Hydraulic Head

- Measure of the potential energy available for flow in groundwater.
- Indicated by the water level in a monitoring well (piezometer).
- Total hydraulic head is a combination of gravitational potential energy and fluid pressure energy.

Hydraulic head is measured using small monitoring wells (piezometer wells).

Head is measured as DTW (depth to water), which is then subtracted from the elevation of the well head.
Point water pressure head vs. Fresh water pressure head

- Point water head: the actual measured hydraulic head.
- Fresh water head: the equivalent hydraulic head that would be observed if the well was filled with fresh water.
- If the aquifer contains fresh water, the two are the same.
Fresh water heads

Actual hydraulic gradient

Fresh

Brackish

Saline

Groundwater contours = equipotential / potentiometric contours

Groundwater flows from high to low equipotential.

Groundwater flow lines cross equipotential lines at 90°.
Groundwater divide - barrier to flow created by water table ridge (recharge) or gaining stream valley (discharge).

Figure 72. The potentiometric surface of the upper glacial aquifer slopes gently to the north and south from a central high, except in the western part of the island where groundwater withdrawals have lowered the water table and created areas of dispersion.

Equipotential contour lines: cross section view

- All points along the same equipotential line have equal value of hydraulic head.
- Hydraulic head = elevation of intersection of water table and potentiometric contour.
Equipotential contour values

Flow lines and Recharge / Discharge

\[ H_T = 25 \]
\[ H_p = 30 \]
\[ z = -5 \]
The hydraulic gradient across a local area of an aquifer can be determined if three values of hydraulic head are known.