Appendix 1

TETRA TECH

OQM | Organizational Quality Management Program

Waste Collection Service Level Review, Cost Analysis and Program Implementation Study: Recommendations

PRESENTED TO

City of Fort Saskatchewan

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EXECUTIVE SUMMARY

The City of Fort Saskatchewan (the City) retained Tetra Tech EBA Inc. (Tetra Tech) to review the City's solid waste collection programs. The objective of the project is to assess alternative options that optimize curbside waste collection programs, with a particular focus on residential curbside services, to ensure cost efficiency and high participation and diversion rates. The primary objectives were to identify optimal collection scenarios and model related costs, determine strategies to promote diversion, and provide the City with recommendations for future policies and programs based on the analysis.

Background

The City of Fort Saskatchewan's residential solid waste program includes weekly curbside collection of garbage and co-mingled ('blue-bag') recycling. The curbside collection system has achieved a diversion rate of approximately 21%. Additional service includes front-load collection of waste and co-mingled recycling from multi-unit residential properties, year-round transfer station operation and annual events for toxic round-up, and Christmas tree and large-item collection. Yard and garden debris are processed on-site at the transfer station.

The City also administers an exclusive franchise agreement for waste collection from the institutional, commercial, and light industrial (ICI) sector. ICI sector customers make arrangements with the franchise contractor based on a "menu" with rates controlled through the franchise agreement.

The City launched a pilot project in 2014 that tested automated collection and source-separated organics for 1,000 single family homes.

Results from the pilot indicate that Fort Saskatchewan could achieve diversion rates above 50% (with the potential to reach 70% in the longer term) by adding a curbside organics stream that includes food scraps and yard debris. Up to 45% of mixed municipal solid waste (MSW) comprises compostable organics and approximately 30% of recyclables are still in the waste stream. By capturing a significant percentage of the organics still in the garbage and improving the capture of recyclables, these ambitious targets are reachable. Experience from other jurisdictions across Canada has demonstrated that switching to every-other-week (EOW) garbage collection will further improve participation in recycling and source-separated organics programs, driving increased diversion rates.

Service Level Recommendations

As part of the City's service review and evaluation, Tetra Tech developed a series of technical memorandums (TM) to support recommendations for future policy and program development. This report draws on key information, analysis and evaluation from each of these TMs to summarize overall program recommendations, presented in Table A.

Table B provides a list of TMs; a summary of each TM follows the table. For more detailed information about the analysis supporting the following recommendations, including additional context, cost breakdowns and assumptions, please refer to the relevant TM.

Table A: Service Level Recommendations

#	Phase 1: Single Family Residential Service Level Recommendations
1	Provide a Curbside Collection Organics Program for Yard Debris and Food Scraps
2	Implement Every-Other-Week (EOW) Garbage Collection
3	Establish Automated Collection for Garbage and Organics
4	Offer Variable Fees Based on Cart Size – Pay As You Throw
5	Maintain the Transfer Station and Offer Peak Season Curbside Set Out (bags) to Manage Excess Organics
6	Maintain the Transfer Station to Manage Excess Garbage
7	Maintain Manual “Blue-Bag” Recycling Collection
	Phase 2: Multi-unit and Non-residential Recommendations
8	Coordinate with Multi-unit Sites to Launch Organics Collection
9	Launch a City Buildings Organics Collection
10	Launch (light) Industrial, Commercial and Institutional (ICI) Sector Organics Collection

Procurement Structure & Implementation Schedule

To streamline administration and provide the most competitive bids, it is recommended that the City put out two separate external collection and processing requests for proposals (RFPs):

1. Collection, Processing and Disposal for both the Residential and Commercial Sectors

2. Collection and Processing/Disposal for the Transfer Station

It is further recommended that proponents be given an option to bid a combination of front-load service only, curbside service only, or both.

Prior to launching a new service level, the City’s waste by-law requires updating. As well, communications strategies must be developed and logistics must be determined to ensure a successful transition. It is anticipated that most of the work leading up to a launch can be completed in 2016 and with a target launch date of mid-spring 2017.

Study Overview

Table B: List of Tech Memos

Tech Memo	Description
TM 1	Regional service level review and evaluation.
TM 2	Service level costs and rate analysis.
TM 3	Strategies for promoting diversion in multi-unit properties.
TM 4	Cart storage in options in higher density residential areas.
TM 5	Compost operations description and evaluation.

In TM 1, the service level review compared five jurisdictions: Leduc, Spruce Grove, Sherwood Park, Whitehorse (similar-size community with an automated program and comparable cold weather challenges), and Cowichan Valley Regional District (similar-sized community on Vancouver Island with very high diversion rates). It highlighted regional trends and best practice in similar-sized jurisdictions. The review included metrics such as number of material streams, frequency of collection, size of containers, choice of different sized container options, use of pay as you throw (PAYT) incentives and diversion rates being targeted and achieved.

Based on this review, the TM 2 cost analysis developed a number of possible collection scenarios for the City's 7,403 households by varying different factors. Factors included automated versus manual collection, two or three streams (i.e., with and without organics collection) and weekly or every-other-week collection. A model was built to assess capital and operating costs of the scenarios by calculating expected tonnages of each material stream and the operating costs of collecting these materials (based on tonnages, size of trucks, number of stops, labour requirements, fuel, etc.). Additionally, a future sensitivity analysis was conducted by looking at how disposal and processing costs will vary over time.

TM 3 and TM 4 were developed concurrently to focus on two of the City's major challenges related to residential collection of organic material, namely: working with multi-unit properties to roll-out new diversion programs and infrastructure and ensure high capture levels; and ensuring that townhome and duplex residents included in higher density areas of the curbside program have sufficient space to store carts on non-collection days.

A review of operations, TM 5, was also conducted to assess the current cost of processing yard waste at the transfer station and to examine how existing operations would work in conjunction with a residential curbside organics program. The study looked at local needs for yard and garden debris and food scraps processing and considered the cost of different program options.

The analysis and evaluation from the five previous TMs was built into a summary of proposed recommendations, presented in this final report as follows:

Section 1.0, Service Level Recommendations, includes the estimated cost of implementing the recommended curbside program, recommendations for multi-unit and ICI organics collection, and anticipated staffing requirements for delivering these programs.

Section 2.0, Procurement Structure, provides supporting information on the recommended request for proposal structure.

Section 3.0, Implementation Schedule, provides a high level schedule with key milestones identified to plan and launch service level recommendations for the spring of 2017.

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1.0 SERVICE LEVEL RECOMMENDATIONS

This section provides a summary of service level recommendations based on the analysis conducted for each of the TMs. Improved collection recommendations for Council are also provided in bold at the end of each subsection.

Table 1: City of Fort Saskatchewan Curbside Program Recommendation

Stream	Frequency	Collection Type	Rate Structure
Garbage	Every-Other-Week (EOW)	Automated – 240/120 L carts	Variable based on cart size
Organics	Weekly (Apr to Nov) EOW (Nov to Apr)	Automated – 240/120 L carts	Included in fixed rate
Recycling	Weekly	Manual – Blue-Bag	Included in fixed rate

Service Level Recommendations

Recommendation 1: Provide Curbside Organics Collection Program for Yard Debris and Food Scraps

Food scraps (and other household organics such as paper towels, food soiled paper) and yard and garden debris together make up over 40% of municipal solid waste by weight in jurisdictions without an organics program. Yard waste can be significantly reduced through practices such as mulch-mowing and home composting. Separation of remaining yard debris (primarily leaves) and food scraps is the best way to achieve diversion targets and reduce costs of garbage disposal.

Under Fort Saskatchewan's current waste management system residents who do not home compost can take grass clippings and yard debris to the Transfer Station. The pilot cart program tested the collection of food scraps and yard waste, i.e., 'co-mingled' organics. Options for a citywide organics program are as follows:

- Weekly collection of co-mingled food scraps and yard debris (i.e., an expansion of the pilot program).
- Weekly collection of food scraps and limited separate collection of yard debris (e.g., a bag program during spring and fall clean-up). Additional yard debris is accepted at the Recycle and Transfer Station.
- Weekly collection of food scraps and no yard debris collection. Yard debris is accepted for drop-off at the Transfer Station.

Co-mingled collection of yard debris and food scraps offers the greatest opportunity for diversion and is consistent with organics programs in neighbouring jurisdictions. Although there are a high number of residents voluntarily bringing yard debris to the Transfer Station already, pilot results showed that residents who were previously disposing of yard waste in the garbage were quick to fill the cart with yard debris, demonstrating that they are keen participate in a curbside organics diversion program. To maximize cost efficiency while supporting increased diversion, the City can provide residents with cart size options for residents to choose depending on how much yard waste they produce.

Recommendation 2: Implement Every-Other-Week Garbage Collection

The emerging Canadian norm is a three-stream program with weekly organics and recycling service, and every other week (EOW) garbage. In order to increase diversion and offset the cost of a third collection route many Capital Region municipalities – including Leduc, Sherwood Park and St. Albert – have an EOW garbage collection schedule. A local exception is Spruce Grove who has introduced source-separated organics but maintained a weekly garbage collection service. At an industry-wide level, the switch to EOW garbage collection alongside implementing organics collection has been credited with a significant decrease in the amount of garbage generated (between 30% and 40%), and an increase in the quantity of organics collected (between 40% and 80%). Cost modelling shows that EOW garbage can realize savings of 3% to 8% compared with weekly three stream collection.

Recommendation 3: Establish Automated Collection for Garbage and Organics

Automated collection improves collection efficiency. The primary financial gain is due to the number of households that can be serviced per hour per crew member. Automated collection can service more households per hour with one staff member, hiring can occur from a broader pool of the workforce, there are improvements in safety, and lower injury rates for automated collection. Fully automated collection trucks can have a larger total load capacity, allowing them to service more households before the truck becomes full.

Pilots in municipalities in British Columbia and Alberta have shown that automated collection increases resident participation in diversion programs. Post pilot surveys have demonstrated a high level of support for carts from the majority of residents who find them easy to manoeuvre and appreciate the benefit of a waste receptacle supplied and maintained by the City. Good quality carts are also more durable and can be amortized over ten years.

Recommendation 4: Offer Variable Fees Based on Cart Size – Pay As You Throw

Pay as you throw (PAYT) incentives are commonly used in combination with cart service. PAYT is an incentive based collection approach where customers are charged for collection and disposal services based on the amount of garbage discarded (i.e., based on the size of cart selected by the resident).

Regardless of fee structure, the City should offer residents two cart sizes to choose from as it provides residents with a degree of control over their collection system and supports easier storage. In the pilot survey, residents expressed a strong desire to have alternative options. This can be done by providing a standard cart size with the option to adjust the size after a grace period, and using a tiered fee schedule to further encourage diversion. Common cart size options are: 120 L and 240 L. (For comparison, typical garbage cans are 80 L or 120 L and standard garbage bags are 75 L.)

Recommendation 5: Maintain Transfer Station and Offer Peak Season Curbside Set out (Bags) to Manage Excess Organics

Seasonal peaks can be managed by encouraging residential use of the Transfer Station and/or through additional bag set outs. In many North American jurisdictions, kraft bags are used since they are voluminous, can be easily composted along with the material therein, and reinforce messaging for residents around what is compostable. The industry trend is moving away from clear plastic bag use for yard debris given that an extra step is required to remove the bags prior to composting, but it ultimately depends on what a processing facility is willing to accept and will be determined by the collection contractor. Education efforts to encourage mulch-mowing, home composting and food scraps and yard debris separation will help to support cost effective diversion more successfully than by limiting curbside collection.

The yard debris drop-off service and composting operation at the Transfer Station will remain a necessary part of the system. Some residents will still need to drop-off excess amounts especially at peak times. Approximately 500 tonnes of yard debris is brought to the facility by local landscaping contractors who also need to access a

drop-off depot. With an organics curbside program in place, yard debris drop-offs should decrease by about 40% to 60% resulting in decreased processing costs. It will then be feasible to sell or make use of the entire batch of compost produced in a given year.

Recommendation 6: Maintain the Transfer Station to Manage Excess Garbage

Based on outcomes from surrounding jurisdictions and industry best practices, it is expected that a majority of resident garbage will be managed through one primary curbside cart and optimizing diversion options available at curbside as well as through the Recycling Depot. It is also important to have options for managing occasional excess garbage resulting from special events, renovation or other. To accommodate these circumstances, it is recommended that residents dispose of their extra waste at the Recycle and Transfer Station for a fee. For those with ongoing excess garbage due to special circumstances (e.g. health issues or other), the use of a second cart is recommended.

Recommendation 7: Maintain Manual "Blue-Bag" Recycling

Although Canada-wide the industry standard for recycling is switching over to blue carts, municipalities in the Capital region predominantly have "Blue-bag" recycling programs. Manual "Blue-bag" remains popular among neighbouring jurisdictions as it reduces the need to store a third cart and also the overall on-street cart footprint on collection day. Additionally, it is easier for haulers to identify contamination during collection. Residents who prefer to toss items into a rigid container instead of bags can continue to use their own can or box, if properly labeled. To accommodate manual recycling collection, the hauler's flexibility is slightly reduced and a separate truck may be required, which could increase costs. A bag-based system may also reduce participation and diversion rates as compared with cart collection.

Recommendation 8: Coordinate with Multi-unit Sites to Launch Organics Collection

The City is somewhat unusual in that multi-unit properties are included under the City-managed waste collection contract, instead of as part of the commercial franchise, which tends to be the norm for municipalities in Alberta. As a result, the City is able to provide a uniform level of waste and recycling collection service for multi-unit residents, and can ensure that organics collection options are available in the future. This additional level of oversight means that the City can directly influence diversion rates more easily than in the commercial sector.

Multi-unit residential properties have some inherent challenges with respect to designing and implementing waste diversion programs; building types and space restrictions, tenant profiles, high resident turnover and socio-economic challenges all need to be considered. Diversion rates usually reflect these challenges and are generally considerably lower than for single family households in the same jurisdiction. That said, several jurisdictions in western Canada have had considerable success with multi-unit organics collection and it is an important sector to bring online for increased diversion and consistent service offerings across the municipality.

To help ensure program success and overcome potential barriers to rolling out organics collection to multi-unit properties it is recommended to:

- Secure personnel to develop and deliver an implementation strategy as well as a detailed work plan and provide individual support to building managers in the run up to the launch, during the roll-out and in the following months.
- Develop an implementation plan including: communicating the new by-law to building managers; creating a timeline for delivering organics containers and starting the service; and developing a guide for building managers (bin placement and grouping, and resources for communicating with tenants).

It is advised that the multi-unit organics collection program roll-out take place after the curbside residential program roll-out. A phased approach will ensure that the City's resources are not pulled in too many different directions and provides the opportunity to maintain momentum while incorporating lessons learned.

Recommendation 9: Launch a City Building Organics Collection Pilot

The City has an opportunity to led by example by introducing organics collection in City buildings, thereby demonstrating commitment to increasing diversion rates. It is recommended that once the single family residential roll-out is launched, that the City continue to expand organics collection in its' own buildings to showcase best practices, and quantify diversion results from public facilities that are representative of the ICI sector.

Recommendation 10: Launch Institutional, Commercial, and (light) Industrial (ICI) Sector Organics Collection

Once the new residential program is established, the institutional, commercial and light industrial (ICI) sector represents an important opportunity for future diversion initiatives. The ICI sector contributes a large amount to the overall volume of waste produced, and diversion rates tend to lag behind the residential sector. Although mandated organics collection programs are not common in the capital region, municipal influence of commercial collection is occurring across Canada both as a result of regulatory measures and voluntary initiatives. As an example of a leading edge program, in Metro Vancouver, BC, the 2015 organics disposal ban includes the commercial sector; businesses that do not have organics collection programs can be fined indirectly by the government through their hauling company. Successful programs are often instigated with regulatory tools and benefit from start-up resources to provide technical assistance and training.

If the City chooses to maintain ICI collection under a separate franchise agreement (as it is currently), organics collection should continue to be provided as an option. However, without a regulatory tool to make organics collection mandatory the service will remain expensive—there is currently no economy of scale since only a small number of businesses use the service. Alternately, if the City linked the residential and commercial collection contracts under a common franchise (see Section 2.0) then the same contractor will deliver cart-based organics collection to residences and businesses. This will enable the contractor to offer commercial clients a better rate.

1.1 ESTIMATED COST OF PROGRAM OPTIONS

A financial assessment model was built to estimate the collection and processing costs for eight different scenarios. Each scenario in the assessment model was compared to the current cost of collection – i.e. the status quo scenario. The status quo along with the recommended scenario is presented in Table 2 below.

The primary financial elements in the model include:

- Capital Costs – collection trucks and carts;
- Operational costs – labour, truck maintenance, fuel, cart administration, overhead and contractor mark-up;
- Disposal and processing costs – net tipping/processing for all waste streams based on current fees: garbage – $72 per tonne; recycling – $60 per tonne; and organics – $47 per tonne.

Table 2: Collection Costs Summary

Collection Costs	2-stream Manual	3-stream Automated Manual Recycling	Difference in Monthly Fees
	Status quo	Weekly – Recycling and Organics EOW – Garbage	
Estimated total program costs (monthly)	**$24 to $26**	**$24 to $29**	**$0-5**

Costs associated with collection of a third stream and purchasing carts will be significantly offset by:

- savings from higher diversion i.e. lower tipping fees compared with organics processing;
- greater efficiency from automated collection; and
- a modified collection schedule in the case of EOW garbage and (seasonal) organics.

While a third material stream adds to overall collection costs, the cost differential of organics processing compared with tipping garbage results in savings as more material is diverted to the organics stream. Conversion to EOW garbage collection compounds savings through reduced collection costs and higher diversion rates. The relative value of these savings will increase overtime as the cost of garbage disposal increases faster than the cost of organics processing.

Additional staffing will be needed to manage the new program including an operations staff person and a Waste Reduction Coordinator. These long-term resource requirements are included in the cost table above. In addition to these annual costs the new program will have one off launch costs associated with logistics, communications, and community outreach, estimated at $190,000 to $250,000 (or an estimated $25 to $34 per household). This is not included in the monthly price noted in the above table.

A number of assumptions were used in order to model the estimated collection costs of each scenario. For example, expected diversion rates for different service level options and collection efficiency for manual versus automated collection. Assumptions are based on industry norms. It is important to note that data from the assessment model is based on current operations, data from the pilot study, and research from a number of other municipalities that use automated collection and service levels. Actual costs will depend on private waste haulers responding to the request for proposals (RFP), who will make similar assumptions for routing efficiency, capital cost requirements and operational and collection costs. Prices will vary depending on their existing fleet (and spare capacity), and potentially escalating fees related to labour, transportation and tipping fees. As a result of these unknowns, the monthly cost upper limit for the new collection program were set conservatively.

The shift to collecting organics at curbside will actively support an increase in diversion and help to mitigate future cost increases related to rising cost of garbage disposal.

1.2 STAFFING AND RESOURCE REQUIREMENTS

The launch of a residential organics program and the switch to automated collection will be a significant change to the City's collection services. Additional staff support, both full-time and temporary, will be needed in order to manage the various aspects of program launch, ongoing support, and future program planning. Longer term staffing requirements include a Waste Reduction Coordinator and an operations staff person to manage the cart inventory. The responsibilities of these staff are:

- **Waste Reduction Coordinator:** A staff position dedicated to ensuring residents use the program properly to optimize diversion and guarantee seamless operations is critical to program success. During program launch the coordinator will oversee communications and outreach, field residents' calls, and conduct door to door engagement with residents. After the initial launch, the coordinator will continue to manage the program including cart inventory and resident outreach and technical support. Once the single family program is established the coordinator will also manage the launch of organics collection in multi-unit and City buildings and act as an advisory resource for building managers. The coordinator will be the City's community and regional liaison and will provide up-to-date information on industry best practice back to the utility department. Creating a long-term coordinator position would ensure that the City has someone to take responsibility for ongoing program management, community education and outreach, and planning for future initiatives.

- **Operations staff:** an operations staff position will be needed on a long-term basis to manage the cart inventory on a day to day basis. Their role will be to manage, maintain and refurbish inventory, deliver and tag new and replacement carts for residents, and locate missing carts. This person will also provide a support role to the coordinator in providing feedback to residents, providing field observations to the coordinator, and contract standards enforcement.

In addition to the longer term requirements, short-term resources will be needed during the program launch. Specifically, these will include:

- Communication strategy development and implementation (e.g. key message development, materials design);
- Outreach staff to go door to door and speak to residents about the new program;
- A small team of operations staff (or a contractor) to deliver carts; and,
- Temporary support staff to answer the phone to residents who have questions about the new program.

The one-time cost of launching a new program, including logistics and communication, will need to be priced on a cost per household basis. The City should budget an estimated $25 to $34 per household, which is equivalent to approximately $190,000 to $250,000.

2.0 PROCUREMENT STRUCTURE

It is recommended that the City put out two separate RFPs:

1. Collection, Processing and Disposal for both the Residential and Commercial Sectors

2. Collection and Processing/Disposal for the Transfer Station

Previous solid waste contracts were tendered for five years with an option to renew. It is recommended that for the new waste contracts Fort Saskatchewan retain contractors through a RFP process whereby the successful proponent will be invited to enter into negotiations with the City. It is also recommended that longer contract periods are considered, ideally seven years. To ensure flexibility, this time frame could be split into a shorter term (e.g. five years) with options to renew to the full seven years. New trucks are generally amortized over a seven year period so this will enable contractors to bid more competitively.

Currently the City has four contracts: 1) Residential Collection (curbside and multi-unit buildings); 2) Transfer Station Collection; 3) Disposal and Processing (residential and transfer station); and 4) Commercial Franchise. The first three are currently with Progressive Waste Solutions and the commercial franchise belongs to GFL Environmental.

Currently the residential and commercial franchises are managed by two different haulers under entirely separate agreements. Tetra Tech recommends that these are combined into one RFP where haulers are invited to provide pricing for A) residential collection, B) commercial collection, and C) the two combined. This relatively unique streamlining option is available to the City because of the way ICI collection is currently handled (i.e. through a franchise agreement).

Combining the collection contracts in this way will allow smaller players who only have front-load trucks to bid on the commercial contract while opening up the possibility of one larger hauler bidding on both together which delivers economies of scale and potentially better overall pricing. The City will then have the option of selecting one hauler for both, or depending on the outcome of the evaluation, hire two separate contractors and maintain the status quo with one hauler managing the residential contract and another the commercial franchise.

A separate RFP will be prepared for the Transfer Station, which is primarily roll-off containers with separated recycling streams.

In order to simplify the RFP process and contract management, Tetra Tech recommends that processing and disposal be combined with the collection contracts. In some instances processing and disposal fees are secured first to ensure competitive pricing and compare collection contracts on a level playing field. However, for the City it will likely be more effective to combine contracts. This will allow haulers—who often own or manage their own processing and/or disposal facilities—to provide the best overall cost, inclusive of transportation. Additionally, since the landscape for organics processing options is likely to change over the duration of the contract, it prevents the City from being locked into one contract and allows the hauler flexibility to find the best value option.

3.0 IMPLEMENTATION SCHEDULE

A high level schedule with key milestones, is presented in the table and Gantt chart below. This schedule plans for a roll-out of the residential organics and cart program in spring 2017. Initially fall 2016 had been discussed for the launch but this schedule does not provide collection contractors with sufficient time to secure collection trucks. Since automated collection is relatively new, haulers do not tend to have spare capacity within their fleet and sourcing trucks can take up to 12 months depending on how many are ordered and where they are being sourced from.

Based on previous experience working with municipalities who are preparing new collection RFPs, ensuring that there is some flex time in the schedule is critical. Aside from the timeline needed to source trucks, launching the residential program in fall 2016 would not provide sufficient buffer time to deal with details and potential unknowns in the planning process.

Table 3: Schedule for Roll-Out

Task	Key Dates
Residential and Commercial Contracts	
Council approval for program	May 2016
Issue RFP for collection and disposal/processing	June 2016
Receive submissions	July 2016
Sign contract	July 2016
Issue RFP for cart and RFID procurement	June 2016
Award contract for cart and RFID procurement	July 2016
By-law update	September 2016 – March 2017
Residential Program Roll-Out	
Communications Planning	August 2016 – March 2017
Curbside Cart delivery (with communications materials)	April 2017
Curbside Program launch	May 2017
Multi-unit program development	June – August 2017
Multi-unit program launch	September 2017
City Buildings Organics Program Roll-Out	
City buildings program launch	September 2017

4.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the City of Fort Saskatchewan and their agents. Tetra Tech EBA Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the City of Fort Saskatchewan, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Tetra Tech's General Conditions are attached as Appendix B to this memo.

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