Exploring the Ruamāhanga SkyTEM data using the interactive mapping tool

We have created an interactive map of the Ruamāhanga Valley's potential aquifers that allows you to explore the various models developed from the data collected by the SkyTEM survey.

This guide explains how to use the tools within this interactive map, the information they generate, and the underlying map layers.

Use this link to access the map

https://data.gns.cri.nz/tez/index.html?map=SkyTEM_Ruamahanga&menu=GW_Demo

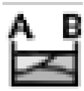
See our webpage for more information on the Ruamāhanga SkyTEM project

www.gw.govt.nz/ruamahanga-skytem-project

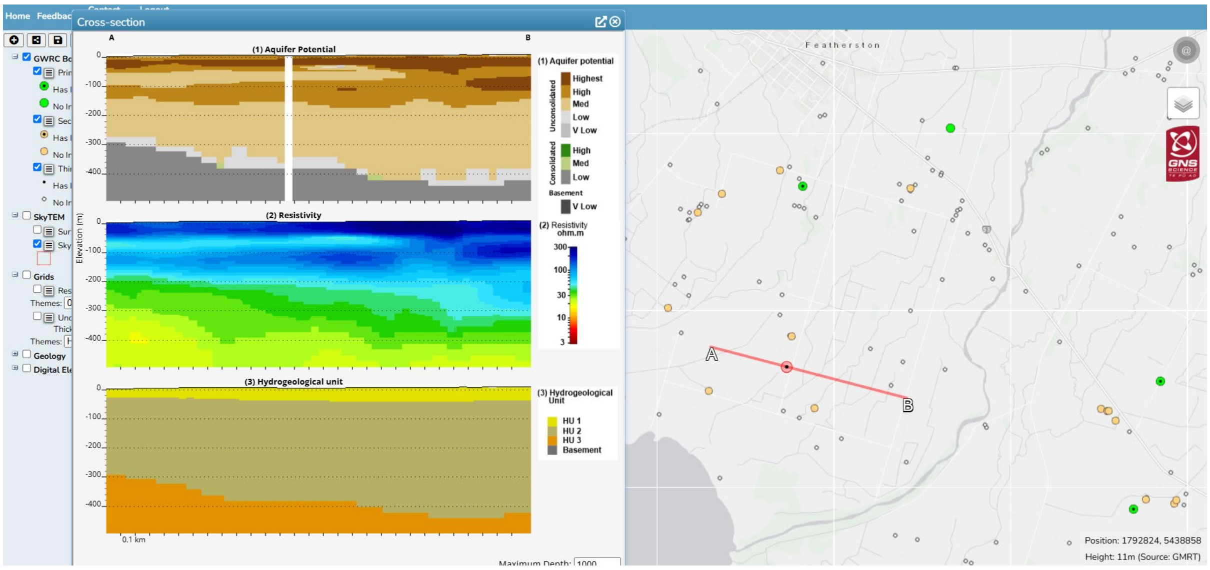
Greater Wellington
Te Pane Matua Taiao

Main tools and model outputs

Cross-section tool

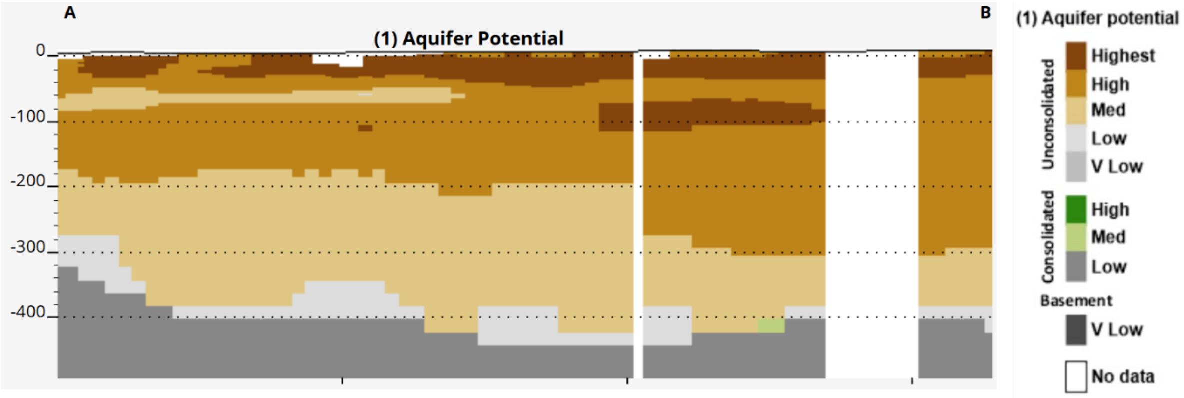
To draw a cross-section, select this icon  by clicking it with your mouse. Go to the map and click once where you would like the cross section to start, move across the map and click to create a line. A simple straight line can be drawn with just two points, or you can use multiple points to create a transect line, double clicking the mouse will finish the line you draw.

The example below shows the cross-section line A – B drawn on the map, and the generated pop-up window with three graphs showing the modelled data of what is underground along the cross-section. The left-hand side of the graphs start at the beginning of the line (A) and the right-hand side finishes at the end of the line (B). If you move your mouse over one of the graphs, you will see a red dot along the transect line showing you where you are. The white areas in the graphs indicate where there is no data because of roading, buildings, powerlines etc.



Aquifer potential model

The aquifer potential model shows the likelihood of the subsurface layers to act as an aquifer. It was developed using the resistivity and hydrogeological models to create classes describing aquifer potential. High aquifer potential indicates an area that is more likely to hold water-bearing material such as sands and gravels than an area with low aquifer potential such as layers of clays and silts.

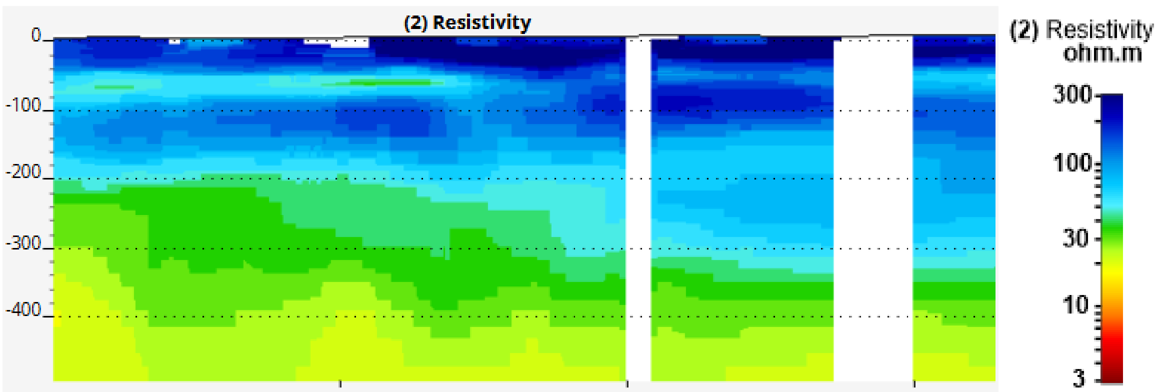


Unconsolidated units are made up of loose material such as gravels and sands, which have spaces between them which can fill up with water.

Consolidated units are made up of compacted materials that have hardened into rock over time, or layers of clay that have very little space between the sediment, so they do not hold much water, although water may move through cracks in these layers.

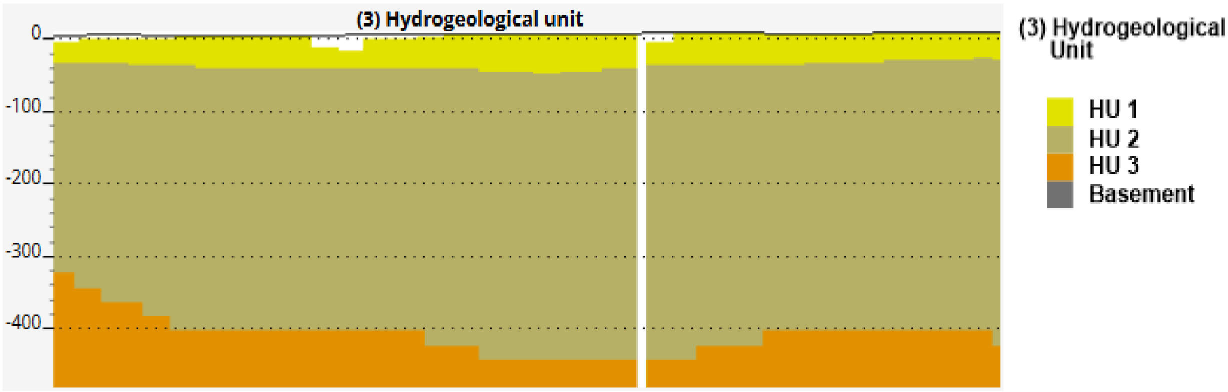
Resistivity model

The resisitivity model shows how easily the subsurface material can resist the flow of an electrical current. It was created from the SkyTEM survey data using established geophysical approaches and supporting evidence such as existing geophysical studies, geological maps and borehole logs. Areas of high resistivity are more likely to indicate layers of gravels and sands while low resistivity areas are more likely to indicate more consolidated layers of tightly packed sands and clays.



Hydrogeological unit model

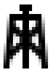
The hydrogeological unit model groups sub-surface layers of rocks and sediment with similar resistivity, characteristics, and age into major hydrological units. It was built using the resistivity model and supporting geological evidence.

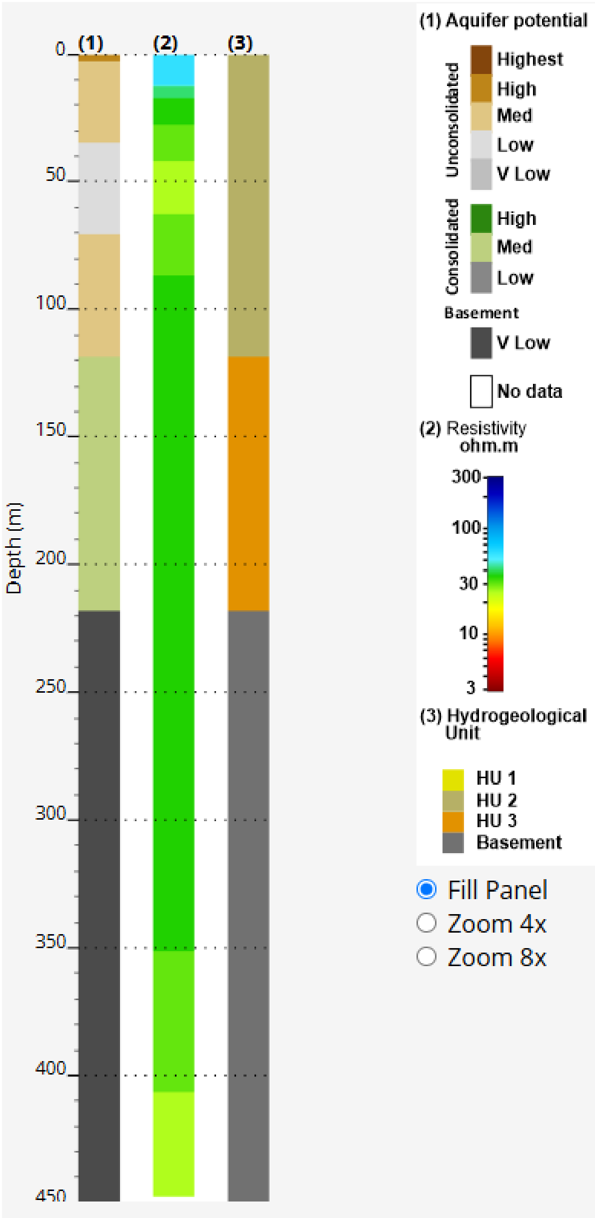


The following table describes the different hydrogeological units.

Hydrogeological units	Description
HU1	Gravel, sand, silt, clay, and windblown soils that formed during the Holocene and Late Pleistocene epochs (i.e. over the last <70,000 years). This layer is found in the river valley and uplifted terraces and is typically between 10-50 metres thick, and approximately 70 metres at its maximum thickness).
HU2	Unconsolidated layers of gravel, sand, silt, and clays formed during the early to middle Quaternary period (i.e. between approximately 2.3-0.1 million years ago). This layer is typically between 100-300 metres thick, and approximately 500 metres at its maximum thickness.
HU3	Hard and solid rocks including conglomerate, sandstone, mudstone, and limestone units that outcrop on the hills and around the edges of the valley. They extend under the Wairarapa Valley. These were formed during the Pliocene and Miocene epochs (i.e. approximately 25-2.3 million years ago).
Basement	Very old greywacke sandstones and mudstones that underlie the entire area and outcrop in the ranges and in parts of the valley. These were formed during the Mesozoic era approximately 230-130 million years ago.

Virtual well tool

To create a virtual well, select this icon  by clicking it with your mouse. Go to the map and click once where you would like to place your well. This generates a bore log at this point with the same model information as described above in the cross-section tool.



Other map layers

There are several other layers in the interactive map, these are explained below.

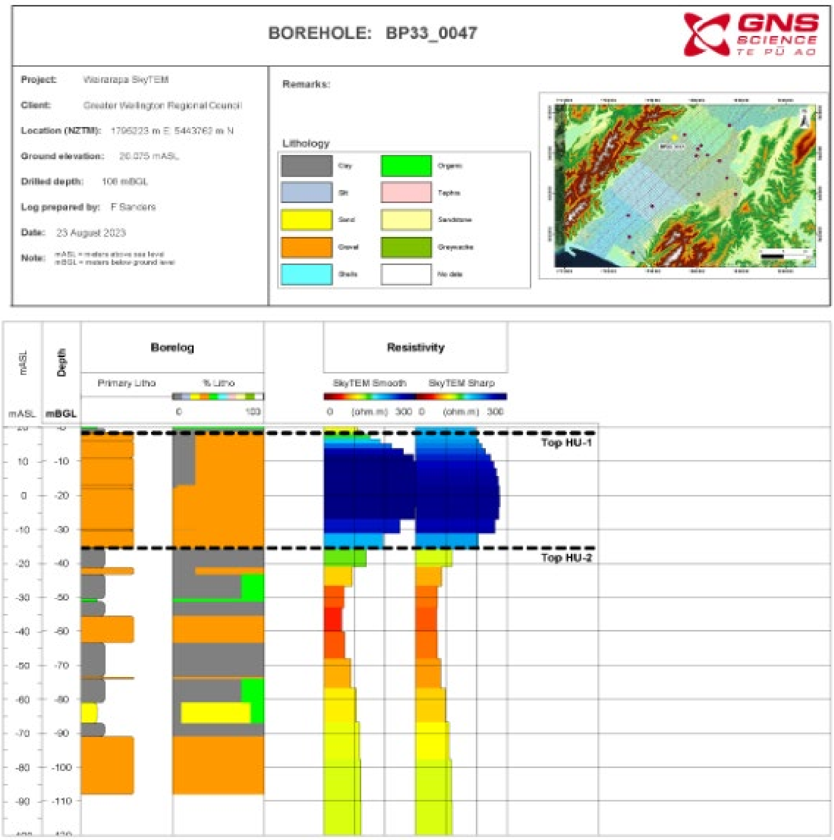
GWRC Borehole Database

This layer shows the 3456 boreholes within the SkyTEM survey area from Greater Wellington's borehole database. Only 1953 of these boreholes hold information such as depth and subsurface material and these have varying degrees of detail and reliability. Most boreholes are shallow –less than 20 metres.

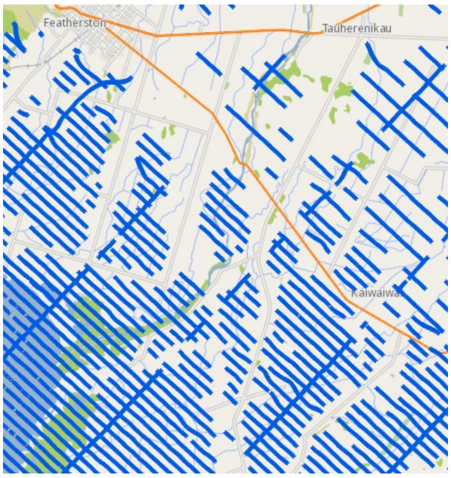
We used the most reliable borehole data to help refine the models. These are the 19 **Primary Boreholes** which are over 50 metres deep and considered to hold reliable information, and the **Secondary Boreholes** which were chosen because they were down to 30 metres, and we had confidence in their information.

To see bore log information select this icon by clicking it with your mouse. Go to the map and click on one of the bores with a dot in the middle (these are the ones with interpretation logs).

This generates the bore log data held for that borehole and also lines up the resistivity model data from the nearest survey point so you can compare them.



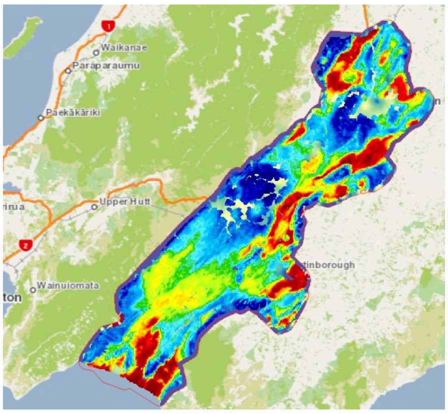
Survey locations



These points track the path of the SkyTEM survey flights, each point shows where the resistivity readings were taken. Resistivity models were created at each point and stitched together to create the full resistivity model of the Ruamāhanga Valley.

The bulk of the survey lines were flown approximately 200 metres apart, although in some areas where the geology is known to be consistent these flight lines were extended to 400 metres without affecting the resolution of the data. Towns, houses in rural areas, roads, railway lines, and power lines were all avoided where possible as these create 'noise' in the data.

Resistivity below ground surface and Unconsolidated sediment thickness layers



The resistivity below ground surface layers show how underground resistivity changes across the whole Ruamāhanga Valley at different depths - from very shallow (0 – 4 metres below ground), to very deep (139 – 156 metres below ground).

In a similar way, the unconsolidated sediment thickness layers show how thick these subsurface layers are from the Quaternary and Holocene-Late Pleistocene geological periods (related to the HU1 and HU2 units described above).

NZ Geology

This layer is the Geological Map of New Zealand 1:250000 (3rd edition).

DEM – Digital elevation model

The DEM layer shows a model of the elevation of the survey area. The hill shade theme simply shows the texture of the hills and plains, while the elevation theme indicates how high features are above sea level.