

## NGWA MAR Terminology

<b>TERM</b>	<b>DEFINITION</b>
Advanced wastewater treatment	Any physical, chemical or biological treatment process used to accomplish a degree of treatment greater than that achieved by secondary treatment.
Advanced water purification	Results in high-quality drinking water using advanced treatment processes available, including, but not limited to microfiltration, reverse osmosis, and high intensity ultraviolet light/advanced oxidation.
Aquifer	A saturated, permeable geologic unit that is capable of yielding economically significant quantities of water to wells/springs.
Aquifer storage and recovery (ASR)	Injection of water into a well for storage in the aquifer and subsequent recovery from the same well.*
Aquifer storage transfer and recovery (ASTR)	Injection of water into a well for storage in the aquifer and recovery from a different well, generally to provide additional water treatment.*
Artificial recharge (AR)	Older term for managed aquifer recharge. Intentional banking of water in aquifers by injection in wells or by surface infiltration.
Artificial recharge and recovery (ARR)	Older term for managed aquifer recharge. Recharge to and recovery of water for subsequent beneficial use.
ASR well	Dual purpose well to inject, store and recover source water in an aquifer for subsequent beneficial use.
ASR well development	Applying to unconsolidated alluvial aquifers, the systematic process in removing fine-grained particles in and around the borehole interface and optimizing bi-directional radial flow into the aquifer and flow to the well.
Bank filtration	Extraction of groundwater from a well or caisson near or under a river or lake that induces infiltration from the surface water body, thereby improving and making more consistent the quality of water recovered.
Buffer zone (BZ)	The heterogeneous area around an ASR well, not intended to be recovered, separating the stored water volume from the surrounding native groundwater in the storage aquifer. Most ASR wells require initial formation and maintenance of a buffer zone, enabling storage of drinking water in brackish or saline aquifers, or aquifers with at least one constituent that is not wanted in the recovered water. Once the buffer zone has been formed, recovery efficiency should be close to 100%, less any losses due to lateral movement or density stratification.
Confined aquifer	An aquifer bounded above and below by units of distinctly lower hydraulic conductivity in which the pore water pressure is greater than atmospheric pressure, causing the water level to rise above the top of the aquifer if tapped by a well.
Conjunctive use	Water resources management practice to optimize the use of both surface and groundwater while typically minimizing undesirable physical, environmental, and economic effects.
Cycle testing	The systematic process in determining the operational recharge and backwashing routine for an ASR well.
Dry well	A well that is constructed in the unsaturated zone of an aquifer and designed to optimize infiltration of water.*

Groundwater	Groundwater is water that exists underground in saturated zones beneath the land surface. The upper surface of the saturated zone is called the water table.
Groundwater overdraft	Occurs where the average annual amount of groundwater extraction exceeds the long-term average natural and managed aquifer recharge in a basin. Potential effects of overdraft can include seawater intrusion, groundwater quality degradation, land subsidence, groundwater depletion, and/or chronic lowering of groundwater levels.
Groundwater recharge or replenishment	The refilling of water contained within aquifers beneath the earth's surface, usually from percolation through soils or connection to surface water bodies. May be natural or managed, and direct or in lieu.
In lieu recharge	Groundwater recharge by substituting surface water for groundwater, and accounting for the groundwater saved/stored for future beneficial use.
Infiltration pond	Synonymous with recharge basin and spreading basin.*
Infiltration galleries	Buried trenches (often containing slotted pipes or other structural components for water storage space) in permeable soils that allow infiltration through the unsaturated zone to an unconfined aquifer.
Infiltration rate	The rate at which a soil under specified conditions can absorb falling rain or melting snow; in recharge, the rate at which water drains into the ground when a recharge basin is flooded, expressed as quantity of water per unit time.
Injection well	Well used for emplacing fluids into the subsurface.
Managed aquifer recharge (MAR)	The purposeful recharge of water to aquifers for subsequent recovery or for environmental benefit.*
Percolation tank, rubber dam or recharge weir	Dams built in ephemeral streams to detain water which infiltrates through the bed to enhance storage in unconfined aquifers.*
Radial injection surge development	The advanced well development procedures implemented when an ASR well is experiencing poor operational efficiency (both recharge and recovery modes).
Rainwater harvesting	Roof runoff is diverted into a tank, well, sump, or caisson where it is allowed to percolate to the water table where it is collected by pumping from a well, or stored for later use.*
Receiving water	The groundwater that will receive the source water recharged.
Recharge area or zone	The surface area or zone in which water infiltrates into the ground, reaches the zone of saturation, recharging the underlying aquifer.
Recharge basin (or pond)	A surface facility, often a large pond, used to increase the infiltration of surface water into a groundwater basin. Basins require the presence of permeable soils or sediments at or near the land surface and an unconfined aquifer beneath.*
Recharge well	A well that is used to recharge water directly to an aquifer.
Reclaimed water	See recycled water.
Recovery efficiency	Calculated as the cumulative volume of water recovered from storage in an ASR well divided by the cumulative volume previously stored during the same operating cycle, usually expressed as a percentage.

Recycled water	Previously used domestic or municipal water (wastewater) that has been treated for reuse for potable or non-potable purposes, and can serve as source water for recharge. Used synonymously with reclaimed water.
Residence time	The average amount of time a fluid spends during transport through a volume of subsurface or a laboratory vessel.
Sand dams	Features built in ephemeral stream beds in arid areas on low permeability lithology, these trap sediment when flow occurs, and following successive floods the sand dam is raised to create an “aquifer” which can be tapped by wells in dry seasons.
Soil aquifer treatment (SAT)	Treated sewage effluent, known as recycled water, is infiltrated through recharge ponds to facilitate nutrient and pathogen removal during passage through the unsaturated zone for recovery by wells after residence in the aquifer.*
Source Water	Referred to as the water that will be recharged in a managed aquifer recharge project.
Spreading basin	Synonymous with recharge basin.*
Surface spreading	Recharging water at the surface through recharge basins, ponds, pits, trenches, constructed wetlands, or other systems.*
Target storage volume (TSV)	The total volume of water to be stored in an aquifer from recharge through a well, comprising the stored water volume that is recovered, plus the Buffer Zone volume required to ensure that recovered water quality remains acceptable.
Tertiary treatment	The treatment of wastewater beyond the secondary or biological stage. The term normally implies the removal of nutrients, such as phosphorus and nitrogen, and of a high percentage of suspended solids.
UIC	Underground Injection Control - refers to the UIC Program under the Safe Drinking Water Act, found in Title 40 of the US Federal Code of Regulations, which provides minimum requirements for injection of fluids through wells into the subsurface.
Unconfined aquifer	An aquifer that has its upper surface at atmospheric pressure, and is in direct contact with the atmosphere through the open pore spaces of the overlying soil or rock. It may be referred to as a water table aquifer.
Vadose zone well	A type of well constructed in the interval between the land surface and the top of the static water level and designed to optimize infiltration of water. Also referred to as a dry well.
Water-table aquifer	See unconfined aquifer.

\* Terminology for managed aquifer recharge (MAR) approaches (modified from Dillon, P., 2005, Future management of aquifer recharge. Hydrogeology Journal 13(1):313-316.)