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**REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, FEBRUARY 24, 2016**

SUBJECT **Technical Oversight Panel (TOP) Report #10**

ISSUE

TOP summary of recent period to February 15, 2016.

BACKGROUND

1. Summary of planning stage work with reference to the project charter and TOP Terms of Reference:

The Core Area Liquid waste management committee (CALWMC) engaged the Technical Oversight Panel (TOP) August 12, 2015 to oversee Planning Phase 2 of Urban Systems and Carollo's (the consultants') work. TOP referenced the Final Project Charter dated November 2, 2015, the consultant scope of services Appendix A, and the TOP terms of reference dated August 12, 2015 in its work. TOP met on several occasions face to face and via teleconference. All meetings were public and recorded by CRD staff, except for a few closed sessions relating to land issues. TOP also had over twenty presentations from various private vendors who presented options ranging from complete solutions to minor components. The objective for the planning phase was to develop site options and to describe processing options for both liquid and solid waste treatment with costing. TOP's role was to provide expertise and advice to the consultants.

2. Project costing considerations:

The costing of the options sets submitted by the consultants represent a pre-concept order of magnitude value with a range of -15% to +25% per the consultants scope of services. Soft costs including engineering, project management, interim financing and cost escalation through the construction period are included in each option set. Long term financing following grant disbursement and project completion is not included but the interest rate given by CRD for long term financing are high and an aggressive loans broker could, in all probability, shave some points or fractions off the current proposed percentages. Operations costs for each option are included. Revenue income for water re-use are included, but should be viewed with caution pending definition of the re-use product and the capital expenditures necessary to produce it, and the market demand. At this very early stage, with so many unknowns, there are considerable financial risks and the contingency provision is quite high. Pending more specific detail from later stages, TOP believes this provision to be prudent. Following the selection of an option set, TOP advises that a project plan should be developed as early as possible covering all stages of the project and including a financing and expenditure pro-forma indicating projected funding draw downs and monthly expenditures in detail. This plan will form the basis of a regular reporting process.

The costs of a single plant are less than the costs of the multiple plant options. TOP believes the single plant option for the 108MLD plant to be the most cost effective for both capital and operating/equipment costs.

3. Project administration considerations:

The key to success in any project rests with the overall management. This applies through all the various project stages to project completion. Reference to the “Lessons Learned” report from The Commission highlights some of the shortcomings of the past, and indicates actions necessary to obviate them as the program moves ahead to definition stage. The report identifies that the key to a successful project is building trust between the parties which requires openness and good communications with regular reporting of both progress and costs. Also referenced is the need for a ‘Champion’ closely identified across the spectrum as the person in charge, and the need for a supportive Board.

TOP and CRD staff met with the chair and vice chair of the Core Area Waste Water Treatment Program Commission on February 5, 2016 to review their “Lessons Learned” document with regard to the consultant deliverables for the planning stage. TOP has identified gaps between the current planning stage consultant deliverables, and the Commission’s position on handover deliverables as outlined in their “Lessons Learned” document. The Commission believes that technical decisions on technologies, effluent quality targets, energy generation targets, water reuse targets, operational layouts, plant locations, waste transport, and base cases and optional upgrades will need to be confirmed before their oversight of the implementation phase can begin. This will require expertise in plant operations and layout, major project delivery phasing, urban design and rezoning, gasification and other solid waste to energy technologies, and tertiary treatment technologies. At this time, several TOP members are prepared to continue to provide technical oversight to support the CRD role with the new consultants (Stantec) as they confirm technical decisions. The CRD has confirmed that TOP has completed its work with this report. TOP advises the CALWMC to engage a new TOP, or augment the CRD team, with the technical oversight skillsets to support the technical decisions outlined above, prior to handing the project over to the Commission for implementation.

4. Site option considerations:

The TOP and the consultants were provided with over thirty sites by the CALWMC as they emerged from public consultations conducted by the CRD. The sites ranged in size from less than an acre, suitable only for small ancillary plants, to multi-acre sites suitable for larger central plants. None of the major sites were close to the existing outfalls and all required extensive infrastructure upgrades. TOP explored options for feasible sites near outfalls, but none were forthcoming; thus the consultant team was limited to exploring options within the given sites and has proposed land options that are sufficient in size to accommodate the facilities. Given the sites available, TOP believes the single plant at Rock Bay is the most appropriate site for the initial 108MLD plant.

5. WWTP considerations:

Effluent criteria, under the current CCME regulations is driven by the Environmental Risk Assessment (ERA). This exercise is key to move the project forward to design and implementation, can take upwards of a year to complete, and is specific to the outfall location and flow volumes of the option selected. TOP advises that once the site selection is complete and the LWMP has been filed with the regulatory and funding agencies, the CRD should immediately begin discussions with the regulators to arrive at effluent criteria and outfall requirements for specific selected sites.

Current reports show that water consumption in the area has been falling steadily for some time shedding doubt on the likelihood of a local market for tertiary treated water. However, the WWTP will discharge directly to the ocean, and tertiary treatment does a better job of addressing

emerging contaminants of concern and of meeting newer and stricter regulations. Costs for tertiary treatment membranes are coming down. As reflected in TM#4, TOP has advised base levels of treatment for several option sets along with advanced level of treatment using membranes in other options. TOP believes that the additional cost of using membranes or other comparable technology to achieve a higher tertiary level of treatment is justified.

The flows have been decreasing steadily over the last 5 years and this trend is not reflected in the flow projections for the plant designs. This trend may be the result of I&I reduction programs, and thus there is a need to determine what impact I&I reductions will have over time. The current design of 195 l/d/p is lower than the national average of 325 l/d/p and TOP believes that this is a reasonable assumption for the planning phase. Regulatory approval for lower capacity for the system cannot be assumed so TOP believes the flows as reflected in the TM#4 are prudent at this time, but increases in 2045 and 2060 capacity requirements may not be as high as currently projected.

6. Bio-solid waste treatment considerations:

With the restrictions on disposal of sludge on the island, and in the landfill, anaerobic digestion (AD) should not be considered as a viable sludge solution moving forward. The base case for sludge disposal should be sludge drying, which will reduce the volume of sludge by 70% and leave a material that can be gasified, subjected to pyrolysis or used as a secondary fuel. Dewatering and drying of the sludge will have a big impact on the gasification or other waste to energy technology from an energy balance perspective. The consultants have provided the cost of centrifuges for the sludge dewatering as this is a standard technology for this application. TOP advises that the base case for sludge disposal should be sludge drying, not AD, and a higher level of sludge dewatering using more efficient technologies than the centrifuge shown in TM#4 should be considered in an effort to maximize energy recovery from sludge.

A comprehensive solids waste plan should be implemented so that the CRD can gain the maximum benefits from gasification (or other solution) and energy recovery. The processing of other waste streams will require additional capital investment to preprocess the waste into a usable feedstock. The selection of technologies to process solid waste to energy should accommodate feedstocks including the components of the municipal solid waste (MSW) which have fuel value (plastics, wood, paper, food waste etc), the course screenings from Clover Point and Macaulay Point, and the septage collected from within CRD. TOP believes that a sludge line from Rock Bay to Hartland to integrate the bio-solid waste stream with the MSW stream will be cost effective and provide optimal resource energy recovery to the community.

The solids handling portions of this project has a higher technology risk than the liquid treatment portion of the project. TOP would advise the CALWMC to consider a solid waste handling 'performance based' RFSI that invites providers to provide proposals for gasification or pyrolysis combined with efficient dewatering.

TOP advises the CALWMC that the consultant will need a gasification expert on staff, and that the CRD will need to build operational gasification expertise.

Private Vendors - TOP has prepared draft summary statement for each provider that will be finalized and available to the public and the CALWMC by the end of February 2016. Some third parties have suggested procurement and operating costs considerably lower than the consultant's costs reported in TM#4 but TOP has not pursued these submissions as they will be made redundant with the submission of detailed proposals at the procurement stage.

ALTERNATIVES

That TOP recommends that:

1. *That the Core Area Liquid Waste Management Committee receive this document for information and accept the recommendations.*
2. *That the Core Area Liquid Waste Management Committee receive this document for information, and revise and accept the recommendations.*
3. *That the Core Area Liquid Waste Management Committee receive this document for information and not accept the recommendations.*

IMPLICATIONS

SOCIAL IMPLICATIONS

Confidence in the project must be restored to attract the full participation of the market. Meeting private vendors supports the building of this trust. Addressing the Lessons Learned in the transition from the planning to the implementation phases will reduce uncertainty in the marketplace and increase fairness and transparency.

ENVIRONMENTAL IMPLICATIONS

Establishing high effluent quality deliverables for treatment levels, and establishing a coordinated approach to the liquid waste bio-solids and the municipal solid waste stream will have positive environmental implications.

ECONOMIC IMPLICATIONS

TM#3R1 indicates that the single plant option is more cost effective than the multiple plant options. Financing costs will need to be addressed. Addressing the Lessons Learned in the transition from the planning to the implementation phases will increase the competitiveness of the bids.

INTERGOVERNMENTAL IMPLICATIONS

The base cases as laid out in TM#3R1 reflect the scope of work given to the consultants, but not the preferred options for treatment of solid waste combined with MSW. Discussions with the Provincial Ministry and the Federal P3 group will be required if funding is to be secured for the preferred alternatives to AD.

GROWTH MANAGEMENT IMPLICATIONS

The report on flow and 2030 and 2045 targets is an important piece of the growth management of this project. The 2016 study by the CRD on water supply will inform 2045 targets. Design and construction will be to the 2030 targets.

CONCLUSIONS

TOP believes it is important for the CALWMC to understand that the *deliverables coming out of the planning stage* are not sufficient for the Commission to begin the implementation stage as many technical decisions remain unmade. The gaps as identified in the Commission's "Lessons Learned" document include technical decisions relating to technologies, effluent quality targets, energy generation targets, water reuse targets, operational layouts, plant servicing, waste transport, and performance metrics for base cases and optional upgrades. TOP advises the CALWMC to engage a new TOP, or to augment the CRD team, with the technical oversight

skillsets needed to support the new concept phase consultant team in their generation of technical decisions as outlined above, prior to handing the project over to the Commission for the implementation phase of the work.

With regard to the *site options*, TOP has reviewed the draft TM#3 and TM#4 and supports the central plant option as the most cost effective initial WWTP solution for a population of approximately 300,000. If a large, appropriately sized site near an outfall was put forward by a municipality, that would be the preferred site, but as such a site was not provided by the participating municipalities to the consultants, Rock Bay is acceptable to TOP among the sites that were provided. A central site allows the growth capacity response and redundancy requirements to be aggregated, which is most efficient. If desired, future modular expansion will also be possible at distributed sites to accommodate growth once the initial infrastructure is in place. TOP believes the single plant option for the 108MLD plant to be the most cost effective for both capital and operating/equipment costs. Given the sites available, TOP believes the single plant at Rock Bay is the most appropriate site for the initial 108MLD plant.

The TOP position on the *WWTP technology* is that the RFP call should be very clear and consistent in all aspects to attract the market back to the project with confidence. The WWTP RFP should be performance based to meet ministry and other standards for effluent quality and flow volumes. TOP advises that once the site selection is complete and the LWMP has been filed with the regulatory and funding agencies, the CRD should immediately begin discussions with the regulators to arrive at effluent criteria and outfall requirements for specific selected sites. Regulatory approval for lower flow capacity for the system cannot be assumed so TOP believes the flows as reflected in the TM#4 are prudent at this time, but increases in 2045 and 2060 capacity may not be as high as currently projected.

TOP's position on water reuse is that reuse piping is both costly and unnecessary as there is no water supply issue now, but that reuse might be considered in the future should conditions change. TOP's position on level of treatment is that money should be spent now on tertiary with preference towards the use of membranes as the membrane costs are coming down in price in a competitive market, and most communities are moving toward tertiary treatment if they can, considering that the regulations will be more stringent over time. TOP understands that the CRD's objective is to be a steward of the environment. Although the regulations are not yet in place, TOP believes it would be advisable for this community to consider tertiary treatment systems as they do a better job with the emerging contaminants of concern. Tertiary treatment now will also support water reuse later. TOP believes that the additional cost of using membranes or other comparable technology to achieve this higher tertiary level of treatment is justified.

TOP's position on *bio-solid treatment* is that the liquid sludge should be piped as sludge up to Hartland landfill site to limit potential odor issues at Rock Bay, and the trucking of sludge through the city. TOP believes that sludge processing at Hartland will be the most cost effective way to process the bio-solids for the community as other municipal solid waste streams may be integrated. TOP believes that a sludge line from Rock Bay to Hartland to integrate the bio-solid waste stream with the MSW stream will be cost effective and will provide optimal resource energy recovery to the community. Ministry discussions will be required to develop these integrated solid waste treatment options and funding for them.

Anaerobic digestion is not an option in TOP's opinion because there is no local use for the digested sludge. A clear high level specific acceptance criteria should be developed outlining the bio-solid waste treatment objectives considering the local constraints, such as no land application. TOP advises that the base case for sludge disposal should be sludge drying, not AD. A higher level of sludge dewatering using more efficient technologies than the centrifuge shown in TM#4

should be considered in an effort to maximize energy recovery from sludge. TOP advises that the Solid Waste (bio-solids) RFSI call should allow for efficient dewatering, generating secondary solid fuels, as a base case with gasification, pyrolysis or other acceptable thermal processing options.

The conclusions of TM#4 anticipate a cost effective, established technology baseline that allows for easy upgrades to both tertiary treatment on the WWTP side, and to gasification and integration with the municipal solid waste stream on the SWTP side.

Summary of TOP conclusions:

- 1. The CALWMC should engage a new TOP, or augment the CRD team, with the technical oversight skillsets required to support technical decisions in the concept phase, prior to handing the project over to the Commission for the implementation phase.**
- 2. A project plan should be developed as early as possible covering all stages of the project and including a financing and expenditure pro-forma.**
- 3. A single plant at Rock Bay is the most appropriate site for the initial 108MLD plant.**
- 4. CRD should immediately begin discussions with the regulators to arrive at effluent criteria and outfall requirements for specific selected sites.**
- 5. Tertiary level of treatment is justified.**
- 6. A sludge line from Rock Bay to Hartland to integrate the bio-solid waste stream with the MSW stream will be cost effective and will provide optimal resource energy recovery to the community.**
- 7. The base case for sludge disposal should be efficient sludge drying, not AD.**
- 8. The CALWMC should consider a solid waste handling ‘performance based’ RFSI that invites providers to provide proposals for efficient dewatering and drying to create a feedstock for gasification, pyrolysis or other thermal processing options.**

RECOMMENDATION

That TOP recommends:

1. That the CALWMC receive this TOP Report #10 for information.
2. That the CALWMC accept TM#4, the Summary Report, as complete.

Submitted by:	Teresa Coady, Chair, Technical Oversight Panel
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