THE CITY OF DAWSON

COMMITTEE OF THE WHOLE MEETING #CW18-29

DATE: MONDAY, NOVEMBER 26, 2018
TIME: 7:00 PM
LOCATION: Council Chambers, City Office

1. **CALL TO ORDER**

2. **ACCEPTANCE OF ADDENDUM & ADOPTION OF AGENDA**
   a) Committee of Whole Agenda CW18-29

3. **PUBLIC HEARING**

4. **DELEGATIONS AND GUESTS**
   a) Greg Hakonson RE: New Era North Fork Klondike Hydro Project

5. **ADOPTION OF THE MINUTES**
   a) Committee of Whole Meeting Minutes CW18-28 of November 13, 2018

6. **BUSINESS ARISING FROM THE MINUTES**
   a) Committee of Whole Meeting Minutes CW18-28 of November 13, 2018

7. **SPECIAL MEETING, COMMITTEE, AND DEPARTMENTAL REPORTS**
   a) Request for Decision RE: Credit Card Authorization
   b) Request for Decision RE: Subdivision Application #18-115, Lots 1-3, Block I, Ladue Estate
   c) Solid Waste Program Design RE: Next Steps

8. **BYLAWS AND POLICIES**
   a) Request for Decision RE: Draft 2018-05 *Encroachment Policy*

9. **CORRESPONDENCE**

10. **PUBLIC QUESTIONS**

11. **INCAMERA SESSION**
    a) Land and legal Related Matters

12. **ADJOURNMENT**

MINUTES OF COMMITTEE OF WHOLE MEETING CW18-28 of the council of the City of Dawson called for 7:00 PM on Tuesday, November 13, 2018 in the City of Dawson Council Chambers.

PRESENT:	Mayor	Wayne Potoroka
	Councillor	Natasha Ayoub
	Councillor	Stephen Johnson
	Councillor	Bill Kendrick
	Councillor	Molly Shore
ALSO PRESENT:	CAO	Cory Bellmore
	EA	Heather Favron

Agenda Item: Call to Order

The Chair, Wayne Potoroka called the meeting to order at 7:00 p.m.

Agenda Item: Agenda

CW18-28-01 Moved by Mayor Potoroka, seconded by Councillor Johnson that the agenda for committee of the whole meeting #CW18-28 be accepted as presented. Carried 4-0

Agenda Item: Adoption of Minutes

a) Committee of Whole Meeting Minutes CW18-25 of September 11, 2018

CW18-28-02 Moved by Mayor Potoroka, seconded by Councillor Johnson that the minutes of committee of the whole meeting #CW18-25 of September 11, 2018 be accepted as presented. Carried 4-0

b) Committee of Whole Meeting Minutes CW18-27 of September 25, 2018

CW18-28-03 Moved by Mayor Potoroka, seconded by Councillor Shore that the minutes of committee of the whole meeting #CW18-27 of September 25, 2018 be accepted as presented. Carried 4-0

Agenda Item: Business Arising from Minutes

Committee of Whole Meeting Minutes CW18-27 of September 25, 2018

Page 2: The committee requested an update regarding the Draft Encroachment Policy. The CAO informed the committee revisions have been made and the policy would be brought back at an upcoming meeting.

Agenda Item: Special Meeting, Committee, and Departmental Reports

CW18-28-04 Moved by Mayor Potoroka, seconded by Councillor Johnson that Committee of the Whole recess for two minutes. Carried 4-0

The committee reconvened the meeting at 7:06 PM.

a) Orientation Session:

For the purpose of orientating the new council, the Chair with the support of the CAO, guided the committee through a review of the *Council Proceedings Bylaw,* the *Code of Conduct for Mayor and Council Policy,* the C*ouncil Remuneration Bylaw,* the *Council Convention Attendance Policy*, the *Travel Policy,* the Active Policy Index, the Frequently Referenced Bylaw Index, and the Council Priority List.

Topics covered as part of the review included:

(1) *Council Proceedings Bylaw*
- the who, what, where, and why of a council meeting
- meeting procedures, rules and guidelines
- calling special meetings
- meeting locations, dates, times and electronic attendance
- meetings open to the public except for in certain cases.
- generally, matters related to labour, land or legal take place in closed session pursuant to the *Municipal Act*.
- no decisions can be made in a closed session
- expected behaviour at meetings
- meeting agendas and packages
- order of meeting and time sensitive matters
- quorum for meetings
- resolutions

(2) *Code of Conduct for Mayor and Council Policy*
- role of councillors
- what the community expects of its members of council
- behaviour
- communications, council email discussions and debates
- benefits and gifts
- direction to the CAO
- relations and interactions with staff and one another
- confidential information and reasons for holding closed meetings
- conflict of interest.

(3) C*ouncil Remuneration Bylaw,*
- compensation
- meeting per diems

(4) *Council Convention Attendance Policy*
- members of council authorized to annually attend AYC AGM
- authorizes each member of council to attend one FCM Annual Convention during term of office

(5) *Travel Policy*
- council travel to be approved by council resolution except for travel allowed under the *Council Convention Attendance Policy*

CW18-28-05 Moved by Mayor Potoroka, seconded by Councillor Johnson that committee of the whole recommends to council that approval be given for council participation at the AYC post election training. Carried 4-0

(6) Active Policy Index and Frequently Referenced Bylaw Index

- many of the policies and frequently referenced bylaws can be accessed on the city website
- those that are not located on website are available upon request to the CAO

(7) Council Priority List
- priorities identified by previous council
- status update on the *Official Community Plan*, the *Zoning Bylaw* and the *Arts Policy*

The committee requested an update regarding the cable system.
The committee requested a strategic planning session of council be scheduled to review the priorities.
The committee requested a copy of the North End Plan along with an update on where the plan is at.
The committee requested a copy of the Solid Waste Management Program Design Report.
The committee requested a copy of the draft *Arts Policy.*

b) Council Appointments: KVA & AYC Boards

CW18-28-06 Moved by Mayor Potoroka, seconded by Councillor Ayoub that Committee of the Whole recommends the following appointments to council: KVA Board Member - Bill Kendrick, and AYC Board Member - Molly Shore. Carried 4-0

c) Request for Decision RE: Volunteer Appreciation 2018

The committee noted a volunteer at the Free Store was missing from the list. The committee suggested a posting these names on the city website as another way to recognize their service.

CW18-28-07 Moved by Mayor Potoroka, seconded by Councillor Johnson that Committee of the whole recommends to council to continue to provide recognition of the important role volunteers play in our community and for the City of Dawson and thank them with a gift of $50 Dawson Dollars. Carried 4-0

Agenda Item: In Camera Session

---

a) Land Related Matters

CW18-28-08 Moved by Mayor Potoroka, seconded by Councillor Johnson that committee of the whole move into a closed session for the purposes of discussing labour, land financial related matters as authorized by section 213 (3) of the Municipal Act. Carried 4-0

Councillor Kendrick joined the committee at 9:46 PM.

CW18-28-09 Moved by Mayor Potoroka, seconded by Councillor Kendrick that committee of the whole revert to an open meeting. Carried 5-0

CW18-28-10 Moved by Mayor Potoroka, seconded by Councillor Johnson that committee of the whole extends meeting CW18-28 by one hour and no more. Carried 5-0

CW18-28-11 Moved by Councillor Johnson, seconded by Mayor Potoroka that committee of the whole move into a closed session. Carried 5-0

CW18-28-12 Moved by Mayor Potoroka, seconded by Councillor Johnson that committee of the whole revert to an open session of committee of the whole and proceeds with the agenda. Carried 4-1

Agenda Item: Adjournment

CW18-28-13 Moved by Mayor Potoroka, seconded by Councillor Johnson that committee of the whole meeting CW18-28 be adjourned at 10:09 p.m. with the next regular meeting being Monday, November 26, 2018. Carried 4-1

THE MINUTES OF COMMITTEE OF WHOLE MEETING CW18-28 WERE APPROVED BY COMMITTEE OF WHOLE RESOLUTION #CW18-29-__ AT COMMITTEE OF WHOLE MEETING CW18-29 OF NOVEMBER 29, 2018.

Wayne Potoroka, Chair

Cory Bellmore, CAO

Report to Council

[X] For Council Decision [ ] For Council Direction [ ] For Council Information

[ ] In Camera

AGENDA ITEM:	Credit Card authorization and borrowing limits	
PREPARED BY:	Cory Bellmore	**ATTACHMENTS:**
DATE:	November 21, 2018	
RELEVANT BYLAWS / POLICY / LEGISLATION: ▪ Policy #13-01 *Credit Card Policy*		

RECOMMENDATION

That council authorize the increase in the total credit card borrowing limit as follows:

- Total Borrowing limit $40,000
- Each cardholder will have a card limit to a maximum of $10,000; and

That council authorize the Superintendent of Public Works to receive a corporate credit card.

ISSUE / PURPOSE

Currently the City of Dawson has a total credit limit of $20,000 shared amongst card holders. It isn't financially viable for a credit card holder to not know the current charges on a shared credit limit when credit card purchases are being made.

There is more financial control and accountability for each card holder to be responsible for purchases by monthly reconciliation rather than multiple departments using one account.

Sharing becomes difficult for individual responsibility and reconciliation. Public Works is a main user of the corporate credit card account on a monthly basis but the responsibility for reconciliation, to the individual card holder is difficult.

BACKGROUND SUMMARY

There are currently 3 corporate credit card holders. CAO, CFO & Rec Manager

ANALYSIS / DISCUSSION

Purchases via credit card are more common as suppliers and service providers move away from corporate accounts and purchase orders.

Credit Card Policy #13-01 allows for each credit card issued to have a maximum credit limit of$10,000, currently CIBC has a council resolution **C16-02-05** which provides for a maximum of $20,000 credit limit in total.

Card Holders will be required to reconcile monthly purchases to the statement and provide the signed reconciliation along with receipts to finance. As well, cardholders will still be required to adhere to authorized spending limits for individual purchases as per current spending authority.

APPROVAL		
NAME:	Cory Bellmore, CAO	**SIGNATURE:** C Bellmore
DATE:	November 21, 2018	

Report to Council

[X] For Council Decision [ ] For Council Direction [ ] For Council Information

[ ] In Camera

SUBJECT:	Subdivision Application #18-115: Lots 1-3 Block I Ladue Estate (Downtown Hotel)	
PREPARED BY:	Clarissa Huffman, CDO	**ATTACHMENTS:** 1. Subdivision Application #18-115 2. Map of Proposed Subdivision
DATE:	November 6, 2018	
RELEVANT BYLAWS / POLICY / LEGISLATION: Municipal Act Official Community Plan Zoning Bylaw Subdivision Bylaw		

RECOMMENDATION

1. That Council approve Subdivision Application #18-115, subject to the following conditions:
   1.1. The applicant submit a Stormwater Management Plan to the satisfaction of the CDO and Public Works Superintendent.
   1.2. The applicant submits a plan of subdivision completed by a certified lands surveyor drawn in conformity with the approval.
   1.3. The applicant shall, on approval of the subdivision plan by the City of Dawson, take all necessary steps to enable the registrar under the Land Titles Act to register the plan of subdivision.
   1.4. The applicant shall enter into a Licence of Occupation for awnings encroaching onto City of Dawson property.

ISSUE

Subdivision Application #18-115 was received on September 14, 2018. The applicant is requesting to consolidate Lots 1-3 and southerly 4 ½ feet of Lot 4, Block I, Ladue Estate, to legitimize a legally non-conforming use.

ANALYSIS / DISCUSSION / ALIGNMENT TO OCP & STRATEGIC PRIORITIES

Comments

The application was circulated to all department heads, and no negative impacts were identified. The application was also circulated to every property owner in a 100m radius of this property, inviting comments and questions. No comments in opposition to this application were received at the time of writing this report.

Subdivision By-Law

Subdivision Control By-Law S3.01 states that every subdivision of land must be made in accordance with the Municipal Act, the Official Community Plan, the Zoning Bylaw, and the Subdivision Control Bylaw. The Analysis/Discussion section of this report is intended to discuss the proposal's conformity with the provisions outlined in the relevant legislation, policies, and plans.

Municipal Act

The Municipal Act S. 314 details the requirements for any proposed plan of subdivision to have direct access to the highway to the satisfaction of the approving authority. In this case, there is no new access, and therefore this section does not apply.

S. 319 stipulates that an approval may be valid for a period of up to twelve months. If the applicant has not provided proof that the conditions of approval have been met, under the Act approval is void. The applicant can request an extension of a further twelve months, which may be granted in whole or in part, at the discretion of the approval authority.

Official Community Plan

The property is currently designated as DC – Downtown Core. Uses associated with this designation include multi-unit buildings and free-standing commercial and mixed-use structures. Therefore, the consolidated lot would retain the same designation. Any new use or development on the proposed lots would be required to conform to the OCP designation, or else apply for an OCP Amendment.

Zoning By-Law

The property is currently zoned C1 – Core Commercial. The Zoning By-Law is intended to implement the goals of the OCP. Therefore, the purpose of the C1 zone as per the Zoning By-Law is to permit a vibrant mix of commercial and mixed-use structures. A full range of permitted uses and associated provisions are contained in the Zoning By-Law, and any future development of the proposed lots must also conform with the Zoning By-Law. No zoning discrepancies were identified on this lot as a result of this consolidation. However, it was noted that several awnings on the building encroach onto City of Dawson boardwalks. This is not a practice that is currently allowed within the Zoning By-Law for liability reasons. Recent practice has been to require applicants wishing to use this type of feature to enter into a Licence of Occupation. This arrangement allows applicants to create historic-style boardwalk awnings with no additional municipal liability.

It is also noted that this consolidation application is the result of the applicant's request to construct a rear addition for a new loading dock with a covered roof, which could not be approved due to the legally non-conforming nature of the structure. The consolidation legitimizes the status of the building as compliant, which means the structure would be eligible to receive a development permit for an addition, pending final zoning assessment.

APPROVAL		
NAME:	Cory Bellmore, CAO	**SIGNATURE:** C Bellmore
DATE:	November 21, 2018	

THE CITY OF DAWSON
Box 308 Dawson City, YT Y0B 1G0
PH: 867-993-7400 FAX: 867-993-7434
www.cityofdawson.ca

PAID
SEP 14 2018
30353

OFFICE USE ONLY	
APPLICATION FEE:	105-
DATE PAID:	14/09/18
PERMIT #:	18-115

SUBDIVISION/CONSOLIDATION APPLICATION

PLEASE READ THE ATTACHED INSTRUCTIONS, GUIDELINES AND SUBMISSION REQUIREMENTS PRIOR TO COMPLETING FORM.

PROPOSED DEVELOPMENT

CIVIC ADDRESS: 1026 2nd Ave **VALUE OF DEVELOPMENT:**

EXISTING USE OF LAND / BUILDINGS: Hotel

PROPOSED DEVELOPMENT: Please provide a brief description of the proposed development, including the legal description (lot, block, estate, plan) of each part to be subdivided/consolidated.

Lots 1-3 Block I Ladue Estate. Plan 83389
to be consolidated.
-as per city request.

and southerly 4 1/2 feet of Lot 4 - added at request of applicant on 20-11-2018

APPLICANT INFORMATION

APPLICANT NAME(S): Stephen Lancaster

COMPANY NAME: 535551 Yukon Inc o/a Downtown Hotel

MAILING ADDRESS: PO Box 780 **POSTAL CODE:** Y0B 1G0

EMAIL: maintenance@downtownhotel.ca **FAX #:**

PHONE #: 867-993-3033 **ALTERNATE PHONE #:** 867-993-5346

OWNER INFORMATION

OWNER NAME(S): Dawson Downtown Ltd Partnership

MAILING ADDRESS: PO Box 780 **POSTAL CODE:** Y0B 1G0

EMAIL: maintenance@downtownhotel.ca **FAX #:**

PHONE #: 993-3033 **ALTERNATE PHONE #:**

It is the responsibility of the applicant to ensure that all plans conform to the provisions of the City of Dawson Zoning Bylaw and applicable territorial and federal legislation.

FURTHER INFORMATION

ACCESS: Does the proposed development require additional access to any public road or highway? If yes, please name the road and describe the location of the proposed access.

no

WATER: Is the land situated within 0.5 miles of a river, stream, watercourse, lake or other permanent body of water, or a canal or drainage ditch? If yes, please name the body of water and describe the feature.

Yukon River.

TOPOGRAPHY: Describe the nature of the topography of the land (flat, rolling, steep, mixed), the nature of the vegetation and water on the land (brush, shrubs, tree stands, woodlots, etc, & sloughs, creeks, etc.), and the kind of soil on the land (sandy, loam, clay, etc.).

Flat lots

EXISTING BUILDINGS: Describe any buildings, historical or otherwise, and any structures on the land and whether they are to be demolished or moved:

Single structure - to stay.

DECLARATION

- I/WE hereby make application for a Development Permit under the provisions of the City of Dawson Zoning Bylaw No. 12-27 and in accordance with the plans and supporting information submitted and attached which form part of this application.
- I/ WE have reviewed all of the information supplied to the City of Dawson with respect to an application for a Development Permit and it is true and accurate to the best of my/our knowledge and belief.
- I/WE understand that the City of Dawson will rely on this information in its evaluation of my/our application for a Development Permit and that any decision made by the City of Dawson on inaccurate information may be rescinded at any time.
- I/WE hereby give my/our consent to allow Council or a person appointed by its right to enter the above land and/or building(s) with respect to this application only.

I/WE HAVE CAREFULLY READ THIS DECLARATION BEFORE SIGNING IT.

Sept 5/18
DATE SIGNED

SIGNATURE OF APPLICANT(S)

SEP 5/2018
DATE SIGNED

SIGNATURE OF OWNER(S)

Consolidation Layout

Site Plan of Proposed Addition, DP Application #18-080

MORRISON HERSHFIELD

FINAL REPORT

Solid Waste Management Program Design Assessment

City of Dawson, Yukon Territory

Presented to:

CITY OF DAWSON
1336 Front Street / P.O. Box 308
Dawson City, YT Y0B 1G0

Report No. 108283500 September 17, 2018

P:\2018\180283500-CITY OF DAWSON SWM PROGRAM DESIGN\12. DELIVERABLES\RPT_2018-09-17_COD SWM PROGRAM DESIGN ASSESSMENT REPORT_FINAL_180283500.DOCX

EXECUTIVE SUMMARY

Currently, municipal solid waste is collected weekly from residents at the curb and taken to the Quigley Landfill. The City of Dawson (CoD) engages a contractor to provide this collection service. Commercial waste is collected on an as-needed basis by the same contractor. A private contractor provides curbside collection of recyclables and organics to approximately 40 households.

CKS operates two recycling depots: one downtown and the other at the Quigley Landfill. These depots are at or beyond their operational capacity.

There are currently no incentives for any waste generators (i.e. residents, businesses) to reduce the waste that ends up in the landfill, and with existing depot infrastructure there are limited opportunities for waste diversion within the CoD. The City has set out on the path of first developing a citywide recycling program, which is to consist of curbside collection of recyclables and organics (in the long term), and the establishment of a new waste diversion centre. A site has already been established for a new waste diversion centre.

The key drivers for undertaking this study are the current high garbage collection costs, limited waste diversion programs, limited remaining landfill life span (only 10 years of landfill capacity remaining under the current design), and the desire to build on the partnership with CKS.

The City commissioned Morrison Hershfield (MH) to assess the current solid waste management system and provide an assessment of options and costs for implementing the citywide recycling program.

Curbside Collection

MH assessed the options for the CoD to expand the existing municipal curbside collection service to not only collect garbage, but also recyclables and potentially organic waste (food and yard waste).

The CoD currently services 537 residential units and 264 commercial units. It is suggested that the CoD is best to provide a weekly collection of garbage and recyclables. The collection could be performed using manual or semi-automated collection systems.

Manual collection would require home owners to supply their own garbage containers; size and weight limits would be placed on the containers to facilitate manual lifting. One of the issues with residents providing their own garbage container is the high risk of attracting wildlife compared to providing an approved wildlife resistant container to each resident, such as the containers assessed as part of the semi-automated option. With manual collection, only pick-up of one garbage container is recommended to offer as part of regular service; additional containers or bags would need pre-paid stickers.

If semi-automatic garbage collection is introduced, each unit would require a standardized container (such as a wildlife proof wheeled carts). These are best to be provided as part of the program cost. Residents could choose a small, regular or large container and pay less or more for the collection service depending on the size of container chosen.

The materials that are suggested for curbside recycling include two streams: fibres (paper and cardboard products) and containers (plastics and metal). Glass is assumed to only be collected at depots. The fibres and containers are best to be separated for placement at the curb in standardized recycling containers: fibres in a 'bluebox' container, and mixed containers in reusable plastic bags. Source separation at the curb saves on sorting and processing costs and increases marketability of the recyclables to end markets.

The enhanced curbside collection service will provide the convenience of garbage and recyclables pick-up at the curb. The recovery of more recyclable materials would improve the environmental performance of the area, and substantially reduce the waste that will have to be disposed at the Quigley Landfill.

Although the study assessed the potential quantities of organics to collect from residents and ICI customers, we recommend that organics (yard & garden and kitchen waste) should not be collected at this time, since the available processing facility is not suitable to handle larger quantities of organics at this point. Backyard composting can be actively encouraged until a processing facility that can handle larger quantities of organic waste has been evaluated and established. This facility is not equipped to handle the full range of food waste (e.g. cooked food and meat) that would be collected in a municipal curbside collection.

The table below presents the initial cost estimates for two of the main curbside collection options for garbage and recyclables: manual collection versus a semi-automated collection. Curbside collection for garbage and recyclables is estimated to cost between $815 and $900) per household per year (or a monthly cost of approximately $70 to $80 per household).

Cost Estimates of Two Options for Curbside Collection of Garbage and Recyclables

	OPTION 1 Weekly Collection of Garbage and Recyclables (manual)	OPTION 2 Weekly Collection of Garbage and Recyclables (semi-automated)
Collection Containers	$15,841	$123,241
Collection Vehicles (Annual costs of equipment, maintenance and insurance)	$251,280	$159,600
Operational Collection Costs ((labor and fuel)	$137,099	$77,195
Processing of Recyclables	$77,792	$77,792
Total Costs	**$482,012**	**$437,828**
Cost per HH	$898	$815

The cost to collect garbage on a weekly basis from ICI customers in 3 yd^3 bins using a front-end loading truck is estimated to cost $1,092 per customer (or $292,000 in total). However not all customers will need that much capacity, and many may want to opt into the residential curbside recycling program or share a collection bin with adjacent businesses. If ICI customers can be serviced by the provision of carts, which may be suitable for recyclables, the costs are likely to be half of those of front-end loaded bins. If garbage is collected via carts this would require semi or fully automated trucks.

Based on the study, MH suggests that the CoD consider the following:

- The final decision regarding selecting a manual or semi-automated collection could be made by the CoD, or left to the private sector firms proposing the services as part of a Request for Proposal submission.

- The entire curbside collection system should be user-pay. This is also emphasized in the City of Dawson Integrated Community Sustainability Plan, which was developed in partnership with the Tr'ondëk Hwëch'in in 2009, and more recently encouraged by the Yukon Ministerial Committee on Solid Waste in 2018. User-pay can be achieved by funding the program through utility fees and, in the case of a manual system, additional use of stickers for anyone wishing to dispose of garbage over and above the basic container limit. It should be noted that user fees do not necessarily cover the entire cost of the service, and a collection service can be funded by a combination of revenue sources.

- There seems to be a limited pool of private contractors/haulers that can provide collection services (i.e. limited competition), and there are concerns about the cost of the current service. To determine how many private service providers might be interested, the next step is best to include some consultation with the private sector and then a Request for Expressions of Interest (RfEOI) could be developed to confirm how many providers could compete at the Request for Proposal (RfP) stage. To increase competition, the CoD can consider also bidding on the contract.

- In addition to offering curbside collection of garbage and recycling, the CoD could consider a ban at the landfill on materials that are recyclable. The CoD is advised to develop a communications plan in which promotion and education methods for the period prior to program-roll out, around the launch and for long-term are clear and financed adequately.

New Solid Waste Diversion Centre

MH prepared a proposed design and cost estimate for the design of a new Solid Waste Diversion Centre (SWDC) on an industrial property within the municipality. Two main design concepts were initially developed in collaboration with the CKS, the expected final operator of the facility. MH developed a conceptual design and incorporated elements from the two previous conceptual designs.

The conceptual design was prepared with the following objectives:

- Provide additional space for sorting recyclables.
- Provide additional space for public drop-off of recycling.
- Provide infrastructure to allow for processing of recyclables collected curbside.
- Provide space allocation to allow for acceptance and processing of additional materials in the future.

A capital cost estimate was prepared based on various system components outlined in this report. The cost estimate is presented below and is considered a Class D preliminary cost estimate (±50 %).

Class D Capital Cost Estimate for Proposed SWDC

Item #		Item	Unit	Quantity	Unit Price	Total Price
1		**Project Summary**				
	1.01	Mob/Demob	LS	1	$ 50,000	$ 50,000
	1.02	Site Preparation	LS	1	$ 120,000	$ 120,000
	1.03	Surfacing, barriers and signs	LS	1	$ 197,500	$ 197,500
	1.04	Lock-block Wall	LS	1	$ 12,600	$ 12,600
	1.05	Surface water management	LS	1	$ 20,000	$ 20,000
	1.06	Site Buildings	LS	1	$ 550,000	$ 550,000
	1.07	Equipment and Containers	LS	1	$ 196,500	$ 196,500
					Subtotal	**$ 1,146,600**
					40% Construction Contingency	$ 459,000
					Subtotal - Construction Cost	$ 1,606,000
					Engineering - Detailed Design Services (8%)	$ 128,000
					Construction Oversight, Contract Administration (7%)	$ 112,000
					TOTAL - COST	**$ 1,846,000**

The capital cost estimate is suitable for preliminary discussion of the proposed SWDC. MH recommends discussing the proposed conceptual design of the new SWDC with various stakeholders, including YG. This report only considered one concept. The CoD has many options with the new SWDC and the final design can be developed to suit the solid waste management system needs, with consideration of potential budgetary restrictions.

Operating costs have not been estimated due to the limited information about staffing, waste processing at the facility, and waste hauling to and from the facility.

Next Steps

The CoD is proposing many improvements to the existing solid waste management system, and all of them cannot be implemented at once. MH has proposed a road map in this report to guide the sequence of events.

All significant changes to the existing system should be informed throughout the process by stakeholder input and consultation. At first, the CoD will need to develop a communications strategy aimed to consult on proposed changes to level of service and changes to costs. Council must be kept informed of proposed changes, associated costs, and stakeholder feedback, and be part of deciding whether adjustments are needed to the plan. The new solid waste management program will need to include a revised solid waste budget based on proposed changes, and the CoD will need to develop a revised revenue structure based on a combination of taxes, utility fees, tipping fees, etc.

The road map presented below was developed to illustrate the sequence of events. Firstly, the CoD needs to focus on immediate operational improvements that can extend the landfill life. After this, it will be important to prioritize the development of a new solid waste diversion centre (i.e., recycling depot). The new depot will provide a sorting facility that can receive recyclables collected via a curbside collection program. In terms of curbside collection, the CoD should

initially focus on only providing a collection service for garbage and recyclables, and leave the collection of organics until a processing facility that can handle larger quantities of organic waste has been evaluated and established.

Currently it is estimated that only 10% of waste materials are diverted from landfilling. In 2015, the CoD set a diversion target of 34% of the MSW stream by 2023. This appears to still be a realistic and achievable target. With the establishment of a new SWDC (recycling depot) and a curbside collection for recyclables, the CoD is likely to achieve roughly 30% waste diversion. With the implementation of an organics management program the CoD is likely to exceed its diversion target of 34%.

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY I

1. BACKGROUND 1

2. CITY OF DAWSON 2

2.1 Demographics 2

2.2 Current Disposal and Diversion Quantities 2

2.3 Waste Stream Characterization 3

3. EXISTING SOLID WASTE MANAGEMENT SYSTEM 6

3.1 Waste Diversion 6

3.2 Residual Waste Management 8

3.3 Solid Waste Bylaws 9

3.4 Solid Waste Management Budget 10

4. LINKAGES WITH OTHER PLANS AND GOALS 11

4.1 Official Community Plans 11

4.2 Integrated Community Sustainability Plan 11

4.3 Other Relevant Strategies and Plans 12

5. PROGRAM DESIGN DEVELOPMENT OPTIONS 13

5.1 Curbside Collection Service 13

5.2 New Solid Waste Diversion Centre 31

5.3 Public Education Programs 46

5.4 Diversion Opportunities 49

5.5 Improvement to Material Management at Depot 50

6. STAKEHOLDER CONSULTATION 53

7. CONCLUSIONS AND RECOMMENDATIONS 54

7.1 Curbside Collection Service 54

7.2 New Solid Waste Diversion Centre 56

7.3 Road Map for Dawson's Solid Waste Management Program 57

Table of Contents (Cont)

Page

TABLE OF FIGURES

Figure 1 Waste Composition of Domestic Waste at the Quigley Landfill in 2009 4
Figure 2: Percent Composition of Residential Waste Landfilled by the City of Whitehorse, Based on Weight (November 2017) 5
Figure 3: Manual Garbage Collection (London ON) 17
Figure 4: Manual Garbage Collection (Edmonton, AB) 17
Figure 5: Typical Automated Collection (Burnaby, BC) 17
Figure 6: Typical Automated Collection (Prince George, BC) 18
Figure 7: Semi-automated Collection (View Royal, BC) 18
Figure 8: Semi-automated Collection M-Class Truck 18
Figure 9. Semi-automated Collection Truck with a Split Compartment (Toronto, ON) 19
Figure 10: Front-end Loading Truck 21
Figure 11: Common Curbside Collection Containers for Recyclables 23
Figure 12: Three Typical Cart Sizes Used for Semi-Automated Curbside Collection (Vancouver, BC) 24
Figure 13: Split Bin Options for Recyclables 25
Figure 14: Option 1 for New SWDC 34
Figure 15: Option 2 for New SWDC 34
Figure 16: Conceptual Plan 36
Figure 17: Recycling Depot with Tipping Floor and Lock-Block Sorting Bays for Recyclables 38
Figure 18: Horizontal Baler 39
Figure 19: Example of a 2.5 m Diameter Stainless Steel Rotary Table 41
Figure 20: Straight Belt Conveyor with Guardrails 42
Figure 21: Detached Recycling Shelter Used to Collect Sorted Recyclables Dropped Off by Residents 43
Figure 22: Garage Style Roll Up Door and Sliding Door 43
Figure 23: Proposed Road Map for the CoD's Solid Waste Management Program 57

Table of Contents (Cont)

Page

LIST OF TABLES

Table 1: Recycling Activities at the Depots Downtown and at the Quigley Landfill 7

Table 2: 2017 City of Dawson's Solid Waste Management Revenues 10

Table 3: Key Recommendations by Ministerial Committee on Solid Waste Relevant to CoD 12

Table 4: Potential Customers to Service 13

Table 5: Potential Quantities of Garbage, Recyclables and Organics to Collect from Residents 14

Table 6: Potential Quantities of Garbage, Recyclables and Organics to Collect from ICI Customers 16

Table 7: Combined Quantities of Garbage, Recyclables and Organics to Collect from ICI and Residential Customers Annually 16

Table 8: Advantages and Disadvantages of providing a City-managed curbside collection program 25

Table 9: Cost Estimates for Two Options for Curbside Collection of Garbage and Recyclables 28

Table 10: Typical Cost of ICI Collection Services per Haul for Lower Mainland BC and Whitehorse 28

Table 11: Curbside Collection Fees in Other Jurisdictions of Yukon 30

Table 12: Class D Capital Cost Estimate for Proposed SWDC 45

APPENDICES

APPENDIX A: Sorting Requirements for Recyclables Collected at Recycling Depots

1. BACKGROUND

Currently, municipal solid waste is collected at the curb and taken to the Quigley Landfill. The landfill operates under a Solid Waste Management Plan that expires in 2023. Conservation Klondike Society (CKS) operates two recycling depots: one downtown and the other at the Quigley Landfill. These depots are at or beyond their operational capacity. Municipal solid waste (MSW or garbage) is collected from residents weekly by a private hauler contracted by the City of Dawson (CoD). Industrial, commercial and institutional (ICI) waste is also collected on an as-needed basis. CKS also provides curbside collection of recyclables to approximately 43 households.

There are currently no incentives for any waste generators (i.e. residents, businesses) to reduce the waste that ends up in the landfill. Based on the current design, the local landfill has less than 10 years of landfill capacity remaining. The CoD has set out on the path of first developing a citywide recycling program, which is to consist of curbside collection of recyclables and a new waste diversion centre. Diversion of organics will be considered in the future.

The CoD commissioned Morrison Hershfield (MH) to assess the current solid waste management system and provide guidance for implementing the citywide recycling program.

The key drivers for undertaking this study are the current high collection costs, limited waste diversion programs, remaining landfill life span (only 10 years of landfill capacity remaining), and the desire to build on the partnership with Conservation Klondike Society (CKS).

2. CITY OF DAWSON

This section provides an overview of the population (current and predicted) in the CoD, characterization of the solid waste generated in the CoD, including the composition of the waste stream, the amount disposed in landfill and the amount diverted. This information, along with the system description in Section 3 provides the baseline for the development of the Solid Waste Management Program Design.

2.1 Demographics

The wasteshed for the CoD's solid waste management program is defined as the geographical area contributing waste and recyclables to the Quigley solid waste management facility. It includes the City of Dawson and the Tr'ondëk Hwëch'in First Nations residential areas.

According to 2016 census data, the City's population is 1,375 with 756 dwellings, of which 678 are private dwellings occupied by permanent residents. There are 80 apartments in buildings that have fewer than five storeys, and no apartments with more than 5 storeys. The population density is 42.2 per km^2 and the town covers 32.45 km^2 [1].

The Tr'ondëk Hwëch'in – a Self-Governing Yukon First Nation – is based within the boundaries of the CoD. According to the Tr'ondëk Hwëch'in Citizenship Registrar, the total population of Tr'ondëk Hwëch'in citizens is 1174, with about 320 currently living in Dawson City. Others live in Whitehorse, elsewhere in the Yukon, and outside the Territory[2].

The permanent population of the entire wasteshed (i.e. the area beyond the municipal limits) was estimated at 1,999 in 2013.

Although the permanent population of the wasteshed is 1,999, seasonal influx of people over the summer months due to construction, mining and tourism is estimated to double the population. Assuming the seasonal influx lasts for four months of the year, the annual average population in 2016 was 2,665.

Based on 2016 data, the population is projected to increase, with a compound annual growth rate of approximately 1% in the Yukon, slightly lower than the Canada average of 1.2%[3].

2.2 Current Disposal and Diversion Quantities

2.2.1 Disposal

As there is no weigh scale at the landfill, waste disposal rates were estimated using scale data from the Son of War Eagle Landfill in Whitehorse and the Canadian average waste disposal rate.

[1] https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/index-eng.cfm
[2] As per correspondence with the Tr'ondëk Hwëch'in First Nation, August 2018.
[3] https://www150.statcan.gc.ca/n1/pub/91-215-x/2017000/sec1-eng.htm

Based on City of Whitehorse data from 2006 to 2013, the per capita MSW disposal rate, including industrial, commercial and institutional (ICI) waste and organics, is 1.9 kg/capita/day. The per capita disposal rate for C&D is 0.7 kg/capita/day, resulting in a total disposal rate of 2.6 kg/capita/day. Using the census 2016 population size of 1,375, the ICI and residential sectors of CoD are estimated to generate 1,305 tonnes of MSW and C&D wastes per year.

The Ministerial Committee on Solid Waste estimated an annual tonnage for the CoD based on Canada's average annual municipal waste generation rate of 0.9 tonnes per capita (Bryna Cable, personal communication, June 26, 2018). For the CoD population, this equates to at 1,238 tonnes of MSW per year.

When planning for a curbside collection program for garbage, recyclables and potentially organics, MH estimated the waste quantities coming from residential customers and ICI customers. All MSW is not assumed to be collected as part of curbside collection. Refer to Section 5.1.1 for these estimates.

2.2.2 Diversion

Insufficient data are available to accurately estimate quantities diverted through methods such as the segregation of clean wood and brush, composting, freestore operations, tire recycling, electrical and electronics ("e-waste") collection, and salvaging of metals from major appliances, scrap metals and autobodies.

The CoD currently estimates that 10% of the MSW and the C&D waste stream is currently being diverted from the landfill. The CoD currently lacks the infrastructure or system in place to record or estimate diverted quantities.

2.3 Waste Stream Characterization

Waste audits were conducted by CKS in 2008 and 2009 at the Quigley Landfill. The waste composition of domestic waste is shown in Figure 1.

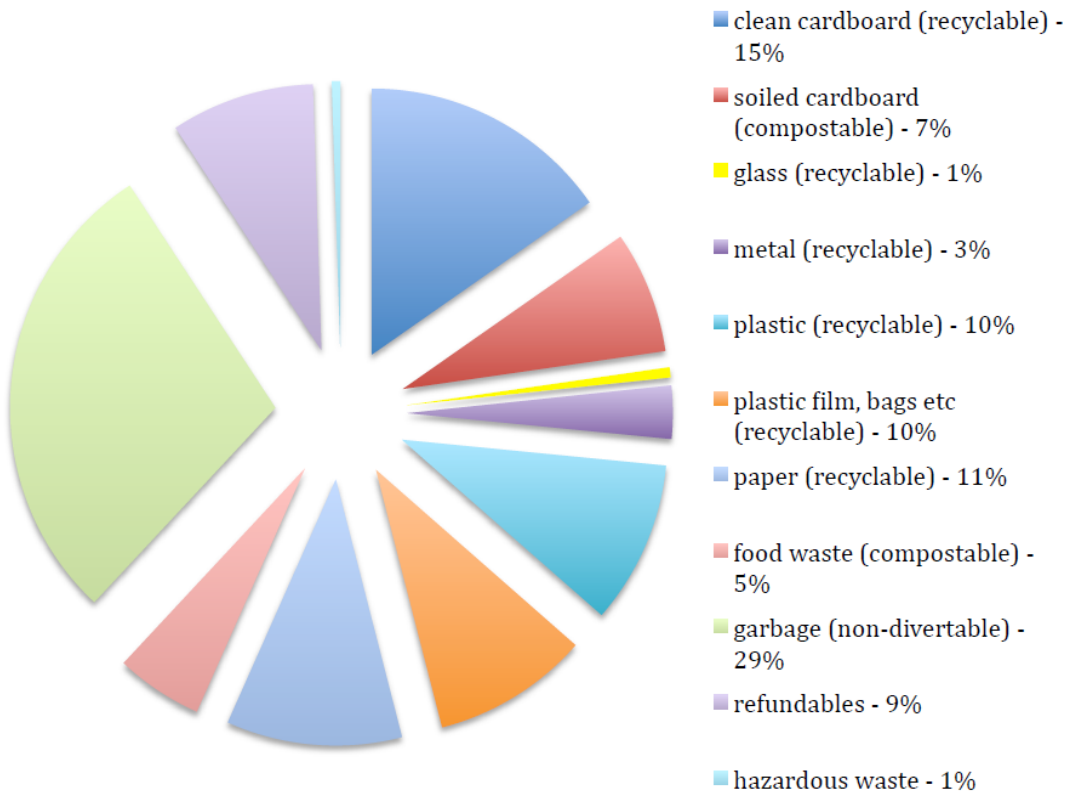

Figure 1 Waste Composition of Domestic Waste at the Quigley Landfill in 2009[4]

Of the domestic waste, 71% of the waste is considered divertible (29% is non-divertible garbage). The large components of the divertible material categories include clean cardboard (15%), paper (11%), plastic packaging (10%) and refundables (9%). Compostable materials made up only 12%. However, typically compostable materials/organics make up to 40% of MSW if organics are not collected at the curb. A waste composition study only represents conditions and characteristics of sampled waste during the time of the audit (i.e. it represents a "snapshot" in time). The composition of waste can change over time (e.g. seasonality), and the waste audit may simply have captured a portion of the waste stream when the organics fraction was low. Another contributing factor to the low organics fraction of the MSW may be due to many households undertaking backyard composting in the CoD.

When CKS audited the C&D waste, the bulk of the waste was found to be lumber and wood products (38%), with cardboard/paper (19%) and plastic and linoleum (18%) being significant contributors as well. It is clear that much of the C&D waste material could be reused.

The City of Whitehorse recently audited its waste stream. Figure 2 shows the waste composition from November 2017, during the winter/low tourism season. This was the first

[4] Quigley Sustainable Landfill Study – Phase II, Aug 2009

sampling event, which is part of a two-season waste composition study during 2017-18. Another sampling event will take place in July 2018 (high tourism season), with results available during fall of 2018.

Residential curbside waste represented 12% of the waste disposed. Figure 2 illustrates the estimated composition of the residential waste stream. As shown, the primary components of the waste stream are: organic waste (39%), plastic and composite materials (11% each), pet waste (9%), personal hygiene (8%), and paper (7%)[5]. The City of Whitehorse offers curbside collection of organics and garbage. Residents self-haul recyclables to a depot or hire private collectors.

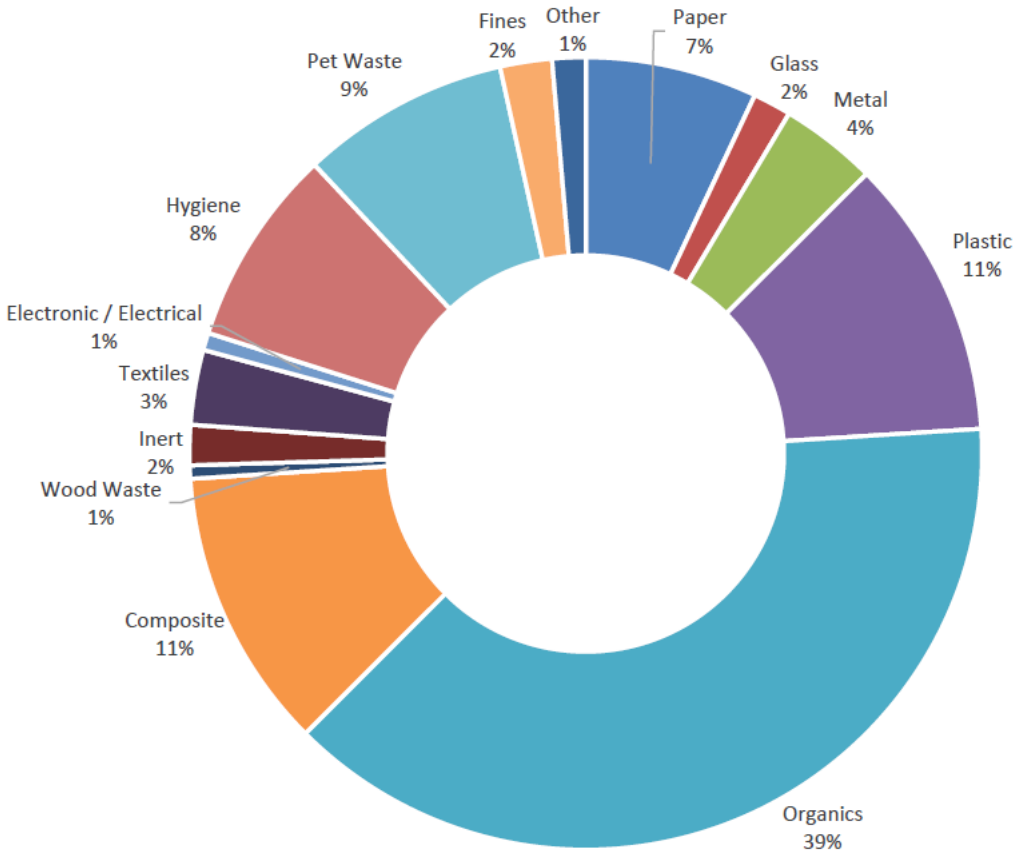

Figure 2: Percent Composition of Residential Waste Landfilled by the City of Whitehorse, Based on Weight (November 2017)

[5] City of Whitehorse 2017-18 Waste Composition Study November 2017, Interim Report by Maura Walker and Associates, January 10, 2017.

3. Existing Solid Waste Management System

3.1 Waste Diversion

3.1.1 Reduction & Reuse Activities

The CoD is currently not actively promoting reduction and reuse activities, however the CKS has some initiatives that target the first 2 Rs (reduce and reuse) of the sequential 5 R pollution prevention hierarchy (reduce, reuse, recycle, recover and residuals management).

At the Quigley Landfill, reusable goods are accepted and stored in the freestore shelter (adjacent to recycling depot). The freestore accepts donated items/clothing in good working order and reuseable construction material that has already been de-nailed and sorted. Bicycles and plastic buckets are stockpiled outside for reuse by the local community.

In 2008, turquoise Dawson City reusable bags were distributed by CKS to reduce the amount of single-use plastic bags used by store customers.

3.1.2 Curbside Collection of Recyclables and Organics

A private curbside collection service for recyclables and organics is available in Dawson. The service is offered by a private contractor. There are currently approximately 40 households signed up for this service at a cost of $20 per month. There is also private collection of cardboard from ICI customers. However, at this time, the majority of cardboard is burned at the Quigley Landfill and not recycled.

CKS offers a commercial paper collection service.

For residents of the Dome subdivision, Dredge Pond Subdivision, the Tr'ondëk Hwëch'in First Nation subdivision and the rec centre, compost bins (individual garbage cans) are provided in each of these areas. The CoD is responsible for the collection of organics twice per week throughout the year. Due to the high level of contamination, the compost product is used for final cover at the landfill.

Organic materials are collected from commercial areas by CKS as needed for a fee.

CKS has a contract through the CoD’s recreational department to rent out recycling bins and place them around town. CKS empties bins weekly and retains the value of the refundables. All recyclable materials are being collected in one stream in those bins. There are 14 bins around town (e.g. at the parks, the community garden, baseball diamonds, skate park, and Victory gardens). Other bins are rented out by CKS for events.

3.1.3 Recycling Activities at the Recycling Depot and Landfill

CKS operates a recycling depot in downtown Dawson at 1067 2nd Avenue, as well as another at the Quigley Landfill. At the CKS depots, residents can drop off their recyclables

and refundables[6]. Table 1 outlines the recycling opportunities offered at each of the CKS depots. CKS has indicated that they are currently operating at or beyond capacity.

Table 1: Recycling Activities at the Depots Downtown and at the Quigley Landfill

Recycling	Downtown	Quigley Landfill
BCR materials (refundables)	x	x
Glass (non-refundables)	x	x
Plastics (e.g. #1, #2, #4 - #7, plastic film	x	x
White paper (e.g. hard mixed paper & office pack)	x	x
Brown paper (Cardboard & Boxboard)	x	x
Metal	x	x
Polystyrene Foam	x	x
Tin	x	x
Tetra Pak®/Wax Cartons	x	x
Household Hazardous Waste (HHW)		x[7]
Tires		x
Used oil		x
Major appliances		x
Compostable organic waste		x
Electronic waste (including cell phones)		x
Batteries[8]		x
Reusable Goods[9]		x

Although cardboard and glass are currently accepted, they are not being recycled. Cardboard is burned at the landfill throughout the year as conditions permit. If there are prolonged dry periods, the cardboard is buried with the C&D waste to prevent a fire hazard. Glass is crushed and disposed of in the landfill. There are currently no reuse options for glass.

HHW collection is currently done once per year. The depot at the Quigley Landfill stockpiles any HHW that is dropped off, but HHW is not commonly accepted as regular practice.

During the summer, the Quigley Landfill is open from Tuesday to Saturday, 12:00 pm to 7:00 pm, and is closed on Sundays, Mondays and Public Holidays. Winter hours are 11:00 am to 6:00 pm.

[6] Material covered under the Beverage Container Regulation (BCR).
[7] Quigley landfill accepts HHW such as asbestos, antifreeze, mercury-containing equipment, paint, used oil, etc. (SWMP 2013-2023).
[8] Alkaline batteries & lead acid.
[9] Reusable goods are salvaged and sold via the reuse store.

3.1.4 Processing of Recyclables

The recyclables collected at the CKS depots are sent to Raven Recycling, where they are consolidated for transport to other material recovery facilities for sorting and processing.

One baler is currently used at the Downtown location. The following materials are received from the CKS depots to Raven Recycling in Whitehorse:

- Materials in mega bags: mixed plastics, polyethylene film, polystyrene foam, tetra (refundable), cans, plastic bottles.
- Materials transported on pallets: glass (refundable), cans, plastic bottles/fibre/aluminum/tin, all in bags on top of pallets.
- Baled materials: cardboard (sometimes). It is unclear which other materials are currently baled.

YG manages the contract for transfer of recyclables from both depots to a local recycling processor in Whitehorse. On a weekly basis, the contractor, Kluane Freightlines, hauls recyclables from the two depots in CoD to Raven Recycling for processing. The hauling of materials is only performed when backhauls are available.

3.1.5 Organics Management

Compostable materials from organics collection bins around the City (Section 3.1.2) and organics accepted from customers at the landfill depot are managed on a concrete slab by the Quigley Landfill.

The organic material is being composted at the landfill. This facility is able to handle compostable food waste (fruit and vegetable trimmings), but is not equipped to handle the full range of food waste (e.g. cooked food and meat). Composting is currently undertaken without a rigid composting process and without any regular testing of product quality.

More work is required to determine the requirements for proper composting and for producing a high quality compost.

3.2 Residual Waste Management

3.2.1 Curbside Collection of Garbage

Curbside collection of garbage is currently undertaken by a private hauler, Ed's Repair. Within municipal boundaries, curbside garbage collection is provided weekly on Wednesdays, Mondays or Fridays. The contractor is servicing residents and small ICI customers at the same time.

Commercial waste is collected by the same private hauler, Ed's Repair, as often as is necessary to keep up with the amount of waste being generated by the businesses. Often, commercial waste is collected six days per week in the summer and three days per week in the winter. Garbage from ICI customers is currently collected in either 6 yd^3 containers or in garbage bags placed in self-made boxes.

For residents of the Dome subdivision, Dredge Pond Subdivision, and Tr'ondëk Hwëch'in First Nation subdivision, 6 yd^3 MSW bins are provided. These bins are sometimes used by residents from elsewhere. The CoD suspects that many of these users are not tax-paying residents.

3.2.2 Operational Waste Disposal Facilities

MSW is not accepted at the downtown depot, and is only accepted at the depot at the Quigley Landfill.

The CoD is operating one waste disposal facility. All MSW from within the CoD is hauled to the Quigley Landfill, which is currently operating under a Solid Waste Management Plan (SWMP) that expires in 2023. Landfilling operations began in 1987.

The landfill currently accepts waste from areas outside their municipal boundaries through separate agreements. The CoD is unable to provide volume estimates of MSW from these areas.

The operating hours of the depot at the landfill are outlined in Section 3.1.3. Specific waste haulers and contractors are granted access to the landfill after operational hours; however, in general, the landfill is only operated during the same hours as the depot. The hours of operation for the facility differ by season and correspond with when the depot is open.

There is no weigh scale on site. No tipping fees are collected for accepting waste or recyclables at the facility. Based on the type of collection and landfilling equipment used, compaction of MSW and C&D waste at the landfill is minimal. Separate landfill cells are maintained for MSW and C&D wastes. With the current design, there is landfill capacity remaining for MSW until the year 2021. For C&D wastes, there is capacity until 2032; however, the Sustainable Landfill Study (Aug 2009), estimated that as of 2008, the C&D waste area may only have 5-6 years remaining in its lifespan. There is a need for an accurate assessment of the remaining landfill capacity. Based on a review of the landfill design and an inspection of the site, there is likely additional capacity that can be gained by revising the final topography plan.

A landfill study conducted in 2008 and 2009, estimated that approximately 66% of the landfill users were residential customers with household waste materials and the second largest user category was ICI at 16% (Quigley Sustainable Landfill Study – Phase II, Jeremy Taylor, Aug 2009).

3.3 Solid Waste Bylaws

The Waste Management Bylaw (#99-06) governs solid waste management activities within the CoD. This bylaw states that all commercial and institutional users must separate cardboard and other recyclables as identified by Council resolution prior to placing them out for pick-up or delivering them to the waste management site.

3.4 Solid Waste Management Budget

Based on the 2017 calendar year, the CoD received revenues from utility fees and YG funding for waste management and groundwater monitoring as follows:

Table 2: 2017 City of Dawson's Solid Waste Management Revenues

Funding Source	Actual	Description
Waste Management Facility Fees	$ 168,833	Further information about the fee structure is included in section 3.2.1.
YG Funding for Waste Management	$ 47,871	Operational funding for the Quigley WMF (for operations and maintenance) of up to $75,000 per year from YG as per the transfer payment agreement (valid until March 31, 2019). The agreement with YG may be revised ahead of March 31, 2019.
YG Funding for Ground Water Monitoring	$ 20,000	
Total	**$ 236,703**	

The YG Funding for waste management is specifically for YGs contribution to cover the additional costs associated with the landfill users that are outside of the municipal boundary but within the wasteshed. It does not fund any portion of the cost of the landfilled waste generated within municipal boundaries.

In the 2017 calendar year, the CoD had total expenses related to waste management of $640,000, of which approximately $330,000 is related to waste collection from residential and commercial customers. There is an obvious shortfall between the revenue and the expenses for solid waste management services.

There is no formal contract set up for the curbside collection of residential or ICI waste by the contractor. It is not possible to break down the cost to collect residential garbage separate from that of ICI. The contractor is currently paid an hourly rate, without any incentives to deliver the service as efficiently as possible.

Structure of Waste Management Facility Fees

The CoD charged the following annual waste collection program fees in 2017:

- Commercial Space $215.00
- Commercial Mobile Refreshment Stands[10] $150.00
- Residential Unit $145.00
- Vacant Institutional Commercial Lot $57.50
- Vacant Non-Institutional Residential Lot $45 00

The vacant lots do not generate any garbage that require collection.

[10] Food trucks receiving the service during the tourist season.

4. LINKAGES WITH OTHER PLANS AND GOALS

4.1 Official Community Plans

The Official Community Plan (OCP) Bylaw is the main policy document for the CoD. It outlines the goals and policies that are used to guide decision making on planning and land use management.

The OCP mentions environmental stewardship and the need to address important local environmental impacts with a long-term goal of minimizing the environmental impacts of municipal regulations, programs, services and projects. The OCP states that the CoD should consider examining methods and approaches to delay the need for a new landfill, such as supporting further recycling and waste diversion programs.

4.2 Integrated Community Sustainability Plan

After the Gold Rush, the Tr'ondëk Hwëch'in and City of Dawson Integrated Community Sustainability Plan (ICSP) was developed in partnership with the Tr'ondëk Hwëch'in and the CoD in 2009. It outlines waste management as one of the sustainability dimensions. The ICSP highlights some aspects of waste management that need improvement. It states, "Initiatives should be introduced to reduce material consumption and associated waste, and raise awareness of solid waste issues. Improved recycling programs and infrastructure would increase the volumes of waste diverted. Better facilities and supervision at the landfill would similarly help reduce the waste deposited at the facility". It identifies the following actions for how these objectives can be achieved:

- Improve facilities at the landfill, including better signage and separation.
- Improve opening hours at the landfill and remove public key access.
- Community promotion of education and initiatives to encourage reduced consumption.
- More local government support and partnerships for local environmental organizations.
- Increase the types of materials that can be recycled.
- Household "blue box" program.
- Public recycling bins, particularly during the tourist season.
- Community composting program.
- Improved downtown recycling depot and drop-off facilities.
- Plastic bag eradication initiative.
- Identify environmentally sustainable alternatives for materials.
- Investigate alternatives to burning waste.
- Research alternatives for recycling waste oil.
- "Polluter/user pays" policy and users paying the full cost for consumption and disposal.
- Lobby governments for greater recycling and waste reduction funding and resources.

4.3 Other Relevant Strategies and Plans

The Minister of Community Services, John Streicker, spoke during the Association of Yukon Communities' annual general meeting on May 11, 2018, about actions towards a sustainable solid waste management system for Yukon. He presented the findings from a report by the Ministerial Committee on Solid Waste on recommendations for actions. Some of these are presented as part of three themes in the Table 3 below, together with potential actions for the CoD.

Table 3: Key Recommendations by Ministerial Committee on Solid Waste Relevant to CoD

Theme	Recommended Initiatives Relevant to CoD	Potential Action for CoD
Regionalization	▪ Develop and implement a solid waste regionalization strategy and framework	▪ Work with YG and other nearby communities to assess synergies to reduce costs
User Pay	▪ Implement Designated Material regulation (DMR) as expediently as possible and explore Extended Producer Responsibility with industry	▪ Plan for the management of increased number of DMR material categories in the development of a new SWDC
	▪ Implement a coordinated communications strategy promoting stewardship programs and practices in Yukon	▪ Collaborate with YG and other municipalities to develop a shared communication strategy
Clear Standards	▪ Establish a Solid Waste Implementation Working Group	▪ Participate in the working group to represent CoD interests
	▪ Implement best practices for waste management facility operations	▪ Ensure that agreed-upon best practices are implemented
	▪ Explore the role of social enterprise, entrepreneurship and local innovation in solid waste management across Yukon	▪ Continue to work closely with CKS and other non-profit organizations to improve current waste management

5. PROGRAM DESIGN DEVELOPMENT OPTIONS

5.1 Curbside Collection Service

There are many considerations for developing a curbside collection program. Key aspects are which waste materials to collect: garbage, recyclables, and organics. The types collected will determine the collection frequency.

For recyclables, decisions need to be made as to which recyclable materials should be included and how these are best collected, either through a commingled collection in larger receptacles or via dual/multi streams that require the residents to sort the materials more.

The service can be provided to single-family dwellings only, or it can also include multifamily (MF) buildings and ICI buildings. For example municipalities often choose to provide services to MF buildings with less than 4 units and to ICI if these can be serviced at curb.

Decisions related to these considerations will inform the collection truck requirements and service costs.

5.1.1 Quantity of Garbage, Organics and Recyclables to Collect

Potential Customers to Service

The primary objective for the CoD is to provide curbside collection service to all of the residential units within City boundaries that are currently being serviced by garbage collection only. An extended curbside collection service for garbage, recyclables and potentially organics must service at least 537 units (currently serviced). For residents of the Dome subdivision, Dredge Pond Subdivision, and Tr'ondëk Hwëch'in First Nation subdivision, where 6 yd^3 MSW bins are provided, we assumed that each of these residential units will be serviced individually. This approach will eliminate the opportunity for outside residents to misuse the central 6 yd^3 containers. A service needs to also account for population growth.

The current garbage collection service also services 260 commercial units and four seasonal food trucks. This section will assess the suitable options and costs for curbside collection for residential and ICI customers.

Table 4: Potential Customers to Service

Customer Type	Number to Service
Residential Unit	537[11]
Commercial Space	260
Commercial Mobile Refreshment Stands (food trucks receiving the service during the tourist season)	4 (seasonal)

[11] Includes 80 units located in MF buildings.

Quantities to Collect from Residential Units

There is no information on the amount of recyclables currently diverted by the collection bins for recyclables provided within the City. In order to estimate the quantity of recyclables that could be collected, the CoD's waste composition results from 2009 and a typical garbage set-out rate with no collection of recyclables were used. MH worked with the City of Terrace and the Regional District of Kitimat-Stikine for the planning of a curbside collection service for garbage and recycling in 2013. Based on numbers from other places, the CoD is likely to have a garbage set-out rate of approximately 15.0 kg/household. This waste generation rate will provide a suitably conservative estimate on which to base the preliminary design of the new curbside collection system.

Garbage set-out rates from City of Whitehorse and their recent waste composition results cannot be directly applied to City of Dawson, since Whitehorse has offered an organics curbside collection for residents for many years and there is wide uptake of recycling through private collection and drop-off at depots.

Experience in other jurisdictions indicates that not all recyclables will be successfully captured. It is reasonable to assume that at the beginning of the program, 70% of households will participate, and those households will successfully divert 70% of their recyclables and organics, yielding an overall recovery rate of 49% of the recyclables and organics respectively. The participation and capture rates may increase over time. Well-established recycling programs can have participation rates of over 95% and capture rates of over 90%.

Table 5 summarizes the potential quantities of the three waste streams: garbage, recyclables and organics.

Table 5: Potential Quantities of Garbage, Recyclables and Organics to Collect from Residents

Waste Stream	Tonnes to Collect per Year	Tonnes to Collect per Week
Garbage	284	5.1
Total recyclables	110	2.1
Recyclable fibres	53	1.0
Recyclable plastic and metal containers[12]	56	1.1
Organics	25	0.5

In BC, Recycle BC is the stewardship organization responsible for the Extended Producer Responsibility (EPR) program, which was launched in BC in 2014. Prior to the launch, they collected data on collection quantities and costs from over twenty local governments.

[12] Assuming half of refundable containers currently found in the garbage would be collected at the curb.

The estimate of recyclables to collect per serviced household of 0.20 tonnes per household per year is within the range of collection rates reported by Recycle BC. In BC, the rates ranged from 0.05 to 0.27 tonnes per household with a mean of 0.18 tonnes and a median of 0.19 tonnes per household.

When estimating the set-out rates for organics, based on waste composition and garbage set-out rates, each household is only assumed to generate approximately 1 kg of organic waste for collection per week (in total 0.5 tonnes to collect per week).

The City of Whitehorse provides a curbside collection for organic waste. The collection covers all food and yard waste free of packaging, food soiled cardboard (i.e., pizza boxes), paper towel, and newspaper used as compost bin liners. When applying the organics set-out rate per household recorded by the City of Whitehorse (5.3 kg per week per household), it yields an annual generation estimate of 148 tonnes organic waste or 2.8 tonnes per week. This rate is only likely to be achieved after several years of successful operation, and it would be reasonable to expect the initial capture rate to be modest (1 kg/week). The curbside collection must be able to handle increasing tonnages of organic waste as the program develops.

Quantities to Collect from Commercial Customers (ICI)

The quantities to collect from commercial customers depend on the types of businesses and institutions operating in the City. It is difficult to simply apply waste generation rates from other regions of Canada, as the make-up of the ICI sector greatly varies. The CoD is currently collecting ICI waste, but does not have any data as to quantities collected. Table 6 provides a summary of the estimated maximum tonnages of materials (garbage, recyclables and organics) available to collect from the ICI sector at the curb.

In 2014, MH was involved in estimating waste disposal rates for southeast Yukon communities as part of a Southeast Yukon Recycling Circuit Study for the Yukon Government (YG). The study resulted in an estimated combined disposal rate for the communities outside Whitehorse of 781 kg/cap/yr. This disposal rate includes residential and ICI quantities, but excludes construction and demolition waste quantities.

For the City of Dawson and its permanent population of 1,375, this equates to 1,074 tonnes, of which an estimated 284 tonnes is likely to be collected from residents. The remaining 789 tonnes (or 15 tonnes per week) can either be available for collection from ICI or from residents self-hauling MSW to the landfill. CoD's population almost doubles during the summer months and will increase ICI waste quantities, rather than the residential curbside collection quantities. Table 6 includes the estimated peak quantities to collect from ICI customers during the summer months. It is unlikely that all of this MSW will be available for curbside collection from the ICI sector; however, this waste disposal rate will be used as a conservative estimate.

In 2012, the Regional District of Nanaimo (RDN) reported 38,717 tonnes of recyclable materials from all sectors (ICI and residential), based on data acquired through waste facility licencing requirements. This represents approximately 0.26 tonnes per capita per year. If this is applied to the City of Dawson's population (1,375 according to 2016 census data), this would equate to 358 tonnes of recyclables per year. If the estimated

tonnages of residential recyclables are deducted (110 tonnes as shown in the table above), the ICI sector is likely to generate a total of 248 tonnes of recyclables (or typically 4.8 tonnes per week). This estimate is likely to be applicable after a few years of program implementation. The RDN already had a well-established waste diversion program with a disposal ban on recyclables when the quantities of recyclables were reported.

The annual capture rates for organic waste from the ICI sector can be expressed per capita. The Comox Valley Regional District (CVRD) in BC has estimated a capture rate from the ICI sector equivalent to 18 kg/capita/year and the Abbotsford transfer station has recorded a capture rate of 31 kg/capita/ year. For the Dawson population, the capture rate in the CVRD is applicable where organics disposal bans have not been enforced yet. The ICI sector is likely to generate approximately 25 tonnes organic waste per year available for collection (the same estimated quantity as from the residential customers).

Table 6: Potential Quantities of Garbage, Recyclables and Organics to Collect from ICI Customers

Waste Stream	Tonnes to Collect per Year	Tonnes to Collect per Week	Peak tonnes to collect per week (summer months)
Garbage	789	15	30
Total recycling	248	4.8	10
Organics	25	0.5	1

Combined Quantities to Collect from Residential and Commercial Customers

The combined annual quantities of garbage, recyclables and organics to collect from both residential and ICI customers are summarized in Table 7 below.

Table 7: Combined Quantities of Garbage, Recyclables and Organics to Collect from ICI and Residential Customers Annually

Waste Stream	Tonnes to collect from residents	Tonnes to collect from ICI	Combined Quantities
Garbage	284	789	1,074
Total recycling	110	248	358
Organics	25	25	49
TOTAL	**419**	**1,062**	**1,481**

5.1.2 Collection Frequency

Most jurisdictions, particularly those that do not offer separate collection of organics waste (food scraps), collect garbage every week. This is the case in the CoD.

If organics are not separated at source (i.e. the household or business), weekly collection is considered appropriate, as the waste contains kitchen scraps and the mixed waste can become odourous when stored for longer than a week. If the CoD is wanting to offer a comprehensive organic waste collection that includes all food scraps, the frequency of

garbage collection can be reduced to biweekly. If only yard waste is collected, the CoD may want to consider only seasonal collection of yard waste.

As recyclables are not putrescible and do not generate odours, they do not require weekly collection. A biweekly collection may be sufficient for residents. If organic waste is collected on a weekly basis, the CoD may want to offer an alternate week curbside collection for recyclables and garbage.

5.1.3 Collection Truck Types for the Residential Quantities

The collection of garbage from residents is likely to require a different truck than what is needed to collect garbage from ICI customers.

For the residential collection of waste materials, the CoD must decide whether it prefers to implement manual, semi-automated or automated collection. Each option has strengths and weaknesses that must be considered.

Figure 3: Manual Garbage Collection (London ON)

Manual collection has been the industry standard for many years. Vehicles are typically operated by a 1 to 3-person crew, with one that drives while the other(s) collect the waste and lift it into the truck. Access can be via a rear-loading or side- loading compartment. Side-loading compartments are now more common in residential applications, as the lift height can be lower. With a manual system, residents provide their own garbage can, which is usually required to meet certain specifications with respect to volume and weight limits. Manual collection trucks cost in the order of $250,000 to $350,000.

Figure 4: Manual Garbage Collection (Edmonton, AB)

Work Safe BC is not in favour of using single-operator manual trucks. For the CoD, it is reasonable to assume that two operators are needed for one manual truck: one for driving and one for collecting waste.

Figure 5: Typical Automated Collection (Burnaby, BC)

Automated collection uses an articulated arm to reach out and grab a standardized garbage cart (Figure 5 and Figure 6).

Automated collection vehicles can be operated by a single person who remains in the cab at all times, operating the arm via a joystick. Fully automated systems work well in areas with good access to the garbage carts. Areas with narrow streets, on-street parking, street trees, or those that experience significant quantities of snow are less well served by automated collection. Fully automated systems are more commonly used in cities with laneways (such as Vancouver), or in cities where most households have driveways (such as Prince George). The cost of an automated vehicle is higher than a manual collection vehicle, due to the incremental cost of the arm. However, the increased speed means more households can be serviced in a single day. The capital cost of the standardized carts required can be a barrier to introducing automated collection. The standardized containers are usually purchased and provided by the local government and remain with the property when an owner/occupant leaves.

Figure 6: Typical Automated Collection (Prince George, BC)

Figure 7: Semi-automated Collection (View Royal, BC)

Semi-automated collection (Figure 7) provides the flexibility of manual collection of recyclables, but reduces the health and safety risks associated with lifting garbage containers from the ground. The truck performs this by a hydraulic lift. This method is similar to manual collection and usually involves the use of standardized collection containers that are compatible with the lift.

Figure 9 shows a collection truck with the option to split the body to manually collect separate streams (e.g. recyclables) or to collect waste streams via carts through a semi-automated system. The M-Class truck is a side-load collection truck available in capacities of 14 to 22 yd^3. The unit can pick up any combination of garbage, recyclables and organics. The truck body can be mounted on a hook-lift frame so the chassis can collect roll-off bins. When a single axle chassis is selected (for sizes of 14 to 16 yd^3) the operator does not require a commercial driver's license. Dual steering can be provided to eliminate the need for two operators.

Figure 8: Semi-automated Collection M-Class Truck

We recommend the use of manual or semi-automated collection for collecting garbage in the CoD. While other jurisdictions have shown that fully automated collection can work in rural areas with snowy winters (e.g. Regional District of Central Okanagan), we believe that fully automated collection is not necessary in the CoD. The additional capital costs associated with the mechanized arm and the higher maintenance requirements make this option less attractive for a service area of only 537 homes. It would be necessary to have a back-up vehicle that would also be capable of doing automated collection, and this represents a significant amount of capital resources that would not be fully utilized.

While semi-automated collection also has some additional costs (i.e. the purchase of standardized carts), the incremental cost for the trucks is substantially lower than a fully automated truck. Existing trucks can be retrofitted with lifts, providing more flexibility in terms of securing primary and back-up collection vehicles. Semi-automated collection offers the potential for increased efficiency and definite improvements to worker health and safety, which should not be overlooked when comparing it to manual collection.

The collection of recycling can be performed differently than the collection of garbage. Manual collection of recyclables is sometimes undertaken when automated or semi-automated collection of garbage is introduced. This is partly because recycling tends to be lighter than garbage, and there are fewer health and safety issues associated with lifting recycling into the truck. Another reason to undertake manual collection is to maintain the ability to collect multiple streams of recyclables (e.g. newsprint, other paper products and containers).

Figure 9. Semi-automated Collection Truck with a Split Compartment (Toronto, ON)

The main advantages of switching to automated or semi-automated recycling collection are potential consistency with the garbage collection system, the potential to use split compartment collection trucks (Figure 8) to collect garbage and recyclables (as commingled) at the same time, and the increased volume of the containers used by residents compared to standard blue boxes (which may increase the capture rate). Refer to Section 5.1.5 for more information about collection containers. However, choosing the appropriate split between compartments may be challenging. If residents of a particular route divert more of one waste stream than other routes, that side of the split truck will fill up faster and may need to be emptied before the other part of the truck is full. Changes in diversion rates over time or the addition of recyclable items to the collection program can have an impact on split requirement of the container.

Trucks used for collection of residential organics and recyclables can be the same as those used for garbage pick-up, as long as the trucks are cleaned between uses. It is important to not contaminate the organics and recyclables.

5.1.3.1 Truck Size Requirements

Garbage Collection

Based on an 8-hour work day (480 minutes available time), approximately 350 minutes was assumed to be available for manual collection (excluding time for breaks, clean-up and to get to landfill/depot). Typical collection times in suburban neighbourhoods with manual collection are in the order of 0.7 min (42 seconds) per household. On this basis, a single manual truck can be expected to service approximately 560 households per day. The City of Whitehorse has reported performing approximately 700 lifts per day per truck.

The number of households in the CoD (currently 537 residential units being serviced) is within the number that can be serviced by a single truck in a single day. However, it is best to plan for collection that also allows for population growth or the addition of ICI buildings, if these can be serviced at curb.

The estimated garbage disposal rate from each household is approximately 10 kg per household per week if recyclables are also collected at the curb and approximately 11 kg per household per week if recyclables and organic waste are also collected at the curb. With these disposal rates and the typical compaction ratios for collection vehicles, a truck servicing 560 dwellings would require a minimum capacity of 16.5 yd^3. To provide sufficient flexibility, we recommend a truck size of at least 18 yd^3 be used for garbage collection using a manual collection truck.

If a multi-purpose semi-automated truck with a 16 yd^3 capacity is used for the collection of garbage (e.g., M-class truck, which does not require a commercial driver's license), it can service approximately 200 households before it needs to dump its load at the landfill. It should still be possible to cover all of the residential units currently serviced within one working day. The main benefit of the semi-automated truck is that it only needs one operator, compared to two operators needed to safely operate a manual collection truck.

We recommend the use of two trucks, with one as a contingency vehicle for those times when the primary truck is out of service, waste volumes are higher than predicted, or when weather and road conditions slow collection activity.

Recyclables

For recyclables, a weekly collection service would require a truck capacity of at least 16.5 yd^3 to service 560 households in a day, if all materials were commingled.

For this study, we assumed that recyclables are collected as two separate streams: fibres (paper, cardboard and boxboard), and mixed containers (plastics and metal). Glass is assumed to only be collected at depots.

Weekly collection of recyclable fibres and mixed containers separately will require truck capacities of 5 yd^3 and 11 yd^3, respectively. Biweekly collection would require a truck capacity of over 22 yd^3 for mixed containers, which may be a larger size of collection vehicle than the City wants to use for other waste streams (garbage and organics).

As mentioned above, two trucks are recommended at a capacity of at least 18 yd^3 each, since this capacity is needed for the garbage collection. The additional truck can be used for weekly collection of the second stream of recyclables.

A smaller collection truck (at a capacity of 16 yd^3), such as an M-class truck with a split compartment for fibres and mixed containers, can also be used. However, two collection days would be required to cover all households with one truck. If two trucks are used, each one can cover the two streams of recyclables (fibres and mixed containers) in one working day.

Organics

Organic waste can be collected with any of the truck sizes that work for garbage and recyclable collection. There is no concern about capacity issues, since the capture rates per households are likely to be modest.

5.1.4 Collection Truck Types for the Commercial Quantities

Garbage from ICI customers is currently collected either via 6 yd^3 bins or garbage bags. Often commercial waste is collected six days per week in the summer and three days per week in the winter.

Front-end loading trucks (Figure 10) currently used by the waste hauler in Dawson can typically collect bins at capacities of 3, 4, and 6 yd^3. These collection trucks are different than the ones used for collecting residential waste quantities at the curb.

Figure 10: Front-end Loading Truck

Truck Size Requirements

As a conservative estimate, 15 tonnes of garbage will be available to collect from ICI customers each week (assuming no collection of organics is provided at the curb). Currently, 264 commercial customers are serviced, which equates to 0.5 tonnes per customer per week. The average volume per customer equates to only 0.5 yd^3, which means a total of 133 yd^3 of uncompacted garbage will be available to collect.

Depending on the business size and type of organization, the quantities will vary greatly. When the population base doubles during the summer months, the waste quantities will also peak and a service will need to cater for this increase. The garbage quantities can reach an estimated 1 tonne per week.

ICI customers can be offered several options, and the preferred option can be made the default. Carts can be serviced by a semi-automated truck used for residential collection, but these will be too heavy for manual collection. Bins at capacities of 3, 4, and 6 yd^3 will require a front-end loading truck.

It is difficult to determine the type of truck needed and the number of lifts required until there is more information on the current waste collected and the types of ICI customers

to service. The collection of waste and recyclables for these customers can be fully left to the private sector to manage. If the CoD wants to continue to service the ICI customers, they can either choose to service them with the residential collection truck or have a separate front-end loading truck dedicated to ICI customers. A dedicated truck for larger volumes may need less frequent collection. The benefits and disadvantages with a City-managed curbside collection program collection is included in 5.1.7.

With the use of an M-class truck, ICI waste can be collected via a semi-automated system for carts. For larger volumes using larger containers, a front-loading system would be required.

5.1.5 Collection Containers for Residents

If a manual garbage collection system is chosen, the CoD will not supply collection containers to residents. The CoD can set requirements for the containers purchased and maintained by residents. Any containers that do not meet the requirements may not be collected. The CoD should work with local retailers to ensure that suitable containers are available for purchase.

The requirements for resident-owned garbage containers should address the number, size and weight of the collection containers. Based on WorkSafe BC standards, it is recommended that the maximum weight of a container be less than 20 kg (44 lbs). It is also advantageous to workers to limit the size of container; a typical restriction is 80 litres. It is also standard to limit the number of containers allowed to be placed at the curb.

In addition to size and weight restrictions, the CoD may also wish to implement additional requirements to limit wildlife attraction, such as requiring garbage to be enclosed in containers with animal-resistant lids (requirements may also specify that lids be able to be removed completely and that residents unlatch lids in the morning of garbage collection). Many jurisdictions have a bylaw that requires residents not to set out their garbage before 7:00 am the day of collection.

For manual recycling collection, the CoD could supply standardized containers or could set requirements for the containers to be purchased and maintained by residents. It is recommended the CoD purchase and supply a recycling container to each household. This will distinguish recycling from the garbage, create more awareness and excitement about the program, and increase participation. Specifying container requirements is not likely to be as effective in addressing wildlife attraction issues compared to providing an approved wildlife resistant container to each resident.

Many municipalities across Canada provide Bluebox Containers (typically approximately 50 litre volume), in which households can place commingled or source-separated recyclables. If source separation is required, each household usually has extra bags for fibres (sometimes broken into newspaper vs cardboard), or they are provided with an additional container (e.g. grey box for other materials such as glass or fibres). Processors that receive source-separated recyclables are likely to achieve a higher operational efficiency and lower processing costs compared to when commingled recyclables are collected.

Figure 11: Common Curbside Collection Containers for Recyclables

If a semi-automated garbage collection system is chosen, the CoD would need to provide standardized collection containers for garbage to residents. Containers are best to remain the property of the CoD, and would be registered to each property receiving the service rather than to the property owner. If the owner moves, the container remains with the residential unit. No weight restriction is required in a semi-automated system, as no manual lifting takes place during collection. Containers typically cost $65-$100, depending on size and number ordered. Bear-proof containers cost approximately $200-$350, depending on the sophistication of the system. The most expensive containers have automated latch systems.

The CoD can offer a range of container sizes for garbage to meet the needs of different households. The estimated weekly volume of garbage and recyclables is approximately 74 litres and 22 litres, respectively. The provision of varying sizes can allow the CoD to implement a user-pay system, whereby a household needing a larger container pays a higher annual fee, reflecting their increased use of the system. While some jurisdictions offer as many as five sizes of cart, we have observed that the majority of local governments offer three sizes (see example shown in Figure 12). Three typical sizes that may suit the CoD are:

- Small: 80 litres (reduced fee)
- Standard: 120 litres (default fee)
- Large: 240 or 360 litres (additional fee)

Figure 12: Three Typical Cart Sizes Used for Semi-Automated Curbside Collection (Vancouver, BC)

For semi-automated collection of garbage, 120, 240 or 360 litre carts are typically provided to all residents. It is not typical to offer multiple sizes of recycling carts. The provision of a single large cart would only allow for commingled collection of recyclables.

Alternatively, recyclables from residents can be collected manually using bluebox containers for mixed containers and separate bags for fibres. This can be done on either a weekly or a biweekly basis. If a biweekly service is selected, the selected container must provide sufficient volume (the average volume of mixed containers will be approximately 40 litres per household every two weeks). If recyclables are comingled, the anticipated volume is approximately 50 litres every two weeks.

5.1.6 Collection Containers for ICI Customers

Waste materials (garbage, recyclables and organics) can be collected from the ICI customers at the curb if there are small quantities that can be collected as part of the residential collection.

Examples of container options for garbage include:

- One cart at a volume of 240 litres (by default), or
- One 3 yd^3 front-end load container.

For larger quantities, ICI customers can be allowed to place several carts at the curb or use larger collection bins (3, 4, and 6 yd^3) at a higher fee. Customers that share a bin can be provided a discount as incentive to save space and reduce waste.

For small quantities of recyclables, ICI customers may want to use carts that can be serviced by a semi-automated curbside collection. Recyclables in some areas are collected from ICI in split bins, in which three types of recyclables can be collected (Figure 13). These collection bins come in capacities ranging from 4 to 14 yd^3.

For ICI customers with large quantities of recyclables, ICI can be serviced by a 20 or 30 yd^3 roll-off for wood waste, metal, or plastics. These large roll-off bins dedicated to source-separated materials are probably not suitable options in the Dawson context. ICI customers are best to contract privately for this type of large-scale pickup.

Figure 13: Split Bin Options for Recyclables

The City of Whitehorse has been offering a voluntary organics collection program for ICI customers since 2014 using small volume carts. Since this program is now at capacity, they are also offering large volume dumpster-based collection of organic waste (2 or 3 yd^3)[13]. The CoD may want to look at similar options and correspond with the City of Whitehorse on key learnings.

5.1.7 Procurement Considerations

The CoD can either provide curbside collection as an in-house delivered service or contract it out to private contractors. There are numerous pros and cons of a City-managed curbside collection program (i.e. a program delivered in-house), as outlined in the Table below.

Table 8: Advantages and Disadvantages of providing a City-managed curbside collection program

Advantages	Disadvantages
▪ More robust monitoring and enforcement of bylaws ▪ Greater flexibility to increase the number of customers receiving service in the future ▪ Better coordination of waste collection with public education and outreach initiatives, which may result in greater potential for customer participation in diversion programs as well as customer satisfaction ▪ Greater flexibility to modify services in the future ▪ Improved coordination between the collection from residential, multi-family, and ICI customers	▪ High initial capital investment to cover equipment costs ▪ Additional staff required – greater risk due to labour market conditions and availability ▪ Greater risk to changing waste stream tonnages and composition ▪ Exposure to greater liability through additional high risk operations ▪ Safety considerations and risks associated with collection ▪ Greater competition with private sector and potential complaints or conflicts

[13] http://www.whitehorse.ca/departments/environmental-sustainability/waste-diversion/additional-information/ici-organic-collection

Advantages	Disadvantages
▪ Potentially better opportunities to track safety data and more confidence in reporting of safety data ▪ Better coordination of waste transfer between transfer stations and processing facilities ▪ Greater control over quality of waste material entering facilities achieved through enforcement at the curb, including recyclables and organics	▪ Potential for higher operating/annual costs (staffing, maintenance, etc.) ▪ Potential for higher administrative, management, coordination costs compared to current contracted delivery model due to additional staff and resources managed

If contracted out, the CoD needs to consider the ability for the contractor to collect the materials. If a contractor has to invest in new trucks, the contract length needs to allow the contractor to amortize the cost of new trucks. It is difficult to determine the cost of contracting out garbage and recyclables collection without determining a market response to a request for proposals (RFP).

The following considerations should be taken into account when developing the RFP for curbside collection services:

- The length of a curbside garbage collection contract should be dependent on the level of service prescribed. Since manual collection has lower up-front costs, a shorter contract term (5 years) should result in an acceptable price. Semi-automated collection requires more expensive equipment; therefore, a longer contract term (8-10 years) will result in a more competitive price. A successful contractor may require six months' lead time from contract award date to purchase specialized equipment. However, if the CoD will accept the use of used equipment that meets performance standards, then the lead time can be reduced.
- All CoD households should be included in the same contract. The population base is not large enough to require multiple contracts. The service for ICI buildings should be separated into its own contract, since different trucks may be required.
- A more prescriptive RFP will yield submissions that are more directly comparable, but may also stifle creativity and the development of local solutions.
- The criteria against which the submissions are evaluated should be clearly defined (e.g. minimum performance standards for collection trucks).
- When manual collection is proposed, enforcement of weight restrictions should be the responsibility of the contractor.
- Receiving and managing complaints arising from the curbside collection should be the responsibility of the contractor.
- Paying of all applicable tipping fees should be the responsibility of the contractor.
- The CoD should have the right to final approval of the proposed route and timing.

We recommend that if the service is contracted out, the promotion and education related to the curbside collection of both garbage and recycling should be the responsibility of the CoD.

There seems to be a limited pool of private contractors/haulers that can provide collection services (i.e. limited competition), and there are concerns about the cost of the current service. One option for increasing competition and making sure costs are reasonable would be to put out a competitive tender and allow the CoD to also bid. To determine how many private service providers might be interested, some consultation with the private sector could be undertaken and then a Request for Expressions of Interest (RFEOI) could be developed to confirm how many providers could compete at the RFP stage.

5.1.8 Estimated Curbside Collection Costs to Households

There are two cost elements for the collection of recyclables: the costs for collection and the costs for processing materials. Processing costs add to the overall cost for recycling in the Yukon, due to the distance from markets as compared to other jurisdictions. The cost to collect recyclables will depend on the collection frequency and the number of streams the CoD chooses to collect.

There are many different ways that the CoD can provide curbside collection of garbage and recyclables to its residents. Two feasible collection options are described below and the estimated costs are described in Table 9.

Option 1: Manual Collection

- Collect garbage in containers purchased and maintained by residents (self-provided and not standardized), with one bluebox provided for mixed containers and reusable plastic bags provided for fibres.
- Collect via manual trucks (two trucks needed) at a capacity of 18 yd^3. Two operators would be needed per truck to operate safely.
- Garbage from all residential units can be covered in one day and two trucks can cover all the units in one day to collect the source-separated recyclables.
- Weekly collection of garbage and recyclables.

Option 2: Semi-Automated Collection

- Collect garbage in a wildlife-proof wheeled cart with one bluebox provided for mixed containers and reusable plastic bags provided for fibres.
- Collect via semi-automated trucks (two trucks needed) at a capacity of 16yd^3. One operator is only needed per truck.
- Garbage is collected in wheeled carts using the semi-automated truck arm, while with two streams of recyclables are collected manually using two trucks.
- All residential units can be covered in one day and two trucks can cover all the units in one day to collect the source-separated recyclables.
- Weekly collection of garbage and recyclables.

Table 9 presents the initial cost estimates for two of the main curbside collection options for garbage and recyclables: manual collection versus and semi-automated collection. Curbside

collection for garbage and recyclables is estimated to cost between $815 and $900 per household per year (or a monthly cost of approximately $70 - $80 per household).

Table 9: Cost Estimates for Two Options for Curbside Collection of Garbage and Recyclables

	OPTION 1 Weekly Collection of Garbage and Recyclables (manual)	OPTION 2 Weekly Collection of Garbage and Recyclables (semi-automated)
Collection Containers	$15,841	$123,241
Collection Vehicles (Annual costs of equipment, maintenance and insurance)	$251,280	$159,600
Operational Collection Costs (labour and fuel)	$137,099	$77,195
Processing of Recyclables (excluding amalgamation costs)	$77,792	$77,792
Total Costs	$482,012	$437,828
Cost per HH	$898	$815

Labour costs for the amalgamation of recyclables (sorting and baling) prior to haulage to the processor in Whitehorse were not included as the costs are largely dependent on the sorting equipment selected at the SWDC, and staffing levels. These costs are unlikely to increase overall costs significantly.

The cost estimates in Table 9 do not include the transportation costs of recyclables to a processor in Whitehorse, as these are costs are covered by YG. The transportation cost for the recyclable materials captured by the residential curbside collection are estimated at approximately $85,000. However, the increased use of balers in the new SWDC is expected to significantly decrease the cost for transportation of recyclables from CoD to Whitehorse.

5.1.9 Estimated Curbside Collection Costs to ICI customers

The following costs were gathered through hauler surveys and interviews conducted by MH (both locally and in BC's lower mainland) in 2016. The costs are assumed to include processing costs of recyclables. The costs from 2016 have been adjusted to account for historic inflation in Canada. The potential collection costs for haulers in Dawson depends on the available trucks and local processing costs. The information below simply provides cost estimates for possible service options. Sometimes customers also pay rental costs for the use of the containers.

Table 10: Typical Cost of ICI Collection Services per Haul for Lower Mainland BC and Whitehorse

Min. Size of Collection Containers	Frequency	Typical Cost of Service per haul Lower Mainland BC	Whitehorse Hauler Cost per haul
1 – cart	Weekly	$6	n/a
2 – carts	Weekly	$11	n/a
1 - 3 yd^3	Weekly	$18	$21
1 - 4 yd^3	Weekly	$18	$26
1 - 6 yd^3	Weekly	$18	$36

Min. Size of Collection Containers	Frequency	Typical Cost of Service per haul Lower Mainland BC	Whitehorse Hauler Cost per haul
1 – 3 yd^3 & 1 cart	Weekly	$24	n/a
1 – 6 yd^3 & 1 cart	Weekly	$24	n/a
1 - 6 yd^3 & 2 carts	Weekly	$29	n/a
14 yd^3 split bin (3 types of recycling)	Weekly	$0	$142
20 or 30 yd^3 roll-off (for e.g. wood waste, metal, or plastics)	On call	$155	$155

Assuming that each ICI customer (267 customers) will be provided a 3 yd^3 bin for weekly garbage collection using a front-end loading truck, the annual waste collection program fees will equate to $1,092 per customer (or $292,000 in total). In reality, not all customers will need that much capacity; many may want to opt into the residential curbside recycling or share a collection bin with adjacent businesses.

If ICI customers can be serviced by the provision of carts, which may be suitable for recyclables, the costs are likely to be half of those of front-end loaded bins. Garbage collected via carts would require semi or fully automated trucks.

5.1.10 Considerations of Processing Costs of Recyclables

It is assumed that all collected recyclables will be delivered to the new SWDC. At this point, it is very difficult to estimate costs per tonne of material processed. These will be dependent on the number of recyclables streams the CoD wants to collect, the market conditions for the collected materials and how much the processor will be paid as diversion credits per tonne of non-refundable recycling shipped to end market. Currently markets are down for many recyclable materials since the largest recycling market, China, is only accepting clean and source-separated recyclables.

There are two recycling processors in Whitehorse that are subsidized by the diversion credits: Raven Recycling and P&M. The processors are paid $150/tonne to offset the high cost of processing recyclables and shipping to markets. However, both processors have indicated there is insufficient revenue to continue recycling the products currently being recycled. YG has been considering other funding options, but there is no indication how the processing costs will be covered in future.

The cost estimates developed for the City of Whitehorse for the residential curbside collection of recyclables included processing costs (refer to Section 5.1.8).

5.1.11 Potential Funding

Table 11 below provides a comparison of the waste management fees for curbside collection based on a jurisdictional review of other municipalities in the Yukon. It shows that only Whitehorse and Faro offer residential curbside collection at lower user fees than CoD, and that CoD's commercial collection fee is the lowest of all jurisdictions. In fact, the City of Whitehorse's fee includes the collection of garbage and organic waste.

We suggest the CoD consider increasing collection fees for both residents and commercial customers. However, it is important to note that many jurisdictions use a combination of user fees and taxes. The CoD only charges residential and ICI customers waste management facility fees and no other taxes. User fees do not necessarily cover the entire cost of the service, and a collection service can be funded by a combination of revenue sources.

Table 11: Curbside Collection Fees in Other Jurisdictions of Yukon[14]

Municipality	Customer Type	Annual Fee or other Fee Structures	Service Level Provided
Faro	Residential Dwelling	$145.72	Curbside collection for garbage
	Commercial	$312.44/year $28.20/pick-up of 6 cubic yards $18.80/pick-up of 4 cubic yards	Curbside collection for garbage
Watson Lake	Residential Dwelling	$300	Curbside collection includes organics, garbage, and may include recycling
	Commercial	$600 (for twice/week pick up)	Curbside collection includes garbage, organics and recycling may be the responsibility of the owner[15]
Whitehorse	Residential Dwelling	$133 $240 (for recycling service)	Curbside collection for organics and garbage. Optional curbside collection for recycling
	Commercial	$133 Fee for recycling service is dependent upon frequency and amount collected	Curbside collection for organics and garbage. Optional curbside collection for recycling[16]
Teslin	Residential Dwelling	$ 300	Curbside collection for garbage. It is unclear whether Teslin also provides curbside collection of recyclables
	Commercial	$600 (for twice/week pick up)	Curbside collection for garbage
City of Dawson	Residential Dwelling	$147.05	Garbage collection only
	Commercial	$218	Garbage collection only

It is important to note that the user pay philosophy is strongly encouraged by the Ministerial Committee on Solid Waste (April 2018). In practice, this means that curbside collection of

[14] 2018 Yukon Municipal Waste Fee Summary, Compiled from Municipal data by Community Affairs branch, Government of Yukon, June 5, 2018.
[15] http://www.watsonlake.ca/wp/wp-content/uploads/2014/10/014-04-Garbage-Collection-Recycling-By-Law.pdf
[16] http://whitehorse.ca/departments/environmental-sustainability/waste-diversion/additional-information/residential-curbside-collection

garbage, recyclables and organic waste should largely be funded by the customers that receive the service (via user fees).

Many municipalities in BC mainly fund their collection services via utility charges to the property owner. The use of a utility fee is recommended for the CoD as well, as it is in line with “user pay” or “pay-as-you-throw” philosophies, which are equitable and generally received better by the public than an increase in taxes. With a transition to user fee-based funding, residents could also receive reduced taxes.

The collection services should be made mandatory for each household in the serviced areas, even if residents choose not to use the service. Any properties that will not receive the service (e.g. vacant properties, or households with insufficient road access) will be exempt from paying the fee.

If the CoD adopts a semi-automated collection system, the delivery of collection carts can trigger the need for payment. The carts would be linked to the property rather than the property owner. As noted earlier, households can be given an opportunity to increase or decrease the size of their container, which would result in the utility fee being adjusted accordingly.

In case of manual collection, all customers within the service area can be automatically assessed the utility fee for the basic level of service (e.g. 1 can of garbage + recyclables pick up per week). If customers (e.g. ICI and MF buildings) require additional garbage disposal capacity, the following mechanisms are proposed:

- Tag-a-bag stickers that would be made available for purchase from local sources (e.g. municipal facilities, local super markets) at a fee that reflects the additional cost of collection and disposal, and/or
- Self-haul the additional waste to the landfill or transfer station and pay the tipping fee (assuming a scale will be installed at the landfill).

The volumes of recyclables and organic waste will be limited by the types of containers used. Any additional recyclable materials will need to be taken to a depot. Some municipalities in BC offer pick-up of unlimited quantities of yard waste when they are stored in paper bags. Alternatively, additional bags can require a tag-a-bag sticker for organics, as described for additional garbage.

5.2 New Solid Waste Diversion Centre

The CoD wishes to explore the option to design and construct a new Solid Waste Diversion Centre (SWDC) on an industrial property within the municipality in collaboration with the Conservation Klondike Society (CKS), the expected final operator of the facility.

The objectives of the new solid waste diversion centre are:

- Increase capacity for sorting by providing a larger sorting table and receiving area.
- Improve materials sorting and processing efficiency of materials dropped off by the public and material collected curbside.

- Provide a processing area (tipping floor and lock-block bays) for receiving recyclables collected from a residential curbside collection program.
- Improve safety controls.
- Provide space to accept and process additional material in future that may be included under the YG DMR.

5.2.1 Site Description

The site for the SWDC is vacant Lot 11, Guggieville Subdivision, in Callison.

The lot was owned by YG and has now been transferred to the CoD.

The CoD has prepared the lot for construction of road and buildings by adding 12 inches of fill, 8 inches of pit run and 4 inches of screened material, compacted and graded.

The lot has an area of 0.608 ha (1.5 acres). However, due to the north area having a pond at a much lower elevation, the useable area for construction and roadways/parking is at most two thirds of the existing lot (i.e. approximately 1 acre).

There is power available on two sides of the lot: the south and the east. The site does not currently have water or sanitary sewer connections. There is a lower undeveloped area to the northwest, west of the existing pond, which may be suitable for a septic field to maximize useable space for parking, roads and construction on the lot.

The CoD has erected fencing around the lot, including two sliding vehicle gates and one man gate. The vehicle gate on the south access will be located approximately 24 m from the southeast property corner, and the vehicle gate on the east access will be located approximately 25 m from the northeast property corner. The main gate is to be located on the northwest side of the fence, essentially opening to the potential location of the septic field to the west of the pond.

5.2.2 Yukon Acts and Regulations Governing Solid Waste Management Facilities in Yukon

Yukon acts and regulations provide the regulatory framework governing development, operations, closure, and post-closure of Yukon solid waste management facilities, and must be considered for the new SWDC. Environment Act RSY 2002, c.76 defines the requirement for SWMPs and provides legislation for the following SWMF related regulations:

- Recycling Fund Regulation O.I.C. 1992/135;
- Beverage Container Regulation O.I.C. 1992/136;
- Special Waste Regulation O.I.C. 1995/47;
- Spills Regulation O.I.C. 1996/193;
- Air Emission Regulations O.I.C. 1998/2007;
- Solid Waste Regulations O.I.C. 2000/11;
- Ozone Depleting Substances and Other Halocarbon Regulations O.I.C. 2000/127;

- Contaminated Sites Regulation O.I.C. 2002/171; and
- Designated Materials O.I.C. 2003/184.

The preliminary conceptual design presented in this report has been prepared with consideration given to the YG's Designated Materials Regulation (DMR) initiatives, which may impact the materials accepted at the SWDC and how the materials are managed in the future.

Materials that may fall under the DMR in future are listed below. These materials are proposed to be added to the DMR, with a proposed fee structure to cover the costs of managing these materials.

Materials expected to be managed under the DMR by the end of 2018

- Vehicle tires (19.5" or less, between 19.5" and 24.5", larger than 24.5").
- Electronic and electrical products (E-waste), such as computers, printers, display monitors, home audio/video systems, phones, and small appliances, including kitchen countertop appliances, microwaves, clocks, bathroom scales).

Tires are already included under the DMR, however the YG is planning for upcoming regulatory changes to tire categories, and the inclusion of additional products such as e-waste with program implementation October 1, 2018. It is unknown at this time exactly what role the YG will play in managing these materials.

Additional features incorporated into the conceptual design to provide flexibility for future modifications include the following:

- A spare bay in the lock-block wall recycling tipping floor area.
- An open recycling shelter structure that can be rearranged to allow for additional materials to be accepted.
- Space allocation to accept additional materials in recycling bins and an additional recycling structure in the southeast corner of the site.

We recommend the CoD discuss this conceptual plan with YG to ensure that as materials are added to the DMR, the CoD is able to transfer the handling and storage to YG or be in a position to negotiate for compensation to accept, handle and store future DMR materials.

5.2.3 Previous Conceptual Designs

CKS developed a preliminary concept design in 2015. Two conceptual designs have since been prepared by YG in 2017 as shown in Figure 14 and Figure 15, next page.

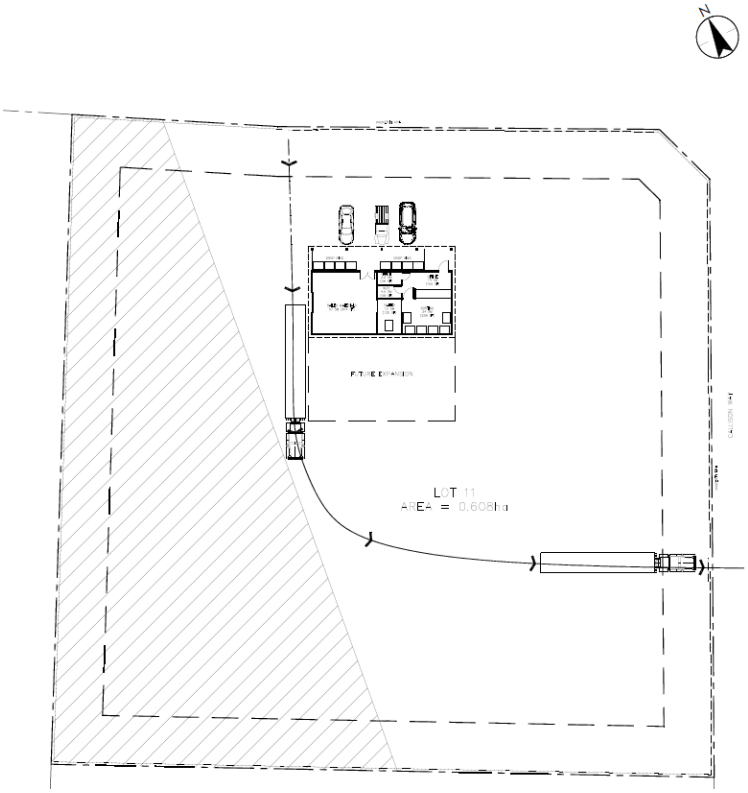

Figure 14: Option 1 for New SWDC

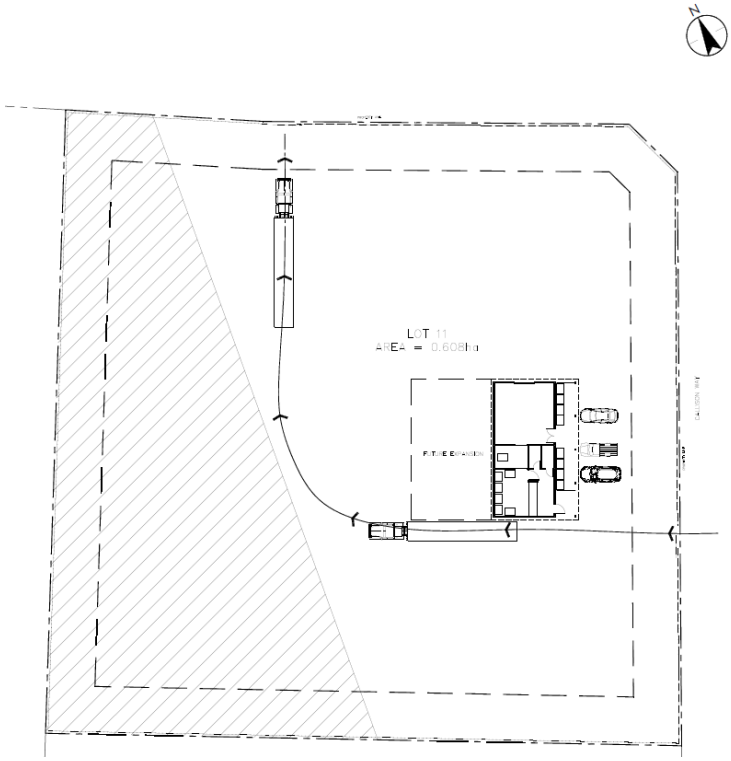

Figure 15: Option 2 for New SWDC

5.2.4 Updated Conceptual Design

MH reviewed the previous two conceptual designs prepared by CKS in 2015 and YG in 2017. Based on updated information and the assessment provided in this report, an updated conceptual design for the new SWDC was prepared. The updated conceptual design incorporates elements from the two previous conceptual designs.

The conceptual design described in this section is considered a preliminary design suitable for discussion and preliminary costing purposes only.

The conceptual plan is presented in Figure 16, next page.

LOT 9

LOT 10

LOT 11

N

WB–20LM
AASHTO 2007 (SU)

PROPSED GATE

PROPOSED
RECYCLING CENTRE

35.00

MATERIAL AND
EQUIPMENT
STORAGE ROOM

15.00

WASHROOM,
OFFICE, PUBLIC
EDUCATION ROOM

WB–20LM
AASHTO 2007 (SU)

RECEIVING AND
BALING ROOM

OUTDOOR
RECYCLING
SHELTER

PROPOSED GATE

DESIGNATED AREA FOR
FUTURE EXPANSION

CALLISON WAY

P:\2018\180283500-City of Dawson SWM Program Design\09. CAD\07. Sheets\FIGURE 01 CONCEPTUAL PLAN – SOLID WASTE DIVERSION CENTRE.dwg Plotted: by Kali Hofmeister

MORRISON HERSHFIELD

DAWSON CITY, YUKON

CITY OF DAWSON
SOLID WASTE MANAGMENT
PROGRAM DESIGN

LEGEND:
UNUSABLE WET LANDS
FENCE —X—X—

FIGURE 16
CONCEPTUAL PLAN - SOLID WASTE
DIVERSION CENTRE

SCALE 1:500 0 2.5m 12.5m 25m

180283500
Aug 01, 2018
VERSION 01

5.2.4.1 Objectives

The conceptual design was prepared with the following objectives:

- Provide additional space for sorting recyclables.
- Provide additional space for public drop-off of recycling.
- Provide infrastructure to allow for processing of recyclables collected curbside.
- Provide space allocation to allow for acceptance and processing of additional materials in the future.

5.2.4.2 Materials to Manage at SWDC

Materials that may be accepted at the SWDC include the following:

- BCR materials (refundables)
- Glass (non-refundables)
- #1 Plastic (Clear and Coloured)
- #2 Plastic (Natural/Cloudy)
- Newspaper
- Hard Mixed Paper & Office Pack
- Cardboard & Boxboard
- Metal
- Mixed Plastics (#4 - #7)
- Plastic Film
- Polystyrene Foam
- Tin
- Tetra Pak®/Wax Cartons
- Propane tanks
- Household Hazardous Waste (HHW)
- Tires
- Used oil
- Lead-acid batteries
- Major appliances
- Compostable organic waste
- E- waste
- Household batteries

The CoD has the option to accept and store larger DMR materials, such as tires, fridges, and appliances at the new SWDC. Another option is to continue accepting these larger items at the landfill and not manage them at the new SWDC.

The proposed conceptual design includes a space allocation to manage larger items; however, this may be less practical from an operational point of view, and it may be more cost effective to manage larger items at the landfill only.

YG is committed to providing an annual HHW collection event at the Quigley Landfill. This is also assumed to be the case for a new SWDC.

5.2.4.3 Key Features

SWDC Main Building

The main building of the proposed SWDC includes the following rooms as shown on Figure 16:

- Receiving and baling room
- Material and equipment storage room
- Washroom
- Office

- Public education room
- Recycling shelter (attached, accessed from the outside)

The structure proposed is a pre-fabricated insulated metal building. The building will require electrical, sanitary, and water connections.

The footprint of the proposed building is estimated to be 525 m^2 and includes the rooms listed above. The recycling shelter will be attached to the main building and is included in the 525 m^2 building footprint.

Lock-Block Wall Receiving Area for Curbside Recyclables

The conceptual design includes an area for receiving recyclables collected from a future curbside collection program. The receiving area consists of a concrete tipping floor and a three-bay lock-block wall for temporary storage of the materials.

It is assumed that two streams of recyclables will be collected from the future curbside collection program: mixed paper (includes newspaper and cardboard) and mixed containers (includes all beverage containers and aluminum cans). A third lock-block receiving bay has been included for future materials that may be collected. It could also be used as a general storage area for materials such as e-waste or bulky waste.

When the collection truck arrives at the facility, the materials are emptied onto the tipping floor. A skid steer would then be used to move the materials into one of the two receiving bays. The material would then be baled at regular intervals (baler located in the receiving room) and the bales would be moved to the storage room.

The conceptual design and cost estimate includes the cost for a three-bay lock-block bunker and a skid steer to manage the incoming recyclables.

An example of a recycling depot with a concrete tipping floor and lock-block bays for receiving recyclables is shown in Figure 17.

Figure 17: Recycling Depot with Tipping Floor and Lock-Block Sorting Bays for Recyclables

Upgraded Balers

One baler is currently used at the depot in downtown Dawson. However, the majority of the recyclables collected at the CKS depots are sent unbaled to Raven Recycling.

YG currently pays for the transportation of materials accepted at the current depots. However, it is in the COD's best interest to manage and store materials as efficiently as possible prior to transport.

The processor, Raven Recycling, currently accepts (and often prefers) that many of the recyclable materials are baled at the depot prior to transportation (refer to Appendix A for preferred sorting requirements). A baler can compress materials prior to shipment to the Whitehorse processing facilities. Baling allows greater quantities of recyclables to be shipped on a single transport vehicle to Whitehorse and improves materials management at the depot facility (space savings if storage capacity is limited).

All BCR materials need to be managed separately from non-refundables at the depot for auditing purposes. YG periodically audits BCR bales to ensure the number of containers per bale remains consistent.

Based on previous work for the YG, it is understood that YG has budgeted to purchase balers. YG will first focus on purchasing balers for depots with access to power and available space. We recommend the CoD contact YG about specific needs for its depots.

The conceptual design and cost estimate include two new horizontal recycling balers and supporting equipment, including a pallet jack. The pallet jack is used for maneuvering and stacking of bales indoors/outdoors.

An example of a horizontal baler is shown in Figure 18

Figure 18: Horizontal Baler

Storage for Bailed Materials and Other Materials

The conceptual design includes a baling and sorting room that will provide sufficient storage for baled materials, including paper and mixed containers. Additional materials, such as HHW and e-waste, can also be stored in this room.

Material storage is an important consideration, because BCR and non-refundables are to be baled separately for auditing purposes.

Improved Sorting Efficiency

The recycling depot located downtown currently has one sorting table, which staff use to sort through mixed recyclables and place sorted items into pails located beside the table.

The conceptual design proposes three potential options to improve the sorting efficiency of mixed recyclables.

Option 1: Larger Rectangular Sorting Table

It appears the current sorting table is undersized for the quantity of recyclables received at the facility. A larger sorting table would provide additional space for more recyclables, and would allow staff to sort through material from either side of the table.

The sorting table would have perimeter guards/rails to prevent material from falling off. The table top would be finished with sheet metal for durability. It is recommended that the table be sloped for drainage purposes. If staff are expected to sort from both sides of the table, the table can be designed so the crest/peak runs along the table's centre and slopes towards both edges. Drainage holes, side channels, and buckets would be required to convey and capture any liquids.

Option 2: Rotating Circular (Rotary) Table

There are several styles of rotating circular tables available. The intent of the rotating table is to improve sorting efficiency by moving the recyclables to the staff completing the sorting, which reduces the amount of bending and reaching staff are required to do during sorting.

Rotary tables are typically produced in stainless steel and are available in a range of diameters up to 1.5 m. The tables have standard guardrails fitted on the outside edge to prevent materials from falling off. The motors can also be variable speed, so users can adjust the RPM to accommodate the speed at which staff can sort.

Mixed recyclables must be manually loaded onto the rotary table, and any materials remaining on the table after sorting is complete must be manually unloaded off the table.

An example of a rotary table is shown in Figure 19 below.

Figure 19: Example of a 2.5 m Diameter Stainless Steel Rotary Table[17]

Option 3: Straight Belt Conveyor

The purpose of a straight belt conveyor is to allow staff to sort through mixed recyclables more efficiently by reducing the amount of bending and reaching required while sorting. The conveyor transports materials to the staff completing the sorting. The conveyors are typically produced with PVC or rubber belts; however, other belt materials are available for specific applications. The conveyors are available in a range of widths, and are produced with variable speed motors that can be adjusted to match the operators' sorting speed. It should be noted that the belts do need to be replaced, and replacement belts are available and relatively easy to replace. The replacement frequency depends on several factors, including belt material, duration of use, nature of materials on the belt, and speed of the motor.

The conveyor is manually loaded with mixed recyclables at one end, and a bucket or bin is placed at the other end of the conveyor to collect any unsorted recyclables. Unsorted materials can be manually loaded back to the front of the conveyor to complete sorting a load of recyclables.

An example of a straight belt conveyor is shown in Figure 20, next page.

[17] https://www.eqm.co.nz/product/rotary-tables/

Figure 20: Straight Belt Conveyor with Guardrails[18]

Outdoor Recycling Shelter

The conceptual design includes a semi-enclosed recycling shelter attached to the main SWDC building. The recycling shelter would be primarily for residential drop-off of sorted recyclables, and would have separate bays for accepting the materials listed in Section 5.2.4.2.

Recyclables would be stored in mega bags (1 m by 1 m freestanding bags). Approximately 2-3 mega bags would fit in each compartment of the recycling shelter. The total number of recycling compartments and shelter size would be determined during detailed design, once a detailed review of anticipated tonnages and accepted materials has been completed.

The purpose of having the recycling shelter attached to the main SWDC building is to minimize the handling distance between placement of recyclables in the bags, transportation to the baler for baling of the materials, and transportation of the baled materials to the storage room.

One advantage of having the recycling shelter attached to the primary building is that transportation distance is minimized. Doors could be installed on the SWDC between the back of the recycling shelter and the building to allow the mega bags to be transferred directly into the building without needing to collect the bags from outside. The style of doors could be either sliding or garage-style roll-up doors, as determined during the preliminary or detailed design stage of the SWDC.

An example of a detached recycling shelter used by a similar sized community in the Yukon is shown in Figure 21.

[18] http://www.cisco-eagle.com

Figure 21: Detached Recycling Shelter Used to Collect Sorted Recyclables Dropped Off by Residents

Two potential door configurations that could be used to transfer the mega bags from the back of the recycling shelter into the main SWDC building are shown in Figure 22 below; a garage style roll up door (shown left) and a sliding door (shown right).

Figure 22: Garage Style Roll Up Door and Sliding Door

Designated Area for Future Expansion and Acceptance of Additional Materials

As noted in Section 5.2.2, changes to the YG's DMR initiatives may impact what materials are accepted at the SWDC and how the materials are managed in the future.

A primary objective of the conceptual design is to provide sufficient flexibility for accepting and managing future materials. As shown in Figure 16, an area has been

designated in the southeast corner of the site for future infrastructure. This space is large enough for an additional detached recycling shelter or multiple 40 yd^3 roll-off bins. This space could also be used as a general storage area for equipment or baled materials.

At this time, given the quantity of recyclables expected to be managed at the facility, it is anticipated that this space will not be used and the proposed SWDC will be sufficient for receiving, processing, and storing all materials in the short term.

5.2.4.4 Future Considerations

Future considerations that should be evaluated as the proposed SWDC progresses into the preliminary and detailed design phases are listed below:

- **Management of materials between the new SWDC and current downtown facility.** If the new SWDC were operated out of Lot 11, the CKS may still wish to receive refundables at the downtown depot location, as opposed to closing down operations at their downtown location. CKS would keep the downtown location open as a bottle depot to distribute refunds to customers.
- **Future DMR material management.** The CoD should meet with YG to assess which materials may be managed by YG in the future and what role YG expects to play in managing the materials. This may impact the space and infrastructure required at the new SWDC. Materials that may be managed by YG in the future include C&D waste, and waste oil.
- **Review of recycling curbside collection program.** The new SWDC is expected to act as the drop-off location for recyclables if a recycling curbside collection program is implemented in the future. It is important to review the requirement of any curbside collection program being considered to ensure drop-off requirements are compatible with the layout of the proposed SWDC. Factors to consider include: type of collection vehicle being used, vehicle capacity, how materials are emptied from the truck, and recyclable streams that will be collected.
- **Staffing.** A new SWDC will require additional staff to operate the facility. If the downtown facility continues to operate as planned, then CKS will require double the staff to operate their depots. CKS currently has five employees and six during the summer. One is the coordinator and the rest are depot attendants. Employees receive a wage of $17.00 an hour at the downtown depot, $18.00 at the landfill and $21 for the coordinator. All positions are part time.

5.2.5 Capital Cost Estimate

A capital cost estimate has been prepared based on the system components presented in this section. The cost estimate is considered a Class D preliminary cost estimate (±50 %) based on the information available on the site at this time. The cost estimate is suitable for preliminary discussion of the proposed SWDC.

Operating costs have not been estimated due to the limited information about staffing, waste processing at the facility, and waste hauling to and from the facility.

The capital cost estimate is presented in Table 12 below.

Table 12: Class D Capital Cost Estimate for Proposed SWDC

Item #		Item	Unit	Quantity	Unit Price	Total Price
1		**Project Summary**				
	1.01	Mob/Demob	LS	1	$ 50,000	$ 50,000
	1.02	Site Preparation	LS	1	$ 120,000	$ 120,000
	1.03	Surfacing, barriers and signs	LS	1	$ 197,500	$ 197,500
	1.04	Lock-block Wall	LS	1	$ 12,600	$ 12,600
	1.05	Surface water management	LS	1	$ 20,000	$ 20,000
	1.06	Site Buildings	LS	1	$ 550,000	$ 550,000
	1.07	Equipment and Containers	LS	1	$ 196,500	$ 196,500
					Subtotal	**$ 1,146,600**
					40% Construction Contingency	$ 459,000
					Subtotal - Construction Cost	$ 1,606,000
					Engineering - Detailed Design Services (8%)	$ 128,000
					Construction Oversight, Contract Administration (7%)	$ 112,000
					TOTAL - COST	**$ 1,846,000**

Further details on the proposed SWDC is provided below.

Site preparation (item 1.02) includes the following items:

- Site grading, clearing, and grubbing. It is understood that the majority of the site is cleared and has been partially graded.
- Landscaping and topsoil.
- Power supply and lighting.

Surfacing, barriers and signs (item 1.03) includes the following items:

- Compacted gravel over the entire site, consisting of a 300 mm thick sub-base and 150 mm thick gravel road base.
- An area approximately 225 m^2 for a concrete tipping floor for managing recyclables collected from the curbside collection program (100 mm thick concrete slab).
- An allowance for traffic barriers and concrete curbing.
- An allowance for up to 10 traffic signs.

Surface water management (item 1.05) includes drainage ditches, pipe culverts, and culvert headwalls.

The site building (item 1.06) is assumed to be a pre-fabricated metal structure with an attached wooden recycling structure. The cost for this line item includes the foundation preparation works associated with the building.

The cost for equipment and containers (item 1.07) includes the following:

- Two horizontal recycling balers.
- One wheeled 3 tonne skid steer.
- One manual rough terrain pallet jack.
- One circular conveyor belt sorting table.
- Twenty large canvas bags and containers for recyclables.
- Miscellaneous safety equipment (fire extinguisher, first aid, spill kit, etc.).

The capital estimate is for budgeting and discussion purposes. As the design progresses, the contingency amount will also become lower and it will be possible to consider ways of lowering the capital costs.

5.2.6 Funding

Recycling depots are financially incentivized via the Recycling Fund to manage BCR materials. The funding does not cover the management of non-refundables, although the non-refundables often make up the majority of the quantities of materials managed at many depots in YT.

CKS receives an operating grant from YG of $40,800 a year, an average of $30,000 in handling fees a year.

YG has the full financial responsibility for removing all DMR materials from the Quigley Landfill. This is assumed to also be the case for a new SWDC. YG may be able to provide funding for capital projects from federal sources, such as rural and northern communities infrastructure funds.

5.3 Public Education Programs

5.3.1 Curbside Collection Program

A well-designed collection system can live up to its potential if it is well promoted and households receive sufficient education about the system before and during program roll-out. Adequate communication is crucial to achieve a smooth transition to a new system, to maximize participation rates and to ensure the ongoing success of the program.

At first the CoD may want to seek additional stakeholder feedback (e.g. haulers, processors and the public) in order to refine the program design and costs.

The following considerations should be taken into account prior to program launch to create awareness and build interest about the new collection program:

Methods of Communication

- Advise households about the upcoming program using a range of media, including the municipal website, direct mailings, utility bill notices, newspaper articles, print and

broadcast public service announcements, community meetings, and paid advertising (newspaper and radio). Representatives from CoD may also attend local events/shows with information about the upcoming program.

- Social media offers additional routes for authorities to engage with residents. For example, Twitter can be used to hold question and answer sessions on waste services. Another example is the use of smart phone apps, which can offer residents information about service details (e.g. which materials can and cannot be recycled, how and when to put out collection containers) and can also send automated reminders about collection days.
- Calendars containing curbside collection schedules and tips are an essential communication tool for many authorities.
- Some information can also be embossed on collection containers (if containers are provided by CoD).

Information to Communicate

- Details about what services will be provided, how this system was selected, who is impacted (and who is excluded), how the system will work (e.g. service rules), program start-date, what happens to their garbage and recyclables after collection and the promotion of a hotline to call with questions.
- Where suitable, address people's barriers to using the system by including positive quotes from residents who are looking forward to the curbside collection program or who have had curbside collection in other jurisdictions
- Information about the benefits (environmental and financial) from waste diversion.
- CoD may want to clarify the long-term plan for waste management, e.g. progress on the Waste Diversion Centre and the potential for organics waste collection.

How to Communicate

- If available, use outreach specialists and other communications-related staff at CoD to build on existing communication programs and branding.
- Inform all relevant CoD staff of a planned change ahead and train staff to respond to hotline calls.

Timing

Approximately 2 months prior to program launch, CoD should start to provide practical information, such as the curbside collection schedule, set-out practices, and details on what can be recycled and disposed of as garbage. Information channels can be expanded to include an increase in earned media, paid advertising, and may also include direct mail, such as a collection calendar.

Approximately 1 month before program launch, the CoD should send information to residents by mail that focuses on the start date and set-out practices.

Approximately 1 month to 2 weeks before program launch, any collection containers that will be supplied by the CoD should be delivered to households. This is another opportunity to provide printed material.

At this time, the CoD also needs to make sure that sufficient staff are in place and are trained to respond to calls. The number of calls typically diminishes within a month or two after program roll-out.

Once the call volume has tapered, the CoD may wish to consider transferring the responsibility for responding to customer enquiries about the collection service from the CoD to the collection contractor (if undertaken by a private contractor). If possible, ensure that the hotline number used during the program launch is transferred to ensure that printed promotional material is still relevant.

The success of the program should be evaluated and communicated on an ongoing basis to encourage participation. The CoD can provide households with information on recycling rates achieved, results from waste composition data and what environmental outcomes are being achieved from the collection so far. Positive messaging is important to keep people engaged and participating in the collection program.

Public Education Costs

Once the CoD invests in a curbside collection program for recyclables, it is important to maximize the waste diversion from this program. There needs to be adequate funding for the launch costs and promotion associated with the program roll-out. The CoD should expect to spend a minimum of $10,000.

On an ongoing basis, the CoD will need to plan for education costs. Recycle BC has reported that among over 20 municipalities in BC, these ongoing costs have varied widely. Before the implementation of the Extended Producer Responsibility (EPR) Program for packaging and printed paper in BC, the cost per household ranged from $0.24 to $11.18 with a mean of $1.71 and a median of $1.05.

5.3.2 New Solid Waste Diversion Centre

The CoD should take the unique opportunity to raise awareness of its solid waste management program and how a new SWDC fits into this program.

The public can be invited to an open house for the facility opening. Ideally, it can coincide with a local celebration or festival. The open house should be staffed with local experts (e.g. CKS and municipal representatives).

On an ongoing basis, the facility is envisioned as being an environmental educational centre for Dawson, providing educational opportunities for schools and other interested groups. CKS may want to provide this education as part of the operation of the SWDC.

5.4 Diversion Opportunities

This section covers potential opportunities for improvements, either in terms of diversion from landfill or from material management.

5.4.1 Waste Reduction

The CoD is able to target waste diversion by implementing some of the initiatives that promote waste reduction and reuse of resources. Some examples include:

- **Hold repair cafés.** These are often popular meetings free of charge aimed at bringing people together to repair broken goods and reduce wastage. Typically, municipalities are making sure that participants can find all the tools and materials required to help make repairs. Volunteer specialists in the community can be invited to guide the repairs.
- **Promote "Make Holiday Memories, Not Garbage" initiative.** Provide ideas of wonderful gift ideas that make memories and create little to no waste.
- **Encourage residential backyard composting.** Until a curbside collection program for organic waste is rolled out, the CoD may want to more actively encourage backyard composting. The City can, for example, subsidize the cost and distribute suitable types of composters and provide education on their use. Backyard composting reduces the amount of organic waste going to landfill and reduces the need for collecting the waste materials (either as part of the garbage or an organic waste collection).
- **Encourage residents to reuse bags.** Develop waste reduction campaign to encourage the use of reusable bags, rather than single-use plastic bags.
- **Promote Food Waste Reduction.** Uneaten leftovers and spoiled food make up over 25% of the waste discarded from a household. The CoD may want to use some of the strategies found in the BC Residential Food Waste Prevention toolkit developed by BC Ministry of Environment. It includes the promotion of a Love Food, Hate Waste style campaign.
- **Support the development of a sharing library.** Several permanent libraries have been set up in Vancouver that offer tools, sports equipment and more. The so called "Thingery" has been a huge success[19]. That pooling of resources means less demand for goods production.

5.4.2 Regulatory Options to Encourage Waste Diversion

Many towns and cities in North America have established bylaws requiring residents and ICI sector waste generators to source separate recyclable and/or compostable materials in order to ensure diversion from landfill.

[19] http://thethingery.com/

There are legislative options for requiring ICI sector waste generators to source separate recyclable and/or compostable materials in order to ensure diversion from landfill (landfill bans, aggressive differential tipping fees, bylaw amendments).

Suitable options that are available to the CoD include:

- Landfill disposal bans on readily recyclable and compostable materials (implemented in conjunction with or after the provision of collection services).
- Landfill disposal bans on all materials covered under BCR and DMR.
- Aggressive differential tipping fees for source-separated materials that can be processed for diversion at the landfill (only feasible for facilities where tipping fees are collected).
- Bylaw requirement requiring ICI sector waste generators to source separate recyclable and/or compostable materials.

5.5 Improvement to Material Management at Depot

5.5.1 HHW Management

The CoD is currently collecting HHW once a year, which makes it difficult for residents and the ICI sector that often want the ability to drop off these materials when the depots are open. YG is responsible for the management of HHW. The CoD may want to influence YG to collect HHW from residents via a mobile HHW depot, which visits each of the territory's depots several times a year. A mobile HHW depot can stay at each location for a period of one week before moving on to another. In 2016, The County of Wellington, ON, established a mobile depot at a capital expense of $15,000, which includes safety features, lockers and shelving. The mobile unit (55 yd^3 roll off bin) can accommodate 25 55-gallon drums that are single stacked[20]. Operating costs are estimated between $130,000 and $215,000. However, there may be opportunities to obtain funding for capital and operational costs from YG.

By targeting HHW, only small quantities of waste are diverted (not noticeable in terms of waste diversion performance tracking), but with significant environmental benefits from avoided costs of pollution and environmental mitigation if these HHW materials ended in the landfill or in the environment.

5.5.2 Glass

Dawson has equipment to crush BCR and non-refundable glass. Instead of simply crushing and disposing of glass into the landfill, the CoD may want to look at finding local uses for it. Glass is costly to transport because there is a very low to no market value for recycled glass.

[20] Information provided by Das Soligo, County of Wellington, January 2018, personal communication.

The Government of the Northwest Territories sends crushed glass to Airdrie, Alberta, where it is processed into fibreglass insulation[21].

In Alaska, they have created a market for crushed glass as a pipe bedding medium for the Water and Wastewater Utility. The Solid Waste and Water and Wastewater Utilities of the Municipality of Anchorage worked together to write a new pipe bedding specification.

C&D glass waste can be diverted from the landfill using deconstruction processes, which involve sorting materials from a building tear-down for reuse and recycling. The City of Portland has a non-profit organization called Rebuilding Center that sorts and sells used building materials for 50-90% of their retail value. The largest issue with deconstruction is time, where demolition typically takes 1 day, deconstruction can take 1-2 weeks. However, the cost of deconstruction can be reduced by reusing glass windows in greenhouses or for interior household windows. Recycled glass can be used as aggregate in concrete, as a sand supplement, or it can be donated to local artists and up-cycled for glass blowing, glass tiles, jewelry, or landscaping decorations[22]. The revenue generated from more profitable recycling materials, such as metals, may be able to subsidize some transportation costs for the recycling of less profitable materials, such as glass[23].

The CoD may want to investigate whether any of these are suitable reuse options for the crushed glass.

5.5.3 Cardboard

Cardboard is currently landfilled in the summer and burned in the winter. The CoD is interested in finding a better use for the collected cardboard than currently burning it at the landfill without energy recovery.

We recommend the CoD consider the feasibility of having balers at each of the depots to allow for baling and stockpiling of cardboard. Recycling of baled cardboard is preferred instead of lower uses of cardboard (recovery or residual waste disposal).

Cardboard can also be made into pellets; however, it presents unique challenges with conventional manufacturing processes. When cardboard goes through size reduction in a hammer mill, it produces a fluffy material that has a static charge. This material does not flow well through the augers of a pellet plant. The production of cardboard pellets would require unconventional equipment that may increase cost. Furthermore, there is a limited market for cardboard pellets, since only some pellet burners can handle their higher ash content[24].

[21] https://www.enr.gov.nt.ca/en/about-environment-and-natural-resources
[22] 2013 Possible options for reuse and recycling of end-of-life waste glass from deconstruction projects, Veronica Vaughan, April 3, 2013.
[23] 2017 Solid Waste Management for Northern and Remote Communities, Planning and technical guidance document, Environment and Climate Change Canada, March 2017.
[24] http://www.pelheat.com/cardboard_pellets.html

5.5.4 Waste Oil

St. Theresa Point, in northeastern Manitoba, has installed a used oil burner and storage unit for the community. They collect recycled oil and use it as heating fuel for the Municipal Fire Station during the winter[25]. This may be a suitable option in Dawson if there sufficient quantities of oil collected and users of the oil for heating.

5.5.5 Waste Textiles

Textiles can often make up a significant part of the waste streams. For example, it made up 3% of City of Whitehorse' residential waste stream in 2017. Many waste textiles can be diverted and reused. The CoD may want to place a textile collection container at the depots and/or the landfill. There are several non-profit organizations across Canada (such as Goodwill, Big Brother and Canadian Diabetes Association) that are willing to collaborate with municipalities across Canada to find unwanted clothing to donate to people in need, either in Canada or in developing countries.

5.5.6 End-of-Life Mattresses

The disposal of mattresses at the landfill is operationally challenging due to the bulkiness of mattresses. One mattress takes up approximately 0.9 m^3. The mattress springs have a tendency to impact landfill and transfer station equipment (e.g. puncture hydraulic systems). The removal of mattresses from the waste stream can help to reduce maintenance costs of transfer station and landfill equipment.

The CoD may want to look at the possibility for manually deconstructing mattresses with high metal content, as there are secondary markets for the steel of the innerspring unit. This recycling has several benefits, such as diverting waste from landfill and creating local jobs.

[25] http://usedoilrecycling.com/recycling-in-canadas-remote-northern-communities/

6. STAKEHOLDER CONSULTATION

The CoD is looking at making significant changes to the existing solid waste management system and the level of service its residents and businesses are currently provided. As part of this project, MH staff engaged with private waste haulers operating in the CoD to understand the current services provided and what issues they experience.

The CoD may want to plan for consultation with the public and other impacted stakeholders on the new direction by:

1. *Informing* the general public and potentially affected stakeholders about the content of the draft design of the SWM program;

2. Obtaining *input* from affected stakeholders (including general public) on the proposed plan components; and

3. *Collaborating* with member municipalities to undertake consultation events that broadly engage with the community on matters related to solid waste management.

The CoD may want to use some of the following strategies to undertake consultation:

- Open Houses at depots or landfill staffed with local experts
- Presentations to stakeholder groups/organizations
- Presentations to First Nation Councils
- Online information on municipal website
- Determine opportunities to piggyback on municipal communications (newsletters, mailers, utility bills, billboards, etc.)
- Use of social media (Facebook)
- TV/radio commercials
- Radio advertisements
- Feedback surveys (online, exit surveys at open houses, at landfills and depots, phone interviews)
- Promotional activities

Feedback from various stakeholders during this consultation can inform how to best design/revise a service. It is important to report out on feedback received and how it will be incorporated into the Final SWM program design.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Curbside Collection Service

This study assessed options for solid waste management program designs to improve the management of waste materials (such as MSW/garbage, recyclables and organics) from within the City boundaries. The CoD currently only collects garbage through the use of a contractor, and there is limited curbside collection of recyclables and organics. The introduction of curbside recycling and (eventually) source separation of organics, will improve the CoD's environmental performance and reduce the amount of waste that goes to landfill.

The materials that are suggested for recycling include the collection of two streams: fibres (paper and cardboard products) and containers (plastics and metal). Glass can be added when there are local markets for crushed glass, but is not included at this stage. The fibres and containers are best to be source separated at the curb. Residents can be made to source separate recyclables if the education and promotion of the program is planned adequately. Source separation at the curb saves on sorting and processing costs and increases marketability of the recyclables to end markets. This is especially important now when large recycling markets, such as China, are only willing to receive clean and source-separated recyclables.

Although the study has assessed the potential quantities of organics to collect from residents and ICI customers, we recommend that organics (yard & garden and kitchen waste) should not be collected at this time, since the available processing facility is not suitable to handle larger quantities of organics at this point. All residual waste (i.e. the garbage collected) will be disposed of at the Quigley Landfill.

Residential Curbside Collection

There are 80 apartment units in MF buildings in CoD, which are currently serviced by a curbside garbage collection. Accessibility for collection trucks and space requirements for collection containers may require further investigation prior to the inclusion of this sector in the residential collection program. As these MF buildings are currently serviced by the existing curbside collection service, it was assumed that a residential service will continue to service them.

There are many different ways that the CoD can provide residential curbside collection of garbage and recyclables to its residents. Some of the main options include:

Option 1: Manual Collection

- Collect garbage in containers purchased and maintained by residents (self-provided and not standardized), with one bluebox provided for mixed containers and reusable plastic bags provided for fibres.
- Collect via manual trucks (two trucks needed) at a capacity of 18 yd^3. Two operators would be needed per truck to operate safely.

- Garbage from all residential units can be covered in one day and two trucks can cover all the units in one day to collect the source-separated recyclables.
- Weekly collection of garbage and recyclables.

Option 2: Semi-Automated Collection

- Collect garbage in a wildlife-proof wheeled cart with one bluebox provided for mixed containers and reusable plastic bags provided for fibres.
- Collect via semi-automated trucks (two trucks needed) at a capacity of 16 yd^3. One operator is only needed per truck.
- Garbage is collected in wheeled carts using the semi-automated truck arm, while with two streams of recyclables are collected manually using two trucks.
- All residential units can be covered in one day and two trucks can cover all the units in one day to collect the source-separated recyclables.
- Weekly collection of garbage and recyclables.

Curbside collection for garbage and recyclables is estimated to cost between $815 and $900) per household per year (or a monthly cost of approximately $70 to $80 per household).

Curbside Collection from ICI

Based on cost estimates from private haulers in Whitehorse, the cost to collect garbage in 3 yd^3 bins on a weekly basis using a front-end loading truck equates to $1,008 per customer (or $287,000 in total). In reality, not all customers will need that much capacity, and many may want to opt into the residential curbside recycling or share a collection bin with adjacent businesses.

If ICI customers can be serviced by the provision of carts, the costs are likely to be half of those of front-end loaded bins, provided that the semi or fully automated trucks are available for cart collection.

With the use of an M-class truck, ICI waste can be collected via a semi-automated system for carts, or for larger volumes (in roll-off bins with capacities of 8 – 12 yd^3). In the CoD there are not likely to be many ICI customers who require these roll-off bin capacities. Most jurisdictions in BC do not collect garbage or recyclables from the ICI sector and instead leave it to the private sector. This is an option for the CoD to consider.

Procurement Considerations

Regardless of servicing residential or ICI customers, it is recommended that the CoD move toward a full cost recovery user-pay system for providing the services. The first step on this path to a more financially sustainable system is to implement a user-pay residential curbside collection system for garbage and recyclables, and eventually organics when the processing capacity has been established.

In order to achieve the most economical system, the collection service should be obtained through a competitive bidding process.

The proposed next steps for implementation include more detailed assessment of garbage and recyclable materials to be included in the collection program and procurement options. Stakeholder consultation (e.g. haulers, processors and the public) will be required to refine estimated program costs and initiate the undertaking of the procurement process.

There seems to be a limited pool of private contractors/haulers that can provide collection services (i.e. limited competition) and there are concerns about the cost of the current service. The CoD may want undertake some stakeholder consultation with the private sector and develop an RFEOI to confirm how many private service providers can potentially compete at the RFP stage.

The RFP can specify the conditions and level of service desired, but leave sufficient leeway for service providers to be able to provide innovative solutions. The use of an RFP gives the CoD more flexibility in terms of evaluating submissions, compared to a traditional tender process. To increase competition, the CoD should consider also bidding on the contract. The City of Whitehorse used this method when it procured a service provider for its curbside garbage collection. The procurement method had some resistance from the private sector as it perceived the municipality to have an advantage as a single axle truck was specified in the RFP requirement. At that time, many potential private sector proponents only owned double axle trucks and were unable to bid. The municipality had a single axle truck at the time of the procurement. MH recommends the CoD consider these kinds of challenges prior to issuing an RFP so that there is a level playing field for all proponents.

If the CoD elects to use specialized carts for the curbside collection (e.g. bear proof), the RFP can specify that the purchase of the specialized carts would be the responsibility of the CoD. This will enable a more accurate comparison between manual and semi-automated collection costs.

7.2 New Solid Waste Diversion Centre

MH recommends discussing the proposed conceptual design of the new SWDC with various stakeholders, including YG.

The design presented in this report is considered only one concept. The CoD has many options with the new SWDC and the final design can be developed to suit the solid waste management system needs, with consideration to budgetary restrictions.

Additional recommendations and considerations are provided in Section 5.2.

7.3 Road Map for Dawson's Solid Waste Management Program

The CoD is proposing many improvements to the existing solid waste management system, and all of them cannot be implemented at once. Currently it is estimated that only 10% of waste materials are diverted from landfilling. In 2015, the CoD set a diversion target of 34% of the MSW stream by 2023. This appears to still be a realistic and achievable target. With the establishment of a new SWDC (recycling depot) and a curbside collection for recyclables, the CoD is likely to achieve a waste diversion of roughly 30%. With the additional implementation of an organics management program the CoD is likely to exceed its diversion target of 34%.

MH has developed a road map to guide the sequence of events. Figure 23 below summarizes the proposed road map for the CoD's new solid waste management program.

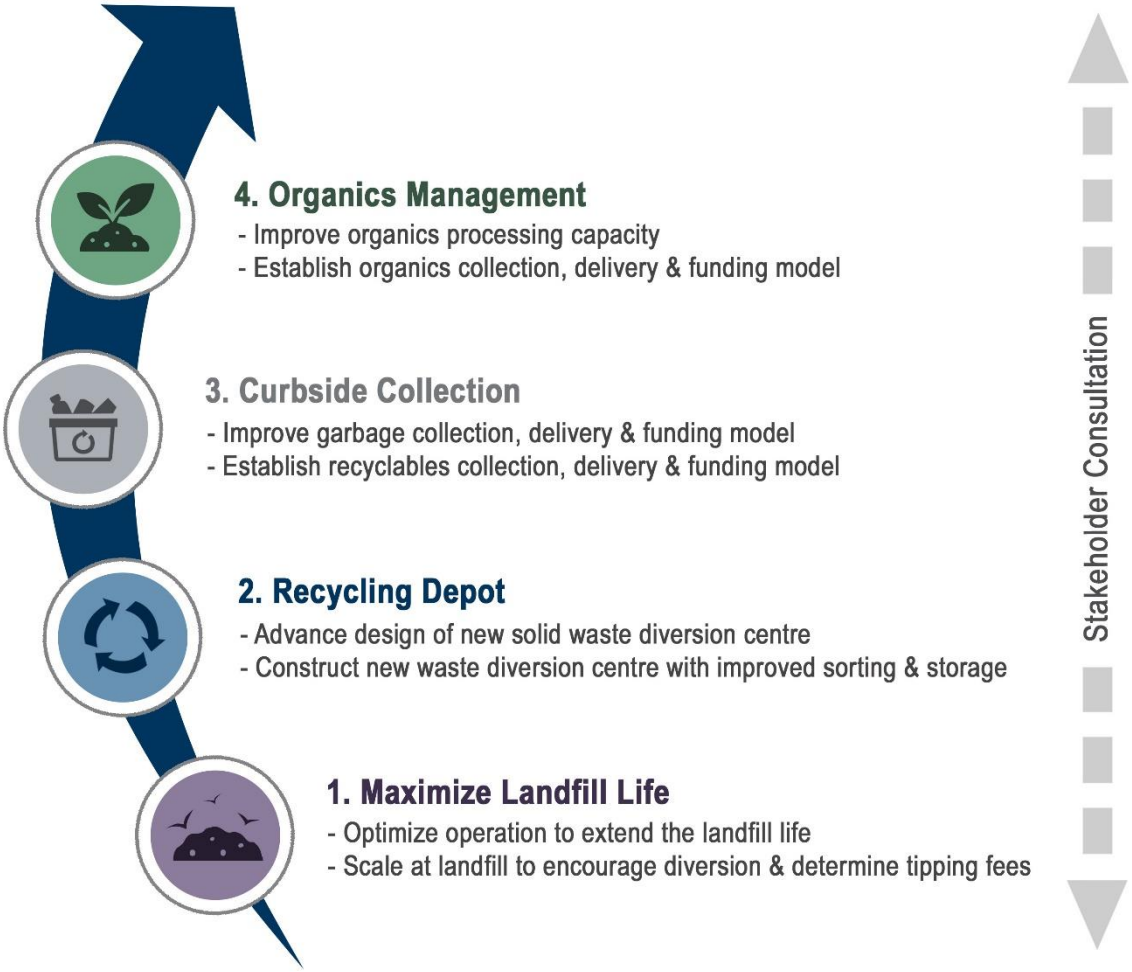

Figure 23: Proposed Road Map for the CoD's Solid Waste Management Program

Firstly, the CoD needs to focus on immediate operational improvements that can extend the landfill life. This was not the focus of this report; however, MH recommends a thorough review to increase operational efficiencies at the landfill.

CKS has been eager to advance plans for a new waste diversion centre for several years, and it will be important for the CoD to build on this enthusiasm and prioritize the development of a detailed facility design. With a detailed plan and cost estimate, the CoD should be able to secure any additional external funding (e.g., from YG and/or federal sources) for the facility or for the equipment needed, such as bailers, scales, etc. The new facility will provide a sorting facility that can receive recyclables collected via a curbside collection program. In terms of curbside collection, the CoD should initially focus on only providing a collection service for garbage and recyclables, and leave the collection of organics until a processing facility that can handle larger quantities of organic waste has been evaluated and established. It will require significant investment in related infrastructure, such as a composting facility suitable to process larger quantities of organic waste and varying types of wastes (including food waste). It is likely to require a fully contained processing facility, which often costs several millions of dollars in investment.

All significant changes to the existing system should be informed throughout the process by stakeholder input and consultation. At first, the CoD will need to develop a communications strategy aimed to consult on proposed changes to level of service and changes to costs. Council must be kept informed of proposed changes, associated costs, and stakeholder feedback, and be part of deciding whether adjustments are needed to the plan. The new solid waste management program will need to include a revised solid waste budget based on proposed changes, and the CoD will need to develop a revised revenue structure based on a combination of taxes, utility fees, tipping fees, etc. With a transition to user fee-based funding model, residents could also receive reduced taxes.

APPENDIX A:

Sorting Requirements for Recyclables Collected at Recycling Depots

DEPOT SORTING REQUIREMENTS FOR BEVERAGE CONTAINERS (as of July 18, 2018 based on interview with Raven Recycling)

Beverage Container Material	Typical Containers	Sorting Instructions	Preferred Collection Procedure	Alternate Collection Option
Aluminum Cans	Pop and Beer Cans	• No sorting by type of beverage required • Separated from non-refundables	Baled	Mega fibre bags
Refillable Beer Bottles*	Domestic Brown Beer Bottles Clear/Green Cider Bottles (Growers, Okanagan)	• Fill original beer/cider cases. • 6 packs fill cardboard flat. Not recommended to use 4 packs. • Stack similar sized bottles together in same row on pallet (long-necked or short-necked). • Only one row of cardboard flats per layer – with 2 rows of 24 cases for stability. • Alternate orientation of cases with each layer to increase strength of a full pallet. • NEVER STACK LOOSE BOTTLES - Even in the middle of a layer. They will fall through or get pushed around and compromise entire pallet!	Shrink-Wrapped Pallets • The entire pallet should be wrapped twice with shrink wrap. • Maximum height of a pallet is 7 layers.	Beer cases in a larger box/tote (**ONLY** if very small volumes – less than one layer of cases on a pallet)
Glass	Liquor and Wine Bottles, Non-refillable Beer Bottles, Pop Bottles, Juice Bottles	• No sorting by size required • Bottles (unbroken) placed in boxes or plastic totes • **NO NON-REFUNDABLES**	Boxes or plastic totes • Containers holding bottles within should be small and/or light enough to lift out without breakage • **NO GLASS IN MEGA FIBRE BAGS**	
#1 Plastic (Clear and Coloured)	Pop/Water/Juice Bottles	• No sorting by size required • Separated from non-refundables	Baled	Mega fibre bags
#2 Plastic (Natural/Cloudy)	Milk Jugs, Water Jugs, Juice Containers	• Milk Jugs and 'cloudy' #2 (HDPE) containers ONLY	Mega fibre bags	

DEPOT SORTING REQUIREMENTS FOR BEVERAGE CONTAINERS (as of July 18, 2018 based on interview with Raven Recycling)

Beverage Container Material	Typical Containers	Sorting Instructions	Preferred Collection Procedure	Alternate Collection Option
#2 Plastic (coloured)	Milk 2 Go White Bottles, Juice Bottles	• No sorting by size required • Separated from non-refundables • Can be commingled with Tetra Paks/Waxed Cartons/Foil Packs	Mega fibre bags	Baled (if large baler capable of compaction)
Tetra Paks®/Waxed Cartons/Foil Packs	Juice Boxes, Milk and Juice Cartons, Drink Pouches	• No sorting by size required • Separated from non-refundables	Baled	Mega fibre bags
Tin	Tomato Juice and Coconut Water Cans	• Commingle with non-refundable tin	Mega fibre bags	

*Please refer to Yukon Liquor Corporation 2011 list of what is refillable. No imports/small liquor/coolers/Alaskan products.

Notes:

1. **There is a higher handling fee of 4 cents per container for non-refillable beer/cider vs. 2.5 cents per container for refillable. To ensure maximum handling fees are received by the depot, only include refillable beer/cider on pallets.**
2. Even though categories on Depot Claim Form are counted together by size (<750 ml, >750 ml) – product must be shipped separately by material type.
3. Refundable beverage containers should not be commingled with non-refundable product (provided space constraints allow).
4. Labels are not required on containers to ensure refund, nor must they be removed prior to shipping.
5. Lids do not have to be removed from beverage containers, provided containers are empty of all residual liquids.

DEPOT SORTING REQUIREMENTS FOR NON-REFUNDABLES (as of July 18, 2018 based on interview with Raven Recycling)

Material	Typical Products	Sorting Instructions	Preferred Collection Procedure	Alternate Collection Option
Glass	Jam Jars, Pickle Jars	• **No longer accepted AT ALL by Raven** • P&M - Jars (unbroken) placed in boxes or plastic totes	• Collect, crush and dispose of on-site	Boxes or plastic totes • Containers holding bottles within should be small and/or light enough to lift out without breakage • NO GLASS in mega fibre bags
White Paper	Newspaper, Flyers, Magazines, Office Paper (white),	• Separate from brown paper	Baled or in boxes On pallet if high volume (Shredded paper in mega fibre bags)	Mega fibre bags
Brown Paper	Corrugated Brown, Cardboard Boxes, Cereal Boxes	• Separate from white paper if space allows • Flattened and clean of food residue • No wax-coated cardboard	Baled •	Mega fibre bags
#1 Plastic (clear)	Produce Clamshells, Dish Detergent Bottles	• Can be commingled with other plastics if not refundable (NO FILM / STYROFOAM!) • Separate from other mixed plastics if space allows	Baled	Mega fibre bags
#2 Plastic (coloured)	Laundry Detergent Bottles	• Can be commingled with other plastics if not refundable (NO FILM / STYROFOAM!) • Separate from other mixed plastics if space allows	Baled	Mega fibre bags
Mixed Plastics (#4 - #7)	Yogurt Containers, Margarine Containers, styrofoam meat trays and all coloured styrofoam	• Can be commingled (NO FILM / STYROFOAM!)	Mega fibre bags	
Plastic Film	Grocery Bags, Bread Bags, Garbage bags, Shrink Wrap	• NOT TO BE MIXED WITH OTHER PLASTICS • No loose bags, smaller bags placed within larger bags • No tarps allowed and lumber plastic wrapping. If sufficient volumes, these can be collected in separate mega fibre bags.	Mega fibre bags	Bale if sufficient volume

DEPOT SORTING REQUIREMENTS FOR NON-REFUNDABLES (as of July 18, 2018 based on interview with Raven Recycling)

Material	Typical Products	Sorting Instructions	Preferred Collection Procedure	Alternate Collection Option
Polystyrene Foam	Styrofoam® Protective Packaging for Electronics, TVs (only white Styrofoam)	• WHITE PACKAGING STYROFOAM ONLY • NOT TO BE MIXED WITH OTHER PLASTICS • Break large protective packaging into smaller pieces • Coloured foam and meat trays to be placed in with mixed plastics	Mega fibre bags	
Tin	Soup Cans, Dog and Cat Food Cans (if not Aluminum)	• Can be commingled with BCR tin • Separate from aluminum cans	Mega fibre bags	
Tetra Pak®/Wax Cartons	Soup broth, meal supplement drinks	• Can be commingled with BCR materials	Baled if sufficient volume	Mega fibre Bags

Report to Council

[X] For Council Decision [ ] For Council Direction [ ] For Council Information

SUBJECT:	Encroachment Policy	
PREPARED BY:	Clarissa Huffman, CDO	**ATTACHMENTS:** 1. Draft Encroachment Policy
DATE:	November 20, 2018	
RELEVANT BYLAWS / POLICY / LEGISLATION: n/a		

RECOMMENDATION

It is respectfully recommended that:

1. Council approve the Encroachment Policy #2018-05 as presented.

ISSUE

The draft Encroachment Policy is intended to assist administration from various departments (mainly Planning and Public Works) in managing encroachments throughout the municipality in a fair and consistent way.

BACKGROUND SUMMARY

The recommended Encroachment Policy is based on recommendations from Groundswell Planning during the North End Plan process, scaled up to accommodate a variety of encroachment situations commonly found throughout the municipality.

The Policy was discussed at Committee of the Whole on September 25, 2018, and some amendments were requested. The revised Policy shows the requested amendments in red text.

ANALYSIS / DISCUSSION

This Policy will provide a framework for both resolving existing encroachments and understanding the process for approving new encroachments where required. Administration and residents will benefit from a policy that outlines details on how encroachments will be resolved, so that there is consistency in application. This consistency creates a more fair and transparent process and gives administration the tools necessary for managing land within the municipality.

APPROVAL		
NAME:	Cory Bellmore, CAO	**SIGNATURE:**
DATE:	November 21. 2018	C Bellmore

City of Dawson
Encroachment Policy
2018-05

DRAFT

1. POLICY STATEMENT

a) The City of Dawson has a rich and complex history of land development. In many cases throughout town, this has resulted in infrastructure and/or development that encroaches beyond the property lines of the subject property, causing liability issues and conflicts between land owners. The purpose of this policy is to provide a framework for how to manage these discrepancies in a fair and consistent manner as they are identified.

2. OBJECTIVES

a) It is the purpose of this policy to:
   i. Provide a fair, consistent, and transparent framework for managing both new/proposed and existing/historic encroachments within the municipal boundary.
   ii. Provide a tool that both administration and the general public can refer to for guidance when conflicts arise due to an encroachment.

3. DEFINITIONS

BOARD OF VARIANCE: is a Board of members appointed by Council who hear and decide upon requests for variance or exemption from a zoning bylaw provision where there are practical difficulties or unnecessary hardships in the way of carrying out the development in accordance with the plan or bylaw.

ENCROACHMENT: a situation in which a development, structure, or associated infrastructure that belongs to one individual/group is partially or entirely situated on the property of an adjacent property owner. An encroachment cannot be resolved or approved by the Board of Variance.

ROAD RIGHT-OF-WAY: a publicly owned parcel of land, primarily surveyed for the purposes of providing a corridor for the passage or parking of vehicles.

TRAVELLED ROADWAY: the developed portion of a road right-of-way.

____ ____
Mayor CAO

4. FRAMEWORK: EXISTING ENCROACHMENTS

a) All consolidations and boundary adjustments required as a result of a provision of this Policy are required to comply with any relevant legislation, policies, and by-laws in effect at the time, including but not limited to the Municipal Act, Subdivision By-Law, and Zoning By-Law.

b) When a travelled roadway is identified to be encroaching onto private property, the City of Dawson shall work with the private property owner directly to resolve the encroachment in one of the following ways:
   i. City of Dawson to relocate the roadway off of the private property and into the surveyed road right-of-way, at the expense of the City of Dawson;
   ii. If relocation is not possible, the City of Dawson shall purchase the land as per the Sale of Municipal Lands Policy;

c) When a dwelling or structure is identified to be encroaching onto a surveyed road right-of-way, the City of Dawson shall work with the owner of the structure directly to resolve the encroachment in one of the following ways:
   i. If the road right-of-way is not in use as a travelled roadway and could be deemed surplus as per the Sale of Municipal Lands Policy, the City of Dawson could initiate a Permanent Road Closure process, allowing the owner of the structure to purchase a portion of the road right-of-way in accordance with the policies and procedures outlined in the Sale of Municipal Lands Policy;
   ii. If the road right-of-way is not in use as a travelled roadway but cannot, for any reason, be deemed surplus as per the Sale of Municipal Lands Policy, a Licence of Occupation can be negotiated between the City of Dawson and the owner of the structure;
   iii. If the road right-of-way is not in use as a travelled roadway but cannot be deemed surplus as per the Sale of Municipal Lands Policy due to being earmarked for a future municipal purpose (e.g. lot development, road expansion), the resolution shall be relocation of the structure off the road right-of-way at the expense of the owner of the structure.

d) When a dwelling or structure is identified to be partially or completely situated on a surveyed land parcel titled to the City of Dawson, the City of Dawson shall work with the owner of the structure directly to resolve the encroachment in one of the following ways:
   i. Owner of the structure to purchase the City of Dawson titled property (or a portion thereof) in accordance with the Sale of Municipal Lands Policy in effect at the time;
   ii. Relocation of the structure off the City of Dawson titled property at the expense of the owner of the structure.

e) When a dwelling or structure on a privately-owned lot is identified to be extending onto an adjacent lot under the same ownership, the City of Dawson shall require the owner of the lots to resolve the issue in one of the following ways:
   i. Complete a consolidation or boundary adjustment to resolve the issue, at the cost of the property owner.
   ii. Relocation of the structure to a location entirely within one property and compliant with all setbacks and Zoning By-Law provisions in effect at the time.

f) When a dwelling or structure is identified to be extending onto an adjacent lot under different private ownership, the two property owners shall negotiate a resolution privately. The recommended resolution includes the following:

DRAFT

i. Owner of the structure to purchase the privately titled property (or a portion thereof) of the property they encroach upon;
ii. Relocation of the structure off the titled property they encroach upon at the expense of the owner of the structure.

g) Where utilities or infrastructure systems of any kind are identified to be crossing a road right-of-way or privately titled land in the ownership of someone other than the owner of the infrastructure, this situation shall be resolved using an easement agreement registered on title.

5. FRAMEWORK: NEW/PROPOSED ENCROACHMENTS

a) New encroachments shall only be permitted in extenuating circumstances at the discretion of the Community Development and Planning Officer and/or the Public Works Superintendent, under the following circumstances:
   i. Where utilities or infrastructure systems of any kind are proposed to cross a road right-of-way or privately titled land, an easement agreement registered on title shall be required.
   ii. Where a balcony or awning is proposed to encroach into or project onto a City of Dawson boardwalk or road right-of-way in the C1: Core Commercial Zone as per the Zoning By-Law in effect at the time, the City of Dawson and the owner of the structure shall enter into a Licence of Occupation.
   iii. When a dwelling or structure proposed on a privately-owned lot is proposed to extend onto an adjacent lot under the same ownership, the City of Dawson shall require the owner of the lots to complete a consolidation or boundary adjustment to resolve the issue, at the cost of the property owner, prior to issuance of a Development Permit.
   iv. When landscaping is proposed in a City of Dawson road right-of-way adjacent to privately-titled property for safety purposes or protection of a dwelling, the City of Dawson and the owner of the privately-titled property shall enter into a Licence of Occupation.

6. MINIMUM REQUIREMENTS FOR A LICENSE OF OCCUPATION

a) A License of Occupation shall contain, at minimum, provisions dealing with the following:
   i. Name and contact information of the individual/party responsible;
   ii. Detailed description of the nature of the occupation and reason, including any required supporting documentation such as maps, site plans, or elevation drawings;
   iii. Period of time the license is valid for;
   iv. Renewal requirements;
   v. Prescribed fee (if applicable), including a provision for who is responsible for payment of property taxes;
   vi. Responsibilities of the City of Dawson and of the Licensee;
   vii. Insurance requirements; and
   viii. Termination/expiration details.

DRAFT

7. ENFORCEMENT

a) When it is determined by the City of Dawson that action is required to resolve an encroachment under this policy, the City of Dawson shall work directly with the property owner listed on file.
b) If a property owner does not cooperate with the City of Dawson to reach a reasonable resolution to an encroachment requiring action under this Policy, the City of Dawson reserves the right to enforce the policy in accordance with the Enforcement and Penalties section of the Zoning By-Law.

POLICY TITLE:	Encroachment Policy
POLICY #:	2018-05
EFFECTIVE DATE:	October XX, 2018
ADOPTED BY COUNCIL ON:	October XX, 2018
RESOLUTION #:	C18-XX-XX

Wayne Potoroka, Mayor

Cory Bellmore, CAO

DRAFT

____ ____
Mayor CAO