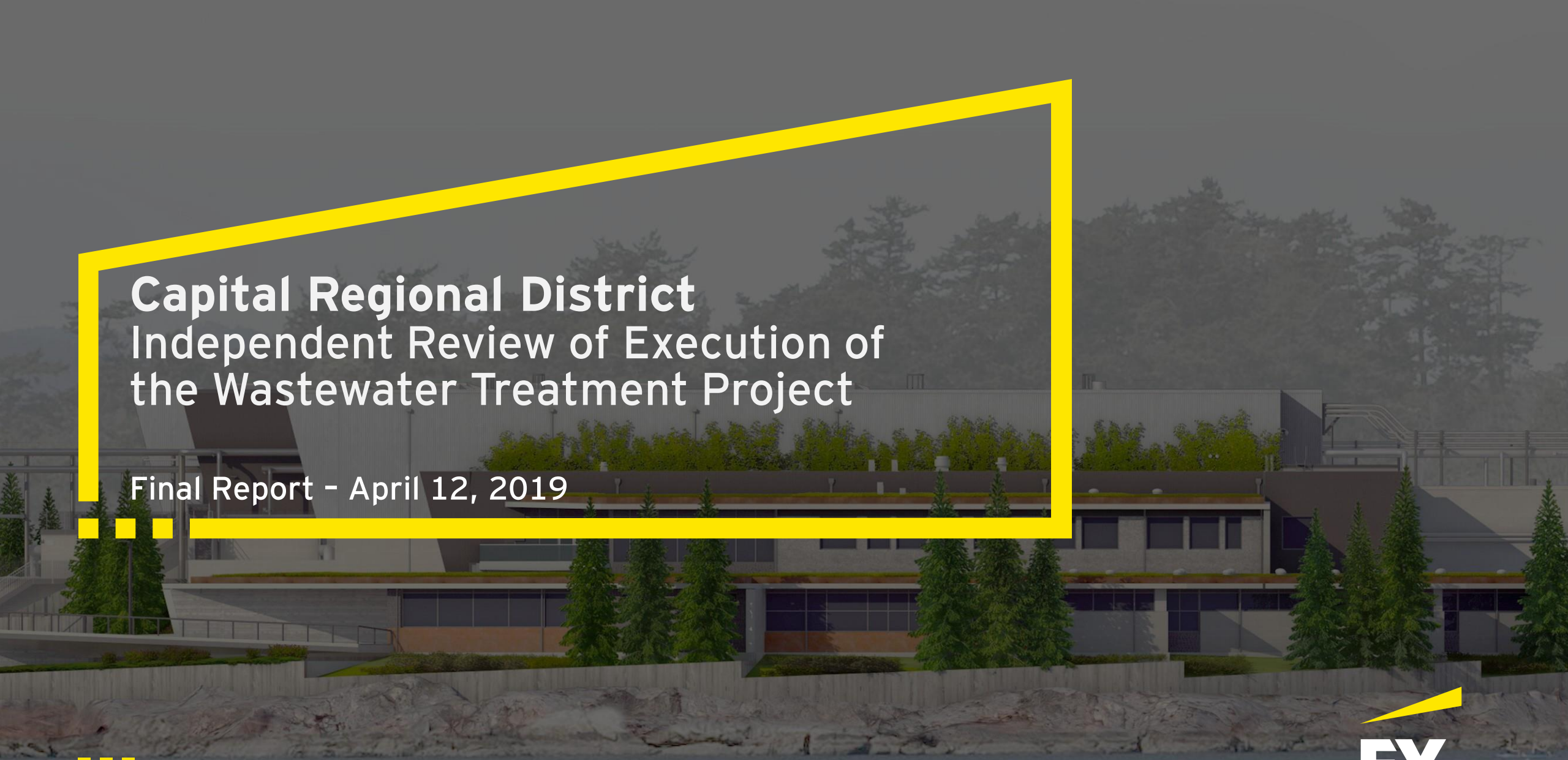
Capital Regional District
Independent Review of Execution of the Wastewater Treatment Project

Final Report – April 12, 2019



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Agenda

1. Executive Summary

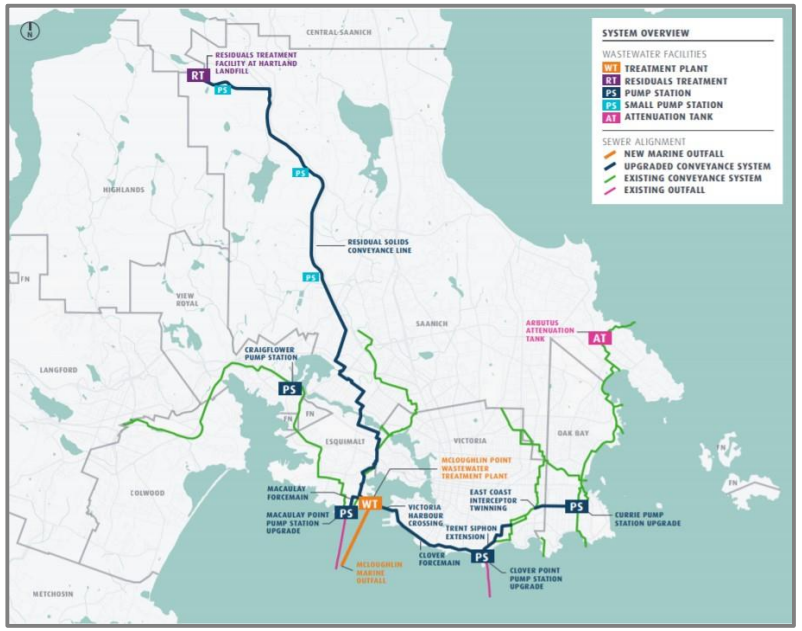
Background, objective & scope

1.1 Background

In 2006, the Ministry of Environment requested that the Capital Regional District ("CRD") amend its Core Area Liquid Waste Management Plan to outline an implementation plan for secondary treatment of wastewater.

The matter was escalated in 2016 when the federal government imposed a deadline for municipalities to meet new effluent quality standards. In response, CRD is in the process of delivering a sewage treatment and resource recovery system (*Core Area Wastewater Treatment Project*) that will:

- Meet or exceed federal and provincial regulations for secondary treatment, ending the continuous discharge of raw wastewater into the marine environment by December 31, 2020
- Minimize costs (lifecycle) to residents and businesses
- Optimize opportunities for resource recovery and greenhouse gas reduction
- Add value to the surrounding community and enhance the livability of neighbourhoods



1.2 Objective

This report has been produced as an independent assessment of the processes and management plans in place to deliver the Project effectively. In addition, remaining risks and contingency have been analyzed to give an opinion on the likely achievability of the Project against the Business Case that was approved in 2016.

1.3 Scope

As part of our scope, EY has completed a review of the following elements:

- Review of current budget, risk management plans, processes and risk registers for the remainder of the work including quantification of risk in the context of remaining contingency
- Review of key cost drivers and indicators compared to the approved project schedule and budget
- Review of the six major contracts awarded to date (over $20 million) to assess the transfer of risks as a contract mechanism
- Review of cost and project management plans and processes, with an assessment of overall project controls for performance monitoring and reporting to identify any potential gaps that may impact the Project

1. Executive Summary

Key findings, drivers & recommendations

1.4 Key finding, drivers, and recommendations

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Key Findings

Our assessment agreed with the Project Team's findings on the overall cost forecast, and in determining if the current contingency allocation is inadequate to address remaining issues and risks on the Project. In order to complete the full scope of work outlined in the Business Case, additional funds will be required.

Drivers

Actual construction cost escalation in British Columbia ("BC") and on Vancouver Island has been higher than what was budgeted for in the Business Case. Escalation was found to be the primary contributor to the forecasted overage.

Recommendations

Mitigating risks will need to remain a focus of the Project, as it has been to date. To maintain the schedule objective, factors outside of the Project Team's control will need to be accepted, as will the associated cost impact against the budget.

2

Key Findings

We observed a strong risk-aware culture that was supported by well-defined processes and risk registers. Our assessment identified strengths, and some opportunities for improvement related to quantification, mitigation and issues management.

Drivers

Realized and expected risks are leading to the forecast exceeding the budget, which is well documented and understood. Additionally, the regulatory deadline has led to the schedule objective taking priority over cost on the Project, further contributing to the forecasted overages.

Recommendations

Develop the issues management and quantification procedures within the current risk management plan. Early identification and quantification of realized risks will assist in the decision-making process.

1. Executive Summary

Key findings, drivers & recommendations

1.4 Key finding, drivers, and recommendations (cont')

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Key Findings

The Project Team has put careful consideration into risk transfer when structuring contracts. Notable and leading industry practices around controlling mechanisms are in place, including incentive and penalty clauses.

Drivers

The regulatory deadline increases the potential impact of a delay to a critical milestone. Responsibilities and liability needed to be clearly defined in the contracts to help mitigate the risk of contractor non-performance.

Recommendations

The Project Team will need to continue the practice of carefully monitoring commercial incentives within the context of schedule and cost objectives. Legal and technical expertise may need to be leveraged to help assess the validity of claims against contract terms and conditions.

4

Key Findings

With the remaining conveyance components kicking-off in 2019, the capacity of the Project Team will continue to be challenged to keep pace with the increased contract management requirements.

Drivers

Remaining conveyance packages are being delivered as design-bid-build ("DBB"), which are typically more resource-intensive to manage due to the contractual separation of design and contractor entities.

Recommendations

Ensure the Project Team continues to have capacity to maintain contractor performance through rigorous review and communication of contract requirements, such as change management, schedule, payment, contractor claims and reporting.

1. Executive Summary

Key findings, drivers & recommendations

1.4 Key finding, drivers, and recommendations (cont')

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Key Findings

We found project reporting to be comprehensive and forward-looking, with commentary to provide the necessary context around key items. Content was supported by detailed contractor reports and vendor-integrated tools for contract management, scheduling, and cost-controlling.

Drivers

Robust processes and software tools for project controls and contract management are necessary on projects of this scale to efficiently manage multiple vendors with differing contract types.

Recommendations

The Project Team will need to continue to enforce the processes and reporting cadence outlined in the project controls and contract management plans. Contractor cash flow statements will need to be evaluated closely as the remaining conveyance packages ramp-up and the project nears key financial milestones.

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Key Findings

The Project Team is responsible for managing and coordinating the interfaces of several large contracts. It is our experience that this can pose a challenge to the commissioning process. While the Project Team has "backup plans" in place to address potential interface delays, a risk still remains that needs to be closely monitored.

Drivers

There are schedule dependencies between components on the critical path of the Project. For example, the Wastewater Treatment Plant ("WWTP") is dependent on delivery of effluent from the Clover and Macauley pump stations. Delays on these sub-components could impact a critical milestone on the WWTP.

Recommendations

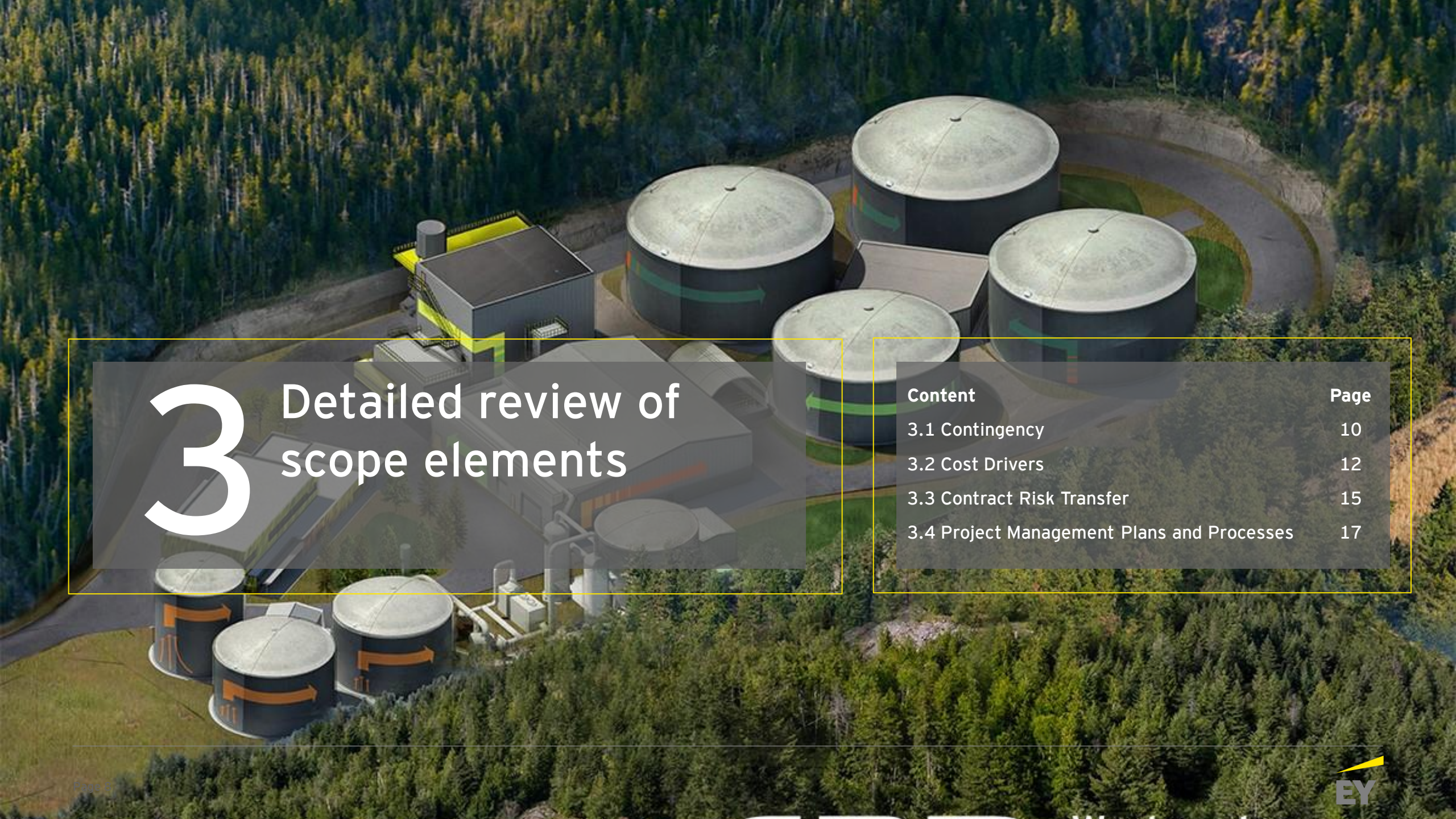
Ensure that commissioning plans detail contingency measures to address upstream and downstream delays. Adjustments to the commissioning path should be considered along with an assessment of potential cost impacts that accompany the alternate plan.

2. Methodology

EY's approach to the independent project execution review

Our approach is centered on an in-depth review of project documentation, layered upon interviews and discussions with key team members and leadership to validate findings and add context where required. To enhance our assessment of the Project's financial health, EY utilized stochastic modeling software that sampled thousands of possible outcomes based on probability and impact metrics defined in the risk registers. This methodology differs from the one undertaken by the Project Team, as the tool enabled EY to quantify the remaining risk across a set of confidence levels and develop "low", "most likely" and "high" cost forecasts.

Scope Element	1 – Financial Health	2- Cost Drivers	3 – Risk Transfer	4 – Process Review
Objectives	Review of the current budget and risk registers, including a detailed analysis of remaining risks and possible opportunities. Assess the financial health of the Project and validate the Project Team's confidence level in delivering on schedule and within the estimated cost to complete.	Review of key cost drivers and indicators compared to the approved project budget and schedule. Provide context surrounding the escalation experienced on the Project to date, and qualify the remaining escalation risk over the remaining schedule.	Review of the six major contracts awarded to date, and overall execution of work on major contracts to date. Assess the transfer of risk as a contract mechanism, and forecast future risks as it relates to contractor performance.	Review of cost and project management plans and processes, with an assessment of overall project controls. Identify potential gaps in the current processes, and provide recommendations for improvement over the remaining schedule duration.
Activities	A. Quantified remaining risks using stochastic modeling software			
	B. In-depth review of relevant project documentation			
	C. Site visit and interview with key team members			
	D. Discussions with Project leadership to provide additional context as required			



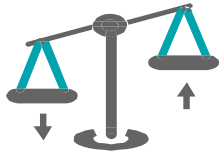
3 Detailed review of scope elements

3. Detailed Review

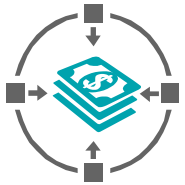
Four primary scope elements & main assumptions

Key observations and comments have been categorized relative to the four primary scope elements (see section 1.3), and are presented on subsequent pages. The main assumptions that framed our review are summarized below:

Primary Scope Elements



Assessment of the adequacy of the contingency in the context of remaining issues and risks.



Review of key cost drivers and indicators compared to the approved project schedule and budget.

Review of major contracts awarded to date and assess the transfer of risks as a contract mechanism.

Review of project management plans and processes, including an assessment on controls and ongoing monitoring.

Main assumptions:

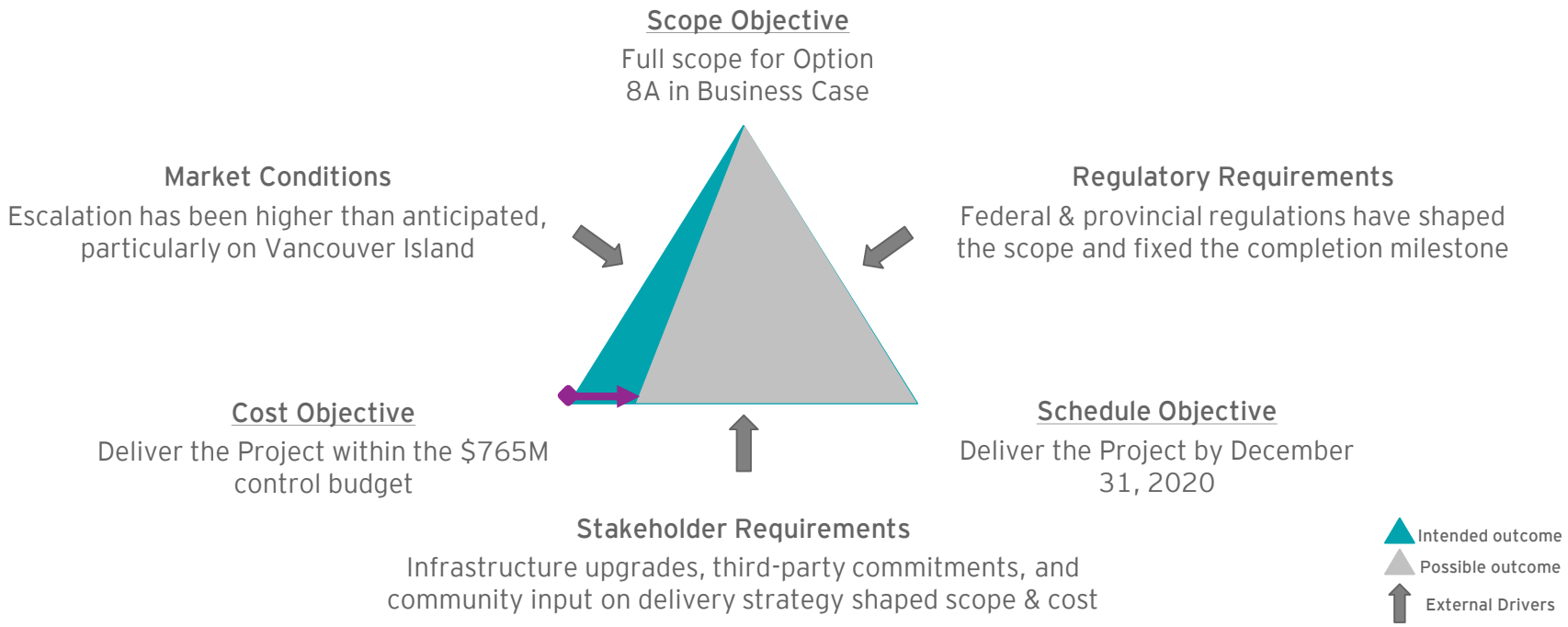
- Our assessment does not constitute an audit of the estimate, budget or financial reporting process, nor is it a validation of whether or not the project budget will be achieved. We focused on using the project documentation and values provided by the Project Team to construct a bottom-up forecast of remaining costs. We also reviewed the processes and controls used to generate the forecast inputs to determine if they were sound.
- Market data from Statistics Canada was used to develop a baseline for the actual construction cost escalation to date in BC. Our assessment considered this quantitative data in context with project-specific factors such as schedule risk premiums, scope, and the Vancouver Island market. EY did not validate the accuracy of the owner or contractor schedules that were used to determine the temporal relevancy of specific cost drivers.
- EY reviewed the 6 major contracts on the Project (over $20 million), capturing at least one of each delivery method: 1) design-bid-build ("DBB"), 2) design-build ("DB"), 3) design-build-finance ("DBF"), and 4) design-build-finance-operate-maintain ("DBFOM"). The focus of the review was on the risk transfer mechanisms within the contracts (i.e. penalty and incentive clauses). The review did not constitute a legal assessment or consider enforceability of the contracts.
- EY reviewed the provided project management plans and processes for adequacy of content and alignment with industry leading practices. Our review was "lighter-touch" in the sense that it relied on interviews and reporting to signify adherence to established project management processes (i.e. our scope did not include a comprehensive audit of project artifacts).

3.1 Contingency
Approach

3.1.1 Approach

- EY utilized documentation provided by the Project Team to construct a "bottom-up" forecast of remaining costs.
- In our experience on large infrastructure projects, it can be challenging to meet each of the scope, cost and schedule objectives laid out in the business case. External pressures can force leadership to re-assess the objectives and determine what can realistically be delivered.
- The strict regulatory deadline (inability to compromise on the schedule objective) and active market conditions has increased pressures on the cost objective.

Project Management Triangle – Schedule and Scope Constraint = Pressure on Cost Objective



3.1 Contingency (cont')

Analysis & discussion of results

3.1.2 Analysis and discussion of results

- The Estimate at Completion value in our analysis considers anticipated overages on untendered scope packages, remaining risks on the risk register, and known issues that have been quantified by the Project Team.
- A stochastic modeling software was used to quantify the remaining risks within a set of confidence levels. The low, most likely and high estimates for remaining risks represent 5%, 50% and 95% confidence levels respectively (ie. confidence that the actual cost will be lower than the forecasted value).
- Our analysis predicts a low (<5%) confidence level in delivering the full scope of work outlined in the Business Case within the $765M budget. It forecasts a $31M overage for the most likely case scenario.
- Escalation on the conveyance sub-components appears to be the primary driver of the variance. The Project has seen $55M in overages to date on these packages.
- The Project Team has identified potential cost reductions that correspond to scope refinements on the following conveyance sub-components: Currie Pump Station, Currie Forcemain, and the ECI Twinning. The technical feasibility of the refined scope and the impact to the Business Case requirements was not evaluated by EY and is being confirmed separately by the Project Team.
- Incorporating the cost reductions into our analysis predicts a $9M overage for the most likely case scenario.

Analysis of Full Scope vs. Refined Scope	Most Likely Estimate
Allocated Control Budget	725
Remaining Contingency/Reserves	40
Budget incl. Contingency/Reserves	**765**
Estimate at Completion (Full Scope)	796
Projected Variance to Budget (Full Scope)	**31**
Deduct: Refined scope	(22)
Estimate at Completion (Refined Scope)	**774**
Projected Variance to Budget (Refined Scope)	**9**

3.2 Cost Drivers

Approach, geotech/found conditions & design development

3.2.1 Approach

As the Project is at a relatively mature stage in its lifecycle – design is nearly complete, the majority of scope is awarded, and construction progress is over 50% - our review of cost drivers was higher-level in nature. We noted that the most cost drivers were either stable or had been retired. We focused additional attention on escalation; specifically the market trends over the last 2 years that have contributed to recent overages, and could impact untendered scope over the remaining procurement timeline.

3.2.2 Geotechnical/Found conditions

- Our assessment is not technical, however we are aware of geotechnical, environmental and archaeological issues in the region that conflict with the scope of work. Historically, geotechnical risks form a large part of the overall risk profile on these types of projects.
- We understand that there has been significant rigour placed behind subsurface investigations, and that the Project Team has transferred this risk to the contractor where appropriate and economical. This transfer of risk is generally more straight-forward for design-build and design-build variant contracts, where the contractor takes on design risk.
- There have been contingency draws related to found conditions to date, specifically relating to archaeological findings, unexpected rock removal, and contaminated material that exceeded thresholds defined in the contracts.
- While this remains a cost driver, it should be relatively stable moving forward. We note that the majority of critical path and high-risk elements are "out of the ground." The remaining subsurface works on the conveyance sections are lower-risk, as geotechnical and environmental professionals are better able to define stratigraphy and composition along linear routes with relatively consistent depths.

3.2.3 Design development

- EY's assessment did not include a technical review of design documents, though we do understand that design development has contributed to some of the overage experienced on the Project to date.
- While the majority of design has been completed, residual risk associated with updates/changes on the DBB contracts or functional design issues discovered at commissioning does remain. The residual risk should be carefully monitored, however, we note that a robust system is in place for design reviews, and managing design changes.

3.2 Cost Drivers (cont')

Permitting, FX rates & tariffs, interest rates & plant and machinery

3.2.4 Permitting

- Permitting is stable, as major permits under the Project Team's responsibility have been obtained. Development and building permit risk has been transferred to the contractors of each respective component and sub-component.
- The Province issued a new Building Code (BCBC 2018) in December '2018. The changes have not impacted the Project, as relevant permits were finalized and submitted prior to the imposed deadline.
- There does remain some residual risk for permitting, with application submissions for two permits required to begin operations expected late this year.
- We would also note that delays in contractor permits can create a stress on the Project that will need to be closely monitored through reporting.

3.2.5 Currency exchange rates and tariffs

- The imposition of 25% steel tariffs by the current US administration has been a factor on this Project, particularly on the Residual Solids Conveyance Line, as this sub-component includes extensive ductile iron sections.
- The cost driver has stabilized on the Project. With the majority of scope awarded, import price risks have been transferred to the contractors. We note that the contract language does not consider tariffs and currency fluctuations to trigger supervening events.

3.2.6 Interest rates

- Interest rates have increased >1.2% through the course of construction, however recent statements from the Bank of Canada indicated a slower, more dovish approach to monetary policy for the remainder of 2019.
- We note that a portion of the financing risk has been transferred to the contractors on the major components. The WWTP is a design-build-finance contract and the Residuals Treatment Facility ("RTF") is a design-build-finance-operate-maintain contract.

3.2.7 Plant and machinery

- As the majority of work – specifically packages involving equipment - has been awarded, this driver remains stable. We understand that most equipment is off-the-shelf and is imported from the United States through Canadian-based suppliers.
- While equipment rental costs are trending up, this risk has been transferred to the contractors.

3.2 Cost Drivers (cont')

Labor & material escalation

3.2.8 Labor and material escalation - actual

- The active construction market in BC has led to higher than anticipated escalation over the past two years. A review of market data during the Sept '16 – Jan '19 time period yielded an actual escalation rate of +/- 14%. This compares against the 5.45% escalation that was included in the Allocated Control Budget.
- The 14% escalation rate is based on construction cost data in Vancouver that was gathered and published by Statistics Canada (data for Victoria was not available). It serves as a baseline value and should be considered in conjunction with the following project-specific factors contributing to the escalation experienced on procurement efforts:
  - **Schedule risk premiums:** The contracts contained aggressive schedule milestone dates and penalty clauses to ensure the fixed regulatory deadline would be met. Taken into context with the number of regional work opportunities, it is likely that these contract risks contributed to higher bid/proposal pricing.
  - **The island effect:** Active BC market conditions are amplified on Vancouver Island, where the limited pool of available trades has a more pronounced impact on pricing. While the scope and scale of the WWTP and RTF packages attracted competition from outside the region, interest in the smaller conveyance contracts was primarily driven by local proponents.
  - **The Victoria market:** According to labour force data compiled by Statistics Canada, Victoria has owned one of the lowest unemployment rates in Canada over the past year. Recently, Victoria averaged 3.2% unemployment between November and February, as compared to 4.9% in Vancouver, and 4.4% across BC.
  - **Scope-specific:** Civil packages are more susceptible to material escalation in busy markets, as trucking distances restrict engineered fill sources, affording suppliers more latitude in their pricing models. Furthermore, there has been price escalation on piping materials beyond broad index rates, as ductile iron sections have been impacted by the 25% steel tariffs, and the high-density polyethylene (HDPE) sections are estimated to have increased in cost by 30% due to high demand in the US and Canada.

3.2.9 Labor and material escalation - forecast

- Recent industry trends indicate that construction cost escalation will continue at ~6% per annum.
- The availability of skilled labor is a significant concern on all upcoming capital projects in Western Canada. The ~6% forecast for construction escalation does not account for higher than normal labour competition that could occur given the large number of these projects kicking-off and/or overlapping in the coming years. We note that this driver is more stable for this project given its stage in the lifecycle – the majority of scope has been tendered or awarded with construction over 50% complete.

3.3 Contract Risk Transfer

Major contracts review – scope

3.3.1 Scope

- As part of our major contract review, we assessed the contract mechanisms for transferring risk and liability to the contractors of the six major contracts awarded to date. The contracts included in our review totaled over $519 million in value and included the following:

Contract	Type	Counterpart	Awarded Contract Value
McLoughlin Point Wastewater Treatment Plant	Construction (Design-Build-Finance)	Harbour Resource Partners[1]	$271,642,181
Residuals Treatment Facility	Construction (Design-Build-Finance-Manage-Operate)	Hartland Resource Management General Partnership[2]	$126,782,789
Macaulay Point Pump Station & Forcemain	Construction (Design-Build)	Kenaidan Contracting Limited	$35,870,000
Clover Forcemain	Construction (Design-Bid-Build)	Windley Contracting Limited	$30,903,883
Residual Solids Forcemain and Centrate Return Line	Construction (Design-Bid-Build)	Don Mann Excavating	$28,959,877
Clover Pump Station	Construction (Design-Build)	Kenaidan Contracting Limited	$25,028,800
		Total Value of Awarded Contracts	$519,187,530

[1] Harbour Resource Partners ("HRP") is a consortium that includes AECOM Canada, Graham Infrastructure, HRD/CEI, SUEZ, Graham Capital, and Michels Canada

[2] Hartland Resource Management Group ("HRMG") is a consortium that includes Bird Construction, Maple Reinders PPP, and Synagro Capital

3.3 Contract Risk Transfer (cont')

Major contracts review – overall assessment

3.3.2 Overall Assessment

- For all six major contracts reviewed, the Project Team has put careful consideration into risk transfer, transferring over significant risk to the contractors by properly structuring each contract based on the complexity and overall risk of the work in scope.
- Where deemed economically beneficial, the contracts transferred geotechnical and environmental risk to the contractors. We noted that upset (maximum) volume amounts were included in some contracts for removal of contaminated material. Excavated volumes below the upset amount are included in the contract, while volumes above the upset amount would trigger a change event (risk retained by the Owner).
- Each contract outlined clear responsibilities for delivery of work (e.g. design, construction, financing, testing, etc.) and liability for non-performance, and that performance management is managed through the contracts by penalties and incentivization. Notable and leading industry practices around the different controls in place to mitigate non-performance include:

  Conveyance contracts (DB/DBB):

  - Liquidated damage: other than by reason of Excusable Delay, Contractor is subject to pay the Owner a set amount per day (varies per contract) in liquidated damages, up to a maximum of 10% of the Contract Price;
  - Payments and holdbacks: a 10% lien holdback from each payment to contractor, a 5% completion holdback from each payment to secure any delayed liquidated damages payable by Contractor, and a warranty holdback (amount varies per contract) from one or more payments due to the Contractor on or after Functional Completion; and
  - Performance security: Contractor to provide a performance bond and a labour and materials payment bond, each in the amount of 50% of the Contract Price.

  Waste Water Treatment Plant (DBF):

  - Performance security & holdbacks: in addition to providing a $10 million letter of credit, HRP finances privately $60 million of construction (due at acceptance testing), therefore reducing the Owner's risk related to financing the construction phase;
  - Warranties: Contractor to provide a $5 million cash deposit (or letter of credit) following acceptance as a security for HRP's warranty obligations (2 year period); and
  - Payments: incentive payment of $1 million for hitting performance milestones.

  Residual Treatment Facility (DBFOM):

  - Payments: the Owner pays 50% of capital cost at service commencement. Contractor is incentivized to meet service date since service payments expire 20 years following Target Service date. O&M reconciliation amounts are structured to incentivize the Contractor to drive effectiveness/efficiency during the 20 year operational period as they include extra incentives for the Contractor around their use of electricity, natural gas, etc.

3.4 Project Management Plans and Processes

Overall assessment & risk identification

3.4.1 Overall assessment

- Our assessment is centered on the review and analysis of all relevant risk documentation (Risk Management Plan, Project Plan, and risk register) provided by the Project Team. We also interviewed Project leadership and the Controls Manager to supplement our understanding of the processes being followed.
- Overall, we found that the Project Team has a strong risk-aware culture and, for the most part, this is clearly defined and managed through the Project Management Plan, Risk Management Plan and risk registers. The Risk Management Plan is aligned with leading practices, and evidence of compliance was borne out in the risk registers, monthly reports, and interviews.
- Key areas of strength can be seen within risk planning, identification, response, reporting, monitoring and control. The initial risk identification process established a solid baseline for the Project and generated detailed registers that are specific to scope components. The risk registers are robust, and it is also clear that individual registers are proactively managed through weekly meetings and monthly workshops. A thorough reporting process is in place, with the monthly, quarterly and bi-annual cadence defined. Reports are comprehensive, and include the definition of key risks from each register, as well as their directional trend.
- There are some areas for improvement within the sub-processes which underpin issues management, risk quantification, and risk analysis.

3.4.2 Risk identification

- The initial project risk register was derived from historic risk assessments developed on earlier versions of the Project. This baseline data was then further validated by a series of workshops for the Project as a whole, as well as each component. These workshops were attended by the leadership team.
- The Project reserve funds were predicated on the Owner's retained risk outlined in the initial risk register, which is good practice.
- The initial identification process is aligned with industry standards, and has created a strong initial risk register to support the early stages of the Project. There is also an ongoing risk identification process that centers around a risk-aware culture, and a procedure in place for anyone to raise a potential risk for review and screening.
- While we did not assess the validity of the risks identified within the register, they appeared to be indicative of the types of risks we would expect to see for a public project of this scale.
- The ongoing identification process could be further reinforced by a standardized risk identification template that is made easily available and accessible to the relevant stakeholders. This procedure is increasingly used on large projects, and facilitates participation by stakeholders that are not as close to the risk process or Project Management Office ("PMO").

3.4 Project Management Plans and Processes (cont')

Risk control, risk assessment & issues management

3.4.3 Risk control

- The risk registers serve as a repository of risks. There is a project-wide risk register that is maintained by the Project Controls Manager, and a separate register for each component that is maintained by the responsible Project Manager. The roles, responsibilities, governance and escalations mechanisms for risk management are well-defined in the plan.
- The plan outlines detailed qualitative and quantitative criteria that is required to populate the registers – this includes categorization by project phase (to be updated as the schedule progresses), assignment (i.e. transferred, retained, closed), the risk owner (governance), and mitigation measures.
- There are columns in the registers that retain previous report risk levels. Archiving shows that the Project Team have strong control measures in place. The continuation of this practice will allow the Project Team to leverage this data as work progresses, especially as it relates to traceability, auditing, and trend analysis.

3.4.4 Risk assessment

- The Risk Management Plan defines the assessment process in the context of both qualitative (risk ranking) and quantitative analysis. The qualitative risk ranking involves a subjective measure of risk probability and impact that together generates a risk ranking. These measures are based on consensus of opinion derived from the monthly meetings.
- Tables are included in the plan which define probability and impact scales, and translate values to a matrix used to calculate risk levels. The risk scales were unique to each key performance indicator on the Project.
- Quantitative analysis is described as a more comprehensive assessment of individual risks and is used to determine discrete risk values for schedule and cost, specifically for those risks with a high risk ranking. It was clear that high-impact risks were quantified in the registers and adjusted monthly based on changes in the risk profile.
- We did not locate a process or methodology defined for the quantification of risk. A robust and transparent quantification process supports qualification efforts, and is a leading practice for establishing a basis of estimate that will assist with future risk analysis and decision-making.

3.4.5 Issues management

- During the Cost Risk Analysis that was carried out by EY using stochastic modeling software, there were a number of risks that were identified as now being issues. Upon review of the Risk Management Plan it was noted that an issues management sub-process does not appear to be referenced.

3.4 Project Management Plans and Processes (cont')

Issues management, project management plan & contract management plan

3.4.5 Issues management (cont')

- Issues management is a key attribute of risk management as a whole. An issue is defined as the occurrence/materialization of an active risk upon declaration by the Project/Risk Management Team to be an ongoing issue. Issues can be held within the risk register (if clearly defined), or held in a separate issues log.
- We recommend that the Project Team implement an issues management sub-process. If the use of a separate issues log is adopted then it is important to close out the risk on the risk register (assuming no residual risk remains) and to ensure clear documentation of its migration to the issues log is captured.

3.4.6 Project Management Plan

- The PMP is a formal, approved document that outlines how the Project is to be executed and controlled. Overall, we found the PMP to be comprehensive, as it provides a good depth of detail for the approach to each of the functional disciplines managed by the PMO.
- Where more thorough plans have been developed (i.e. risk management, financial controls, environmental protection), the PMP provides high-level content and directs the reader to the relevant plan for further detail.
- Governance is well defined within the plan, with multiple organizational charts included that illustrate lines of responsibility, coordination, and communication. Roles and responsibilities are documented at the management, director and board level, with escalation points defined.

3.4.7 Contract Management Plan

- The Contract Management Plan is well defined within the overall PMP. The Project Team is utilizing Prolog for contract management and cost controlling functionality. While this software is not fully integrated like some of the Oracle offerings, it is appropriate for a project of this size.
- We were encouraged by the integration of contractors with the Prolog software, lessening the administration burden on the team. Monthly reports submitted by contractors provided detailed content on each of the Project's key performance indicators.
- The plan defines separate approaches to each contract type, including a verification and audit approach for the DBFOM (HRMG) contract, and an oversight and audit approach to the DBF (HRP) and DB (Kenaidan) contracts. As operational risk will be transferred to the CRD following the 2-year performance period, we would concur with the plan's reference to the need for a heavy focus on the oversight of the DBF and DB contracts. DBB conveyance contracts are actively managed by the Project Team.
- Contract management requirements will increase as activity on the conveyance packages ramps-up, particularly with the DBB contracts which are typically more difficult to administer. The burden on the Project Team should be carefully monitored to ensure objectives continue to be met.

3.4 Project Management Plans and Processes (cont')

Change control & project controls

3.4.8 Change control

- The change control process defines the types of owner and contractor-initiated changes on the Project. Given the performance-driven nature of the design-build and design-build variant contracts, change volume is expected to be lower, especially considering that the majority of this scope is out of the ground. The prescriptive and complex nature of the DBB contracts typically gives rise to more changes.
- The Project Team employs a one window approach to contract and change management. A single point of contact is responsible for transmitting and receiving change notices and change claims to/from contractors, ensuring the process is managed accurately and that content is consistent.
- The work breakdown structure has elements reserved for scope-specific changes, allowing for contingency draws to be traced to their respective scope component (WWTP, RTF, Conveyance, etc.).
- Contingency changes are committed once change orders are approved, whereas forecasted changes/issues are tracked separately by the Project Team. While a unified software tool for financial/change control is ideal, the current process appears to be working effectively, allowing for clear definition of planning and mitigation mechanisms.
- The contracts reviewed contained terms that were dedicated to the change process, and outlined the means and methods for submitting and valuing a change. The valuation section referred to a schedule of values that were produced by the contractor as part of the competitive tender/proposal process.
- As the volume of changes increases with the commencement of multiple DBB contracts, the change control process would benefit from a documented procedure for valuating different types of changes. The procedure would distinguish unit rate from lump sum changes, and define thresholds for validation by the estimating team.

3.4.9 Project controls

- The Project Control Plans are well documented, and the team is using effective controlling tools. Finance has developed a separate Financial Control Plan including supplemental details. Roles and responsibilities are clearly defined, including delegations of authority for contract and change order values. We were also encouraged to see that the Project Controls Group maintains independence from the Project Managers, reporting directly to the Deputy Project Director.
- Prolog Converge and Prolog Manager are used for cost controlling, including work breakdown structure setup, vendor contract set-up/maintenance, invoice entry and upload, and change orders. SAP is employed on the Project and utilized for financial planning, accounts payable processes, and staff time entry. SAP is the financial system utilized by the CRD and is managed internally by CRD staff. We note that the integration of Prolog and SAP is not completely automated, requiring duplication of certain processes (i.e. contract/purchase order commitment entry). Strong processes for change order and invoice entry/approval are also clearly defined.

3.4 Project Management Plans and Processes (cont')

Project controls

3.4.9 Project controls (cont')

- Vendor interface and integration for cost controlling is strong, with major contractors using Prolog for change management and invoicing.
- Financial reports are generated and issued on a monthly basis, providing details, on commitments, expenditures, financing, proposed changes, and contingency draws. While not included in the contractor monthly reports, we understand that contractor cash flow statements are included in the financial reports. As the mix of funding sources and payment terms are relatively complex, it will be important for the team to closely monitor contractor cash flows as additional scopes come online and certain contracts near key financial milestones.
- Oracle Primavera P6 is used by the Project Team for scheduling. Here again, efforts have been made to fully integrate vendors into the controls process, with major contractors using the P6 software for schedule management. There is a designated Scheduler position within the Project Controls Group who manages the master schedule. Contractors submit updated schedules monthly for review and verification; any impacts to the master schedule are flagged and escalated.
- The Schedule Management Plan is foundationally strong. The approach is predicated on the Critical Path Methodology ("CPM"), and the work breakdown structure used in the baselined master project schedule mirrored the one used to generate the financial report.

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