

access areas	areas open for public entry such as golf courses, public and private parks, playgrounds, schoolyards and playing fields, residential landscapes and industrial park landscapes
actual crop evapotranspiration ET_a	rate of evapotranspiration equal to or smaller than predicted ET_{crop} as affected by the level of available soil water, salinity, field size or other causes
active storage	volume of water stored in reservoir between the minimum water level and normal water level
afflux	elevation rise in maximum flood level from the original unobstructed flood level which result after an obstruction to the flow such as a dam, has been introduced
algal bloom	overgrowths of algae in water producing dangerous toxins in fresh or marine water
angle of inclination	the tilt of the PV module with respect to the horizontal plane
application efficiency E_a	ratio of the average depth of irrigation water infiltrated and stored in the root zone to the average depth of irrigation water applied
aquifer	geologic formation which contains water and transmits it at a rate sufficient to be economically developed for pumping with a well
average pressure	average sprinkler pressure of a lateral
basin	field that is level in all directions, encompassed by a dike to prevent runoff, and provides an undirected flow of water onto the field
basin irrigation	type of surface irrigation where water is applied to the basin through a gap in the perimeter dike or adjacent ditch; water is retained until it infiltrates into the soil or the excess is drained off
bearing capacity	maximum average contact pressure between the foundation and the soil which should not produce shear failure in the soil
border irrigation	method of irrigation which makes use of parallel border strips where the water flows down the slope at a nearly uniform depth
border strip	area of land bounded by two border ridges or dikes that guide the irrigation stream from the inlet point of application to the ends of the strip
charge controller	monitors the charging and discharging of the battery connected to the PV array
check dam	small barrier built across the direction of water flow on shallow rivers and streams intended to convey runoff during peak flow and to slow and hold surface water long enough for the water to deposit sediment it is carrying; facilitates irrigation by using the upstream bay of the dam as pump sump
confined aquifer	aquifer where groundwater is confined or overlain by a relatively impermeable layer
contamination	introduction of substances not found in the natural composition of water that make the water less desirable or unfit for intended use
controller	link between motor pump and solar generator that regulates the operation of PV array to pump and is classified into two types: inverter (directly connected to pump set) and charge controller (with batteries)
conveyance efficiency E_c	ratio between water received at the inlet for a block of fields to that released at the project's headwork
conveyance loss	loss of water from a channel during transport due to seepage and percolation
crop coefficient k_c	ratio of the actual crop evapotranspiration to its potential evapotranspiration
crop evapotranspiration	rate of evapotranspiration of a disease-free crop growing in a large field (one or more ha) under optimal soil conditions, including sufficient water and fertilizer and achieving

	full production potential of that crop under the given growing environment; includes water loss through transpiration by the vegetation, and evaporation from the soil surface and wet leaves
cropping pattern	sequence of different crops grown in regular order on any particular field or fields
crop water requirement CWR	amount of water used in producing crops which is the sum of evapotranspiration or consumptive use plus seepage and percolation losses
critical depth	depth of water flow where the energy content is at minimum hence, no other backwater forces are involved
dam	any barrier constructed to store water
dam height	vertical distance from lowest point of the ground line to the dam crest
dead storage	volume below the intake structure computed as $V = 20900 \times A^{0.687}$ where A is the drainage area, (km ²), sediment volume based on 25 years of accumulation in the reservoir
designed height	actual height of the embankment after settlement
design irrigable area	maximum area which an irrigation project can serve considering the extent of arable lands and the available water supply
design pressure	pressure required to overcome the elevation difference between the water source and the sprinkler nozzle, to counteract friction losses and to provide adequate pressure at the nozzle for good water distribution
diversion dam	structure or weir provided across the river or creek to raise its water level and divert the water into the main canal to facilitate irrigation by gravity
distribution uniformity	numerical value on the uniformity of application for agricultural irrigation systems
drop	in-line canal structure designed to convey canal water from a higher level to a lower level, duly dissipating the excess energy resulting from the drop in elevation
drip irrigation	trickle irrigation involves dripping water onto the soil at very low rates (2-20 L/h) from the emitters where water is applied close to plants so that only part of the soil in which the roots grow is wetted
diversion water requirement DWR	the total quantity of water diverted from a stream, lake, or reservoir, or removed from the ground in order to irrigate a crop
effective rainfall ER	amount of rainwater that falls directly on the field and is used by the crop for growth and development excluding deep percolation, surface runoff and interception
effective rooting depth	soil depth from which the bulk of the roots of the crop extracts most of the water needed for evapotranspiration
effective size	particle diameter corresponding to a 10% sieve passing
effluent	discharges from known sources which is passed into a body of water or land, or wastewater flowing out of a manufacturing plant, industrial plant including domestic, commercial and recreational facilities
effluent standard	any legal restriction or limitation on quantities, rates, and/or concentrations or any combination thereof, of physical, chemical or biological parameters of effluent which a person or point source is allowed to delivery into a body of water or land
elevated flume	water conveying conduit or trough which is supported on abutments by piers

emitters	applicator used in drip, subsurface, or bubbler irrigation designed to dissipate pressure and to discharge a small uniform flow or trickle of water at a constant rate that does not vary significantly because of minor differences in pressure
emitter spacing	spacing between emitters or emission points along a lateral line
equipment crossing	provision for passing of equipment and small machinery
evapotranspiration	combination of water transpired from vegetation and evaporated from the soil, water, and plant surfaces
farm ditch	channel which conveys irrigation water from the turnout to the paddy field
farm water requirement FWR	amount of water to replenish the crop water requirement and losses less the effective rainfall
filter drain	dam component which prevents migration of small particles and screen off fine materials that flow with seepage water and prevent piping
finished height	height of the embankment to be attained during construction
Flume	in-line structure with a geometrically specified constriction built in an open channel such that the center line coincides with the center line of the channel in which the flow is to be measured
freeboard	additional height of the dam provided as a safety factor to prevent overtopping by wave action or other causes
furrow irrigation	method of irrigation where water runs through small parallel channels as it moves down the slope of the field
furrows	small parallel channels, made to carry water in order to irrigate the crop
gabion	stones wrapped in wire fence meshes for added stability and strength
head ditch	supply ditch small channel along one part of a field that is used for distributing water in surface irrigation
homogeneous embankment	dam composed of a single kind of embankment material exclusive for slope protection
hydraulic jump	occurs when a thin sheet of incoming flow moving at high velocity strikes water of sufficient depth
hydrologic frequency analysis	estimation of the chance or likelihood of occurrence of a given event by determining the frequency curves of best fit to samples of hydrologic data
inside slope	slope of the upstream face of the embankment
inverter	converts direct current (DC) from PV module to alternating current (AC)
irrigation period	time required to cover an area with one application of water
Karst topography	geological formation shaped by the dissolution of a layer or layers of soluble bedrock, usually carbonate rocks such as limestone or dolomite
land preparation water requirement LPWR	amount of water required in lowland rice production which includes water losses through evaporation, seepage and percolation and land soaking
land soaking water requirement LSR	amount of water required in lowland rice production which is a function of the initial soil moisture and the physical properties of the soil
lateral spacing	spacing between irrigation laterals
leaching	deep percolation of water beyond the root zone of plants, resulting in loss of salts or nutrients

loading limit	allowable pollutant-loading limit per unit of time, which the wastewater generator is permitted to discharge into any receiving body of water or land
manifold	portion of the pipe network between the mainline and the laterals
manufacturer's coefficient of variation Cv	measure of the variability of discharge of a random sample of a given make, model and size of emitter, as provided by the manufacturer and before any field operations or aging has taken place determined through a discharge test of a sample of 50 emitters under a set pressure at 200C
natural spillway	spillway which is not excavated such as natural draw, saddle or drainage way
normal storage elevation	maximum elevation the water surface which can be attained by the dam or reservoir without flow in the spillway
outside slope	slope at the downstream face of the embankment
pan coefficient	ratio between reference evapotranspiration (ET _o) and water loss by evaporation from an open water surface of a pan
pan evaporation	rate of water loss by evaporation from an open water surface of a pan
percolation	vertical flow of water to below the root zone which is affected by soil structure, texture, bulk density, mineralogy, organic matter content, salt type and concentration
permeability test	method to determine the rate of flow under laminar flow conditions through a unit cross sectional area of soil under unit hydraulic gradient
pipng	internal erosion induced by regressive erosion of particles from downstream and along the upstream line towards an outside environment
pollutant	any substance, whether solid, liquid, gaseous or radioactive, which directly or indirectly alters the quality of any segment of the receiving water body or land resource so as to affect or tend to affect adversely any beneficial use thereof, or is hazardous or potentially hazardous to health, or imparts objectionable odor, temperature change or physical, chemical or biological change to any segment of the water body or land, or is in excess of the allowable limits or concentrations or quality standards specified in contravention of the condition, limitation or restriction prescribed in these guidelines
pond	sealed section formed between earth embankments where combined seepage and percolation will be measured
potential irrigable area	area capable of being irrigated, principally as regards to availability of water, suitable soils, and topography of land
pumping test	pumping of water from a fully developed well at a controlled rate and observing, with respect to time, the drawdown in two or more observation wells, in order to determine the aquifer hydrologic properties
PV performance ratio	ratio of the input solar power to the PV module and the output power of the inverter/controller
ray of incidence	the angle with which a ray of sunlight strikes the surface of the PV module, measured with respect to a line perpendicular to said surface
reference crop evapotranspiration ET_o	rate of evapotranspiration from a reference surface which is a hypothetical reference crop with an assumed crop height of 0.2 m, a fixed surface resistance of 70 s/m and an albedo of 0.23
reservoir	part of the system that impounds the runoff or temporary water storage that adds kinetic energy to facilitate water distribution (also known as a water tank)

residual moisture content	moisture left in the soil before the initial irrigation water delivery which describes the extent of water depletion from the soil when the water supply has been cut-off
restricted areas	areas with limited entry such as freeway landscape, highway medians and other similar areas
re-use	taking wastewater from one industry or process, treating it and then using it in another process or industry such as for irrigation, as liquid fertilizer and for aquaculture
rockfill dam	dam that relies on rock, either dumped in lifts or compacted in layers, as a major structural element where an impervious membrane is used as the water barrier and can be placed either within the embankment or on the upstream slope
seepage	water escaping below or out from water conveyance facilities such as open ditches, canals, natural channels, and waterway
seepage line	phreatic line line with no filter arrangements where seepage occurs
seismicity	occurrence or frequency of earthquakes in a region
setback distance	distance from the perimeter of the irrigation area to the community or area of concern that is sensitive to contamination
shallow tubewell	tube or shaft vertically set into the ground at a depth that is usually less than 15 m for the purpose of bringing groundwater into the soil surface with the use of suction lift pumps
Solar Powered Irrigation System (SPIS)	irrigation system powered by solar energy, using PV technology, which converts solar energy into electrical energy to run a DC or AC motor-based water pump. It consists of solar PV modules, pump set, electronic controls to operate the pump, the required hardware, and in some cases other items like inverters and batteries
solar irradiance	amount of solar energy received by or projected onto a surface, expressed in Watts per square meter (W/m ²)
spillway	channel which releases surplus or flood water which cannot be contained in the active storage space of the reservoir
sprinkler irrigation	method of applying irrigation water similar to natural rainfall where water is distributed through a system of pipes by pumping and then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground
sprinkler spacing	distance between two sprinkler heads along the lateral
storage capacity	total capacity at normal water surface elevation
storage ratio	ratio of the storage capacity to the total earth volume required for embankment construction which indicates the relative cost of the different types of reservoir
structural height	vertical distance measured from the top of the dam down to the bedrock
suction lift	the vertical distance from the free suction water level to the center line of the pump suction
surface irrigation system	application of water by gravity flow to the surface of the field. Either the entire field is flooded (basin irrigation) or the water is fed into small channels (furrows) or strips of land (borders)
system efficiency	ratio of the output power of the pump set and the total solar input power
total dynamic head	total head measure of energy increase imparted to the water by the pump and expressed by the algebraic difference between the total discharge head and total suction head, expressed in meters (m)

unconfined aquifer	aquifer which has water table serving as upper surface of the zone of saturation
uniformity coefficient	ratio of the particle size at 60% passing to that at 10% passing
unimodal rainfall pattern	rainfall pattern with five wet months of more than 200 mm/month, five dry months of less than 100 mm/month, two transition months of 100mm-200mm/month and total annual rainfall above 1500 mm
upstream face	side of the embankment wetted by the impounded water
waste	any material either solid, liquid, semi-solid, contained gas or other forms resulting from industrial, commercial, mining, or agricultural operations, or from community and household activities that is devoid of usage and discarded
wastewater	waste in liquid state containing pollutants
water balance	accounting of water inflows, such as irrigation and rainfall, and outflows, such as evaporation, seepage and percolation
watershed	area which contributes runoff or drains water into the reservoir
water right	privilege granted by the government to use and appropriate water
Weir	an overflow structure built perpendicular to an open channel axis to measure the rate of flow of water
well-protected reservoir	reservoir where the upper reaches of the basin is shielded by high mountain barriers
well log	a record of formation stratification of an aquifer showing the depth, thickness, lithology and other aquifer physical characteristics
wetted diameter	diameter of the circular area wetted by the sprinkler when operating at a given pressure and no wind
zoned embankment	dam consisting a central impervious core flanked between zones of more pervious materials
Geologic Investigations	Surface Investigation. Preliminary basis for determining groundwater potential through collection, analysis, and hydrogeologic interpretation of existing maps and logs.
Remote Sensing	Surface Investigation. Determines groundwater conditions using photographs of the earth taken from aircraft or satellite at various electromagnetic wavelengths (e.g., infrared imagery).
Geophysical Exploration	Surface Investigation. Uses scientific measurement of the physical properties of the earth's crust; findings are interpreted for rock type, porosity, water content, and water quality.
Electrical Resistivity Method	Surface Investigation. Determines actual resistivities from apparent resistivities (calculated from current and potential differences); used for delineating geothermal areas, estimating aquifer permeability, and determining polluted water areas.
Seismic Refraction Method	Surface Investigation. Measures the time required for sound (from a small shock) to travel a known distance; used to identify geologic materials and assess site suitability for test drilling.
Test Drilling	Subsurface Investigation. Drilling of small-diameter holes to confirm geologic and groundwater conditions; often used as observation wells for water level monitoring or pumping tests.
Geologic Log	Subsurface Investigation (Test Drilling). Constructed by sampling and examining well cuttings collected during drilling.

Drilling Time Log	Subsurface Investigation (Test Drilling). Has accurate record of time needed to drill each unit depth, interpreted in terms of formation and depth.
Water Level Measurement	Subsurface Investigation. Determines depth to groundwater, flow directions, changes in water levels over time, and effects of pumping tests.
Geophysical Logging	Subsurface Investigation. Uses sensing devices to determine a physical parameter interpreted in terms of formation characteristics, groundwater quantity, quality, movement, and borehole structure.
Resistivity Logging	Subsurface Investigation. Measures the resistivities of the surrounding media in an uncased well using current and potential electrodes; trace variation relates to depth.
Spontaneous Potential Logging	Subsurface Investigation. Measures natural electrical potentials to determine permeable zones and estimate total dissolved solids in groundwater.
Radiation Logging	Subsurface Investigation. Measures fundamental particles emitted from unstable radioactive isotopes in cased wells or open holes filled with fluid.
Temperature Logging	Subsurface Investigation. Uses a recording resistance thermometer to obtain a vertical traverse measurement of groundwater temperature.
Caliper Logging	Subsurface Investigation. Measures the average diameter of a borehole using caliper tools to identify lithologic properties, locate fractures, and correct other logs.
Dug Well	Shallow well. Used in unconsolidated formations with large diameters which permit considerable water storage.
Bored Well/Augered Well	Shallow well. Used in formations with very shallow water depths ; constructed using a hand-operated or power-driven earth auger.
Driven Well	Shallow well. Used in unconsolidated formations with shallow water tables that contain not too many rocks; constructed using a series of connected lengths of pipe driven by repeated impacts.
Jetted Well	Shallow well. Constructed by the cutting action of a downward-directed stream of water to excavate the hole and carry the excavated materials out of the hole.
Depth of water bearing formation	Lithological property. Relevant for well design, well depth.
Aquifer thickness	Lithological property. Relevant for well design, length of screened or perforated portion of well.
Presence or absence of confining layer (confined, semi-confined or unconfined); Thickness and hardness of confining layer or layers	Lithological property. Relevant for well design, methods of well drilling and development.
Particle size distribution of aquifer materials	Lithological property. Relevant for well drilling, specifications of well perforations and gravel envelop in artificially developed wells.
Water table or piezometric level	Soil water property. Relevant for feasibility of suction lifting, groundwater withdrawal amounts before water level goes down below suction lifting range, well design, practical limits to STW deep setting, selection of pumping units.

(annual range of fluctuations)	
Groundwater quality (salinity, presence of toxic elements)	Soil water property. Relevant for suitability of water for irrigation.
Hydraulic conductivity or transmissivity	Hydraulic property. Relevant for well design, economic worth of aquifer as water source, well discharged-drawdown relationships, spacing of wells, maximum discharge under suction lifting, determining specifications of STW pumping units.
Specific yield or storage coefficient	Hydraulic property. Relevant for established head-storage volume relationships and head-pump discharge relationships, well design, spacing of wells, specifications of pump sets.
Probable recharge, Usable recharge, Groundwater discharge	Recharge-discharge property. Relevant for estimating safe yields, groundwater conservation and management, planning STW irrigation projects.
Safe yield	Recharge-discharge property. Relevant for shallow aquifer conservation and management, allocating GW resources.
Weir	An overflow structure built perpendicular to an open channel axis to measure the rate of flow of water.
Flume	In-line structure with a geometrically specified constriction built in an open channel such that the center line coincides with the center line of the channel in which the flow is to be measured.
Orifice	Measuring device with a well-defined, sharp-edged opening in a wall through which flow occurs such that the upstream water level is always well above the top of this opening.
Current Meter	Velocity measuring device used in a sample point through which partial discharge can be obtained.
Sharp-Crested/Thin-Plate Weir	A weir constructed with a crest of vertical thin plate.
Anemometer and Propeller Type Current Meter	Current meter that uses anemometer cup and propellers for sensing velocity; it is rated by dragging through tanks of still water at known speeds and does not sense the direction of velocity.
Electromagnetic Current Meter	Current meter that produces voltage proportional to the velocity; it provides direct analog reading of velocity and directional measurements.
Doppler Type Current Meter	Current meter that measures velocity by the change of source light or sound frequency from the frequency of reflections from moving particles; uses laser light (laser Doppler velocimeters) or sound (acoustic Doppler velocimeter).
Optical Strobe Velocity Meter	Current meter that measures velocity using the strobe effect with mirrors mounted around a polygon drum reflecting light coming from the water surface. The rate of rotation of the mirror drum is varied until images become steady, and surface velocity can be determined when the rate of rotation and the distance from the mirrors to the water surface are known.
Piezometers	Dam instrument. Provide data on the water pressure at selected points within an embankment dam or foundation.
Pneumatic piezometer	Dam instrument. Measures pore water pressure acting on one side of a flexible diaphragm by applying an equal pneumatic pressure (nitrogen or carbon dioxide is the

	recommended gas). Buried within embankment dam; connected with tube lines to reading point on downstream slope.
Standpipe piezometer	Dam instrument. Measures the water level within a casing using an electrical probe called a dipmeter; includes open-well piezometers and groundwater observation wells.
Flow Measuring Devices	Dam instrument. Measure the total seepage and the seepage from selected locations, both through and under the dam. Weirs (often V-notch weirs) are placed strategically to collect and measure seepage water.
Total Pressure Cells	Dam instrument. Measure the total vertical pressure (combination of water pressure and effective earth pressure) at selected locations within the embankments. They are usually pneumatic.
Cross-arm Settlement Devices	Dam instrument. Measure internal settlements in an embankment dam and in foundations. They use a series of horizontally placed cross-arms along vertical tubing, whose elevations are determined by lowering a cylindrical torpedo.
Surface Settlement and Deflection Points	Dam instrument. Measure long term settlement and horizontal deflection on the dam crest and slopes. These are steel pins set in concrete blocks embedded on the embankment fill, surveyed using precise methods.
Seismic Instruments	Dam instrument. Installed to measure the effects of strong earthquakes and seismic activity at the site.
Strong Motion Accelerograph	Dam instrument. A high precision, battery operated recorder designed to measure ground accelerations resulting from a strong local earthquake; triggered automatically when a certain magnitude is reached.
Auxiliary Short Period Accelerograph System	Dam instrument. Monitors any crustal disturbance at the damsite by recording low-motion seismic events; provides a continuous record of local seismic activity.
Closed Single Basin	Basin Irrigation Type. Water is applied to one basin and fully infiltrates. Each basin operates independently. Inflow is typically shut off before the water reaches the downstream end.
Multiple/Sequential Basin	Basin Irrigation Type. Basins are irrigated separately using a supply channel where water overflows onto the basin. Excess water drains back to the channel and irrigates the next downstream basin.
Direct Method	Basin Irrigation Operation Method. Irrigation water is channeled straight from the field channel into the basin using siphons, spiles, or bundbreaks.
Cascade Method	Basin Irrigation Operation Method. Water is supplied to the highest terrace and then allowed to flow sequentially to lower terraces.
Open-end Border System	Border Irrigation Type. Used for large borders; the ends have openings for free water flow and drainage.
Blocked-end Border System	Border Irrigation Type. Used for small borders; the end borders prevent further downward flow of water.
Corrugation Irrigation	Furrow Irrigation Type. Water flows down the slope in small furrows (corrugations or rills). It is used for germinating drill-seeded or broadcasted crops without using raised beds.
Zigzag Furrow	Furrow Irrigation Type. Designed to increase the water travel length, which reduces the average slope and water velocity. These furrows can be mechanically formed down and across the slope.
Set System	Sprinkler systems that operate with sprinklers set in a fixed position.

Periodic-Move System	Sprinkler systems that must be moved manually through a series of positions during the course of irrigation.
Hand-Move System	Sprinkler systems composed of portable or buried pipe with valve outlets for attaching the portable laterals . Categories include portable, semi-portable, and drag-hose type.
Mechanical-Move System	Sprinkler systems that are moved mechanically.
Side-roll lateral system	Sprinkler systems with lateral pipes rigidly coupled, supported by large wheels (the lateral forms the axle), and mechanically moved by an engine mounted at the center.
End-tow lateral system	Sprinkler systems with laterals rigidly coupled, connected to a buried mainline, and towed lengthwise over the mainline in an "s" form.
Gun and boom sprinkler system	Sprinkler systems with nozzles attached to long discharge tubes and rotated by means of a rocker arm drive .
Fixed System	Sprinkler systems not requiring to be moved during the course of irrigation. Categories include solid-set, permanent buried, and sequencing-valve laterals.
Continuous Move System	Sprinkler systems that operate while moving in either a circular or straight path.
Center-Pivot	Sprinkler systems that sprinkle water from a continuously moving lateral pipeline that is fixed at one end (pivot point) and rotates to irrigate a large circular area.
Linear-Move	Sprinkler systems that combine the structure and guidance system of a center-pivot lateral with a traveling water-feed system similar to a travelling sprinkler.
Travelling	Sprinkler systems with high capacity sprinkler fed with water through a flexible hose, mounted on a self-powered chassis, and travels along a straight line while watering.
Impact sprinkler	Sprinkler type. Water coming out of the nozzle is directed by the spoon at 90°, forcing the arm away from the impact bridge; the arm spring returns the arm, which hits the bridge, causing the body to rotate . Usually made of brass, stainless steel, aluminum, and heavy-duty plastic.
Rotor and gear rotating sprinkler	Sprinkler type. Water coming out of the nozzle is directed into an offset channel on the rotor plate, creating a reactionary drive force that turns the sprinkler . Gear-driven types are often for landscape use, while rotor-types are used for solid set, portable, and semi-portable agricultural systems.
Stationary sprinkler	Sprinkler type. Manufactured from stable engineering plastic and silicon tubing; has no moving parts and a built-in flow controller, making it suitable for undulating terrain. Water sets the silicon tube in motion to spread water on the field.
Long-path Emitter	Emitter (pressure dissipation) . Water is routed through a long, narrow passage with laminar flow to reduce pressure and create more uniform flow; flow areas range from 1 mm ² to 4.5 mm ² .
Tortuous Emitter	Emitter (pressure dissipation) . Has relatively long flow paths with larger cross-sections operating under turbulent flow regime.
Short-path Emitter	Emitter (pressure dissipation) . Similar to long-path emitters but with a shorter water path; ideal for very low-pressure systems.
Orifice Emitter	Emitter (pressure dissipation) . Uses a fully turbulent jet at the outlet, which breaks into drop-by-drop flow; flow area ranges from 0.2 mm ² to 0.35 mm ² .

Vortex Emitter	Emitter (pressure dissipation). Contains a round cell that induces circular flow; the fast rotational motion creates a vortex, generating higher head loss that allows larger openings.
On-off Flushing Emitter	Emitter (flushing ability). Flushes for a few moments each time the system is started and again when turned off.
Continuous Flushing Emitter	Emitter (flushing ability). Continuously ejects large particles during operation using relatively large-diameter flexible orifices in series to dissipate pressure.
On-line Emitter	Emitter (lateral connection). Designed for direct or indirect installation on the wall of the irrigation lateral.
In-line Emitter	Emitter (lateral connection). Intended for installation between irrigation laterals.
Line-source Emitter	Emitter (field application). Discharges water from closely spaced perforations, emitters, or a porous wall along the lateral line.
Point-source Emitter	Emitter (field application). Discharges water from individually spaced emission points, typically spaced more than 1 m apart; multiple-outlet emitters can discharge at two or more points.
Straight Embankment	Small farm reservoir. Suited to an area with an undulating topography . A dam is built across a valley, and water is impounded on the upstream side of the dam.
Rectangular Balanced Excavation	Small farm reservoir. On slightly sloping land , excavated earth can be used to impound water above ground level. On higher slopes, it can be designed so that all water is stored above service level.
Semicircular Embankment	Small farm reservoir. Water is impounded against the slope behind a semicircular embankment.
Dugout Pond	Small farm reservoir. The only design suited to flat areas . The reservoir is constructed by excavating the earth , leaving storage space filled with water below the ground level, requiring pumping to draw out water.
Ogee	Diversion dam. A weir wherein the upper curve conforms to the shape of the lower nappe of a ventilated sheet of water falling from a sharp-crested weir; it has a high discharge efficiency and is suited for most sites under normal conditions .
Vertical Drop	Diversion dam. A weir that produces free-discharging flows and dissipates the overflowing water jet with impact in the downstream apron. This type is not adaptable for high drops on yielding foundation . For mountain streams with very steep slopes where a hydraulic jump cannot form, the drop height should not exceed 1.50 m, and the foundation must be firm and unyielding .
Glacis	Diversion dam. A weir with a surface that slopes gently downward from the crest to the downstream apron, where only the horizontal component of the overflow jet impacts the tailwater. It is most adaptable for rivers that have heavy sediment loads . It is also used for weirs not more than 1 m high located on rivers with large, rolling boulders and other debris during flood condition .
Gated	Diversion dam. A weir where the main body achieves most of the ponding, but additional head is achieved by installing gates on the crest that can be collapsed or raised during floods. It is suited for use in rivers or creeks where the afflux level would affect populated or cropped areas on the upstream side or for sites where the river has heavy sediment loads during floods which need to be passed through the gate openings.

Trapezoidal	Diversion dam. A weir with sloping upstream and downstream slopes which allow boulders and debris to roll over and hit the downstream apron with less impact. It is suitable for weirs more than 1 m in height but not exceeding 4 m , located on rivers with large, rolling boulders and other debris during flood condition .
Corewall	Diversion dam. Used to stabilize the river bed for intake type diversion structures or to gain a limited diversion head; the external part is pure concrete while the inside is filled with stones and cobbles for an economical section. It is used to stabilize the river bed for sites of intake structures requiring only a minimal additional diversion head and where there is a need to maintain a smooth flow into the intake ; the maximum height from the crest to the existing river bed is 0.50 m.
Brushwood Check Dam	Constructed using posts and brush; suited for gradients of 5% to 12%, depths less than 1 m, lengths ≤ 100 m, and catchment areas ≤ 1 ha. Maximum dam height is 1 m, with upstream and downstream face inclination of 30% backwards, and a concave or rectangular spillway form.
Log Check Dam	Constructed using logs and posts, planks, heavy boards, slabs, poles, or old railroad ties; suited for lengths ≤ 100 m and catchment areas ≤ 2 ha. Maximum dam height is 1.5 m, with upstream and downstream face inclination of 25% backwards. The spillway is rectangular, with a length of 1 m to 2 m and a depth of 0.5 m to 0.6 m.
Loose Stone Check Dam	Constructed using relatively small rocks; suited for lengths ≤ 100 m and catchment areas ≤ 2 ha. Maximum dam height is 1.5 m, foundation depth is ≥ 0.5 m. It features a vertical upstream face and a downstream face inclination of 20%. Dam thickness at the spillway level is 0.5 m to 0.7 m.
Boulder Check Dam	Constructed using boulders; suited for lengths ≤ 900 m and catchment areas ≤ 20 ha. Maximum dam height is 2 m, foundation depth is ≥ 0.5 dam height. It features a vertical upstream face and a downstream face inclination of 30%. Dam thickness at the spillway level is 0.7 m to 10 m, with a Trapezoidal spillway.
Masonry Check Dam	Constructed using cement mortar and non-disintegrating stones ; suited for lengths > 900 m and catchment areas > 20 ha. Design details are addressed through computations as shown in Section 5.2.
Gabion Check Dam	Constructed using gabions (stones wrapped in wire fence meshes); suited for lengths > 900 m and catchment areas > 20 ha. Design details are addressed through computations as shown in Section 5.3.