PESM: Madagascar Water Project

Phase II Project Summary

February 2016

Phase II: Southern Part of Andovoranto

- **Well 201: Andovoranto Well 4**
- Location: center of village
- Lat: Long:
- Number of people served: 250
- Top of water table: 2.5m below surface
- Lithology: Sand 100%
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 6 hours
- Well Design: 2.8mGalva+2mGalva+1mFilter= +/-6m in Total in which 5.2m under the ground, no check valve
- Comments: drilled in wet season

Andovoranto Well – 4: preparations for dedication

Phase II: Southern Part of Andovoranto

Well 202: Andovoranto Well 5

- Location: southeast side of village
- Lat: Long:
- Number of people served: 150
- Top of water table: 2.0m below surface
- Lithology: Sand 100%, formation exceptionally hard, broke two well points
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 6 hours
- Well Design: 2.8mGalva+1mGalva+1mFilter = 4.8mTotal in which 4..2m under the ground, with check valve
- Comments: drilled in wet season, with the top of screens only 1m below the top of the water table in the wet season, the well is at some risk of going dry in the dry season.

Andovoranto Well 5: Drillers prepare to go to the next well

Phase II: Southern Part of Andovoranto

Well 203: Andovoranto Well 6

- Location: extreme south side of village, near the Pangalana Channel
- Lat: Long:
- Number of people served: 150
- Top of water table: 2.5 below surface
- Lithology: Sand 100%
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 6 hours
- Well Design: 2.8mGalva+2mGalva+1mFilter = 5.8mTotal in which 5..2m under the ground, no check valve
- Comments: drilled in wet season

Andovoranto Well 6: with PESM Director General, Fred Rittelmeyer

Phase II: Southern Part of Andovoranto

Well 204: Andovoranto Well 7

- Location: next to Mayor's office
- Lat: Long:
- Number of people served: 150
- Top of water table: 2.5 below surface
- Lithology: Sand 100%
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 5 hours
- Well Design: 2.8mGalva+2mGalva+1mFilter = 5.8mTotal in which 5.2m under the ground, with check valve
- Comments: drilled in wet season
- Number of people served: 150

Andovoranto Well 7 with Phase II Drill Team

Phase II: Mahonoro

- **Well 205: Mahatsara Well 1**
- Location: north of Mahonoro, just east of main road
- Lat: Long:
- Number of people served: 350
- Top of water table: 2.0 below surface
- Lithology: Sand 100%
- Water: Fresh but taste of sulfur
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 5 hours
- Well Design: 2.8mGalva+2mGalva+1mFilter = 5.8m Total in which 5..2m under the ground, with check valve
- Comments: drilled in wet season, supplemented 1 existing well in village

Mahatsara Well-1: Dedication Ceremony

Phase II: Mahonoro

Well 207: Ambilabe Well

- Location: North of Mahonoro, in center of village on the old road
- Number of people served: 350
- Top of water table: 2.0 below surface
- Lithology: Sand 100%
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill well: 6 hours
- Well Design: 2.8mGalva+2mGalva+1mFilter = 5.8mTotal in which 5..2m under the ground, with check valve
- Comments: drilled in wet season, supplemented 1 existing well in village

Ambilabe Well-1: Clean-up and Flow Test

Phase II: Vatomandry

Well 206: Tsivangina Well 1

- Location: in center of village, next to the market, on a hill
- Number of people served: 250
- Top of water table: 3.0 below surface
- Lithology: Variable: sand, silty sand and claystone
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 10 hours
- Well Design: 4.5mGalva+2mGalva+1mFilter = 7.5mTotal in which 7.1m under the ground, with check valve
- Comments: screen had to be positioned in optimal lithology, well initially drilled to 8.5m but 1m had to be cut off due to limitations of the hand pump – this is as deep as can be pumped with unassisted hand pumps, drilled well at invitation of local Peace Corp Volunteer, supplements water sourced from several bucket wells in village which have muddy water due to clay and some seasonally go dry
- Frequent maintenance will likely be required as pump is operating at its maximum limits

Tsivangina Well – 1: Serving the Community

Phase II: Vatomandry

Well 208: Ampasimbe Well 1

- Location: on side of hill, above rice paddy
- Number of people served: 350
- Top of water table: 3.5 below surface
- Lithology: : Variable: sand, sand/soil mixture, silty sand and claystone
- Water: Fresh
- Initial Flow Rate: 30 liters / minute
- Time to drill & complete well: 12 hours, including 2 hours for first fishing job - successful
- Well Design: 3.8mGalva+1.5mGalva+1mFilter = 6.3mTotal in which 5.7m under the ground, with check valve
- Comments: screen had to be positioned in optimal lithology, supplements water sourced from two bucket wells in village which have muddy water due to clay and go dry seasonally.
- Well will serve as a test well for a larger project to be done as part of the Phase III Program

Ampasimbe Well – 1: Dedication Ceremony

Geological Studies for Future Projects

Ampasimbe

Ampasimbe is a very nice village but lacks easy access to water. In addition to the well recently drilled by PESM, it has two bucket wells that go dry seasonally and are thought by some to be contaminated. The project concept is to drill water wells every 300m along the long axis of the village, which would require up to 5 wells.

The lithology is not ideal as it is interbedded sands, silty sands and claystone overlying the weathered basement "red rock". A test hole was drilled along the road that runs through the village to confirm the lithology and to determine the top of the water table and where it lies relative to reservoir quality sands and the weathered basement.

The lithology is identical to the Ampasimbe Well-1:

- 0.0 - 2.5m : clean sand
- 2.5 – 4.5m : sand with black soil
- 4.5 – 6.5m (TD) : silty sand with claystone laminae, traces of red basement indicating proximity to basement

The top of the water table was found at 5.5m in the lower layer, which is the producing zone in the Ampasimbe Well-1. Although the productive interval is narrow, it is theoretically possible to make a completion in the aquifer. However, minor changes in the water table or in the lithology could work to the detriment of a good water well. The Ampasimbe Well-1 will be monitored to evaluate the quality of the aquifer and the sustainability of production with seasonal fluctuations in the depth of the water table.

Village of Ampasimbe

Ambodiloranjy

The village of Ambodiloranjy lies in an elevated position next to a river that has year-round flow. The river is the only source of water and is subject to contamination from nearby agricultural and livestock activities. The village very much needs a potable water source closer to the village
.
On inspection, the village appears to be built on the red basement rock, below which the potential for finding an aquifer is low to none. Three test holes were drilled to confirm the lithology with results as noted below:

Test Hole 1: Location: at the bottom of the hill on the river side of the village: drilled 1.75m and found only weathered basement "red rock" which has no aquifer potential. No water found.
Test Hole 2: Location: next to the rice paddy: drilled 4.3m, found water at 1m, all the rock was clay which has no aquifer potential. If there is any hope, this would be the area, albeit small.
Test Hole 3: in Litchi trees on left side as you approach the village: drilled 3m, no water seen, all rock was the weathered basement "red rock". It appears there is little hope to be able to drill a water well within the Village of Ambodiloranjy.

Two solutions have been identified:
Option A: The solution may lie in education and the introduction of ceramic or other filters to clean the drinking water sourced from the river.
Option B: Use a “Ram Pump” to bring the river water into the village and treat or filter it prior to being used for drinking water. If successful, this option could be used in many more villages.

Village of Ambodiloranjy