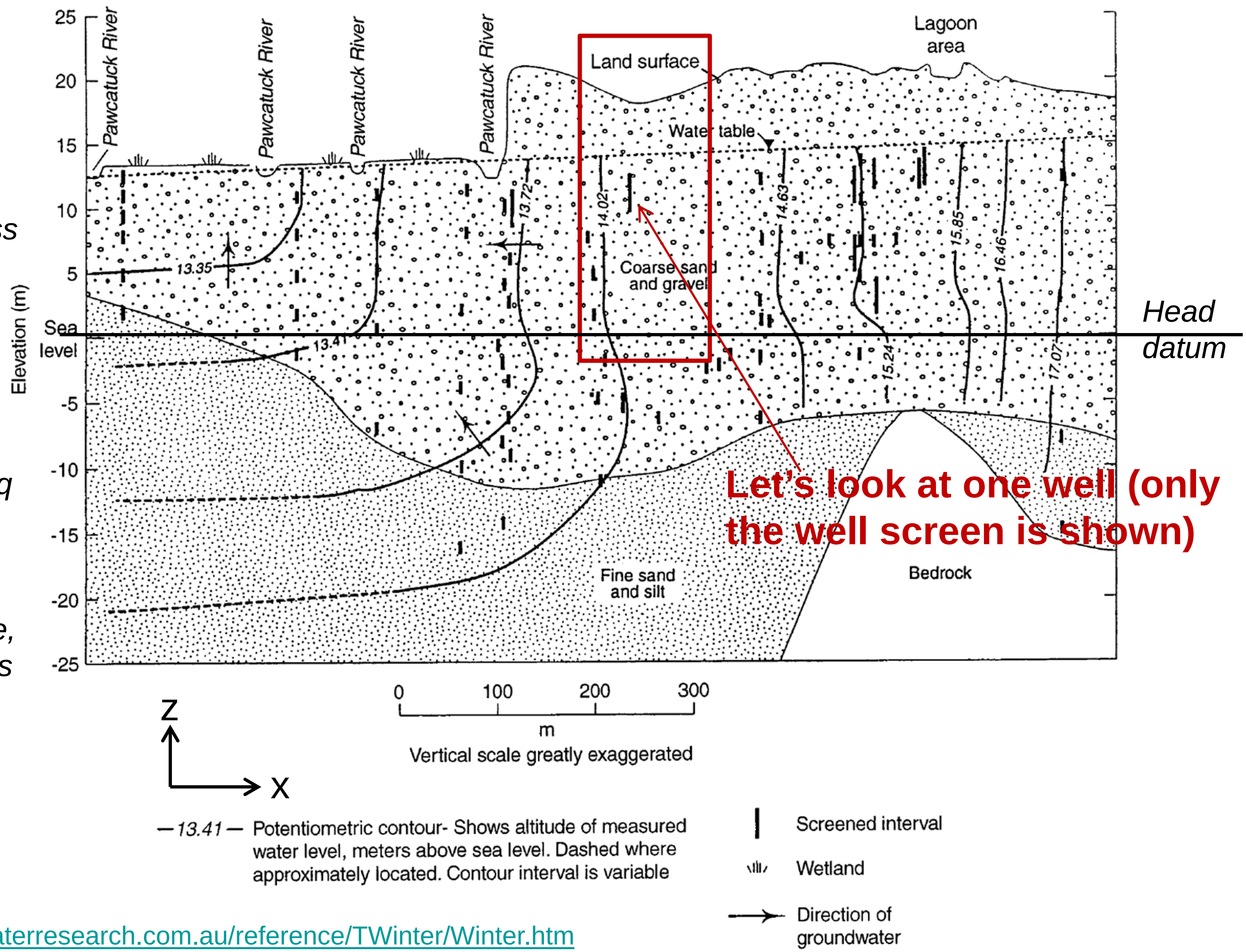
Besides water table map (Hw5) or potentiometric surface map (future Lab 5) where $h=h(x,y)$ (vertical head variation in the aquifer is ignored), another common head contour map is constructed along a geologic cross section $h=h(x,z)$:

Darcy flux vectors (black arrows) are perpendicular to the head contours, since the researchers assumed isotropic conductivity (in a cross section, it means Kx=Kz).

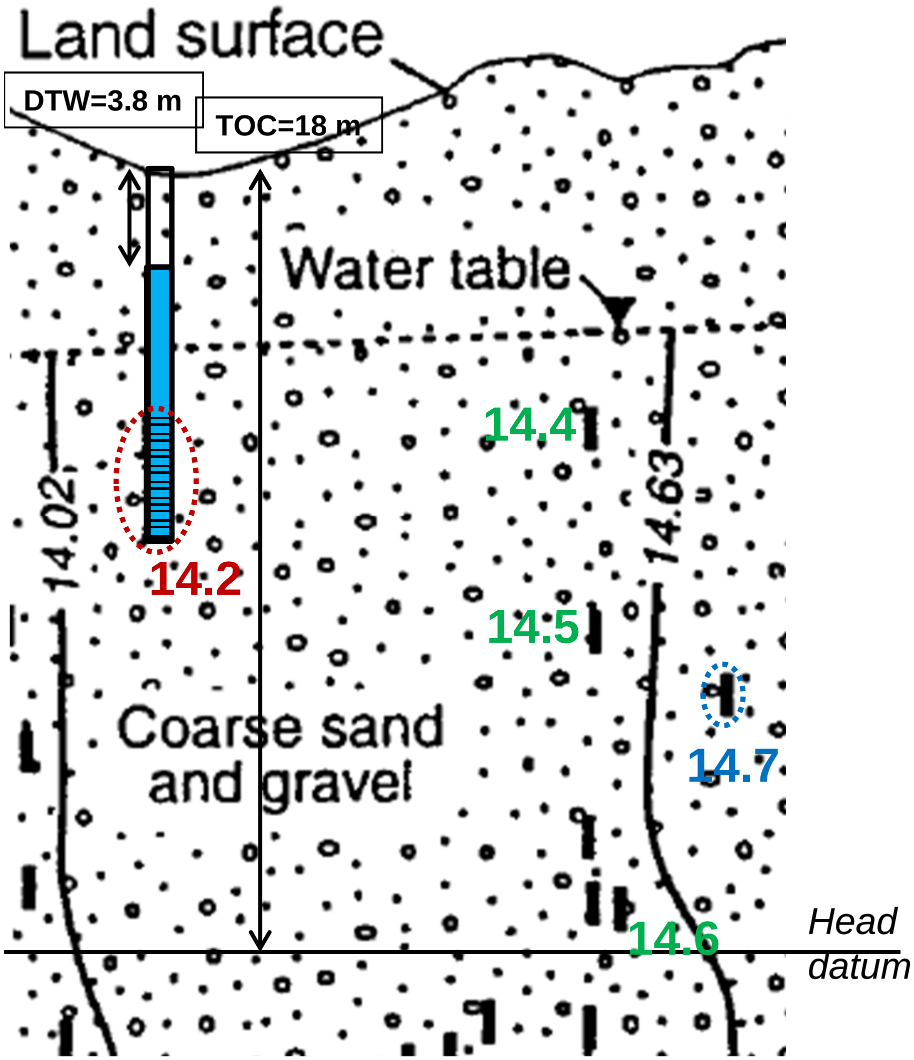
However, if Kz=Kx/10 due to sedimentary layering, you would know how to find the q vectors exactly?

- *Recall Ex5 of Chp4;*
- *Here, head contours are changing in space, so you need to assess the head gradient vector locally (i.e., a moving windows analysis).*



http://www.groundwaterresearch.com.au/reference/TWinter/Winter.htm

How was the previous head contour map created?



Let's put a well back in to help us better understand:

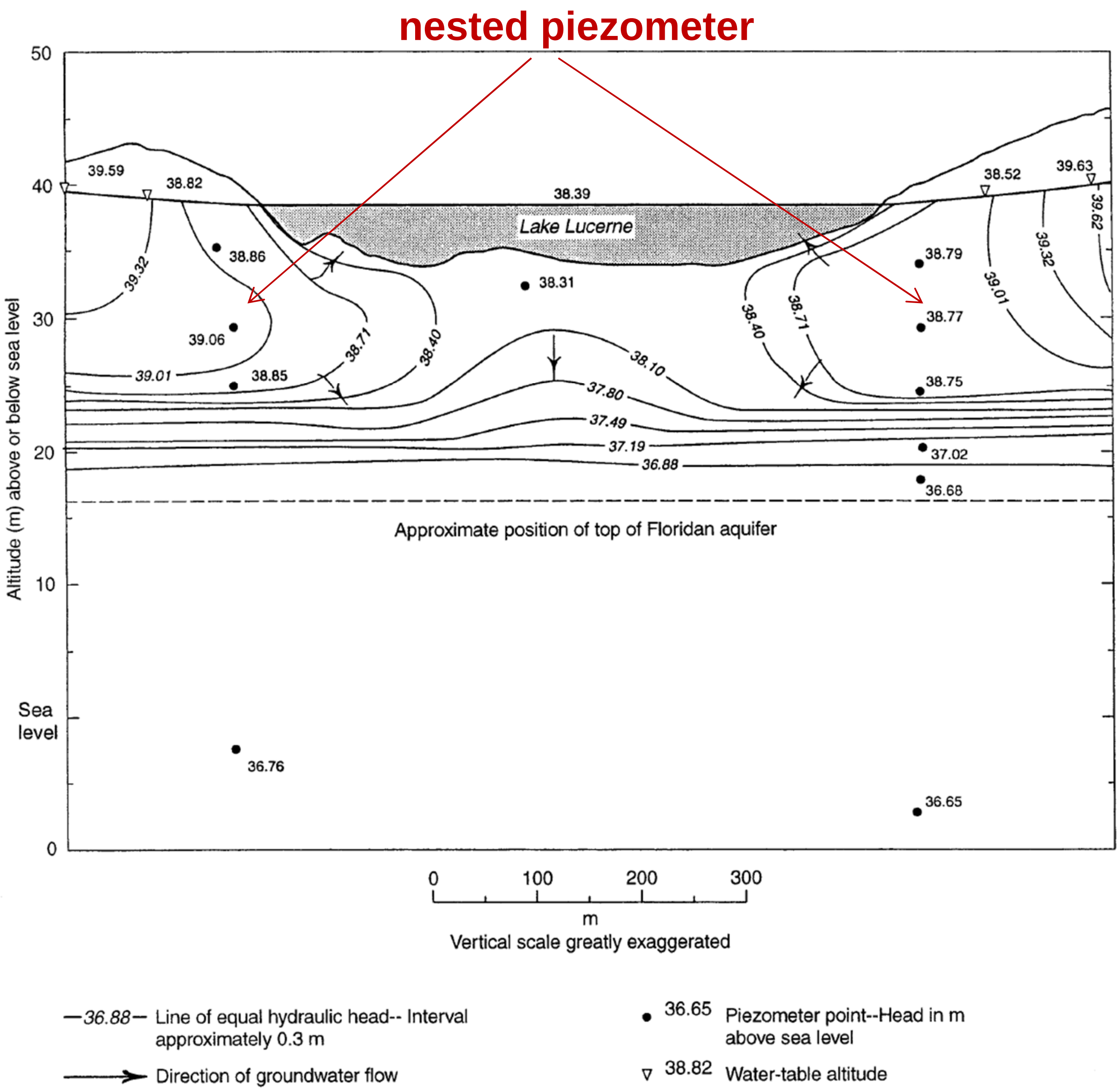
Water level inside the well
= TOC – DTW=18.0-3.8= 14.2 m
(TOC in reference to the head datum, here it's sea level).

Water level inside the well = hydraulic head of the aquifer at the well screen
→ aquifer head (at the ellipse) = 14.2 m

At another well, we have another water level, e.g., 14.7 m, which is the aquifer head at another well screen location (ellipse).

Given water levels collected at different well screens (e.g., 14.4, 14.5, 14.6, as shown) →we have head values at different aquifer positions.

Contour these measurements → head contour map with which we infer flow direction (whether assuming isotropic K or measuring the actual anisotropic K).



Here we have 2 special wells (nested piezometers). At each nested piezometer, multiple heads can be measured through tiny perforations in the wellbore (“piezometer point”).

At each piezometer point, we get one water level measurement --

value shown next to “▪”

→ a “point” head is measured at that aquifer location.

Contour all point head measurements.