

Planning, design and installation of irrigation schemes —

Part 1: Glossary of terms

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Committees responsible for this British Standard

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- Agricultural Engineers' Association
- British Agricultural and Garden Machinery Association Ltd.
- Health and Safety Executive
- Ministry of Agriculture, Fisheries and Food
- National Farmers' Union
- Silsoe College
- Silsoe Research Institute
- UK Irrigation Association
- Water Services Association of England and Wales
- Well Drillers' Association

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Foreword

This Part of BS 7562 has been prepared under the direction of the Agricultural Machinery and Implements Standards Policy Committee and is a glossary to a series of Parts containing recommendations on good practice in the planning, design and installation of irrigation schemes together with information and guidance. BS 7562 is intended for the use of engineers and farmers having some knowledge of the subject. It embodies the experience of engineers successfully engaged on the design and construction of irrigation schemes so that other reasonably qualified engineers may use it as a basis for the design of similar irrigation schemes.

The other Parts of BS 7562 are written as codes of practice. A code of practice represents good practice at the time it is written and, inevitably, technical developments may render parts of it obsolescent in time. It is the responsibility of engineers concerned with the design and construction of schemes to remain conversant with developments in good practice, which have taken place since publication of the code.

The six Parts of BS 7562 are as follows.

- *Part 1: Glossary of terms;*
- *Part 2: Code of practice for acquisition of site data¹⁾;*
- *Part 3: Code of practice for irrigation water requirements¹⁾;*
- *Part 4: Code of practice for water resources¹⁾;*
- *Part 5: Code of practice for distribution systems and irrigation equipment¹⁾;*
- *Part 6: Code of practice for implementation procedures¹⁾.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 27 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ In preparation.

1 Scope

This Part of BS 7562 gives a glossary of terms used in the planning, design and installation of irrigation systems.

Units of measurement are generally quoted in SI units.

No.	Term	Definition
Section 1. Basic terms		
1 01	actual crop evapotranspiration [ET_a (crop)]	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; mm/day.
1 02	agriculturally effective rainfall	Rainfall available for plant growth.
1 03	allowable soil water depletion	Depth of water in the root zone readily available to the crop for given soil and climate, allowing unrestricted evapotranspiration as the fraction p of total available soil water between field capacity and wilting point; mm/m soil depth.
1 04	available water capacity (AWC)	The soil water which is available or can be taken up by plants at any moisture content between field capacity and permanent wilting point; mm. NOTE Sandy soils contain less available water than clay soils and loams form an intermediate group.
1 05	average annual rainfall	For a specified place, the average annual value for rainfall is the mean of the annual amounts over the period for which rainfall statistics are available. In the UK the period seldom exceeds 40 years; mm.
1 06	capping	The formation of a crust on a soil, often during a hot, dry spell, usually after heavy rain which causes the surface soil particles to break down, blocking up the soil pores.
1 07	crop coefficient/factor	Ratio between crop evapotranspiration and the reference crop evapotranspiration (ET _r); mm/day.
1 08	depth of irrigation, d	Gross depth of water discharged by irrigation system (including application losses).
1 09	effective groundcover	Percentage of ground covered by the crop when ET crop is approaching maximum, generally 70 % to 80 % of surface area.
1 10	effective rooting depth	Soil depth from which the full-grown crop extracts most of the water needed for evapotranspiration; mm.
1 11	field capacity	The maximum possible amount of water held by a soil allowing for free drainage; mm/m. NOTE For example, the field water content of soil 2 days or 3 days after heavy rain or irrigation.
1 12	infiltration rate	The rate at which water is absorbed, or seeps into or through the interstices of a soil or other porous material; mm/h. a) initial infiltration rate. The rate at which the water enters the soil at the beginning of water application to the soil. b) instantaneous infiltration rate. The rate at which water enters the soil at a specific point in time. c) average infiltration rate. Rate of infiltration of water into the soil. The total depth of water applied divided by the time during which the water is applied.

No.	Term	Definition
		d) final infiltration rate . Rate at which water will enter the soil when, after initial wetting of the soil, the rate becomes essentially constant.
1 13	net irrigation requirement	Depth of water required for meeting evapotranspiration minus contribution by precipitation, groundwater, stored soil water. This does not include operation losses and leaching requirements; mm/period.
1 14	potential crop evapotranspiration [ET(crop)]	Rate of evapotranspiration of a disease-free crop growing in a large field under optimal soil conditions, including water and fertilizer. Includes water loss through transpiration by vegetation and evaporation from the soil surface and wet leaves; mm.
1 15	readily available moisture	The volume of moisture held in a soil that can be extracted without moisture stress.
1 16	reference crop evapotranspiration (ET_r)	Rate of evapotranspiration from an extended surface of 8 mm to 15 mm tall, green grass cover of uniform height, actively growing, completely shading the ground and not short of water; mm/day.
1 17	soil structure	The arrangement of individual soil particles and aggregates.
1 18	soil water tension	Force at which water is held by the soil or negative pressure or suction that has to be applied to bring the water in a porous cup into static equilibrium with the water in the soil.
1 19	wilting point	a) permanent wilting point. The stage when a soil is so dry that plant roots are permanently unable to extract water at a rate sufficient to maintain turgidity. NOTE At this stage, transpiration almost ceases, the plants wilt, and the plant is said to be at permanent wilting point. b) temporary wilting point. The stage when available soil water is reduced to the point where the rate at which the plant extracts available soil water is less than ET crop even though the soil moisture may be plentiful.

No.	Term	Definition
Section 2. Site data and water resource terms		
2 01	acid	Having a pH value of less than 7.0.
2 02	acidification	The use of acid, usually hydrochloric, to increase the water supply from a borehole which is failing owing to encrustations on screens and slotted pipes. It may also be used to improve the yield from bores in chalk or limestone by enlarging the fissures.
2 03	air-lift pump	An appliance for lifting water in a well or sump. It consists of an air compressor at the surface and two pipes hanging vertically, with one pipe perhaps within the other. The smaller pipe delivers compressed air to the depth at which water occurs. At this point a nozzle discharges the air into the free water and, by aerating it, causes its density to drop. This mixture of water and air is then forced upwards by the head of groundwater.
2 04	air-pumping	Lifting water from a well using compressed air to aerate the water so that the air-water mixture will rise to the surface.
2 05	alkaline	Having a pH value above 7.0.
2 06	alluviation (or aggradation)	The deposition or building-up of sediments by stream or water action, particularly along rivers and estuaries where flow is retarded.
2 07	angle of repose	The maximum slope, measured from the horizontal, at which rocks, soils, and loose material on the banks of canals, rivers, dams, or embankments remain stable.
2 08	angle of slide	The angle (measured in degrees from the horizontal) of the sloping sides of a canal, reservoir, or other cutting, at which a landslide will start. The angle varies considerably and the water content has a major influence.
2 09	annular space	The space or cavity between the outside of the borehole casing and the surrounding ground.
2 10	apron	A hard floor or surface to the bed or banks of a river or canal, or below chutes, spillways, groynes or the toes of dams, to minimize scour. It may consist of begwark, mattress, timber, mass concrete, riprap, or preferably reinforced concrete.
2 11	aquifer	A relatively permeable or fissured deposit which yields useful supplies of water when tapped by a well.
2 12	area of influence (well)	The surface area around a well or borehole with the same horizontal extent as that part of the underlying water-table that is lowered by pumping from the well at a given rate of discharge.
2 13	artesian aquifer	A confined aquifer in which the water is under sufficient pressure to cause water to rise above ground level.
2 14	artesian borehole	A borehole which penetrates an artesian aquifer and in which the water level rises above ground level.

No.	Term	Definition
2 15	artificial recharge	Augmenting the natural infiltration of surface water or rainfall into underground rocks or channels. The recharge may be by spreading of water, by changing the natural conditions, by some form of construction or by putting down wells.
2 16	artificial recharge of aquifer (or groundwater increment or groundwater recharge)	The introduction of surface water, such as streams and rainfall, into underground storage.
2 17	backblowing	A method of improving the water yield from boreholes, particularly in fissured rocks. It is not unlike swabbing in action and is sometimes more effective. It employs compressed air (a) for pumping in the bore by air lift, or (b) by pumping in air (when the top of the hole is sealed) until the maximum pressure is obtained and then releasing it suddenly.
2 18	backwash	The back flow of water which follows the breaking of a wave; it scours and carries the finer material towards deeper water where it is temporarily deposited.
2 19	baffles	A series of plates, vanes or guides set in a channel or conduit to secure more uniform flow conditions by damping eddies.
2 20	bailer	A tool used in drilling for removing sludge, mud or sand from a borehole. It consists of a steel tube with an open end, the other being either closed or fitted with a simple valve.
2 21	balanced earthworks	Earthworks in which the “cuts” equal the “fills”. The ideal is not easily achieved but is a target when planning the layout of trenches, water supply channels, and other hydraulic works.
2 22	base flow	The sustained flow of streams from snow and glaciers (not normal in the UK) or from underground storage and not related to direct runoff. NOTE Sustained flow resulting from drainage of large lakes or springs or other outflow of groundwater, as opposed to surface runoff.
2 23	battering	The artificial sloping bank of a river or other bank to a flatter grade to reduce caving or collapse of the earth. The procedure is often allowed by beaching with stone or by grassing or other vegetation to bind the soil layers.
2 24	beaching	A layer of stones for revetting below the level of stone pitching a reservoir or embankment: the layer is from 0.3 m to 0.6 m thick and stone size from 75 mm to 200 mm. Also applied to a layer of stones of about 150 mm diameter to prevent scour due to wave action.
2 25	bed load	The weight or volume of boulders, pebbles, and gravel rolled or moved by a stream along its bed in unit time.
2 26	bed scour	The wearing away of the rock, soil, or deposited material from the bed of a river by flowing water or waves.
2 27	bed slope	The inclination of the bed of a stream along its course given as difference in elevation per unit of horizontal distance.

No.	Term	Definition
2 28	bentonite	A very fine clay substance with a maximum particle size of 2 μm ; has a very high swelling property when moistened. Used in reservoirs, ponds, irrigation and water supply channels, and in small farm dams to reduce seepage.
2 29	blow out	A failure due to tunnelling or piping in earth dams or channels.
2 30	boil	The seepage or inflow of water and fine sand or silt at the bottom of an excavation due to a high external water pressure.
2 31	bonded gravel screen	A well screen of an improved type and made from particles of gravel bonded together with a resin adhesive.
2 32	borehole	A hole drilled into the ground, from the surface or from subsurface excavations, to secure geological information or for the drainage or abstraction of water.
2 33	borehole casing	A plain or perforated pipe of steel or other material inserted in a borehole; often used in weak or loose ground.
2 34	borehole log	A record, mainly of the rocks penetrated during the drilling of a borehole, and prepared by the master driller or field geologist.
2 35	borehole pattern	The disposition or spacings of a group of boreholes put down for water supplies or for geological information.
2 36	borehole pump	In general, a centrifugal pump, often electrically driven and designed to operate in a borehole.
2 37	borehole samples	Refers to the soil or rock chippings, sludge, or core extracted during drilling and used to ascertain the nature of the ground penetrated in the borehole.
2 38	borehole surveying	The lowering of instruments into a borehole to determine whether the hole has deviated from the vertical plane or the planned direction of drilling.
2 39	brackish	Water which ranges from 1 000 mg/l up to the dissolved salt content of sea water. Mildly brackish: 1 000 mg/l to 5 000 mg/l. Heavily brackish: 15 000 mg/l to 35 000 mg/l.
2 40	cable tool	A sharp chisel-edged bit used in drilling a deep well; it is lifted and dropped to break the rock by impact.
2 41	capacity of well	The ability or competence of a well to yield water under certain specified conditions.
2 42	catchment area	The area of land from which rainwater or snowmelt drains into a reservoir, pond, lake, or stream, usually expressed in hectares or square kilometres.
2 43	checkdam	A low, temporary type of dam or barrier erected across a narrow watercourse to retard flow, minimize erosion, and promote the deposition of silt. It may be of stonemesh, with an apron of similar construction or timber.
2 44	circle of influence	The circular area of ground at the surface corresponding to the circular base of the inverted cone of depression.

No.	Term	Definition
2 45	clay blanket	A construction to reduce the seepage of water through the beds or banks of earthen supply dams or channels. It usually consists of a clay layer, about 0.6 m thick, placed on the slope of the banks or on the bottom of the bed.
2 46	clay core	A watertight core or barrier, consisting of puddled clay, in dam construction and embankments.
2 47	coefficient of permeability	The rate of flow of water, usually in litres per day through unit cross section of soil under hydraulic gradient of unity and a specified temperature. Used to calculate seepage in earth channels or dams and drawdown in wells.
2 48	collecting area	The surface area from which an aquifer receives its supply of water. The area may be large or small and near to, or at some distance from, a well supplied by the aquifer.
2 49	compensation water	The water which is required by law to be released from a reservoir to meet the requirements of the downstream users who received a water supply before the dam was constructed.
2 50	cone of depression (or cone of exhaustion or cone of influence)	The inverted cone-shaped depression in the water-table around a well, shaft, or borehole in which pumping is in operation. The rate of pumping and recharge of groundwater will affect the shape and volume of the cone.
2 51	consolidation	The slow volume reduction of a cohesive soil under applied loads as in foundations, earth dams, and embankments.
2 52	conveyance loss	The loss of water, largely unavoidable, in irrigation and water supply channels. It includes all losses (evaporation, seepage, structure leakage, absorption, etc.) between headworks and the farms or consumers.
2 53	core	The cylinder of rock extracted during drilling with the diamond drill or shot-drill. The core is taken from the core barrel and may be about 25 mm or more in diameter and up to 6 m or more long.
2 54	corrosion	The chemical wearing away of soils and rocks; of minor importance compared with that of erosion. NOTE Internal corrosion of pipes may be caused by the aggressive quality of the water carried.
2 55	cover, soil	The protective mat of vegetation over the soil surface. It retards erosion and runoff.
2 56	crack	An opening which may develop in an earth dam or embankment due to tensile stresses.
2 57	creep (water)	The movement of water and the resulting erosion around and under a structure.
2 58	crest	The top of a dam, weir, spillway, or bank; often restricted to the overflow portion.
2 59	cross section (stream)	A section along a plane at right angles to the mean direction of flow.
2 60	cut and fill	A type of reservoir construction or other works which is partly below ground in cut, and partly above ground in fill or embankment.