

Table of Contents

Executive Summary
Corporate Authorization
Acknowledgements

1.0	Introduction	1
1.1	Background	1
1.2	Objective	1
1.3	Scope of Work	1
2.0	Literature Review	2
2.1	Hamlet of Clairmont – Water Distribution System, Sanitary Sewer System Review and Evaluation – GPEC Consulting Ltd., February 1997	2
2.2	Hamlet of Clairmont – Off-Site Levy Review – GPEC Consulting Ltd., September 2002	2
2.3	Clairmont Servicing and Planning Areas Study – County of Grande Prairie No. 1 – Infrastructure Systems Ltd., December 2002	2
2.4	Pre-Design Report – SW ¼ Section 27-72-6-W6M – Clairmont Sewage Treatment and Disposal Expansion – GPEC Consulting Ltd., October 2002	2
2.5	County of Grande Prairie No. 1 - Municipal Development Plan Bylaw No. 2360, January 2004	2
2.6	County of Grande Prairie No. 1 – City of Grande Prairie, Town of Sexsmith – Regional Water and Wastewater Systems – Infrastructure Systems Ltd. And Turnkey Management Consulting, July 2001	3
2.7	Levy Options for Oversizing and Lift Station – Clairmont – Beirsto-Stewart-Weir Engineering Limited, December 2001	3
2.8	Balisky-Hodges Area Structure Plan (N ½ Sec 2-72-6-W6M; S ½ 11-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., March 2005	3
2.9	Althen Corner Area Structure Plan (N ½ Sec 11-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., March 2004	3
2.10	Kehr-Althen Area Structure Plan (Sec 14-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., March 2005	3
2.11	West Clairmont Area Structure Plan (Sec 23-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., May 2004	4
2.12	Faul-Althen Area Structure Plan (N ½ Sec. 6, Sec 7-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., July 2004	4
2.13	Crossroads South Phase 1 Area Structure Plan (Sec 12-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., May, 2005	4
2.14	Crossroads South Phase 2 Area Structure Plan (Sec 7-72-6-W6M) – Infrastructure Systems Ltd. in association with Beirsto Lehnrs Ketchum Engineering Ltd., June, 2005	4

2.15	Crossroads North Area Structure Plan (Sec 13-72-6-W6M) – Infrastructure Systems Ltd. in association with Bearsto Lehnrs Ketchum Engineering Ltd., May, 2005	5
2.16	County of Grande Prairie No. 1 (Part of S1/2 Sec 24-6-72-W6M and Part of SW ¼ Sec 25-6-72-W6M)– Lakeside Area Structure Plan – Infrastructure Systems Ltd. in association with Bearsto Lehnrs Ketchum Engineering Ltd., August, 2004	5
2.17	Lakeside Area Structure Plan(SW 19-72-5-6, SE 24-72-6-6, Pt. SW 24-72-6-6 Lot 39, Plan 0023278, Pt. NE 24-72-6-6 and Road Allowances)-Infrastructure Systems Ltd. in association with Bearsto Lehnrs Ketchum Engineering Ltd. October 18, 2004.	5
3.0	Projected Growth and Land Use	6
3.1	Land Use	6
3.2	Industrial and Commercial Growth	6
3.3	Residential Growth	8
4.0	Design Criteria	10
4.1	Introduction	10
4.2	Minimum Pipe Size	10
4.3	Residential Wastewater Flow	11
4.4	Commercial Wastewater Flow	12
4.5	Industrial Development	12
4.6	Institutional Development	13
4.7	Non- Residential Peaking Factor	13
4.8	Inflow/Infiltration (I/I) Allowance	14
4.9	Pipe Design Flow	14
4.10	Low Pressure Sewer System	14
5.0	Existing Wastewater System	16
5.1	Sanitary Sewers	16
5.2	Lift Stations	16
5.3	Forcemains	16
5.4	Lagoon	17
6.0	Existing Wastewater Model	18
6.1	Model Development Data Sources and Assumptions	18
6.2	Hydrologic Model Set-Up	18
6.3	Review of Rainfall Data	18
6.4	Model Calibration	18
6.5	Proposed Flow Monitoring Stations	19
7.0	Existing System Assessment and Upgrading Requirements	20
7.1	Existing Collection System Deficiencies	20
7.2	Existing Collection System Improvements	20
7.3	Existing Lagoon Improvements	20
7.4	Existing Lagoon Interim Improvements	25
8.0	Ultimate Servicing Options	26
8.1	Introduction	26
8.2	Servicing Alternatives	26
8.3	Over-arching Servicing Issues	35
8.4	Recommended Ultimate Servicing Concept	37

9.0	Staging and Interim Servicing Plan	39
9.1	Staging of Major Wastewater Conveyance Infrastructure	39
9.2	Interim Servicing	41
10.0	Benchmark Information	43
10.1	Municipality of Wood Buffalo	44
10.2	Lakeland County	46
10.3	Yellowhead County	47
10.4	Red Deer County	48
10.5	Parkland County	51
10.6	Leduc County	54
11.0	Wastewater System Best Practice	56
11.1	Introduction	56
11.2	Good Governance in Wastewater Utilities	56
11.3	Reducing the Impact of Variations in Financial Plans	57
11.4	Adoption of a Strategic Planning Framework	58
11.5	Strategies for Competitive Advantage	58
11.6	Best Practices for Maintenance Work Orders	59
11.7	Wastewater Environmental Goals and Objectives	60
11.8	Total Productive Organization	61
11.9	Program Driven Maintenance Programs	61
11.10	Treatment Plant Performance Dashboard	62
11.11	Selecting Wastewater System Rehabilitation Technologies	64
12.0	Funding Mechanism	73
12.1	Government Grants	73
12.2	Infrastructure Charge Fees	75
13.0	Conclusions	81
14.0	Recommendations	83
 Appendices		
Appendix A	Cost Estimates	
Appendix B	Upgrading Schedule for the Main Lift Station and Forcemains on 100 Avenue	
Appendix C	Clairmont Main Lift Station Assessment Report	
Appendix D	Levy and Cash Flow Analysis	

List of Tables

Table 3.2.1:	Clairmont Area Commercial and Industrial Land Consumption Estimates (ha)	7
Table 3.3.1:	Clairmont Area Population Growth Estimates	8
Table 4.1.1	Comparison of Wastewater Collection System Design Standards for Various Alberta Municipalities	After Page 10
Table 4.3.1.1:	Current Winter Water Consumption	11
Table 5.2.1:	Lift Station Pump Characteristics	16
Table 7.3.1:	Lagoon for Current Wastewater Flow	20
Table 7.3.2:	Projected Lagoon Design Average Days Wastewater Flows	21
Table 7.3.3:	Conventional Lagoon Projected Capacity	21
Table 7.3.4:	Aerated Lagoon Projected Capacity	21
Table 7.3.5:	Lagoon Expansion Land Requirement	21
Table 7.3.6:	Discharge Rate into 116 Street Sanitary Trunk Sewer	23
Table 7.3.7:	Potential Options Construction Cost Estimates	24
Table 8.4.2:	Ultimate Sanitary Servicing Shareable Cost Summary	38
Table 9.2.6.1:	Staging Construction Cost Estimates	42

List of Figures

Figure 1.1.1	Study Area Plan	After Page 1
Figure 3.1.1	Future Land use	After Page 6
Figure 3.1.2	Growth Areas	After Page 6
Figure 3.2.1	Industrial Built-out	After Page 7
Figure 3.3.1	Residential Built-out	After Page 8
Figure 4.10.1	Low Pressure Sewer System	After Page 14
Figure 4.10.2	Design Curves for Low Pressure System	After Page 15
Figure 5.0.1	Existing Wastewater System	After Page 16
Figure 6.5.1	Proposed Flow Monitoring Stations Location Plan	After Page 19
Figure 8.1.1	Servicing Options	After Page 26
Figure 8.1.2	Service Area Boundary Plan	After Page 26
Figure 8.2.9.1	Service Area No. 17, 18 and 23 Servicing Options	After Page 30
Figure 8.2.10.1	Service Area No. 13 and 14 Servicing Options	After Page 31
Figure 8.2.14.1	Service Area No. 2, 21 and 22 Servicing Options	After Page 34
Figure 8.4.1	Ultimate Servicing Concept Plan	After Page 37
Figure 8.4.2	Service Area Boundaries and Sewer Sizing	After Page 37
Figure 9.1.1	5 Year Contour Stage Implementation Plan	After Page 39
Figure 9.1.2	10 Year Contour Stage Implementation Plan	After Page 39
Figure 9.1.3	20 Year Contour Stage Implementation Plan	After Page 39
Figure 9.1.4	Ultimate Contour Stage Implementation Plan	After Page 39