

Water Well	a hole in the ground for the purpose of obtaining groundwater; “work type” as defined by AENV includes test hole, chemistry, deepened, well inventory, federal well survey, reconditioned, reconstructed, new, old well-test
Yield	a regional analysis term referring to the rate a properly completed water well could be pumped, if fully penetrating the aquifer Apparent Yield: based mainly on apparent transmissivity Long-Term Yield: based on effective transmissivity
AAFC-PFRA	Prairie Farm Rehabilitation Administration Branch of Agriculture and Agri-Food Canada
AENV	Alberta Environment
AMSL	above mean sea level
BGP	Base of Groundwater Protection
DEM	Digital Elevation Model
DST	drill stem test
EUB	Alberta Energy and Utilities Board
GCDWQ	Guidelines for Canadian Drinking Water Quality
IAAM	<i>Infinite Aquifer Artesian Model</i> . The mathematical model is used to calculate water levels at a given location. The model has been used for more than 17 years by HCL for several hundred groundwater monitoring projects. The model aquifer is based on a solution of the well function equation. The simulation calculates drawdown by solving the well function equation using standard approximation methods. The drawdown at any given point at any given time uses the method of superposition.
NPWL	non-pumping water level
TDS	Total Dissolved Solids
WSW	Water Source Well or Water Supply Well

10 CONVERSIONS

Multiply	by	To Obtain
Length/Area		
feet	0.304 785	metres
metres	3.281 000	feet
hectares	2.471 054	acres
centimetre	0.032 808	feet
centimetre	0.393 701	inches
acres	0.404 686	hectares
inchs	25.400 000	millimetres
miles	1.609 344	kilometres
kilometer	0.621 370	miles (statute)
square feet (ft ²)	0.092 903	square metres (m ²)
square metres (m ²)	10.763 910	square feet (ft ²)
square metres (m ²)	0.000 001	square kilometres (km ²)
Concentration		
grains/gallon (UK)	14.270 050	parts per million (ppm)
ppm	0.998 859	mg/L
mg/L	1.001 142	ppm
Volume (capacity)		
acre feet	1233.481 838	cubic metres
cubic feet	0.028 317	cubic metres
cubic metres	35.314 667	cubic feet
cubic metres	219.969 248	gallons (UK)
cubic metres	264.172 050	gallons (US liquid)
cubic metres	1000.000 000	litres
gallons (UK)	0.004 546	cubic metres
imperial gallons	4.546 000	litres
Rate		
litres per minute (lpm)	0.219 974	UK gallons per minute (igpm)
litres per minute	1.440 000	cubic metres/day (m ³ /day)
igpm	6.546 300	cubic metres/day (m ³ /day)
cubic metres/day	0.152 759	igpm

CLEARWATER COUNTY

Appendix B

Maps and Figures on CD-ROM

1) General

- Index Map
- River Sub-basins
- Surface Topography
- Surface Casing Types Used in Drilled Water Wells
- Location of Water Wells and Springs
- Minimum Depth of Existing Water Wells
- Maximum Depth of Existing Water Wells
- Difference Between the Maximum and Minimum Depth of Existing Water Wells
- Depth to Base of Groundwater Protection
- Hydrogeological Maps
- Generalized Cross-Section (for terminology only)
- Geologic Column
- Cross-Section A - A'
- Cross-Section B - B'
- Cross-Section C - C'
- Cross-Section D - D'
- Cross-Section E - E'
- Cross-Section F - F'
- Cross-Section G - G'
- Cross-Section H - H'
- Bedrock Topography
- Bedrock Geology
- Relative Permeability
- Authorized Non-Exempt Groundwater Water Wells
- Estimated Water Well Use per Section
- Water Wells Recommended for Field Verification

2) Surficial Aquifers

a) Surficial Deposits

- Thickness of Surficial Deposits
- Non-Pumping Water-Level Surface in Surficial Deposits Based on Water Wells Less than 20 Metres Deep
- Total Dissolved Solids in Groundwater from Surficial Deposits
- Sulfate in Groundwater from Surficial Deposits
- Nitrate + Nitrite (as N) in Groundwater from Surficial Deposits
- Chloride in Groundwater from Surficial Deposits
- Total Hardness in Groundwater from Surficial Deposits
- Piper Diagram - Surficial Deposits
- Thickness of Sand and Gravel Deposits
- Amount of Sand and Gravel in Surficial Deposits
- Thickness of Sand and Gravel Aquifer(s)
- Water Wells Completed in Surficial Deposits
- Apparent Yield for Water Wells Completed in Sand and Gravel Aquifer(s)
- Changes in Water Levels in Surficial Deposits

b) Upper Sand and Gravel

- Thickness of Upper Surficial Deposits
- Thickness of Upper Sand and Gravel (not all drill holes fully penetrate surficial deposits)
- Apparent Yield for Water Wells Completed through Upper Sand and Gravel Aquifer

c) Lower Sand and Gravel

- Structure-Contour Map - Top of Lower Surficial Deposits
- Depth to Top of Lower Surficial Deposits
- Thickness of Lower Surficial Deposits
- Thickness of Lower Sand and Gravel (not all drill holes fully penetrate surficial deposits)
- Apparent Yield for Water Wells Completed through Lower Sand and Gravel Aquifer
- Non-Pumping Water-Level Surface in Lower Sand and Gravel Aquifer

3) Bedrock Aquifers

a) General

Apparent Yield for Water Wells Completed in Upper Bedrock Aquifer(s)
Total Dissolved Solids in Groundwater from Upper Bedrock Aquifer(s)
Sulfate in Groundwater from Upper Bedrock Aquifer(s)
Chloride in Groundwater from Upper Bedrock Aquifer(s)
Fluoride in Groundwater from Upper Bedrock Aquifer(s)
Total Hardness of Groundwater from Upper Bedrock Aquifer(s)
Piper Diagram - Bedrock Aquifer
Bedrock Recharge/Discharge Areas
Non-Pumping Water-Level Surface in Upper Bedrock Aquifer(s)
Areas of Potential Groundwater Depletion - Upper Bedrock Aquifer(s)

b) Disturbed Belt Formation

Depth to Top of Disturbed Belt
Structure-Contour Map - Disturbed Belt
Non-Pumping Water-Level Surface - Disturbed Belt Aquifer
Apparent Yield for Water Wells Completed through Disturbed Belt Aquifer
Total Dissolved Solids in Groundwater from Disturbed Belt Aquifer
Sulfate in Groundwater from Disturbed Belt Aquifer
Chloride in Groundwater from Disturbed Belt Aquifer
Fluoride in Groundwater from Disturbed Belt Aquifer
Piper Diagram - Disturbed Belt Aquifer

c) Dalehurst Member

Depth to Top of Dalehurst Member
Structure-Contour Map - Dalehurst Member
Non-Pumping Water-Level Surface - Dalehurst Aquifer
Apparent Yield for Water Wells Completed through Dalehurst Aquifer
Total Dissolved Solids in Groundwater from Dalehurst Aquifer
Sulfate in Groundwater from Dalehurst Aquifer
Chloride in Groundwater from Dalehurst Aquifer
Fluoride in Groundwater from Dalehurst Aquifer
Piper Diagram - Dalehurst Aquifer

d) Upper Lacombe Member

Depth to Top of Upper Lacombe Member
Structure-Contour Map - Upper Lacombe Member

e) Lower Lacombe Member

Depth to Top of Lower Lacombe Member
Structure-Contour Map - Lower Lacombe Member

f) Haynes Member

Depth to Top of Haynes Member
Structure-Contour Map - Haynes Member

4) Hydrographs and Observation Water Wells

Hydrographs
Annual Production from WSW Nos. 02-33 and 10-28
Water-Level Comparison - Obs WW No. 02-28
Obs WW No. 02-28 - Measured Water Level and Early Summer Precipitation
Obs WWs Water Levels and June to August, 1999 Precipitation
Water-Level Comparison - AENV Obs WW No. 95, Obs WW No. 02-28 and DeMonnin Dom Obs WW - 1999
Water-Levels in Obs WW No. 10-07

5) Specific Study Areas

a) Study Area 1

Apparent Yield for Water Wells Completed in Sand and Gravel Aquifer(s) - Area 1
Total Dissolved Solids in Groundwater from Surficial Deposits - Area 1
Apparent Yield for Water Wells Completed through Dalehurst Aquifer - Area 1
Total Dissolved Solids in Groundwater from Dalehurst - Area 1
Estimated Water Well User Per Section - Area 1
Changes in Water Levels in Surficial Deposits - Area 1
Discharge Rate in Clearwater River and Water-Level Measurements in WSW No. SE10
Areas of Potential Groundwater Depletion in Upper Bedrock Aquifer(s) - Area 1

b) Study Area 2

Licensed Groundwater Diversion for Injection Purposes
Licensed Groundwater Versus Reported Diversion