsolidated sediment aimed at obtaining undisturbed samples or cores.

visual amenity – attractiveness to the eye.

volcanic rocks – rocks that have formed from molten rock extruded near to or over the surface of the earth (lava).

volcanics – a general term applied to rock types of volcanic origin (e.g. basalt).

volcaniclastic – a rock composed from the deposition of volcanic material.

WAD – weak-acid dissociable.

wash thickener – a structure used to both wash and thicken slurries.

washing plant – a plant designed to wash unwanted sized materials from product.

waste emplacement – structure to hold waste rock, formed by the placement of waste rock in stacked layers (typically 7 to 10 metres thick), engineered in such a way as to maximise stability and minimise erosion.

waste oils – old oils and lubricants retrieved from machinery.

waste rock – rock without mineralisation.

waste rock – uneconomic rock extracted from the ground during a mining operation to gain access to the ore.

waste rock emplacement – the area set aside for disposal of low grade or waste rock materials encountered during mining.

water chemistry – the interaction of the chemical constituents (dissolved metals, suspended particles, etc.) of water.

water clarity – a measure of the transmission of light through water.

water column – the body of water overlying the bed of a stream, lake, swamp or ocean.

water inventory – in the heap leach context refers to sufficient process water for establishment of a cycle between the process pond, barren and pregnant ponds and ore treatment pond.

water quality – degree of the lack of contamination of water.

water quality criteria – generally refers to numeric levels specified for key water quality variables, such as dissolved metals or pH, which can be measured to determine the suitability of water for human consumption, supporting aquatic life, etc.

water table – the upper limit of the saturated zone within a rock mass, generally at atmospheric pressure. It is characteristic of unconfined aquifers.

waterbody – any expanse of water, such as a sea, river, swamp, lake, or dam.

watercourse – stream or river, running water.

waterlogging – excessive saturation of soil with water.

weathered rock – rock affected to any degree by the processes of chemical or physical weathering.

weathering – the group of processes (e.g. action of air, rain, water, etc.) change in character, decay and eventually crumble to soil.

weathering – the in-situ physical disintegration and chemical decomposition of rock materials at or near the earth's surface.

weed – any plant (in particular an herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use.

weir – a dam across a waterway used to raise the water level to assist boating, or for irrigation.

wet blasthole – blasthole set up for operation under wet conditions.

wet/dry strength variation test – a test which provides an indication of the durability of rock.

wetland – swamp of damp area of land.

wetland – a low-lying area regularly inundated or permanently covered by shallow water.

wet processing plant – a plant designed to wash unwanted sized materials from product.

wet scrubbing – a conventional method of dust collection whereby the dust is deposited into water and the resultant slurry settled or re-used.

wildfire – an unplanned, generally intense and difficult-to-control fire, in contrast to a prescribed burn.

wildlife – non-domesticated fauna.

wildlife corridor – a strip of vegetation that has a design purpose of allowing animals to pass from one area to another and acting as an undisturbed area for wildlife preservation.

wind direction – the direction from which the wind, averaged over a certain period of time, is blowing.

wind-driven surface currents – currents in the upper section of a waterbody generated by the friction of wind across its surface.

wind erosion – wearing away of exposed soil, earth, or rock surfaces by the abrasive action of wind-blown particles (e.g. grains of sand).

wind rose – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

winze – a vertical or steeply inclined excavation used for access to a mine.

wobbler sprinkler – form of sprinkler generating large droplets.

wollastonite – calcium silicate mineral formed by thermal metamorphism of impure limestone.

woodland – plant communities dominated by trees whose crowns shade less than 30% of the ground.

worst-case scenario – a sequence of events likely to result in the worst-case effects on the environment.

xeric – characterised by dry conditions used to describe habitats and associated species.

yield – (of a water bore) 1) the capacity of the bore to produce water. 2) the amount of water actually withdrawn.

zircon – a mineral of composition $ZrSiO_4$.

Acronyms, Symbols and Units

~ - approximately.

^{o}C – degrees Celsius.

^{o}C/100 m – degrees Celsius per 100m.

µg/g – micrograms per gram.

µg mercury – micrograms of mercury.

µg Zn/L – micrograms of zinc per litre.

µg/L – micrograms per litre.

µg/m^{3} – micrograms per cubic metre.

µm – micron, one millionth of a metre (one thousandth of a millimetre).

µS/cm – microsiemens per centimetre; a measure of conductivity.

% – percentage.

$M – one million dollars.

3-D – three dimensional.

24-hour air quality standard – value of an air quality variable not to be exceeded when averaged over 24 hours.

72-hour rainstorm – total rainfall recorded over a 72-hour period.

100 year flood limit – predicted extent of a 1 in 100 year flood occurrence.

'000 t – multiples of one thousand tonnes.

< – less than.

≤ – less than or equal to.

> – greater than.

≥ – greater than or equal to.

95% exceedance – a value that is exceeded by 95% of sample values.

1cm – loose cubic metres.

AADT – Average Annual Daily Traffic.

ABS – Australian Bureau of Statistics.

ADO – Automotive Diesel Oil.

AEP – Annual Exceedance Probability.

Ag – silver.

AGV – air guideline value

AHC – Australian Heritage Commission.

AHD – Australian Height Data; in metres above mean sea level.

AHIMS – Aboriginal Heritage Information Management System.

ANC – see acid-neutralising capacity.

ANFO – mixture of ammonium nitrate and fuel oil (diesel) used as an explosive.

ANOVA – see analysis of variance.

ANZECC – Australian and New Zealand Environment and Conservation Council.

ARD – see acid rock drainage.

ARI – average recurrence interval.

ARTC – Australian Rail and Track Corporation

As – arsenic, a metal-like element (i.e. a metalloid).

AS – Australian Standard.

A-Scale – a sound level measurement scale. It disseminates against low frequencies. It approximates the human ear.

Au – gold.

bcm – Bank cubic metre – a volume of 1m^{3} in the ground prior to disturbance.

Bi – bismuth.

B.L.S. – Breaker Line Support – a self propelled powered hydraulic support unit used in bord and pillar or Wongawilli extraction to protect the mining area from the goaf. The unit "breaks" the roof collapse and stops it overriding into the work area.

BOM – Bureau of Meteorology.

Ca – calcium.

Cd – cadmium.

CEC – Cation Exchange Capacity.

cm – centimetre (unit of measure).

CM – coarse matter.

CO_2 – carbon dioxide

CO_2-e – carbon dioxide equivalent.

CSIRO – Commonwealth Scientific and Industrial Research Organisation.

Cu – copper.

$CuSO_45H_20$ – copper sulphate (cupric sulfate).

D% – dispersion percentage.

dB – decibel, unit used to express sound intensity.

dB(A) – the unit of measurement of sound pressure level heard by the human ear, expressed in "A" scale.

dB(A) – decibels, A-weighted scale; unit used for most measurements of environmental noise; the scale is based upon typical responses of the human ear to sounds of different frequencies.

dB(Linear) – the measurement of sound pressure level in which the amplitudes of the sound signal, though all frequencies of the signal, are treated equally, i.e. not weighted.

DCS – distributed control system.

DECCW – Department of Environment, Climate Change and Water (NSW). Now OEH.

DGB 20 – Dense Graded Base with a maximum of 20mm.

DGB 40 – Dense Graded Base with a maximum size of 40mm.

DGS 20 – Dense Graded Sub-base with a maximum size of 20mm.

DMR – Department of Mineral Resources (now Division of Resources and Energy [DRE]).

DP&E – Department of Planning and Environment (NSW).

DP&I – Department of Planning and Infrastructure (NSW).

DP – Deposited Plan.

DPI – Department of Primary Industries (NSW)

dS/cm – decisiemens per centimetre; a measure of conductivity.

dS/m – decisiemens per metre; a measure of conductivity.

EC – see electrical conductivity.

EIS – Environmental Impact Statement.

EL – Exploration Licence.

ENM – Environmental Noise Model.

EP&A Act – Environmental Planning and Assessment Act 1979 (NSW).

EP&A Regulation – Environmental Assessment and Planning Regulation 2000.

EPA – Environment Protection Authority (NSW).

EPL – Environment Protection Licence.

EPP – Emergency Plan and Procedures.

ESD – Ecologically Sustainable Development.

Fe – iron.

FIS – Fauna Impact Statement.

FP – fine particle.

g – gram (= 0.001 kilogram).

g/m^2/month – grams per square metre per month unit for deposited dust.

g/t – grams per tonne.

GHG – greenhouse gas.

GWh – gigawatt hours.

ha – hectare (100 m x 100 m).

ha/year – hectares per year.

HDPE – high density polyethylene.

Hg – mercury.

HQ – hazard quotient (health risk assessment).

HRA – health risk assessment.

HS – Hanging Swamp; surface swamp underlain by clay barrier.

HVAS – High Volume Air Sampler.

Hz – Hertz – a unit of frequency.

ID – Identification

IDO – Interim Development Order.

INP – Industrial Noise Policy.

K – potassium.

kC or kCal – kilo calorie (energy unit).

kg – kilogram (weight measure).

kg H_2SO_4/t – kilograms sulphuric acid per tonne.

kg/day – kilograms per day.

kg/ha – kilograms/hectare

kg/minute – kilograms per minute.

kL – kilolitre (thousand litre).

km – kilometre (= 1 000 metres).

km^2 – square kilometres.

km/hr – kilometres per hour.

kV – thousand volts (Electrical Potential Unit).

kVA – kilovolt amps.

kVh – kilowatt hours.

kW – thousand Watts (energy unit).

L – litre.

L/day – litres per day.

L/s – litres per second.

L/t – litres per tonne.

lcm – loose cubic metres.

LEP – Local Environmental Plan.

L_{A10} – sound level exceeded 10 per cent of the sampling time.

L_{A90} – sound level exceeded 90 per cent of the sampling time.

L_{Aeq} – the L_{Aeq} is the "equal energy" average noise levels, and is used in some instances for the assessment of traffic noise effects or the risk of hearing impairment due to noise exposures.

$L_{Aeq\ 1\ hour}$ – the "equal energy" average noise level over 60 minutes – used for assessing impacts of motor vehicles.

$L_{Aeq\ T}$ – Sound level of continuous noise which emits the same energy as the fluctuation sound over a given time period (T).

L_{Amax} – the absolute maximum noise level measured in a given time interval.

L_{AN} – the A-weighted sound pressure level exceeded by N% of a given measured period.

LALC – Local Aboriginal Land Council.

LDP – Licensed Discharge Point.

LEP – Local Environmental Plan.

LGA – Local Government Area

LPG – liquid petroleum gas.

m – metre.

M – million.

m AHD – metres Australian Height Datum.

m BGL – metres below ground level.

m^2 – square metre.

m^3 – cubic metre.

m^3pa – cubic metres per annum.

mg – milligram (weight unit).

Mg – magnesium.

Mcm – million cubic metres.

Mbcm – million bank cubic metres.

Mlcm – million loose cubic metres.

MLpa – megalitres per annum.

mg/kg – milligrams per kilogram; unit commonly used to express the concentration of metal (such as copper) in a rock or sediment; is equal to parts per million.

mg/L – milligrams per litre (parts per million).

mg TSS/L – milligrams of total suspended solids per litre.

mg Zn/kg – milligrams of zinc per kilogram.

MIC – Maximum Instantaneous Charge.

MJ – mega joules (energy unit).

ML – megalitre.

ML/a – megalitres per annum.

ML/day – megalitres per day.

ML/year – megalitres per year.

MLA – Mining Lease Application.

mm – millimetre (= 0.001 metres).

Mm^3 – million cubic metres.

mm/day – millimetres per day.

mm/month – millimetres per month.

mm/s – millimetres per second.

MMU – mobile manufacturing unit.

Mn – manganese.

Mo – molybdenum.

MOP – Mining Operations Plan.

MREMP – mining, rehabilitation and environmental management plan.

mRL – metre reduced level.

m/s – metres per second.

m^3/s – cubic metre per second.

Mt – million tonnes (metric tonne = 1 000 kg).

Mtpa – million tonnes per annum.

MW – megawatt.

Na – sodium.

NAG – see net acid generation test.

NaOH – sodium hydroxide.

NAPP – see net acid-producing potential.

NATA – National Association of Testing Authorities.

NEPC – National Environment Protection Council

NEPM – National Environment Protection Measures

NFR – non-filterable residue of suspended solids.

NHMRC – National Health and Medical Research Council.

NO – nitrogen oxide.

NO_2 – nitrogen dioxide.

NO_x – nitrous oxides.

NP&W Act – National Parks and Wildlife Act 1974 (NSW).

NTU – Nephelometric turbidity units.

NP&W Act – National Parks and Wildlife Act 1974 (NSW).

NPA – National Parks Association.

NPWS – National Parks and Wildlife Service (NSW).

NSW EPA – New South Wales Environment Protection Authority.

O_3 – ozone.

oz – ounce.

oz/year – ounces per year.

PAD – Potential Archaeological Deposit.

PAX – potassium amyl xanthate.

Pb – lead.

pH – measurement indicating whether water or soil is acid or alkaline.

pH – a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acidic, 7 is neutral acid, and 14 is most basic (alkaline).

PLC – Programmable Logic Controller

PM_{10} – particulate matter <10μm in diameter.

$PM_{2.5}$ - particulate matter <2.5μm in diameter.

PPD – Patched Point Dataset.

ppm – parts per million.

PVS – peak vector sum.

REA – Refuse Emplacement Area.

RH – relative humidity.

ROM – Run-of-Mine.

RMS – Roads and Maritime Services.

RTA – Roads and Traffic Authority (NSW).

Sb – antimony.

SEPP – State Environmental Planning Policy.

SG – specific gravity.

SPCC – State Pollution Control Commission. Now superseded by the EPA.

SR – Shire Road.

swl – standing water level.

t – tonnes.

TAPM – The Air Pollution Model.

TD – Total Depth.

TDS – total dissolved solids expressed in mg/L

TEOM – Tapered Element Oscillating Microbalance dust sampling unit.

t/m^3 – tonnes per cubic metre.

tpa – tonnes per annum.

tpd – tonnes per day

tph – tonnes per hour.

TSC Act – Threatened Species Conservation Act 1995 (NSW).

TSP – Total Suspended Particulate.

$\mu g/m^3$ – micrograms per cubic metre.

μm – micron (1 micron=0.001 millimetre).

μS/cm – micro siemens per centimetre.

V – volt.

V:H – vertical to horizontal ratio.

w/v – weight per volume.

WHO – World Health Organisation.

WSP – Water Sharing Plan.

Zn – zinc.