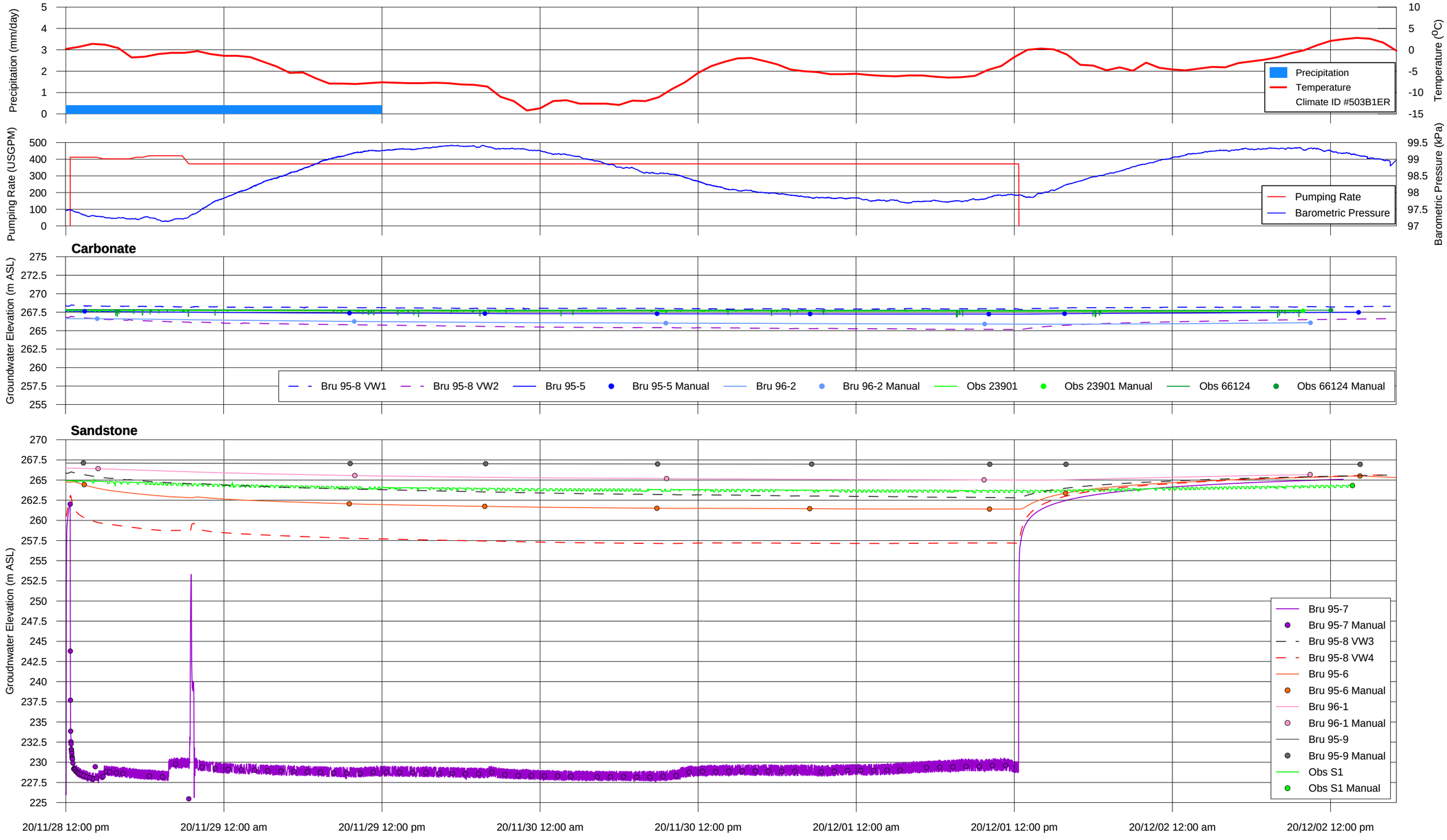


Figure 3-2. Groundwater Levels During Pumping Test – Red River Carbonate and Winnipeg Sandstone

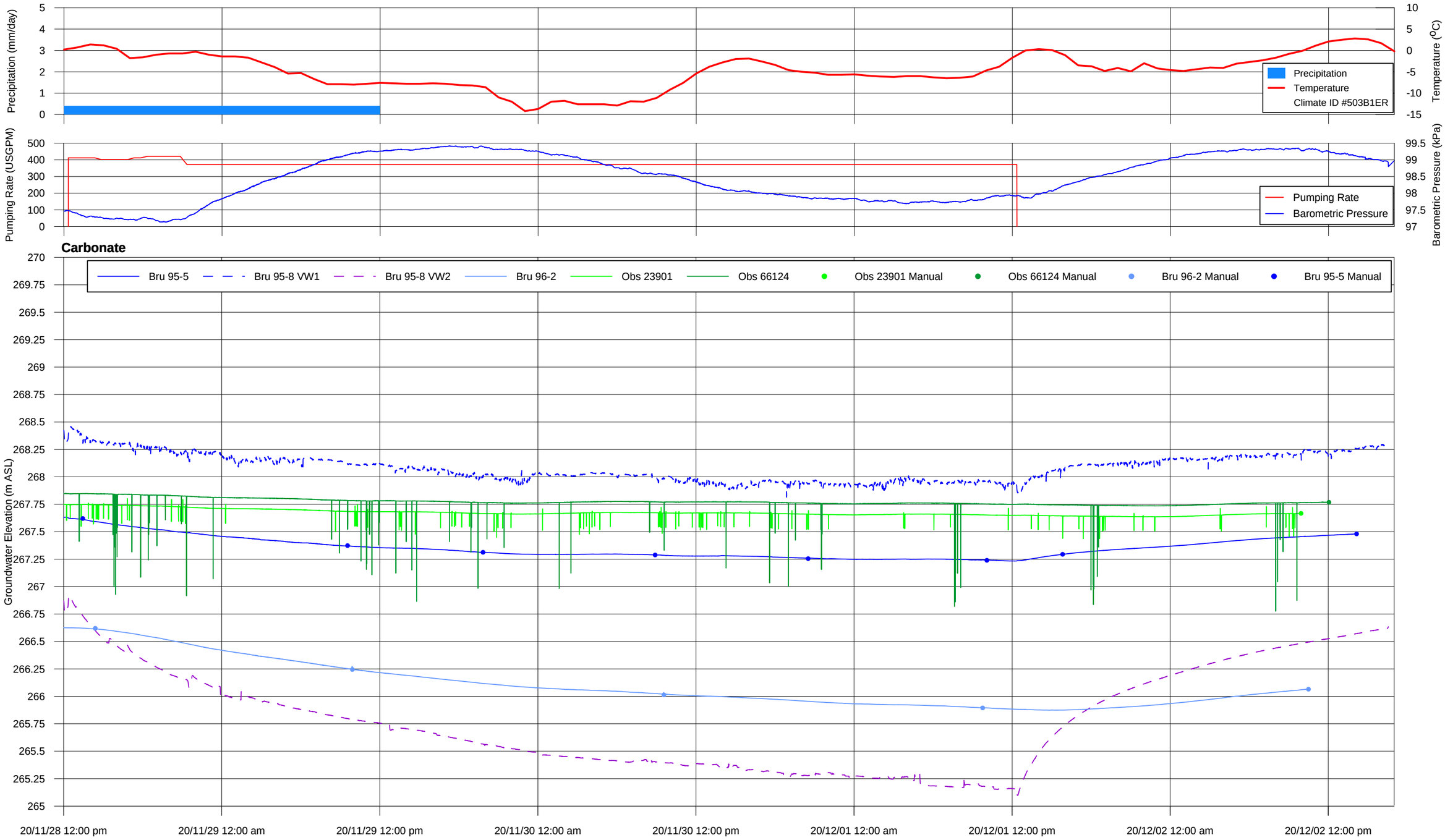
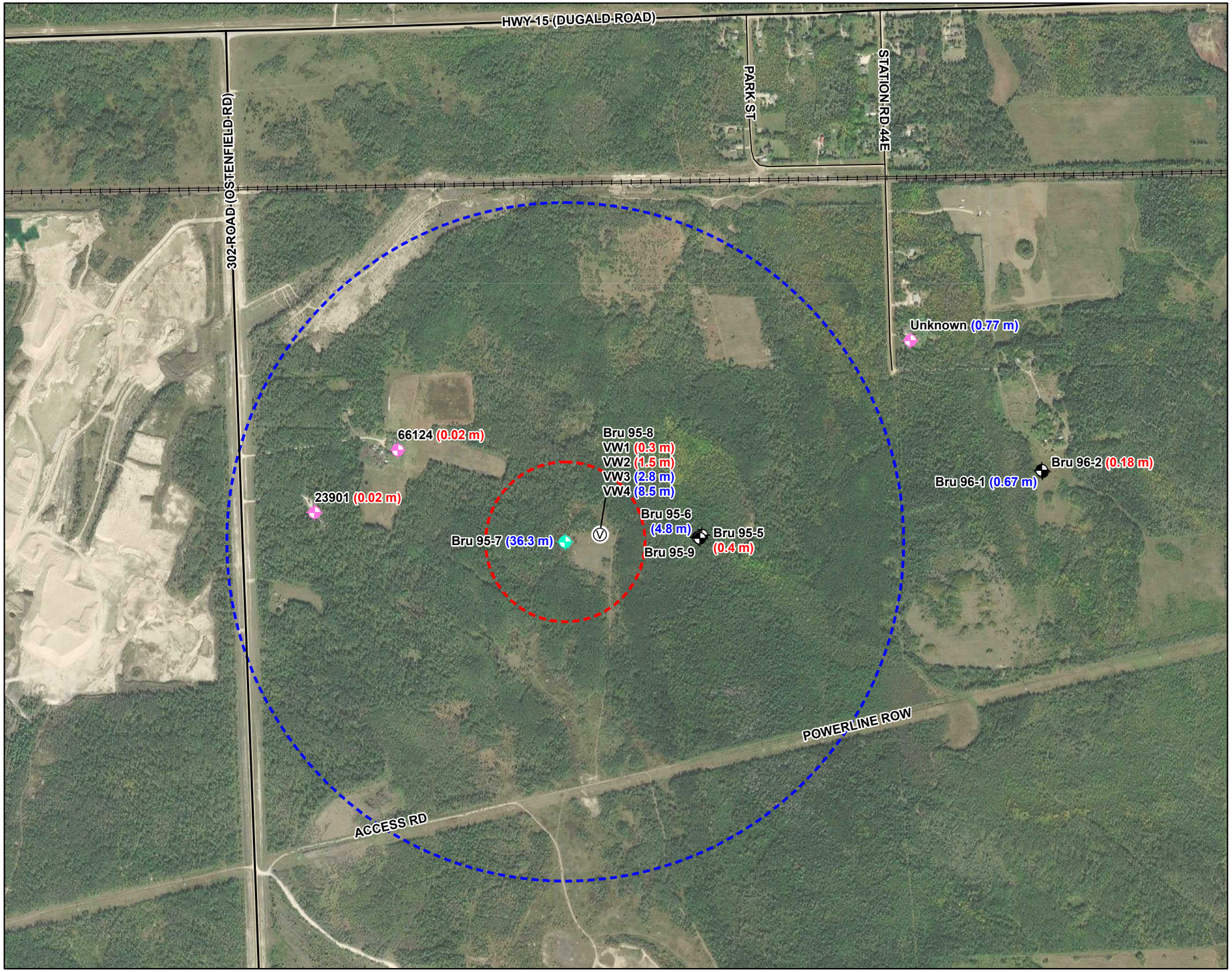


Figure 3-3. Groundwater Levels During Pumping Test – Red River Carbonate

AECOM



Legend

- Groundwater Monitoring Well (CanWhite)
- Vibrating Wire Piezometers (CanWhite)
- Pumping Well (CanWhite)
- Surveyed Domestic Well
- Extent of 1m Drawdown Cone (Carbonate)
- Extent of 1m Drawdown Cone (Sandstone)
- (1.5 m) Measured Drawdown (Carbonate)
- (2.8 m) Measured Drawdown (Sandstone)

General Features

- Highway
- Road
- Railway

1:10,000
NAD 1983 UTM Zone 14N

100 50 0 100 200 300 m

Basemap: Canvec
Imagery: Esri World Imagery Basemap

AECOM

Figure: 3-4

MAXIMUM EXTENT OF DRAWDOWN DURING 72-HOUR PUMPING TEST

VIVIAN SAND EXTRACTION PROJECT
HYDROGEOLOGY AND GEOCHEMISTRY ASSESSMENT
CANWHITE SANDS CORPORATION
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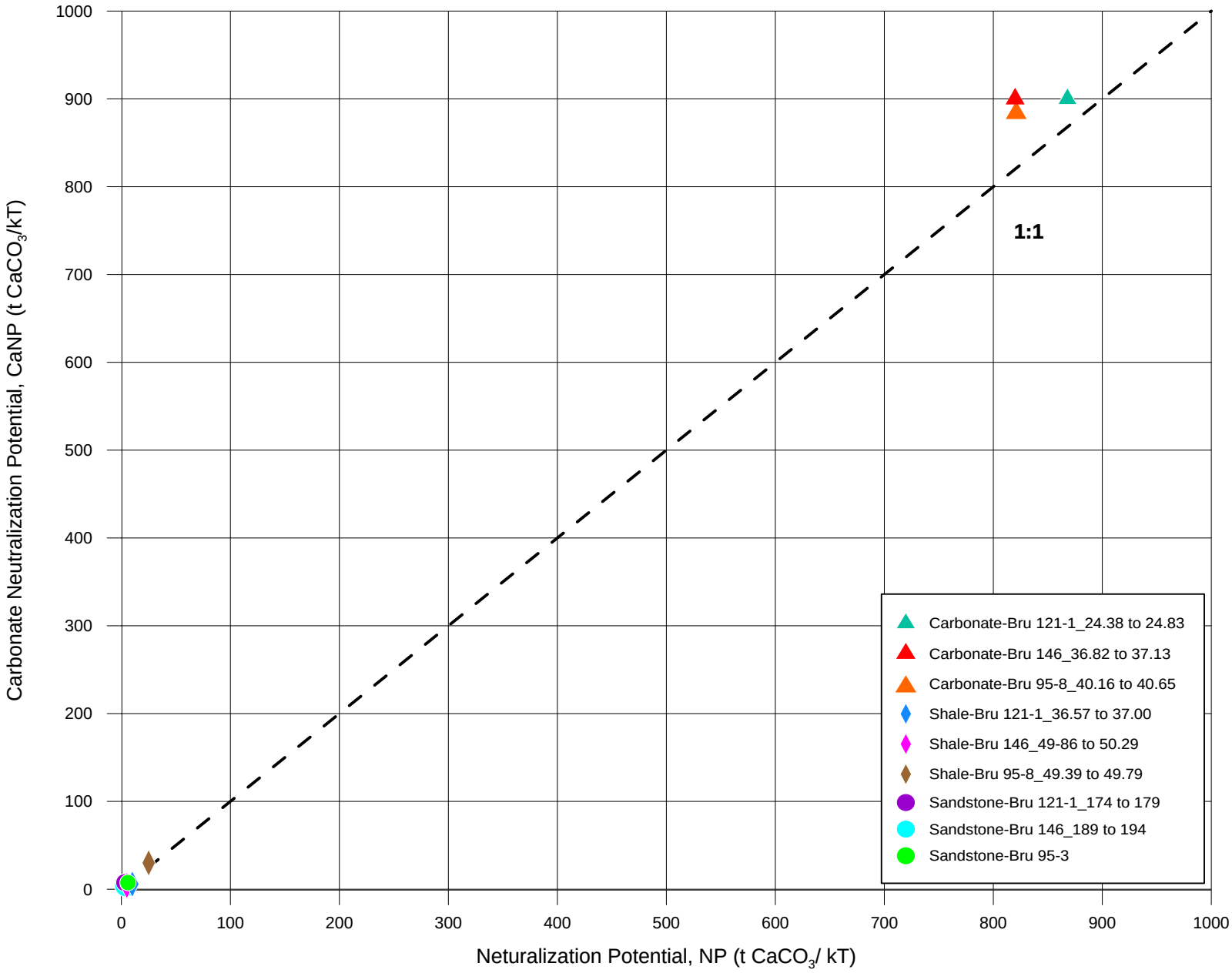

Figure 4-1. Neutralization Potential (NP) vs. Carbonate Neutralization Potential (CaNP)

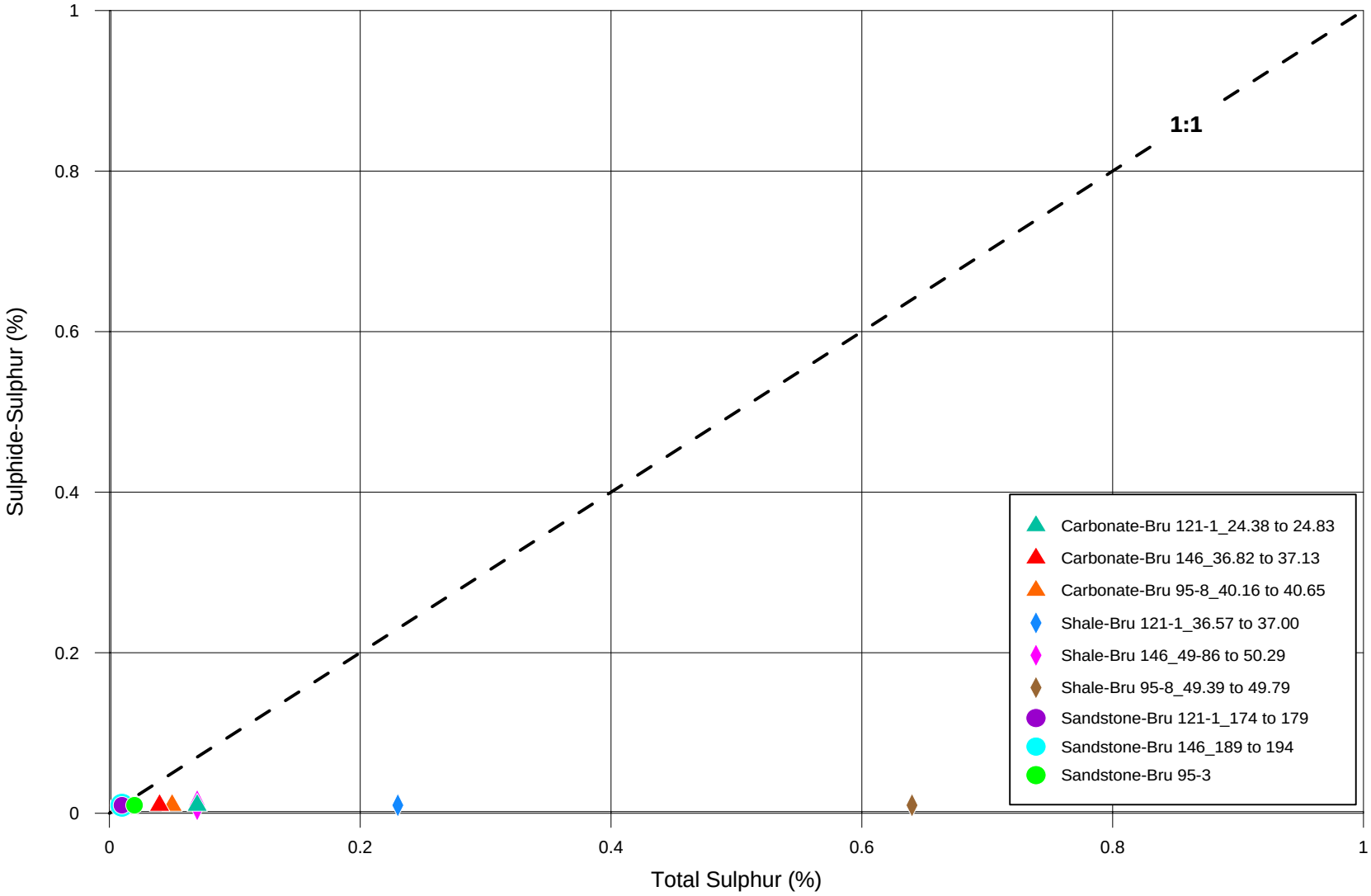

Figure 4-2. Sulphide Sulphur (%) vs. Total Sulphur (%)

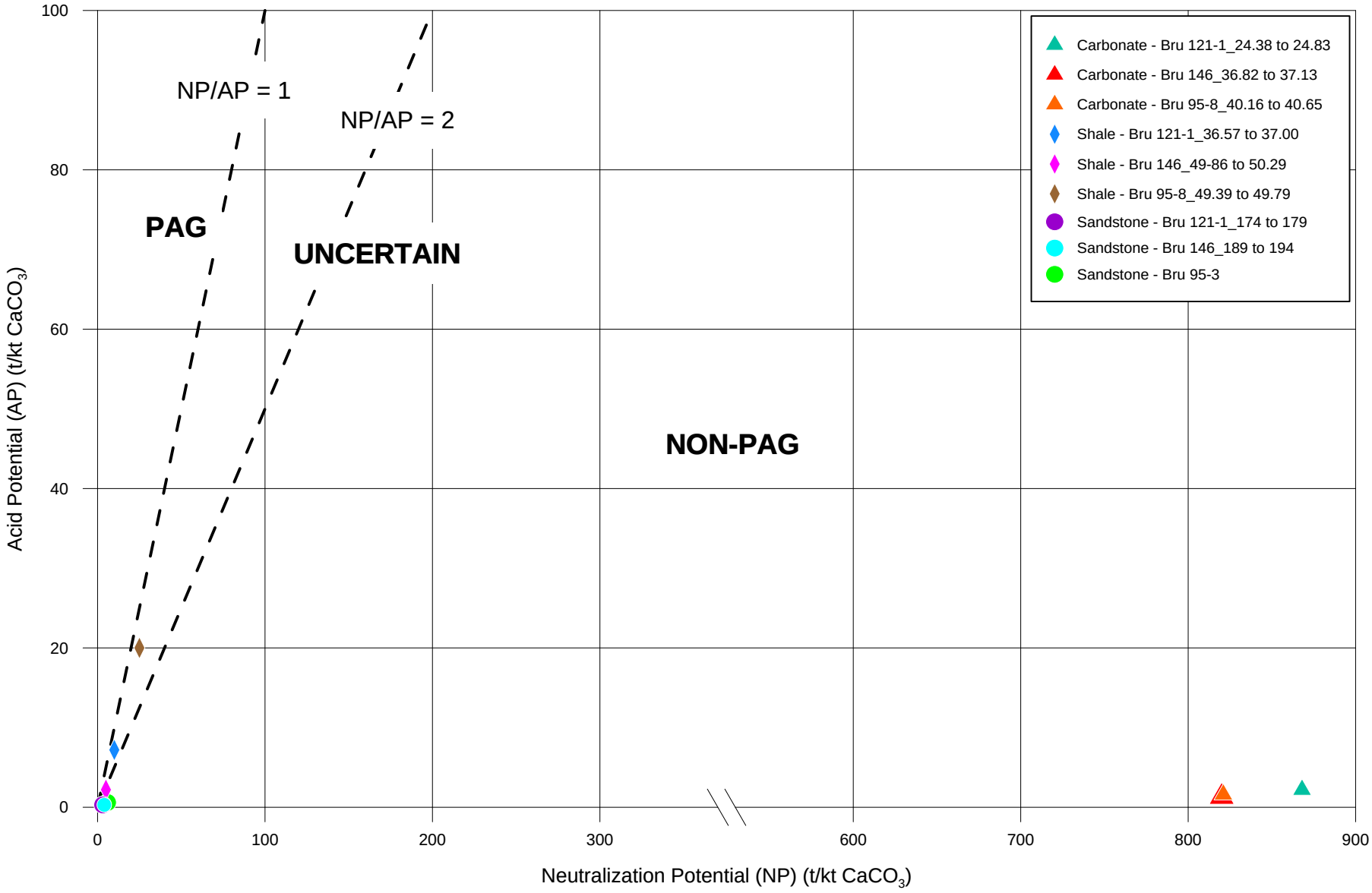

Figure 4-3. Acid Generation Potential (AP) vs. Neutralization Potential (NP)

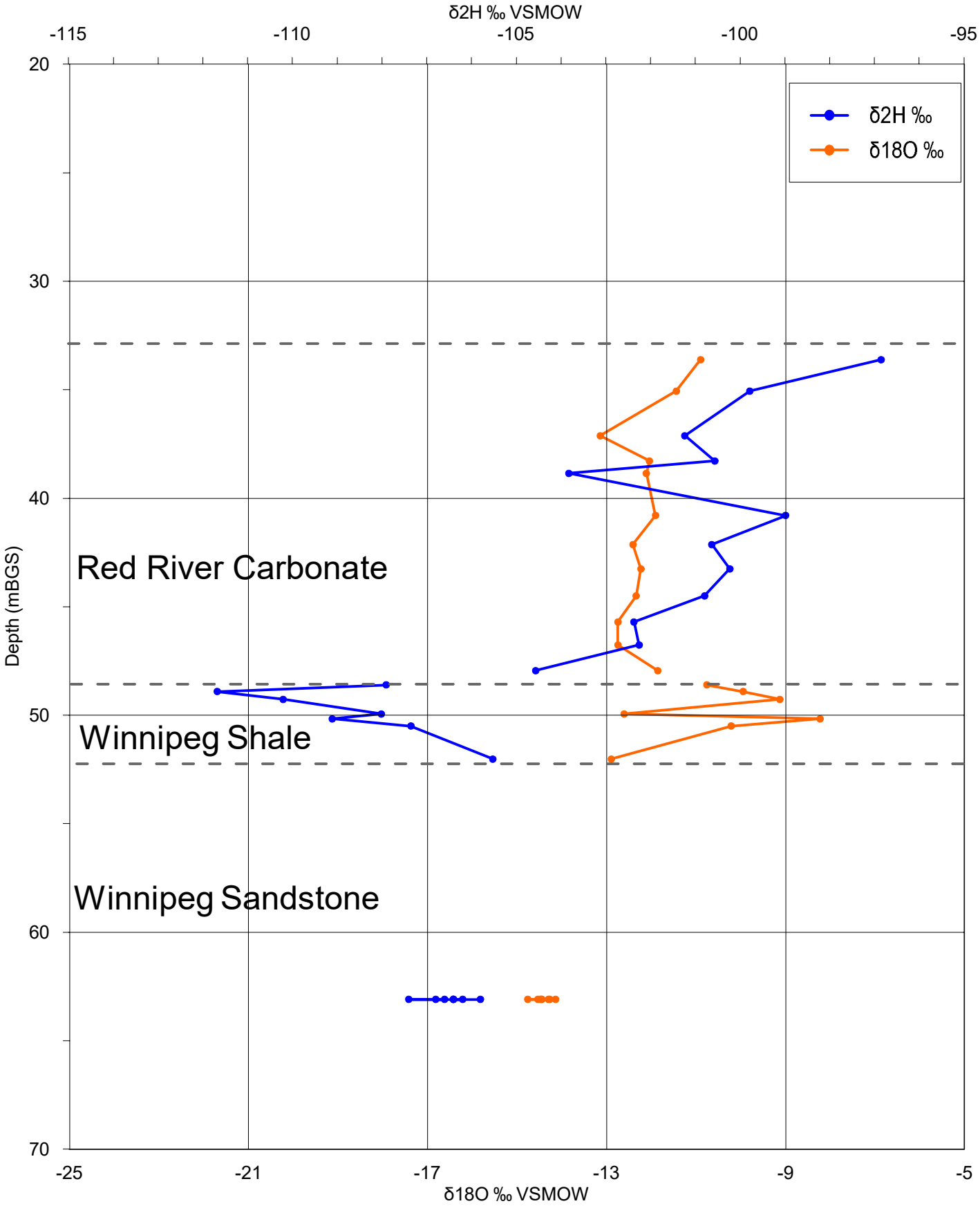

Figure 4-4. Depth Profile of Stable Isotopes - Oxygen-18 and Deuterium

AECOM

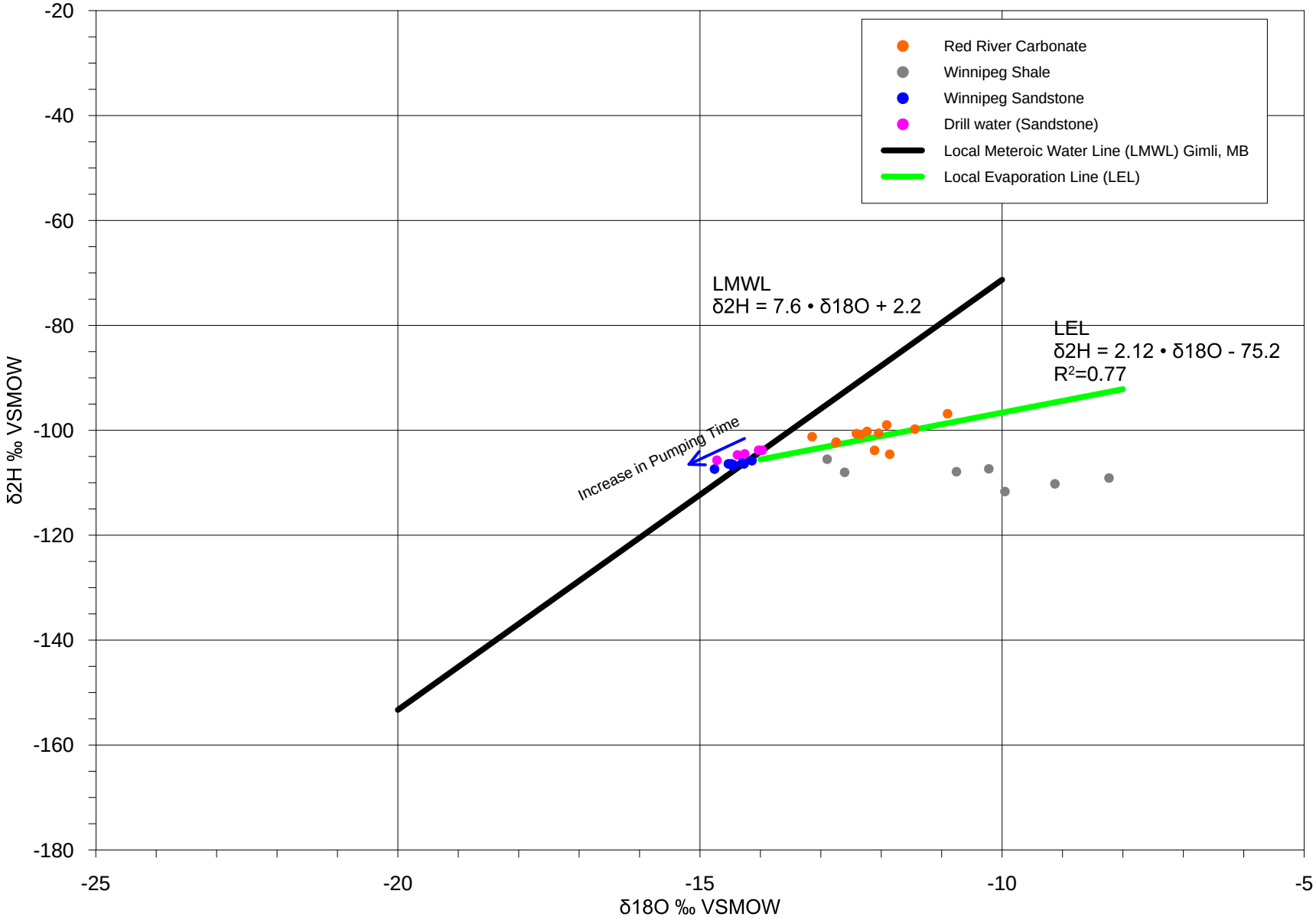

Figure 4-5. Stable Isotopes of Water in Carbonate, Sandstone and Shale Units

AECOM

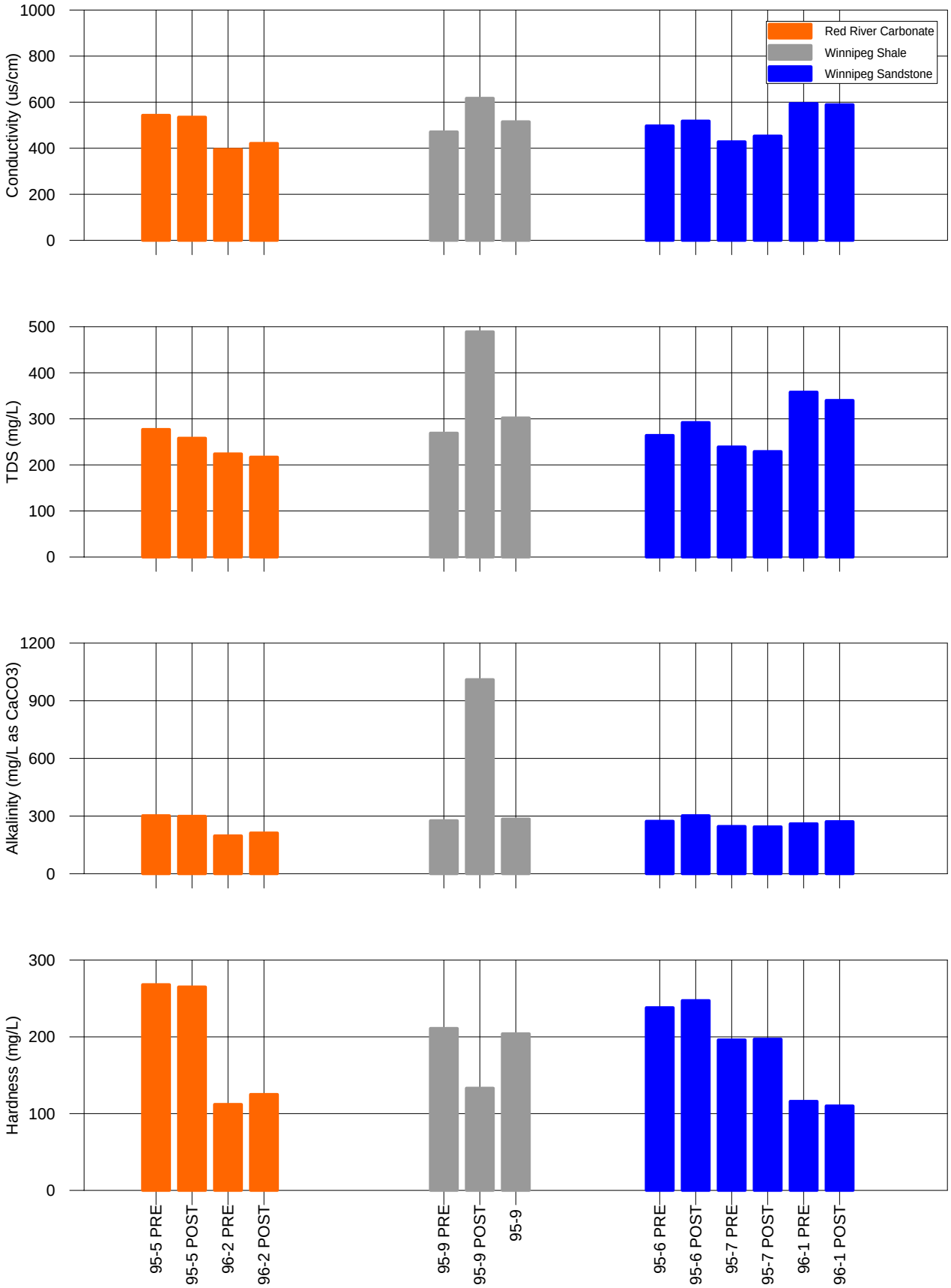

Figure 4-6. Groundwater Chemistry - Conductivity, Total Dissolved Solids, Alkalinity and Hardness AECOM

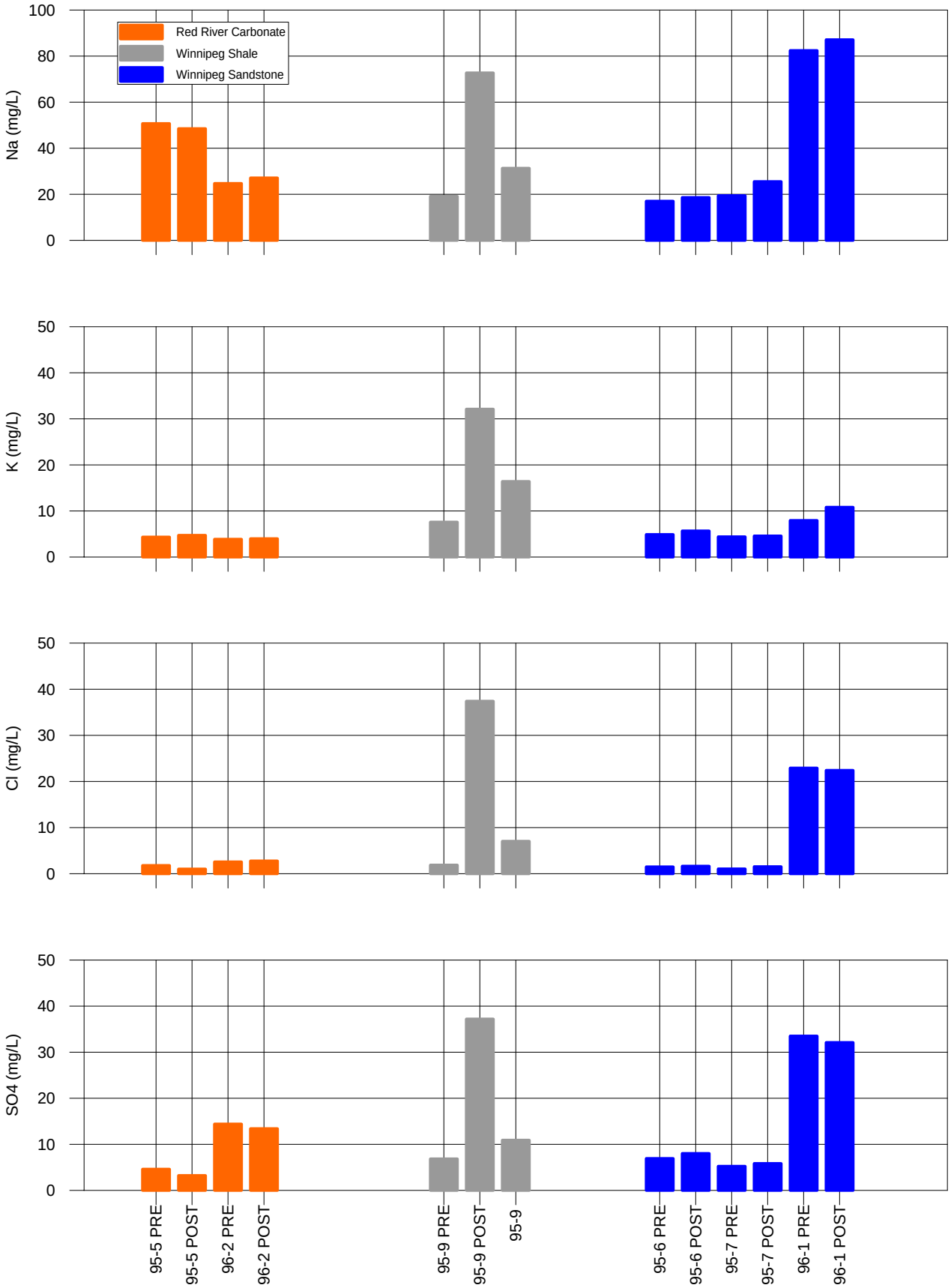

Figure 4-7. Groundwater Chemistry – Sodium, Potassium, Chloride and Sulphate

AECOM

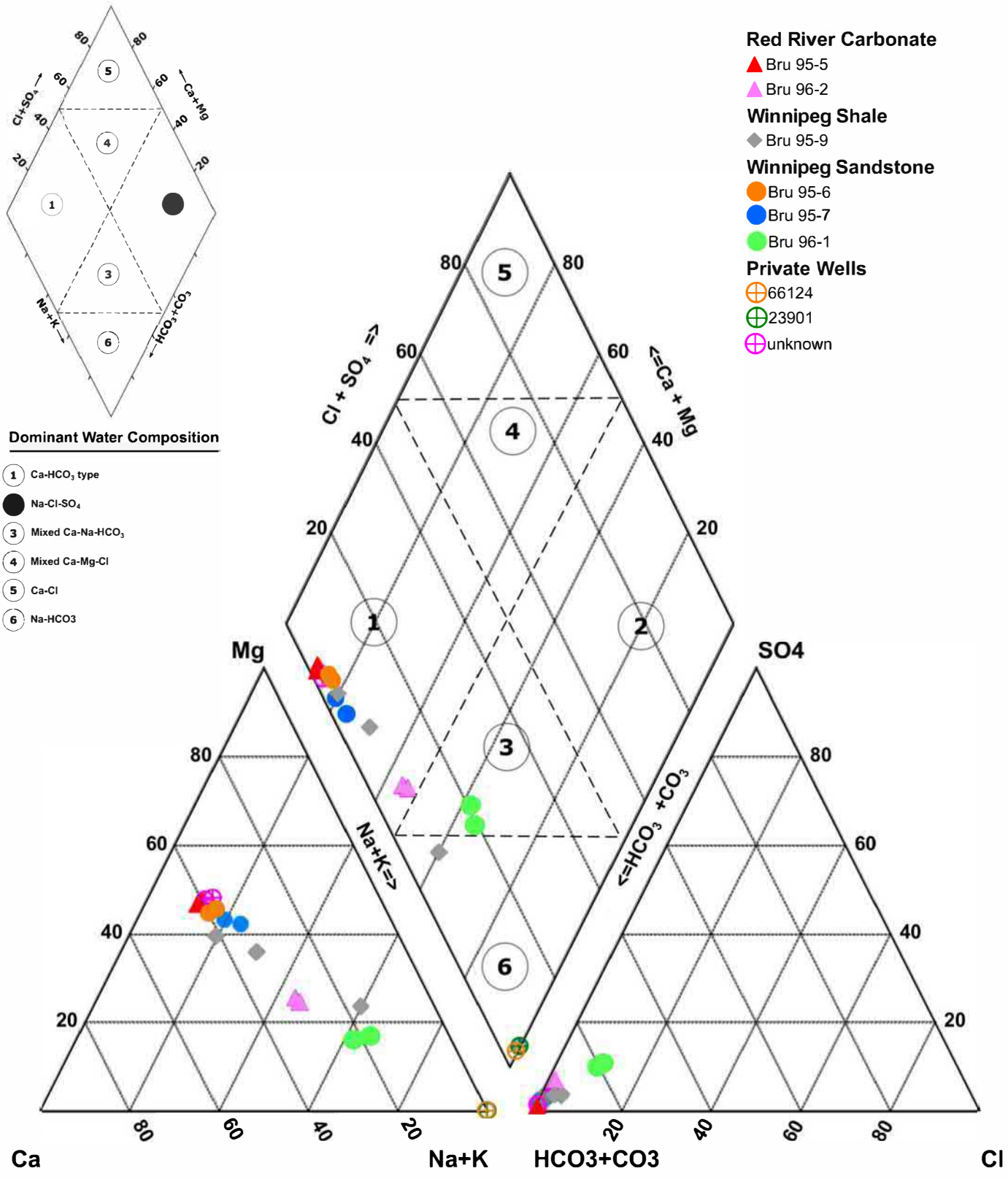

Figure 4-8 Groundwater Piper Plot of Major Ions

AECOM

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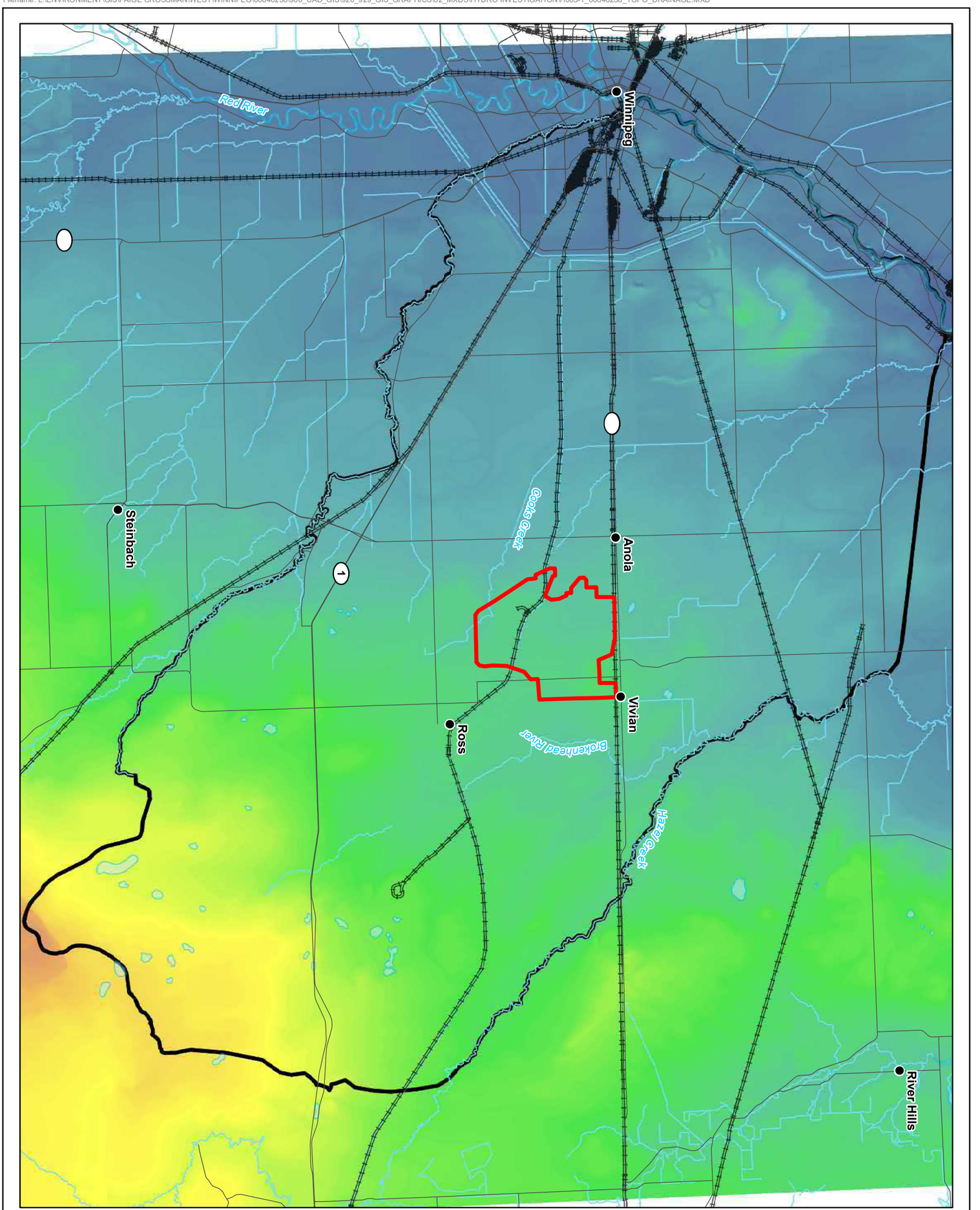

VIVIAN SAND EXTRACTION PROJECT
HYDROGEOLOGY AND GEOCHEMISTRY ASSESSMENT
CANWHITE SANDS CORPORATION
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TOPOGRAPHY AND DRAINAGE

AECOM

Figure: 5-1

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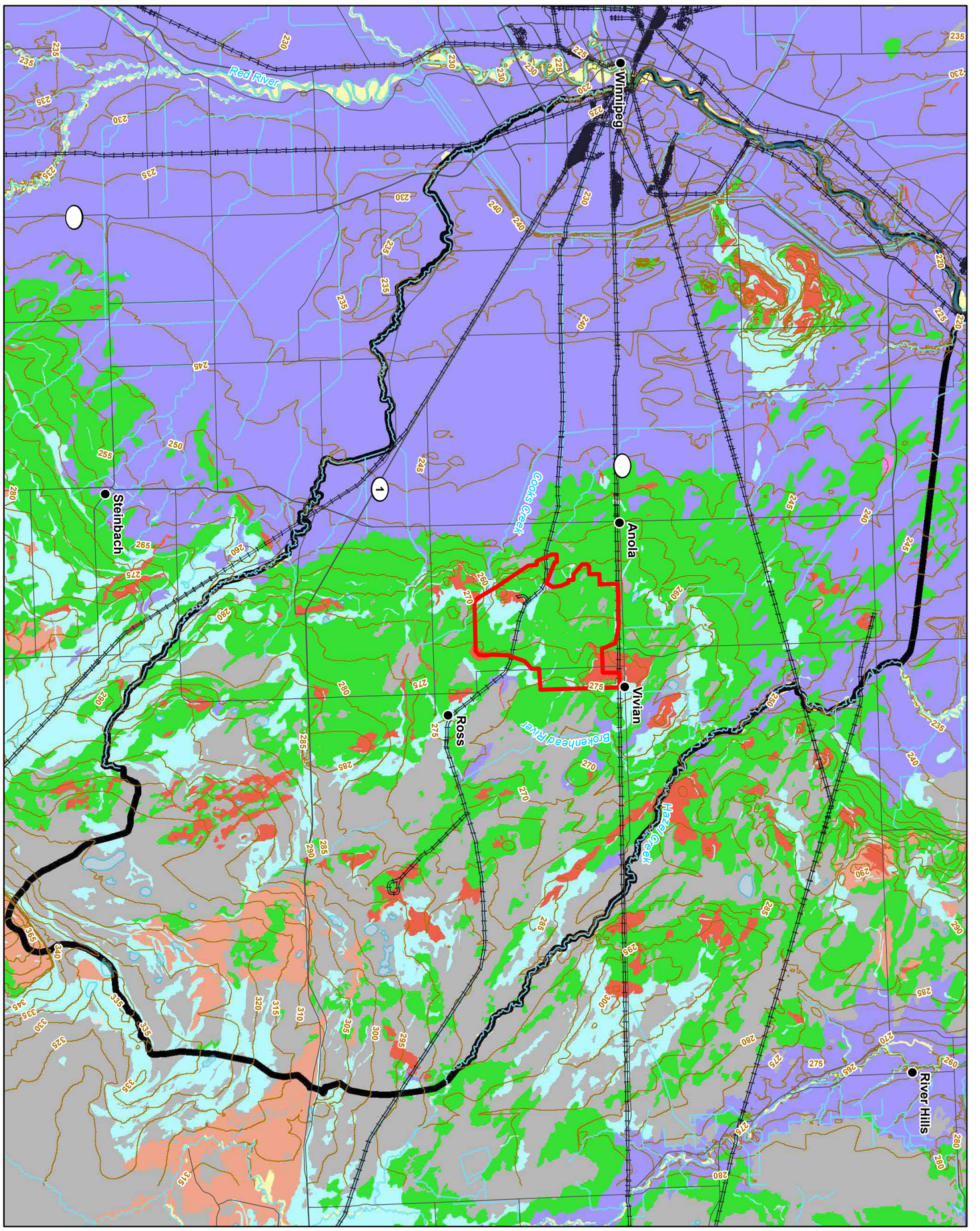

Legend

- Project Site
- Model Domain

General Features

- Highway
- Railway
- Topographic Contour (5m)
- Watercourse
- Waterbody

Surficial Geology

- Eolian
- Proximal Glaciofluvial Sediments
- Offshore Glaciolacustrine Sediments
- Marginal Glaciolacustrine Sediments
- Distal Glaciofluvial Sediments
- Calcareous Diamicton
- Organic Deposits
- Alluvial Sediments

DRAFT

1:310,000
NAD 1983 UTM Zone 14N
5 2.5 0 5 10
km

Basemap: Canvec
Geology: Manitoba Agriculture and Resource Development

VIVIAN SAND EXTRACTION PROJECT
HYDROGEOLOGY AND GEOCHEMISTRY ASSESSMENT
CANWHITE SANDS CORPORATION
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SURFICIAL GEOLOGY

AECOM

Figure: 5-2

Winnipeg
Anola
Vivian
River Hills
Ross
Steinbach
Red River
Cooks Creek
Brokenhead River
Hazel Creek
1

Legend

- Project Site
- Model Domain

General Features

- Highway
- Railway
- Topographic Contour (5m)
- Watercourse
- Waterbody

Bedrock Geology

- 1 Mafic Volcanics
- 12 Granodiorite, Gneiss
- Granite
- 5 Amphibolite
- 8 Tonalite
- Tonalite Gneiss
- J Sandstone, Shale
- Limestone, Dolomite
- Orrfg Massive dolomite
- Osmgp Calcareous Shale
- Sandstone

DRAFT

1:310,000
NAD 1983 UTM Zone 14N

5 2.5 0 5 10 km

Basemap: Canvec

AECOM

Figure: 5-3

BEDROCK GEOLOGY

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Legend

- Quaternary Sediment
- Red River Carbonate
- Winnipeg Shale
- Winnipeg Sandstone
- Lower Shale / Precambrian Bedrock
- Project Site

NOTE:
Vertical Exaggeration is 20x

A - A'

DRAFT

AECOM

Figure: 5-4

3D GEOLOGICAL MODEL

VIVIAN SAND EXTRACTION PROJECT
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QUATERNARY ISOPACH

TOP OF RED RIVER CARBONATE

Legend

- Project Site
- Model Domain

General Features

- Highway
- Railway
- Watercourse
- Waterbody

Winnipeg Sandstone Subcrop

- Lower Contact
- Upper Contact

Quaternary Isopach (m)

- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 100

Top of Red River Carbonate (masl)

- 160 - 180
- 180 - 200
- 200 - 220
- 220 - 240
- 240 - 260
- 260 - 280

DRAFT

1:580,000
NAD 1983 UTM Zone 14N

10 5 0 10 20 km

Basemap: Canvec

AECOM

Figure: 5-5

TOP OF RED RIVER CARBONATE AND QUATERNARY ISOPACH

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CANWHITE SANDS CORPORATION
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