June 5, 2014

REPORT TO: **ENGLISHMAN RIVER WATER SERVICE MANAGEMENT BOARD**

FROM: **ENGLISHMAN RIVER WATER SERVICE MANAGEMENT COMMITTEE**

SUBJECT: **PRELIMINARY DESIGN OF THE WATER INTAKE, TREATMENT PLANT AND SUPPLY MAINS AND DETAILED DESIGN FOR THE WATER INTAKE, TREATMENT PLANT AND SUPPLY MAINS.**

PURPOSE: **To obtain English River Water Service Management Board approval of the Preliminary Design of the Water Intake, Treatment Plant and Supply Mains report, and to continue with the Detailed Design of the Water Intake, Treatment Plant and Supply Mains in an effort to meet the objective of having a new water intake and treatment plant operational by December 31, 2016**

EXECUTIVE SUMMARY:

Significant planning and investigation has been undertaken over the last 20 years in an effort to develop a regional water supply that is sustainable and developed in a phased approach to meet both current and future water demand needs. These efforts have followed our mission statement and will result in the delivery of potable water source exceeding the Canadian Drinking Water Guidelines, while enhancing and protecting the health of the Englishman River for fisheries purposes.

Over the last several years the capital plan has been accelerated in order to meet both domestic drinking water demands and water treatment enhancements imposed by the Vancouver Island Health Authority (Island Health). To date the following project milestones have been completed:

- Determining the best location for the water intake and subsequently obtaining approval to re-locate the intake to this location as part of our licensed water withdrawal.
- Analyzing the water quality of the Englishman River.
- Examining water treatment technologies that best suit the Englishman River water source.
- Developing an Implementation Plan, Joint Venture Governance, Capital Plan and associated Five Year Financial Plan.
- Completing a feasibility analysis of Aquifer Storage and Recovery to determine its role in water management for the region.
- Developing a communication plan to help educate and obtain public input and feedback from stakeholders through Community Working Group meetings, public presentations, media releases, senior government consultations, web page development and open houses.

The last phase of capital works (Phase 3) Preliminary Design is now complete and engaged the services of CH2M Hill. Overall the Preliminary Design services concluded the location and type of water intake, the location and treatment technology of the water treatment plant, transmission main upgrades, confirmation of the Arrowsmith Dam release flows for both fish and domestic supply for the next 20 years and engaging the public to incorporate community goals and standards into the intake and water treatment plant design. CH2M Hill's team also developed procurement documents to engage water treatment ultrafiltration / microfiltration

polymeric membrane vendors for design services and pre-purchasing. The advantages of bringing in the membrane supplier in at the detailed design stage is to gain efficiencies in the overall plant design, meet conditions set in the warranty of the membranes, educate and train operators and save on general contractor markup. Three membrane suppliers were shortlisted to submit detailed proposals and were evaluated through a complex matrix that included capital costs, operations, life cycle costs, technical support, and technical requirements. It was determined that two of the membrane suppliers met all conditions and are both equally weighted. The selection committee made of technical staff from CH2M Hill and ERWS are currently going through the terms and conditions of each vendor's proposal to determine which supplier best meets our terms for delivery, replacement, service and warranty. We expect to be in a position to award the design services to the top rated vendor within several weeks once all the terms and conditions of the contact are satisfactory with ERWS staff.

The next steps for consulting services include detailed design, contract document preparation, tendering, contract award and construction services. CH2M Hill's proposal for the entire detailed design budget is $2,581,648 (plus GST) of which $1,619,328 (plus GST) is allocated for year 2014 works. These fees are within the scope and price of similar projects of this type and magnitude. The detailed design will be complete up to a 60% design, and cost estimates will be prepared prior to November 2014. This will help further refine actual costs required for this project and put us in a favourable position to receive Federal / Provincial grants. There are sufficient funds allotted in the 2014 ERWS Provisional Budget to cover the fees for the detailed design services for this year. The additional detailed design fees for 2015 will need to be approved by the ERWS Board in the 2015 fiscal year following approval of the 2015 Provisional Budget.

RECOMMENDATION(S):

THAT the Englishman River Water Service Management Board recommend the Joint Ventures adopt the report titled "Predesign Report – Water Intake, Treatment Plant, and Supply Mains", dated June 5, 2014;

THAT, the Englishman River Water Service Management Board direct the Englishman River Water Service Management Committee to continue to proceed with negotiating the terms and conditions with the two top rated membrane vendors for the purpose of engaging the top rated membrane vendor for detailed design services in the amount not to exceed $ 415,000 plus GST,

THAT, the Englishman River Water Service Management Board authorize the Englishman River Water Service Management Committee to engage CH2M Hill to complete Phase 4 – Detailed Design of the Water Intake, Treatment Plant and Supply Mains for $1,619,328 (plus GST).

BACKGROUND:

The original 1992 Regional Water Supply System for the Englishman River study recommendations were followed resulting in the construction of the Arrowsmith Dam for reservoir storage impoundment to help augment summer river flows to support both fisheries requirements and future potable water allocations for the region. This concept of using the Englishman River as a natural conduit to supply water from the Arrowsmith Lake Reservoir to the region was determined to be the most cost effective way of conveying water, while

creating significant benefits for fish and naturally recharging the Englishman River Aquifer. Since the inception of the Arrowsmith Dam in 1999, significant salmon enhancements have been achieved.

The regions plans to further develop surface water supply were needed to augment groundwater supply to each jurisdiction given concerns for limited yields and declining aquifer levels. The original plans to develop the surface water system were to implement it based on a phased approach being:

- Phase 1 – Construction of Arrowsmith Dam and creation of Arrowsmith Lake Reservoir.
- Phase 2 – Construction of a new river intake on the Englishman River to support future water demands.
- Phase 3 – Enhanced Surface Water Treatment.

The initial plans for the intake location were to have it sited below the confluence of the south Englishman River and pump to a central reservoir located on Little Mountain that would gravity feed water to the region. In 2008, following input from the Department of Fisheries and the Vancouver Island Health Authority, it was determined that an intake located further downstream would be more cost effective and provide additional fisheries benefits while mitigating health risks.

In 2009 the Vancouver Island Health Authority (VIHA) imposed changes to our Operating Conditions that accelerated the implementation of enhanced water treatment in conjunction with the timing of constructing a new water intake. Regardless of the intake location, enhanced surface water treatment to fully remove biological health risks that are naturally occurring in the surface waters within the Englishman River watershed is required. This is a typical health risk mitigation standard in place throughout North America that has recently been adopted on Vancouver Island.

The Capital Program for the region's future water supply was revised and an Implementation Plan was developed and adopted in an effort to meet the VIHA target deadline of December 31, 2016 for enhanced surface water treatment. To meet this objective, the following planning, investigation and research studies have been completed:

- Phase 1 - Conceptual Planning:
    - Determined the best location for the new intake taking into account, social, health risks, economic and environmental concerns.
    - Determined the location for the new water treatment plant and land requirements.
    - Identified conceptual costs and budgets for the new intake, water treatment and transmission mains.
    - Introduced a water management strategy considering Aquifer Storage and Recovery (ASR) as a small component for water harvesting and storage.
- Phase 2 - Conceptual Planning:
    - Examined the water quality of the Englishman River with a full year of lab analysis to determine and figure print the characteristics of sedimentation and potential biological health risks.
    - Examined and piloted different water treatment technologies to determine the most feasible and cost effective water treatment technology for the Englishman River water source.

  - Reviewed the feasibility of ASR in the region and piloted cycle injection and extraction tests to determine hydraulic aquifer confinement and water quality.
  - Updated capital costs for the water intake, treatment plant, transmission mains and ASR.
- Phase 3 - Preliminary Design

These technical documents were prepared to give the ERWS guidance in implementing and proceeding with immediate planning needs, capital infrastructure works, budget preparation and potential land acquisition.

The Preliminary Design is now complete and engaged the services of CH2M Hill to determine the type of water intake structure, raw water pump station location, confirmation of water treatment technology and plant location. Kerr Wood Leidal (a sub consultant to CH2M Hill) determined the hydraulics of the Englishman River for water extraction, aquatic effects based on the new intake location and water model analysis for the transmission water supply mains. Other investigations such as geotechnical, archaeological and biological assessments were also undertaken in an effort to comply with senior government permitting requirements.

Overall the Preliminary Design services concluded:

1. Permitting for senior government and land acquisitions / right-of-way requirements.
2. The new water intake location is to be on the right bank (east side) of the Englishman River upstream of the Highway 19 bridge. The Intake will be an instream concrete weir with pneumatic crest gates (Obermeyer weir) to create backwater in low summer flow conditions that will direct water into a side inlet concrete intake structure with stainless steel fish screens.
3. The raw water pump station will be housed away from the intake, up the embankment and above the 200-year flood plain located in Top Bridge Park. It will be designed for the ultimate regional future population capacity of 48,000 cubic meters per day.
4. A raw water transmission main will be routed under the Highway 19 Bridge and utilize the existing access road, cross the E & N railway and be directed into the City of Parksville Public Works Yard and will be designed for the ultimate regional future population capacity of 48,000 cubic meters per day.
5. The water treatment plant will be a pre-engineered building located on the City of Parksville Public Works Yard adjacent to their Operations and Engineering Building. The treatment technology will be chemical coagulation followed by pressurized membranes using Ultraviolet Disinfection as primary disinfection, with secondary disinfection with chlorination for water distribution residuals to meet Island Health requirements. The water treatment plan will be built in phases to allow for the initial 20-year demand of 24,000 cubic meters per day with a second phase capacity of 48,000 cubic meters per day.
6. Transmission main requirements for distribution into the regional water supply network include:
   - A direct transmission main connecting the water treatment plant to the Springwood Reservoir to service the City of Parksville domestic and fire flow demands.

- A direct transmission supply main connecting the water treatment plant to the Top Bridge Reservoir to service Craig Bay and Nanoose regions domestic and fire flow demands.
- Various localized distribution water main improvements to help improve peak domestic demands and fire flow demands.

7. The re-location of the new intake will not have an impact on downstream minimum fisheries flow requirements for the next 20 years (based on 24,000 cubic meters per day extraction for drought returns less than 1:20 year return).
8. An Operational Rule Curve was defined taking into account domestic water withdraws, minimum fisheries flow requirements and seasonal drought conditions to determine best operational flow release rates from the Arrowsmith Dam with all the above considerations.
9. The Community Working Group and public surveys based on Open House participation and on-line surveys concluded:
    a. the proposed water intake and pump station should blend into the natural environment and be kept open to the public,
    b. the chemical option for removal of colour should be pursued but make provisions and allowances in future phases for secondary filtration (Nano) should this treatment technology become more feasible than conventional coagulation,
    c. create walking trails over water transmission mains and install interpretation signage for education purposes where possible,
    d. the water treatment plant building should be aesthetically appealing to the public and reflect the natural watershed and Englishman River through the design,
    e. to promote conservation though demonstrating water re-use and energy efficiency,
    f. and construct a public meeting area for water treatment plant tours; help promote water conservation, general public education and potential water treatment seminars / courses.

CH2M Hill's team also developed procurement documents to engage water treatment ultrafiltration / microfiltration membrane vendors for design services and pre-purchasing. With this type of water treatment technology, engaging the services of a membrane supplier at the detailed design stage is common practice. The advantages of bringing in the membrane supplier in at the detailed design stage is to gain efficiencies in the overall plant design, meet conditions set in the warranty of the membranes, educate and train our operators and save on general contractor markup. Polymeric membrane filtration suppliers available in the North American market were evaluated based on the criteria of being non-proprietary interchangeable membrane modules, service in Canada, having a reputable product, proven track record and ability to meet filtration requirements from the Englishman River Source. Three membrane supplier firms were short listed and selected to submit detailed proposed namely:

- GE Water & Process Technologies
- H20 Innovation
- PALL Corporation

The proposals from the three above referenced companies were evaluated based on a weighted average of technical factors including technical support, expected performance, system flexibility, warranty, overall life cycle costs, initial capital costs and overall proposal submission. The selection committee made of technical staff from CH2M Hill and ERWS are currently going through the terms and conditions of each vendor's proposal to determine which supplier best meets our terms for delivery, replacement, service and warranty. We expect to be in a position to award the design services to the top rated vendor within several weeks once all the terms and conditions of the contact are satisfactory with ERWS staff. The equipment pre-purchase will not be binding and will not be awarded at this time as it is pending funding consent from the general public on November 15, 2014.

The next stage (Phase 4) will require detailed design and tendering services in order to complete the design of the water treatment plant, water intake and required water transmission mains. For additional works of this magnitude, retaining qualified engineering consultants acting as an Engineer of Record is required. It has been previously agreed that the process of engaging engineering consultants will be managed by the City of Parksville in accordance with the City's Purchasing Policy, as may be amended from time to time. Such policy is consistent with the generally-accepted municipal government financing models. On June 6, 2013 the ERWS Management Board carried a motion to direct staff to engage and negotiate the work plan and fees with CH2M Hill for future phase of work through to the completion of the project providing satisfactory performance of CH2M Hill and develop appropriate budgets for such in the future Financial Plans. The detailed design will include:

- A Value Engineering review after 30 % Detailed Design – Year 2014 works
- Detailed Design to 60 % review complete with cost estimates – Year 2014 works
- Detailed Design to a 95 % review – Year 2015 works
- Preparation of specification and contract documentation – Year 2015 works
- Tendering Services – Year 2015 works
- Contract Award – Year 2015 works

OPTIONS:

1. Accept the budget fee proposal of $ 1,619,328 from CH2M Hill for Phase 4 – Detailed Design for year 2014.

2. Direct staff to receive additional engineering service fee proposal from other qualified engineering firms.

ANALYSIS:

Option 1 - Proceeding expediently with the next phase of the Capital Plan is required in order to meet the 2015 construction start milestone and put us in a favourable position for Federal / Provincial grant opportunities. The ERWS has already gone through a qualification-based competitive selection process which led to the now completed Phase 3 services by CH2M Hill. Based on the urgency of commencing the next phase and their satisfactory performance on preliminary design, the ERWS Management Committee is recommending that the ERWS Management Board authorize engaging CH2M Hill to proceed with the additional full scale Detailed Design.

Option 2 - The ERWS Management Board could reject the engineering fee proposal from CH2M Hill. This would further delay the project and potentially result in higher engineering fees. Since Phase 4 is on the critical path, delaying Phase 4 may result in delaying construction and commissioning of the project.

INTERGOVERNMENTAL IMPLICATIONS

Staff from the City of Parksville and the Regional District of Nanaimo agree unanimously to adopt the Predesign Report, Water Intake, Treatment Plant, and Supply Mains dated June 4, 2014, further negotiate the terms and conditions with the shortlisted membrane suppliers for detailed design services not to exceed $ 415,000 plus GST and engage CH2M Hill for Phase 4 Detailed Design services in the amount of $ 1,619,328 plus GST.

REFERENCES

- Phase 1 - Conceptual Planning, Budgeting and Scheduling dated April 2011
- Phase 2 - Water Treatment Pilot Testing and Aquifer Storage and Recovery Feasibility Analysis
- AWS Board Committee Meeting Minutes held on June 23, 2011
- ERWS Board Committee Meeting Minutes held on February 22, 2012
- ERWS Board Committee Meeting Minutes held on June 6, 2013
- ERWS Year 2014 Budget, dated December 5, 2013

Respectfully submitted,

Englishman River Water Service Management Committee

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