



Date: July 5, 2023 File: 2023-2776  
To: Joe Mitchell, P.Eng. Page: Page 1 of 14  
From: Michael Owen  
Project: Deer Ridge Sanitary Servicing  
Subject: Sanitary Servicing Options and Cost Breakdown

---

## 1 INTRODUCTION

Associated Engineering (BC) Ltd (AE) has been by the District of Summerland (DoS) to complete an analysis of two routing options and provide funding recommendations for the new sanitary service area in Deer Ridge shown in Figure 1-1.

In 2019 AE was retained by the DoS to design the sanitary servicing for the Deer Ridge Subdivision, and this design is completed to approximately 90% design levels. The analysis and design work completed for this memo further develops the work from 2019 and provides clarity into the options available.

Two Options have been reviewed and discussed in this Memo.

- Option 1 is to route a gravity sanitary sewer along the old flume trail connecting Morrow Ave to Taylor Place.
- Option 2 is to route gravity sanitary sewer to the intersection of Morrow Ave and Prairie Valley Road, and install a lift station to pump wastewater over Prairie Valley Road to Cartwright Ave. The work along Prairie Valley Road has been assumed to occur during the planned re-construction of that section of road, therefore amalgamating works and minimizing sanitary construction costs.

Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 2 -

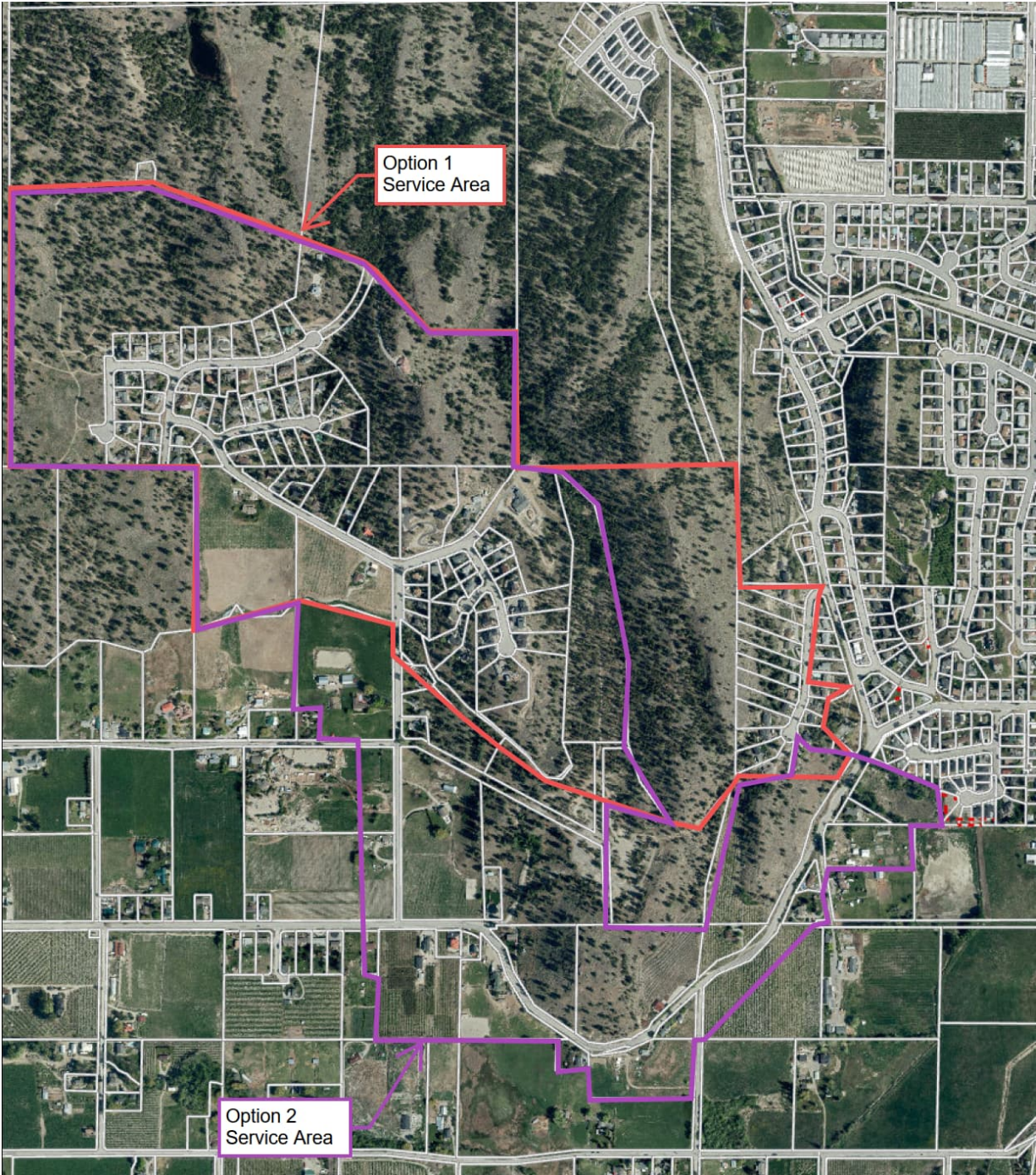


Figure 1-1 – Service Area



Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 3 -

2 BACKGROUND

Currently all the properties located within the proposed optioned serviced areas as noted on Figure 1-1 are on septic fields and many don't meet current bylaws and standards for minimum parcel size for a septic field. The number of lots that could be serviced per road are listed below:

Table 2-1 – Existing Lots

| Road   | # of Existing Lots |
|--|--------------------|
| McLarty Pl   | 9                  |
| Hermiston Dr   | 16                 |
| Morrow Ave   | 14                 |
| Sutherland Pl  | 15                 |
| Summergate Dr  | 4                  |
| Sunset Pl  | 7                  |
| Sunset Crt   | 14                 |
| Upper Morrow Ave                                       | 7                  |
| Sub Total  | 86                 |
| Option 1 Serviceable                                   |                    |
| Upper Area (from above)                                | 86                 |
| Taylor Place/Cartwright                                | 15                 |
| Total Option 1- Gravity                                | 101                |
| Option 2 Serviceable                                   |                    |
| Upper Area (from above)                                | 86                 |
| Lower Morrow Ave                                       | 6                  |
| Prairie Valley Rd                                      | 12                 |
| Total Option 2 – Prairie Valley Road with Lift Station | 104                |



Memo To: Joe Mitchell, P.Eng.  
July 5, 2023  
- 4 -

Additionally, there are a number of potential development properties in the area that could be provided with sanitary sewer connections should the servicing be extended. These properties with the estimated building density include:

Table 2-2 – Proposed Lots

| Address   | # of Proposed Lots <sup>1</sup>                 | Single Family Home (Lot) Equivalents |
|---|---|--------------------------------------|
| 12914 Prairie Valley Road   | 13  | 13                                   |
| 13316 Prairie Valley Road   | 13  | 13                                   |
| 12013 Morrow Avenue   | 5   | 5                                    |
| 12583 Sunset Place  | 8 TH <sup>2</sup>                               | 6.5                                  |
| 12830 McLarty Place   | 74  | 74                                   |
| 12591 Morrow Ave(Eco Village)   | 25 SFH, 22 TH <sup>2</sup> , 64 MF <sup>3</sup> | 25, 17.2, 33.9 = 76.1                |
| Lower Prairie Valley Servicing Area<br>(Future Sanitary Servicing area) | 16  | 16                                   |

1. Assumed building density (to be confirmed prior to Finalizing Local Area Service)
2. Townhouse development to have a 0.78 equivalence factor
3. Multifamily development to have a 0.53 equivalence factor

In addition to the lot distribution listed above AE also reviewed the entire area for future development lots based on the following criteria:

- Lot Area - subdividable if over 1 acre
- ALR status - subdividable if not in the ALR
- Average Slope - subdividable if less than 20% lot slope

Based on a review of the density criteria noted above, the calculations didn't have a significant impact on the results so the existing lot count plus the breakdown for developments provided in Table 2-1 and 2-2 has been used.



Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 5 -

### 3 ROUTING OPTIONS

#### 3.1 Option 1

Option 1 routing includes approximately 3km of gravity sanitary sewer from the top of Deer Ridge, along the Flume Trail, down Taylor Place to connect to the existing sanitary sewer on Cartwright. See attached Figure C-001 and 002

Benefits of this option include:

- No lift station required for current properties.
- Less Pipe than Option 2.
- Lowest Capital Costs.
- No ongoing operational costs other than the regular gravity sewer maintenance program.

Challenges with this option include:

- Need for a Statutory Rights of Way along Morrow Ave above the flume trail to achieve gravity flow.
- Potential bedrock along the flume trail.
- Developers on Prairie Valley Road would have to pump to the gravity main or take an alternate route.

#### 3.2 Option 2

Option 2 routing includes approximately 4km of gravity sanitary sewer from the top of Deer Ridge, down Morrow, to a Lift Station at the intersection of Morrow and Prairie Valley. A Force Main would be required to pump to the high point on Prairie Valley, with a Gravity Main from the high point on Prairie Valley to the existing sewer located at the intersection of Cartwright and Prairie Valley. See attached Figure C-011 and 012

Benefits of this option include:

- Developers are interested in supporting the development of a Lift Station.
- Approximately 12 additional properties on Prairie Valley Road can be serviced.
- The sanitary sewer would be closer for future extension to the west.
- Pipe remains on the road network for easier maintenance.
- There are plans to upgrade Prairie Valley Road therefore reducing the sewer servicing installation costs.

Challenges with this option include:

- One Statutory Right-of-Way required for a Lift Station at one of 4 potential locations.
- Prairie Valley Road especially near Morrow Ave is congested with existing underground water infrastructure.
- Ongoing Operational Costs of the Sanitary Lift Station
- Additional Pipe Under Prairie Valley Road
- Approximately 11 properties on Taylor would not be serviced by this route
- Capital cost of the Lift Station is significant.





PLOT DATE: 2023-06-02 4:33:37 PM  
 SAVE DATE: 2023-06-02 4:15:01 PM SAVED BY: SZABO  
 DWG PATH: \\scc\caldata\projects\kier20192639\00\_2019\_inst\_upgrade\working\_dwg\100\_civil\2639-03-001-002\_1-ek-apt1.dwg



PRELIMINARY/  
 FOR DISCUSSION  
 NOT FOR CONSTRUCTION  
 DRAFT

| REV | DATE      | DESIGN  | DRAWN    | DESCRIPTION       |
|-----|-----------|---------|----------|-------------------|
| A   | 2023JUN01 | M. OWEN | L. SZABO | ISSUED FOR REVIEW |

DISTRICT OF  
 SUMMERLAND  
 INFRASTRUCTURE UPGRADES  
 SANITARY SEWER  
 PRAIRIE VALLEY ROAD

SCALE: 1:1500



CIVIL  
 OPTION 1 - GRAVITY  
 1 OF 4

| DRAWING       | REVISION | SHEET |
|---------------|----------|-------|
| 2776-00-C-001 | A        | 1     |





PLOT DATE: 2023-06-02 4:35:45 PM  
SAVE DATE: 2023-06-02 4:15:01 PM SAVED BY: SZABO  
DWG PATH: \\scc\apps\projects\kx\2019\inst\_upgrade\working\_dwg\100\_civil\26269-03-00-01-002\_1-ek-apt1.dwg



PRELIMINARY/  
FOR DISCUSSION  
NOT FOR CONSTRUCTION

DRAFT

| REV | DATE      | DESIGN  | DRAWN    | DESCRIPTION       |
|-----|-----------|---------|----------|-------------------|
| A   | 2023JUN01 | M. OWEN | L. SZABO | ISSUED FOR REVIEW |
|     |           |         |          |                   |
|     |           |         |          |                   |
|     |           |         |          |                   |

DISTRICT OF  
SUMMERLAND  
INFRASTRUCTURE UPGRADES  
SANITARY SEWER  
PRAIRIE VALLEY ROAD

SCALE: 1:1500



CIVIL  
OPTION 1 - GRAVITY  
2 OF 4

| DRAWING       | REVISION | SHEET |
|---------------|----------|-------|
| 2776-00-C-002 | A        | 2     |





PLOT DATE: 2023-06-02 4:45:10 PM  
SAVE DATE: 2023-06-02 4:44:01 PM  
DRAWN BY: SZABO  
DWG PATH: \\scc\apps\projects\2023\2776-00\2023\_06\_02\_152639\00\_2019\_inst\_upgrade\working\_dwg\100\_civil\262639-03-001-002\_1-ek-apt2.dwg



PRELIMINARY/  
FOR DISCUSSION  
NOT FOR CONSTRUCTION

DRAFT

| REV | DATE      | DESIGN  | DRAWN    | DESCRIPTION       |
|-----|-----------|---------|----------|-------------------|
| A   | 2023JUN01 | M. OWEN | L. SZABO | ISSUED FOR REVIEW |

DISTRICT OF  
SUMMERLAND  
INFRASTRUCTURE UPGRADES  
SANITARY SEWER  
PRAIRIE VALLEY ROAD

SCALE: 1:1500



CIVIL  
OPTION 2 - LIFT STATION  
1 OF 2

| DRAWING       | REVISION | SHEET |
|---------------|----------|-------|
| 2776-00-C-011 | A        | 1     |





PLOT DATE: 2023-06-02 4:46:24 PM  
 SAVE DATE: 2023-06-02 4:44:01 PM SAVED BY: SZABO  
 DWG PATH: \\scc\apps\projects\k20192639\00\_2019\_inst\_upgrade\working\_dwg\100\_civil\2639-03-00-01-002\_1-ek-apt2.dwg



**PRELIMINARY/  
FOR DISCUSSION**  
 NOT FOR CONSTRUCTION  
**DRAFT**

| REV | DATE      | DESIGN  | DRAWN    | DESCRIPTION       |
|-----|-----------|---------|----------|-------------------|
| A   | 2023JUN01 | M. OWEN | L. SZABO | ISSUED FOR REVIEW |
|     |           |         |          |                   |
|     |           |         |          |                   |
|     |           |         |          |                   |

**DISTRICT OF  
SUMMERLAND**  
**INFRASTRUCTURE UPGRADES**  
**SANITARY SEWER**  
**PRAIRIE VALLEY ROAD**

SCALE: 1:1500



CIVIL  
 OPTION 2 - LIFT STATION  
 2 OF 2

| DRAWING       | REVISION | SHEET |
|---------------|----------|-------|
| 2776-00-C-012 | A        | 2     |





Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 6 -

4 OPINION OF PROBABLE COSTS

4.1 Option 1

Figure 4-1 details the expected construction costs per road for the upper gravity route.

Major Assumptions include:

- \$350 per m for 200mm Sanitary Pipe Installation with out pavement restoration
- \$250 per m<sup>3</sup> for an estimated quantity of 1000m<sup>3</sup> of Bedrock for the Flume Trail

Table 4-1 – Option 1 Opinion of Probable Costs

| UPPER              |                      |  |  |  |                     |
|--------------------|----------------------|--|--|--|---------------------|
| Item No.           | Description          |  |  |  | Total               |
| 1.0                | GENERAL REQUIREMENTS |  |  |  | \$ 310,658          |
| 2.0                | MCLARTY PL.          |  |  |  | \$ 304,681          |
| 3.0                | HERMISTON DR.        |  |  |  | \$ 602,264          |
| 4.0                | SUTHERLAND PL.       |  |  |  | \$ 212,069          |
| 5.0                | SUMMERGATE DR.       |  |  |  | \$ 120,263          |
| 6.0                | SUNSET PL            |  |  |  | \$ 149,864          |
| 7.0                | SUNSET CRT.          |  |  |  | \$ 64,506           |
| 8.0                | MORROW AVE.          |  |  |  | \$ 444,899          |
| <b>TOTAL</b>       |                      |  |  |  | <b>\$ 2,209,204</b> |
| EASEMENT TO TAYLOR |                      |  |  |  |                     |
| Item No.           | Description          |  |  |  | Total               |
|                    | UPPER                |  |  |  | \$ 2,209,204        |
| 9.0                | MORROW EASEMENT      |  |  |  | \$ 1,639,155        |
| 10.0               | TAYLOR PL.           |  |  |  | \$ 276,250          |
| 11.0               | CARTWRIGHT AVE.      |  |  |  | \$ 34,450           |
| <b>TOTAL</b>       |                      |  |  |  | <b>\$ 4,159,059</b> |





Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 7 -

4.2 Option 2

Figure 4-2 details the expected construction costs per road for the lower route along Prairie Valley Road which requires a lift station. Major Assumptions include:

- Prairie Valley Road Construction is scheduled to occur through other budget's so restoration of the road surface has not been included.
- \$350 per m for 200mm Sanitary Pipe Installation.
- \$2,000,000 has been assumed for the lift station capital cost based on a recent 2022 tender of a similar Lift Station that was awarded at a cost of \$1,850,000.

Table 4-2 – Option 2 Opinion of Probable Costs

| MORROW SOUTH |                     |  |  |  |                     |
|--------------|---------------------|--|--|--|---------------------|
| Item No.     | Description         |  |  |  | Total               |
|              | UPPER               |  |  |  | \$ 2,209,204        |
| 12.0         | MORROW AVE. SOUTH   |  |  |  | \$ 520,260          |
| 13.0         | PRAIRIE VALLEY ROAD |  |  |  | \$ 961,350          |
| 14.0         | LIFT STATION        |  |  |  | \$ 2,700,000        |
| <b>TOTAL</b> |                     |  |  |  | <b>\$ 6,390,814</b> |

4.3 Servicing of Subdivision Lots on Prairie Valley

If the upper gravity route is selected there are two options to service, the two potential development lots at 12914 and 13316 Prairie Valley Road. These Include:

- Developers to design and build a lift station and approximately 350m of force main from their development to the upper gravity route to handle flows from their development.
- Developers to pay for a gravity main from Cartwright to the crest of Prairie Valley Road at 12914 Prairie Valley Road. A low-pressure sewer main system may be required for lots that are situated below the gravity route.
  - Work could take place while Prairie Valley Road is under construction.
  - 800m of 200mm Sanitary Main could be installed.
  - Estimated Cost is \$450,000.

It is expected that the design, and construction of a lift station and piping to connect to the upper gravity route will have a higher cost than a low-pressure system for a few properties and a gravity main down Prairie Valley Road from the crest of the hill.



5 COST RECOVERY OPTIONS

Associated Engineering reviewed numerous funding distribution models for both routing options including:

1. Even distribution of the project costs among all lots including those that are proposed by developers.
  - o This is recommended as being the fairest to all end users.
2. Developer Lots contribute the respective percentage of the costs of construction to their lots. The remaining project costs are evenly distributed among the existing lots.
  - o This option is not recommended since it does not consider the risks of carrying costs in relation to future connection schedules
3. Costs be distributed based on location and distance from the tie in point on Cartwright.
  - o This option is not recommended since it doesn't result in a "fair" distribution of the costs to the lots.
4. Costs be distributed by section for 3 sections (Taylor Place, To Morrow Ave, and Deer Ridge), with each section paying to portion to reach that location.
  - o This option is not recommended since it doesn't result in a "fair" distribution of the costs to the lots.

Based on Opinion of Probable Costs Prepared by Associated Engineering, June 2023.

Table 5-1 – Cost Recovery Options

| Option                                       | Description   |             | Total Area Cost | Existing Lots | Upper Development Lots | Eco Village  | Prairie Valley Road Developments |
|--|---|-------------|-----------------|---------------|------------------------|--------------|----------------------------------|
|  |   | # of Lots   | 264.1           | 101           | 87                     | 76.1         |                                  |
| Option 1<br>Gravity/Flume Trail              | 1A<br>Local Sanitary Service Area - Project costs distributed evenly based on total number of lots at full buildout   | \$ Per Area | \$ 4,200,000    | \$ 1,610,000  | \$ 1,390,000           | \$ 1,220,000 |                                  |
|  |   | \$ Per Lot  |                 | \$ 16,000     | \$ 16,000              | \$ 16,000    |                                  |
|  |   |             |                 |               |                        |              |                                  |
|  |   | # of Lots   | 293.1           | 104           | 87                     | 76.1         | 26                               |
| Option 2<br>Lift Station/Prairie Valley Road | 2A<br>Local Sanitary Service Area - Project costs distributed evenly based on total number of lots at full buildout   | \$ Per Area | \$ 6,400,000    | \$ 2,271,000  | \$ 1,900,000           | \$ 1,670,000 | \$ 570,000                       |
|  |   | \$ Per Lot  |                 | \$ 21,900     | \$ 21,900              | \$ 21,900    | \$ 21,900                        |
|  |   |             |                 |               |                        |              |                                  |
|  | 2B<br>2 Local Sanitary Service Areas (Upper Area and Lower Area) - Costs for Existing Lots and Upper Development based on Gravity Pricing and Distributed Evenly, Lower Developments Share Costs for Extra due to the routing | \$ Per Area | \$ 6,400,000    | \$ 1,610,000  | \$ 1,390,000           | \$ 1,220,000 | \$ 2,240,000                     |
|  |   | \$ Per Lot  |                 | \$ 16,000     | \$ 16,000              | \$ 16,000    | \$ 86,200                        |
|  |   |             |                 |               |                        |              |                                  |

Notes:

- 20% Contingency
- 10% Engineering



6 OPERATIONS AND MAINTENANCE

Associated Engineering reviewed the DoS Bylaw 98-001 Schedule O – Sewer Fees and Charges.

The user fee will be charged on a monthly basis with a minimum charge of one unit.

- Per unit sewer operating and maintenance user fee: \$36.72 per month
- Apartment rate sewer operating and maintenance user fee: \$22.04 per month

The O&M costs were estimated based on the ISC DIAND Cost Reference Manual (July 2005), and conversations with the DoS regarding current O&M expenditures.

6.1 Option 1: Gravity Wastewater Collection System

The summary of the annual O&M cost estimate for Option 1 is summarised in Table 6-1.

Table 6-1  
O&M Estimate - Option 1

| Description          | 2005 Cost      | 2020 Cost      |
|----------------------|----------------|----------------|
| Sanitary Sewer Mains | \$3,932        | \$6,000        |
| <b>TOTAL</b>         | <b>\$3,932</b> | <b>\$6,000</b> |

6.2 Option 2: Route along Prairie Valley Road c/w Lift Station

The summary of the annual O&M cost estimate for Option 2 is summarised in Table 6-2.

Table 6-2  
O&M Estimate - Option 2

| Description                         | 2005 Cost       | 2020 Cost       |
|-------------------------------------|-----------------|-----------------|
| Sanitary Sewer Mains                | \$5,000         | \$8,000         |
| Lift Station (Includes Force Mains) | \$7,419         | \$12,000        |
| <b>TOTAL</b>                        | <b>\$12,419</b> | <b>\$20,000</b> |



Memo To: Joe Mitchell, P.Eng.  
July 5, 2023  
- 10 -

### 6.3 Life Cycle Cost Estimates

The total life cycle cost estimates are based on the 2023 capital cost plus the O&M cost over the 20-year, 30-year, and 35-year life of the proposed system in 2023 dollars. The longer life cycle was used to confirm when the difference in life cycle costs would start to be less significant between the options for the following reasons:

- Life expectancy of the sanitary sewer collection piping is typically considered to be 75 years.
- For information replacement of individual septic systems is required every 20 years.

The total life cycle cost shows the impact of O&M on the total cost of each option. The discount rate was assumed to be 3%.

The net present worth for the two proposed options is summarized in Table 6-3, 6-4, and 6-5.

Table 6-3  
Life Cycle Cost Estimate Summary

| Description   | Option 1         | Option 2         | Difference       |
|---|------------------|------------------|------------------|
| Net Present Value Capital Cost                      | \$4,159,059      | \$6,390,814      |                  |
| Year 0-10 NPV Replacement and O&M Life Cycle Costs  | \$52,717         | \$172,271        |                  |
| Year 11-20 NPV Replacement and O&M Life Cycle Costs | \$39,226         | \$160,176        |                  |
| <b>TOTAL OPERATIONS</b>                             | <b>\$91,943</b>  | <b>\$332,448</b> | <b>\$240,505</b> |
| Cumulative Revenue                                  | \$1,679,069      | \$1,829,430      | \$150,361        |
| Year 21-30 NPV Replacement and O&M Life Cycle Costs | \$29,188         | \$106,456        |                  |
| Year 31-35 NPV Replacement and O&M Life Cycle Costs | \$11,660         | \$42,528         |                  |
| <b>TOTAL OPERATIONS</b>                             | <b>\$132,791</b> | <b>\$481,432</b> | <b>\$348,641</b> |
| Cumulative Revenue                                  | \$2,499,282      | \$2,727,640      | \$228,358        |



District of Summerland  
 DEER RIDGE COMMUNITY WASTEWATER SYSTEM  
 WASTEWATER COLLECTION OPTIONS  
 LIFE CYCLE COSTS  
 Option 1 – Gravity Wastewater Collection System

Total Construction Cost \$ 4,159,059  
 O&M Cost \$ 6,000 per year  
 Discount Rate 3.00%

| Year No. | Year | Annual O&M Expenditure | Replacement Costs | Capital Cost | Capital & O&M Subtotal | Net Present Value      |                   |              |                        |                 | Comment    | Revenue       | Revenue      | Cumulative Revenue | Comment                             |
|----------|------|------------------------|-------------------|--------------|------------------------|------------------------|-------------------|--------------|------------------------|-----------------|------------|---------------|--------------|--------------------|-------------------------------------|
|          |      |                        |                   |              |                        | Annual O&M Expenditure | Replacement Costs | Capital Cost | Capital & O&M Subtotal | Cumulative Cost |            |               |              |                    |                                     |
| 1        | 2024 | \$ 6,000               | \$ -              | \$ 4,159,059 | \$ 4,165,059           | \$ 6,000               | \$ -              | \$ 4,159,059 | \$ 4,165,059           | \$ 4,165,059    | Annual O&M | \$ 44,504.64  | \$ 44,504.64 | \$ 44,505          | Existing                            |
| 2        | 2025 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 5,825               | \$ -              | \$ -         | \$ 5,825               | \$ 4,170,885    | Annual O&M | \$ 63,497.76  | \$ 61,648    | \$ 106,153         | 25% buildout of future subdivisions |
| 3        | 2026 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 5,656               | \$ -              | \$ -         | \$ 5,656               | \$ 4,176,540    | Annual O&M | \$ 82,490.88  | \$ 77,756    | \$ 183,909         | 50% buildout of future subdivisions |
| 4        | 2027 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 5,491               | \$ -              | \$ -         | \$ 5,491               | \$ 4,182,031    | Annual O&M | \$ 120,477.12 | \$ 110,254   | \$ 294,162         | Full buildout                       |
| 5        | 2028 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 5,331               | \$ -              | \$ -         | \$ 5,331               | \$ 4,187,362    | Annual O&M | \$ 120,477.12 | \$ 107,042   | \$ 401,205         | Full buildout                       |
| 6        | 2029 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 5,176               | \$ -              | \$ -         | \$ 5,176               | \$ 4,192,538    | Annual O&M | \$ 120,477.12 | \$ 103,925   | \$ 505,129         | Full buildout                       |
| 7        | 2030 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 5,025               | \$ -              | \$ -         | \$ 5,025               | \$ 4,197,563    | Annual O&M | \$ 120,477.12 | \$ 100,898   | \$ 606,027         | Full buildout                       |
| 8        | 2031 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,879               | \$ -              | \$ -         | \$ 4,879               | \$ 4,202,441    | Annual O&M | \$ 120,477.12 | \$ 97,959    | \$ 703,986         | Full buildout                       |
| 9        | 2032 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,736               | \$ -              | \$ -         | \$ 4,736               | \$ 4,207,178    | Annual O&M | \$ 120,477.12 | \$ 95,106    | \$ 799,091         | Full buildout                       |
| 10       | 2033 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,599               | \$ -              | \$ -         | \$ 4,599               | \$ 4,211,776    | Annual O&M | \$ 120,477.12 | \$ 92,336    | \$ 891,427         | Full buildout                       |
| 11       | 2034 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,465               | \$ -              | \$ -         | \$ 4,465               | \$ 4,216,241    | Annual O&M | \$ 120,477.12 | \$ 89,646    | \$ 981,073         | Full buildout                       |
| 12       | 2035 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,335               | \$ -              | \$ -         | \$ 4,335               | \$ 4,220,575    | Annual O&M | \$ 120,477.12 | \$ 87,035    | \$ 1,068,109       | Full buildout                       |
| 13       | 2036 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,208               | \$ -              | \$ -         | \$ 4,208               | \$ 4,224,783    | Annual O&M | \$ 120,477.12 | \$ 84,500    | \$ 1,152,609       | Full buildout                       |
| 14       | 2037 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 4,086               | \$ -              | \$ -         | \$ 4,086               | \$ 4,228,869    | Annual O&M | \$ 120,477.12 | \$ 82,039    | \$ 1,234,648       | Full buildout                       |
| 15       | 2038 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,967               | \$ -              | \$ -         | \$ 3,967               | \$ 4,232,836    | Annual O&M | \$ 120,477.12 | \$ 79,650    | \$ 1,314,298       | Full buildout                       |
| 16       | 2039 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,851               | \$ -              | \$ -         | \$ 3,851               | \$ 4,236,687    | Annual O&M | \$ 120,477.12 | \$ 77,330    | \$ 1,391,627       | Full buildout                       |
| 17       | 2040 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,739               | \$ -              | \$ -         | \$ 3,739               | \$ 4,240,426    | Annual O&M | \$ 120,477.12 | \$ 75,077    | \$ 1,466,705       | Full buildout                       |
| 18       | 2041 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,630               | \$ -              | \$ -         | \$ 3,630               | \$ 4,244,056    | Annual O&M | \$ 120,477.12 | \$ 72,891    | \$ 1,539,595       | Full buildout                       |
| 19       | 2042 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,524               | \$ -              | \$ -         | \$ 3,524               | \$ 4,247,581    | Annual O&M | \$ 120,477.12 | \$ 70,768    | \$ 1,610,363       | Full buildout                       |
| 20       | 2043 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,422               | \$ -              | \$ -         | \$ 3,422               | \$ 4,251,002    | Annual O&M | \$ 120,477.12 | \$ 68,706    | \$ 1,679,069       | Full buildout                       |
| 21       | 2044 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,322               | \$ -              | \$ -         | \$ 3,322               | \$ 4,254,324    | Annual O&M | \$ 120,477.12 | \$ 66,705    | \$ 1,745,775       | Full buildout                       |
| 22       | 2045 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,225               | \$ -              | \$ -         | \$ 3,225               | \$ 4,257,550    | Annual O&M | \$ 120,477.12 | \$ 64,762    | \$ 1,810,537       | Full buildout                       |
| 23       | 2046 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,131               | \$ -              | \$ -         | \$ 3,131               | \$ 4,260,681    | Annual O&M | \$ 120,477.12 | \$ 62,876    | \$ 1,873,413       | Full buildout                       |
| 24       | 2047 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 3,040               | \$ -              | \$ -         | \$ 3,040               | \$ 4,263,721    | Annual O&M | \$ 120,477.12 | \$ 61,045    | \$ 1,934,458       | Full buildout                       |
| 25       | 2048 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,952               | \$ -              | \$ -         | \$ 2,952               | \$ 4,266,673    | Annual O&M | \$ 120,477.12 | \$ 59,267    | \$ 1,993,725       | Full buildout                       |
| 26       | 2049 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,866               | \$ -              | \$ -         | \$ 2,866               | \$ 4,269,538    | Annual O&M | \$ 120,477.12 | \$ 57,541    | \$ 2,051,265       | Full buildout                       |
| 27       | 2050 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,782               | \$ -              | \$ -         | \$ 2,782               | \$ 4,272,320    | Annual O&M | \$ 120,477.12 | \$ 55,865    | \$ 2,107,130       | Full buildout                       |
| 28       | 2051 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,701               | \$ -              | \$ -         | \$ 2,701               | \$ 4,275,022    | Annual O&M | \$ 120,477.12 | \$ 54,237    | \$ 2,161,367       | Full buildout                       |
| 29       | 2052 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,622               | \$ -              | \$ -         | \$ 2,622               | \$ 4,277,644    | Annual O&M | \$ 120,477.12 | \$ 52,658    | \$ 2,214,025       | Full buildout                       |
| 30       | 2053 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,546               | \$ -              | \$ -         | \$ 2,546               | \$ 4,280,190    | Annual O&M | \$ 120,477.12 | \$ 51,124    | \$ 2,265,149       | Full buildout                       |
| 31       | 2054 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,472               | \$ -              | \$ -         | \$ 2,472               | \$ 4,282,662    | Annual O&M | \$ 120,477.12 | \$ 49,635    | \$ 2,314,784       | Full buildout                       |
| 32       | 2055 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,400               | \$ -              | \$ -         | \$ 2,400               | \$ 4,285,062    | Annual O&M | \$ 120,477.12 | \$ 48,189    | \$ 2,362,973       | Full buildout                       |
| 33       | 2056 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,330               | \$ -              | \$ -         | \$ 2,330               | \$ 4,287,392    | Annual O&M | \$ 120,477.12 | \$ 46,786    | \$ 2,409,759       | Full buildout                       |
| 34       | 2057 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,262               | \$ -              | \$ -         | \$ 2,262               | \$ 4,289,654    | Annual O&M | \$ 120,477.12 | \$ 45,423    | \$ 2,455,182       | Full buildout                       |
| 35       | 2058 | \$ 6,000               | \$ -              | \$ -         | \$ 6,000               | \$ 2,196               | \$ -              | \$ -         | \$ 2,196               | \$ 4,291,850    | Annual O&M | \$ 120,477.12 | \$ 44,100    | \$ 2,499,282       | Full buildout                       |

1. Does not account for renewal of infrastructure (ie pipe or lift station replacement)  
 2. Assumes Sewer Rates to remain consistent and match inflation



District of Summerland  
DEER RIDGE COMMUNITY WASTEWATER SYSTEM  
WASTEWATER COLLECTION OPTIONS  
LIFE CYCLE O&M COSTS  
Option 2 - Prairie Valley Road c/w Lift Station

Total Construction Cost \$ 6,390,814  
O&M Cost \$ 20,000 per year  
Pump Replacement \$ 10,000 after 5 years and includes supply and install.  
Communications Upgrade \$ 30,000 after 20 years and includes supply and install.  
Discount Rate 3.00%

| Year No. | Year | Annual O&M Expenditure | Replacement Costs | Capital Cost | Capital & O&M Subtotal | Net Present Value      |                   |              |                        |                 | Comment    | Net Present Value |            |                    | Comment                             |
|----------|------|------------------------|-------------------|--------------|------------------------|------------------------|-------------------|--------------|------------------------|-----------------|------------|-------------------|------------|--------------------|-------------------------------------|
|          |      |                        |                   |              |                        | Annual O&M Expenditure | Replacement Costs | Capital Cost | Capital & O&M Subtotal | Cumulative Cost |            | Revenue           | Revenue    | Cumulative Revenue |                                     |
| 1        | 2024 | \$ 20,000              | \$ -              | \$ 6,390,814 | \$ 6,410,814           | \$ 20,000              | \$ -              | \$ 6,390,814 | \$ 6,410,814           | \$ 6,410,814    | Annual O&M | \$ 44,504.64      | \$ 44,505  | \$ 44,505          | Existing                            |
| 2        | 2025 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 19,417              | \$ -              | \$ -         | \$ 19,417              | \$ 6,430,232    | Annual O&M | \$ 66,361.92      | \$ 64,429  | \$ 108,934         | 25% buildout of future subdivisions |
| 3        | 2026 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 18,852              | \$ -              | \$ -         | \$ 18,852              | \$ 6,449,084    | Annual O&M | \$ 88,219.20      | \$ 83,155  | \$ 192,089         | 50% buildout of future subdivisions |
| 4        | 2027 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 18,303              | \$ -              | \$ -         | \$ 18,303              | \$ 6,467,387    | Annual O&M | \$ 131,933.76     | \$ 120,738 | \$ 312,827         | Full buildout                       |
| 5        | 2028 | \$ 20,000              | \$ 10,000         | \$ -         | \$ 30,000              | \$ 17,770              | \$ 8,885          | \$ -         | \$ 26,655              | \$ 6,494,041    | Annual O&M | \$ 131,933.76     | \$ 117,221 | \$ 430,048         | Full buildout                       |
| 6        | 2029 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 17,252              | \$ -              | \$ -         | \$ 17,252              | \$ 6,511,293    | Annual O&M | \$ 131,933.76     | \$ 113,807 | \$ 543,855         | Full buildout                       |
| 7        | 2030 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 16,750              | \$ -              | \$ -         | \$ 16,750              | \$ 6,528,043    | Annual O&M | \$ 131,933.76     | \$ 110,492 | \$ 654,348         | Full buildout                       |
| 8        | 2031 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 16,262              | \$ -              | \$ -         | \$ 16,262              | \$ 6,544,305    | Annual O&M | \$ 131,933.76     | \$ 107,274 | \$ 761,622         | Full buildout                       |
| 9        | 2032 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 15,788              | \$ -              | \$ -         | \$ 15,788              | \$ 6,560,093    | Annual O&M | \$ 131,933.76     | \$ 104,150 | \$ 865,772         | Full buildout                       |
| 10       | 2033 | \$ 20,000              | \$ 10,000         | \$ -         | \$ 30,000              | \$ 15,328              | \$ 7,664          | \$ -         | \$ 22,993              | \$ 6,583,086    | Annual O&M | \$ 131,933.76     | \$ 101,116 | \$ 966,888         | Full buildout                       |
| 11       | 2034 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 14,882              | \$ -              | \$ -         | \$ 14,882              | \$ 6,597,968    | Annual O&M | \$ 131,933.76     | \$ 98,171  | \$ 1,065,059       | Full buildout                       |
| 12       | 2035 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 14,448              | \$ -              | \$ -         | \$ 14,448              | \$ 6,612,416    | Annual O&M | \$ 131,933.76     | \$ 95,312  | \$ 1,160,371       | Full buildout                       |
| 13       | 2036 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 14,028              | \$ -              | \$ -         | \$ 14,028              | \$ 6,626,444    | Annual O&M | \$ 131,933.76     | \$ 92,536  | \$ 1,252,907       | Full buildout                       |
| 14       | 2037 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 13,619              | \$ -              | \$ -         | \$ 13,619              | \$ 6,640,063    | Annual O&M | \$ 131,933.76     | \$ 89,840  | \$ 1,342,747       | Full buildout                       |
| 15       | 2038 | \$ 20,000              | \$ 10,000         | \$ -         | \$ 30,000              | \$ 13,222              | \$ 6,611          | \$ -         | \$ 19,834              | \$ 6,659,896    | Annual O&M | \$ 131,933.76     | \$ 87,224  | \$ 1,429,971       | Full buildout                       |
| 16       | 2039 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 12,837              | \$ -              | \$ -         | \$ 12,837              | \$ 6,672,733    | Annual O&M | \$ 131,933.76     | \$ 84,683  | \$ 1,514,654       | Full buildout                       |
| 17       | 2040 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 12,463              | \$ -              | \$ -         | \$ 12,463              | \$ 6,685,197    | Annual O&M | \$ 131,933.76     | \$ 82,217  | \$ 1,596,871       | Full buildout                       |
| 18       | 2041 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 12,100              | \$ -              | \$ -         | \$ 12,100              | \$ 6,697,297    | Annual O&M | \$ 131,933.76     | \$ 79,822  | \$ 1,676,693       | Full buildout                       |
| 19       | 2042 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 11,748              | \$ -              | \$ -         | \$ 11,748              | \$ 6,709,045    | Annual O&M | \$ 131,933.76     | \$ 77,497  | \$ 1,754,190       | Full buildout                       |
| 20       | 2043 | \$ 20,000              | \$ 40,000         | \$ -         | \$ 60,000              | \$ 11,406              | \$ 22,811         | \$ -         | \$ 34,217              | \$ 6,743,262    | Annual O&M | \$ 131,933.76     | \$ 75,240  | \$ 1,829,430       | Full buildout                       |
| 21       | 2044 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 11,074              | \$ -              | \$ -         | \$ 11,074              | \$ 6,754,336    | Annual O&M | \$ 131,933.76     | \$ 73,049  | \$ 1,902,479       | Full buildout                       |
| 22       | 2045 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 10,751              | \$ -              | \$ -         | \$ 10,751              | \$ 6,765,087    | Annual O&M | \$ 131,933.76     | \$ 70,921  | \$ 1,973,400       | Full buildout                       |
| 23       | 2046 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 10,438              | \$ -              | \$ -         | \$ 10,438              | \$ 6,775,524    | Annual O&M | \$ 131,933.76     | \$ 68,855  | \$ 2,042,255       | Full buildout                       |
| 24       | 2047 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 10,134              | \$ -              | \$ -         | \$ 10,134              | \$ 6,785,658    | Annual O&M | \$ 131,933.76     | \$ 66,850  | \$ 2,109,105       | Full buildout                       |
| 25       | 2048 | \$ 20,000              | \$ 10,000         | \$ -         | \$ 30,000              | \$ 9,839               | \$ 4,919          | \$ -         | \$ 14,758              | \$ 6,800,416    | Annual O&M | \$ 131,933.76     | \$ 64,903  | \$ 2,174,007       | Full buildout                       |
| 26       | 2049 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 9,552               | \$ -              | \$ -         | \$ 9,552               | \$ 6,809,968    | Annual O&M | \$ 131,933.76     | \$ 63,012  | \$ 2,237,020       | Full buildout                       |
| 27       | 2050 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 9,274               | \$ -              | \$ -         | \$ 9,274               | \$ 6,819,242    | Annual O&M | \$ 131,933.76     | \$ 61,177  | \$ 2,298,197       | Full buildout                       |
| 28       | 2051 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 9,004               | \$ -              | \$ -         | \$ 9,004               | \$ 6,828,246    | Annual O&M | \$ 131,933.76     | \$ 59,395  | \$ 2,357,592       | Full buildout                       |
| 29       | 2052 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 8,742               | \$ -              | \$ -         | \$ 8,742               | \$ 6,836,988    | Annual O&M | \$ 131,933.76     | \$ 57,665  | \$ 2,415,257       | Full buildout                       |
| 30       | 2053 | \$ 20,000              | \$ 10,000         | \$ -         | \$ 30,000              | \$ 8,487               | \$ 4,243          | \$ -         | \$ 12,730              | \$ 6,849,718    | Annual O&M | \$ 131,933.76     | \$ 55,986  | \$ 2,471,242       | Full buildout                       |
| 31       | 2054 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 8,240               | \$ -              | \$ -         | \$ 8,240               | \$ 6,857,958    | Annual O&M | \$ 131,933.76     | \$ 54,355  | \$ 2,525,597       | Full buildout                       |
| 32       | 2055 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 8,000               | \$ -              | \$ -         | \$ 8,000               | \$ 6,865,957    | Annual O&M | \$ 131,933.76     | \$ 52,772  | \$ 2,578,369       | Full buildout                       |
| 33       | 2056 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 7,767               | \$ -              | \$ -         | \$ 7,767               | \$ 6,873,724    | Annual O&M | \$ 131,933.76     | \$ 51,235  | \$ 2,629,604       | Full buildout                       |
| 34       | 2057 | \$ 20,000              | \$ -              | \$ -         | \$ 20,000              | \$ 7,541               | \$ -              | \$ -         | \$ 7,541               | \$ 6,881,265    | Annual O&M | \$ 131,933.76     | \$ 49,742  | \$ 2,679,346       | Full buildout                       |
| 35       | 2058 | \$ 20,000              | \$ 10,000         | \$ -         | \$ 30,000              | \$ 7,321               | \$ 3,660          | \$ -         | \$ 10,981              | \$ 6,892,246    | Annual O&M | \$ 131,933.76     | \$ 48,294  | \$ 2,727,640       | Full buildout                       |

1. Does not account for renewal of infrastructure (ie pipe or lift station replacement)  
2. Assumes Sewer Rates to remain consistent and match inflation





Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 11 -

## 7 SUMMARY/DISCUSSION

- Option 1 is recommended since it provides the lowest cost to existing residents as well as overall project costs.
- For Option 1 – Gravity:
  - Suggest that a local sanitary sewer service area be established to include all existing and potential development lots to full buildout. The Developers would be expected to provide a Lump Sum Payment to the District for their portion of the works.
- For Option 2 – Lift Station:
  - Option 2A divides costs equally through all the end users, however this option increases the costs to the existing lots who could potentially have a gravity option.
  - Option 2B divides the Lift Station and increased costs to the developers that benefit from the addition of the Lift Station and uses the gravity option (Option 1) cost as the baseline and distributes those costs to the upper lots.
- Based on a review of the Prairie Valley Road grades a gravity sewer from 12914 Prairie Valley Road may be achievable and may minimize pumping needs for the Prairie Valley Road development properties. If work was completed while Prairie Valley Road is under construction the expected cost for this routing would be less than a lift station and piping requirements to the recommended routing.





Associated  
Engineering

GLOBAL PERSPECTIVE.  
LOCAL FOCUS.

Memo To: Joe Mitchell, P.Eng.

July 5, 2023

- 12 -

8 CERTIFICATION PAGE

This report presents our findings regarding the Deer Ridge Area Sanitary Servicing project for the District of Summerland .

The services provided by Associated Engineering (B.C.) Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Engineering (B.C.) Ltd.

Engineers & Geoscientists BC Permit Number: 1000163

Prepared by:

Reviewed by:

Michael Owen, P.Eng.  
Project Manager/Civil Engineer

Don Daigneault, CET.  
Branch Manager - Kelowna

MO/DD