Groundwater Assessment Using Electrical Resistivity Geophysics – North East Viti Levu, Fiji Islands

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Outline

- Introduction and objectives
- Approaches used

Jiutiti Salusalu

- Site characterisation
- Location maps and results
- Implications to community-water supply
- Lessons learnt

Amini Loco

- Project Update
- Key conclusions & Future work

Ilaitia Bulai

Micro-projects Program (MPP)

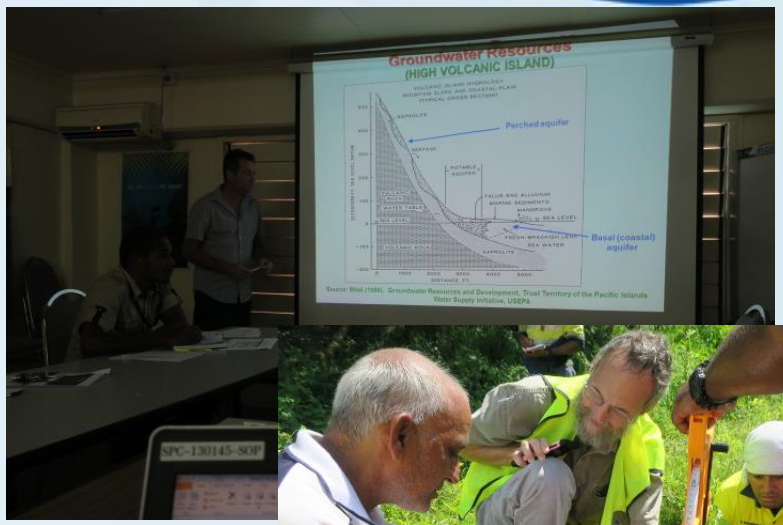
- EU's contribution to the decline in Sugar Industry
- Reshaped as TC Winston recovery fund
- 3 components:
  - Including Groundwater Assessment

Objective of Assessment:

- ❖ Identification of groundwater sources to strengthen the resilience of 6 disaster-prone communities
- ❖ Focus will be Qerelevu community assessment

Approach

- Desktop study
  - Hydrogeological Conceptual Model
  - Lineaments Analysis

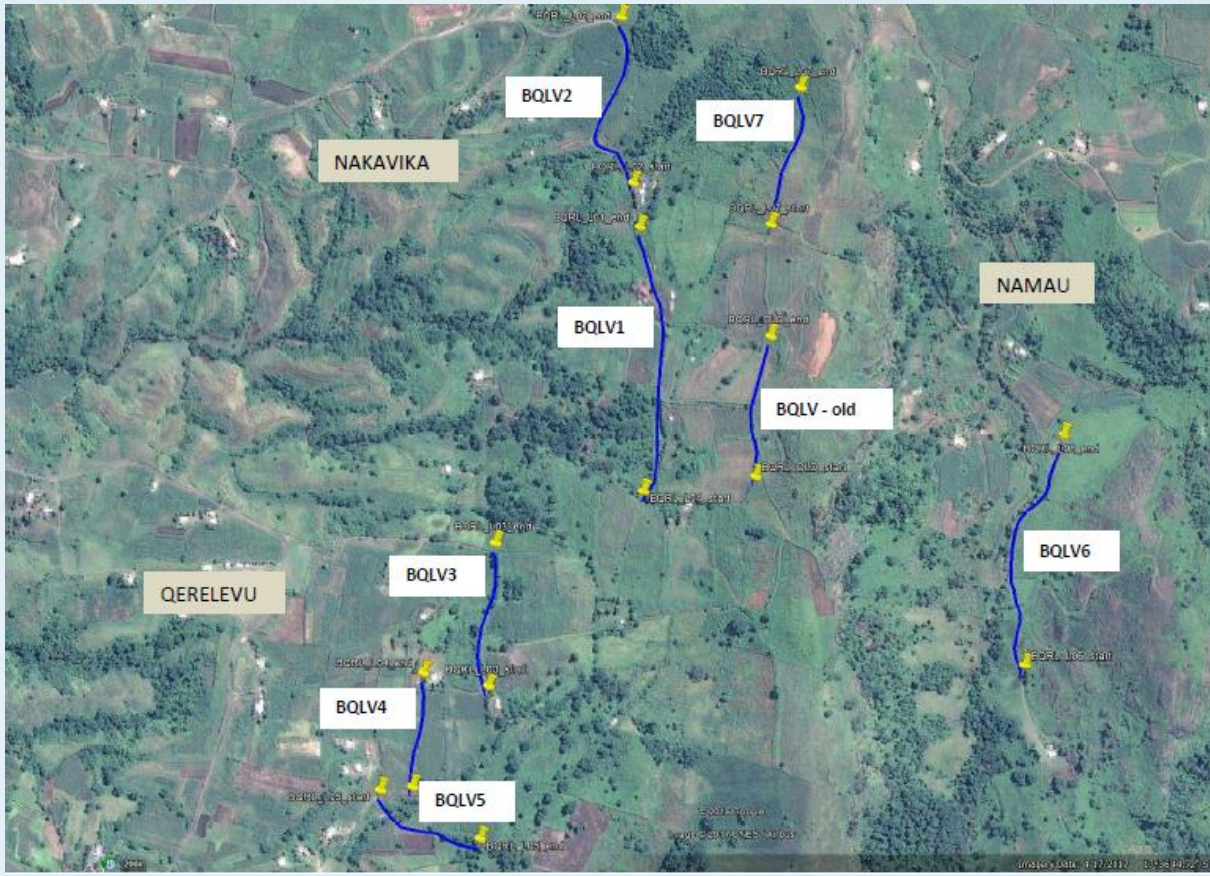


- Site reconnaissance
  - Accessibility
  - Community visit and district officers
  - Water supply considerations:
    - Community extent
    - Exiting water supply facilities including tanks and boreholes

- Field survey
  - Geophysics survey design
  - Elevation survey

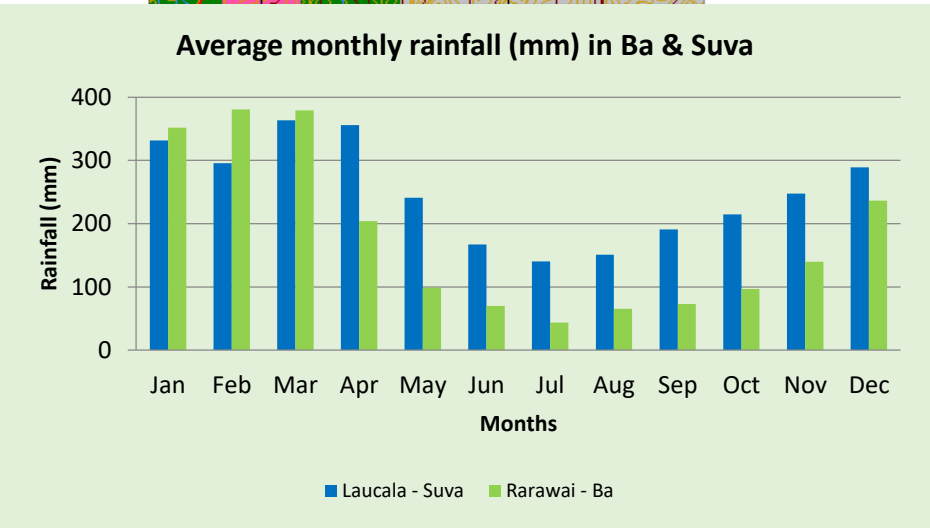
Field Assessment

- Geological characterisation
  - Geo and hydro reports
  - Database
  - Lineaments
  - Spacing & orientation guided by observed geological and structural targets
- Geophysics:
  - ABEM terrameter
  - Gradient Array
  - 3- 5 m spacing
- Groundwater sampling of existing boreholes
- PPK survey using R10 Trimble GPS

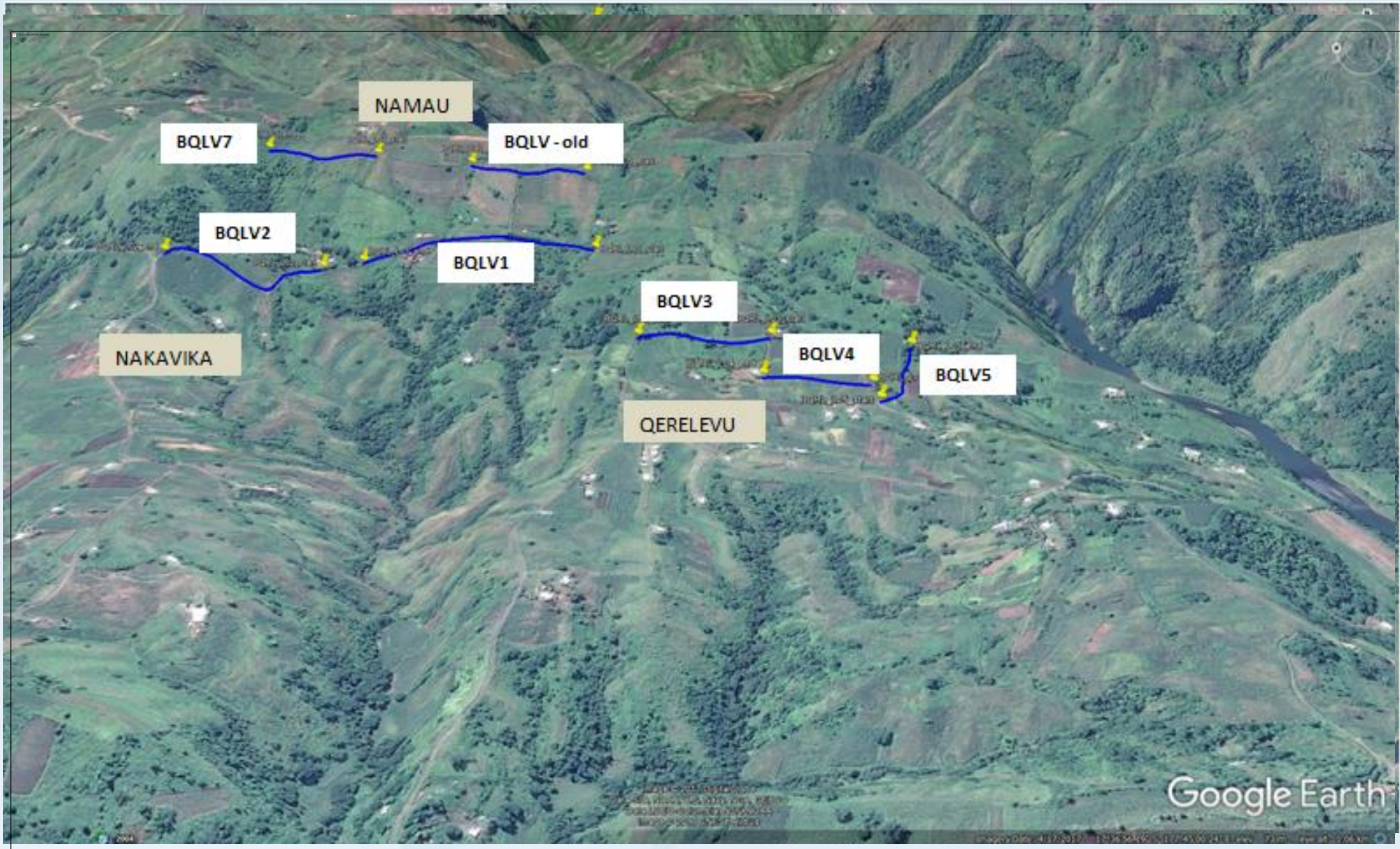


Qerelevu - Site Characterisation

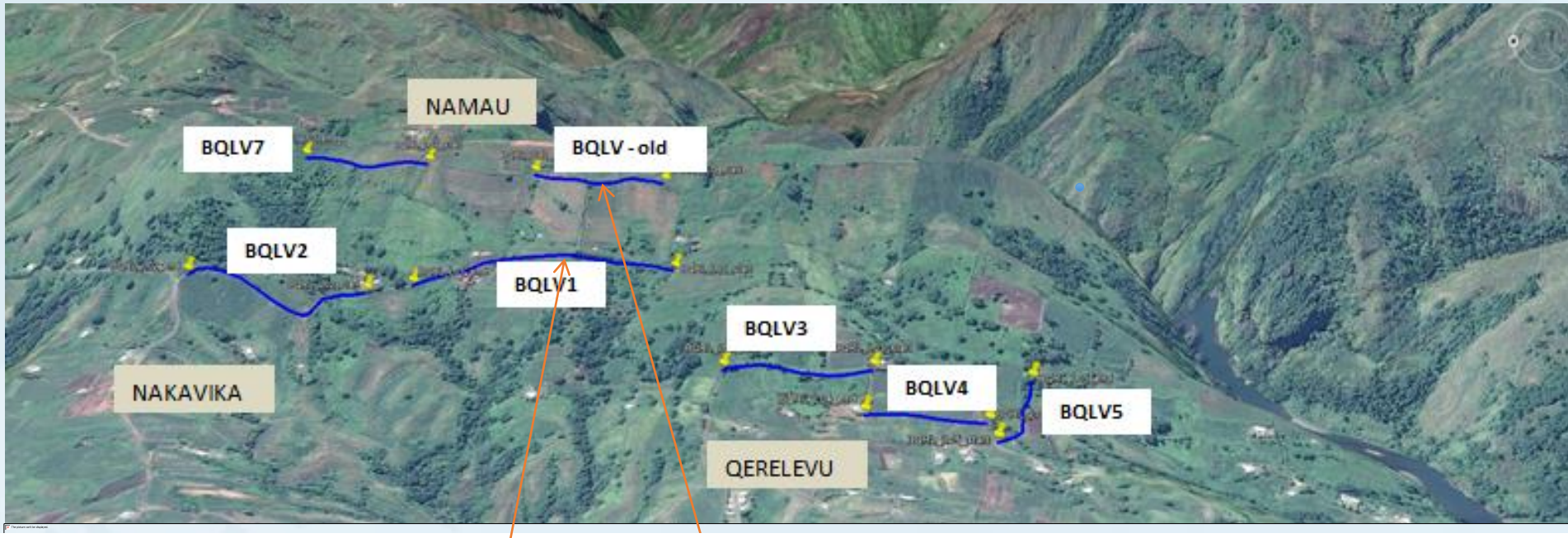
- Geology and hydrogeology
  - Fractured andesite flow & Interbedded sandstone along regional anticline
  - GW conceptual model
- Landuse and water demand
  - Extensive sugar-cane farming
  - High water cartage for portable purposes and irrigation
- Rainfall
  - Rain shadow effects
  - Average annual of 2100 mm & monthly CV range of 0.5 - 1
  - 30% less than Suva with a monthly CV of range 0.4 -0.7
  - Drought vulnerability

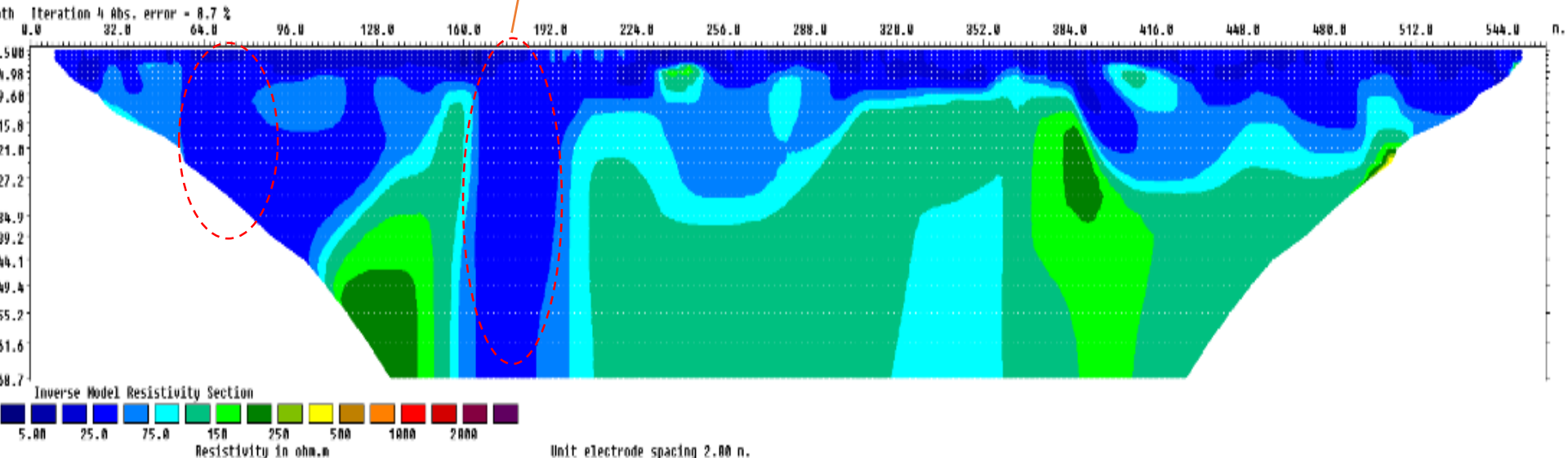


Location Map

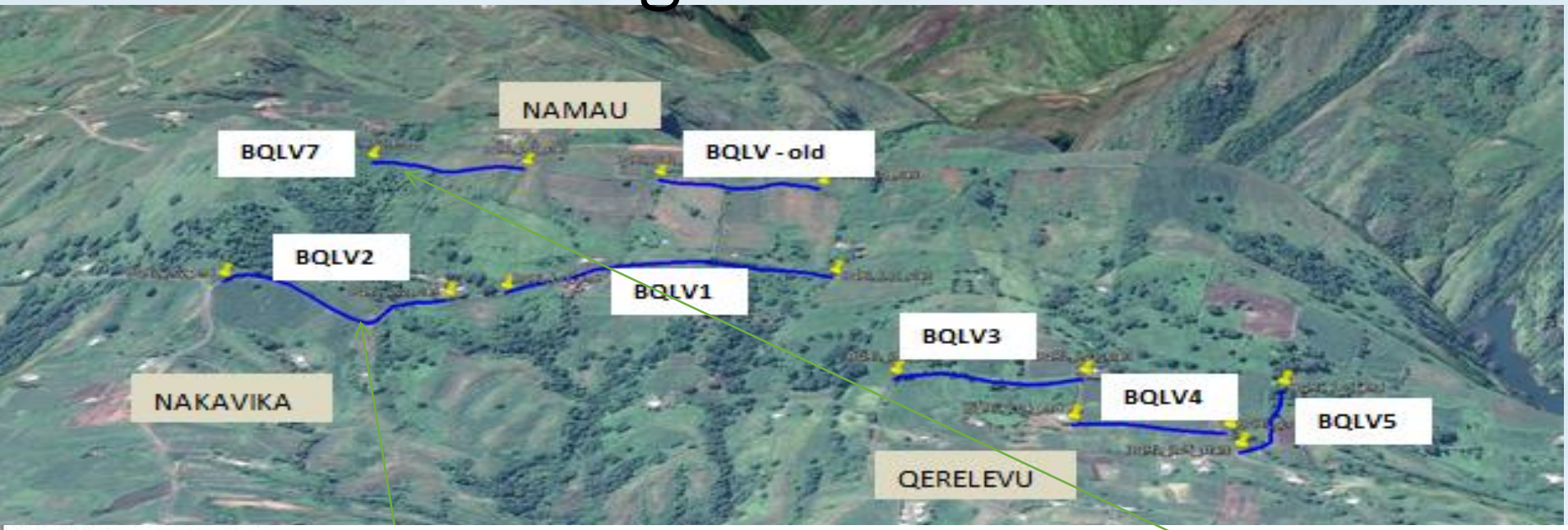


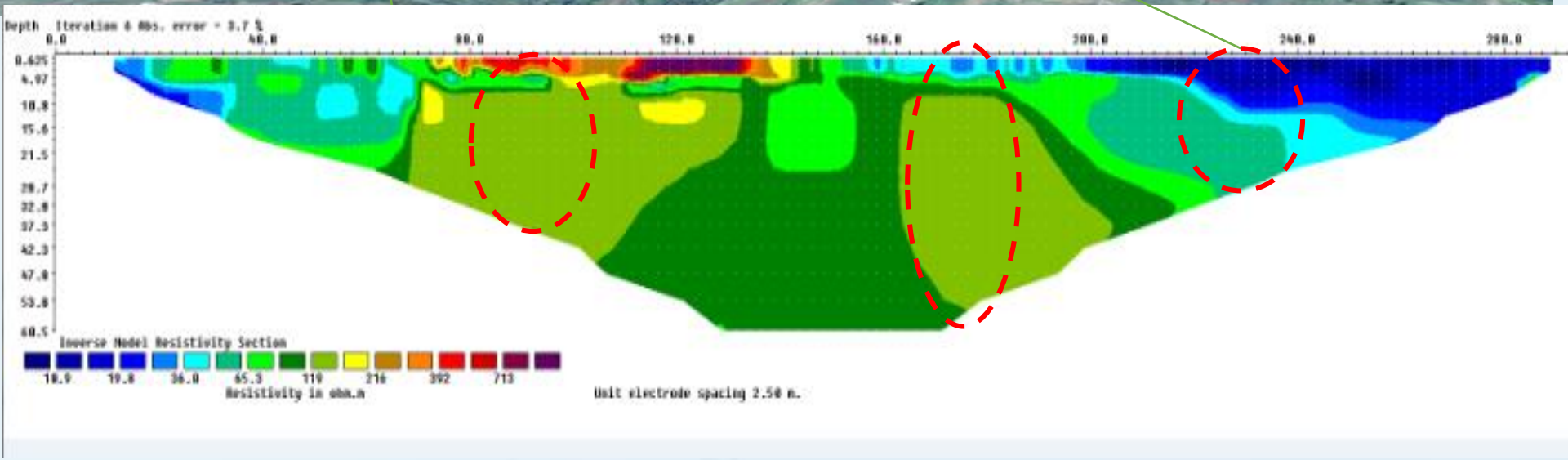
Preliminary Results – Fracture Zones



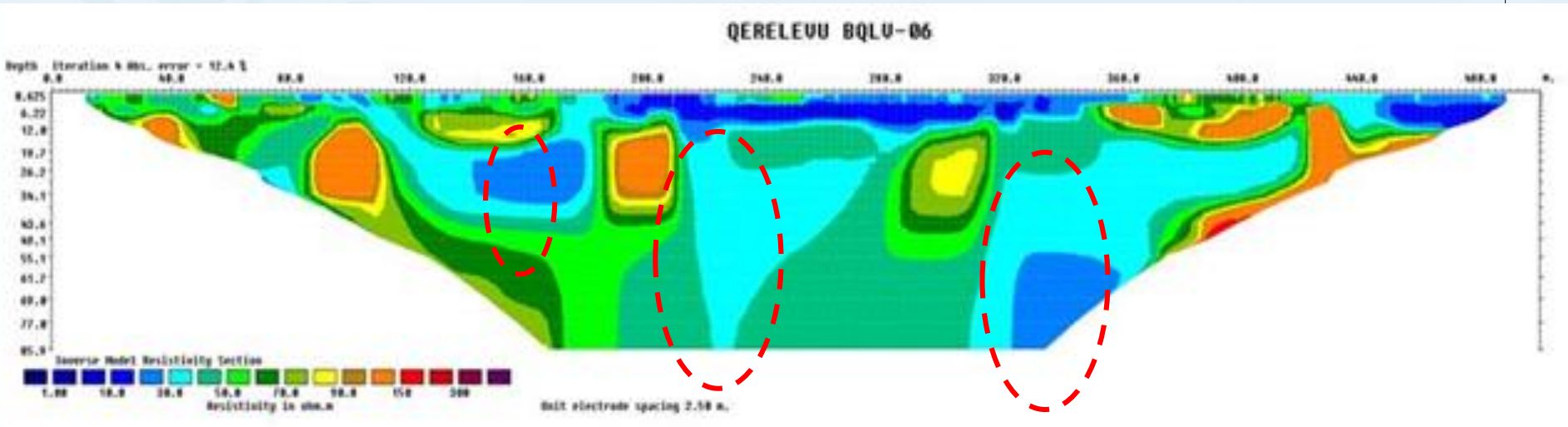


Geological Contacts





Namau profile



Implications on Qerelevu Community Water Supply

- Several groundwater targets
- Drilling required for further assessment and for validation of these findings
- Community engagement/discussion required for
  - Design of water supply
  - Use of water (daily vs emergency source)
  - Maintenance & operation aspects

Lessons learnt to date

- Thorough desktop review and site reconnaissance is critical
- All technical surveys require community engagement:
  - Managing community expectation
  - Understanding community needs

Project Linkages

- 3 phases approach

  a. Assessment of GW potential and selection of drill targets
  b. Groundwater drilling , construction and evaluation
  c. Equipping bores with water supply reticulation & water governance

Conclusions and Future work

- High resolution subsurface profiles on vertical and horizontal dimensions:
  - Well-defined and localised groundwater-bearing zones pointing towards fractures or fissured system and geological contacts
  - Improved geological understanding
  - Supports conceptual model and improved hydrogeological understanding
- Identified several potential drilling targets
- Follow-up drilling is essential for validation and resource evaluation
- Community engagement with a focus on water use and governance

VINAKA VAKALEVU!!!!