



Construction Technology

Dewatering System

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Dewatering:

- Construction of buildings, powerhouses, dams and many other structures requires excavation below the ground water table into water-bearing soils.
- Such excavations require lowering the water table below the slopes and bottom of the excavation to prevent sloughing of the slope and to ensure dry, firm working conditions for construction operations.
- Groundwater can be controlled by means of one or more types of dewatering systems depending on size and depth of the excavation, geological conditions, and characteristics of the soil.

AREA OF APPLICATION

1. Hydro projects
2. Excavation of foundations for buildings
3. Basement construction
4. Laying of deep sewer lines
5. Tunnel work
6. Construction of subways
7. Water supply projects
8. Land reclamation projects
9. Canal construction
10. Thermal power project structures with not too deep foundations
Underground tank construction
11. Bridge construction

Dewatering:

Purpose of Dewatering:

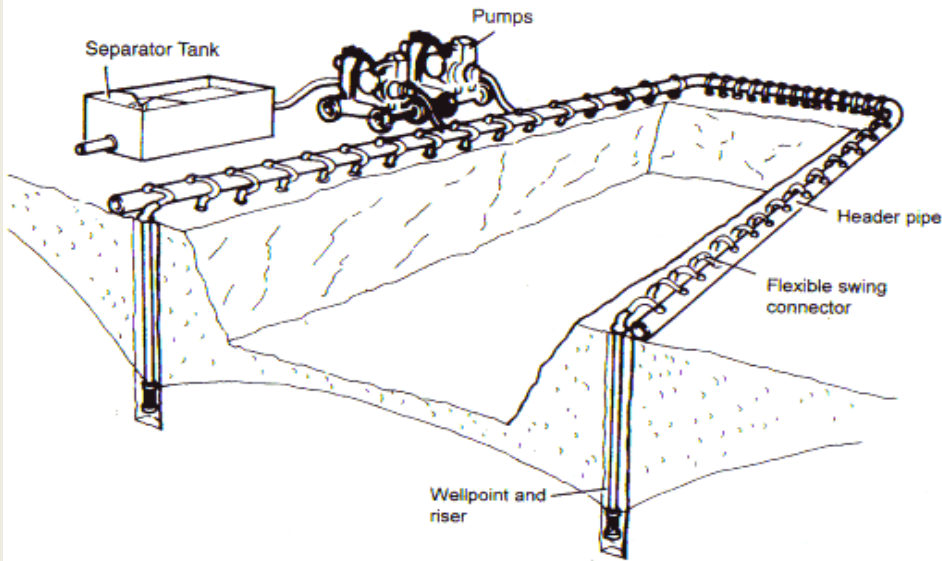
- ✓ To provide suitable working surface at the bottom of the excavation.
- ✓ To stabilize the banks of the excavation thus avoiding the hazards of slides and sloughing.
- ✓ To prevent disturbance of the soil at the bottom of excavation caused by boils or piping. Such disturbances may reduce the bearing capacity of the soil.
- ✓ Lowering the water table can also be utilized to increase the effective weight of the soil and consolidate the soil layers.
- ✓ Reducing lateral loads on sheeting and bracing.

WELL POINT DEWATERING



WELL POINT DEWATERING

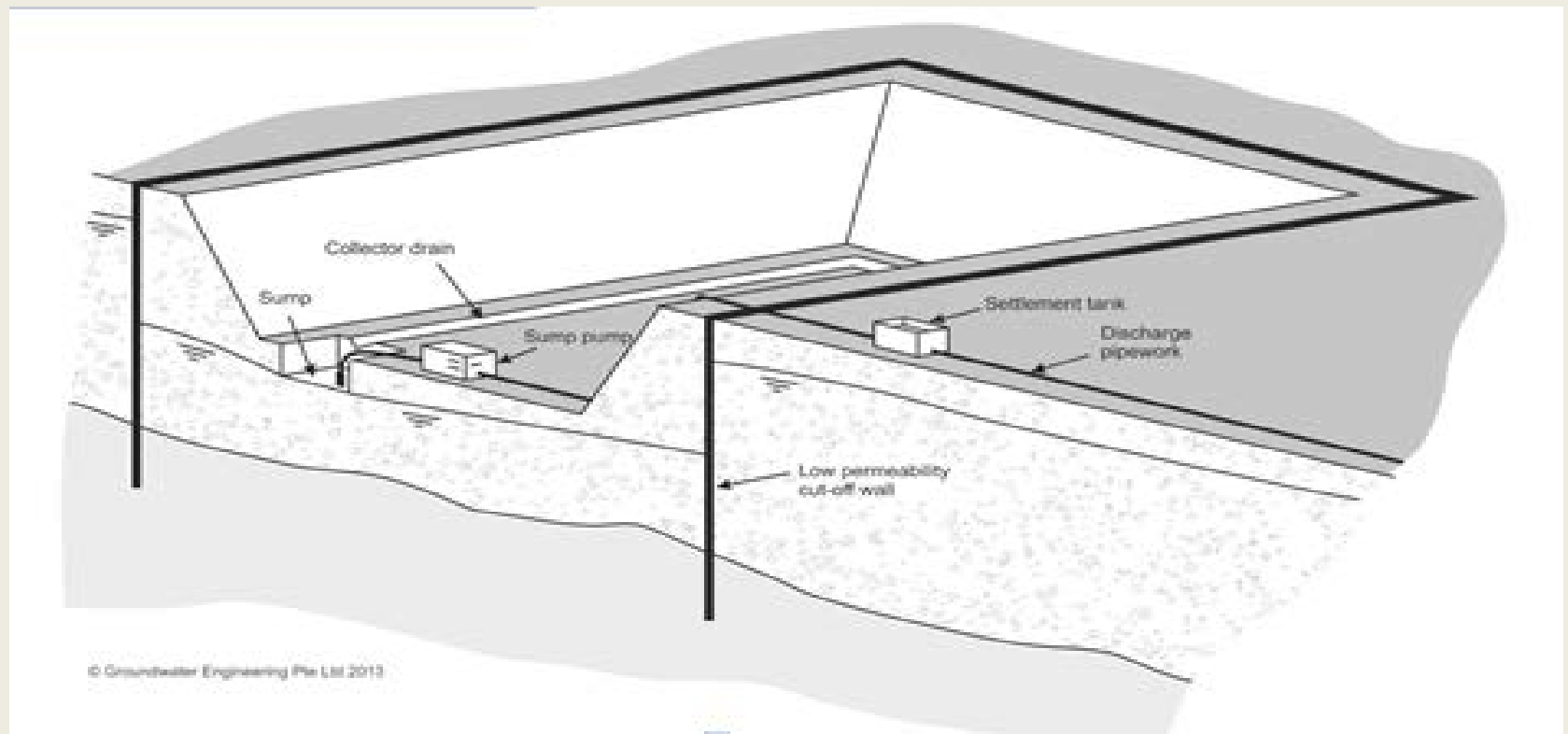
Typical Wellpoint System



- **PICTURES SHOWING WELL POINT**

Dewatering:

As an alternative to groundwater control by pumping, physical cut-off walls can be installed around a site to exclude groundwater from the site.



Dewatering:

Surface water must also be controlled:

Sources of surface water

- ✓ Rainfall
- ✓ Construction operations (e.g. concreting, washing of plant)
- ✓ Seepage through cut-off walls

Detrimental effects of poorly-managed surface water

- Risk of localised flooding
- Softening of soil exposed in excavation

Dewatering:

Controlling the inflow of water into an excavation:

A number of methods are available for controlling the inflow of water into an excavation; the choice of method will depend on:

- ✓ the nature and permeability of the ground,
- ✓ the extent of the area to be dewatered,
- ✓ the depth of the water table below ground level and the amount by which it has to be lowered,
- ✓ the proposed methods of excavation and ground support,
- ✓ The proximity of existing structures,
- ✓ the proximity of water courses etc.

Dewatering:

Widely used dewatering techniques

- Sump Pumping
- Well-points
- Deep-wells
- Ejector wells

Water collection

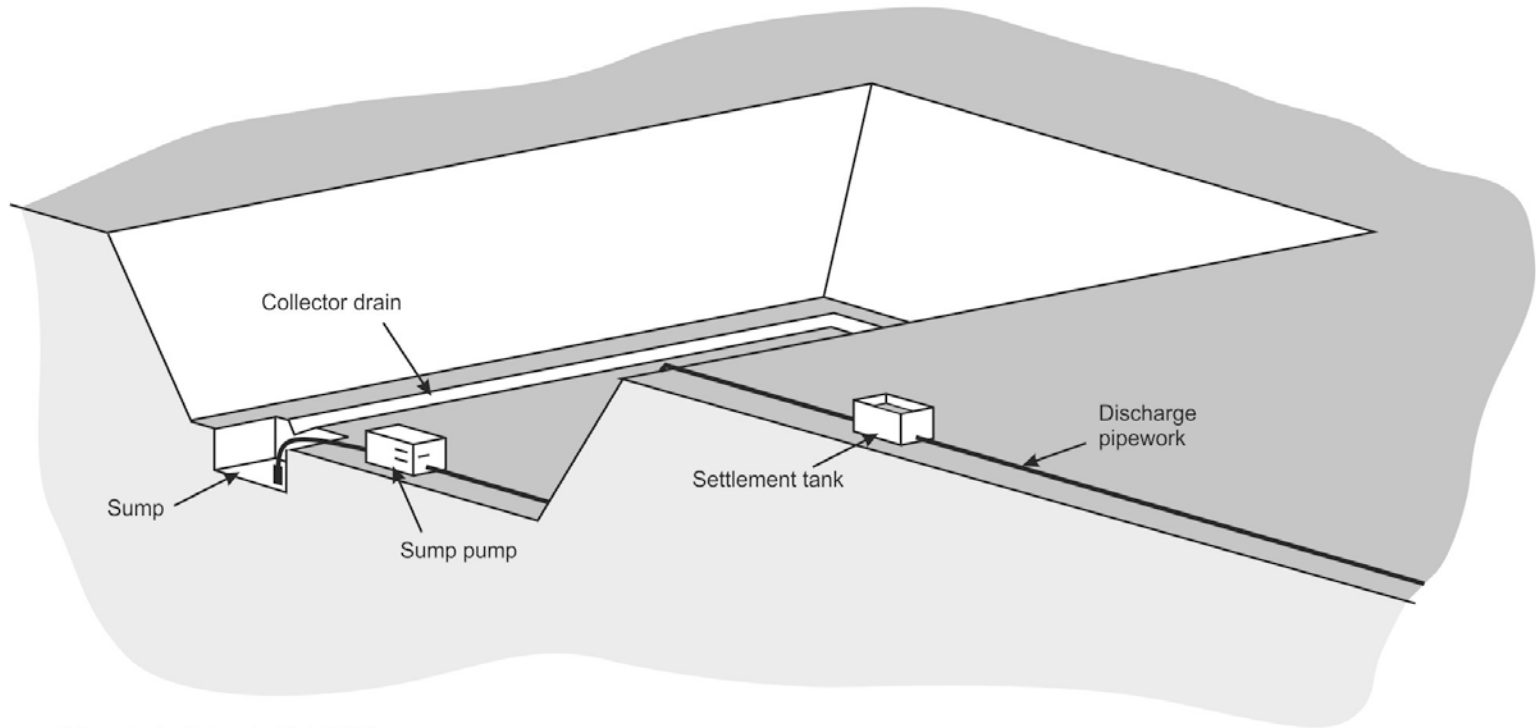
- Trench drains to intercept run off
- collector drains and sumps
- pumping systems (keep it simple!)

Widely used dewatering techniques

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Sump Pumping



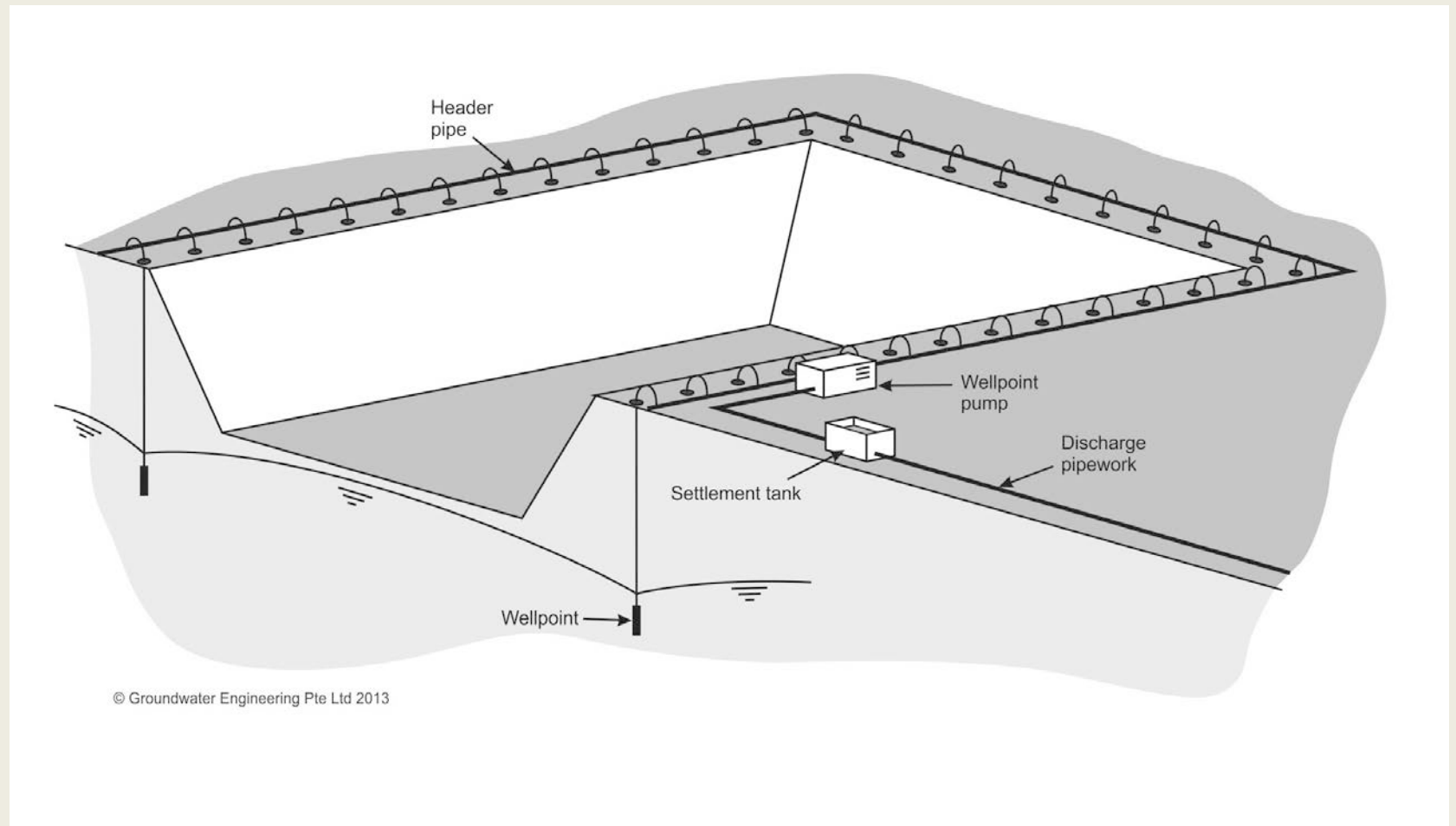
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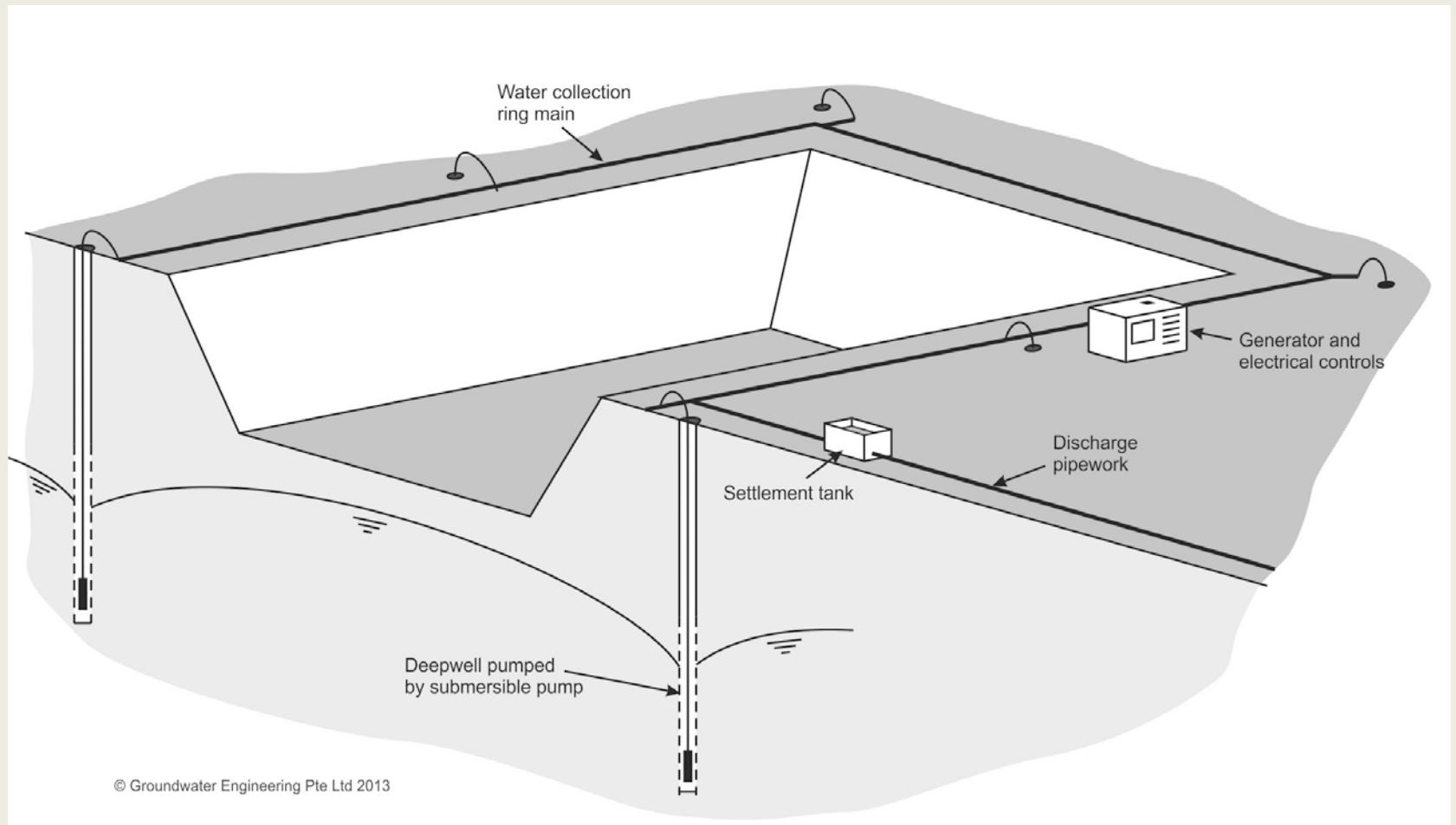
Sump Pumping

- Water is collected in deeper parts of the excavation (called sumps) and pumped away
- Simple and cheap method of dewatering in favorable ground conditions
- Limited to use in relatively coarse soils or fissured rock – if used in fine grained soils can lead to erosion and loss of fines with the risk of resulting instability
- The sump takes up space within an excavation
- Can lead to water pollution problems due to silt-laden water

Wellpoints



Deep-wells



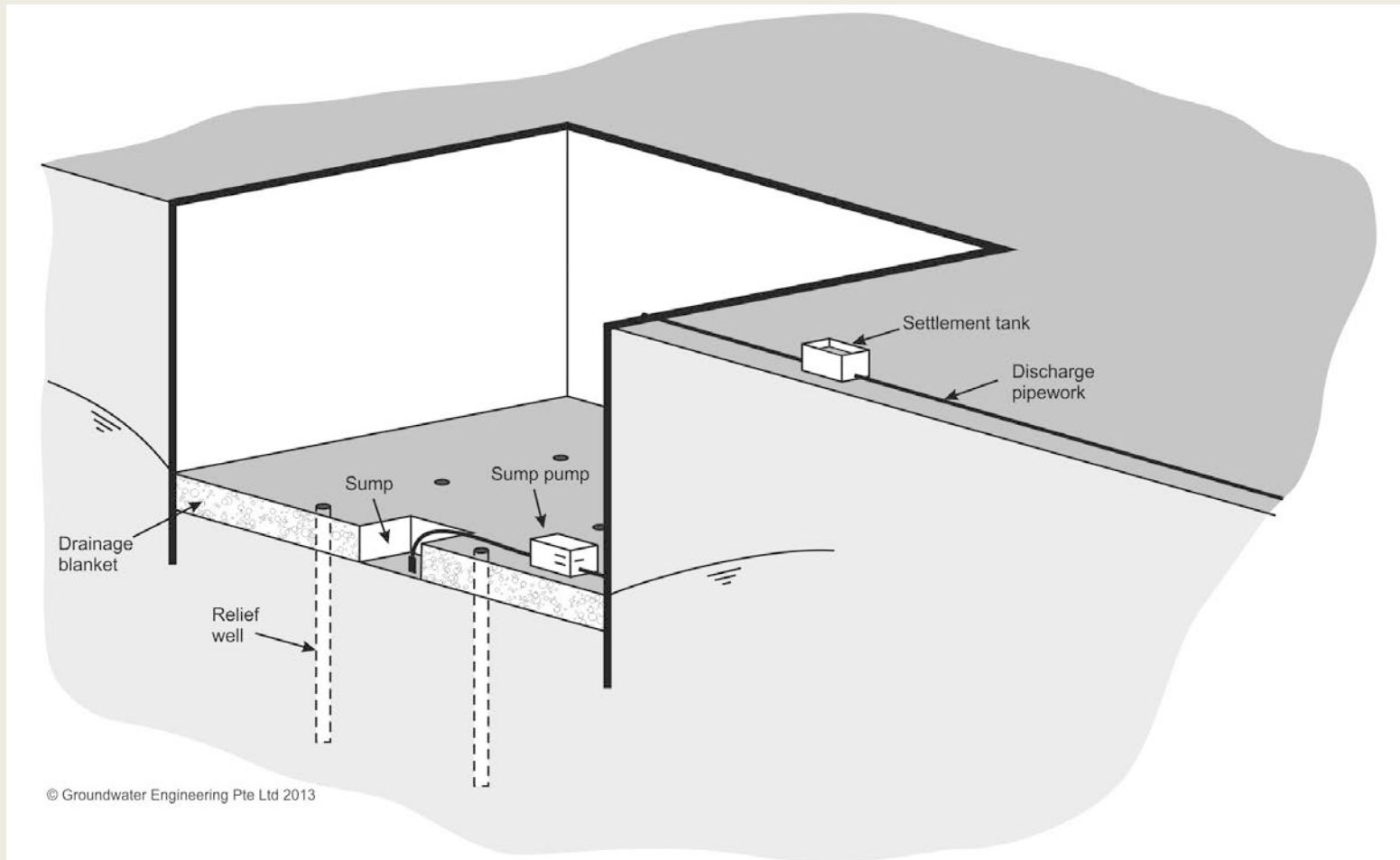


Deep-wells

- Wells are drilled at wide spacing (10 to 60 m between wells) to form a ring around the outside of the excavation
- An electric submersible pump is installed in each well. Drawdown limited only by well depth and soil stratification
- Effective in a wide range of ground conditions, sands, gravels, fissured rocks



Relief Wells



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Relief Wells

- Relief wells are used to form preferential vertical flow paths to relieve water pressures in confined aquifers beneath an excavation
- Water flows upward into the excavation and is collected in a drainage blanket and sumps and pumped away
- Commonly used to prevent heave or uplift of the base of excavations

Next lecture, Compaction Process

THANK YOU!