



# Chapter 34

Terms and abbreviations



# Terms and abbreviations

Term	Definition
\$	Expressed as \$AUD throughout the EIS unless otherwise stated
%	Per cent
<	Less than
>	Greater than
°C	Degrees Celsius
µg/L	Micrograms per litre
µg/m <sup>3</sup>	Micrograms per cubic metre
µS/cm	Micro siemens per centimetre (a measure of electrical conductivity)
4G	Fourth generation
Abstraction	Extraction of groundwater from a coal seam
Abundance	The number of individuals of a given species in an area
Access track	Cleared and graded track constructed where existing tracks are not available
ACHAR	Aboriginal Cultural Heritage Assessment Report
Acidic Sands	A type of soil described as brown to yellow texture contrast soils
ADG Code	Australian Dangerous Goods Code
Adsorption	The attachment of particles to a surface
AEMO	The Australian Energy Market Operator
AEP	Annual exceedance probability
AGL	Australian Gas Light Company or AGL Energy
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AIP	NSW Aquifer Interference Policy
AIS	Agricultural Impact Statement
Alignment	The line or lines that describe a linear-infrastructure route; it defines how linear infrastructure (such as a road, access track or pipeline) will be located in relation to the features encountered along the route
Alluvial	Sediments deposited following a decrease in velocity of flowing water
Alluvium	General term for unconsolidated deposits of inorganic materials (clay, silt, sand, gravel, and boulders) deposited following a decrease in velocity of flowing water
Alluvium aquifer	An aquifer formed within alluvium. See <i>Alluvium</i> .
a.m.	Ante Meridiem (before midday)
Amended water	Produced water that has undergone treatment and amendment to a quality commensurate with requirements for the beneficial reuse of irrigation and dust suppression on non-forested land within the project area
Ambient air quality	The state of quality of air as it exists in the environment
ANCOLD	Australian Committee on Large Dams
Anisotropy	Directional dependence, such that a variable changes with direction. For example, the movement of water in a groundwater unit may vary vertically and horizontally
Annual exceedance probability	The probability that a given rainfall event would occur in a single year
Anthropogenic	Associated with or relating to human influence (or impact) on the environment
Anticline	A ridge or fold in a geological formation, sloping downward from a crest
ANZECC	Australian and New Zealand Environment and Conservation Council

Term	Definition
APIA	Australian Pipeline Industry Association
apiary industry	Industry related to beekeeping
Appraisal well	Well drilled after the discovery of gas to establish the limits of the reservoir, the productivity of wells in it and the properties of the gas
Aquatic ecosystems	The physical and chemical environment that contains a community of organisms (plants, animals, and microbes), and ecological processes within rivers and their riparian zones and reservoirs, lakes, wetlands and their fringing vegetation
Aquifer	Rock or sediment in a formation, group of formations or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs
Aquitard	Saturated geological unit with a relatively low permeability that can store large volumes of water but does not readily transmit or yield significant quantities of water to bores or springs. An aquitard can sometimes, if completely impermeable, be called an aquiclude
Arable	Capable of producing crops or grazing land
Arboreal	Living in or among trees
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
Artesian aquifer	A confined aquifer whose water is pressurised i.e. if tapped by a bore, would flow naturally to the surface
Artesian bore	A term commonly used to describe a bore that taps into an artesian aquifer
AS	Australian Standard
AS/NZS	Australian Standard/New Zealand Standard
Assessment period	A duration of about 25 years over which the project is assessed in the Environmental Impact Statement
Ausplume	Dispersion model to predict air emission concentrations at incremental distances from the major sources of air emissions
AUSRIVAS	Australian River Assessment System
Australian Height Datum (AHD)	A level datum that generally approximates mean sea level. The datum is treated as uniform throughout Australia
Background noise	The existing noise level in the Narrabri Gas Project area excluding the impacts from the Narrabri Gas Project.
BBAM	BioBanking Assessment Methodology
Basement	In relation to geology, basements are typically metamorphic or igneous formations that underlie sedimentary cover
Basin Plan	Murray Darling Basin Plan
BC	Base case
Beneficial reuse	The reuse of a resource generated by an activity for beneficial purposes. For example, the reuse of treated and amended water produced from natural gas wells for irrigation
Biocide	A chemical that deters the growth of microorganisms
Biometric	Relating to the measurement of biological features
BIOSCREEN-AT	Screening-level model that simulates remediation through natural attenuation of dissolved hydrocarbons at petroleum fuel release sites
Bohena Trough	A subdivision of the Gunnedah Basin encompassing the project area
Bore	Artificially constructed or improved groundwater cavity used for the purpose of accessing or recharging water from an aquifer
Brackish	Water that contains between 500 and 10,000 milligrams per litre of dissolved solids according to the National Water Commission

Term	Definition
Brigalow Belt	The bioregion that spans inland and eastern Queensland from Townsville in the north to northern New South Wales, covering an area of approximately 36,400,000 ha. The bioregion, as its name implies, is characterised by brigalows. The bioregion also supports a range of ecosystems including eucalypt forest and woodlands, grassland, dry rainforest, cypress pine and riparian communities
Brigalow Grey Clays	A type of soil described as gradational grey to grey-brown cracking clays
Brine	Saline water with a total dissolved solid concentration of greater than 40,000 milligrams per litre (mg/L). May be a wastewater produced by the desalination of coal seam water (e.g. by reverse osmosis)
BSAL	Biophysical Strategic Agricultural Land
BTEX	Benzene, toluene, ethyl benzene or xylene compounds
Buffer	An area of land separating adjacent land uses that is managed for the purpose of mitigating impacts of one use on another. A buffer area consists of a separation distance and one or more buffer elements
Bund (or bunding)	Wall of a secondary containment system, usually in the form of an embankment, used to prevent sediment and liquids from entering the environment
CaCO <sub>3</sub>	Calcium carbonate
CaSO <sub>4</sub>	Calcium sulfate (gypsum)
CALMET	Meteorological model to predict local meteorology
CALPUFF	Dispersion model to predict air emission concentrations at incremental distances from the major sources of air emissions
Catchment	The area of land that collects and transfers rainwater into a watercourse
Cathodic protection	A measure to control erosion of metal
Cation exchange capacity	The number cations (positively charged ions) available in a soil. Cation exchange capacity can be used as a measure of soil fertility
Cavitation	In relation to soil, the formation of openings (cavities) by erosion
CCC	Community Consultative Committee
CCME	Canadian Council for Ministers of the Environment
Chip holes	Vertical wells drilled to determine the presence of coal
Clearing	For vegetation – means removing, cutting down, ringbarking, pushing over, poisoning or destroying by burning, flooding or draining; but it does not include destroying standing vegetation by stock, or lopping a tree
Cleat	Natural fracture within a coal bed, accounting for most of the permeability and much of the porosity of coal seam gas reservoirs
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> -e	Carbon dioxide equivalent
Coal	Carbon-based sedimentary rock formed by the accumulation and decomposition of plant material in layers, which can be used as a combustible fuel. Main types, in order of highest to lowest rank of energy density, are black coal (anthracite, bituminous, sub-bituminous), and brown coal (lignite)
Coal measure	Geological strata that contain coal
Coal seam	Blanket-like coal deposits which can range from a few centimetres to tens of metres thick
Code of Practice	NSW Department of Trade and Investment, Resources and Energy <i>Code of Practice for Coal Seam Gas: Well Integrity (2012)</i>
Completions rig	A rig used for well completion and/or maintenance activities. Also referred to as a workover rig. Completions rigs are generally smaller than drilling rigs used to drill the well initially
Complex units	Mapped areas containing multiple soil types

Term	Definition
Constraint	Environmental values with the potential to be impacted by a project and hence presenting a constraint on the development, requiring the implementation of avoidance, mitigation and management measures
Contamination	The introduction of a pollutant into the environment
Core holes	Vertical wells that are drilled using similar equipment to pilot and production wells to determine the geology of a site and help assess gas content
Core koala habitat	An area of land with a resident breeding population of koalas, evidenced by attributes such as breeding females and recent sightings and historical records of a population
CORMIX	Model for mixing zone analysis. An empirical model based on experimentally derived curve-fit equations that predict the dilution ratio of water quality parameters and that verify the accuracy of theoretical models
Critical habitat	The whole or part or parts of an area or areas of land comprising the habitat of an endangered species, an endangered population or an endangered ecological community that is critical to the survival of the species, population or ecological community. Critical habitat is listed under the <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
Critically endangered	Designated as critically endangered under the <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i> . Refer to conservation status for meaning of 'critically endangered' under the Act
CSG	Coal seam gas
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cultural heritage	Indigenous and non-Indigenous items and areas (commonly referred to as places) that are a significant indicator of historical and cultural events and practices
DA	Development application
dB	Decibel ratio
dB(A)	Decibels – A – weighted
DEC	NSW Department of Environment and Conservation
DECC	NSW Department of Environment and Climate Change
DECCW	NSW Department of Environment, Climate Change and Water
Decibel [dB]	A unit of sound level measurement
Decibel [dB] A weighted [A]	The method of frequency weighting the electrical signal from a noise measuring instrument to simulate the way the human ear responds to a range of acoustic frequencies. The symbols for the noise parameters often include the letter "A" (e.g. LAeq) to indicate that frequency weighting has been included in the measurement
Decommission	Remove something from service
Degradation	Negative or undesirable change or disturbance to the environment
Depocentres	The deepest area of a sedimentary basin
Depressurisation	The lowering of the groundwater elevation over an area
Desorption	The release of an adsorbed particles from a surface
Diffuser	An aeration device to facilitate mixing
Discharge	Flows of water
Discharge regime	The volume and frequency of discharges to or from a watercourse
Dissolved oxygen (DO)	The amount of oxygen dissolved in water
Dissolved solids	Minerals and organic matter dissolved in water; a measure of salinity
Distillate	Treated water from brine concentrator
Disturbance	A physical displacement of existing features that leads to impacts
Diurnal	Occurring or active during the day time

Term	Definition
Diversity	The number of different species in an area
DotE	Commonwealth Department of the Environment and Energy
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Planning and Infrastructure
Drainage	In relation to soil, the ability of soil to let water pass through it
DRET	Commonwealth Department of Resources, Energy and Tourism
Drilling rig	A machine that creates holes (usually called wells or bores) in the ground
Drilling fluid	A fluid (sometimes referred to as a mud) made up of 70 to 80 per cent water that is pumped into wells during drilling to cool and lubricate the drill bit and carry drill cuttings to the surface
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
Dust suppression	Reduction of dust generated by wind, typically by the application of water to exposed soil
Easement	Legal term used to describe land over which a third party has rights to locate infrastructure and undertake certain activities
EC	Electrical conductivity
Ecological	Relating to the relationships between organisms and their environment
Ecological community	An assemblage of species occupying a particular area
Ecologically sustainable development	Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes
Ecology	Scientific study of abundance, distribution and interactions between organisms and their natural environment
Edge effect	The direct effects and secondary impacts of cleared areas on neighbouring patches of vegetation, such as light and noise intrusion
EEC	Endangered ecological community, typically listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth), <i>Threatened Species Conservation Act 1995</i> (NSW) and/or <i>Fisheries Management Act 1994</i> (NSW)
EHSMS	Environment, Health and Safety Management System
EIS	Environmental impact statement
ELA	EcoLogical Australia
Emission	Discharge of a substance such as gas
Endangered	Designated as endangered under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth), <i>Threatened Species Conservation Act 1995</i> (NSW) and/or <i>Fisheries Management Act 1994</i> (NSW). Refer to conservation status for meaning of 'endangered' under these Acts
Environmental impact statement (EIS)	A document prepared to identify, describe and assess the potential impacts of a proposed action on the environment, and document ways to mitigate such impacts; it should provide sufficient detail to inform a decision on the proposal
Environmental management plan (EMP)	Document that provides operational detail of how environmental management measures identified in the environmental impact statement will be implemented. Contains environmental sub-plans
Environmental management strategy (EMS)	Overarching strategy that provides detail of how environmental management measures identified in the environmental impact statement will be implemented. Implemented through an EMP and/or environmental sub-plans
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
Ephemeral	Relates to the amount of time that surface water persists in a watercourse or wetland; ephemeral watercourses flow only during significant rainfall events and for a short-time following rainfall events. Also known as intermittent
EPL	Environmental protection licence

Term	Definition
Erosion	Wearing away of rock or soil caused by physical or chemical processes
ESD	Ecologically Sustainable Development
Exploration well	A petroleum well that is drilled to: a) Explore for the presence of petroleum or natural underground reservoirs suitable for storing petroleum, or b) obtain stratigraphic information for the purpose of exploring for petroleum. For clarity, an exploration well is not a production well
Extrusive	Igneous rock forming process that present at the earth's surface
Fault	Zone of displacement in rock formations resulting from forces of tension or compression in the earth's crust
Fauna	The animals of a given region or period, taken collectively
FCNSW	Forestry Corporation NSW
FEED	Front end engineering design
Feral	Animal existing in a wild or untamed state, having escaped from domestication
Field Development Protocol	Protocol for locating infrastructure in the gas field. The Field Development Protocol provides the necessary flexibility for locating the gas field infrastructure, whilst ensuring environmental performance objectives are met over the life of the project
Fill	A kind of material in solid form (whether or not naturally occurring) capable of being deposited at a place but does not include material that forms a part of, or is associated with, a structure constructed in a watercourse, wetland or spring including a bridge, road, causeway, pipeline, rock revetment, drain outlet works, erosion prevention structure or fence
Major infrastructure	Infrastructure that has a determined location in the project area. Major infrastructure includes project components at Bibblewindi, the Bibblewindi to Leewood infrastructure corridor, Leewood, and the Leewood to Wilga Park infrastructure corridor
Flare pit	An earthen containment area in which waste gases released during drilling are combusted
Floodplain	Flat or nearly flat land adjacent a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high flow
Flora	The plants of a given region or period, taken collectively
Flow regime	The volume and frequency of flows in a watercourse
Flowlines	Alternate name for underground pipelines transporting gas or water from the gas field to facilities at Bibblewindi or Leewood. Refer to 'gas gathering line' and 'water gathering line'
Fluorescent powder tracking	A method for tracking short term terrestrial movement using powder which shows up brightly under UV light
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
Foraging	Searching for wild food resources
Formation	Contiguous layers of rock that have similar physical characteristics
Fracture	A break in a rock including cracks, joints and faults
Fragmentation	Discontinuities in an organism's preferred habitat
Fresh water	Water that contains less than 500 milligrams per litre dissolved solids
FTE	Full-time equivalent
Fugitive dust	Dust derived from a mixture of non-point or not easily defined sources; examples include dust from vehicular traffic on unpaved roads, materials transport and handling and disturbed (unvegetated) soils and surfaces
FullCAM	Full Carbon Accounting Model
Full-time equivalent	A ratio of the total number of paid hours during a fixed time period by the number of hours worked in that period



Term	Definition
Fyke	A long, bag-shaped net supported by hoops and used for trapping fish
GAB	Great Artesian Basin
Gas compression facility	A facility that houses multiple compressor units, either nodal or hub compressors or a mixture of both used to increase the pressure of gas for the purpose of transmission; may be collocated with a gas treatment facility and/or water management facility
Gas field	Geographic area delineated by petroleum tenure that is developed for a natural gas resource
Gas gathering lines	Underground high-density polyethylene pipelines through which natural gas flows from a well head to gas compression facility under low pressure. Gas gathering lines may also be referred to as flow lines
Gas processing facility	A facility that may use various treatment technologies to remove heavy hydrocarbon gases, moisture and other impurities from the gas to meet supply specifications
GDEs	Groundwater dependent ecosystems
Geofabric	Permeable fabric placed on exposed soil to prevent erosion or prevent weed establishment
Geographical information system	Computer system that can capture, store, analyse, and present in various ways data that locates places on the earth's surface
Geomorphology	Study of the physical features of the surface of the earth and their relation to underlying geological structures
Geophones	Instrument to detect sound waves off underground rock formations
Geophysical survey	Systematic collection of information regarding the Earth's physical properties
GIS	Geographic information system
GLNG	Gladstone Liquefied Natural Gas Project
Gigajoule	One billion joules
Gigalitre	One billion litres
Gilgai	A small ephemeral lake that forms in the soil depressions; they typically form over certain clay soils (vertisols), which swell and shrink through the addition and evaporation of water. Also known as mima mounds, hogwallows and melon holes
GJ	Gigajoules
GJ/m <sup>3</sup>	Gigajoules per cubic metre
GMA	Groundwater Management Area
GOB	Gunnedah-Oxley Basin
GPS	Global positioning system
Graticular	A unit of measurement of the surface of the Earth, defined in s4 of the NSW <i>Petroleum (Onshore) Act 1991</i> . It is a block of five minutes latitude by five minutes of longitude that in the Narrabri region equates to about 63,000 hectares
GRE	Glass reinforced epoxy
Great Artesian Basin	A large aquifer underlying approximately 22 per cent of Australia. The Great Artesian Basin within the Namoi River catchment is a complex multi-layered system of water bearing sandstones confined by shales and mudstones, up to 2,000 m depth
Greenhouse gas	An atmospheric gas that contributes to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface; including carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O) and water vapour
Groundwater	Water found in the subsurface in the saturated zone below the water table or piezometric surface i.e. the water table marks the upper surface of groundwater systems

Term	Definition
Groundwater Management Area	Areas designated for the monitoring or management of groundwater resources. Through the development of legislative arrangements, the main groundwater resources in NSW would be managed through water sharing plans, with the remaining groundwater resources would be covered under groundwater macro plans
GSOO	Gas Statement of Opportunities
Gunnedah Basin	Covers an area of just over 15,000 square kilometres in the central part of the Sydney-Gunnedah-Bowen Basin system. The Gunnedah Basin comprises rocks of Permian and Triassic age and is partly underlying the Surat Basin.
ha.	Hectare
Habitat	The area or natural environment in which an organism or population normally lives. A habitat is made up of physical factors such as soil, moisture, range of temperature, and availability of light as well as biotic factors such as the availability of food resources and the presence of predators
Hair tube	Lengths of tube with sticky tape to catch hair off passing animals for identification
Hardstand	A compacted and/or paved ground surface for the storage of vehicles and equipment
Hazardous material	Substance that, if improperly treated, stored, disposed of, or otherwise managed, is likely to cause serious or material environmental harm because of (a) its quantity, concentration, acute or chronic toxic effects, carcinogenicity, teratogenicity, mutagenicity, corrosiveness, explosiveness, radioactivity, or flammability or (b) its physical, chemical, or infectious characteristics
HC	High case
HDPE	High density polyethylene
Heavy vehicle	A vehicle with three or more axles or with dual tyres on the rear axle
Highway	High-order road of a high standard, facilitating connectivity between population centres
HIPAP	Hazardous Industry Planning Advisory Paper (Department of Planning)
Holding tank	Water holding tank
HSE	Health, safety and environment
Hydraulics	Relating to the movement of liquid in a confined space, such as a river
Hydrocarbon	A compound of hydrogen and carbon
Hydrogeological domain	The simulated physical extent of a groundwater model
Hydrogeology	The study of the interrelationships of geological materials and processes with water, especially groundwater
Hydrology	The study of water, in particular its movement over land
Hydrostratigraphic units	Geological formations containing groundwater
IAP2	International Association of Public Participation
lb	Pounds
ICOMOS	International Council on Monuments and Sites
IESC	Independent Expert Scientific Committee
Igneous	Rock made of solidified lava or magma
Impact	An event that alters ecosystem, community, or population structure and alters the physical environment, directly or indirectly. An impact may have a short or long duration
In situ	In the original or existing place of something
Incision	In relation to a watercourse, erosion of the channel bed resulting in a decrease in elevation
Indirect impacts	Impacts that are not a direct result of project activities but that occur away from the original impact area, sometimes via a complex pathway

Term	Definition
Inflow	Flows of water into a groundwater unit such as rainfall, interaction with surface water bodies, or flows from other groundwater units
Initial risk	Combined likelihood and consequence of a potential environmental impact, prior to the implementation of avoidance, mitigation or management measures
Intergenerational equity	The principle of intergenerational equity asks that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
Intermediate input	Raw materials or semi-finished goods and services that are purchased from supply-industries and then used to produce other goods and services for final consumption
Intermittent	In relation to a watercourse, one that does not flow permanently. An intermittent stream would generally flow temporarily after heavy rainfall events and would also be seasonal. Also known as ephemeral
Intra-cratonic	Craton are the relatively old and stable parts of the earth's crust, typically in the interior parts of the continents. Intra-cratonic means within the bounds of a craton. The Surat Basin, for example, is an intra-cratonic basin
Invasive species	A species occurring beyond its accepted normal distribution due to human activities which threatens valued environmental, agricultural or other social resources by the damage it causes
Inversion	An area of uplift in otherwise low lying geological formation
IPART	NSW Independent Pricing and Regulatory Tribunal
Isolation valve	A mechanism that enables the isolation of part of a pipeline to minimise losses in the event of pipe failure
Jurassic	Geological time period between about 200 to 150 million years ago
Key threatening processes	The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) and the <i>Threatened Species Conservation Act 1995</i> (NSW) include actions that adversely affects threatened species, populations or ecological communities or if it could cause species, populations or ecological communities that are not threatened to become threatened
kg	Kilogram
Kilolitre	One thousand litres (kL)
Kilovolt	One thousand volts (kV)
kL	Kilolitres
km	Kilometre
km/h	Kilometres per hour
km <sup>2</sup>	Square kilometre
kPa	Kilopascals
kPag	Kilopascal gauge
kV	Kilovolts
kVa	Kilovolt-ampere
kW/m <sup>2</sup>	Kilowatts per square metre
L	Litre
LAeq	A weighted equivalent noise level measure in decibels
LAeq(15min)	The equivalent continuous noise level which is the level of noise equivalent to the energy average of noise levels occurring over a 15 minute measurement period
LAeq(day)	The equivalent continuous noise level which is the level of noise equivalent to the energy average of noise levels occurring over a the day measurement period which is defined by the Industrial Noise Policy as the period from 7 am and 6 pm (Monday to Saturday) and 8 am to 6 pm (Sundays and Public Holidays)

Term	Definition
LAeq(evening)	The equivalent continuous noise level which is the level of noise equivalent to the energy average of noise levels occurring over a the evening measurement period which is defined by the Industrial Noise Policy as the period from 6 pm to 10 pm
LAeq(night)	The equivalent continuous noise level which is the level of noise equivalent to the energy average of noise levels occurring over a the night measurement period which is defined by the Industrial Noise Policy as the period from 10 pm to 7 am (Monday to Saturday) and 10 pm to 8 am (Sundays and Public Holidays)
LAeq(period)	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring
Lake	Permanent or ephemeral natural or artificial body of water of considerable size surrounded by land
LALC	Local Aboriginal Land Council
LAmix	The maximum noise level during a noise measurement period
Land access agreement	An agreement that formalises the compensation that the Narrabri Gas Project will pay to a landholder for adverse impacts that result from the Narrabri Gas Project's activities on a landholder's property and sets out standards for land access. Also known as conduct and compensation agreements
Landholder	The owner, occupier, manager, or controller of land or water, including anyone acting on their behalf
Landscape impacts	A product of the value of the landscape and the magnitude of impact on that landscape
Lateral	Horizontal
LC	Low case
Leewood	A rural property of about 250 hectares in size owned by Eastern Star Operations Pty Ltd (now Santos NSW (Operations) Pty Ltd) and its joint venture participants that hosts the central gas processing facility, water management facilities and optional power generation facility
LEP	Local environmental plan
LGA	Local government area
Licence	Approval to operate; usually imposes conditions on authorised activities and is subject to regulations
LiDAR	Light detection and ranging
Life cycle analysis	An analysis of the total environmental impact of a product or item including aspects of its existence from raw material production to ultimate disposal
Light spill	Light that falls outside of the area that is intended to be lighted
Light vehicle	Car, four wheel drive, motorcycle or car towing a caravan
Listric fault	Faults where the fault plane is concave
LNG	Liquefied natural gas
LSTU	Less significant transmissive units
LTAEL	Long-term average annual extraction limit
m	Metre
m/s	Metres per second
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
Macroinvertebrate	An animal without a backbone that is visible with the naked eye
Macrophyte	An aquatic plant visible to the naked eye

Term	Definition
Marley	The lip of a plate between the rim and the flat base
MDBA	Murray-Darling Basin Authority
Mechanical extension	Deformation of a geological formation by physical stress
Megalitre	One million litres
Meteorological	Relating to meteorology or to phenomena of the atmosphere or weather
mg/L	Milligrams per litre
MicroSiemen	A measure of electrical conductivity. In relation to soils, electrical conductivity can be used as a proxy measure of salinity
Migratory species	Species listed as 'migratory' under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth); refer to definitions of <i>Environment Protection and Biodiversity Conservation Act 1999</i> conservation status, for meaning of 'migratory' under the Act
Mining SEPP	State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007
Mitigation	To appropriately protect and maintain the existing environment in accordance with relevant legislation and best-management principles; taken to have the same meaning as management.
MJ/m <sup>2</sup>	Megajoules per square metre
ML	Megalitre
ML/day	Megalitre per day
ML/y	Megalitre per year
mm	Millimetre
mm/s	Millimetre per second
mm/s PPV	Millimetre per second peak particle velocity
MMSCFD	Million standard cubic feet per day
MNES	Matters of national environmental significance
MODHMS	Model that simulates surface water – groundwater interaction, including overland flow
Monitoring bore	A bore used to monitor groundwater levels or quality, often containing a piezometer
MSDS	Material safety data sheet
Mt	Million tonnes
Mt CO <sub>2</sub> -e	Million tonnes of carbon dioxide equivalent
Mtpa	Million tonnes per annum
Murray-Darling Basin	The surface water basin of the Murray and Darling rivers, covering around 14 per cent of Australia across Queensland, New South Wales, Victoria and South Australia
MW	Megawatt
N	Nitrogen
Namoi Alluvium	The Upper Namoi Alluvium, an aquifer made of coarse-grained river gravels and sands. The Lower Namoi Alluvium, a hydrostratigraphic unit made of shallow alluvial fan deposits associated with the Namoi River. These units contain a significant resource of readily accessible, good quality groundwater that is heavily utilised for irrigation, public water supply, private water supply and livestock
Narrabri LEP	Narrabri Local Environmental Plan 2012

Term	Definition
National park	Land reserved by the Department of National Parks, Recreation, Sport and Racing for a National Park, National Park (Scientific), Conservation Park or Resource Reserve
Native Title	The legal recognition of some Indigenous people's rights and interests to land and water that comes from their traditional laws and customs under the <i>Native Title Act 1993</i> (Cth); bestows different rights to the holders. In cases where the land was Crown land, it may include the right to possess and occupy an area to the exclusion of others
Net present value (NPV)	The financial worth of a series of cash flows occurring over time, discounted to reflect the total dollar value in today's terms
Nitrogen dioxide	An air pollutant, high concentrations of which can contribute to acid rain, eutrophication of watercourses and formation of photochemical smog
NTU	Negligibly transmissive units
Nocturnal	Occurring or active during the night time
NOW	NSW Office of Water (Called NSW Department of Primary Industries – Water from 03 July 2015)
Noxious	Harmful to the environment or ecosystem
Noxious weeds	Noxious weeds are defined in the <i>NSW Noxious Weeds Act 1993</i>
NPV	Net present value
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
NSW Biodiversity Offset Policy for Major Projects	Policy clarifies, standardises and improves biodiversity offsetting for major project approvals. The policy applies to state significant development and state significant infrastructure
NSW Department of Primary Industries – Water	The name for the NSW Office of Water from 03 July 2015
NSWIC	NSW Irrigators Council
NUDLC	National Uniform Drillers Licensing Committee
OEH	NSW Office of Environment and Heritage
Offsets	Measures that compensate for the residual impacts of an action on the environment, after avoidance and mitigation measures are taken
Outcrop	Geological formation visible at the ground surface
Outflow	Flows of water out of a groundwater unit, such as extraction, interaction with surface water bodies, or flows into other groundwater units
PAL	Petroleum assessment lease
Paleo-channel	An old, inactive watercourse that has been buried by more recent sediments
Particulate matter (PM)	Particles (e.g. dust, vapour) that are introduced or resuspended into the air through certain activities, such as soil cultivation or vehicles operating on open fields or dirt roadways. PM <sub>10</sub> is particulate matter 10 micrometres or less in diameter. PM <sub>2.5</sub> is particulate matter 2.5 micrometres or less in diameter; generally described as fine particles
PBT assessment	Persistence, bioaccumulation and toxicity assessment
PEA	Preliminary environmental assessment
Peak construction period	The initial two to three years of the project
PEL	Petroleum exploration licence
Perennial watercourse	A watercourse that has continuous flow in parts of its stream bed all year round during years of normal rainfall

Term	Definition
Permeability	The ease with which a fluid can pass through a porous medium and is defined as the volume of fluid discharged from a unit area of an aquifer under unit hydraulic gradient in unit time (metres per day)
Permeate	Treated water from reverse osmosis
Petroleum activities	Low impact petroleum activities, limited petroleum activities, and all other Narrabri Gas Project activities including major facilities such as permanent accommodation camps, gas treatment facilities, air strips, gas compression facilities, water management facilities such as water storage and water treatment facilities
pH	The absolute value of the decimal logarithm of the hydrogen-ion concentration (activity), used as an indicator of acidity (pH less than 7) or alkalinity (pH greater than 7) or neutrality (pH 7)
Pilliga, the	An agglomeration of forested area covering more than 500,000 hectares in north-western NSW around Coonabarabran, Baradine and Narrabri
Pilliga Outwash	A low lying, undulating landscape characterised by deposited sediments from the erosion of the Pilliga Sandstone plateau. There are numerous drainage lines in the landscape including abandoned paleo-channels
Pilliga Sandstone	The Jurassic Pilliga Sandstone Formation of the Great Artesian Basin, an aquifer made of coarse grained quartzose sandstones with conglomerates and minor thin siltstone/mudstone. The Pilliga Sandstone is a major regional aquifer and significant transmissive unit
Pilot wells	A well for gas and water extraction, generally in close proximity to another for the assessment of field potential
PINNEENA	NSW groundwater data archive
PJ	Petajoules
Planar	In relation to a watercourse, flat with limited channel definition
p.m.	Post Meridiem (after midday)
PM	Particulate matter
PM <sub>10</sub>	Particulates with aerodynamic diameter less than 10 micrometres
PM <sub>2.5</sub>	Particulates with aerodynamic diameter less than 2.5 micrometres
PNTU	Probable negligibly transmissive units
PoEO Act	Protection of the Environment Operations Act 1997
Pollution	The introduction into the environment of a substance by the action of humans, which results in significant harmful effects to man or the environment
PPL	Petroleum production lease
PPLA	Petroleum production lease application
Precautionary principle	The precautionary principle is that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
Produced water	Water extracted through the act of depressurising coal seams
Production well	A well that is designed to extract gas from one or more natural underground reservoirs
Project area	The area of about 95,000 hectares which bounds the Narrabri Gas Project
Project footprint	The area of surface expression being about 1,000 hectares occupied by the infrastructure components of the Narrabri Gas Project
Project region	The local government areas of Narrabri, Moree, Gwydir, Inverell, Glenn Innes Severn, Tamworth Regional, Uralla, Armidale, Gunnedah, Liverpool Plains, Warrumbungle, Gilgandra, Dubbo, Coonamble, Walgett

Term	Definition
Proponent	Santos NSW (Eastern) Pty Ltd on behalf of its joint venture participants—referred to in this EIS as Santos (or the Proponent).
Province	In relation to groundwater, see 'hydraulic head'
Putrescible waste	Refuse or other discarded material that is liable to become putrid or rotten through decay or decomposition
QSN Link	Queensland to South Australia/NSW pipeline
Quadrat	A small plot used to isolate repeatable areas to study the distribution of an organism
Qualitative	Relating to or concerned with quality or qualities, rather than quantity or measured value
Quantitative	An assessment based on quantities or quantifiable data
Quantum	A fraction or expected value of something
Ramsar wetland	An area designated as a wetland of international importance under the <i>Ramsar Convention</i> (also known as the <i>Convention on Wetlands of International Importance</i> signed by Australia in 1971) because of its role in preserving biological diversity, or because it is a representative, rare or unique wetland type
RAPs	Registered Aboriginal Parties
RCE Inventory	Riparian, Channel and Environmental Inventory
Reactivation	In relation to geology, movement of a pre-existing fault
Receiver	That part of the environment that may be the recipient of environmental harm; receivers may include houses, schools, hospitals, surface waters, land, ecosystems etc
Recent Alluvium	A type of soil described, depending on subtype, as brown to yellow-brown texture contrast soils; gradational grey to brown, cracking clays; or red, red-brown, yellow, to grey gradational soils
Red-brown Clays	A type of soil described as gradational brown to red-brown cracking sandy clays
Red-brown Earths	A type of soil described as gradational red-brown clay loams
REF	Review of Environmental Factors
Rehabilitation	Returning the land to its pre-disturbance state or providing the foundations for the land to return to its pre-disturbance state
Relative humidity	The amount of water vapour in the air relative to the saturation point at a given temperature
Remediation	Removal of pollution or contamination from the environment to restore to health; requires that impact is reduced to some acceptable level
Remnant	A part that is left after the greater part has been removed/destroyed
Residual impact	The effect remaining or left over following implementation of mitigation measures
Residual risk	Combined likelihood and consequence of a potential environmental impact, despite the implementation of avoidance, mitigation and management measures
Revegetation	Establishment of suitable plant species to support the agreed post project land use and stabilise soils
Reverse fault	Faults resulting from horizontal compression in which a hanging wall moves up over a footwall
Reverse osmosis	A water-purifying technology by which a fluid moves under pressure through a semi-permeable membrane from a high solute concentration to a lesser concentration; used to remove salt and other impurities from water
RFO	River flow objectives
Riparian	Situated along or near the bank of a watercourse



Term	Definition
Risk	Combination of likelihood and consequence of a potential environmental impact. For example, an event that could have a major consequence but is unlikely is a medium risk, whereas the same event is a high risk if considered likely
Roost	Group at a location for rest, usually used in relation to birds or bats
Runoff	All surface from a catchment. In practice generally refers to the flow off the land and into drainage lines
Rural Lands SEPP	State Environmental Planning Policy (Rural Lands) 2008
Saline	Presence of salts, in water or spoil, at concentrations greater than 10,000 milligrams of total dissolved solids per litre
Salinisation	An increase in soil salt concentration
Salinity	A problematic soil characteristic defined by high concentrations of salt
Sandy Sodic Duplex soils	A type of soil described as brown to yellow texture contrast soils
Santos	Santos NSW (Eastern) Pty Ltd
Safety flare	Safely manages gas released from pressure during maintenance activities or non-routine situations
SCADA	Supervisory control and data acquisition
Scat	The excrement of an animal
Scour	Erosion of sediment that occurs around structures in a watercourse due to increased velocity
Scour valve	A valve situated at a low point in a pipeline to flush the line, usually for maintenance or repair work
Section valve	A mechanism that enables the isolation of part of a pipeline to minimise losses in the event of pipe failure
Sediment	Particles derived from rocks or biological materials that have been transported by air or water
Sedimentation	Deposition or accumulation of mineral or organic matter deposited by air or water
Seine	Net which hangs vertically in the water to capture organisms, usually with floats at the top and weights at the bottom
Seismic survey	Survey to measure properties of underground rock formations undertaken by reflecting sound waves
Sensitive receiver	Area or structure sensitive to a predicted environmental impact (usually from air emissions or noise) such as a dwelling, a library, childcare centre, kindergarten, school, college, university or other educational institution; a hospital, surgery or other medical institution; a protected area or an area identified under a conservation plan as a critical habitat; or a park or garden that is open to the public
SEPP	State Environmental Planning Policy
SEPP 33	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
SEPP 44	State Environmental Planning Policy No. 44 – Koala Habitat Protection
SEPP 55	State Environmental Planning Policy No 55 – Remediation of Land
Shallow groundwater	Groundwater resources not deeper than 100 metres
SIA	Social impact assessment
SIDRA	Computer modelling program for road intersections
SIGNAL scores	Stream Invertebrate Grade Number Average Level - a simple biotic index for macroinvertebrates using the pollution tolerance levels of different macroinvertebrate types to create a site score and water quality rating for the waterbody being studied

Term	Definition
Sinuosity	In relation to a watercourse, the waviness of the channel
Skid mounted	Placement of buildings and equipment on metal rails, rather than directly onto the ground
SKM	Sinclair Knight Mertz (now Jacobs)
SoundPlan	Predictive noise model
Spring	Natural discharges of groundwater at the surface or within stream beds
SRLUP	Strategic Regional Land Use Plan
Stakeholder	Person or group affected by or concerned with an issue or enterprise. Also see: affected person
State and Regional Development SEPP	<i>State Environmental Planning Policy (State and Regional Development) 2011</i>
State forest	Land reserved by the Department of Natural Parks, Recreation, Sport and Racing for state forest purposes
Stockpile	Large supply of essential materials, held in reserve for later use
Stop valve	A mechanism that enables the isolation of part of a pipeline to minimise losses in the event of pipe failure
Stratified	In relation to survey effort, physically distributed according to an environmental parameter such as habitat type
Stratum	A layers of rock, gravel, sand or minerals in a geological sequence
Stream order	A numbered classification system in which watercourses are assigned a number according to their number of tributaries. The stream order of watercourses therefore generally increases in the direction of flow from lower order streams (generally higher up in the catchment) to higher order rivers (generally lower down in the catchment)
Streamlines	Watercourses
STU	Significant transmissive units
Study area	Area defined by each of the relevant supporting studies and specific to the particular environmental aspect being considered for the purpose of environmental impact assessment
Subduction	Deformation of a geological formation by physical stress, where one geological formation is forced beneath another
Subsidence	Excavation or vertical compression of a geological formation and resulting sinking of overlying strata
Surat CMA	Surat Cumulative Management Area
Sydney-Gunnedah-Bowen Basin system	A complex of geological basins in eastern Australia including the Sydney Basin, Gunnedah Basin, and the Bowen Basin (underlying the Surat Basin).
t	Tonne
t CO <sub>2</sub> -e	Tonnes of carbon dioxide equivalent
TAPM	Meteorological model to predict local meteorology
TDS	Total dissolved solids
TEC	Threatened Ecological Communities
TEG	Triethylene glycol
Telemetry	Relating to communication, measurement or remote control over distance
Terajoule	One trillion joules
Terrestrial	Relating to, consisting of, or representing the Earth; relating to the land as distinct from the water
The project	The Narrabri Gas Project

Term	Definition
Thermal	Relating to heat
THPS	Tetrakis Hydroxymethyl Phosphonium Sulfate
Threatened	A collective term used with reference to ecological communities, regional ecosystems or species that are critically endangered, endangered, vulnerable or near threatened as listed under the <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i> , <i>Threatened Species Conservation Act 1995 (NSW)</i> and/or the <i>Fisheries Management Act 1994 (NSW)</i>
Threatening process	Key threatening processes threaten or have the potential to threaten the survival or evolutionary development of a species, population or ecological community. They are listed under the <i>Threatened Species Act 1995 (NSW)</i> , the <i>Fisheries Management Act 1994 (NSW)</i> and the <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
Threshold criteria	A quantitative measure of an environmental value (such as water quality, air quality or noise) that can sometimes define a point at which adverse impacts to human health or the environment may occur. For example, the ANZECC guidelines specify criteria for protection of aquatic ecosystems, homestead water supply, irrigation, visual amenity and so forth. These guidelines are used as water quality objectives in NSW
Thrust fault	Faults that are reverse faults where the angle between the hanging wall and footwall is less than 45 degrees
TJ	Terajoules
TJ/day	Terajoules per day
TJ/hour	Terajoules per hour
Topsoil	The top layer of a given soil type, as opposed to the deeper subsoil
tpa	Tonnes per annum
Transect	Path along which organisms or items are counted
Transmissivity	The rate at which a groundwater unit is able to convey groundwater
TRB	Transportation Research Board
Treated water	Produced water that has undergone treatment to a quality commensurate with requirements for the beneficial reuse of dust suppression on forested land, and for use in construction and drilling activities within the project area. Treated water is also suitable for managed release to Bohena Creek at flows of over 100 megalitres per day as measured at the Newell Highway gauging station
Tributaries	A tributary is a stream or river which flows into another river (a parent river) or body of water but which does not flow directly into the sea
Trigger or trigger level	See threshold criteria. A water chemistry term that 'triggers' a management response when a specific analyte exceeds a guideline or threshold value
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
Tunnel erosion	The erosion of subsoil that may not be immediately visible from the surface
Turbidity	A measure of water clarity indicating the amount of suspended material (e.g. soil or algae) is in the water
UK	United Kingdom
Unconformity	In relation to geology, a break in the geological record, expressed as variation between parallel layers of sedimentary rock
UNFCCC	United Nations Framework Convention on Climate Change
VHF	Very high frequency
VIC	Victoria

Term	Definition
Visual impact	A product of the sensitivity of the visual receptor being affected and the magnitude of impact on that receptor
Visual sensitivity	Degree to which a change to the landscape will be perceived in an adverse way
Volcanics	A type of geological formation formed from material released by volcanic eruption
Vulnerable	Designated as vulnerable under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth), <i>Threatened Species Conservation Act 1995</i> (NSW), and/or <i>Fisheries Management Act 1994</i> (NSW). Refer to conservation status for meaning of 'vulnerable' under these Acts
WAL	Water Access Licence
Water Act	<i>Water Act 2007</i> (NSW)
Water gathering line	High-density underground polyethylene lines through which coal seam water flows from a well head under low or medium pressure to water transfer, storage and/or treatment infrastructure. Water gathering lines may also be referred to as flow lines
Water management facility	The collective term to refer to the major infrastructure components involved in water storage and treatment
Water sharing plan	Legislated plans under the <i>Water Management Act 2000</i> that establish rules for sharing water between the environment and water users. Water licences are issued to water users in accordance with water sharing plans
Watercourse	A river, creek, or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events: In a natural channel, whether artificially modified or not, or in an artificial channel that has changed the course of the stream. It also includes weirs, lakes and dams
Weeds	Plant species that invade native ecosystems and can adversely affect the survival of indigenous flora and fauna, often competing with indigenous plants for resources such as nutrients, moisture and light. Weed species are not necessarily exotic non-indigenous species, but can also be non-endemic natives that are naturalised to areas outside of their natural distribution
Well	A structure that is designed to bore through the earth's surface in order to extract resources; including gas and/or water
Well head	The above-ground components of a gas well at the surface
Well pad	An area approximately one hectare in size upon which the wells would be constructed, and around one quarter of a hectare following partial rehabilitation
Wider area of influence	The local government areas of Narrabri, Moree, Gwydir, Inverell, Glenn Innes Severn, Tamworth Regional, Uralla, Armidale, Gunnedah, Liverpool Plains, Warrumbungle, Gilgandra, Dubbo, Coonamble, Walgett
WM Act	<i>Water Management Act 2000</i> (NSW)
Workover rig	A rig used for well completion and/or maintenance activities (also referred to as a completions rig)
WQOs	Water quality objectives
WRPs	Water resource plans
WSP	A water sharing plan, for example the <i>Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008</i>
Yield	The rate at which groundwater is extracted, or able to be extracted, from a groundwater unit