

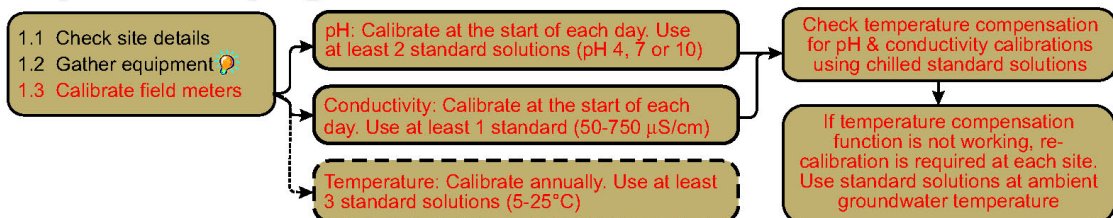
Nationally Standardised Protocol for State of the Environment Groundwater Sampling in New Zealand – Flow Chart

Instructions in **RED** must be done

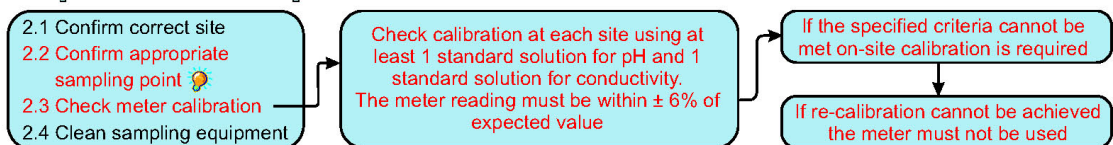


See over for further explanations

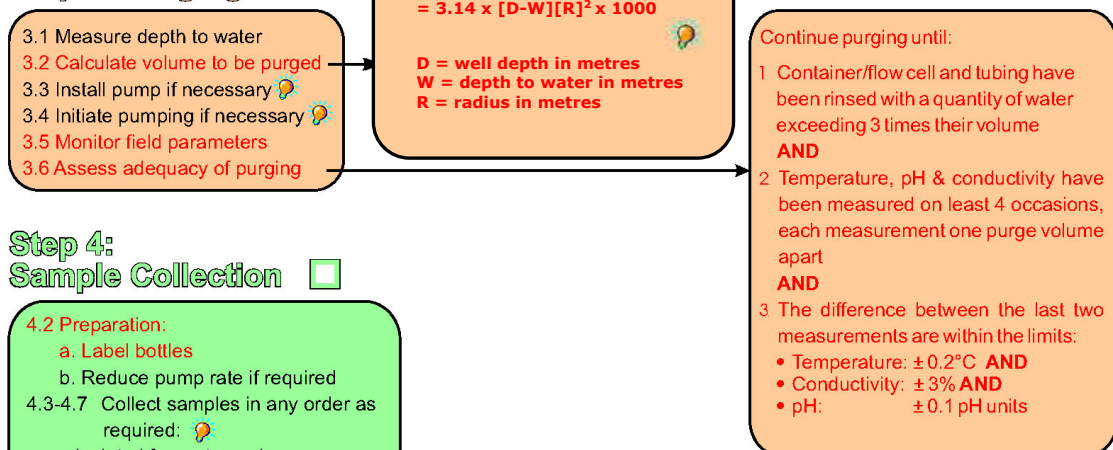
Step 1: Pre-sampling tick box



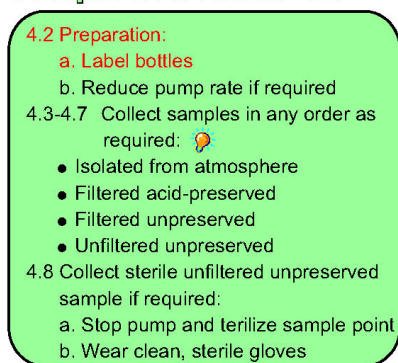
Step 2: On-site Preparation



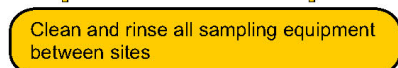
Step 3: Purging



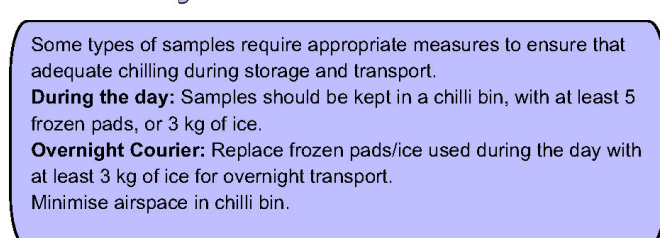
Step 4: Sample Collection



Step 5: Site Clean-up



Step 6: Sample storage, transport and delivery



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- 1.2 A preservative is required for some types of sample, (e.g. an acid preservative for samples to be analysed for cations). Be prepared to chill samples (e.g. for nutrients) to 1-4°C immediately after collection and for the duration of transport to the laboratory.
- 2.2 An appropriate sampling point is one that minimises the purging time (see Step 3) and minimises the potential for contamination or alteration of the sample. It is acceptable to collect samples from a short length of clean hose attached to the tap or wellhead.
- 3.2 For calculation of purge volume:
 - Well depth, depth to water, and well radius must be expressed in meters in order to derive the purge volume in litres.
 - If the depth to water under ambient (non-pumping) conditions cannot be determined for any reason, assume “depth to water” = 0.
 - Well depth can be obtained from the drilling log or through the use of the dip tape.
 - Well radius refers to the casing dimension and not to the dimension of the bore.
 - If it is not possible to determine depth to water and if the well depth is unknown, then purge volume cannot be calculated. In this case, any samples collected from the well will not comply with this protocol.
- 3.3 The pump should be installed so that its intake is positioned at least 1 m below the static water level and a minimum distance above the top of the screened/open interval of 10 times the well diameter (for example, 1500mm for a 150mm well diameter). This will ensure that the sample is representative of the entire screened or open interval of the well.
- 3.4 A suitable pumping rate produces a continuous stream of water from the pump outlet or sample point without turbulence, entrainment of air or pump cavitation. Compliance with this protocol requires determination of the pumping rate during purging.
- 3.6 For assessment of adequacy of purging, note that:
 - The purging operation requires extraction of *at least three times* the calculated purge volume and may require extraction of many more than three times the calculated purge volume.
 - The field values of temperature, conductivity and pH must be measured on at least four separate occasions, each measurement at least one purge volume apart.
 - The differences between the last two sets of field measurements must be the same within the following limits:
 - Temperature: ± 0.2 °C, AND
 - Conductivity: $\pm 3\%$ ($\pm 5\%$ if < 100 $\mu\text{S}/\text{cm}$ at 25 °C), AND
 - pH: ± 0.1 pH unit
- 4.3-4.7 All samples must be collected sequentially from the sample point or from a short length of clean tubing attached to the sample point. The filtered acid-preserved, filtered unpreserved, unfiltered unpreserved samples and the samples collected in isolation from the atmosphere can be collected in any order.
- 4.8 Sterile samples must be collected after all other samples. This is because the requirements for sterilisation could potentially influence the chemistry of samples collected afterwards. Note that sterilisation of the sample point requires the pump to be turned off briefly.



Refer to Groundwater Sampling Protocol for further detailed explanations when required

