

Glossary

abstraction	the withdrawal of water by pumping from an aquifer
AHD	Australian Height Datum; equivalent to Mean Sea Level (MSL) + 0.026 m, and Low Water Mark Fremantle (LWMF) + 0.756 m
alkaline	any of various soluble mineral salts that have a pH greater than 7 and which is found in water and soil
allocation limit	annual volume of water set aside for consumptive use from a water resource
alluvium (alluvial)	detrital material that is transported by streams and rivers and deposited
anion	a negative-charged ion that migrates to an anode (such as in electrolysis)
annual licensed water entitlement	the quantity of water that a person is entitled to take on an annual basis in accordance with the <i>Rights in Water and Irrigation Act 1914</i>
anticline	type of fold that is an arch-like shape and has its oldest sedimentary strata at its core
aquifer	a geological formation or group of formations able to receive, store and transmit significant quantities of water
artesian aquifer (bore)	a confined aquifer under sufficient pressure that the water would rise in a bore above the ground surface
confined aquifer	an aquifer lying between confining strata of low permeability so that the water in the aquifer cannot flow vertically
perched aquifer	an unconfined aquifer separated from an underlying body of groundwater by an unsaturated zone (contains a perched watertable)
unconfined aquifer	an aquifer near the surface with a free watertable or phreatic level at atmospheric pressure
semi-confined aquifer	An aquifer that is underlain by an impermeable stratum and bounded at the top by soil layers of relatively low permeability (hydraulic conductivity), especially in a horizontal sense. These layers form the semi-confining layer (the aquitard) in which a free watertable is found

aquifer system	intercalated permeable and poorly permeable materials that comprise two or more permeable units separated by aquitards, which impede vertical groundwater movement but do not affect the regional hydraulic continuity of the system
aquitard	a geologic formation, group of formations, or part of a formation through which virtually no water moves
Archean	the earliest part of Precambrian, between 4000 Ma and 2500 Ma
baseflow	the portion of river and stream flow coming from groundwater discharge
basin (geological)	a depression of large size, which may be of structural or erosional origin (contains sediments)
bed (geological)	a subdivision of a formation, smaller than a member
bedrock	lithified rock that lies under the loose, softer material (regolith) at the ground surface
bore	small diameter well, usually drilled with machinery
brackish (water)	with a salinity ranging between 1000 mg/L TDS (fresh water) and 3000 mg/L TDS (saline water)
Breakup unconformity	unconformity formed after the breakup of Gondwana during the Early Cretaceous
brine	water that contains more than 35 000 mg/L TDS
Cenozoic	Cenozoic era covers the earth's history during the last 66 million years. It is subdivided into the Tertiary and Quaternary (last 2 million years) periods
Cambrian	the first geological period of the Paleozoic Era, lasting from 541 to 485 million years ago
clastic	composed of fragments, or clasts, of pre-existing minerals and rocks, and that have been transported from their place of origin
coffee rock	colloquial term for iron oxide (limonite) cemented sand grains
colluvium (colluvial)	material transported by gravity down hill slopes
confining bed	sedimentary bed of very low hydraulic conductivity

confluence	meeting of two or more water courses; the place where a tributary joins the main stream
conformably	sediments deposited in a continuous sequence with a break
conformity	the stratigraphic continuity of adjacent sedimentary strata, i.e. they have deposited in an orderly series without evident time lapses
craton	part of the continental crust that has been stable (no orogeny activity) for at least 1000 Ma
Cretaceous	final period of the Mesozoic era occurring 65–135 million years ago
delta (deltaic)	sediments deposited at the mouth of a river where it enters a lake or the ocean
dewatering	removing underground water for construction or other activity. It is often required in mining below the watertable or as a preliminary step to developments in an area
diachronous	varying in age from place to place
diffusion	net movement of molecules or atoms from a region of high concentration (or high chemical potential) to a region of low concentration (or low chemical potential)
discharge (groundwater)	all water leaving the saturated part of an aquifer
disconformity	unconformity between parallel layers of rocks that represents a period of erosion or non-deposition (see unconformity)
dispersion	the extent to which a liquid substance introduced into a groundwater system spreads as it moves through the system
divertible resource	amount of surface water or groundwater that can economically be diverted from groundwater resource or catchment each year
downhole	occurring in the drilled borehole
drawdown (s)	difference between the elevation of the initial potentiometric surface and its position after pumping
drawdown per log cycle (Δs)	Δs is the change in drawdown (s) given by the straight line plot over one log cycle of time (t) or distance (r) during a pumping test when plotting drawdown data on a semilogarithmic graph

ephemeral stream	a stream or part of a stream that flows only in direct response to precipitation and whose channel is above the watertable
eolian	windblown; deposit formed by wind action
estuary (estuarine)	the seaward or tidal mouth of a river where fresh water comes into contact with seawater
evapotranspiration	a collective term for evaporation and transpiration
facies	a mappable lithostratigraphic unit, differing in lithology from adjacent units deposited at the same time and in lithologic continuity
fault	a fracture in rocks or sediments along which there has been an observable displacement
flow path	an underground route for groundwater movement, extending from a recharge zone to a discharge zone
fluvial	pertaining to streams and rivers
formation (geological)	a group of rocks or sediments that have certain characteristics in common and that were deposited about the same geological period, and constitute a convenient unit for description
gaining stream	a stream or reach of stream whose flow is being increased by inflow of groundwater
gamma-ray (logging)	measurement of natural radioactivity from rocks, useful in distinguishing high radiation shale from low radiation quartz sand
Gondwana	Late Palaeozoic continent of the Southern Hemisphere
groundwater	water that occupies the pores and crevices of rock or soil beneath the land surface
groundwater area	groundwater/surface water area: An area proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> for the purposes of licensing and managing water use
groundwater barrier	rock or formation which has a relatively low permeability and which occurs below the land surface where it impedes the movement of groundwater and consequently causes a difference in the hydraulic head on either sides of it
groundwater discharge	flow of groundwater from the zone of saturation

groundwater divide	a ridge in the watertable or other potentiometric surface from which groundwater moves away in both directions normal to the ridge line
groundwater flow	movement of water in the saturated zone
groundwater isotopes	Isotopes of hydrogen (e.g. deuterium, tritium) and oxygen (e.g. oxygen-18) in water and in constituent (e.g. carbon-14) that can be used to determine characteristics of recharge and groundwater age
groundwater management unit (GMU)	discrete aquifer within a groundwater management area (GMA)
groundwater mound	a raised area in a watertable or other potentiometric surface caused by groundwater recharge
groundwater recharge	hydrologic process where water moves downward from surface water to groundwater. Recharge is the primary method that water enters an aquifer
groundwater system	an aquifer (groundwater reservoir) and its contained water. Also, the collective hydrodynamic and geochemical processes at work in the aquifer
groundwater travel time	the time required for groundwater to travel between two locations
group (geological)	includes two or more contiguous or associated formations with significant lithologic features in common
heterogeneous	the state of being non-uniform in structure or composition throughout
hydraulic	pertaining to groundwater motion
hydraulic barrier	a general term referring to modifications of a groundwater flow system to restrict or impede movement of water
hydraulic conductivity (permeability)	the flow through a unit cross-sectional area of aquifer under a unit hydraulic gradient
hydraulic downward head	the hydraulic head decreases with depth indicating potential for downward groundwater flow

downward hydraulic gradients	decreasing heads with depth
hydraulic gradient	rate of change of hydraulic head per unit distance, at a given point and in a given direction
hydraulic head	height of a free surface of a body of water above a given point beneath the surface
upward hydraulic head	the hydraulic head increasing with depth indicating potential for upward groundwater flow
upward hydraulic gradients	increasing heads with depth
homogeneous	the state of being uniform in structure and composition throughout
hypersaline	excessively saline; with a salinity substantially greater than that of sea water (>35 000 mg/L TDS)
igneous rocks	igneous rock is formed through the cooling and solidification of magma or lava
impermeable	a characteristic of some geologic material that limits its ability to transmit significant quantities of water under head differences found in the subsurface
infiltration	movement of water from the land surface to below ground level
inlier	area of older rocks surrounded by younger rocks. Inliers are typically formed by the erosion of overlying younger rocks to reveal a limited exposure of the older underlying rocks
interbedded (of strata)	being positioned between, or alternated with, other layers of dissimilar character
interface	contact zone between two fluids (groundwater) of different chemical and physical composition
interfinger	lithological facies being conformably and alternatively deposited
ion	a positively or negatively charged atom or groups of atoms
major ions	constituents commonly present in groundwater in concentrations exceeding 1.0 mg/L. Major cations are calcium, magnesium, sodium and potassium; the major anions are sulfate, chloride,

	fluoride, nitrate, and those contributing to alkalinity, most generally assumed to be bicarbonate and carbonate
isoline	contour line
isopach	a contour line joining points of equal thickness of geological unit
Jurassic	the second period of the Mesozoic era occurring 135–190 million years ago
juxtaposition	side by side
karst	a type of topography that is formed on limestone by dissolution, and that is characterised by sinkholes, caves, dolines, solution channels and underground drainage
lacustrine	pertaining to, produced by, or formed in a lake
lateritised (lateritic)	a surficially formed deposit consisting mostly or entirely of iron or aluminium oxides and hydroxides
leach (leaching)	removal of soluble matter by percolation of water
leakage	the flow of water from one aquifer to another
licence	a formal authorisation that entitles the licence holder to ‘take’ water from a watercourse, wetland or underground source for a specified quantity and period of time
lithology	description of the physical characteristics of a rock unit
losing stream	a stream or that loses water to groundwater as it flows downstream
Map Grid of Australia	a metric rectangular grid system (i.e. east and north), comparable to the AMG grid in use since the 1980s. It is a Cartesian coordinate system based on the Universal Transverse Mercator projection and the Geocentric Datum of Australia 1994
member (geological)	minor rock stratigraphic unit comprising some portion of a formation
metamorphic rocks	sedimentary and igneous rocks that were subjected to more intense pressure or heat and as a result underwent a complete change
Mesozoic	an era of geological time occurring 66–252 million years ago

model (modelling system)	a groundwater flow model simulates hydraulic heads (and watertable elevations in the case of unconfined aquifers) and groundwater flow rates within and across the boundaries of the groundwater system under consideration
analytical model	an analytical model makes simplifying assumptions (e.g. properties of the aquifer are considered to be constant in space and time) to enable solution of a given problem. Analytical models are usually solved rapidly, sometimes using a computer, but sometimes by hand
conceptual model	a conceptual (hydrogeological) model is a descriptive representation of a groundwater system that incorporates an interpretation of the geological and hydrological conditions. It consolidates the current understanding of the key processes of the groundwater system, including the influence of stresses, and assists in the understanding of possible future changes
numerical model	numerical model divides space and time into discrete pieces. Features of the governing equations and boundary conditions (e.g. aquifer geometry, hydrogeological properties, pumping rates or sources of solute) can be specified as varying over space and time
microplankton	microscopic, drifting organism that inhabits the open water, or pelagic zone, of ocean or fresh water
miospore	collective term for microspore and pollen grains
Neocomian	European stage of geological time at base of Cretaceous
non-potable	water that is not of drinking quality, but may be suitable for other purposes
orogen	the process responsible for the development of mountainous terrain, and for deformation of rock within the mountains
overburden	the loose soils, silt, sand, gravel or other unconsolidated material overlying bedrock, and which is either transported or formed in place. Also termed 'regolith'
oxidation	a chemical change in which electrons are lost by an atom or group of atoms
palaeochannel	a channel that is no longer part of the contemporary fluvial system, i.e. has been abandoned or buried

palaeovalley	a valley that is no longer part of the contemporary fluvial system, i.e. has been abandoned or buried
Palaeozoic	the era of geological time extending from about 541 to 252 million years ago
palynology	study of plant pollen, spores and certain microscopic plankton organisms (collectively termed palynomorphs) in both living and fossil form
paralic	laid down on the landward side of a coast
pelagic	part of the open sea or ocean that is not near the coast or sea floor
permeable	ability to permit water movement
permeability	the property or capacity of a porous rock, sediment or soil for transmitting water
phreatic	term used in hydrology to refer to aquifers
plain	tract of flat or level terrain
plateau	an extensive land region considerably elevated (more than 150 m in altitude) above the adjacent country or above sea level
porosity	the percentage of the bulk volume of a rock or soil that is occupied by interstices, whether isolated or connected
potable	fresh and marginal water generally considered suitable for human consumption
potentiometric surface	a surface of equal hydraulic heads or potentials, typically depicted by a map of equipotentials such as a map of watertable elevations
Precambrian	the era of geological time extending from about 4600 to 541 million years ago
Proterozoic	the later of the two major subdivisions of the Precambrian
aquifer test	one of a series of techniques to evaluate the hydraulic properties of an aquifer by observing how water levels change with space and time when water is pumped from the aquifer
Quaternary	relating to the most recent period in the Cenozoic era

recharge (groundwater)	all water reaching the saturated part of an aquifer (natural or artificial), such as rainfall recharge, induced recharge from other aquifers or throughflow
renewable resource (groundwater)	Groundwater extracted from an aquifer that receives recharge from rivers, rainfall or from other aquifers
resistivity (logging)	Measurement of electrical resistivity in the formation immediately surrounding a borehole, useful for estimation of salinity in clean sands
ridge	a tectonic subdivision of a geological basin having relatively shallow basement
runoff	part of the precipitation flowing to surface streams
salinity	a measure of the concentration of total dissolved solids (TDS) in water (DoW 2014) 0–500 mg/L, fresh 500–1000 mg/L, marginal 1000–3000 mg/L, brackish 3000–35 000 mg/L, saline >35 000 mg/L, hypersaline
saturated	all open spaces are filled with water under pressure equal to or greater than that of the atmosphere
saturated zone	the area in an aquifer, below the watertable, in which relatively all pores and fractures are saturated with water
scarp	a line of cliffs (steep slopes) produced by faulting or by erosion
scheme	water diverted from a source or sources by a water authority or private company and supplied via a distribution network to customers for urban and industrial use or for irrigation
seawater interface	a diffusion zone in which fresh water and saltwater mix and which is maintained near the coast
seawater intrusion	the invasion of fresh water by seawater. This can be caused by excessive groundwater abstraction from coastal aquifers, or upward movement from deeper saline zones due to up-coning near coastal discharge/pumping wells
seawater wedge	a wedge-shaped intrusion of salty ocean water into a freshwater estuary, tidal river or aquifer; it slopes downward in the upstream/upgradient direction, and salinity increases with depth

secondary salinity	salinisation of soil, surface water or groundwater due to human activity such as urbanisation and agriculture (irrigated and dryland)
sedimentary basin	a low area in which permeable sediments laid down at various times in the past have accumulated
sedimentary rock	sedimentary rocks are formed on the surface of the Earth, either in water or on land. They are called secondary, because they often result from the accumulation of small pieces broken off from pre-existing rocks
seepage	water that seeped or oozed through a porous soil
self-supplied	water users (individuals or organisations) who divert from a source for their own individual requirements
shelf	shallow, marginal part of a sedimentary basin
solution channel	tubular or planar channel formed by the solution of calcium carbonate in limestone
specific capacity (of a bore)	the pumping rate (yield) divided by the drawdown. It is a valuable number that can be used to provide the design pumping rate or maximum yield for the well
specific yield	the ratio of the volume of water that a given mass of saturated rock or soil yields by gravity to the volume of that mass. This ratio is expressed as a percentage
spring	place where discharge of groundwater flows at the ground surface
stage	succession of rock strata laid down in a single age on the geologic timescale, which usually represents millions of years of deposition
storage	the estimated volume of water contained in an aquifer
storativity or storage coefficient	the volume of water released from storage per unit decline in hydraulic head in the aquifer, per unit area of the aquifer
stratigraphy	the science of rock strata. Concerned with original succession and age relations of rock strata and their form, distribution, lithology, fossil content, geophysical and geochemical properties

stygofauna	name used for any fauna that live in groundwater systems or aquifers, such as caves, fissures and vugs. Stygofauna are made up predominantly of many kinds of crustaceans but includes worms, snails, insects, other invertebrate groups, and, in Australia, two species of blind fish
subarea	a subdivision, within a surface or groundwater area, defined to better manage water allocation. Subarea boundaries are not proclaimed and can therefore be amended without being gazetted
sub-basin	a geological basin within a larger geological basin
subcrop	to lie directly beneath another geological unit
surface water	water flowing over the landscape, held in estuaries, rivers and wetlands or collected in a dam or reservoir
surface water area	an area proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> for the purposes of licensing and managing water use
sustainable (yield)	level of groundwater extraction measured over a specified planning timeframe that should not be exceeded to protect the higher value social, environmental and economic uses associated with the aquifer
swale	a slight depression, sometimes filled with water, in the midst of generally level land
syncline	a basin-shaped fold with younger sedimentary strata closer to the centre of the structure
tectonic	pertaining to the forces involved in, or the resulting structures or features, of rocks
Tertiary	the first period of the Cenozoic era occurring 2–65 million years ago
throughflow	groundwater flow within an aquifer
total dissolved solids	a term that expresses the quantity of dissolved material in a sample of water, either the residue on evaporation, dried at 180oC or, for many, water that contain more than about 1000 mg/L, the sum of chemical constituents

transmissivity	the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the aquifer thickness
trough (geological)	a linear depression or basin that subsides as it receives clastic material, located not far from the source supplying the sediment
type (locality, section)	the place at which a stratotype is situated and from which it derives its name
unconformably	time break in sequence of deposition
unconformity	break in a sequence of strata in an area that represents a period of time during which no sediments were deposited
unconsolidated	loosely bound (sediments)
unit (geological)	is a volume of rock of identifiable origin and age range that is defined by the distinctive and dominant, easily mapped and recognisable petrographic, lithologic or palaeontologic features (facies) that characterise it
unsaturated	the area above the watertable where soil pores are not fully saturated, although some water may be present
watertable	the surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere
weathering	the in-situ physical disintegration and chemical decomposition of rock material at or near the earth's surface
well	large diameter bore, usually dug by hand; also petroleum bore
wetland	area permanently, seasonally or intermittently waterlogged or inundated with water that may be fresh, saline, flowing or static
WIR	the Department of Water's self-service water information system that provides online access to a range of scientific data from the department's water information databases
yield	sustainable rate at which a bore or well can be pumped