KERR WOOD LEIDAL
consulting engineers

Greater Vancouver
200 - 4185A Still Creek Drive
Burnaby, BC V5C 6G9
T 604 294 2088
F 604 294 2090

Memorandum

DATE: May 29, 2019

TO: Dave Newman, AScT
Town of Gibsons

FROM: Karl Mueller, P.Eng.

RE: **PROWSE ROAD LIFT STATION UPGRADES**
Prowse Road Net Present Value - FINAL
Our File 2132.028-300

1. Introduction

The piping, valves, and forcemain inside the Prowse Road Lift Station are at the end of their service life and require replacement. This was identified in a recommendation completed by Kerr Wood Leidal Associates Ltd. (KWL) in 2014, and as of 2018, KWL has been working on the design to upgrade the lift station, concurrently with the design and upgrade of the Wastewater Treatment Plant.

2. Existing Lift Station Condition and Proposed Upgrades

With the pending improvements to the wastewater treatment plant, the existing Prowse Road Lift Station has adequate capacity for existing station flows and can accommodate growth for another 20 years, assuming an annual 1% growth in population. However, the existing station piping is in poor condition and needs to be replaced. The existing pumps were rebuilt in 2012 and do not need to be replaced. The station structure was previously upgraded in the 1990s and is in an adequate condition and can be reused. Some structural modifications are required in the wet well to improve the station hydraulics and pump performance. The station valving needs to be relocated outside the wet well to improve worker safety and meet current WorkSafeBC guidelines and recommendations. The station electrical equipment was upgraded in approx. 2012 and is adequate for another 15-20 years. The structural and mechanical upgrades allow the station to take advantage of the remaining life in the electrical equipment and improve operator safety.

The 2014 KWL analysis of options for the pump station included the following table with a net present value (NPV) comparison:

Table 1: Present Value Analysis

Scenario	Estimated Cost	Life Expectancy	Present Value
Option A: New Station	$2,063,000.00	40 years	$776,100
Option B: Station Retrofit	$493,000.00	20 years	$319,200

In the current project, there are additional components not considered in the 2014 scope, including:

- A section of the forcemain is being upgraded as part of this project. The original AC forcemain is nearing the end of its service life and the high-pressure section through the Marina and across Gower Point Road is being replaced.
- The original station wet well was not equipped with a ventilation system. The current project is providing ventilation equipment for the wet well as required by the electrical code.
- An odour control system is included for the station.
- Additional instrumentation to monitor pump performance is added.

It is important to note that these short-term upgrades for the lift station focus solely on the condition of the lift station and do not address system capacity. There has been a steady rise in the peak flows recorded at the treatment plant and the wastewater treatment plant is currently undergoing an upgrade to address the system capacity issue through the construction of a buffer tank, which will allow the lift station pumps to run at a higher rate of flow. This will improve both the operations and capacity of the lift station.

3. Cost Estimate Comparison

To compare the 2014 and 2018 cost estimates, both estimates need to be inflated to reflect costs in the present year, 2019, and additional costs for the extra project scope, identified in section 2 above, will need to be added to the 2014 estimate, solely for comparison purposes.

The cost estimate completed in 2014 shows a final total of $493,000 to upgrade the lift station and was inflated to current dollars at approximately $547,000. Published RS Means inflation factors were used. Adding the additional scope not included in the 2014 estimate raises the total to $956,000, not including the replacement of a section of forcemain between the lift station and Gower Point Road at an estimated cost of $420,000. The estimated service life of this section of the main will be approximately 80 years.

The cost estimate for the pump station replacement completed in 2014 was $2,063,000 and inflated to current dollars equals $2,288,500. Adding the additional scope not included in 2014 raises the estimate to $2,671,000 for the pump station replacement.

Upgrading the existing pump station extends the pump station life by 20 years until the next overhaul / rehabilitation is required, which will be triggered by the electrical equipment needing replacement and the existing pumps needing replacement. A new station is expected to have a 40-year life before a major rehabilitation is required. For comparing the two different projects, we calculated the net present value of the two projects using a 3% net rate and the values of the projects are $760,600 and $1,543,500 for the upgrade and the replacement respectively. The project value of $1,543,000 for the replacement did not consider costs associated with environmental monitoring, archaeological monitoring, construction risk, and contingency, which raises the total project value to $1,758,000.

A comparison of the two project estimates is included in Table 2 at the end of this document.

4. Discussion

The major cost component of building a new pump station is the excavation, shoring, and dewatering costs and building the below-grade structure. By renovating the station structure, all the major excavation, dewatering, and concrete costs are avoided. As can be expected, the pump station upgrade/rehabilitation has a lower expected cost than constructing a new station.

We have assigned a simple 20-yr life to the upgrade option, which is the remaining life of the electrical equipment. However, the new station piping and metal work is stainless steel, and we are expecting a longer life out of these components. The station structure will need to be inspected in the future to confirm its condition, but we expect it can be rehabilitated at least once more before a new pump station is required.

Karl Mueller, P.Eng.
Project Engineer

Encl.: Table 2

Table 2: Project Estimates Comparison

Year	Description	Life Expectancy (Years)	Percentage	Prowse Upgrade TOTAL $	Prowse Station Replacement TOTAL $
2014	Base Cost from 2014 Tech Memo			$ 493,000.00	$ 2,063,000.00
	Subtotal			**$ 493,000.00**	**$ 2,063,000.00**
	Inflation Rate (Based on RS Means for 2014 to 2019)		10.9%	$ 53,896.00	$ 225,532.35
2019	**Inflated Cost to Current Year**			**$ 546,896.00**	**$ 2,288,532.35**
	Additional Prowse Upgrade Cost			$ 26,374.00	
	Subtotal			**$ 573,270.00**	**$ 2,288,532.35**
	Cost for Additional Pump Station Improvements (Odour Control, Instrumentation, HVAC) Not Included 2014 Estimate			$ 382,408.00	$ 382,408.00
2019 RVSD	**Updated Totals**			**$ 955,678.00**	**$ 2,670,940.35**
	Station Life Expectancy, Upgrade Only	20			
	Station Life Expectancy, Full Replacement	40			
	Net Rate		3%		
	NPV			**$ 710,903.77**	**$ 1,543,454.43**

Note The current Prowse Lift Station project includes a section of forcemain replacement to extend the life of the existing asbestos cement (AC) forcemain that was not included in the original 2014 replacement cost estimate. The value of the forcemain replacement is approximately $420,000.