

**SEWPCC Upgrading/Expansion
Conceptual Design Report**

SECTION 25 - Risk Assessment and Management Report Update

Table of Contents

25.0	RISK ASSESSMENT AND MANAGEMENT REPORT UPDATE	25.1
25.1	INTRODUCTION.....	25.1
25.2	SERIOUS PROJECT RISK FACTORS (CATEGORY ONE)	25.1
	25.2.1 Project Schedule	25.1
	25.2.2 Basement Flooding	25.2
	25.2.3 Project Delivery Methods	25.3
	25.2.4 Project Communications	25.4
	25.2.5 Regulation Requirements.....	25.5
	25.2.6 Project Budget.....	25.5
	25.2.7 Contractor Availability.....	25.6
	25.2.8 Quality Control.....	25.7
25.3	IMPORTANT PROJECT RISK FACTORS (CATEGORY TWO).....	25.7
	25.3.1 Stability of Project Team	25.8
	25.3.2 Design Parameters.....	25.9
	25.3.3 Current Plant Conditions	25.10
	25.3.4 Staffing	25.11
	25.3.5 Operating Strategies	25.12
	25.3.6 Detailed Design Quality	25.13
	25.3.7 Operational Risk.....	25.14
	25.3.8 Chemical Leak.....	25.15
	25.3.9 Odor Control.....	25.15
	25.3.10 Expected Growth.....	25.16
	25.3.11 Stability of Construction Resources.....	25.17
25.4	RISK MANAGEMENT	25.18
25.5	CONCLUSIONS.....	25.18

25.0 Risk Assessment and Management Report Update

25.1 INTRODUCTION

This section summarizes the results of the risk analysis carried out for the South End Water Pollution Control Center Upgrade / Expansion project for the City of Winnipeg. The City has retained the Stantec Team to provide engineering services related to the design and construction of the project.

This portion of the risk analysis includes identification and quantification of risk factors and the development of mitigation strategies based on the scope of work that was defined during the conceptual design phase of the project. The risks identified during the preliminary design phase of the project and summarized in Section 26 of the PDR were used as the baseline for this analysis. Ownership of the risk mitigation strategies is premised on the axiom that the party in the best position to manage the risk should own the risk.

25.2 SERIOUS PROJECT RISK FACTORS (CATEGORY ONE)

In this section, each of the serious risk factors is briefly described, factors that could trigger the risk to occur are identified, the impacts of the risk if it were to occur are listed, and strategies to mitigate the concerns or impacts of the risk are provided.

The risk mitigation strategies identified in this section are summarized in Table 25.1 – Risk Management Plan. This table also lists the person responsible for managing each of the risk mitigation strategies.

25.2.1 Project Schedule

Risk Event Description:

The project delivery date of December 2012 may not be achieved due to the delay in the selection of the project delivery methodology. Finalization of the project delivery methodology is outside of the span of control of the Department. The mitigation strategy focuses on actions that are within the span of the control of the Department, and are necessary to mitigate the impacts of the schedule delay. Other mitigation strategies to mitigate schedule risk are also listed.

Risk Event Causes:

The triggers for this risk event are:

1. Uncertainty with project delivery method.
2. Delays encountered during the commissioning process.

3. Lack of construction resources.
4. Delay caused by owner change orders and changes in the project scope.
5. Delays encountered during construction.
6. Delay of key process components.
7. Delay due to acquiring all required approvals.

Risk Event Impacts:

1. City of Winnipeg commitment to the Province will be compromised and the Licence requirements will be violated. This could result in fines or other charges being brought against the City by the Province.
2. Environmental impact by not meeting the Licence requirements.
3. Effects on other City projects and programs.
4. City image might be negatively impacted.
5. Cost overruns at project completion.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Make timely project decisions and act upon them quickly through a streamlined process. (streamlined process has been established to enhance the decision making process). Timely decision making / review remains a top priority.
2. Consider pre-qualifying contractors, publicize the work early and package the work in such a way that it is attractive to contractors (Is dependent on the selected project delivery methodology).
3. Proceed to the Detailed Design / Construction stage with the components of the project that are deemed to be critical from an operating risk perspective, and reduce the remaining scope of work to be undertaken separately through an alternative delivery methodology to the nutrient removal components.
4. Consider pre-selection/pre-purchase of major equipment confirmed through the conceptual design process and for which alternatives will not be considered (e.g. IFAS Treatment System)

25.2.2 Basement Flooding

Risk Event Description:

Insufficient pumping capacity at the SEWPCC during wet weather events may result in basement flooding upstream in the collection system.

Risk Event Causes:

The triggers for this risk event are:

1. The St. Mary's outfall is inoperable due to high river levels.
2. Future collection system infiltration/inflow control is not in place.
3. Increase in infiltration/inflow with time due to deterioration or failure within the collection system.
4. Increased flow to the SEWPCC due to changes in CSO discharge practices.
5. Insufficient pumping capacity at the SEWPCC resulting from too small pumps, pump failure or loss of power.

Risk Event Impacts:

1. Basement flooding and direct impact on residents.
2. Cost incurred by City to repair basement damages.
3. Reduced resident confidence in the City.

Suggested Mitigation Strategies:

1. Proceed to the detailed design / construction stage independently of the nutrient removal scope of work.
2. City to complete the SEWPCC collection system I/I study and implement recommended I/I reduction measures. To date, the field monitoring has been performed. Further evaluation is being performed by others.

25.2.3 Project Delivery Methods

Risk Event Description:

The project might fail if the City decides to implement the project utilizing a project delivery method that they have little experience with.

Risk Event Causes:

The causes for this risk event are:

1. Selecting an inappropriate project delivery method may create an undesirable project outcome.
2. The familiarity with alternative project delivery within the City is limited. Implementing a project of the size, complexity and schedule of the SEWPCC using an alternative project delivery methodology involves significant risk.

Risk Event Impacts:

1. Project failure by not achieving the intended project scope, facility quality, reliability or an increase in the project final cost.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. The Department is not currently in a position to effectively implement an alternative project delivery methodology such as design-build. Mitigation of this risk begins with an organizational readiness assessment to assess and address the gaps in order to ensure that the Department is in a position to implement the project delivery methodology as soon as the decision is made.
2. Develop an internal resource plan to address the City's resources for the SEWPCC project that includes capacity building.

25.2.4 Project Communications

Risk Event Description:

If City comments or reviews are not communicated in a timely manner then work packages may be delayed, the schedule may not be achieved and project costs may increase.

Risk Event Causes:

1. Improper planning for review process.
2. Staff not scheduling enough time to complete the reviews.
3. Too large a review team.
4. Unclear decision making responsibility.

Risk Event Impacts:

1. Delay in making decisions and providing feedback that could impact cost and schedule.

Suggested Mitigation Strategies:

1. Consultant to plan for the submittal and review process in a timely and practical manner.
2. Information to be submitted in small packages to facilitate faster communication. (Concise, well written reports)
3. Communicate regularly.
4. City to plan project resources and budget adequate time to complete the reviews.
5. Incorporate the City review activity in the schedule to give the City the ability to plan for the reviews.

25.2.5 Regulation Requirements

Risk Event Description:

If successful and timely negotiation with Manitoba Conservation is not achieved the project will be proceeding under significant uncertainty with regard to its objectives, and eventually its overall costs and delivery schedule.

Risk Event Causes:

1. Unclear licence requirements.
2. Lack of communication with Manitoba Conservation.

Risk Event Impacts:

1. Unclear project objectives, which results in significant uncertainty to project design criteria.
2. Potential impacts to budget and schedule.

Suggested Mitigation Strategies:

1. Develop a regulator engagement strategy
2. Ongoing and timely dialogue with regulators.

25.2.6 Project Budget

Risk Event Description:

If the design team is not able to maintain the design within the proposed budget the project will be considered a failure.

Risk Event Causes:

1. Many factors defined in this risk analysis can be considered trigger events for budget increases.
2. Project delivery may affect the final costs. As project delivery has not been defined as of yet, the project costs are uncertain.
3. A tight design schedule may result in production losses, claims and rework that increase project cost.
4. Availability and interest from construction contractors for this size project.
5. Continued high construction cost inflation due to the potential for a very active construction industry in Western Canada.

Risk Event Impacts:

1. Project exceeding its budget is not a desirable outcome for any public project.

2. Project components need to be reduced or eliminated to stay within budget, negatively impacting the plant capacity, effluent quality or reliability.
3. Reputation of Water and Waste Department is damaged.

Suggested Mitigation Strategies:

1. Value engineering at end of Conceptual Design to seek a balance between cost and functionality.
2. Alternatives presented with costs clearly outlined in order for the project team upper managements/stakeholders to make informed decisions.
3. Obtain input from contractors and suppliers as the costs are updated.
4. Prepare a range estimate to establish level of uncertainty associated with each budget estimate.
5. Consider staged construction plan.
6. Prioritize upgrade and expansion.
7. Maintain schedule to minimize influence of high construction inflation.
8. Engage a contractor to provide design-assist services during the detailed design phase
9. Include an appropriate contingency in the project budget for unforeseen conditions arising from upgrading an existing plant.
10. Integrate action items arising from the risk and criticality assessment that can be handled most effectively through the expansion / upgrade project.

25.2.7 Contractor Availability

Risk Event Description:

Lack of competition during the tendering process may cause a delay to the project start date or increase in the project cost.

Risk Event Causes:

1. Busy construction environment with limited resources.
2. Unattractive delivery method.
3. Unattractive tendering packages.
4. Project complexity and associated high risk.
5. Other major projects occurring at the same time.
6. Project risks all assigned to the Contractor.

Risk Event Impacts:

1. Project delay and/or cost overruns.

Suggested Mitigation Strategies:

The following discussion is based on the traditional design-bid-build delivery method.

1. Dialogue with possible contractors to get their input into topics such as contract packages, schedule, risk sharing, etc.
2. Proactive advertisements and announcement to attract contractors to this project.
3. Develop a contract packaging strategy to maximize competition.

25.2.8 Quality Control

Risk Event Description:

If inexperienced contractors or contractors with a reputation for poor quality workmanship were awarded some of the work, then a lower quality product may be realized; or, if quality assurance and quality control are not appropriately undertaken during the design and construction stages then additional costs may result from extra work orders. This may place pressures on the budget.

Suggested Mitigation Strategies:

1. Pre-qualify contractors/subcontractors.
2. Tight specifications.
3. Experienced resident engineer.
4. Properly implemented QA/QC program for both design and construction.

25.3 IMPORTANT PROJECT RISK FACTORS (CATEGORY TWO)

This section briefly describes Category Two that were identified Project Scope Creep

Risk Event Description:

As the project moves forward, the project scope might change and jeopardize the success of the project.

Risk Event Causes:

The triggers for this risk event are:

1. Recommendations of Winnipeg Regional Hauled Liquid Waste (HLW) Master Plan.
2. Treating Brady Road landfill leachate at the SEWPCC.

3. A move toward more stringent guidelines by the provincial or federal regulators during the course of the project.
4. Client preferences for specific equipment, additional facilities or more elaborate facilities.
5. Items not included in the Conceptual Design that are later determined to be required.
6. Studies and reviews related to the project that are being completed by others, which increase the project scope and hinder the project schedule (IRT, P3, Value Engineering, other).

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Increased project cost.
2. Schedule overrun, and the associated regulatory issues.
3. City image might be negatively impacted.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Confirm and address the Hauled Liquid Waste questions early in the Detailed Design. Subsequent to the nitrifier growth rate testing, four options have been developed for the City to address related to the impacts of Hauled Liquid Waste on the growth rate.
2. Finalize outstanding issues with Manitoba Conservation as soon as possible.
3. Include cost and schedule implications in key facility option discussions.
4. Include Value Engineering at completion of Conceptual Design.
5. Schedule and organize the Value Engineering session in conjunction with the final review of the Conceptual Design and implement traditional Value Engineering approach where the team agrees on the action to be taken at the value engineering session so the project can move forward in a timely manner.

25.3.1 Stability of Project Team

Risk Event Description:

If unexpected or unavoidable changes occur to key project staff, then the success of the project could be jeopardized.

Risk Event Causes:

The triggers for this risk event are:

1. Illness, tragedy, and change of employment or retirement of key project staff (City, Consultant or Contractor).

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Loss of project continuity and knowledge.
2. Project schedule could be negatively impacted.
3. Project budget could be negatively impacted.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Develop a project contingency succession plan for all key project staff (City, Consultant and Contractor).
2. Implement the succession plan by ensuring “deputy” positions are filled for all key project staff and that these individuals are involved throughout the project so they are well informed of all activities and decisions.

25.3.2 Design Parameters

Risk Event Description:

Current influent characterization measurements may not be representative of actual conditions to the extent required for proper design.

Risk Event Causes:

The triggers for this risk event are:

1. Non-representative nitrifier growth rate test.
2. Frequency of sampling may not represent the whole spectrum.
3. Inaccurate tests results.

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Undersize or oversize components and processes at the new facility.

2. Violate the licence requirements.
3. Future changes to the project scope and definition in order to address changes to the wastewater characterization.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Complete the nitrifier growth rate tests by midway through the Conceptual Design *Nitrifier growth rate testing has been completed and the results indicate some inhibition, particularly related to hauled liquid waste. Four options have been identified for the City to address.*
2. Undertake diurnal testing of spring runoff and major wet weather event. *. Some testing has been completed. Additional testing to be undertaken during the Detailed Design phase.*
3. Involve two or three people in the selection of sampling points within the SEWPCC.
4. Utilize a certified laboratory.

25.3.3 Current Plant Conditions

Risk Event Description:

Unforeseen conditions at the existing plant may create a need for reconstruction or repair, which is not planned for and which could jeopardize the success of the project.

Risk Event Causes:

The triggers for this risk event are:

1. Undetected facility deficiencies may exist that are not visible or accessible during the building assessment.
2. Construction activities adjacent to the existing structure could cause failure.
3. Inaccurate as-built plans of the existing facility. The location of pipes, wiring, foundations or structural members which could be damaged during construction

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Damaged pipes, wiring, foundations or structural members could result in loss of key processes.
2. Damage to infrastructure and operational interruptions.
3. Creation of a hazardous situation, jeopardizing worker safety.
4. Cost overrun to address unidentified facility deficiencies or to work around incorrectly identifies components.

5. Schedule overrun.
6. Potential violation of licence requirements due to loss of processes.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Design team meet with long-term operations staff to discuss key tie-in locations and strategies.
2. Detailed review with long-term operations staff of proposed work to upgrade existing facility.
3. Review of all proposed designs that involve construction work adjacent to the existing structures.
4. Include an appropriate contingency in the project budget for unforeseen conditions.
5. Develop a “quick response” process for issues that arise during construction and require immediate attention to mitigate schedule and cost impacts

25.3.4 Staffing

Risk Event Description:

If appropriate staff is not available for commissioning then the system may not be tested or documented properly.

Risk Event Causes:

The triggers for this risk event are:

1. City, Consultant or Contractor not assigning or having the right staff to commission the new facility.
2. Late changes to the commissioning schedule that cannot be accommodated by key commissioning staff.

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Systems not adequately tested and important deficiencies not discovered until after the warranty period.
2. Delays in commissioning the facility resulting in licence violations.
3. Important documentation and training not available for facility operators resulting in operational inefficiencies and potential licence violations.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Identify key staff from all parties for commissioning and testing of the facility, at the end of the detailed design.
2. Development of a detailed commissioning plan by the Contractor well in advance of the commissioning date for review by the City and Consultant. This plan should identify all the key staff involved in each activity.
3. Detailed review by all parties of the Contractor's completion schedule as the commissioning approaches.

25.3.5 Operating Strategies

Risk Event Description:

If operating strategy, facility staffing and training are not complete prior to testing and commissioning the success of the project could be jeopardized.

Risk Event Causes:

The triggers for this risk event are:

1. Inadequate or inappropriate staff available to complete the operating strategy for the SEWPCC prior to testing and commissioning.
2. Incomplete review of the operating strategy by the City operations department.
3. City has insufficient staff in place to operate the larger facility.
4. Existing and current staff not adequately trained on the new processes and equipment prior to facility start-up.

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Delay in putting the new facility into operations, or,
2. Additional costs incurred to have a contractor operate the facility until these concerns are addressed.
3. Inefficient operation of the new facility.
4. Potential for licence violations.
5. Potential for cost and schedule overruns.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Conduct a detailed review of the operating strategy by the City of Winnipeg Wastewater Services Division.
2. Develop a staffing management plan for the upgraded facility that includes recruitment and training.

25.3.6 Detailed Design Quality

Risk Event Description:

Incomplete or poor quality detailed design and contract documents.

Risk Event Causes:

The triggers for this risk event are:

1. Inappropriate or insufficient staff assigned to the design.
2. Too aggressive a design schedule.
3. Insufficient design input and review by senior staff.

Risk Event Impacts:

The possible impacts to the project should this risk event occur are:

1. Increased risk to the Contractor resulting in an inability to attract good contractors to bid the project and/or increased tender prices.
2. Increased change orders.
3. Budget and schedule overruns.
4. Damaged reputation of City.
5. Long-term operational problems and costs.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Consultant make staff identified in the proposal available for the project and obtain City approval for changes.
2. Develop realistic design and construction schedules and press all parties to keep their work on schedule.

25.3.7 Operational Risk

Risk Event Description:

If the operators get frustrated with systems or processes that need to be fine tuned after commissioning then problems will occur during operations; or, breakdowns in the operation of the plant may create operational challenges to meet the regulatory requirements.

Risk Event Causes:

The triggers for this risk event are:

1. Design does not account for low flow operation (hydraulic and process).
2. Equipment failure.
3. Equipment layout does not provide adequate space for operation and maintenance activities.
4. Operator error.

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Operational challenges and process upset.
2. Not being able to meet the Licence requirements.
3. Increased complication in performing operation and maintenance activities resulting in higher costs and less effective work.
4. Reduced morale and quality of work of employees at the plant.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Operations group make existing operating concerns well known to design team during Conceptual Design.
2. Open communication between operations staff and consultant design staff in specifying equipment for the facility.
3. Operations staff involved in reviewing the detailed design.
4. Implementation of a well thought through operating staff training program prior to commissioning of the facility.

25.3.8 Chemical Leak

Risk Event Description:

If there is a major chemical leak, then there could be a major health risk for staff and possibly other residents.

Risk Event Causes:

The triggers for this risk event are:

1. Major chemical spill during commissioning (such as chlorine or even alum or a polymer).

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Depending on the type of chlorine, serious health risks and maybe even death.
2. Slip resulting in a bad fall causing injury.
3. Environmental damage.
4. Negative impact on schedule as well as City image.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Operating procedures in place that specify how chemicals are handled at the site and how staff is to respond in the event of a chemical spill.
2. Facility design considerations that take into account operator activities in loading and unloading chemicals, provide for adequate containment, and provide ventilation of chemical areas.
3. Proper commissioning of new equipment and training of staff to ensure staff are familiar with the necessary safety procedures for dealing with potentially hazardous chemicals.

25.3.9 Odor Control

Risk Event Description:

Odor from the SEWPCC impacting the adjacent residents.

Risk Event Causes:

The triggers for this risk event are:

1. Inadequate odor control.
2. Process upsets that result in severe odor events.

3. Hauled liquid waste and trucked sludge spills.

Risk Event Impacts:

The possible impacts to the project should this risk event occur are:

1. Noticeable odor at adjacent residents.
2. City receives numerous complaint calls.
3. Image of City and operational staff is damaged.
4. Additional costs are incurred to rectify the odor problems.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Involvement of a wastewater treatment odor control / treatment specialist on the design team.
2. Budget to include leading edge odor control technology in the facility design including biofilter treatment for the strongest sources.
3. Complete odor dispersion modeling, if required subsequent to initial odor control upgrades.

25.3.10 Expected Growth

Risk Event Description:

The City experiences a higher growth rate than projected or the infiltration rate for new developments is higher than projected resulting in an undersized facility.

Risk Event Causes:

The triggers for this risk event are:

1. Selecting the lowest migration rate and the low population distribution for developing the dry and wet weather flow projections for the facility.
2. Higher growth and development rate than expected.
3. Higher infiltration and inflow than projected (greater than 25% of current I/I).
4. City not moving forward with an inflow / infiltration (I/I) reduction program in the SEWPCC collection area.

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Undersizing the required upgrade and expansion work.

2. Difficulty operating the facility during wet weather events.
3. Periodic violation of the operation licence requirements.
4. Need to expand the facility sooner than year 2031.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Undertake a sensitivity analysis related to population forecasting early in the Conceptual Design.
2. City to complete the SEWPCC I/I study to better define wet weather contributions from newer neighborhoods. *Field data has been collected. Further evaluation is in progress by others.*
3. Implementation of an I/I reduction program for the SEWPCC collection area.
4. Separation of the Mager CSO district.

25.3.11 Stability of Construction Resources

Risk Event Description:

Disruption to the construction program due to labor unrest could impact the success of the project.

Risk Event Causes:

The triggers for this risk event are:

1. Contractor strike during construction.
2. City Union Strike during construction.
3. If worker injury/death occurs (i.e. due to confined space entry, chemical releases, falls, vehicle accident) during construction, the project will be delayed and suffer a loss.

Risk Event Impacts:

The possible impacts to the project should the risk event occur are:

1. Any major union strikes during the construction of a major project like the SEWPCC have the potential to impact work on the site. There are many unions that have the potential to be involved on the project.
2. Jobsite injuries result in work stoppages, delays during investigations and loss of employee morale at the site. All impact the project schedule and budget.

Suggested Mitigation Strategies:

To mitigate this risk factor the following mitigation strategies were suggested by the project team:

1. Implementation of a well-developed workplace health and safety plan that is well-coordinated by the General Contractor.
2. City has a contract in place with the Canadian Union of Public Employees who represent the SEWPCC operation and maintenance staff.

25.4 RISK MANAGEMENT

Considerable effort has been expended to describe the potential project risks, identify the possible causes and project impacts should the risk occur, and to develop suggested risk mitigation strategies. In order for this process to provide value to the project delivery, the risk mitigation strategies need to be assigned to the party most able to manage the risk. Accountability can then be built into the process by assigning the management of the risk mitigation strategies to specific individuals representing the selected part.

Table 25.1 – Risk Management Plan, presents all the identified risk management strategies and assigns the management of the strategy to the party and individual most able to manage the risk.

These individuals are responsible to take the necessary actions during the Conceptual Design phase to optimize the effectiveness of the identified risk management strategy.

25.5 CONCLUSIONS

The risk analysis carried out at this stage highlights risk factors that need to be addressed at this stage of the project development. The risk management plan should be tracked, reviewed and updated on a regular basis in order to properly mitigate those factors. Risk management must become part of the ongoing project dialogue as it proceeds through the various phases.

The current status of the design includes significant uncertainty stemming from clarifications related to the licence¹, operational requirements, the delivery method to be employed and general issues that are common to large projects. The risks have been amplified by the delay in selection of the project delivery methodology. Proceeding with the portions of the work that are not related to the nutrient removal components and are required regardless of treatment process is a reasonable next step.

¹ Following the workshop Manitoba Conservation issued a letter clarifying the licence at the City's request.

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
Serious Project Risk Factors (Category One)					
1	Project Schedule	<p>The project delivery date of December 2012 may not be achieved due to the delay in the selection of the project delivery methodology. Finalization of the project delivery methodology is outside of the span of control of the Department. The mitigation strategy focuses on actions that are within the span of the control of the Department, and are necessary to mitigate the impacts of the schedule delay. Other mitigation strategies to mitigate schedule risk are also listed.</p> <p>Impacts:</p> <p>Erosion of City's purchasing power due to escalation of construction costs.</p> <p>Regulatory non-compliance.</p>	<ol style="list-style-type: none"> 1. Make timely project decisions and act upon them quickly through a streamlined process. (streamlined process has been established to enhance the decision making process). Timely decision making / review remains a top priority. 2. Consider pre-qualifying contractors, publicize the work early and package the work in such a way that it is attractive to contractors (Is dependent on the selected project delivery methodology). 3. Proceed to the Detailed Design / Construction stage with the components of the project that are deemed to be critical from an operating risk perspective, and reduce the remaining scope of work to be undertaken separately through an alternative delivery methodology to the nutrient removal components. 4. Consider pre-selection/pre-purchase of major equipment confirmed through the conceptual design process and for which alternatives will not be considered (e.g. IFAS Treatment System). 	<p>City of Winnipeg</p> <p>City of Winnipeg</p> <p>City of Winnipeg / Stantec</p> <p>City of Winnipeg/Stantec</p>	<p>Mike Shkolny</p> <p>Jerry Comeau</p> <p>Jerry Comeau / Eric Wiens</p> <p>Mike Shkolny/ Jerry Comeau / Eric Wiens</p>
2	Basement Flooding (Ongoing Operations Risk)	<p>Insufficient pumping capacity at the SEWPCC during wet weather events may result in basement flooding upstream in the collection system.</p> <p>Impact:Ongoing operations</p>	<ol style="list-style-type: none"> 1. Proceed to the detailed design / construction stage independently of the nutrient removal scope of work. 2. City to complete the SEWPCC collection system I/I study and implement recommended I/I reduction measures. To date, the field monitoring has been performed. Further evaluation is being performed by others. 	<p>City of Winnipeg</p> <p>City of Winnipeg</p>	<p>Mike Shkolny / Jerry Comeau</p> <p>Nick Szoke</p>

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
3	Project Delivery Methods	<p>The project might fail if the City decides to implement the project utilizing a project delivery method that they have little experience with.</p> <p>Impacts: All project drivers</p>	<ol style="list-style-type: none"> The Department is not currently in a position to effectively implement an alternative project delivery methodology such as design-build. Mitigation of this risk begins with an organizational readiness assessment to assess and address the gaps in order to ensure that the Department is in a position to implement the project delivery methodology as soon as the decision is made. Develop an internal resource plan to address the City's resources for the SEWPCC project that includes capacity building 	City of Winnipeg	Mike Shkolny
4	Project Communications	<p>If City comments or reviews are not communicated in a timely manner then work packages may be delayed, the schedule may not be achieved and project costs may increase.</p>	<ol style="list-style-type: none"> Consultant to plan for the submittal and review process in a timely and practical manner. Information to be submitted in small packages to facilitate faster communication. (concise, well written reports) Communicate regularly. City to plan project resources and budget adequate time to complete the reviews. Incorporate the City review activity in the schedule to give the City the ability to plan for the reviews. 	Stantec	Eric Wiens
5	Regulation Requirements	<p>If successful and timely negotiation with Manitoba Conservation is not achieved the project will be proceeding under significant uncertainty with regard to its objectives, and eventually its overall costs and delivery schedule.</p>	<ol style="list-style-type: none"> Develop a regulator engagement strategy. Ongoing and timely dialogue with the regulators. 	City of Winnipeg	Mike Shkolny / Nick Szoke

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
6	Project Budget	If the design team is not able to maintain the design within the proposed budget the project will be considered a failure.	<ol style="list-style-type: none"> 1. Value engineering at end of Conceptual Design to confirm a balance between cost and functionality 2. Alternatives presented with costs clearly outlined in order for the project team upper managements/stakeholders to make informed decisions. 3. Obtain input from contractors and suppliers as the costs are updated. 4. Prepare a range estimate to establish level of uncertainty associated with each budget estimate. 5. Consider staged construction plan. 6. Prioritize upgrade and expansion. 7. Maintain schedule to minimize influence of high construction inflation. 8. Engage a contractor to provide design-assist services during the design phase. 9. Include an appropriate contingency to the project budget for unforeseen conditions arising from upgrading an existing plant. 10. Integrate action items from the risk and criticality assessment that can be handled most effectively through the expansion / upgrade project. 	<p>City of Winnipeg / Stantec</p> <p>Stantec</p> <p>Stantec</p> <p>Stantec</p> <p>Stantec</p> <p>Stantec</p> <p>City of Winnipeg / Stantec</p> <p>City of Winnipeg / Stantec</p> <p>City of Winnipeg / Stantec</p> <p>City of Winnipeg / Stantec</p>	<p>Jerry Comeau / Eric Wiens</p> <p>Eric Wiens</p> <p>Scott Bezak</p> <p>Scott Bezak</p> <p>Jes Alexant</p> <p>Jes Alexant</p> <p>Jerry Comeau / Eric Wiens</p> <p>Jerry Comeau / Eric Wiens</p> <p>Jerry Comeau / Eric Wiens</p> <p>Jerry Comeau / Eric Wiens</p>
7	Contractor Availability	Lack of competition during the tendering process may cause a delay to the project start date or increase in the project cost.	<ol style="list-style-type: none"> 1. Dialogue with possible contractors to get their input into topics such as contract packages, schedule, risk sharing, etc. 2. Proactive advertisements and announcement to attract contractors to this project. 3. Develop a contract packaging strategy to maximize competition. 	<p>Stantec</p> <p>Stantec</p> <p>Stantec</p>	<p>Eric Wiens</p> <p>Eric Wiens</p> <p>Eric Wiens</p>

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
8	Quality Control	If inexperienced contractors or contractors with a reputation for poor quality workmanship were awarded some of the work, then a lower quality product may be realized; or, if quality assurance and quality control are not appropriately undertaken during the design and construction stages then additional costs may result from extra work orders. This may place pressures on the budget.	1. Pre-qualify contractors/subcontractors.	Stantec	Eric Wiens
			2. Tight specifications.	Stantec	Eric Wiens
			3. Experienced resident engineer.	Stantec	Eric Wiens
			4. Properly implemented QA/QC program for both design and construction.	Stantec	Eric Wiens
Important Project Risk Factors (Category Two)					
1	Project Scope Creep	As the project moves forward, the project scope might change and jeopardize the success of the project.	<ol style="list-style-type: none"> 1. Confirm and address the Hauled Liquid Waste questions early in the Detailed Design. Subsequent to the nitrifier growth rate testing, four options have been developed for the City to address related to the impacts of Hauled Liquid Waste on the growth rate. 2. Finalize outstanding issues with Manitoba Conservation as soon as possible 3. Include cost and schedule implications in key facility option discussions. 4. Include Value Engineering at completion of Conceptual Design. 	City of Winnipeg	Nick Szoke
				City of Winnipeg	Mike Shkolny
				Stantec	Eric Wiens
				City of Winnipeg	Jerry Comeau

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
2	Stability of Project Team	If unexpected or unavoidable changes occur to key project staff, then the success of the project could be jeopardized.	<p>5. Schedule and organize the Value Engineering session in conjunction with the final review of the Conceptual Design and implement traditional Value Engineering approach where the team agrees on the action to be taken at the value engineering session so the project can move forward in a timely manner.</p> <p>1. Develop a project contingency succession plan for all key project staff (City, Consultant and Contractor).</p> <p>2. Implement the succession plan by ensuring “deputy” positions are filled for all key project staff and that these individuals are involved throughout the project so they are well informed of all activities and decisions.</p>	City of Winnipeg	Jerry Comeau
3	Design Parameters	Current influent characterization measurements may not be representative of actual conditions to the extent required for proper design.	<p>1. Complete the nitrifier growth rate tests by midway through the Conceptual Design Nitrified growth rate testing has been completed and the results indicate some inhibition, particularly related to hauled liquid waste. Four options have been identified for the City to address.</p> <p>2. Undertake diurnal testing of spring runoff and major wet weather event. Diurnal testing has been completed.</p> <p>3. Involve two or three people in the selection of sampling points within the SEWPCC.</p> <p>4. Utilize a certified laboratory.</p>	City of Winnipeg / Stantec	Jerry Comeau / Eric Wiens
4	Current Plant Conditions	Unforeseen conditions at the existing plant may create a need for reconstruction or repair, which is not planned for and which could jeopardize the success of the project.	<p>1. Complete the nitrifier growth rate tests by midway through the Conceptual Design Nitrified growth rate testing has been completed and the results indicate some inhibition, particularly related to hauled liquid waste. Four options have been identified for the City to address.</p> <p>2. Undertake diurnal testing of spring runoff and major wet weather event. Diurnal testing has been completed.</p> <p>3. Involve two or three people in the selection of sampling points within the SEWPCC.</p> <p>4. Utilize a certified laboratory.</p> <p>1. Design team meet with long-term operations staff to discuss key tie-in locations and strategies.</p> <p>2. Detailed review with long-term operations staff of proposed work to upgrade existing facility.</p> <p>3. Review of all proposed designs that involve construction work adjacent to the existing structures.</p> <p>4. Include an appropriate contingency in the project budget for unforeseen conditions.</p> <p>5. Develop a “quick response” process for issues that arise during construction and require immediate attention to mitigate schedule and cost impacts</p>	City of Winnipeg / Stantec	Saibal Basu

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
5	Staffing	If appropriate staff is not available for commissioning then the system may not be tested or documented properly.	<ol style="list-style-type: none"> 1. Identify key staff from all parties for commissioning and testing of the facility, at the end of the detailed design. 2. Development of a detailed commissioning plan by the Contractor well in advance of the commissioning date for review by the City and Consultant. This plan should identify all the key staff involved in each activity. 3. Detailed review by all parties of the Contractor's completion schedule as the commissioning approaches. 	Stantec	Saibal Basu
6	Operating Strategies	If operating strategy, facility staffing and training are not complete prior to testing and commissioning the success of the project could be jeopardized.	<ol style="list-style-type: none"> 1. Conduct a detailed review of the operating strategy by the City operations department. 2. Develop a staffing management plan for the upgraded facility that includes recruitment and training. 	Stantec City of Winnipeg	Eric Wiens Bill Borlase Bill Borlase
7	Detailed Design quality	Incomplete or poor quality detailed design and contract documents.	<ol style="list-style-type: none"> 1. Consultant make staff identified in the proposal available for the project and obtain City approval for changes. 2. Develop realistic design and construction schedules and press all parties to keep their work on schedule. 	Stantec Stantec	Eric Wiens Eric Wiens
8	Operational Risk	If the operators get frustrated with systems or processes that need to be fine tuned after commissioning then problems will occur during operations; or, breakdowns in the operation of the plant may create operational challenges to meet the regulatory requirements.	<ol style="list-style-type: none"> 1. Operations group make existing operating concerns well known to design team during Conceptual Design. 2. Open communication between operations staff and consultant design staff in specifying equipment for the facility. 3. Operations staff involved in reviewing the detailed design. 4. Implementation of a well thought through operating staff training program prior to commissioning of the facility. 	City of Winnipeg City of Winnipeg / Stantec City of Winnipeg City of Winnipeg	Bill Borlase Bill Borlase / Jes Alexant Bill Borlase Bill Borlase
9	Chemical Leak	If there is a major chemical leak, then there could be a major health risk for staff and possibly other residents.	<ol style="list-style-type: none"> 1. Operating procedures in place that specify how chemicals are handled at the site and how staff is to respond in the event of a chemical spill. 2. Facility design considerations that take into account operator activities in loading and unloading chemicals, provide for adequate containment, and provide ventilation of chemical areas. 	Stantec Stantec	Saibal Basu Jes Alexant

**TABLE 25.1 – UPDATED RISK MANAGEMENT PLAN
FOR THE SEWPCC UPGRADE/EXPANSION PROJECT**

NO.	RISK	RISK DESCRIPTION	SUGGESTED MITIGATION STRATEGY	RESPONSIBLE PARTY	W&W RISK MANAGER
10	Odor Control	Odor from the SEWPCC impacting the adjacent residents.	<ol style="list-style-type: none"> 1. Involvement of a wastewater treatment odor control / treatment specialist on the design team. 2. Budget to include leading edge odor control technology in the facility design including biofilter treatment for the strongest sources. 3. Complete odor dispersion modeling, if required, subsequent to the initial odor control upgrades. 	<p>Stantec</p> <p>Stantec</p> <p>City of Winnipeg / Stantec</p>	<p>Eric Wiens</p> <p>Bob Bowker</p> <p>Jerry Comeau / Eric Wiens</p>
11	Expected Growth	The City experiences a higher growth rate than projected or the infiltration rate for new developments is higher than projected resulting in an undersized facility.	<ol style="list-style-type: none"> 1. Undertake a sensitivity analysis related to population forecasting early in the Conceptual Design. This work has been approved by the City and will be completed in January 2009. 2. City to complete the SEWPCC I/I study to better define wet weather contributions from newer neighborhoods. Field data has been collected. Further evaluation in progress by others. 3. Implementation of an I/I reduction program for the SEWPCC collection area. 4. Separation of the Mager CSO district. 	<p>Stantec</p> <p>City of Winnipeg</p> <p>City of Winnipeg</p> <p>City of Winnipeg</p> <p>City of Winnipeg</p>	<p>Eric Wiens</p> <p>Nick Szoke</p> <p>Nick Szoke</p> <p>Nick Szoke</p> <p>Mike Shkolny</p>
12	Stability of Construction Resources	Disruption to the construction program due to labor unrest could impact the success of the project.	<ol style="list-style-type: none"> 1. Implementation of a well-developed workplace health and safety plan that is well- coordinated by the General Contractor. 2. City has a contract in place with the Canadian Union of Public Employees who represent the SEWPCC operation and maintenance staff. 	<p>General Contractor (TBD)</p> <p>City of Winnipeg</p>	<p>TBD</p> <p>Bill Borlase</p>