District of Tofino
REPORT TO COUNCIL

MEETING DATE 26/11/2019

TO Mayor & Council File No: C&C - 02
FROM CAO
TITLE Wastewater Treatment and Conveyance Project - Update

RECOMMENDATION

1. THAT staff be authorized to continue to pursue Value Engineering items identified in the report titled “Wastewater Treatment and Conveyance Project – Update” dated November 26, 2019.

2. THAT staff be authorized to undertake a prequalification and tender process as soon as practicable for the construction of the Wastewater Treatment Plant and Conveyance System upgrades.

CAO’S COMMENTS

Report prepared by CAO.

PURPOSE

The purpose of this report is to update Council on the progress of the Wastewater Treatment Plant design and procurements.

2019-2022 STRATEGIC PLAN

Strategic Plan Goal:
Infrastructure.

Strategic Priority:
Complete construction of the waste water treatment plant (and associated infrastructure) and initiate operation.

FINANCIAL IMPACTS

The Wastewater Treatment Plant (WWTP) and associated conveyance system upgrades, with a projected cost of between fifty-five and sixty million dollars, will be the largest infrastructure project undertaken by the District of Tofino.
Grants from senior levels of government have assisted with reducing the local portion of the cost of this project:

- The District received a grant under the Clean Water and Wastewater Fund of over one million dollars to cover 83.3 percent of the costs of the design of the WWTP and associated systems.
- The District has been awarded a grant under the Investing in Canada Infrastructure Program, Environmental Quality Stream (ICIP-EQ) to cover 73.3% of the cost of building a wastewater treatment plant, conveyance system upgrades, reconstructed outfall and a compost facility. This grant has a value of approximately forty point two million dollars.

Notwithstanding the sizable support from the Federal and Provincial governments, it is recognized that beginning to treat municipal liquid waste will be a large capital expense for the District. The District has enacted a borrowing bylaw that will allow approximately sixteen million dollars to be borrowed to fund this project.

BACKGROUND

For decades the District of Tofino has discharged untreated sewage into the Pacific Ocean at Duffin Passage. This discharge has resulted in a shellfish harvesting closure that wraps around the tip of the Esowista Peninsula.

Federal regulations under the Wastewater Systems Effluent Regulations require that the District and other polluters cease polluting activities. Through what is referred to as “transitional authorities” the District has a deadline of January 1, 2021 to begin treating waste that is being discharged into federal waters.

Liquid Waste Management Plans

In British Columbia, provincial regulations under the Waste Management Act require local governments and other polluters to have Liquid Waste Management Plans (LWMPs) in place to set out a framework for how liquid waste is to be treated and discharged to the environment. LWMPs are typically divided into three progressive stages. The District of Tofino began the process of preparing a LWMP in the late 1990’s and in June of 1999 a draft stage one report was presented to the District.

In 2004 the District received a Stage 2 report that reviewed possible treatment plant sites and possible treatment process options. The report identifies that the likely best location for a WWTP is on District Lot 117 with an outfall to Duffin Passage.

Various Stage 3 reports were prepared between 2006 and 2012; none of which were approved by the Minister of Environment. Among a host of other concerns was the District’s proposal to not begin construction of a WWTP until 2026. The plan also lacked significant technical details that were required by the Province.

In 2014 and 2015, the District initiated a process to complete the LWMP by confirming the site selection that had been made in Stage 2 a decade earlier, and undertaking a Stage 3 process with the assistance of Opus Dayton and Knight Consultants (later WSP Consultants).
The District’s Stage 3 Plan was approved by the Minister of Environment in early 2018.

**Wastewater Treatment Plant Design**

As noted, the District received a grant for the design of a new wastewater treatment plant in 2017. WSP Consultants (previously OPUS) were selected to undertake pre-design and design of a treatment plant, conveyance system, outfall and biosolids management facility.

The WSP design team worked methodically with District Staff to ensure that decisions were being made with the right technical information at the right time in the process. When needed, staff would refer matters to District Council for consideration (i.e. Design criteria and treatment method). District staff and WSP connected in bi-weekly teleconferences to keep the project on track. Additionally, in-person design milestone meetings were held at 30%, 60% and 90% design completion with District and WSP participants. Further, “technical memos” were produced throughout the process to finalize certain directions.

Two important early components of this work were the establishment of a *Pre-design Report* and *Wastewater Treatment Plant Design Criteria* that together reflected Tofino’s realities and priorities. Some of the important considerations included:

- Establishing a 20 year design population of 10,800 (including Parks Canada, TFN communities and Tofino visitor, permanent and seasonal populations);
- Choosing treatment methods and designs that are suitable for wastewater that has higher than average biological oxygen demand and suspended solids;
- Choosing a treatment method that works well with swings in seasonal populations;
- Directing the design to recognize the challenges of operating in a remote location such as:
  - Designing a plant that can be operated with a lower level of plant operator certification,
  - Ensuring that operating components are of a quality that will mean minimal disruption and periods of non-compliance,
  - Recognition of frequent power outages that occur on in Tofino,
- Planning for future expansion beyond the 20 year design life.

In keeping with the extended timeline approved by funding agencies, a wastewater treatment plant design and tender documents were substantially completed in March 2019.

In addition to designing the WWTP and associated works, the District was also required to provide a *Community Employment Benefits Report*, a *Greenhouse Gas Mitigation Assessment* and a *Climate Resilience Assessment* to ensure eligibility under the ICIP-EQ program.

The design process included the preparation of multiple cost estimates by the WSP design team and independently by Hanscomb Cost Consultants. As information became more refined, cost estimates generally increased. The “Class “B”” cost estimate that was prepared in 2018 estimates a mid-point construction cost of $55,361,525 including contingencies. Cost escalation has been estimated to be 5% per year.
DISCUSSION

As noted (and well known) the District has received a grant from senior levels of government under the Investing in Canada Infrastructure Program of $40,264,769. This represents 73.33% of total eligible project costs. Staff efforts are now focused on moving this project to tendering and construction.

Value Engineering

As required by the funding approval from the Federal and Provincial Governments, the District sought and engaged a third-party to conduct a “Value Engineering” review of the WWTP, and conveyance system upgrade designs. Value engineering is a structured approach, led by a skilled facilitator that seeks project value in six phases:\n
1. Information: Gather information to better understand the project.
2. Function Analysis: Analyze the project to understand and clarify the required functions.
3. Creative: Generate ideas on all the possible ways to accomplish the required functions.
4. Evaluation: Synthesize ideas and concepts and select those that are feasible for development into specific value improvements.
5. Development: Select and prepare the ‘best’ alternative(s) for improving value.
6. Presentation: Present the value recommendation to the project stakeholders.

In considering a project, a value engineering team is seeking value for a project rather than simply seeking to reduce project costs. Value engineering recognizes the function of a project and works to deliver value to the project. At times, this can mean that recommendations include increases to construction cost that will deliver better long-term value to the project.

For the WWTP and associated construction, the District retained HDR Consultants, through a competitive process, to undertake the value engineering (VE) review. The six-phase process that is noted above was followed with steps three to six being undertaken in a workshop held in Vancouver in late October. A draft report was provided to the District on November 11, 2019. This report has been reviewed by the writer and by the WSP design team. It is noted that implementing the recommendations of the VE Report generally means a need for redesign and project schedule slippage. Appendix “1” notes value opportunities that were identified by the VE team, the opinion of WSP and the writer as to whether the opportunity should be pursued and the cost of redesigning to pursue the opportunity. Some highlights of recommendations for improved value of the WWTP Project are:

1. **De-emphasize the Gas N’ Go Lift Station** - The VE team identified an opportunity to reduce the volume of effluent that is carried through Pump Station #4 (Gas N’ Go) and thus reduce concerns of odour issues at this location. To achieve this, the Lynn Road lift station would require significant upgrades to be capable of pumping effluent from Lynn Road and Pacific Rim Highway to the new WWTP at the top of Industrial Way. Further, the Hellesen Road and Abraham Drive lift stations would also require upgrades (although less significant than Lynn Road). The VE team estimate that there would be an _increase_ to the project budget of approximately $340,000 to make this change.

While it is an intriguing idea to have the Lynn Road lift station do more work and push effluent directly to the new WWTP, this additional project cost is not justified in the view of the design.

---

1 SAVE International website
team or the writer. Further, upgrading the Lynn Road lift station would cause the need for private sewer pumps along the Pacific Rim Highway to need upgrades as well.

It is noted, that for several reasons, the initial plan of rebuilding a pump station at Gas n’ Go has been reconsidered and this pump station will likely be redesigned at the intersection of Warren Way and the Pacific Rim Highway.

2. **Use corrosion Resistant Materials in Wet well at Gas N’ Go Lift Station** - No capital cost increase or savings is identified with his recommendation. However this recommendation is accepted with the notation that corrosion resistant materials such as epoxy coatings and stainless steel fittings are part of the original specifications from WSP.

3. **Redesign the WWTP Administration Building** – The value engineering exercise identified that simplifying the design of the administration building at the wastewater treatment plant to a single floor design could yield savings of approximately $617,000. The writer and WSP both support following up on this opportunity. The expected redesign cost is approximately $74,000.

4. **Relocate Grit Removal to Exterior of Headworks Building** – Collected municipal effluent will initially flow into a “headworks” building where inorganic solid materials that cannot otherwise be processed are separated from the effluent by screening and other mechanical methods. One component to this separation is the removal of “grit” by way of specialized machinery. The value engineering team has recommended that a grit removal mechanism does not need to be located indoors and can be moved to a covered location outside of the building. A potential cost savings of $60,000 has been identified. WSP and District Staff believe that this idea has merit, subject to technical considerations, and will further study this idea to determine its feasibility. Important in this consideration is the redesign cost which might be as much as sixty percent of the estimated savings.

5. **Delete Control Room from Head Works Building** – The VE team has identified that moving a control panel that has been designed into the headworks building to a covered, outdoor location could result in savings of $161,000. Most of the saving would be from a reduced floor area in the headworks building. The writer and the design team do not recommend pursuing this item for several reasons:
   a. The redesign cost of this element would be approximately $31,500,
   b. It is unknown if the electrical redesign needed could be accomplished due to the headworks building being “rated” for having explosive materials,
   c. Placing touch-control screens in an outdoor environment is expected to shorten the life expectancy of the equipment.

6. **Lower Exterior Grading at Clarifiers to Reduce Site Fill** – The wastewater treatment plant compound has a design elevation of twenty-five metres above sea level. The VE team suggest that if some areas of the compound are lowered to twenty-four metres, there could be a cost savings of $344,000. The design team does not recommend this as the WWTP is to be built in a location that is fairly wet, with nearby ephemeral streams and a small water body. The construction contractor will need to dewater the site. Lowering parts of the site will create the risk of flooding occurring on the site which may necessitate redesign or active dewatering in the future.

7. **Combine Dewatering and Mechanical Buildings** – The VE team has suggested that by combining
two buildings on the WWTP site into a single building, savings could be realized. This concept was explored early during the design phase but was abandoned due to seismic reasons. Put simply, these buildings are of different construction types (one with full basement and the other is a slab on grade) and will thus move differently in the event of an earthquake. Combining these two structure types would make post disaster design very difficult and add cost that the value engineering report does not appear to account for.

8. Relocate Odour Control Equipment and Generator – The VE team identifies that moving two pieces of exterior equipment could result in significant savings. The writer and WSP design team believe that this is a notion that should be further considered subject to other site functions such as truck access being maintained; and technical issues like the cost of longer runs of wiring.

9. Provide Two Smaller Generators In Lieu of One Larger Generator – The VE team projects that including two “small” generators instead of a single large generator could result in a savings of approximately $70,000. The VE team are of the view that two generators that each provide half of the WWTP’s peak needs could be of value in that if one generator fails, there would be a second available to run fifty percent of the plants functions. The writer and the WSP design team do not see the value having two generators as the plant functions as an entire entity and would provide little function with fifty percent of power. Additionally there would be increased electrical costs such as additional switch gear that have not been accounted for.

There would also likely be an increase in the lifecycle costs of maintaining two generators rather than one.

10. Substitute Screw Press or Volute Press In Lieu of Centrifuge for Dewatering – The wastewater treatment plant has a variety of processes to separate the liquid and solid components. At the end of the process, the plant mechanically prepares “biosolids” to be exported to the compost facility. The design team is concerned that a screw press or volute press may not sufficiently reduce the moisture content of sludge for ideal composting. Additionally, there is concern that changing the dewatering method would trigger a redesign of the dewatering building resulting in a negligible net savings. This idea will not be further considered.

11. Use Single-Pass Biological Scrubbers Instead of Carbon for Odour Removal – A capital cost savings has not been identified for this alternative. The writer and the design team recommend staying with carbon scrubbers as this is a more reliable odour control approach that is in keeping with community values and concerns about odour that were expressed throughout the LWMP process.

12. Specify PLC/Wonderware In Lieu of Emerson Delta V DCS system – The District has been implementing SCADA (Supervisory Control and Data Acquisition) systems throughout our utilities over the past several years. These systems of integrated hardware and software allow users to remotely monitor and control many aspects of utility operations. It is planned that the new WWTP and conveyance components would have an integrated SCADA system. The VE team recommends using a different software than was specified by the system designers.

After much consideration, the WSP designers recommend that the project retain the originally specified SCADA system approach. The WSP recommendation is due to the longer-term ability of the District to integrate Delta V with our existing systems and resultant longer-term savings.
13. **Make Changes to Air Handling System Approach** – The VE team has identified an alternate approach to air handling systems at the WWTP. A potential savings of $140,000 has been identified. This is recommended for acceptance subject to the proposed change complying with an acceptable standard (NFPA 820\(^2\)). The WSP design team notes that the savings of this change, if it meets the NFPA standard, could be much greater than the $140,000 projected by the VE team. This potential savings is tempered by a redesign cost that could be in the order of $100,000.

14. **Install a Self-Backwashing Strainer for Reclaimed Water Rather Than Pressure Filters** – The WWTP has been designed to collect reclaimed water. This reclaimed water is non-potable and thus has limited uses but is suitable for wash down within the treatment plant or washing of other sewer components. Using the strainers rather than the sand filters that were originally specified will mean that the reused water will not be as high in quality. However the savings of approximately $94,000 and minimal redesign cost justify making this change.

15. **Increase Size of the Mechanical Bar Screening Specification** – This item is the identification of an error in the specification prepared by WSP. The size proposed by the VE team is the correct size and the specification will be changed. There is no savings associated with this modification.

16. **Install Grease Filters on Odour Control Systems** – This item has no cost savings. The WSP design team has reviewed this recommendation and does not recommend its implementation as no grease build-up on the fans is expected.

17. **Modify Materials Specifications at Plant Yards and Process Piping** – The VE team has identified that there may be cheaper piping materials that will perform equally well at some locations. It is, however recommended that stainless steel be retained where exposed to the elements.

18. **Simplify Coatings Specifications** – The VE team identified that coating such as paints and concrete sealants can be simplified to save capital costs. Switching some of these types of specifications is recommended by the WSP design team, with some reservations about longer-term maintenance issues.

Overall, the value engineering process identified a potential construction cost savings of approximately three million dollars. The writer and the WSP design team recommend following up on many of these ideas as noted and would anticipate a net project savings of under one-million dollars. For local ratepayers and local partners, this is a savings of approximately $394,000 ($1,500,000 X 26.3%).

**Risk Assessment**

Construction projects of any size have associated risks. It is reasonable to expect that larger projects have larger associated risks. A leading practice is to identify risks in a risk register and seek ways to mitigate those risks, where possible, as a project develops. In addition to seeking value, the value engineering team had a task of identifying potential risks to the WWTP and Conveyance project. Where possible the VE team also identified risks mitigation measures for consideration. Some of the risks identified are:

- **Availability of Municipal Staffing** – There are currently no qualified WWTP operators working for

\(^2\) NFPA820 is a standard from National Fire Protection Association that specially addresses wastewater treatment facilities.
the District. If the WWTP is to be operated by municipal staff, the District will need to:
  o hire qualified staff from elsewhere,
  o train current staff or
  o develop a combination of new staff plus training.
It is also understood that existing treatment plants on Vancouver Island are challenged to maintain desired staffing levels. Additionally, it is expected that staffing requirements for new and expanding WWTPs will further strain workforce availability. The VE team recommended either paying incentive rates to WWTP employees or considering a concessionaire / build and operate contract. These ideas will be further considered and an operating model will be developed for Council consideration.

- **Skilled Labour and Material Availability** – The availability of skilled labour for large construction projects in remote areas can be challenging. Constructing a WWTP and related infrastructure in a remote location without a nearby labour market is of concern. These challenges may be partially mitigated by finding a location for a work camp to better enable contractors to bring in needed workers. Additionally, some of the strategic procurement measures that have been identified will assist with mitigating this concern by getting the local workforce more engaged in this project.

- **Materials Pricing** – There has been volatility in pricing the WWTP. It may be possible to pre-purchase some materials to mitigate this challenge however the District’s ability to store pre-purchased components is limited. It has also been identified that meeting the needed supply of concrete will create challenges.

- **System Start-up and Sequencing** – The establishment of an entirely new WWTP is very rare. The VE team has identified that getting the construction contractor to have an extended commissioning period, would be advisable. This may be combined with a longer-term concessionaire contract.

- **Utility Power Availability** - In mid-summer, BC Hydro indicated that their electrical grid may not adequately meet the operational demands of the WWTP. This has been further investigated and the following actions are being taken to mitigate this risk:
  - The writer and Mayor Osborne have met with senior officials at BC Hydro to share our concerns.
  - BC Hydro has committed that senior and experienced transmission engineers will are reviewing the line capacity from the hydro substation to Tofino and planning for the upgrade to this transmission line. However the timing of this upgrade may not align with the startup of the WWTP.
  - BC Hydro is working with the electrical engineers from WSP engineering to better understand and quantify the gap between available power supply and the demands of the WWTP.
  - The writer is engaging with BC Hydro to through their “New Plant Design Program” to find opportunities to reduce the WWTP load requirements.

It is noted that the WWTP electrical demand would peak in the summer when visitor and seasonal resident numbers are at their highest. Conversely, Tofino’s overall electrical demand peaks in the winter at loads that are almost twice those experienced in the summer.
Solid Waste Disposal – Wastewater treatment operations produce a number of solids that must then be addressed. District Staff have discussed this with the Alberni-Clayoquot Regional District (owners of the West Coast Landfill). We are advised as follows:

- Screenings of non-organic materials will be accepted at the landfill;
- The Regional District is moving toward the construction of a compost facility that will accept biosolids.

Needed Permits – The District and its advisors have been working with permitting agencies to ensure that needed permits are in place.

Limited Contractor Interest – It is understood that getting good, competitive pricing will partially depend on how competitive the large-project construction environment is when the tender is issued. While multiple contractors have expressed interest in this project, it is not know the extent to which this interest will translate into bids.

Contract Separation – District staff had directed that the WWTP project and the conveyance upgrades be separated into two tender documents. The VE team has identified that this could create some risks for the project:

- It will be difficult to understand feasibility until both tenders are received.
- If one contractor’s schedule slips, the other may submit a delay claim to the District.

An additional risk that the VE team did not specifically identify is cost escalation. This risk has long been known and it is understood that there is a strong likelihood that construction costs will generally increase with time. In developing cost estimates, Hanscomb Cost Consultants included a cost escalation factor of 5% per year. Project delays can exacerbate cost increases. To mitigate this, staff are making every effort to keep this project moving forward.

Next Steps

Project timelines have experienced slippage as we have sought grant funding and undertaken value engineering work. It is our objective to tender this project in the first quarter of 2020. Prior to tendering, the following actions are being undertaken:

1. The District is awaiting a cost sharing agreement from the Federal and Provincial governments. While this was expected in early October, it has not materialized. Following the completion of this agreement, the District will further its discussions with other parties that will contribute to the wastewater stream – Parks Canada and the Tla-o-qui-aht First Nation.
2. The District is preparing a request for qualifications – to be released shortly in hopes of creating a list of prequalified contractors for the WWTP and conveyance system.
3. Based on the outcomes of the value engineering work, staff will be engaging WSP to redesign certain components of the WWTP and conveyance project. This work will occur at the same time as the prequalification process.
4. Following the completion of design changes and the prequalification process, a request for tenders will be issued. It is expected that the request for tenders will be in the market for eight to ten weeks to ensure the highest possible level of contractor participation.

If all goes well, it is realistic to expect that project construction could start in the spring of 2020. With an
expected construction period of 24 months, project completion would occur more than a year after the federal deadline.

COMMUNICATION

The District has sought to inform and engage the public at several stages of this project, most notably in the development of the Stage 3 LWMP. In order to receive the public and technical feedback required to complete Stage 3, the District combined First Nations, technical and public representatives into one Joint Liquid Waste Management Advisory Committee. From 2015-2017, the Committee met approximately 7 times in open, advertised, public meetings. The District also developed seven LWMP Newsletters which were sent to residents in hard copy and available from the District’s website. A dedicated project page has been set up (www.tofino.ca/lwmp) which includes project and funding updates, staff and technical reports, and an explanation anticipated taxation impacts.

More recently, the construction of the WWTP and conveyance system have been the subject of several reports to Council at Council and Committee of the Whole meetings, featured in this and the previous Council’s Strategic Plans, and reported on in the local media. Staff will continue to engage with the community using opportunities such as Open Houses, online forms, and subscriber emails as the project progresses.

CONCLUSION

The Wastewater Treatment project is continuing to move forward. Staff is pleased to provide this update for Council.

Respectfully submitted,

_________________________________
Bob MacPherson, CAO

Appendices:
Appendix “1”: Summary of Value Engineering Recommendations and Responses