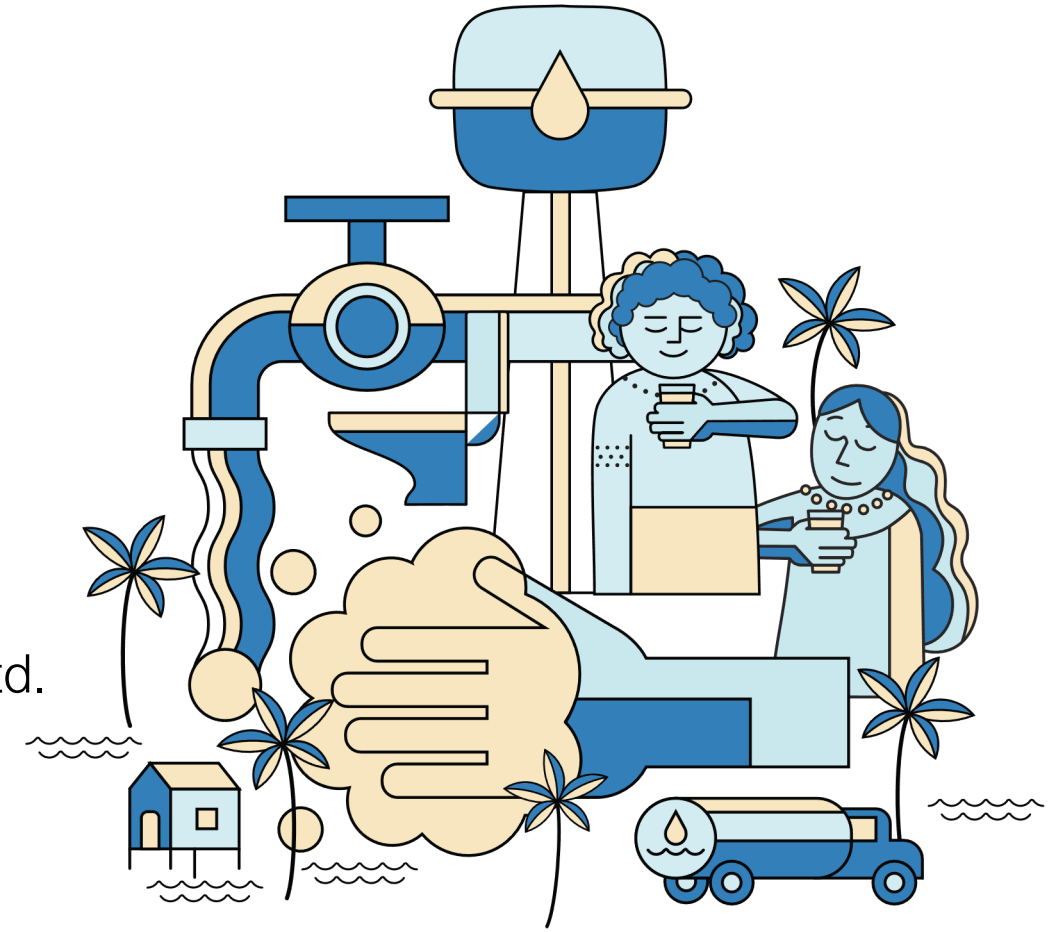
Pacific WASH
WEBINARS

Groundwater Assessment of Port Moresby, PNG



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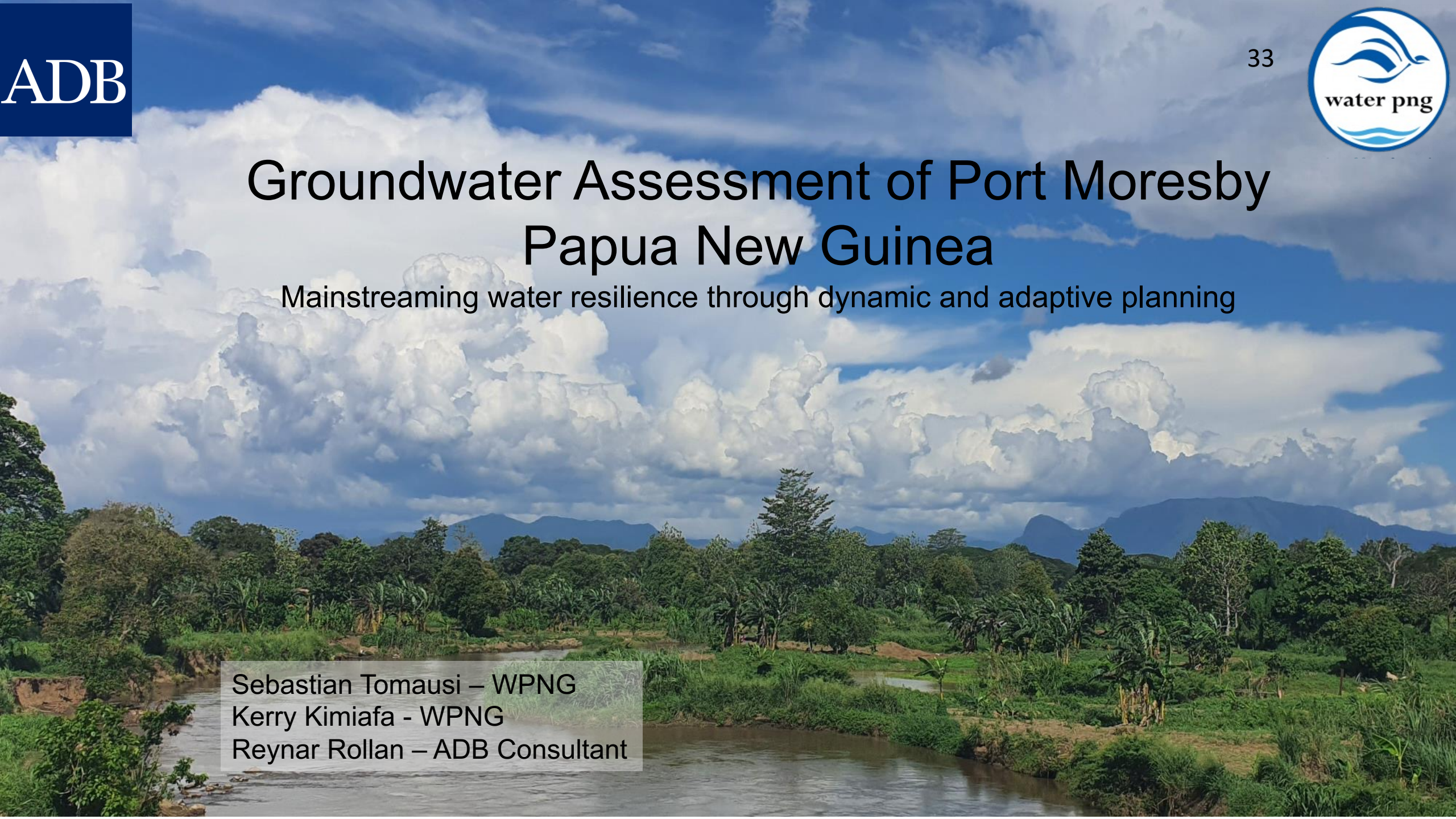
Reynar Rollan
Hydrogeologist, ADB Consultant

Groundwater Assessment of Port Moresby Papua New Guinea

Mainstreaming water resilience through dynamic and adaptive planning



Sebastian Tomausi – WPNG
Kerry Kimiafa - WPNG
Reynar Rollan – ADB Consultant

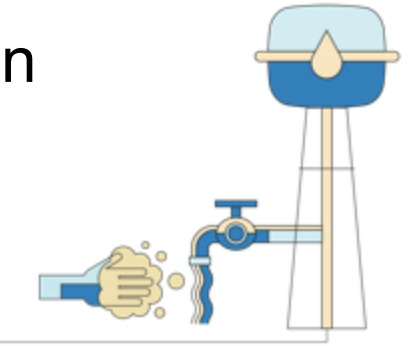
Presentation Outline

1. Port Moresby Water Situation

2. Methods Employed in Desktop Groundwater Resources Assessment of Port Moresby
   a. GIS-aided spatial assessment
   b. Water Balance Analysis

3. Groundwater Systems of Port Moresby

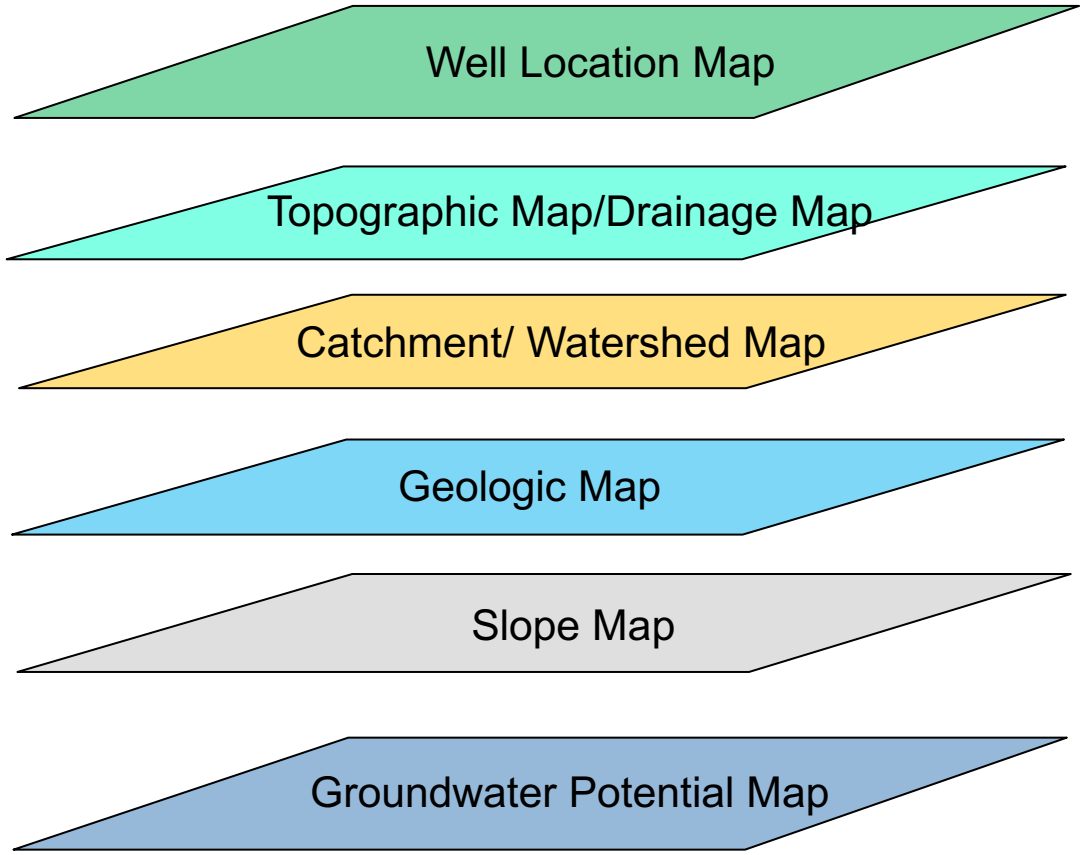
4. Applicability of Methods to the Western Pacific Region




39 existing
61uncertain conditions
66 abandoned
<1 – 2 lps per well
POM Wells
33 kms
Sinnumu
Dam/Reservoir
Main water
source of POM
Capacity: 234 MLD
Port Moresby Water Supply Situationer
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image © 2023 CNES / Airbus
Image © 2023 Maxar Technologies
N
8 km

Methods Employed in Desktop Groundwater Assessment

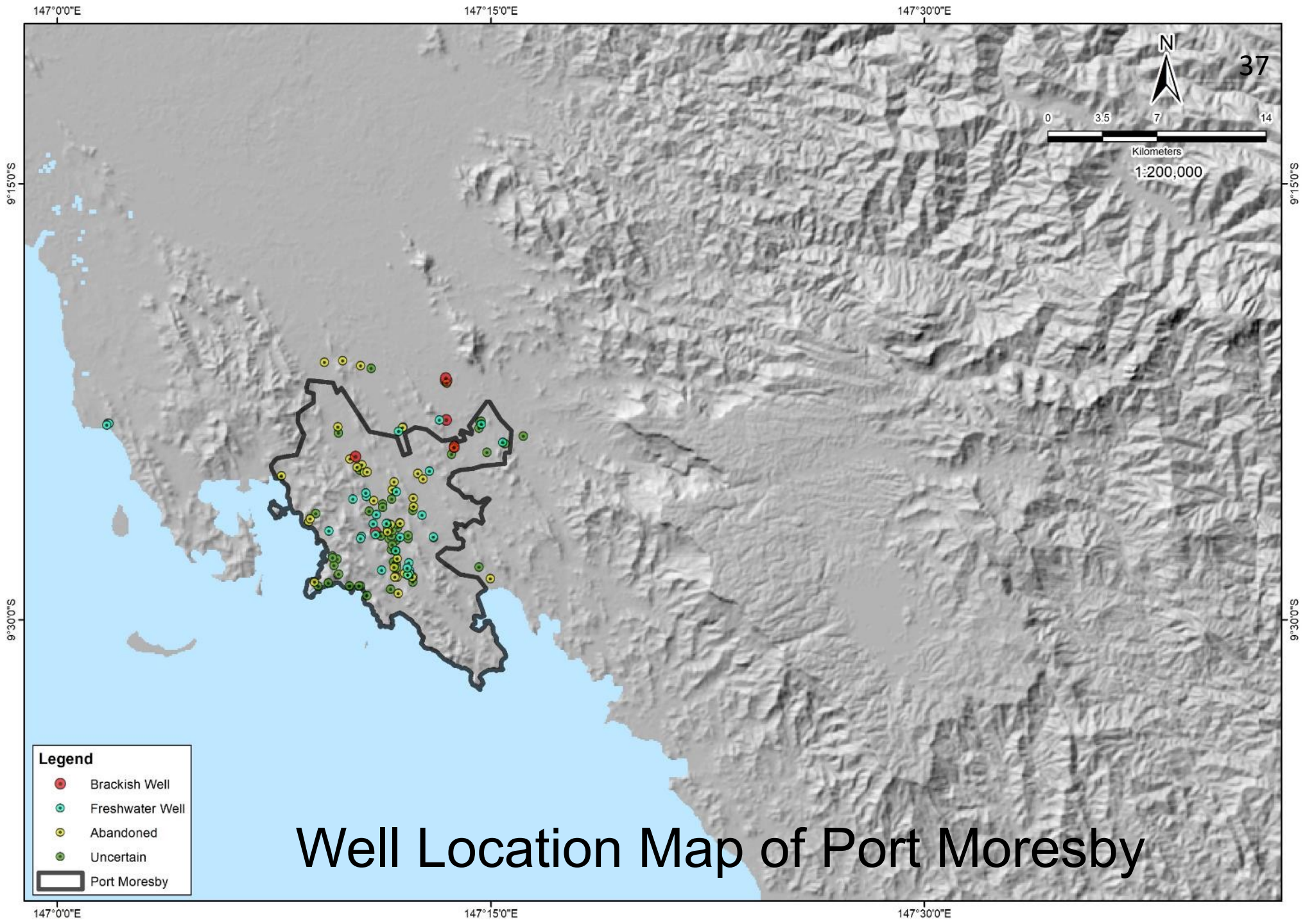
GIS-aided Spatial Analysis + Water Balance Analysis



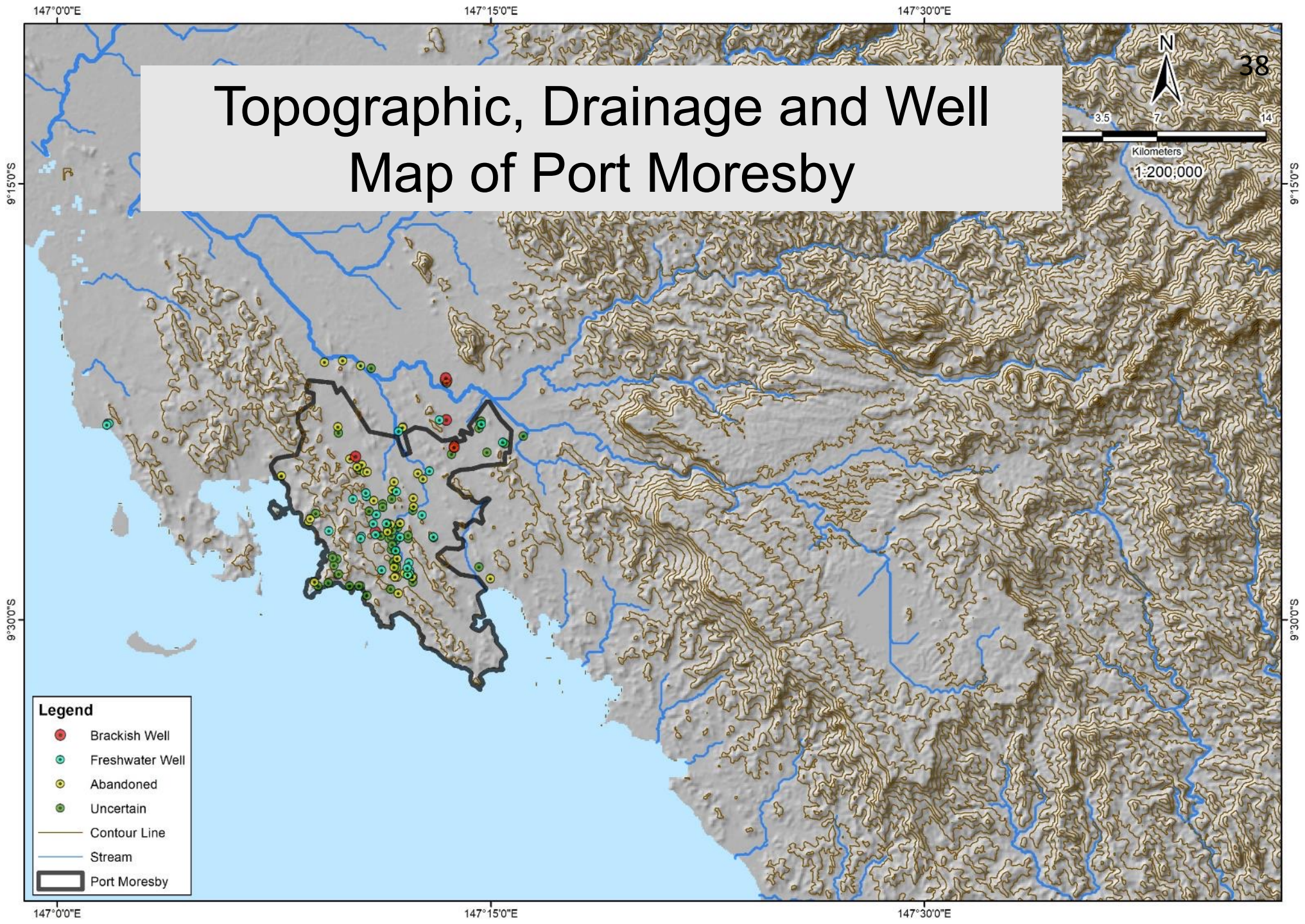
Rainfall
Temperature
Soil Moisture

Rainfall = AET + Runoff + GWR

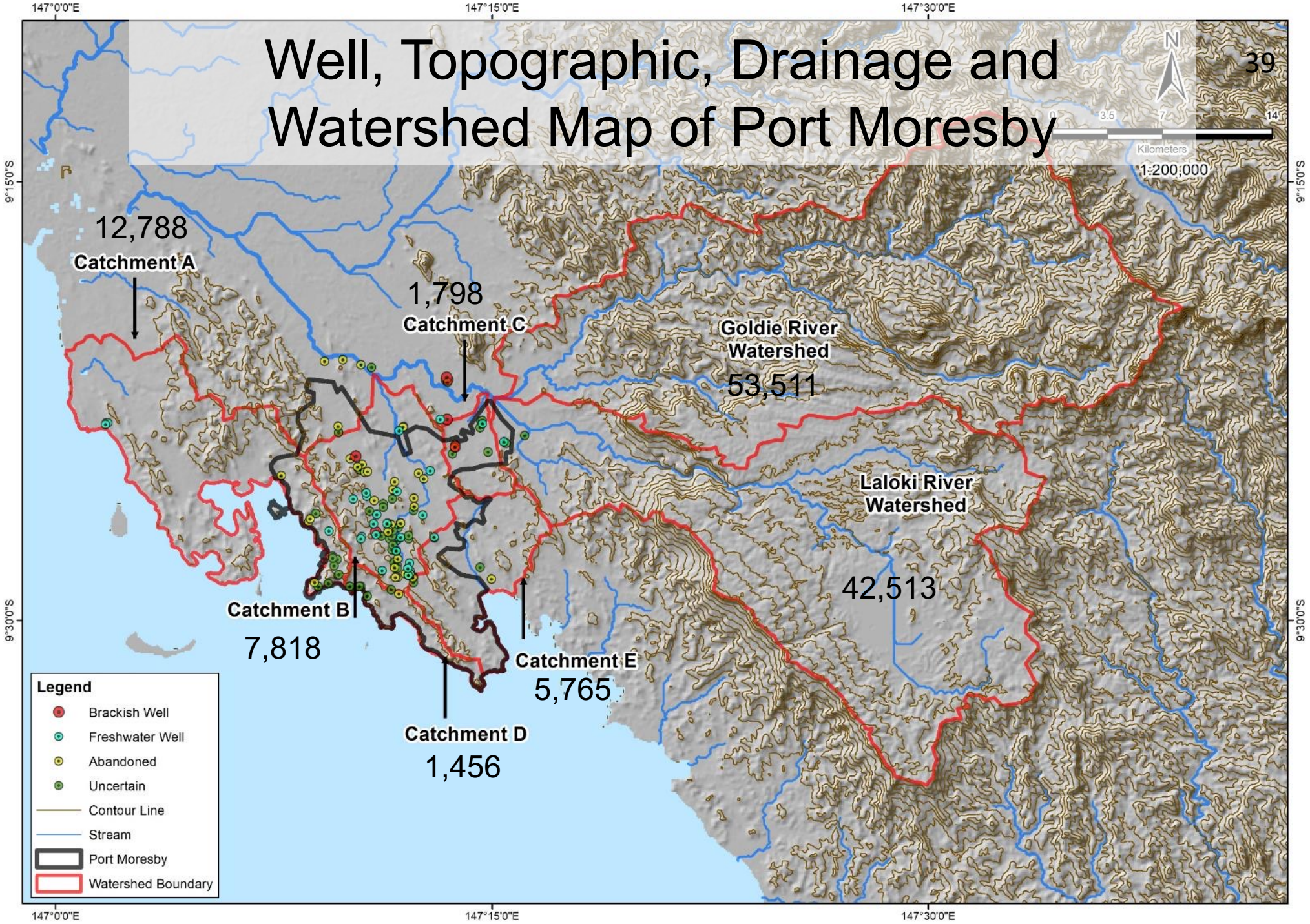
Potential GW = GWR x Watershed Area


147°0'0"E
147°15'0"E
147°30'0"E
9°15'0"S
9°30'0"S
N
37
0
3.5
7
14
Kilometers
1:200,000
Legend
Brackish Well
Freshwater Well
Abandoned
Uncertain
Port Moresby
Well Location Map of Port Moresby

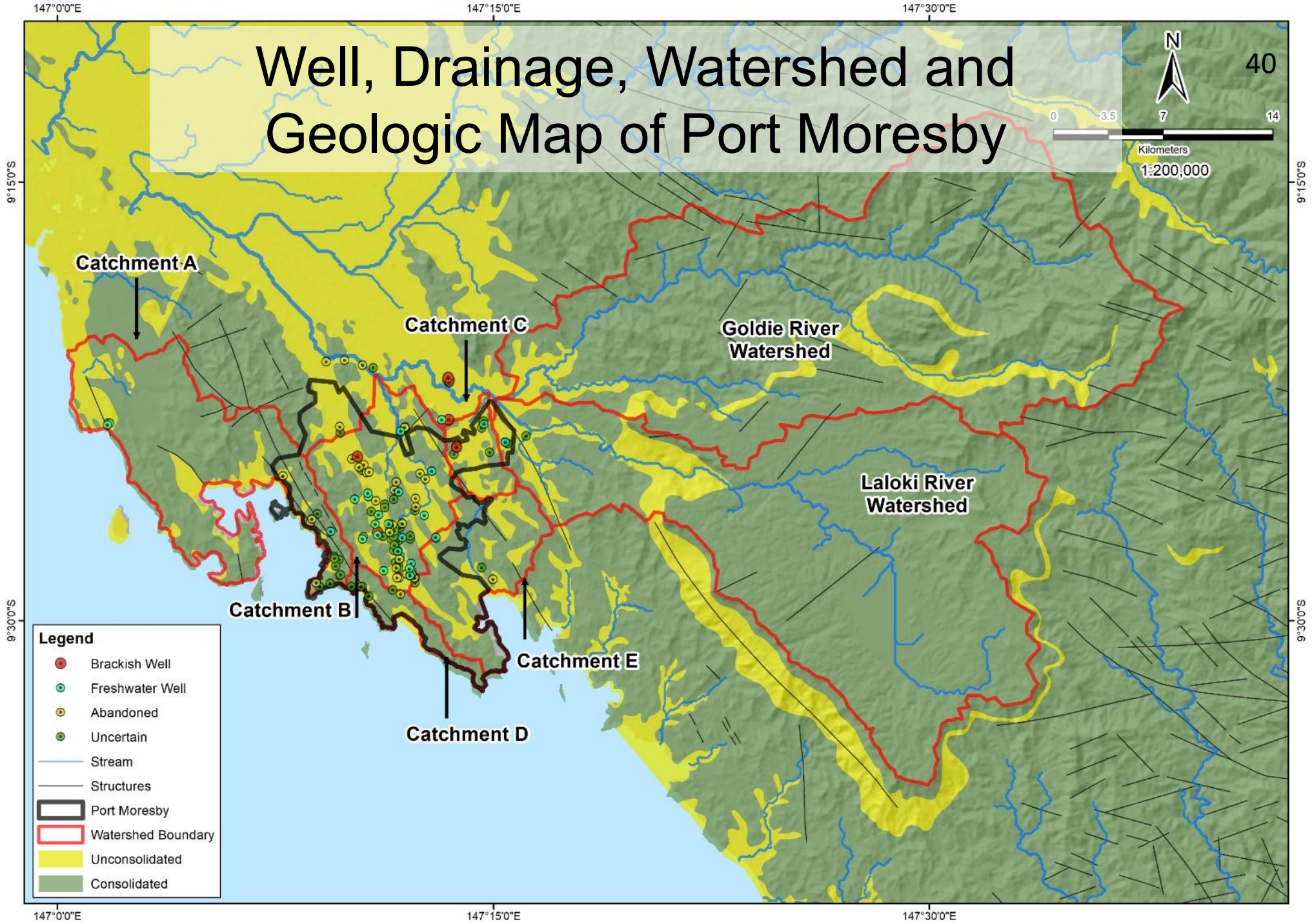
Topographic, Drainage and Well Map of Port Moresby

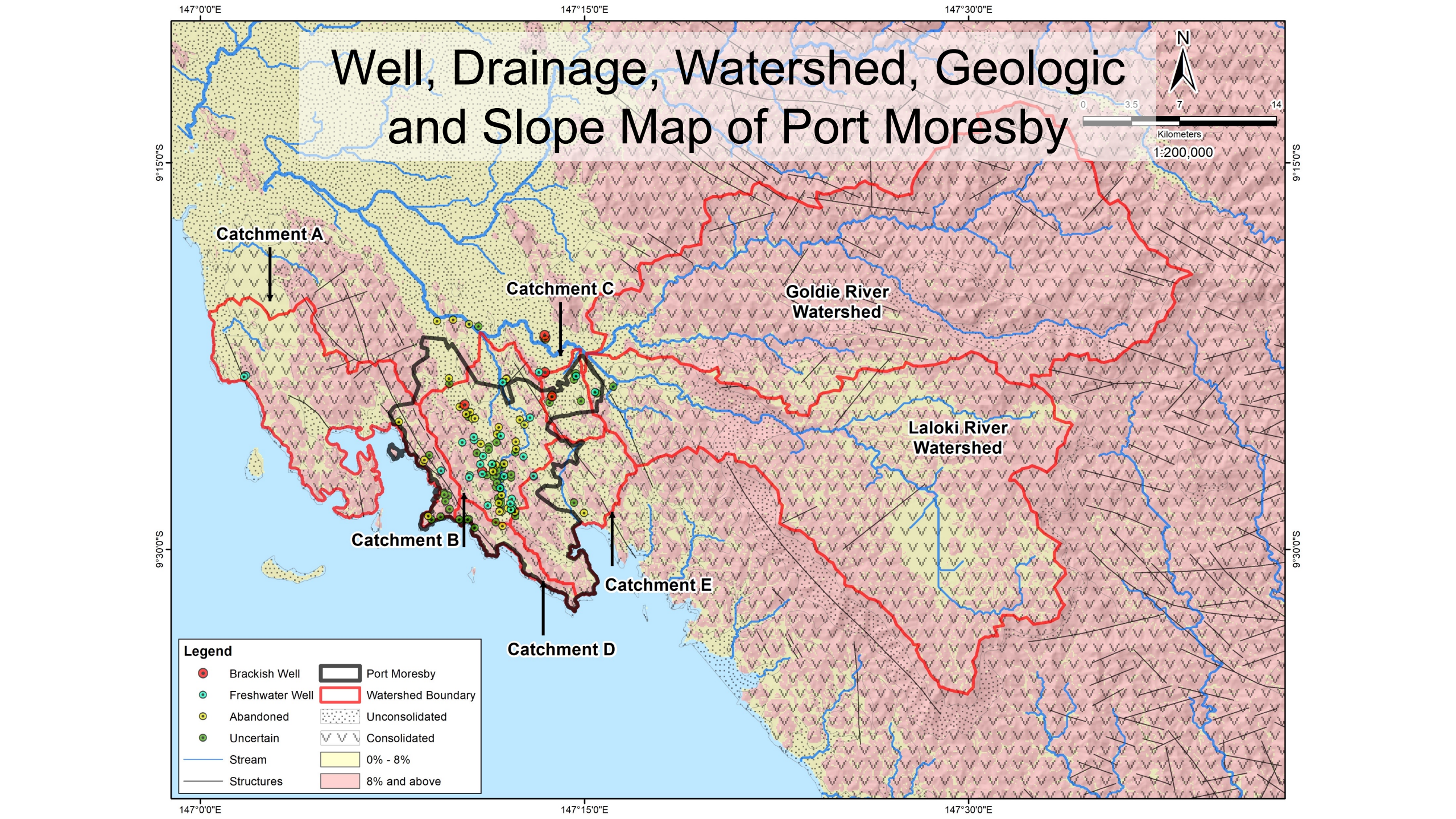


Well, Topographic, Drainage and Watershed Map of Port Moresby



Well, Drainage, Watershed and Geologic Map of Port Moresby




Well, Drainage, Watershed, Geologic and Slope Map of Port Moresby
147°0'0"E
147°15'0"E
147°30'0"E
9°15'0"S
9°30'0"S
N
0
3.5
7
14
Kilometers
1:200,000
Catchment A
Catchment B
Catchment C
Catchment D
Catchment E
Goldie River Watershed
Laloki River Watershed
Legend
Brackish Well
Freshwater Well
Abandoned
Uncertain
Stream
Structures
Port Moresby
Watershed Boundary
Unconsolidated
Consolidated
0% - 8%
8% and above

Climatological Conditions of Port Moresby

Month	Temperature (°C)	Monthly Rainfall (mm)
January	27.9	139.13
February	27.6	179.43
March	27.4	260.15
April	27.6	149.14
May	27.6	60.07
June	27.24	75.80
July	26.66	17.68
August	26.63	29.55
September	25.65	29.22
October	27.64	32.97
November	28.45	72.52
December	28.61	112.12
Total		1,157.78

Port Moresby shielded from the northeast monsoon and southeast trade winds by mountainous terrain – Rain shadow

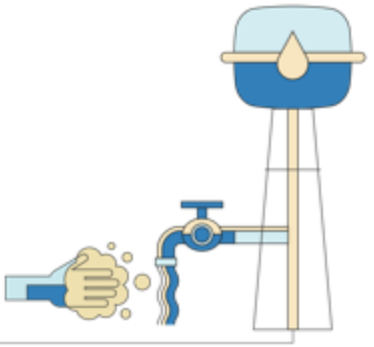
Low Rainfall
Nearly constant high temperature
Large evapotranspiration

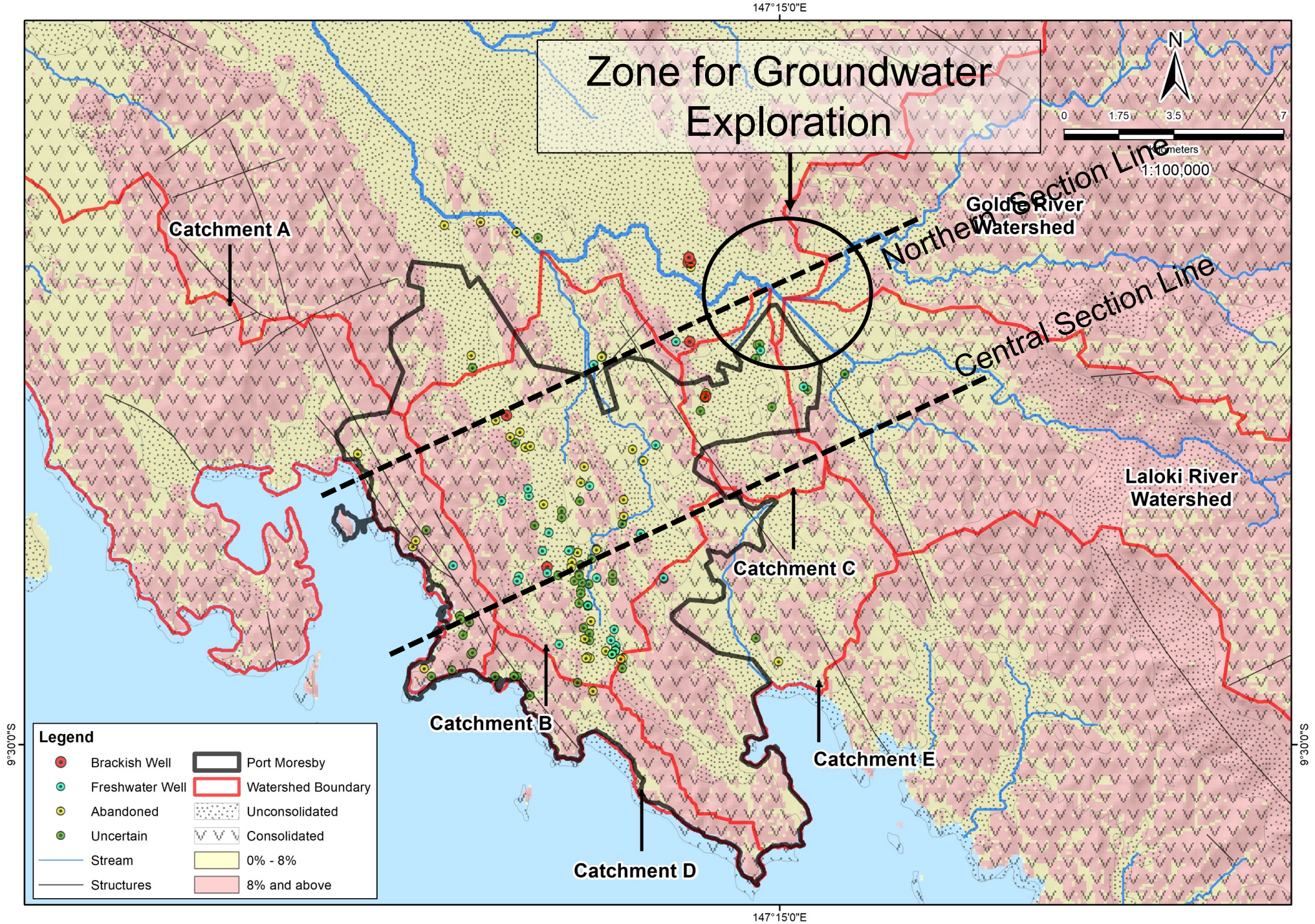
Low groundwater recharge

Results of Water Balance Analysis

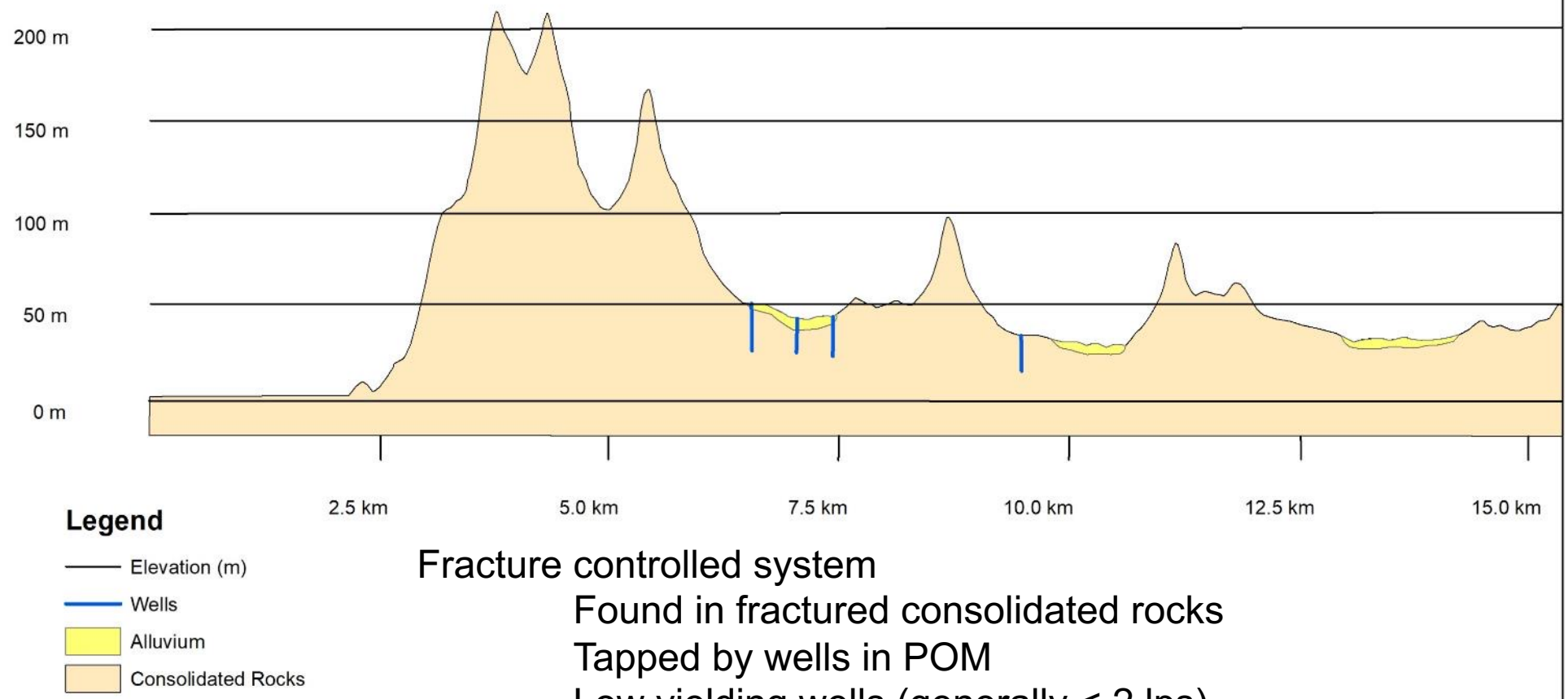
Components (mm)	Unconsolidated	Consolidated
Rainfall	1,158	1,158
AET	1,009	1,009
Runoff	112	127
GWR	37	22

Hydrologic Unit	Area (has)	Groundwater Potential (lps)
Catchment A	12,788	1,062
Catchment B (POM)	**7,818**	**555**
Catchment C	1,798	226
Catchment D	1,456	117
Catchment E	5,765	409
Goldie River Watershed	53,511	4,158
Laloki River Watershed	42,153	3,250




147°15'0"E
Zone for Groundwater Exploration
N
0
1.75
3.5
7
Kilometers
1:100,000
Catchment A
Golden River Watershed
Northern Section Line
Central Section Line
Laloki River Watershed
Catchment C
Catchment B
Catchment E
Catchment D
9°30'0"S
Legend
Brackish Well
Freshwater Well
Abandoned
Uncertain
Stream
Structures
Port Moresby
Watershed Boundary
Unconsolidated
Consolidated
0% - 8%
8% and above

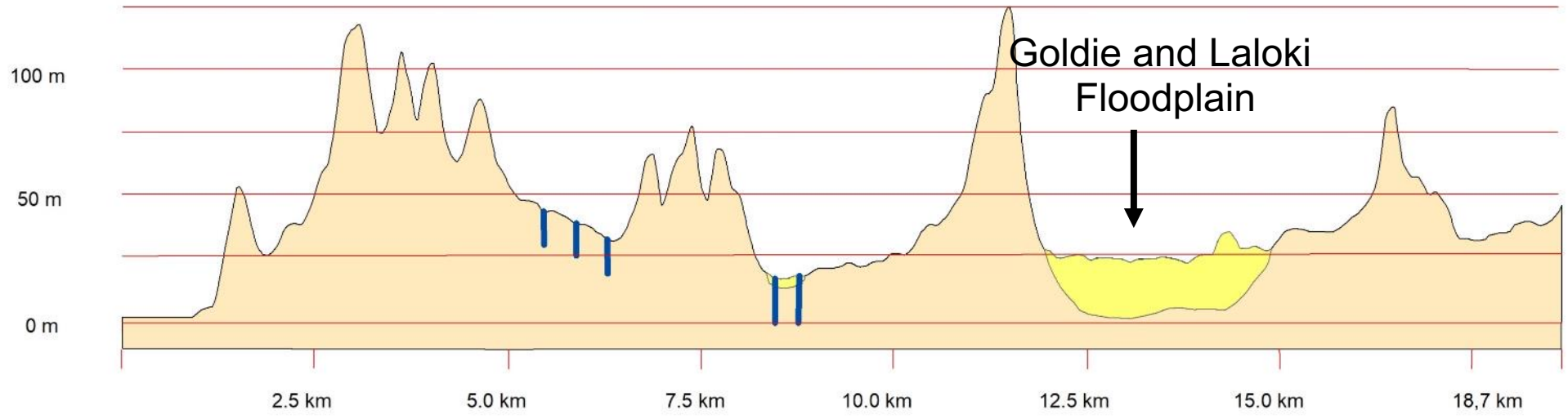
Schematic Section: Fracture-controlled and Alluvial System of Central POM



Fracture controlled system

- Found in fractured consolidated rocks
- Tapped by wells in POM
- Low yielding wells (generally < 2 lps)

Schematic Section: Alluvial and Fracture-Controlled System – Northern POM



Alluvial System

- Founded in alluvial deposits
- Inferred to be thickest at floodplain of Goldie River and Laloki River
- No reported wells drilled through alluvial system

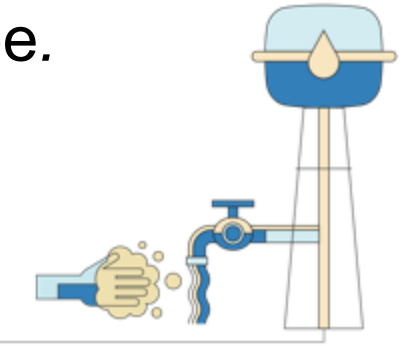
Applicability of Methods to the Western Pacific Region

The desktop groundwater assessment yielded the following:

1. Identification of potential well field at the northern end of POM
2. Identification of fracture-controlled and alluvial groundwater systems
3. Explanation for the low yields of wells within POM

The same methods could be employed in other island countries in the Western Pacific for systematic planning groundwater exploration.

Basic data needed for assessment include location and production of wells and springs, geology, climate, topography, drainage and slope.



Thank you for your attention.