

Risk Update

Introduction

In July 2019, after considering report TT2019-0811 - Green Line Q2 2019 Update, Council directed the Technical and Risk Committee (TRC) to undertake an independent peer review of risk identification, quantification, and mitigation as part of a set of efforts to close project gaps and 'help place the City on a successful path to plan, procure, and deliver the Green Line project'.

This corporate direction is further supported in the *2019 Year-end City Manager's Risk Report: Update on Risk and Tolerance*, which highlights three key transformative themes: understanding entrenched organizational risk aversion to projects and refocusing efforts to understand "levels" of risk taking; developing comprehensive risk assessments with focused risk reporting; and demonstrating an openness to risk by promoting transparent discussions and continuous improvement.

The July Council direction, in conjunction with developments in the Green Line Program scope, led the Green Line Program Team to engage SMA Consulting, a specialized risk management firm. SMA is assisting with corporate due diligence of risk management activities and leading the management of risk on the Green Line Program. This work is in alignment with the stage gating process delineated in the readiness plan outlined in report GC2020-0246 titled, "Green Line - Project Readiness Report" presented to the Green Line Committee on 2020 February 21. In report GC2020-0246, the TRC and the General Manager, Green Line indicated their view that executing the actions outlined in the readiness plan in a timely manner and by a team having all the required competencies would place The City on a successful path to plan, procure and deliver the Green Line Program.

Earlier this year, SMA commenced a review and update of the Green Line Program's current risk practices and associated risk management tools in alignment with these themes. Several major milestones have been achieved and work continues to progress.

Due Diligence on Risk Management Activities

The Green Line Program Team, in alignment with The City's Corporate Integrated Risk Management Framework (IRM) and Council's direction, has implemented and continues to improve comprehensive risk management on the Program. SMA began a full due diligence review and update in January 2020.

The Green Line's prior risk management practices reflected standard approaches and were highly detailed, however, the activity was isolated, lacked megaproject scalability, and lacked sufficient resources. As the Green Line Program developed (including decisions to convert the project into a Program and splitting up the alignment into two segments: Segment 1 and Segment 2), increased project complexity required a more robust risk management approach. The updated approach integrates with The City's IRM framework, makes it easier to collect updates on risk response strategies, provides appropriate reporting to different levels of



management, and better informs the affordability assessment. The current phase will also require more structured risk and contingency tracking, which is underway. Key activities include:

Risk Management Plan: A strong risk management plan details the purpose and goals of risk management for the Program and the approach to identifying, quantifying, prioritizing, and responding to risks. It also establishes how risks will be escalated and reported and aligns the team to a risk-aware culture. SMA worked with the Green Line Program Team to update the Green Line Risk Management Plan, which was approved by the Executive Steering Committee (ESC) in April 2020.

Risk Register Update: The risk register is the foundation of all risk management activities, and contains all potential events that may have a material negative impact on the Program or projects, as well as estimates of that negative impact and strategies for response. It is continually updated. The risk register is a vital input to the program affordability analysis, as risk is an important part of contingency determination. SMA undertook an in-depth reorganization and update of the risk register to introduce hierarchical structure, aligning with best practices on megaprojects and SMA's direct experience with ongoing LRT projects in Alberta and Canada. A full risk assessment exercise was held to update the register (see Risk Assessment section below). The register is currently well-positioned to support critical Green Line Program functions, including ongoing proactive risk management.

Ongoing Proactive Risk Management: Risk management is where the value of the risk assessment is realized and drives responses to each risk which help the Program strategically control, accept, transfer, or eliminate risk. This process is tightly linked to contingency management, as contingency is re-evaluated throughout the life of the Program as risks are either realized or mitigated. Regular evaluation of the Program risks allows the team to proactively manage the budget and avoid potential cost overruns. In direct collaboration with the Green Line team, efforts continue to strengthen and refine the Program's risk management strategies.

The updated approach includes methods for escalating severe risks to the appropriate level of governance, including stimulating a risk-aware culture through individual responsibilities for risks and responses, contract development that reduces risk, and informing affordability assessments. SMA also continues to highlight key areas of concern and provide a risk-based perspective on project issues to aid the team in their decision-making.

COVID-19 Risk Response: The new reality of the COVID-19 pandemic introduces significant uncertainty into markets, working conditions, liability management, and construction methods, and has brought forward several specific risks to monitor and mitigate. The Green Line Program Team has developed a specialized COVID-19 risk dashboard and is tracking key risks and responses as the pandemic continues to evolve.

The risk management approach being undertaken by the Program is designed to provide relevant and timely information to ensure appropriate issue and risk escalation, and reduce uncertainty and risk exposure over time as scope certainty increases. This will strengthen the Green Line Program's ability to strategically handle risk, stabilize a risk-aware culture, and actively support affordability and program success.

Risk Assessment

A risk assessment consists of a full review and update of all risks, quantification, and responses. At this time, the objective of the risk assessment is twofold: first, to drive efforts to understand and reduce risk, and second, to inform the affordability assessment of the Program. To this end, multi-disciplinary review sessions were held with key Program stakeholders, culminating in a Green Line risk workshop on March 25, 2020 that engaged more than 30 Program Team participants. Following the workshop, SMA aggregated the information and undertook a multi-impact structured risk assessment using Monte Carlo simulation to derive results. Key risks include:

- **Scope Additions and uncertainty:** The risk is that the affordability of the Program could be jeopardized. Cost increases could be driven by the compounding impact of many other risks, but especially, the potential addition of scope. The Program will need to make binding decisions under conditions of significant uncertainty, such as committing to large contracts and progressing with site preparations, before the full Program design is finalized. Current risk response strategies include finalization of planning activities, Value Engineering, and budget management strategies.
- **Governance and decision making:** Upcoming multiple parallel procurements drive the need for agile decision-making, particularly with regard to scope/planning details. If this need is not met, this can lead to ongoing uncertainty regarding the affordability of the Program as a whole, and reputational impacts to The City in relation to the design and construction market. Current risk response strategies include proposed revision of the governance structure and increased resourcing.
- **Procurement and market:** This risk area focuses on the potential that procurement delays could lead to market uncertainties that impact Program success. Several interdependent procurements are planned over the next year and additional delays could result in significant escalation costs, reduce competition, and damage The City's reputation. Current risk response strategies include reaching out to the market, reviewing contingency plans, and prioritizing procurement preparation.
- **Contract interfaces:** There are significant risks associated with the complex technical, contractual, and physical overlaps and the need for integration among contracts. As The City will be entering into multiple contracts, once projects are awarded, The City will be responsible to manage the interfaces and meet the requirements for the individual contracts, or ensure that they are being met by the contractors. Current risk response strategies include pursuit of interface management and alignment of contracts.

- **Segment 2 Design and Constructability:** Segment 2 involves intensive construction in Calgary's downtown area, with major river crossings and a significant tunnel portion. Some key technical information is not yet available for the proposed alignment modifications, meaning uncertainty is very high. Given that Council's approval of the alignment is pending most preparatory and mitigation works have not yet commenced. Current risk response strategies include seeking Council's confirmation of the alignment and continuation with technical risk response.
- **Canadian National (CN) / Canadian Pacific Railway (CPR) coordination:** Both Segment 1 and Segment 2 involve many kilometers of construction that are within/directly adjacent to Canadian Pacific Railway (CPR) or Canadian National (CN) Right of Way (ROW). The challenges and restrictions of design and construction near active rail are well known. Current risk responses include contract review and ongoing engagement with CN/CP.
- **COVID-19 impacts:** The COVID-19 situation is very fluid and the market is not familiar with pricing construction during pandemic conditions. These unfamiliar conditions could lead to increased pricing and contract ambiguities. It is important that the project avoid unintentionally taking on liability and preserve optimal risk sharing and transfer to the private sector while maintaining safety for all. Other potential impacts could include Program Team productivity issues due to the need to work remotely and slower political processes. Both of these could jeopardize meeting procurement timelines. Current strategies include leveraging remote work tools, identifying emerging best practices, and ongoing monitoring of COVID-19 impacts.

The program holds risk in all typical categories of an LRT megaproject, but has a number of high-risk elements such as downtown tunneling, proximity to rail, and contract interfaces. Interim results show risk exposure for the Green Line is at the high end of the typical range of other major LRT projects at this stage, with the need for a strong risk response by the Program Team to continue to ensure project affordability, market buy-in, construction claim prevention, and successful delivery within the current timelines. Critical responses that the Green Line Program Team has taken and will continue to implement include:

- *Finalizing planning details:* Halting additions and changes to Program scope and planning accounted for in the budget, as these have cascading impacts on contracts as well as increasing risk of schedule delay.
- *Streamlined, risk-informed decision-making:* Providing clear delegations of authority and accountability so that timely decisions can be made at the appropriate level of leadership.
- *Meeting established procurement timelines:* Making every effort to avoid delay in procurement as the separation of Segments 1 and 2, LRVs, utility relocations, and

Enabling Works means many contracts are co-dependent and delays have cascading effects.

- *Clearly projecting support for the Green Line Program:* Ensuring The City of Calgary demonstrates to the market that it is fully behind the Green Line Program and the risks are known, clear, and appropriately allocated in order to ensure attractive bids and the best value for money for taxpayer dollars.
- *Finalize Segment 2:* Completing alignment and engineering of this segment in order to progress critical geotechnical, environmental, and utility investigations.
- *Resourcing:* Expediting bringing on remaining required in-house and external resources to meet the Program organization's needs.
- *Cost savings measures:* Implementing cost savings measures that have been identified and completing the development of scope ladders for procurement to ensure budget targets are met.

Next Steps

Going forward, the risk management strategy will be focused on ensuring that the Program Team continues to align with The City's IRM framework, facilitating open discussion of risk and the ongoing maturation of a risk-aware culture, with focused reporting to aid risk-informed decision-making. The short-term goal over the next few months is intensive risk management to reduce overall risk exposure, with continual updating of quantification to gauge ongoing residual risk levels.





The team will also leverage risk management strategies to inform contract development and claims preparedness. Major updates will be timed for critical points where multiple risks can change in value, such as alignment approval, release of tender packages, reception of bids, completion of negotiations, and completion of key construction activities. With team effort directed toward managing and controlling risk on the Green Line Program, the risk profile should continue to reduce over time.


Top Areas of Risk

The following risk areas represent **current** and **important** threats to project success that have been identified in the interim risk assessment. Each area includes related risks that have been measured for likelihood, impact, and severity. Risks with a red severity reflect an importance level of 3 out of 4 (worst risks) and require escalation and monthly monitoring by Program leadership in order to drive responses. Risks with a black severity reflect the highest risks with an importance level of 4 out of 4, requiring review by the Executive Steering Committee (ESC) in addition to weekly monitoring by Program leadership. Impacts increase exponentially between severity levels. Monitoring and escalation processes are captured in the Risk Management Plan.

Extreme	Critical threat to Project success and City business processes	To be escalated to the Executive Steering Committee (ESC) and possibly Council. Devoted resources to resolution. Warrants additional funding for mitigations, potential budget and schedule adjustments; engage Legal as required.
High	Potential threat to Project success and/or City business processes	General Manager regularly updated. ESC informed if risk is trending towards Black severity. Warrants spending risk contingency to mitigate, including hiring additional resources. Gather specific documentation for claim preparedness. Probability monitored closely to determine if warrants escalation to Black status.
Moderate	Important risks and are tracked and controlled proactively	Green Line leadership team informed. Standing set of mitigation actions are undertaken by the program teams. Risks are tracked monthly for changes and documented in the risk register. Program leadership team engaged as required.
Low	Minimal risks, tracked and monitored periodically	Undertake standard risk mitigations through project management. Quarterly check-in of risk status by Risk Management Lead.

Risk Area	Risk Area Description	Key Current Risk Responses	Severity
Scope additions and uncertainty	The risk is that the affordability of the Program could be jeopardized. First, the compounding impact of many other risks, but especially the potential addition of scope, could drive cost increases. Second, the Program will need to make binding decisions under conditions of significant uncertainty, such as committing to large contracts and progressing with site preparations, before the full Program design is finalized.	<ul style="list-style-type: none"> Finalization of planning activities Design optimization Budget management strategies 	■

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Governance and Decision Making	Upcoming multiple parallel procurements drive the need for agile decision-making, particularly with regard to scope/planning details. If this need is not met, this can lead to ongoing uncertainty regarding the affordability of the Program as a whole, and reputational impacts to The City in relation to the design and construction market.	<ul style="list-style-type: none"> • TRC review of project governance adequacy and resourcing Revision of governance structure (report included on today's Committee agenda) • Increased internal and external expert resources 	
Procurement and Market	This risk area focuses on the potential that procurement delays could lead to market uncertainties that impact Program success. Several interdependent procurements are planned over the next year. Additional delays could result in significant escalation costs, reduce competition, and damage The City's reputation.	<ul style="list-style-type: none"> • Engagement with potential bidders • Reviewing contingency plans • Prioritizing procurement preparation • Seeking Council approval for finalized alignment 	
Contract Interfaces	There are significant risks associated with the complex technical, contractual, and physical overlaps and the need for integration among contracts. As The City will be entering into multiple contracts, once projects are awarded, The City will be responsible to manage the interfaces and meet the requirements for the individual contracts, or ensure that they are being met by the contractors.	<ul style="list-style-type: none"> • Best practice interface management • Alignment of contracts • Dedicated resourcing 	
Segment 2 Design and Constructability	Segment 2 involves intensive construction in Calgary's downtown area, with major river crossings and a significant tunnel portion. Some key technical information is not yet available for the proposed alignment modifications, meaning uncertainty is very high. Given that Council's approval of the alignment is pending, most preparatory and mitigation works have not yet commenced.	<ul style="list-style-type: none"> • Confirmation of Segment 2 alignment • Continuation with technical risk responses 	

Risk Area	Risk Area Description	Key Current Risk Responses	Severity
CN/CP Coordination	Both Segment 1 and Segment 2 involve many kilometers of construction that are within/directly adjacent to Canadian Pacific Railway (CPR) or Canadian National (CN) Right of Way (ROW). The challenges and restrictions of design and construction near active rail are well known.	<ul style="list-style-type: none"> • Review of contract language regarding work near rail • Ongoing engagement with CN and CPR 	
COVID-19 Impacts.	The COVID-19 situation is very fluid and the market is not familiar with pricing construction during pandemic conditions. These unfamiliar conditions could lead to increased pricing and contract ambiguities. It is important that the project avoids unintentionally taking on liability and preserves optimal risk sharing and transfer to the private sector while maintaining safety for all. Other impacts include potential Program Team productivity issues due to the need to work remotely and a potential slowing of political processes. Both of these could jeopardize meeting procurement timelines.	<ul style="list-style-type: none"> • Leverage remote work tools • Identify emerging best practices • Ongoing monitoring of COVID-19 impacts 	