

**Cook Islands Northern Water Supply and Drought Proofing for Pukapuka,
Nassau and Penrhyn
Project Design Document**

At the request of Peter Tierney I have reviewed this PDD. Peter's request was not that I give it detailed scrutiny but rather that I give in a general and quick review because if it was satisfactory he wanted to seek approval for funding of Phase 1 immediately.

For all three islands phase one involves upgrading the roof catchment / rainwater harvesting capacity of the water supply, together with associated community education and training on wise water use, sanitation and hygiene.

Continuing to base the water supply for the communities on these three islands on roof catchments is a sound and sensible decision and the design included in the PDD is good. The rainfall is plentiful on all three islands (between 2200 and 2800 mm/year – compared to Wellington 1270 mm) and while there is no information given on the annual distribution of the rainfall (which is an unfortunate information gap) it does appear that in most years there is no extensive period of dry weather (see below).

I would support a decision to give approval to proceeding with Phase one and the education programme on the basis of this PDD. My comments below are by way of suggestions for consideration of minor changes in the design.

1. It is apparent that roof catchment water is much more likely to be of good potable quality than that from wells or other ground water sources. This means that in preparing for drought it is preferable to conserve the water in the rain water tanks. Some careful community education can probably achieve this. For example encouraging households to monitor the water level in their tanks and **as soon as** it falls to half full institute conservation measures and use this water for potable purposes only. A half full 6 cu metre tank provides enough water to last a family of five 60 days at 10 litres/person/day – which should be enough to get through a drought (but note the reference above to the lack of information on the seasonality of the rainfall pattern). Obviously starting a drought period with a near empty tank is bad news!
2. For those houses with kikau thatched roofs that are unsuitable for re-roofing in corrugated iron (mainly 21 houses on Nassau) consideration should be given to providing the household with a 'Dutch barn' structure to collect rainwater and a tank. This would give them a level of service comparable with the rest of the community (rather than have them walk to the community tank) at relatively little extra cost (compared to those who are getting repaired spouting and a new tank). To meet their daily needs (rather than just the potable needs) a family of 5 would require no more than an 8 metre square Dutch barn – and the extra shade area is probably an added bonus!
3. It is worth putting the effort and expense in to ensuring that the household and community rainwater harvesting and storage facilities are of good quality and well designed, because the back-up use of underground sources (phase 2 see below) are much more problematic to operate effectively. E.g. ensuring that the guttering and piping is designed to collect all the rain that falls on the roof.

4. A minor point about the polyethylene tanks – they may be relatively light and ‘only need a sand base to place them on’ as noted in 2.8.1, but a 6 cu metre tank will contain 6000 kg of water, and they need to be sited on a well compacted level and firm base. If the base settles differentially it will stress the tank and likely cause it to pull away from the inlet pipes.

I have significant reservations around the Phase 2 groundwater works on all three islands. The core of my reservation is that the PDD does not adequately make the case for the need for the works proposed. The works are intended as back-up for the rain water harvesting and they are expensive – at \$1.7 million over half the total budget.

According to the report:

1. The wells on Pukapuka and Nassau are shallow and water when required is drawn manually for non-potable uses.
2. On Penryhn ‘there is little use of groundwater from wells at present’. The only well in use is fitted with a hand pump, and a new well installed in June 2000 was ‘found to be full of rubbish during the visit’!
3. The wells tap into a fresh water lenses that sits over the more dense sea water and the well level rises and falls with the tide.

On that information there would seem to be a good case for completing the phase one rainwater harvesting work and the associated water conservation education, then reviewing the situation. It is more than likely that this phase one work will provide all three islands with a water supply sufficient to meet even drought year needs and that the most that it is worth doing is tidy up and improve the access and sanitary safety of the existing wells.

As noted above the groundwater work proposed for phase 2 is over half the total project cost and it is probable that spending the time and money to maximise the use of rainwater harvesting and encouraging water conservation will give the communities a better quality water supply and save money.