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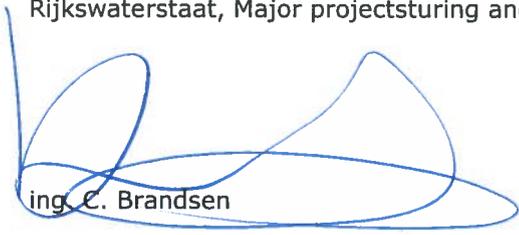
Dear mr. Kusturin,

Herewith I send you the report made by my organization Room for The River. It became clear to us that with this project, Toronto will not only extend its waterfront but will also create a well-protected and attractive city district for living and working.

I would like to take this opportunity to express my appreciation for your invitation to conduct a peer-review of the Port Lands Flood Protection and Enabling Infrastructure Project. I am convinced that the exchange of knowledge and experience this peer-review has enabled, will improve the quality of both our organizations. Furthermore, I would also like to thank you for the welcoming and cooperative attitude of your project team.

Finally, I would like to wish you success during the further implementation of this remarkable and innovative project. We will follow the projects progress with great interest.

Yours sincerely,
General Director
Rijkswaterstaat, Major projectsturing and maintenance


ing. C. Brandsen



Rijkswaterstaat
*Ministry of Infrastructure and the
Environment*

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Port Lands Flood Protection and Enabling Infrastructure

Peer Review of Due Diligence Report

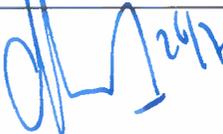
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Executive Summary

Introduction

Toronto Waterfront Revitalization Corporation ("Waterfront Toronto") has requested Rijkswaterstaat to conduct a peer review of the Due Diligence Report prepared for the Port Lands Flood Projection and Enabling Infrastructure Project (the "Project"). The objective of the peer review is to assess the strengths of the process and analyses undertaken and the rationale for the conclusions and recommendations presented.

Scope of Peer Review

The peer review was focussed on selected aspects of the Due Diligence Program, to validate the approach, methodology, costs/scheduling, procurement and implementation plan. Appendices and other documents listed as part of the request have only been taken into account to the degree necessary to assess the quality of the Due Diligence Report.

Review Process

The standard Gate Review performed by Rijkswaterstaat was customized to this Project. The core of the review process was a three day visit by the review team to Toronto, during which the Project site was visited and several interviews were conducted with the project team, representatives of TRCA and the City of Toronto. It should be kept in mind that the peer review is a snapshot of the Due Diligence Program at that point in time; in the meantime new versions of the Due Diligence Report have been drafted.

Conclusion

The review team concludes that the goals of the Due Diligence Program have been reached: the Due Diligence Report provides adequate information necessary for the decision at hand. The contingencies and risk estimates are comparable with the Dutch situation for this phase of the project. We confirm the conclusion of the project team that the recommended scope can be delivered within the 90th percentile risk-adjusted cost estimate and 90th percentile risk-adjusted time schedule.

Findings and recommendations

The findings of the peer review are presented below. The recommendations aim to guide the next phase of the Project.

Objectives

The objectives of the Project are clear to the project team:

- 1 Flood protection in accordance with the DMNP EA;
- 2 Naturalization of the Don River mouth in accordance with the DMNP EA;
- 3 Support revitalization and development in accordance with relevant parts of the Lower Don Lands Master Plan Environmental Assessment (LDL MP EA).

Scope

The key components in the recommended scope will achieve the objectives mentioned above; some additional infrastructure needed for the revitalization will be implemented as development proceeds.

Organization

The project team is qualified and experienced, and capable of managing this complex project. We found that the project team thoroughly understands the problems involved and has clear ideas to solve them. The knowledge that they have accumulated is vital and the continuity of the project team will be a key factor in Project success. We recommend that the continuity of the project team up to procurement is assured.

Design

The conceptual design is of high quality. The design as a whole will enhance the spatial quality of the Port Lands immensely and its positive effect on Toronto cannot be overstated. However, it will be a challenge to maintain or even enhance the current level of design quality in the subsequent design, procurement, and construction phases. Therefore, we recommend that a process be established to ensure the continuous control and development of spatial quality through delivery of the Project. We recommend that Waterfront Toronto's corporate objective regarding design excellence be formulated more explicitly for this Project in terms of specific goals and desired quality. In particular, we recommend that the desired unique experience from the water level perspective is formulated as a design requirement for the bridges. In our experience it helps to appoint one or two very senior design reviewers who monitor and amend the design process on behalf of Waterfront Toronto on a regular basis.

We recommend strengthening the characteristics of this area by combining the retained heritage buildings, in particular industrial chimneys, with modern city development. The industrial chimneys will also connect the power plant at the existing waterfront with the new island and Port Lands. In future, the silos both north of the Keating Channel and on the island could make the same connection.

Flood protection

The flood protection system is robust and is capable of accommodating a regular event. Some risks related to the adaptable weirs have been identified and we recommend optimizing the weir system in the upcoming design phase.

Sediment management

One of the key features of the Don River is that the hydraulic processes are very dynamic. The sometimes high velocities can cause extreme sedimentation and erosion. The intended armouring and the introduction of a sediment management area will be adequate measures to manage the sediment transport. The project team and TRCA acknowledge that after a serious flood event restoration of the landscape will be necessary.

Soil management

The scale and complexity of managing soil in this project is exceptional. The appended reports show extensive research has been done on the existing conditions, especially on the physical and chemical characteristics of soil. The soil in the entire area is very heterogeneous and numerous contaminated spots have been identified. The risk of deviations from anticipated soil characteristics will remain significant. This risk is acknowledged by the project team and included in the Risk Register and Cost Estimate. We recommend that additional site investigations be undertaken to validate the estimated volumes of soil with distinctive physical and chemical characteristics.

Earth Works

A comprehensive and feasible earth works strategy was presented. It provides confidence that most of the soil can be re-used given enough space and production capacity for remediation. The earth works drive the construction phasing and we agree with the project team that by applying the proposed strategy the project can be completed in 2023. We recommend distinguishing between hard requirements and discretionary assumptions with respect to earth works in order to determine the boundary conditions within which the contractor has to work.

Risks

In general the risks are recognized and controlled. The documents are in general of good quality, validated and based on adequate research and expertise. The risk register contains risks that are comparable with our projects, and they are well documented. Adequate measures have been identified to prevent risks or mitigate the consequences if they occur.

Planning

The schedule is adequate for the investment decision. In the early stages of the construction time is a more critical factor than later in the construction. Based on our Room for the River experience, we advise paying extra attention during the next phase to some risks that may affect the entire Project Schedule.

Costs

The construction cost estimate is based on quantity take-offs based on MVVA drawings, and quantities provided by CH2M and Riggs Engineering. These were combined with a cost database of unit prices for the Greater Toronto Area. Evaluation of these quantities and unit prices was not part of this peer review. Given the construction cost estimate, which totalled approximately \$784 million in 2016 dollars, we found that the total cost estimate is complete and consistent with the recommended scope and other documents. In our experience the contingencies match with this type of project. The 90% probability that the project can be completed for \$1.25 billion or less provides a realistic forecast, given the presented uncertainties.

Interfaces with other projects

The interfaces with other projects and developments have been clearly expressed by the Project Team, although the consequences for this project are not always clear at this phase, since some of these other projects are still in very early stages of development. One of the most important interfaces is the Gardiner East project. Due to its location, the Gardiner East project overlaps with the flood protection measures, may affect the spatial quality and the construction activities. This requires an integrated design approach. We recommend that responsibility for completing the scope related to this interface is decided upon as soon as possible.

Quality assurance

We learned from the interviews that regular meetings were held by the consultants to align the results of their research. In some documents such as the cost estimates we found cross references to the other documents. However, in most documents the consistency could not be verified. We recommend the application of appropriate tools in the next phase to enforce consistency.

Procurement

We agree with the conclusions in the Due Diligence Report. A more traditional delivery option, like the proposed Construction Manager/General Contractor (CM/GC) model, seems more suitable for this Project than the Design-Build-Finance (DBF) model. We find the outcome of the Value for Money (VfM) analysis, as described in the Public-Private-Partnership/Alternative Finance and Procurement (P3/AFP) Screening Report and the Due Diligence Report, implausible. We recommend that the result of the VfM analysis is not the leading consideration for determining the delivery option.

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1 Introduction

1.1 Portlands Flood Protection and Enabling Infrastructure Project

The Port Lands Flood Protection and Enabling Infrastructure Project (the Project) is a comprehensive strategy for protecting the southeast district of downtown Toronto from costly negative impacts of flooding by the Don River as a result of a major storm event. Working together over the past decade, Waterfront Toronto, Toronto and Region Conservation Authority (TRCA), and the City of Toronto have developed and refined a plan consisting of a new, naturalized mouth for the Don River and other related measures. It also includes the major municipal infrastructure that must be constructed, in order to maintain functional transportation and servicing networks, and the finishing of the floodplain and adjacent upland areas to provide new publicly-accessible green space and parks.

1.2 Due Diligence Program and Due Diligence Report

Starting in July 2015, a Due Diligence Program has been undertaken with the following goals in mind:

- Reducing cost and schedule uncertainty, particularly the uncertainty arising from environmental and geotechnical factors, to allow for more informed and accurate cost estimating;
- Making and documenting reasonable assumptions regarding site characteristics, design parameters, construction methods, regulatory approval requirements, and implementation strategies and scheduling; and
- Thoroughly understanding and quantifying the risks and uncertainties (as well as opportunities) inherent in this early stage of the Project, in order to support risk analysis, and confirming the Project scope and budget to government partners.

The outcome of the Program has been summarized in the Due Diligence Report. This report contains all information that is needed for executive level decision making and proceeding to the next phase. It is also the basis for our peer review.

1.3 Scope of Peer Review

As requested, the peer review examined selected aspects of the Due Diligence report. The scope of the peer review was to assess the strengths of the process and analyses undertaken and the rationale for the conclusions and recommendations presented.

The aims of this peer review were to:

- provide an opinion on the scope, process, and thoroughness of the due diligence and project planning work;
- identify any additional "up front" work that should be undertaken prior to approving the budget and committing funding;
- recommend any material adjustments to the process, assumptions and/or conclusions; and
- describe any alternate implementation approaches that should be considered.

2 Review process

2.1 Approach

Our approach is based on the Gate Review process used by Rijkswaterstaat for major capital infrastructure projects and the review process conducted by the Room for the River Program¹ as part of the Project Decision milestone, which marks the transition from the planning phase to the execution phase. We tailored our approach by combining both of these processes and selected those review aspects that are most relevant for this Project, focussing on the identified top risks. Aspects such as decision making, regulatory processes (permitting and approvals), public participation, communication and stakeholder management have not been reviewed, although these aspects were discussed during the interviews. Appendix A contains a list of questions that served as a framework for the review.

In addition, we used our risk profiles and evaluations (including evaluations of soil management and costs) as benchmarks in order to compare figures and numbers. Since execution of all projects within the Room for the River Program is now complete, we have also applied our own practical experiences, e.g., unforeseen risks that have occurred.

2.2 Review process

The review process was limited in time. The core of the review process was a three day visit of the review team to Toronto, from 8-10 June 2016. The peer review focused on a draft version of the Due Diligence Report completed in November 2015. All appendices and other documents were only taken into account to the degree necessary to assess the quality of the Due Diligence Report. The outcome of the peer review is a snapshot of the Due Diligence Program as of 17 June 2016, including results of ongoing work that had been documented in updated versions of several reports.

On 2 June 2016, we had a joint virtual Kick-Off meeting, during which Waterfront Toronto gave a presentation on the main elements of the Project and the Due Diligence Program. On 6 June 2016, the initial findings of experts from the Room for the River Programme were shared with the review team, based on a quick review of the underlying documents on soil, flood protection, costs and risks.

During the visit to Toronto these early findings were verified through interviews with the Project team and staff of the City of Toronto and TRCA. These discussions provided good insight into the key problems inherent in this Project and the ways in which the project team was proposing to deal with them. After each interview, the review team internally discussed its findings.

¹ The Room for the River Program is a €2.3 billion Dutch flood mitigation initiative completed over the past decade, aimed at safeguarding flood prone areas by enabling rivers to safely discharge far greater volumes of water. This has been accomplished by implementing a variety of measures, including the construction of secondary channels, as proposed for the Don River. The primary goal of the Room for the River Program has been to make the Netherlands' rivers safer and more attractive by stepping back from the river and allowing water to flow through the river system without hindrance. The ultimate result has been more "room for the river" to travel through the floodplain during high-flow events. The program also recognizes the importance of ecological and cultural elements and aesthetics by formulating a secondary goal on spatial quality and has worked to incorporate these into all of the work undertaken.

On 10 June 2016, the review team gave a presentation of the preliminary findings. Back in the Netherlands, these findings were validated by comparing the information about the Project gathered through our site visit and interviews to the text of the draft Due Diligence Report. On 27 June 2016, we received an updated draft report, which incorporated several preliminary findings and recommendations from the peer review. A draft Peer Review Report was prepared and subject to a quality assurance review by the Management Team of the Room of the River Program on 28 June 2016.

3 Findings and recommendations

The review team concludes that the goals of the Due Diligence Program have been reached: the Due Diligence Report provides adequate information necessary for decision making. The contingencies and risk estimates are comparable for this phase of the Project. We confirm the conclusion of the project team that the recommended scope can be delivered within the 90th percentile risk-adjusted cost estimate (approximately \$1.25 billion) and proposed Project Delivery Schedule. The recommendations presented below aim to guide the next phase of the Project.

3.1 Objectives

Findings

The Project will achieve a number of critical priorities for the three orders of government. The Project will also deliver social, environmental and economic benefits. The Project contributes to climate change objectives, strategic public policy objectives, Remedial Action Plan (RAP) objectives for water quality and other objectives of TRCA's Toronto RAP. From the interviews, we learned that the risk of conflicting interests and objectives is limited because the approved EAs do not permit significant changes in the scope and therefore the objectives:

- 1 Flood protection in accordance with the Don Mouth Naturalization and Flood Protection Environmental Assessment (DMNP EA);
- 2 Naturalization of the Don River Mouth in accordance with the DMNP EA;
- 3 Support revitalization and development in accordance with the LDL MP EA.

Recommendations

In our experience, an objective on improving spatial quality is very beneficial in getting support from the public, authorities and decision makers. We recommend retaining and perhaps even surpassing the level of design excellence shown in other Waterfront projects completed to date. In our experience design quality does not necessarily mean higher costs.

3.2 Scope

Findings

The key components of the recommended Project scope will achieve the objectives mentioned above. In particular, the interface with the Gardiner East project may pose a risk for the scope of this project, since the flood protection measures at this location are crucial and both projects overlap.

Recommendations

The area of the Don River between the Canadian National/GO Transit railway bridge and the Keating Channel requires an integrated design for both projects. We advise forming an integrated design team for this key component of the Project and completing a joint risk assessment before making a final decision on which of the two projects should include the construction of this area.

One consideration, should the Lake Shore Boulevard bridge extension scope be transferred to become part of the Gardiner East project, is how on-going maintenance of this component should be addressed. The Gardiner East project is to be procured using a Design-Build-Finance-Maintain (DBFM) delivery model, while the Project is limited to the design and construction phases, and the cost estimate does not provide for any maintenance. Note that not all components constructed as part of a DBFM contract have to be maintained by the contractor, but if maintenance of a particular component is excluded, the quality requirements must be specified in very strict and clear terms.

We recommend highlighting the uncertainty with respect to interfaces with other projects and future developments to decision makers.

3.3 Organization

Findings

From what we have read in the Due Diligence Report and heard during the team member interviews, we have come to the conclusion that the project team has completed a solid and thorough analysis to support the Project funding decision. The team is qualified and experienced, and capable of managing a complex project like this.

Recommendations

We recommend assuring project team continuity and continuing work on critical aspects in anticipation of a funding decision for the Project.

3.4 Design

Findings

Spatial quality and landscape design excellence are key goals addressed by the Project Plan. The evolution of Plan Development (illustrated in Section 2.2 of the Due Diligence Report) shows the continuous positive influence of the leading landscape architect Michael Van Valkenburgh and Associates (MVVA) on spatial quality throughout the years, and elsewhere the report reinforces the idea that spatial quality is part and parcel of the Project. It is unclear how the spatial quality implicit in MVVA's conceptual design will be provided for and ensured through the Project's design and construction phases of the Project. MVVA's competition submission, reviewed during our visit, showed a new area in the middle of the river delta, while the Due Diligence Report showed a scaled-back version of the original design. Therefore, at this stage we cannot conclude that the Due Diligence process has sufficiently emphasized the design and spatial quality needed to realize the vision put forward in MVVA's competition entry.

From that perspective, we have some concerns regarding the design criteria for the bridges set out in Appendix 1 to the Due Diligence Report. Only technical quality (such as durability and material selection) is described, but for instance no mention is made of the experience of bridge users or of the way these bridges should harmonize with their surroundings or even strengthen the identity of this unique urban river park.

We learned from the interviews that the design of the naturalized river beds may require alteration to deal with any contaminated spots found during construction. Sometimes, it will be less costly to leave contaminated soil in place, provided that appropriate measures can be implemented to reduce environmental and human health

risks to acceptable levels. What will the impact on the landscape architecture be should costs to implement this river landscape system increase?

Our experience is that there is a risk that design quality diminishes during procurement and execution. How will spatial quality be assured in the future? We recognize the idea that some of the main bridges will be built in two parts and two phases. This is a smart solution from maintenance and necessity perspectives. In our opinion, however, a high design quality should be provided for at the front end of the Project in order to assure the quality of the new area and its infrastructure upon Project completion.

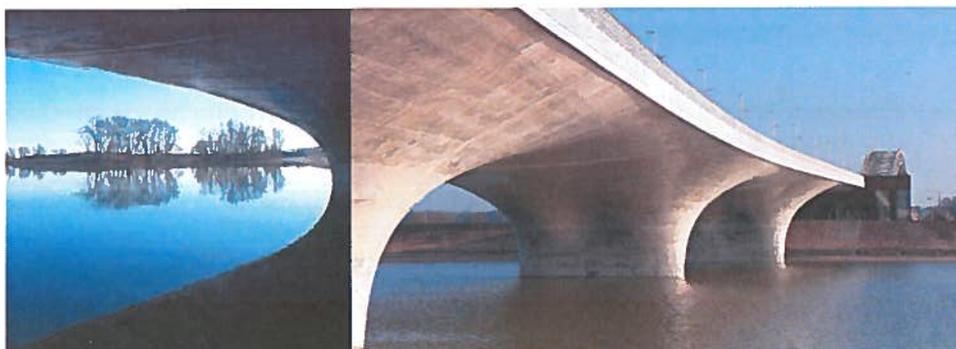
Recommendations

We recommend explicitly formulating ambitious design and spatial quality requirements that ensure the detailed design of the Project expresses the original vision and addresses key questions such as: what is the new unique identity of this whole new area? Why will people want to live and work here? Why will people from all over the world visit this area? The goal of making this area one of the uniquely situated areas in the world where residents of a metropolis can enjoy the benefits of living near a waterfront and actually touch the water in the flood plains should be a primary consideration in further design and further development.

Therefore, we recommend that the experience of the area from the water level perspective, which is a unique quality of the naturalized river area, be formulated as a design requirement for the bridges.



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Examples of bridge design from water level experience perspective

We recommend to specify the intended level of spatial quality precisely, by detailed drawings. In our experience, it takes considerable effort to assure spatial quality in the tender specifications.

We recommend appointing a design reviewer who can monitor the design process and request design amendments on a weekly basis up to delivery.

The characteristics of this area will be strengthened by combining the retained heritage buildings, in particular the views of the industrial chimneys around Villiers Island, with modern city development. The industrial chimneys will also connect the power plant at the existing waterfront with the new island and the industrial chimneys of Port Lands. In future, the silos both north of the Keating Channel and on the island could make the same connection.

3.5 Flood protection

Findings

The flood protection features aim to protect existing neighborhoods near the mouth of the Don River as well as the new Villiers Island, Polson Quay, and South River precincts. Based on the information contained in Appendix 1 of the Due Diligence Report and provided during the interviews, the strategy with regard to flood projection appears to be robust. The hydraulic computations look reasonable, although during heavy floods the water velocity in localized areas can reach up to 7 m/s, which is considered to be very high. The critical infrastructure and buildings will be well protected against flooding by the sheet pile walls and buried armour incorporated in the new river valley. The areas east of the Don River will be protected by the First Gulf/Unilever Flood Protection Landform and the Eastern Avenue Flood Protection.

Under a regulatory storm event, and most likely also as a result of significant annual storm events, damage to the initial landscaping is to be expected due to water velocities larger than 2 m/s.

A critical element contributing to the proper functioning of the flood protection system is the adaptable weir that regulates flow into the Keating Channel. This weir is considered to be the weak link in the chain due to a relative high risk of failure. Due to its location, it is vulnerable to damage from ice, heavy sediment loads, and debris. Moreover, the automated and remote operation in relation to the short response times makes high

demands on protocols and IT elements. It is not clear if TRCA currently operates other weirs of this type. The position and orientation of both weirs might cause additional increase of water levels at moments of failure. Additional increase of water levels should be avoided at this location.

With regard to climate change, the Don Greenway is available to provide a long-term adaptive solution.

Recommendations

We recommend optimizing the weir system and considering a more robust and cost efficient solution with, for example, a permeable weir. This optimization should be based on a desired split of flows between the Keating Channel and the new naturalized channel for the entire range of flows that can occur. From our viewpoint and experience, a fixed weir provides better reliability than an adaptable weir.

The detailed design for the stabilization of the flood protection works is foreseen in the next stage. Based on our experience, the height of the protection works is relatively easy to cover, but stability during regulatory events often appears to be more difficult.

Many relatively small objects (such as piers) in the Don River are shown schematically in the hydraulic model. Additional surveys for the calibration of the hydraulic model are part of ongoing works. We endorse the recommendation by the Project Team to refine the model grids and survey data in order to provide more accurate estimates of the water velocity and elevations to be expected in the Don River. We also recommend that calculations are included with low lake levels in combination with high river discharges.

We recommend that the contractor be required to prove that its proposed sequencing of work will not substantially increase flood risk to any area during construction. In our opinion, the risk of damage as result of severe floods will need to be retained by the owner.

3.6 Sediment Management

Findings

Sediment management in the naturalized Don River is a delicate balance between sedimentation and erosion. During flood events, sediment will be flushed down the river to the lake. During the rest of the year, sediment will be transported and deposited into the system to maintain the balance. Taking sediment from the sediment management area is one of the crucial actions necessary to maintain a stable situation. The fine materials, the wood stabilization, and the bioengineered banks will probably become part of the new river dynamic. This dynamic situation is part of the landscape and one of the strong points of the design. Room for natural processes is considered an important aspect of the naturalization. After large run offs the impact on the landscape can be significant, to the extent that reconstruction of the intended landscape of the river valley is required.

Recommendations

We recommend that design of the river system be optimized on a life cycle basis taking into account upstream weirs and dams, and incorporating more detailed modelling, the most up to date data for hydraulic/morphological computations, and a number of scenarios for maintenance. This optimization will lower the overall life cycle costs of

execution and maintenance. TRCA is well aware of the need for this optimization to take place.

3.7 Soil Management

Findings

The reports by CH2M show that their research on the existing conditions was thorough, especially regarding soil characteristics, both physical and chemical. Available historical data combined with recent investigations provided over 300 locations and over 1,000 soil samples. A number of issues were identified by CH2M associated with the data included in the database, such as erroneous data that they were unable to correct. Table A4 gives a good overview of data gaps.

The Integrated Soil Management Plan contains crucial information since it aggregates all data into volumes of soil (see Tables F1-F4). We did not find an elaboration of the methodology that was used to interpolate the information from the samples to get a 3D coverage of soil characteristics, and to distinguish between soil that is considered suitable for remediation (320,000m³) and soil requiring off-site disposal (164,000 m³). The uncertainty in these values is not quantified in the report. The risks that are related to deviations in the soil quantities are recognized with a probability of 25-30%. Because of the heterogeneity of the soil, the many contaminated spots, and the density of the boreholes, based on our experience we think it is more likely that significant deviations may occur. The risks are included in the risk register and cost estimate.

The Digital Elevation Model (DEM) was generated based on a TRCA database and Light Detection and Ranging (LIDAR) measurements. These data were not verified or validated (CH2M H 4.2). The analyses did not account for the difference in elevation between historical and current sampling (e.g., Villiers Street and bio piles). The risk of inaccurate data and the consequence for the calculated volumes of soil excavation and/or filling was not addressed in the risk register.

Recommendations

The scale of the soil improvement in this project is exceptional. Since there is no standard regulatory approval process, we expect that there could be considerable risk of a prolonged period for obtaining the necessary approvals or acknowledgments from the authorities. This situation requires proactive risk management.

In our experience the information on soil characteristics that is provided to the contractor as part of the procurement documentation invariably deviates from reality, especially with respect to the extent of contaminants and unusable soil. We recommend careful communication of the uncertainty in the aggregated volumes that are calculated, and definition of the risk that is to be transferred to the contractor. In general, not all risks related to soil can be transferred to the contractor. If the contractor gets enough time to validate the information, the risks can be shared. We recommend that additional research is carried out to validate the estimated volumes.

We recommend validation of the Digital Elevation Model.

3.8 Earth works

Findings

A comprehensive and feasible earth works strategy was presented in the Due Diligence Report. It provides confidence that most of the soil can be re-used (given enough space and production capacity for remediation) and the Project can be completed in 2023. The project team is well aware that a contractor probably will choose another strategy in order to optimize the workflow. The boundary conditions that drive the earth works and therefore the construction phase are set out in different appended consultant reports, such as:

- 1 no works are permitted within Lake Ontario between March and July (CH2M H3.1);
- 2 increasing flood risk is to be avoided when a significant storm event occurs during construction (CH2M F4);
- 3 for safety purposes, different work zones need to be established (CH2M report H4.1);
and
- 4 continuity of road access during construction for any remaining occupants of the area must be assured (interview).

A clear specification of (regulatory) requirements that determine these boundary conditions was not found.

Recommendations

We recommend clearly distinguishing between requirements and assumptions related to the earth works strategy before procurement. In order to challenge the implicit ideas on how this project should be executed, we recommend formulating at least one alternative construction strategy that meets the boundary conditions, preferably one that is simple and robust. For example, if it is assumed that the characteristics of the excavated soil are not well known, will this require alternate solutions to provide sufficient room and time for soil management? Is the execution still feasible?

3.9 Planning

Findings

The schedule looks adequate for the funding decision. The most important risks and interfaces that affect the Project Schedule are recognized. As expected, the excavation of soil lies on the critical path. In the early stages of the construction the required weekly production for excavation results in risks due to e.g. bad weather conditions that may affect the schedule.

Recommendations

Based on our experience, we advise paying extra attention to the following issues:

- We think that the progression of the decision making- and approval process in the coming phase is a risk that might cause delays. This is due to the fact that this process is sequential.
- After the procurement phase, it is essential to have maximum leeway and flexibility in the schedule to enable the contractor to create a parallel work flow to make the schedule more robust.

3.10 Risk Management

Findings

A comprehensive risk database is essential to support decision-making about funding, cost estimates, scheduling, and the procurement strategy. Based on the interviews with the team members, we are confident that there has been a thorough risk- assessment. We have discussed the major risks with the Project Team. We recognize that the team members have sufficient experience to maintain and update the risk database as the Project evolves.

Recommendations

Based on our experience, we advise paying extra attention to the following risks:

- As mentioned in the interim Due Diligence report, Risk of delay due to delay in decision making and approval.
- The risk of scope changes due to interfaces is significant, especially the interface with the Gardiner East project.
- The risk database contains risk above a \$1M threshold. We recommend to keep focussing on the risks below that threshold as well, to prevent them from growing larger.

We also advise the development and implementation of a solid risk management system to be used by all team members during the design and construction phases. Focussing on implementing risk measures will minimize the risk of setbacks and surprises.

3.11 Quality Assurance

Findings

We found that in the early stage of the due diligence program much effort was put into weekly meetings to synchronise parallel activities. The massive amount of information, the complexity of the subjects, the number of reports, and the many consultants involved inevitably lead to a risk of inconsistency. We did not see any system engineering or System Breakdown System (SBS). This can cause discussion later on as to which elements belong to the scope, especially regarding interfaces with other projects and existing infrastructure.

The documents are verified and validated by consultants, specialist team members and the Project Director. The Cost Estimate Report uses the numbers of the key components as cost identifiers. The cost descriptions refer to the design identifiers on the MVVA materials and program plan and to the sequence ID of CH2M (Report F table F1 and F2). Although no SBS was used, the structure of the cost estimate provides confidence that the cost estimate is consistent with the recommended scope and other documents.

Recommendations

We recommend that the validation and quality assurance by the Project Team is traceable in the documents. Tools such as an SBS and System Engineering help to assure the quality of the information that will be part of the tender specification. The consistency between the different documents of the Due Diligence Report may need some extra attention as the content of these documents is further developed into tender specifications.

3.12 Costs

Findings

The construction cost estimate is based on quantity take-offs based on MVVA drawings and quantities and unit prices provided by CH2M and Riggs Engineering, combined with a cost database of unit prices for the Greater Toronto Area. Evaluation of these quantities and unit prices was not part of this peer review. Given the construction cost estimate we found that the total cost estimate is complete and consistent with the recommended scope and other documents. The actual Base Cost Estimate escalated to Base Schedule without the risk component and without incorporating projected escalation (\$1,08 billion), together with the Risk Analysis Results with a 90% probability that the project can be completed for \$1,25 billion or less are well substantiated and realistic. The estimate fits this phase of the project. Based on our experience a contingency budget of 12 – 30% is necessary, depending on the type of work and the project phase. The application of a 30% contingency applied to both hard and soft costs and including consistent with the risks, recognizable and, from our experience, realistic for this phase and type of work. The validation based on risk estimates confirms the presented uncertainty.

The Cost Estimate Report gives adequate information on the sources with respect to quantities. The cost descriptions refer to the design identifiers on the MVVA materials and program plan and to the sequence ID of CH2M (Report F table F1 and F2). The Project schedule has a significant influence on the cost estimate. A later start means higher costs.

Recommendations

Figure 34 in the Due Diligence Report, Project Cashflow, shows us that “The 30 per cent contingency for both escalation and risk is expended in direct proportion to the base costs”. The Room for the River programme saw a peak in the contract changes the moment the execution was just over 50% complete.

3.13 Procurement

Findings

Flood protection is a non-standard form of civil infrastructure in Canada. There are few, if any, past projects of similar scope and scale that have been completed in the country.

For the peer review, we received a draft version of the Ernst and Young (EY) report dated May 2016. (EY was engaged by Waterfront Toronto to assist in analyzing the viability of delivering the Project via a P3 approach). In the EY report, two procurement options were compared: Design-Bid-Build (DBB) and DBF. During the interviews it became clear that this should have been a comparison between CM/GC and DBF. For this review, we focused on the objectives in relation to the VfM analysis.

In the VfM analysis, risk adjusted costs are used to compare DBF and CM/GC. VfM is based on a number of critical estimates and assumptions, and on expert judgement. In our opinion, the VfM analysis was not sufficiently customized for this project. For instance, it was not clearly substantiated that the 7.5% innovation factor is applicable to this Project. We recommend leaving the 7.5% innovation factor out of the VfM analysis.

In our view, DBF is only interesting if long term financing is required. Otherwise, we think that DBF will be more expensive. The VfM analysis also considers the difference in payment time frames between traditional delivery and P3/DBF delivery. It is assumed that monthly progress payments would be made under a CM/GC approach while a P3/DBF approach would feature a single lump substantial completion payment. We think the options are more flexible than this assumption. Under either a CM/GC or a P3/DBF approach, it is possible to make different payment arrangements that take into account the risk allocation and/or progress in delivering the Project. Therefore, the difference in payment time frames should not be a distinctive element in the VfM analysis.

The draft calculation and report shows a difference in the total costs calculated for the CM/GC and P3/DBF options. These differences are almost completely due to the difference in the calculated values of risk retained by the private sector. Besides our comments on the innovation factor, we think that the difference in calculated values of risks retained is unrealistic. It is our experience that in a P3/DBF approach with this type of project, the risk adjusted costs are either fully integrated in the pricing of the bid or claimed during construction. There is no such thing as "cheap" risk, especially in this Project where there is a need for the public sector to retain a larger than typical share of project risks. There are other ways to manage or mitigate the risks.

We agree with the conclusions in the Due Diligence Report that the difference in calculated values of risks in the VfM analysis does not reflect a realistic outcome for this specific project.

Recommendations

We recommend that the result of the VfM analysis is not the leading consideration in the selection of a delivery option. A more traditional delivery option, like the proposed CM/GC, seems more suitable for this project. Furthermore, we recommend that the possibilities of CM/GC to customize the risk allocation, financing and organizational demands of the partners are further developed.

Appendix A. Standard Gate Review Questions

The questions below are a selection from the survey used in the standard Gate Review. In addition, we formulated questions from the risk based approach of Room for the River in which we evaluate the highest risks more deeply. The top risks concern spatial quality, flood protection, soil and earth works.

A.1 Scope and decision making

Stable and feasible project scope, including interfaces

- ✓ Do the objectives of the Project match with the problem?
- ✓ Is the Project scope clearly described and demarcated?
- ✓ Is the scope up to date and feasible?
- ✓ Are the key interfaces with the surroundings and stakeholders described?
- ✓ Are the interfaces with other projects described?
- ✓ Are changes in scope registered and communicated with stakeholders?
- ✓ Are the characteristics of the project described at the right level of detail?

Decision making

- ✓ Are there (signed) governmental agreements?
- ✓ Is it clear what legal procedures and acknowledgements are required?
- ✓ Is there enough time to discuss the different interests and make informed decisions?

Public participation and communication

- ✓ Are the stakeholders consulted?
- ✓ Is a participation plan for the next phase available?

A.2 Organization

Project team

- ✓ Is the project team composed and ready for the next phase?
- ✓ Are roles and responsibilities clearly specified?
- ✓ Is the integral approach assured?

Organization

- ✓ How is the governance of the project organized?
- ✓ Is the steering process and monitoring of the project clear?
- ✓ Is the approach for the next phase clear?

Asset manager involvement

- ✓ Are the organizations that are responsible for maintenance sufficiently involved?

A.3 Risks, planning and quality assurance

Risk management

- ✓ Does the risk management process function adequately?
- ✓ Are risks and risk measures specified?
- ✓ Are risks translated to planning and cost estimates?
- ✓ Is risk management applied as an integral process?

Planning

- ✓ Is the planning up to date and complete?
- ✓ Is the planning realistic? Can the project be delivered within proposed timeline?

Quality assurance

- ✓ Does the internal quality assurance function?

A.4 Costs

- ✓ Is the cost estimate validated or approved?
- ✓ Are lifecycle costs specified?
- ✓ Can the scope be realised within the proposed budget?
- ✓ Are potential revenues explored?

A.5 Procurement

Procurement strategy

- ✓ Is there a procurement strategy?

composing contract, procurement and contract management

- ✓ Has a Gate Review procurement been conducted?
- ✓ Is clear how the interests of the asset manager are included?

A.6 Design, effects and technical aspects

- ✓ Is the design spatially and technically of sufficient quality?
- ✓ Has an integral analysis been carried out on mitigation and compensation of effects of the design?
- ✓ Does the design match with the cost estimate?
- ✓ Is enough attention paid to safety?
- ✓ Is there a bridge or civil work with movable parts?
- ✓ Are availability of sites, existing and future services taken into account?
- ✓ Is the information on existing conditions and assets up to date and complete?
- ✓ Are the asset managers involved?
- ✓ Are stakeholders involved?