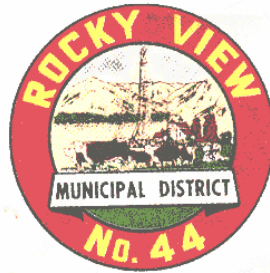


M.D. of Rocky View No. 44

Part of the South Saskatchewan River Basin
Tp 021 to 029, R 25 to 29, W4M & Tp 023 to 029, R 01 to 06, W5M
Regional Groundwater Assessment

Prepared for the M.D. of Rocky View No. 44



In conjunction with



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

Prairie Farm Rehabilitation
Administration

Administration du rétablissement
agricole des Prairies

Canada 

Prepared by
hydrogeological consultants ltd.
1-800-661-7972
Our File No.: **01-206**

March 2002

PERMIT TO PRACTICE

HYDROGEOLOGICAL CONSULTANTS LTD.

Signature _____

Date _____

PERMIT NUMBER P 385

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

© 2002 M.D. of Rocky View No. 44

Table of Contents

Table of Contents.....	ii
List of Figures.....	iv
List of Tables.....	vi
Appendices	vi
Acknowledgements.....	vii
1. Project Overview.....	1
1.1 Purpose	1
1.2 The Project	2
1.3 About This Report.....	2
2. Introduction.....	3
2.1 Setting.....	3
2.2 Climate.....	3
2.3 Background Information	4
2.3.1 Number, Type and Depth of Water Wells	4
2.3.2 Number of Water Wells in Surficial and Bedrock Aquifers.....	4
2.3.3 Casing Diameter and Type	5
2.3.4 Dry Water Test Holes.....	5
2.3.5 Requirements for Licensing	5
2.3.6 Groundwater Chemistry and Base of Groundwater Protection.....	6
3. Terms.....	8
4. Methodology	9
4.1 Data Collection and Synthesis.....	9
4.2 Spatial Distribution of Aquifers	11
4.3 Hydrogeological Parameters	11
4.4 Maps and Cross-Sections	12
4.5 Software.....	12
5. Aquifers.....	13
5.1 Background.....	13
5.1.1 Surficial Aquifers	13
5.1.2 Bedrock Aquifers	14
5.2 Aquifers in Surficial Deposits.....	15
5.2.1 Geological Characteristics of Surficial Deposits	15
5.2.2 Sand and Gravel Aquifer(s).....	17
5.2.3 Upper Sand and Gravel Aquifer	19
5.2.4 Lower Sand and Gravel Aquifer	20

5.3	Bedrock.....	21
5.3.1	Geological Characteristics.....	21
5.3.2	Aquifers	22
5.3.3	Chemical Quality of Groundwater	24
5.3.4	Disturbed Belt Aquifer	25
5.3.5	Dalehurst Aquifer.....	26
5.3.6	Lacombe Aquifer	27
5.3.7	Haynes Aquifer.....	28
5.3.8	Upper Scollard Aquifer	29
6.	Groundwater Budget	30
6.1	Hydrographs	30
6.2	Estimated Water Use from Unlicensed Groundwater Users	33
6.3	Groundwater Flow	34
6.3.1	Quantity of Groundwater	36
6.3.2	Recharge/Discharge.....	36
6.4	Areas of Groundwater Decline	38
6.5	Discussion on Specific Study Areas	39
6.5.1	Area to the Northeast of Calgary.....	40
6.5.2	Area East and North of Chestermere Lake.....	41
6.5.3	Area North of Tsuu t'ina First Nation and South of the Elbow River	42
6.5.4	Area North of Cochrane	43
6.5.5	Shepard Area	44
7.	Recommendations.....	45
8.	References	47
9.	Conversions.....	54
10.	Glossary.....	55

List of Figures

Figure 1. Index Map	3
Figure 2. Location of Water Wells and Springs	4
Figure 3. Surface Casing Types Used in Drilled Water Wells.....	5
Figure 4. Depth to Base of Groundwater Protection (after EUB, 1995)	7
Figure 5. Generalized Cross-Section (for terminology only)	8
Figure 6. Geologic Column.....	8
Figure 7. Hydrogeological Map.....	10
Figure 8. Cross-Section G - G'	13
Figure 9. Cross-Section A - A'	14
Figure 10. Bedrock Topography	15
Figure 11. Thickness of Sand and Gravel Deposits	16
Figure 12. Water Wells Completed in Surficial Deposits	17
Figure 13. Apparent Yield for Water Wells Completed in Sand and Gravel Aquifer(s)	17
Figure 14. Total Dissolved Solids in Groundwater from Surficial Deposits	18
Figure 15. Apparent Yield for Water Wells Completed through Upper Sand and Gravel Aquifer	19
Figure 16. Apparent Yield for Water Wells Completed through Lower Sand and Gravel Aquifer	20
Figure 17. Bedrock Geology.....	21
Figure 18. Apparent Yield for Water Wells Completed in Upper Bedrock Aquifer(s)	23
Figure 19. Total Dissolved Solids in Groundwater from Upper Bedrock Aquifer(s)	24
Figure 20. Distance from Top of Lacombe Member vs Sulfate in Groundwaters from Upper Bedrock Aquifer(s)	24
Figure 21. Apparent Yield for Water Wells Completed through Disturbed Belt Aquifer	25
Figure 22. Apparent Yield for Water Wells Completed through Dalehurst Aquifer	26
Figure 23. Apparent Yield for Water Wells Completed through Lacombe Aquifer	27
Figure 24. Apparent Yield for Water Wells Completed through Haynes Aquifer.....	28
Figure 25. Apparent Yield for Water Wells Completed through Upper Scollard Aquifer	29
Figure 26. Hydrograph - AENV Obs WW No. 223.....	30
Figure 27. Hydrograph – Andrews Water Well	31
Figure 28. Map of 1998 Drawdown	31
Figure 29. Water-Level Comparison – Andrews Water Well	32
Figure 30. Hydrograph – West/Descouteaux Water Well	32
Figure 31. Estimated Water Well Use Per Section	34
Figure 32. Non-Pumping Water-Level Surface in Surficial Deposits Based on Water Wells Less than 20 Metres Deep	36
Figure 33. Recharge/Discharge Areas in Upper Bedrock Aquifer(s)	37
Figure 34. Changes in Water Levels in Sand and Gravel Aquifer(s)	38
Figure 35. Changes in Water Levels in Upper Bedrock Aquifer(s)	38
Figure 36. Specific Study Areas	39
Figure 37. Bedrock Geology of Specific Study Areas.....	39
Figure 38. Apparent Yield for Water Wells Completed in Sand and Gravel Aquifer(s) - Specific Study Areas	39
Figure 39. Apparent Yield for Water Wells Completed in Upper Bedrock Aquifer(s) - Specific Study Areas	39
Figure 40. Area Northeast of Calgary - Apparent Yield in Upper Bedrock Aquifer(s)	40
Figure 41. Area Northeast of Calgary - Location of Gas Wells	40

Figure 42. Area East and North of Chestermere Lake - Apparent Yield in Sand and Gravel Aquifer(s)..... 41

Figure 43. Area East and North of Chestermere Lake - Apparent Yield in Upper Bedrock Aquifer(s)..... 41

Figure 44. Area North of Tsuu t'ina First Nation and South of the Elbow River - Apparent Yield in Sand and Gravel Aquifer(s)
..... 42

Figure 45. Area North of Tsuu t'ina First Nation and South of the Elbow River - Apparent Yield in Upper Bedrock Aquifer(s) 42

Figure 46. Area North of Cochrane - Apparent Yield in Sand and Gravel Aquifer(s)..... 43

Figure 47. Area North of Cochrane - Apparent Yield in Upper Bedrock Aquifer(s)..... 43

Figure 48. Shepard Area – Fluoride in Upper Bedrock Aquifer(s) 44

Figure 49. Shepard Area – Total Hardness vs. Fluoride in Upper Bedrock Aquifer(s) 44

List of Tables

Table 1. Licensed Groundwater Diversions.....	6
Table 2. Concentrations of Constituents in Groundwaters from Upper Bedrock Aquifer(s).....	6
Table 3. Concentrations of Constituents in Groundwaters from Surficial Aquifers	18
Table 4. Completion Aquifer	22
Table 5. Apparent Yields of Bedrock Aquifers	23
Table 6. Unlicensed and Licensed Groundwater Diversions	33
Table 7. Total Groundwater Diversions	34
Table 8. Groundwater Budget	35

Appendices

- A. Hydrogeological Maps and Figures
- B. Maps and Figures on CD-ROM
- C. General Water Well Information
- D. Maps and Figures Included as Large Plots
- E. Water Wells Recommended for Field Verification