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**Organic Waste Management Strategy**
**Regional District of Okanagan Similkameen**

# TASK 4 - COLLECTION OPTIONS MEMO

**Aug 2016**
**SLR Project No.: 209.40329.00000**

**ORGANIC WASTE MANAGEMENT STRATEGY**

**COLLECTION OPTIONS MEMO**

**SLR Project No.: 209.40329.00000**

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**FINAL** - Aug 2016

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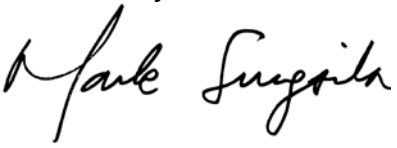

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## EXECUTIVE SUMMARY

RDOS is engaged in the development of a program for the improved management of organic wastes in order to increase landfill diversion. This work is set within the context of the 2010 Regional Organic Waste Management Strategy and the 2011 Regional Solid Waste Management Plan. SLR Consulting is assisting the RD with certain aspects of the strategy implementation, focussing primarily on the selection of the optimum collection & processing scenario.

This report comprises Task 4 of our appointment and considers a variety of issues, specified in the original RfP, relating to the collection and transportation of organic wastes, which feed into the definition of the various scenarios considered in a Lifecycle Costing Analysis which is reported separately as Task 7.

Specific issues considered by this report comprise the following:

- Options for organic waste management, including: advantages and disadvantages of combined or separate collection of food scraps & yard waste; types of containers and benefits of automatic collection;
- Experience of the introduction of organic waste management systems in other jurisdictions;
- Specific considerations for RDOS including typical costs of service, engagement with cart manufacturers and consideration of wildlife interaction issues;
- Management of the more challenging aspects of organic collection in the Multi-Family & I,C&I sectors; and
- Transport and processing logistics, including the development of a conceptual transfer station design and associated costing.

The report includes a range of recommendations for RDOS to consider in the process of specifying, procuring and implementing a new organic waste segregation system.

Where processing capacity is to be developed in the south of the RD, the report identifies that a transfer facility in Penticton will provide cost benefits. Such a facility would need to be able to handle up to 18 tonnes per day. An enclosed building with split level construction, allowing up to 2 vehicles to deposit waste at the same time, into a dedicated hooklift container, could involve project costs of around $700,000.

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## 1.0 INTRODUCTION

In December 2010, the Regional District of Okanagan Similkameen (RDOS) published a Regional Organic Waste Management Strategy, in recognition of the significant contribution this could make to landfill diversion goals. This document considered a range of options for the management of organics, and evaluated the costs and other impacts of a number of defined systems.

The RDOS Solid Waste Management Plan (SWMP) was updated in June 2011 and sets out a program for implementation of key recommendations over the period up to 2017. This program includes specific initiatives relating to organic waste, which can be summarized as follows:

**Table 1:**
**Organics-related SWMP Recommendations**

| Implementation Yr | Recommendation |
|---|---|
| 2014 | • Acquire land for regional composting facility<br>• Develop Compost Market Strategy |
| 2015 | • Begin site development for regional composting facility |
| 2016 | • Construct regional compost facility<br>• Prepare for curbside food waste collection<br>• Undertake a waste composition study at local landfills |
| 2017 | • Begin operation of regional composting facility<br>• Implement curbside food waste collection |

The SWMP also includes proposals that the RDOS will:

- Ban food waste from curbside garbage collection;
- Ban food waste from RDOS and Municipal Landfills;
- Mandate source separation at large I,C&I food waste generators; and
- Consider provision of segregated food waste collection from small & medium I,C&I generators as part of curbside services.

As part of the process of taking the various SWMP initiatives forward, RDOS commissioned Tetra-Tech EBA to carry out a 3-stage evaluation of the potential suitability of existing publically owned waste facilities within the RD, as follows:

**Stage 1**: Site overview & initial assessment – Reported in Dec 2014;
**Stage 2**: Detailed site assessments – Reported in Aug 2015;
**Stage 3**: Odour mapping at selected sites – Reported in draft in Oct 2015.

At this stage only one of the original nine public sites has been excluded from the process of identifying those with potential to provide a regional treatment facility.

In parallel with the assessment of public sites, the RD has also sought input from the private sector regarding proposals for either: a) land on which an organics processing operation could be carried out with equal or lower environmental impact than at the public sites or b) existing private processing facilities which can be expanded/upgraded to successfully manage some or all of the RD's organics.

A summary of the latest available data on organic waste flows within the Regional District is shown in Figure 1

### 1.1 Role of SLR Consulting

The RDOS has commissioned SLR Consulting (Canada) Ltd to carry out a variety of tasks in further support of the progression and implementation of a full organics management system. These can be summarized as follows:

- Collection Options Memo;
- Compost & Wood Chip Market Potential Memo;
- Review of Public Properties Feasibility Studies;
- Review of Private Compost Site RfP;
- Lifecycle Costing Memo;
- Triple Bottom Line Evaluation
- Recommended Scenario Report

This document represents the first of these tasks and is organised according to the following structure:

Section 2: Options for Collection of Organic Waste
Section 3: Experience in Other Jurisdictions
Section 4: Considerations for RDOS
Section 5: Managing Multi-Family & I,C&I Sector Organics
Section 6: Transport & Processing Logistics.

## 2.0 OPTIONS FOR COLLECTION OF ORGANIC WASTE

The general principles relating to organic waste collection are set out in good detail in the 2010 Regional Organic Waste Management Strategy. With the exception of some multi- family (MF) properties, we have assumed that the introduction of full organic waste collection will involve some form of curbside collection system for all other households. This is because experience with centralized and distributed neighbourhood “bring” systems demonstrates that they deliver much lower rates of organic waste diversion, due to the lower levels of user convenience and participation.

There are essentially three primary decisions to be made regarding the implementation of full organics collection, as follows:

1. Will the food scraps and yard waste be collected separately or mixed?
2. What type of containers will need to be used to store the organic wastes between collections? and
3. How will the organics collection be integrated with the other collection services?

Issues relating to organics collections from MF properties are discussed in Section 5.0 below.

## 2.1 Separate or Mixed Collection of Residential Organics

Aerobic processing systems that are suitable for handling food scraps require a proportion of yard waste to balance the Carbon: Nitrogen ratio and to provide structural material that ensures adequate airflow through the mix. Practical experience demonstrates that yard waste should be within the range of 30-50% of the total volume of material.

The seasonal variability of yard waste generation means that in practice, combined collection of yard waste and food scraps will only provide the optimum mix at certain times of the year. This suggests that separate collection can provide benefits in keeping good control over material ratios; with yard waste stockpiled at the processing plant in order to smooth out the annual yard waste generation cycle.

The solution which may be optimal for the urban parts of the RD may not be ideal for the more rural areas, but the boundary between such areas may be transitional or difficult to define. One or more collection routes may need to encompass elements of both areas as numbers of properties rarely split ideally into weekly collection increments.

A potentially effective approach may be to collect mixed food scraps and yard waste from rural areas given the relatively modest volumes they contribute; with separate collections in the urban and semi-urban areas.

Separate collection of the majority of yard waste would ensure that all of this material could be directed to open-windrow composting operations in the event that there were problems with operation of the food waste processing facility and the latter material needed to be temporarily sent to landfill.

However, in order to try and avoid an excessive number of modelled combinations, the scenarios used in our Life Cycle Analysis of collection, transport and processing system costs commence with consideration of separate collection of organics. We then consider the potential costs of substituting combined organics collection, on a small selection of scenarios which appear to offer the best all round value with separate collections.

## 2.2 Container Types

### *2.2.1 Paper sacks*

Yard wastes are currently collected throughout the RD using kraft-paper bags, due to their ability to be easily assimilated into the shredding and composting process. However, while they are relatively low-cost and have been a useful means of developing community participation in a yard waste scheme, they suffer from a number of inherent disadvantages, as follows:

- The sacks rapidly lose strength where they are filled with wet materials or it is raining during the set-out and collection period;
- Heavier sacks can contribute to worker injuries during the loading process;
- Sealing of sacks is not practical, so they can contribute to curbside littering.

Paper sacks are inherently unsuited to the containment of food scraps due to their high moisture content.

### *2.2.2 Recycling boxes*

This system requires lidded shallow plastic boxes, which are of limited capacity, in order to allow operatives to manually sort mixed dry recyclables into compartments in the collection vehicle at the curbside. This approach tends to have significantly higher costs, due to the higher staffing levels and lower productivity, i.e. number of properties per day. However, it has also produced a better quality of recyclate due to lower levels of contamination. The advent of modern Materials Recovery Facilities (MRF's) using near infra-red (NIR) sorting technology means that the historical quality advantages of curbside sort are no longer relevant.

### *2.2.3 Wheeled carts*

Use of wheeled plastic carts has grown dramatically across N. American jurisdictions in recent years, due to a range of inherent advantages over traditional collection, such as:

- Significantly reduced worker injuries and associated treatment costs;
- Increased collection efficiencies, i.e. pickups per day;
- Reduced lifecycle costs, between cart replacement cycles;
- Improved storage capacity and reduced littering.

Wheeled carts are not suitable for collection systems for mixed dry recyclables, where the materials are to be sorted at the curbside.

Practical issues to be considered in the roll-out of a cart waste collection system are as follows:

a) Consider using standard colour cart bodies with different colour lids to differentiate garbage, recycling, yard waste and food scraps - this will minimise storage requirements for spares;
b) Consider procuring carts directly from a manufacturer, rather than through the appointed collection contractor - this is likely to provide more flexibility at collection contract renewal;
c) For Municipalities and Areas of the RD which have not yet procured carts, consider seeking collective agreement on one or two cart providers in order to minimise the number of spare parts and obtain better bulk purchasing power;
d) Budget for purchasing around 2% more carts than the total required during the first year as the service settles in and expect to replace 1 – 1.5% of the total per annum;
e) Discuss the cart roll-out program with the manufacturer and ensure the provision of adequate management and staff resources if the roll-out is to be managed in-house;
f) Consider selecting a pilot neighbourhood route as a test-bed for the cart delivery program and the initial cart-based collection service – ideally select an area comprising the number of properties which the selected collection system can service in five days, i.e. sufficient to keep one vehicle fully occupied;
g) Give careful consideration to the opportunities to re-configure collection routes in order to maximize the benefits of cart based efficiencies while providing for short to medium term planned new housing build;
h) Subject to local budgeting rules/procedures, consider making an annual provision for the eventual replacement of the cart fleet as it approaches its practical working life (typically between 15-20 years);

## 2.3 Fully or Semi-Automated Collection

A variety of mechanized solutions have been devised to remove the strains of manual loading of garbage and recyclables. Fully-automated systems involve only a driver who aligns an on-board collection arm with each cart and then initiates the collection sequence. Vehicles are available which can collect from either side or only from one. Where the vehicles are designed for dual materials collection, the container body can be split either vertically or horizontally, with the driver selecting the appropriate compartment for the material type. The loading hatches are normally covered by CCTV to ensure the emptying sequence can be monitored and any blockages identified.

Semi-automated systems involve a driver plus one or two operatives who push carts to the rear of the collection vehicle where they are hitched to a hydraulic lifting arm which empties the cart. These systems can be used with collection vehicles that are split vertically into two (or occasionally three) compartments which can be independently discharged.

The Currotto-Can is a specialized semi-automated solution which allows cart collection using a standard front-loading dumpster-type vehicle. It is unsuited to the collection of dual materials.

Characteristics of the two types of automated system are set out in Table 2 below:

**Table 2:**
**Comparison of Fully and Semi-Automated cart collection**

| Feature | Fully Automated | Semi-Automated |
|---|---|---|
| Minimization of worker injury risk, compared to conventional collection: | Up to 90% reduction | 70-80% reduction |
| Productivity | 1000 to 1200 properties/day | Around 10% less than with full automated collection |
| Waste carrying capacity of vehicle: | Typically around 10 tonnes | Typically around 11 tonnes |
| Operating crew | Driver only | Driver plus 1 or 2 loaders |

A study carried out by the City of Columbia in 2015 examined the operational and cost benefits of the introduction of a fully automated cart collection system. Table 3 below sets out some of the key comparative data against the previous system which used conventional semi-automated collection:

**Table 3:**
**City of Columbia - Automated cart collection performance**

| Criteria | Previous system | Automated |
|---|---|---|
| Average households per route | 840 | 960 |
| Average cycle time while stationary | 30 secs | 23 secs |
| Number of collection routes | 8 | 7 |
| Total capital costs | $2.65M | $4.55M |
| Operational cost per annum | $1.3M | $0.79M |
| Net annual cost incl. Capital & depreciation | $1.57M | $1.25M |
| Overall cost reduction | - | 20% |

For the purpose of our Lifecycle Costing, we have assumed that the RDOS could achieve a 20% cost reduction over current yard waste collection costs, with the long-term implementation of a fully automated collection system.

## 3.0 EXPERIENCE IN OTHER JURISDICTIONS

We have spoken to Waste Managers in a number of other jurisdictions regarding their experience with organic waste management and we have researched available data relating to other public authorities in BC and elsewhere.

### 3.1 RD of Kootenay Boundary

The City of Grand Forks set up the first residential food scraps collection program outside the lower Mainland/Vancouver Island, in Oct 2012. Their original RfP sought to achieve the three goals of increased diversion, reduced GHG emissions and reasonable costs to taxpayers.

The initial pilot program was directed to 1,800 homes in an upper income part of the City and enabled an increase in diversion from 18% to 62% after one year of operation, when the annual food scraps generation was 123kg per household. Garbage and food scraps are collected using split bin packer truck and the RD considers that it is not possible to get any appreciable Greenhouse Gas (GHG) reduction without this approach. Residents continued to receive a separate monthly yard waste collection for nine months of the year.

Costs of collection bins were approximately $30 per household and the service was initially provided to residents as a utility, at a cost of $12 per month.

Key lessons learned from the program implementation were;

- Introducing the program in an affluent area of the City, supported by marketing through social media, generated a positive response which became disseminated into the wider community;

- Trials of 23 and 46 litre bins identified that supply costs were similar but use of automatic collection with the larger bin provided both safety improvements for operatives and some productivity improvements;

The pilot program has been extended, such that by 2015 it was serving over 4,000 homes and generating in excess of 20t/month. The plan is to roll out the program across the whole RD but this would require a full landfill ban on organics and discussions with some non-participating Municipalities and the I,C&I sector need to progress further before this can be implemented. RDKB consider that they will eventually need to assume the management of all curbside programs in the RD, in order to deliver effective diversion.

The RD did provide home composting bins to residents around 15 years ago but has no current plans to repeat this, relying instead on gentle and steady encouragement of home composting.

At present, all of the derived compost from food scraps and yard waste collection is used in daily cover and final restoration on the RD's landfill sites. The public have indicated in surveys that they would like to see the benefits of segregation but until there is a surplus from landfill requirements the RD would not take on the additional costs of meeting OMRR.

### 3.2 City of Kamloops

The City operates a successful yard waste composting program with material sold to businesses and the general public. This is discussed further in the Compost Market Memo. All yard waste is delivered to City facilities by businesses and householders and there are no plans to introduce a City collection system.

With regard to food scraps, the city has begun an assessment of the implications of extending curbside services to include these. The City has engaged consultants to assess the feasibility of alternative collection and processing strategies, including the potential to incorporate biosolids. Collection options are well understood but options and costs for meeting OMRR requirements are still being considered.

### 3.3 RD of Nanaimo

The RD introduced a commercial food waste landfill ban in 2006 at the same time as introducing a pilot scheme for residential food waste collection. Funds for cart purchase were made available from landfill reserves, on the basis that the program would conserve valuable landfill capacity. Green bins and kitchen caddies were purchased at a cost of $25.23 per household and by 2012 the total cost of all waste services to RD residents, across 23,500 homes, was $134 per household. The curbside program delivered an improvement in landfill diversion from under 30% to over 60%. When direct delivered materials are included the diversion rate is nearly 70%.

Lessons learned from implementation of the program included:

- Opportunity to completely reconfigure collection services, reducing garbage to bi-weekly and removing glass;
- Commencing with a pilot program enabled useful experience to be gained which proved invaluable in the next steps of roll-out.

Despite this success the RD reported in 2015 that there was still an appreciable quantity of organics remaining in garbage and considered a number of options to improve performance, including:

- Curbside outreach & education;
- Enforcement through a disposal ban;
- Extending full services to multi-family sector;

The RD concluded that focussing on improving multi-family performance and enforcing participation of the I,C&I sector were likely to have the greatest impact on diversion, for a given investment.

### 3.4 City of Port Coquitlam

The City was the first in Metro Vancouver to offer a full curbside collection of fruit and vegetable scraps in 2008. This progressed to include all food scraps in 2009 and the service was extended to multi-family homes in 2011,so that it now covers a total of over 12,000 homes. Combined with alternate week garbage collection, these services have delivered the diversion of 480kg of organics per household in 2013 and a diversion rate of 63%.

The program required no new container purchase as these were already in place to service the yard waste service. However 12,000 kitchen pails were purchased for around $5 each. The operation of the service is estimated to cost between $77 and $80 per household per annum. Multi-family homes can participate at an annual cost of $12 per annum for a 240 litre container, which is paid for by the building.

Key lessons learned from the program implementation were as follows:

- During the winter food scrap bin collections were left until later in the day as overnight freezing often led to material becoming lodged in the bins. The colder temperatures meant that residents generally did not complain about any odour issues. Additional collection days were added to the schedule at Christmas time to reduce any odours from accumulating material.
- Increasing landfill charges have seen gradually increased savings from diversion of organics and have supported the encouragement of increased participation, to reduce overall charges to residents.

### 3.5 District of Saanich, Vancouver Island

The District reviewed its cost base for 2016 and published new rates, as follows:

| Organics recycling cart size | Annual fee |
|---|---|
| Small (80 litre): | $25 |
| Standard (120 litre): | $35 |
| Large (240 litre): | $70 |

These charges are in addition to the standard annual base fee for waste services which is $112.50 per household.

### 3.6 City of Winnipeg

The City carried out public engagement in 2011 which suggested that over 60% of citizens wanted to see the introduction of curbside organic waste collection. In early 2016 initial options for collection services were discussed and the public were consulted on the range of costs involved. Three possible services considered, and their costs, were as follows;

- Vegetable & fruit scraps only: $55 – 65 additional costs per home, per annum;
- All food waste: $60 – 70 additional costs per home, per annum;
- All food waste plus pet waste: $100 additional costs per home, per annum;

In the light of this cost advice there has been considerable media attention and push-back from residents, with a number of Councillors recommending a fourth “do nothing” option. This is driven by perceived unfairness of having flat rate service charges when some residents already home compost and others do not have pets. A decision is pending very shortly.

This situation highlights the need for RDOS to prepare the ground carefully and ensure that residents understand the benefits of diversion in preparation for consideration of the additional costs of achieving it.

## 4.0 CONSIDERATIONS FOR RDOS

As requested in the RfP, we give consideration to a number of specific issues which are likely to influence the RD’s decisions regarding the implementation of an organics collection system.

### 4.1 Comparison of Separate and Mixed Organic Waste Collection

Where organic waste is to be collected at the point of production, options include

- separate collection of food waste and yard waste as individual materials streams; and
- collection of food and yard waste as a single, mixed (co-mingled) stream.

As part of Task 4, SLR has reviewed available data on the comparative costs of these organic waste collection options. This review has been undertaken as a desk-based search, reviewing available information on collection system costs in Canada, the US, as well as the UK.

In reviewing available data on local government organic waste services in Canada and the US, a number of reports of overall service costs have been identified. However, typically, limited information is provided on elements considered within these costs, such as the number of households served, and the tonnages collected.

To allow a meaningful comparison of the costs of organic waste collection, it is essential that cost data is collated on a consistent basis for each case. Furthermore, costs must be expressed on an equivalent unit basis (for example, the cost per household served by collections, or per tonne of organic waste collected). This is a significant challenge, in that Municipalities rarely publish cost details in this format, nor sufficient raw data metrics to consistently calculate truly comparable data from first principles.

Given the limited availability of suitable collection service cost data in Canada and the US, SLR has also reviewed published cost data for organic waste services in the UK. While collection

system arrangements may differ to some extent from those in Canada, UK data provides a useful indication of the relative costs of the two collection options.

Within the UK, Wales imposes particularly stringent requirements on local authorities in both the provision of organic waste collection services and the reporting of annual data on waste service provision. This includes recording detailed information on expenditure on waste collection and treatment.

While part of the UK, Wales as a country has established a form of self-government, via a process of devolution. Wales is a largely mountainous and rural country amounting to 20,700 square kilometres, approximately twice the area of RDOS. 67% of the Welsh population live in urban areas, predominantly in the South East of the country. At 148 people per square kilometre, the population density of Wales is higher than that of RDOS, at 6.2 people per square kilometre (2011 census), but is similar to that in the main Okanagan valley.

Entered by Municipalities via the online 'WasteDataFlow' tool[1], cost data is analysed and published in summary form by the Welsh Local Government Associate (WLGA)[2]. To allow comparison of mixed / separate organics collection under Task 4, SLR has approached the WLGA and requested detailed cost data for curbside organics collections provided by Welsh local authorities. These collection costs are reported on a gross basis, inclusive of expenditure on vehicles, crew, maintenance, fuel, depot costs, and containers. WLGA collection costs exclude requirements for 'downstream' management of materials including bulking/transfer, treatment (for example in-vessel composting or anaerobic digestion) and management of residues. Figures 1 and 2 below provide our analysis of individual curbside organics collection costs reported by the WLGA.

The cost of organics waste collection services per household served is illustrated in Figure 1. Here, circles indicate costs reported by individual Waste Collection Authorities, while the bars show the mean cost for each type of service. From left to right, cost datasets are included for:

- separate food waste collection;
- separate yard waste collection;
- the combined cost of separate food and yard waste collection (i.e. the sum of the former two costs); and
- the cost of collection of mixed food and yard waste.

Cost estimates are presented in Canadian dollars at an exchange rate of 2.07 CAD$ per GBP[3], and extrapolated from Welsh records for year 2013/14 at assumed 2% annual inflation.

Data presented in Figure 1 indicates that the mean cost of separate food and yard waste is $64 / household / year, substantially exceeding a mean of $38 / household / year for mixed food and yard waste collection. While these averages indicate a significant differential between the costs of separate and mixed collection, it is notable that Municipal collection costs vary substantially around these mid-points. This cost variation is likely a reflection of specific local factors, including:

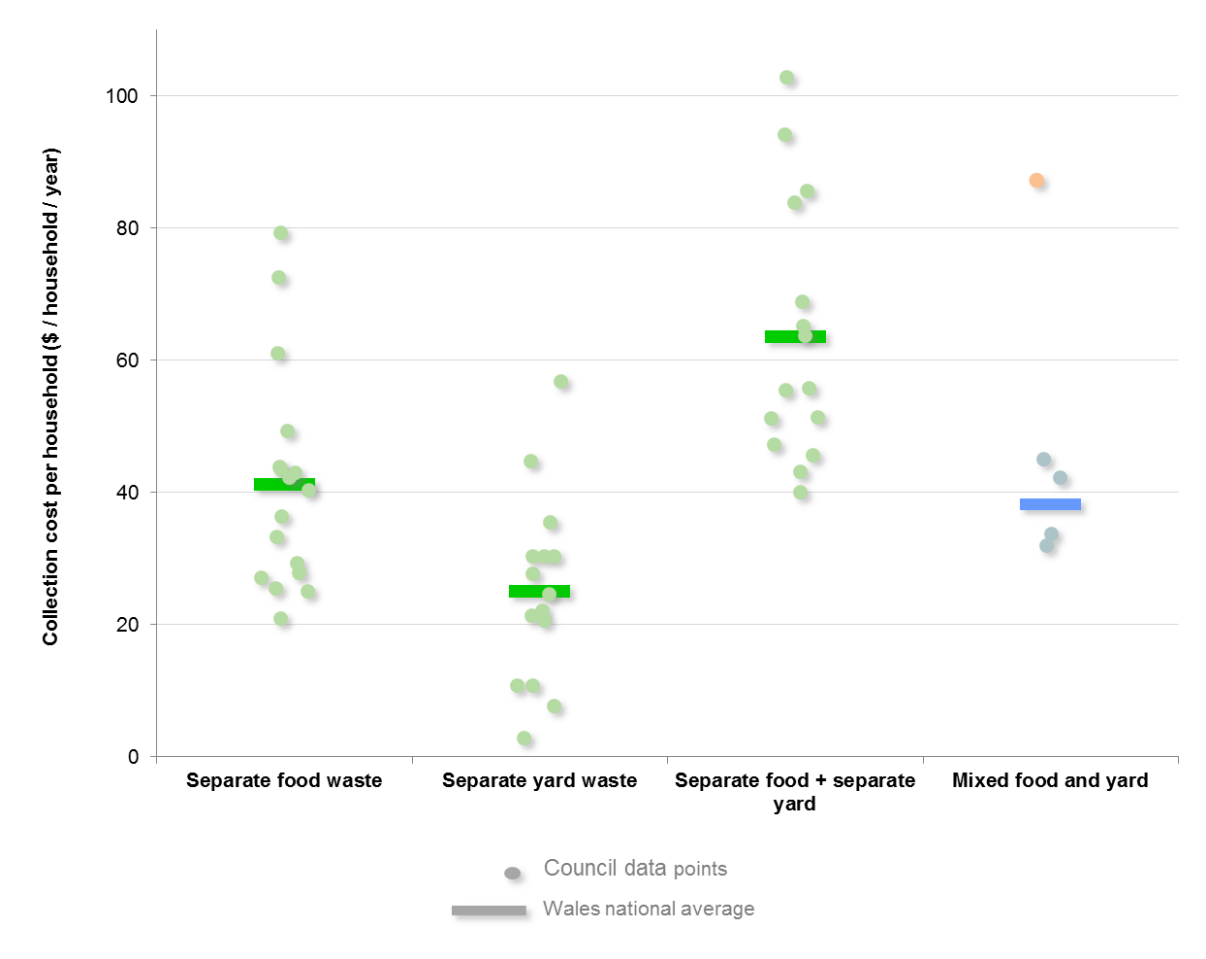
[1] http://www.wastedataflow.org/

[2] http://www.wlga.gov.uk/waste-finance-data-project

[3] Quoted on 18th December 2015.

- population density;
- the extent and efficiency of road networks;
- collection frequency (weekly vs alternate weekly);
- collection vehicle type (in particular use of dedicated vehicles for waste streams, compared to co-collection with other waste streams in multi-compartmental vehicles); and
- levels of generation of food / yard waste in each Municipality.

**Figure 1:**
**Comparison of Separate and Mixed Organic Waste Collection Costs per Household**

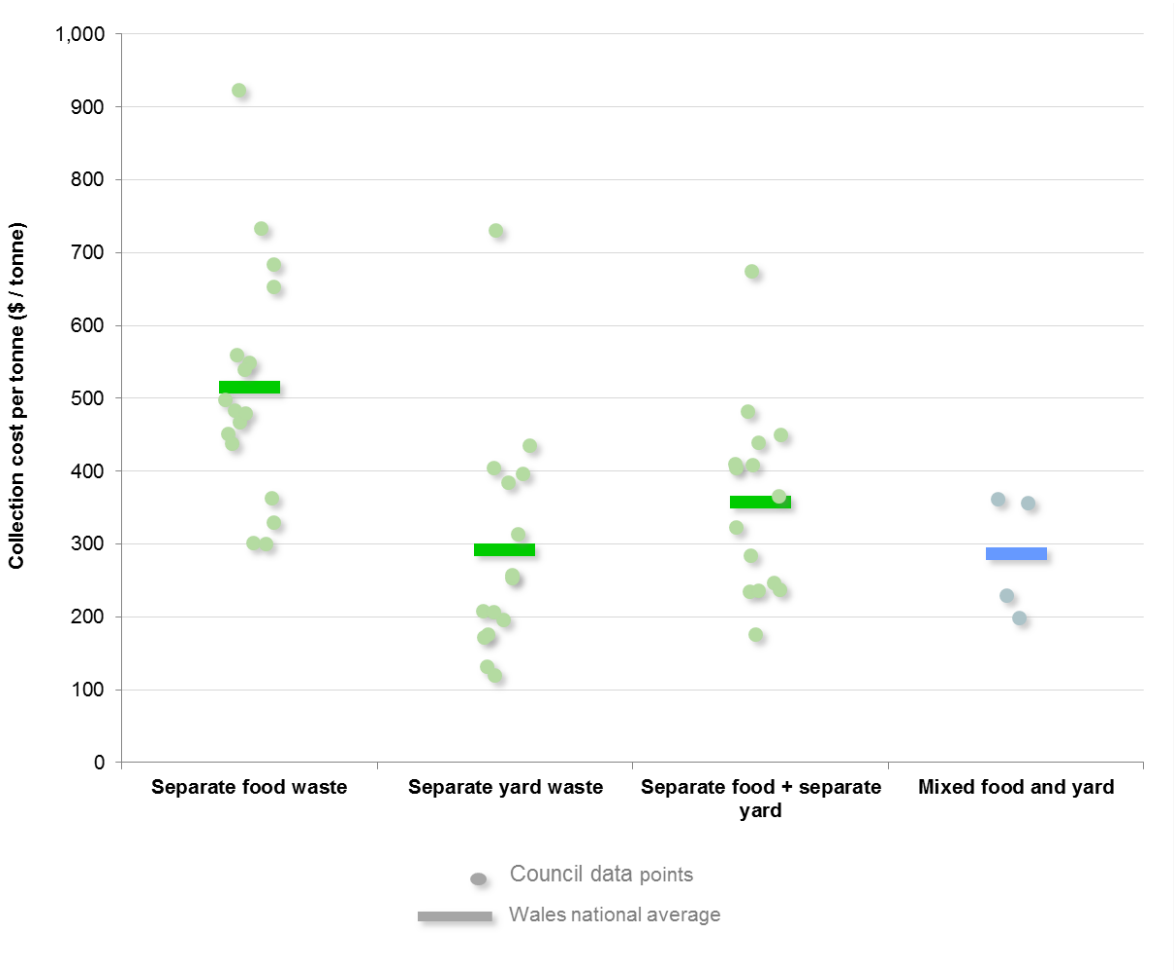



Cost variation may also reflect differences in financing arrangements (for example up-front payment for capital items, vs amortisation), as well as differences in Municipal reporting procedures. Significantly, there are a limited number of cases for which the combined cost of separate food and yard waste collection is comparable to reported costs of mixed waste collections.

Data made available by WLGA also allows the comparison of organic waste collection costs on a unit basis per tonne. Adopting the same format as Figure 1, Figure 2 shows per collection costs per tonne, for each of the four scenarios. With costs expressed on a per tonne basis, a

significant differential again exists between the mean cost of separate food / yard collections at $358/t, and mixed food / yard collections, at $286/t.

**Figure 2:**
**Comparison of Separate and Mixed Organic Waste Collection Costs per Tonne4**




For comparison, SLR has carried out analyses of proposed contractor charges for the introduction of mixed organic waste collection systems on behalf of a number of BC Municipalities outside Metro Vancouver, in recent years. For communities comprising 4,000 to 5,000 properties, annual organics tonnages of 1,800t to 2,200t and weekly collection, costs per tonne have been in the range of $125/t to $165/t. This is equivalent to a range of $56 to $77 per household.

In presenting collection cost estimates, it should be emphasised that a rigorous lifecycle comparison (to be developed in Task 7) is required to fully explore the comparative costs of

[4] Note: the per tonne cost for separate food + separate yard collections assumes food and yard waste respectively contribute 31% and 69% to the combined organic waste tonnage collected (estimates derived from trials conducted by the Waste and Resources Action programme in the UK).

organic waste management options. To give a true indication of the net cost of services, this should account for factors including (but not limited to) the following:

- differences in anticipated food and yard waste tonnage yields for separate and mixed schemes;
- the onward cost of bulk hauling and processing separately collected, or mixed organic waste; and
- the avoided disposal costs of managing food and yard waste which is diverted from the residual waste (i.e. landfill) stream.

The purpose of presenting this data, which is the most comprehensive analysis of comparative costs of organic waste collection currently published, is to provide a basis for calibrating the costs of alternative RDOS scenarios against the costs of the existing yard waste only collection system. Although the cost basis for the Welsh data will be different from the situation in the Okanagan, the cost differentials are likely to be very similar.

### 4.2 Engagement with Cart Manufacturers

As part of Task 4, SLR has contacted cart manufacturers and suppliers that are easily identified as operating in North America, with the primary objective of identifying the key issues that the RDOS may wish to consider when rolling out a new organics collection programme. The two approaches to organic waste collections that suppliers have been asked to consider are:

- Curbside collection of mixed food waste and yard waste in a single container (co-mingled); and
- Curbside collection of food waste and yard waste in separate containers (source-segregated).

In order to meet the objectives of this task a questionnaire was developed to gather the required information and sent out via email to named contacts (where known) detailing the purpose of the exercise. Appendix A provides the template of the correspondence and questionnaire sent out to cart suppliers. The emails were followed up with phone calls where no email responses were received.

Of the 8 companies initially contacted, one was identified as a distributor (Busch Systems), but they forwarded on the questionnaire to their manufacturer, so in total 9 companies were approached. Table 4 below shows a summary of the companies contacted and those that provided a response. A total of 5 of the companies contacted have attempted to answer some or all of our questions and these were as follows:

- Orbis;
- Rehrig Pacific;
- Toter.
- IPL Plastics; and
- SSI-Schaefer.

### *4.2.1 Responses to Questions*

***Q.1 Does your company have any experience in supplying carts for organic waste collections?***

All respondents have stated that they have experience in supplying carts for both separate and co-mingled organic waste collections in the North American and/or Canadian markets.

***Q.2 Does you company have any information available (either from yourselves or your customers) on cost differentials between the two approaches, i.e. separate versus mixed collection systems for food scraps and yard waste?***

Most respondents were reluctant to provide any detailed information on costs; however Rehrig Pacific did provide some indicative figures that demonstrate the long-term cost benefit to residents of using carts as compared to using disposable sacks. It is generally accepted that the initial capital investment can be quite high, but if Authorities can see beyond this, there is potential for lower operational costs in the long-run which by far outweigh the relatively high initial capital investment.

Another point that was repeated by a number of respondents is that the argument of co-mingled versus separate food and yard waste collections is almost always dependent on the processing capability of the receiving facility. Many organics processors may require a specific ratio of food waste to yard waste to help facilitate the composting process.

***Q.3 In your experience, have you found that there are typical preferred cart capacities for these services in North America, and if so, what sizes are the most popular among your customers for each of the collection scenarios?***

All respondents provided some information on preferred cart sizes for each of the collection scenarios. Typical cart sizes for automated collection systems are as follows:

- Separate food scraps: 40L – 120L;
- Separate yard waste: 120L – 360L; and
- Co-mingled food and yard waste: 240L – 360L.

A key consideration would be whether the collection system is a manual or an automated collection system.

***Q.4-1 Based on the response above, would your company be in a position to provide indicative costs for the supply of containers to all properties across the RDOS for each of the collection scenarios?***

On the whole, most respondents were reluctant to divulge any detailed information relating to costs, citing the following reasons:

- Not enough detail provided to be able to provide a price estimate;
- Commercially sensitive information; or
- The companies themselves also offer consultancy services directly to Authorities.

Orbis and SSI-Schaefer did however provide the following indicative costs:

Orbis *(indicative estimate only)*

- Separate food and yard waste (12 gallon container) - $20 / cart; and
- Co-mingled food and yard waste (21 gallon container) - $27 / cart.

SSI-Schaefer *(indicative estimate only)*

- Separate food and yard waste (80L container) - $50 / cart; and
- Co-mingled food and yard waste (240L) - $65 / cart.

**Table 4:**
**Contacted cart suppliers**

| Supplier | Country | Area | Link to products | Contact Name | Telephone | Email | Survey Complete? |
|---|---|---|---|---|---|---|---|
| Orbis | US | Oconomowoc, Wisconsin | http://www.orbiscorporation.com/products/environmental-recycling-and-waste/organic-waste-carts-and-bins#.VnF9hLmyp84 | Sharon Ramroop | 800-999-8683 | sharon.ramroop@orbiscorporation.com | Yes |
| SSI-Schaefer | Canada | Brampton, Ontario | http://www.ssi-schaefer.ca/waste-technology/products/organic-compost-carts.html | Jeff Rollins | 604.533.0048 | jeff@rollinsmachinery.ca | Yes |
| Busch Systems | Canada | Barrie, Ontario | http://www.buschsystems.com/recycling-waste-bin-products/go-cart/ | Nick Stocki | 705.722.0806 | nicks@buschsystems.com | No |
| IPL Plastics | Canada | Lévis (Québec) | http://www.ipl-plastics.com/organicoption.aspx | Geoge Quon | (778) 879-3890 | gquon@ipl-plastics.com | Yes |
| Rehrig Pacific | Global presence | Quebec | http://www.rehrigpacific.com/products/waste-recycling/roll-out-carts-and-recycle-bins/organic-waste-carts-and-containers | Dennis Monestier | 647-348-6199 | lbeaudoin@rehrigpacific.com<br>DMonestier@Rehrig.com | Yes |
| Otto | US | Charlotte, North Carolina | http://www.otto-usa.com/organic-waste-solutions.html | Travis Dowell | 800.795.6886 | tdowell@otto-usa.com | No |
| Toter | Canada | - | http://www.toter.com/municipalities | Haydon Morris | 206-697-1230 | hmorris@wastequip.com | Yes |
| Ecolife products | Canada | Vancouver, BC | http://www.ecolifeproducts.ca/?show=greencart | Greg Beresford | 604-876-5100 | gregb@biobag.ca | No |
| Cascade cart solutions | US | Grand Rapids, Michigan | http://www.cascadecartsolutions.com/products/organics-green-waste-containers | Dann Farrell | 559.706.6180 | dan.farrell@cascadeng.com | No |

***Q.4-2 What would be the cost implication of purchasing the containers in 3 separate batches, for each of the collection scenarios?***

A number of respondents have stated that container prices are highly dependent on oil and resin prices. They have indicated that Authorities tend to be aware of this, so a resin escalator / de-escalator is typically included in the tender to protect both parties. IPL Plastics have stated that for them, this typically applies if the resin *re-order* time is more than 90 – 120 days.

The general consensus from those respondents willing to provide indicative cost estimates is that staggering the container rollout will increase the overall cost of the rollout programme. This is primarily due to the labour costs associated with mobilising crews to distribute the containers. IPL Plastics have indicated that the staggered container rollout would likely result in a price increase upwards of 20%.

Rehrig Pacific have stated that an additional point worthy of consideration in a phased container roll-out is whether the Municipality would require assembly and distribution of the carts. Having staff on the ground for a phased approach could prove more costly if there is no local experienced labour to do this type of work. If there is a requirement for labour to be 'brought in' on a regular basis this would prove more costly.

The practical logistics of cart program roll-out are an area that we have identified to be regularly underestimated by Municipalities engaged in the development of these services.

***Q.5 Does your company have any information available on typical contamination levels experienced by customers for any of the approaches?***

None of the respondents have provided any information relating to typical contamination levels, and both Rehrig Pacific and IPL Plastics have stated that this type of information tends not to be passed on by Municipalities to container suppliers. Rehrig Pacific suggested that this information may be acquired from Authorities which have had successful organics programs in place for a few years, such as the City of Toronto and Strathcona County.

***Q.6 In you experience, how do customers rate each of the following key factors when contemplating a move to a cart-based collection system?***

The number of respondents rating each of following elements as low, medium or high is summarised in Table 5 below:

**Table 5:**
Factors influencing cart procurement

| Factor | Low | Medium | High |
|---|---|---|---|
| Cost / affordability | 2 | 2 | 1 |
| Complexity / operational flexibility | 1 | - | 4 |
| Convenience | - | - | 5 |
| Containment | - | 1 | 4 |
| Space requirements | - | 1 | 4 |

Other key factors highlighted include:

- Having a good public information campaign before rolling out new services. It is important to have residents 'on-side' in order to ensure the program is successful in achieving significant landfill diversion. Rehrig Pacific have cited the Region of Peel, ON as an example of when things can go wrong, i.e. the public were not well informed and the carts were of poor quality and structural integrity, resulting in members of the public resorting to disposing of organics with the general waste *(see Rehrig Pacific's response to Q.6 for more details)*;
- IPL Plastics have also alluded to the point that it is worth investing in getting members of the public 'on-side' fairly early on to give the program the best chance of success;
- Toter, in promoting their products have stated that some of their customers have found odours to be an issue when using carts provided by other manufacturers. Toter's offering is of a fully sealed container with a lock mechanism that renders it less susceptible to being tampered with by 'urban wildlife' such as racoons. (See Section 4.3 below, for broader discussion).

***Q7.1 In your experience, have you identified whether new customers are tending to opt for automated collection systems or whether they are happy to continue using manual rear loading?***

This decision appears to be dependent on local factors. For example, Orbis have found that typically automated loading means larger trucks and more traffic for local communities; while rear loading creates welcome employment opportunities, thus aiding the economy.

From the perspective of Rehrig Pacific, they have found that operators prefer automation because it reduces time spent on route, and reduces the potential for injury by keeping operators in the cab of the vehicle and not having heavy repetitive strain injuries.

Rehrig Pacific have found that residents like to have one container in which to put everything that they can roll out to the curbside. The material that they put out to the curb will not change; it is just the container that they put it in, so if they are well informed beforehand this can be a smooth and seamless transition.

Some of the points above have been echoed by Toter who have found that automated systems result in improved safety, reduced labour requirements and consequently reduced operational costs.

***Q7.2 Of those customers who have made the switch to an automated system, what elements of the change have they found to be positive or beneficial? What elements of the change have been less favourable?***

<u>Positives:</u>

- Vehicle tracking and container scanning result in an overall increase in efficiency;
- Decrease in safety risks to collection staff;
- Colour coding of carts for various streams offers a more uniform system. This is often clearer than a labelling system and is generally well received by customers;
- Most customers that have an automated curbside collection system ultimately buy-in to the concept and cannot see themselves without a cart; they do not want to go back to a bag system;

- Using carts also means a larger storage capacity for recyclables, yard waste and food waste;
- Moving away from backyard collection removes liability associated with Municipal workers entering a resident's private property; and
- Significantly reduced spillage and littering compared to bag collections.

Negatives:

- Not necessarily 'negative', but the initial capital investment required to roll out an automated collection system may be perceived by some to be quite high.
- The less favourable issues revolve around the "space" issue and where to store the carts.
- The amount of material that the resident presents at the curbside does not change; it is merely the container, however residents will almost always complain that the container is too big. As such, the Municipalities just need to ensure that the residents are well informed.

***Q.8 Is there any other relevant information that your company can provide that in your opinion would enhance / assist us in our study?***

IPL Plastics have stated that one aspect that should be considered is the use of RFID chips embedded in carts. In their view, each cart should have an RFID tag installed as this enables the Municipality to have a database of all the carts linked to each address and their GPS coordinates. As well as this, the implementation of comprehensive Cart Maintenance Programme / Asset Management software is also considered important.

## 4.3 Wildlife Interaction

There are indications that public officials in other parts of N. America are increasingly advocating for source segregated organic (SSO) waste collections without necessarily considering adequate containment measures to prevent bears and other wildlife from accessing materials that are put out for disposal. This can result in additional expenses being incurred after implementation of a cart roll-out program, in taking retrospective measures to fit locks to carts in order to make them adequately bear-resistant.

### *4.3.1 Issues*

Although residents have been encouraged to lock up their waste to deter bears for a number of years, bear activity in residential areas, the inevitable 'human-bear' conflict and consequent complaints from local residents remain a major issue.

Bears are intelligent creatures, so if they get sustenance from garbage or other waste materials put out in carts in a particular area, they are likely to remain close to these areas and return frequently in search of the same food source. They can become bolder and more aggressive in their search for food, thus posing a risk to themselves as well as the local residents. As such, there is a need to reduce this food-conditioning of bears and adopt proactive measures for the management of household waste so that bears are less likely to venture into residential areas.

It is recognised that there is a need to improve public safety and reduce property damage that can be caused by bears. One key way in which this could be achieved is by reducing the dependency of bears on garbage and other attractants, however, destroying or moving the

bears are not adequate solutions. A more effective and appropriate course of action would be to deter the bears from residential areas by limiting their exposure to attractants and preventing them from accessing materials contained in carts put out for collection.

### *4.3.2 Options*

Implementation of the RDOS Bylaw limiting garbage set-out times has been an important contributor to avoiding incidences of human-bear conflict and associated impacts that occur as a direct result of the poor management of waste in residential areas.

Further improvements could primarily be achieved by the use of certified 'bear-resistant' carts which have been proven to reduce the number of incidences of human-bear conflict. Any solutions adopted by the Regional District should ideally be certified by the BC Wildlife Conservation Foundation (BC Wildsafe). A further option following a decision to move to SSO would be to extend a Bylaw which bans organic waste from general garbage. This would support landfill diversion and Greenhouse Gas reduction, but would require strong political support and a willingness to enforce.

The source segregation of food waste into a dedicated cart presents a concentration of the attraction of this waste type to bears and other wildlife. Combining food scraps with yard waste does not significantly reduce the attractiveness of the source material. By the same token, introduction of food scraps segregation does not guarantee that such materials will not still find their way into general garbage.

In response to demand from local residents, the City of Trail put a proposal to the RDKB in 2015, for a waiver of tipping fees relating to the establishment of a series of community access bear-proof bins, within the City. The proposal was intended to assist residents who needed 24 hour access to secure disposal, rather than temporary storage at home or disposal at the local landfill. After careful consideration and liaison with Wildsafe BC, RDKB concluded that this would not be a viable or sustainable solution, because it goes against the principle of personal responsibility and BC anti-wildlife attractant legislation.

As part of their evaluation of options and costs, the City of Revelstoke worked with the local Bear Aware Group, to map the areas of the City where some or all residents do not have the means to store garbage securely[5]. This information was used to feed into an assessment of the costs of various cart rollout options. This study provided some useful indications of the relative costs of options as follows:

- Moving to a weekly collection service involving half the City properties receiving bear-resistant carts and the remainder standard carts, would involve total service costs (excluding disposal) that were 6% higher than a base case using only standard carts;
- By extension, moving to a weekly service with all City properties receiving bear-resistant carts, would involve total service costs (excluding disposal) that were 12% higher than the base case.

It is our view that any new cart program for SSO in the BC interior should incorporate bear-resistant carts. However, important considerations for RDOS will include the following:

[5] Solid Waste Management Report (2014), City of Revelstoke, Penny Page-Brittin

- If food waste is banned from general garbage, how will this be enforced?
- Are there appropriately trained staff resources available to carry out the enforcement function within existing budgets or will additional budget need to be made available and for how long?
- Can such enforcement reliably ensure that carts for general garbage do not need to be bear resistant?
- Will bear-resistant carts be rolled out to all properties or should these be targeted to only those property types that do not already have secure storage? There would be savings to the RD with this approach but non bear-resistant carts, will still be vulnerable between set-out and collection times.

### *4.3.3 Review of Cart Solutions*

Bear-resistant cart solutions can be broadly split into two categories; retrofitted lock systems and bear-resistant cart systems. Retrofitted locks are either designed to fit specific types of conventional carts or as a generic fitment. Cart systems usually have a clip or latch mechanism that is integral to the overall design of the cart. Information on available bear-resistant cart solutions has been compiled from web research and contact with Waste Managers and Wildsafe BC representatives. The various options considered are summarised below:

**Retrofitted Lock Systems**

Critter Guard Lock System[6]

- Suitable for manual or semi-automated collection systems;
- Understood to have previously been in use in Whistler, Squamish, Port Coquitlam and some other Lower Mainland locations;
- The City of Castlegar considering its options which previously included this retrofit lock system, though it is unclear whether this system has been certified as bear resistant[7]; Port Coquitlam has since launched its own Waste Cart Lock Project (see below).

Waste Cart Lock Project[8]

- The City of Port Coquitlam designed and manufactured their own wildlife resistant lock for organic waste and garbage waste bins, in order to reduce costs (compared to Critter Guard) improve compliance with their Solid Waste Bylaw and achieve certification from BC Wildlife Foundation;
- Locks distributed to households receiving city waste services in bear-prone areas;
- Makes residential areas less attractive to bears while minimising the cost borne by tax payers;
- Supplied with 'simple' easy to follow installation instructions so residents can fit their own locks;
- Bin is not self-locking, and as such residents are required to unclip their bins during stipulated periods for collection of waste[9].

[6] http://www.bearsmart.com/docs/whistler-bear-people-conflict-mgmt-plan.pdf

[7] Email notes from *Jenny Wallace, Castlegar WildSafeBC Community Co-ordinator*

[8] http://www.portcoquitlam.ca/Citizen_Services/Pets___Wildlife/Bears/Waste_Cart_Lock_Project.htm

[9] Solid Waste Management Report (2014), City of Revelstoke, Penny Page-Brittin

Haul-All[10]

- Retrofitted to conventional carts (Rollins Machinery in partnership with IPL and Schaefer[11]);
- Compatible with semi-automated and fully automated collection systems, although locks must be unlatched beforehand;
- Municipalities that have gone 'city-wide' and fitted bear resistant kits on organic and garbage trucks have seen a decrease in incidences of bear-human conflict and complaints from residents;
- Labour intensive to build;
- Estimate range of $50 - $60 per kit inclusive of labour and installation. Variation in cost estimate is to account for different cart sizes;
- Proposed for use by the City of Castlegar as part of roll-out of new carts after having looked at a variety of options[12] and after consultation with local Wildsafe BC representative who recommended use of cart approved by the US-based Interagency Grizzly Bear Committee. System is also understood to have been successfully implemented in Squamish.

**Integrated Bear Resistant Cart Systems**

BearSaver

- Self-locking carts with a patented bear resistant push lock / latch system;
- Designed for manual and semi-automated collection system;
- Not compatible with a fully automated collection system as an operator is unable to determine from the truck whether or not a cart is unlatched;
- Understood to have been trialled in problem areas in Anchorage[13];
- However, Revelstoke[14] reported problems with the latch system during their pilot trial;
- Cart prices range from $161 - $231 per unit[15].

Orbis[16]

- Supplier has stated that the carts supplied are bear-proof. Wildsafe BC have advised against the use of this terminology;
- Prices provided in Section 4.2 above were stated to be for bear-resistant carts, i.e. $27 per unit for 21 gallon containers and $20 per unit for 12 gallon containers, when purchased in bulk.

[10] Email from *Jeff Rollins, Rollins Machinery Ltd*

[11] http://www.ssi-schaefer.us/waste-technology/products/bear-resistant-carts.html

[12] Email notes from *Jenny Wallace, Castlegar WildSafeBC Community Co-ordinator*

[13] http://www.bearsaver.com/Links.htm

[14] Solid Waste Management Report (2014), City of Revelstoke, Penny Page-Brittin

[15] http://www.bearsaver.com/Residential-Poly-Carts/c555/

[16] Email from *Sharon Ramroop, Orbis Corporation*

Toter Bear-Tough Carts[17]

- Suppliers of bear resistant carts that feature a locking mechanism;
- Cart has received a three star rating, the highest rating given by the Living with Wildlife Foundation (US based);
- Available in sizes of 64 gallons and 96 gallons;
- Compatible with semi-automated and fully automated collection systems;
- No indicative costs provided on suppliers' website, however research indicates individual 64 and 96 gallon carts retailing for c. $220 and $320 per unit respectively[18].
- Understood to have recently been rolled out to all of the Three Rivers communities in California[19], as part of a new 3-cart program.

IPL Wheeled Cart *(MantisWay Option)*[20]

- Cart features a lockable latch system which it is claimed eliminates unwanted access by pests and animals;
- The cart along with the integral latch / locking mechanism is compatible with semi-automated and fully automated collection systems;
- Available in sizes of 21 gallons, 32 gallons and 64 gallons;
- No indicative costs provided on the suppliers' website.

## 5.0 MANAGING MULTI-FAMILY AND I, C&I ORGANICS

### 5.1 Multi-family Properties

The RD has a well-established yard & garden waste collection system, serving the majority of Single Family (SF) properties. Given the predominantly rural nature of the RD, Multi-Family (MF) properties form a relatively small proportion of the total housing stock, estimated at 17%, based upon data in the current RDOS SWMP. By their nature MF properties usually generate relatively low levels of yard waste and maintenance is normally provided by private contractors, who often have commercial relationships with private compost operators.

The current RDOS SWMP includes a number of proposed initiatives to encourage general recycling at MF housing, but it is notable that there are no specific initiatives targeted at the management of food scraps. Many jurisdictions that have developed a food scraps collection system for SF housing have recognized the additional difficulties associated with MF properties, which can be summarized as:

- Older MF buildings tend to have insufficient storage space to allow adequate provision of appropriate containers to allow segregation of materials;
- Even where local bylaws require new buildings to provide adequate storage capacity for garbage and recyclables containers, this requirement is not always observed by constructors or enforced by inspectors;

[17] http://www.toter.com/assets/documents/products/Toter_Bear-Tough_Cart_Flyer_092015.pdf
[18] http://www.amazon.com/Toter-025B96-R1BKS-Residential-2-Wheeled-Blackstone/dp/B00DPJNA00
[19] http://www.kaweahcommonwealth.com/news/mid-valley-disposal-rolls-out-new-cans
[20] http://www.ipl-plastics.com/MantisWay.aspx

- Collection services are the responsibility of the owner/manager of the property and are normally provided by private contractors who may not choose to offer services for separate collection of certain recyclables, such as food scraps;
- Implementation of voluntary recycling services only happens where there is a "champion" or motivated group within the tenant community who will encourage and support reluctant residents to participate.

Much of the work that has been carried out to understand the issues influencing improved organics collection in MF housing has derived from major metropolitan areas, such as the Greater Toronto Area and Metro Vancouver. However, some of the lessons learned from these and other studies are applicable to more rural communities such as the RDOS.

It is generally recognized that a combination of "push" and "pull" initiatives are required to encourage significant change in organics diversion from MF and I,C&I waste generators. Examples of these initiatives are given in Table 6 below.

**Table 6:**
**Push & Pull initiatives for Organics segregation**

| Pull initiatives | Push initiatives |
|---|---|
| Ensure that options for the receipt & processing of organics are available in the local market | Introduce a ban on all organic materials going to landfill, combined with effective inspection, enforcement and surcharges |
| Encourage and support development of business collaboration models to allow use of shared waste & recyclables storage resources in busy downtown locations | Introduce and enforce Bylaws that ban organic material from garbage containers |
| Provide building owner/managers with education material & training support for the introduction of organics segregation | Introduce & enforce Bylaws that require the provision of adequate waste and recyclables container storage space in new buildings and suitable access by personnel and vehicles |

Experience elsewhere has indicated that introducing legislation can send a signal to waste producers that in itself encourages positive change, but results are much improved where the new laws are backed up by monitoring & enforcement. Enforcement needs to be ramped up slowly to avoid negative publicity and to target those least willing to engage. The resources required for enforcement need to be adequately budgeted, but experience also indicates that such resource requirements typically reduce significantly within 12 to 18 months of the introduction of the push initiatives outlined above.

### 5.2 I, C&I Waste Generators

Traditionally the I,C&I sector has been seen as lagging significantly behind the residential sector, in terms of diversion of organic wastes. This is primarily because Municipalities have developed waste strategies and then taken collective decisions to introduce universal collection services which involve the whole community. Private sector food waste generators have usually acted alone and on a purely commercial basis, until legislation forces behaviour change.

Our experience in Metro Vancouver (Metro) has however indicated that there are operators in the restaurant, catering and food retail sectors that are motivated by other factors such as a desire to operate sustainably and also to be seen to be doing so. During the consultation period for the organic waste landfill ban introduced in Metro in 2015, a number of traditional waste haulers started to offer organics collection to their private customers and more notably, a small group of new haulers emerged to serve the needs of waste generators who sought green credentials and saw potential for future collection cost savings.

Information on the characteristics of I,C&I waste is sparse, but a study by Cascadia in 2006 identified that food waste formed around 75% by weight of the existing waste generated by food stores and full service restaurants. Although it reflects a more urban/suburban mix than RDOS, experience gained from relevant studies in Metro help to demonstrate the differences between residential and I,C&I organics. In their 2012 Recycling Market Study, Metro identified that the I,C&I sector contributed 35% of the total organics generated and this material was made up as follows:

| | |
|---|---|
| Food Scraps: | 63% |
| Yard Waste: | 15% |
| Food-soiled paper: | 22% |

In order to optimize the prospects for improved organics diversion in the I,C&I sector it is recommended that RDOS carry out early engagement with waste generators and haulers, during the early development of Bylaws and other legislation intended to encourage behaviour change. In Metro this was achieved using a mix of the following approaches;

- Adverts on radio and occasional interviews with Metro staff on news programs;
- Notifications and updates through social media;
- Newspaper adverts;
- Targeted mailshots; and
- Briefings from Metro staff held at suitable venues in the Region.

## 6.0 TRANSPORT AND PROCESSING LOGISTICS

The selection of collection methods and systems should be driven primarily by the needs of customers, the aspirations of the RD to maximise re-use/recycling and the diversion of materials from landfill. However, the selection of a collection system must also give consideration to the means by which collected materials are delivered to the processing facility or facilities and the nature of the processes at those facilities.

The RDOS comprises a series of relatively compact settlements, with a significant rural hinterland of varying and often very low population density. The majority of properties within the RD receive a bi-weekly or monthly yard waste collection service, with material collected in paper sacks and normally delivered directly to the nearest landfill with a composting operation. Yard waste collection is not currently provided to the Indian Band communities, part of Electoral Area F, Princeton or Electoral Area H.

Factors that will need to be considered in the determination of the optimum waste transport logistics for a new organic waste collection service include the following:

- Will yard waste and food scraps be collected separately or together?
- How many processing facilities will be developed for treating food waste?

- Where will these facilities be located in relation to the main centres of population and the highway network?
- Which areas will continue to deliver organic waste directly to the new processing facility (facilities) and which will require the transfer of waste to allow more cost-effective bulk haulage from collection areas to the processing location(s)?
- Are transfer facilities required and if so how many and where can they be located?

In order to constrain the range of modelled options within manageable levels, we have considered two future processing scenarios in our modelling exercise as follows:

1. One regional facility for processing all collected food waste plus sufficient yard waste to ensure an effective process. Direct delivered yard and wood waste plus any collected surplus not required for the IVC process, would continue to be composted by open windrow at a selection of existing sites;
2. As 1 above, but with a minority of food scraps being processed at existing open windrow composting facilities, where infrastructure and operations are upgraded to ensure products meet OMRR requirements.

A wide range of potential locations for a regional processing facility have been considered by the RD, through the Public Sites Environmental Feasibility Study by TetraTech and the Private Sites RfP process conducted by RDOS. In discussion with RDOS, we have agreed to focus our modelling work on two sites from each of the Public and Private sectors which appear, on the basis of current information, to be the most favourable in terms of proximity to population mass and potential environmental impacts[21]. The following regional processing facility locations have been selected:

1. Summerland Landfill;
2. Oliver Landfill;
3. PIB Locatee Site, off Highway 3A in Marron Valley;
4. Golden Mile Organics Site, off Highway 97 near Gallagher Lake.

### 6.1 Transfer Station Development

The introduction of new waste management systems and processing locations includes a requirement to consider whether there may be benefits from bulking certain waste streams in order to optimize tonne-kilometres travelled. In addition to the cost savings which this can offer there will also be proportionate savings in Carbon emissions.

The higher complexities and unit costs of managing food wastes mean that it will not be realistic to consider the development of treatment capacity at the same number of facilities that currently carry out open-windrow operations. The consideration of options has identified that there may be a need for transfer facilities to enable the efficient bulk haulage of some food scraps and required quantities of yard wastes to a dedicated regional processing facility, from the communities which lie furthest away.

[21] Note that Odour Impact Assessment work is still ongoing in respect of a number of Private sector sites.

There is a balance to be struck between the costs of developing a suitable transfer facility with bulk hauling organic material to the processing facility and the costs of direct delivery of material to the facility. This will include the value of the lost time while the collection vehicle drives the additional distance beyond its local disposal point as well as the inefficiency of using a collection vehicle for longer distance haulage. Costs per tonne/km for hauling material via collection vehicle are likely to be nearly twice that of a dedicated bulk vehicle.

An analysis of the potential material flows shows that in most cases tonnages are too small to justify the costs and impracticality of developing transfer facilities. The exceptions are the scenarios where material collected in Summerland, Penticton and their associated Electoral Areas needs to be taken to one of the potential regional processing facility locations in the south of the RD. Specifically these are a) the Oliver landfill site and b) the Golden Mile Organics Site near Gallagher Lake.

The data identifies that the quantities of material that may require bulk haulage from Penticton & Summerland collection areas are likely to lie within the ranges set out below. These figures assume waste collection takes place daily, with the exception of weekends and Public Holidays, i.e. 250 days/annum.

| | |
|---|---|
| Penticton Area: | 9.5 – 12.3 tonnes per day |
| Summerland Area: | 0.2 – 1.5 tonnes per day |

For design purposes, these figures should include an additional contingency allowance of 30%, to cope with daily and seasonal fluctuations outside the annual average. On this basis the operational capacity of the new transfer station would need to be at least 18 tonnes per day or 4,500 tonnes per annum.

In order to provide a logical basis for our Lifecycle Costing, we have agreed in discussion with RDOS that a new transfer station to channel organics from the Penticton and Summerland wastesheds would be constructed at an assumed location within an industrial area of Penticton, where there are already several other waste-related facilities. This location has been used as the basis for distance and haulage cost calculations in our Lifecycle Costing.

For the purposes of modelling we have assumed that transfer costs are evaluated only for curbside residential organics and that any IC&I sector wastes delivered to the potential transfer station in Penticton will be charged an appropriate gate fee which makes these inputs cost-neutral.

Our modelling therefore assumes that for all other collection areas, the waste vehicles will need to drive to the regional processing facility and this has been costed accordingly. However there is the option to develop transfer points at each of the existing landfill sites, where geographically relevant, which would allow collection vehicles to tip directly into a suitable roll off container. This could be used for receipt and temporary storage of either:

a) Separately collected food scraps, mixed with a suitable quantity of locally shredded yard waste, or

b) Food scraps and yard waste collected in combination.

We have not developed this idea further at this stage as it will require discussion with BC MoE, to ensure that they are satisfied, on a site by site basis, that there would be no unacceptable odour or other environmental or health & safety impacts.

## 6.2 Design Considerations

The relatively small volumes of material that are required to be transferred on a daily basis mean that it should be possible to carry out waste transfer directly from the collection vehicle to a suitable bulk container.

The transfer infrastructure required is very modest and could simply comprise a stepped concrete bay allowing the collection vehicle to discharge its load by gravity into one or more dedicated roll off (hook lift) containers. The design would need to include safety provision to protect reversing vehicles from approaching the edge of the container bay. The proposed urban location means that it will be necessary to fully enclose the container loading bay, to contain odours and provide protection from rain and snow.

We have developed a suitable generic design as shown in Figures 3 and 4.

## 6.3 Development Costings

In order to provide guidance on the order of costs that should be budgeted for in providing a new transfer station, we have estimated the costs of designing and constructing the facility shown in Figure 3. These costs are set out in detail in Appendix 2 and can be summarized as follows:

| | |
|---|---|
| Contractor mobilization, overheads etc; | $42,720 |
| Site works, access, drainage, etc; | $152,450 |
| Lock-block grade separation; | $21,228 |
| Floor slabs and footings; | $87,150 |
| Transfer building; | $163,100 |
| Landscaping; | $3,270 |
| Construction estimate; | $469,917 |
| + Estimating contingency (30%) | $140,975 |
| +Design, Contract, Tender, Oversight & Administration; | $100,000 |
| Budget Project Cost; | **$710,892** |

In arriving at these cost estimates we have made the following assumptions:

- Costs of acquiring land have not been included;
- The facility can be constructed on land which does not comprise waste material which is subject to ongoing settlement and does not require any clean-up of contamination;
- The facility does not require the diversion of any existing underground or overhead public utilities;
- Costs of obtaining necessary regulatory approvals have not been included.

This costing estimate has been incorporated within the costs used in our Lifecycle Costing Analysis.

## 7.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for RDOS, hereafter referred to as the "Client". It is intended for the sole and exclusive use of RDOS. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

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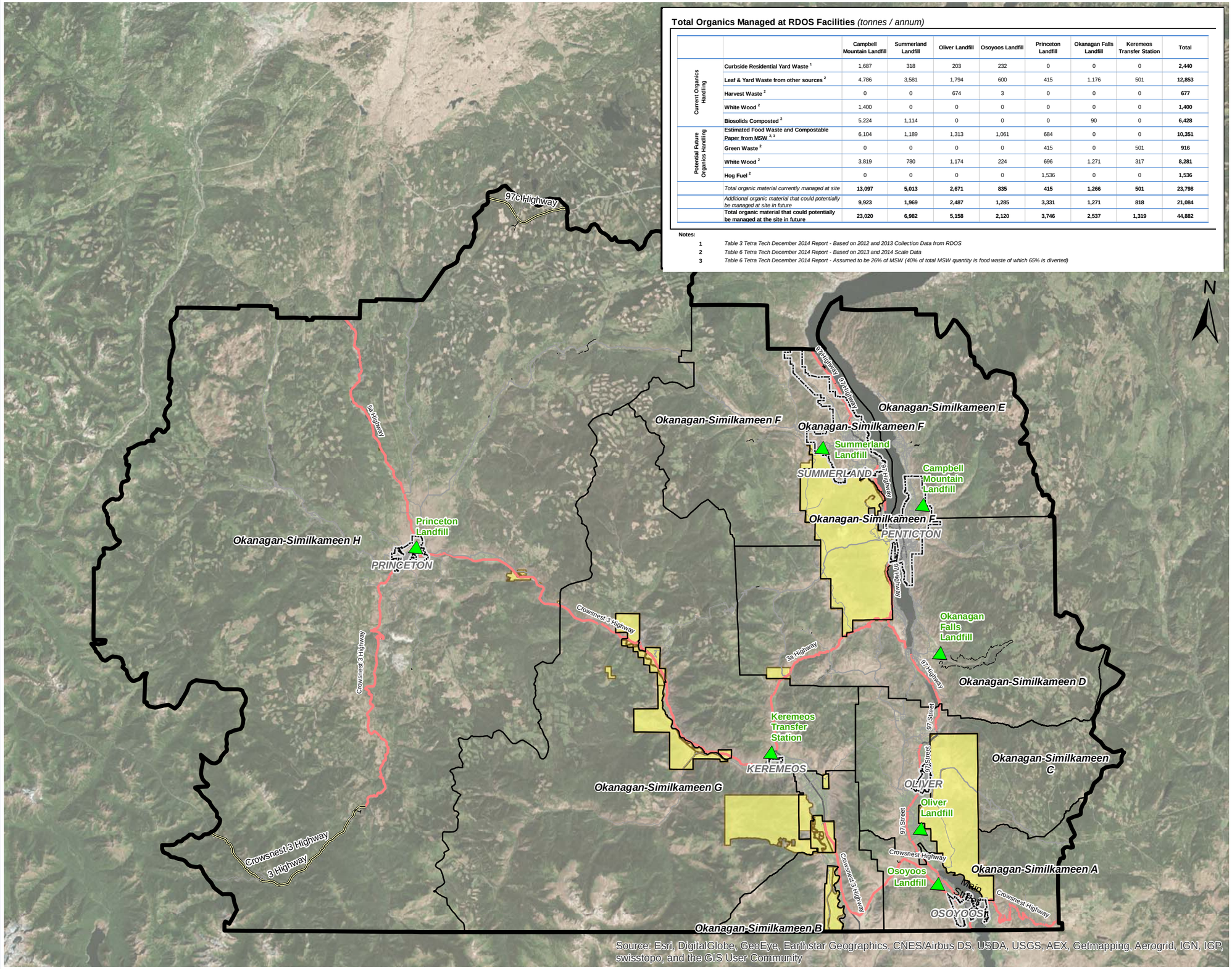
Drawings

## Total Organics Managed at RDOS Facilities *(tonnes / annum)*

| | | Campbell Mountain Landfill | Summerland Landfill | Oliver Landfill | Osoyoos Landfill | Princeton Landfill | Okanagan Falls Landfill | Keremeos Transfer Station | Total |
|---|---|---|---|---|---|---|---|---|---|
| Current Organics Handling | Curbside Residential Yard Waste [1] | 1,687 | 318 | 203 | 232 | 0 | 0 | 0 | **2,440** |
| | Leaf & Yard Waste from other sources [2] | 4,786 | 3,581 | 1,794 | 600 | 415 | 1,176 | 501 | **12,853** |
| | Harvest Waste [2] | 0 | 0 | 674 | 3 | 0 | 0 | 0 | **677** |
| | White Wood [2] | 1,400 | 0 | 0 | 0 | 0 | 0 | 0 | **1,400** |
| | Biosolids Composted [2] | 5,224 | 1,114 | 0 | 0 | 0 | 90 | 0 | **6,428** |
| Potential Future Organics Handling | Estimated Food Waste and Compostable Paper from MSW [2, 3] | 6,104 | 1,189 | 1,313 | 1,061 | 684 | 0 | 0 | **10,351** |
| | Green Waste [2] | 0 | 0 | 0 | 0 | 415 | 0 | 501 | **916** |
| | White Wood [2] | 3,819 | 780 | 1,174 | 224 | 696 | 1,271 | 317 | **8,281** |
| | Hog Fuel [2] | 0 | 0 | 0 | 0 | 1,536 | 0 | 0 | **1,536** |
| | *Total organic material currently managed at site* | **13,097** | **5,013** | **2,671** | **835** | **415** | **1,266** | **501** | **23,798** |
| | *Additional organic material that could potentially be managed at site in future* | **9,923** | **1,969** | **2,487** | **1,285** | **3,331** | **1,271** | **818** | **21,084** |
| | **Total organic material that could potentially be managed at the site in future** | **23,020** | **6,982** | **5,158** | **2,120** | **3,746** | **2,537** | **1,319** | **44,882** |

**Notes:**

1. *Table 3 Tetra Tech December 2014 Report - Based on 2012 and 2013 Collection Data from RDOS*
2. *Table 6 Tetra Tech December 2014 Report - Based on 2013 and 2014 Scale Data*
3. *Table 6 Tetra Tech December 2014 Report - Assumed to be 26% of MSW (40% of total MSW quantity is food waste of which 65% is diverted)*




## LEGEND

- Landfill
- Regional District
- Municipalities
- Electoral Areas
- Native Lands

**DRAFT**

0 5 10 20 Kilometers

SCALE: 1:500,000
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 BC Environment Albers

### NOTES

This map is for conceptual purposes only and should not be used for navigational purposes.

Basedata: GeoBC, Downloaded December 2015

RDOS

ORGANIC WASTE STRATEGY

**ORGANIC WASTE FLOWS**

| | | |
|---|---|---|
| February 10, 2016 | Rev **0.0** | Figure No. **1** |
| Project No. 212.06535.00000 | | |

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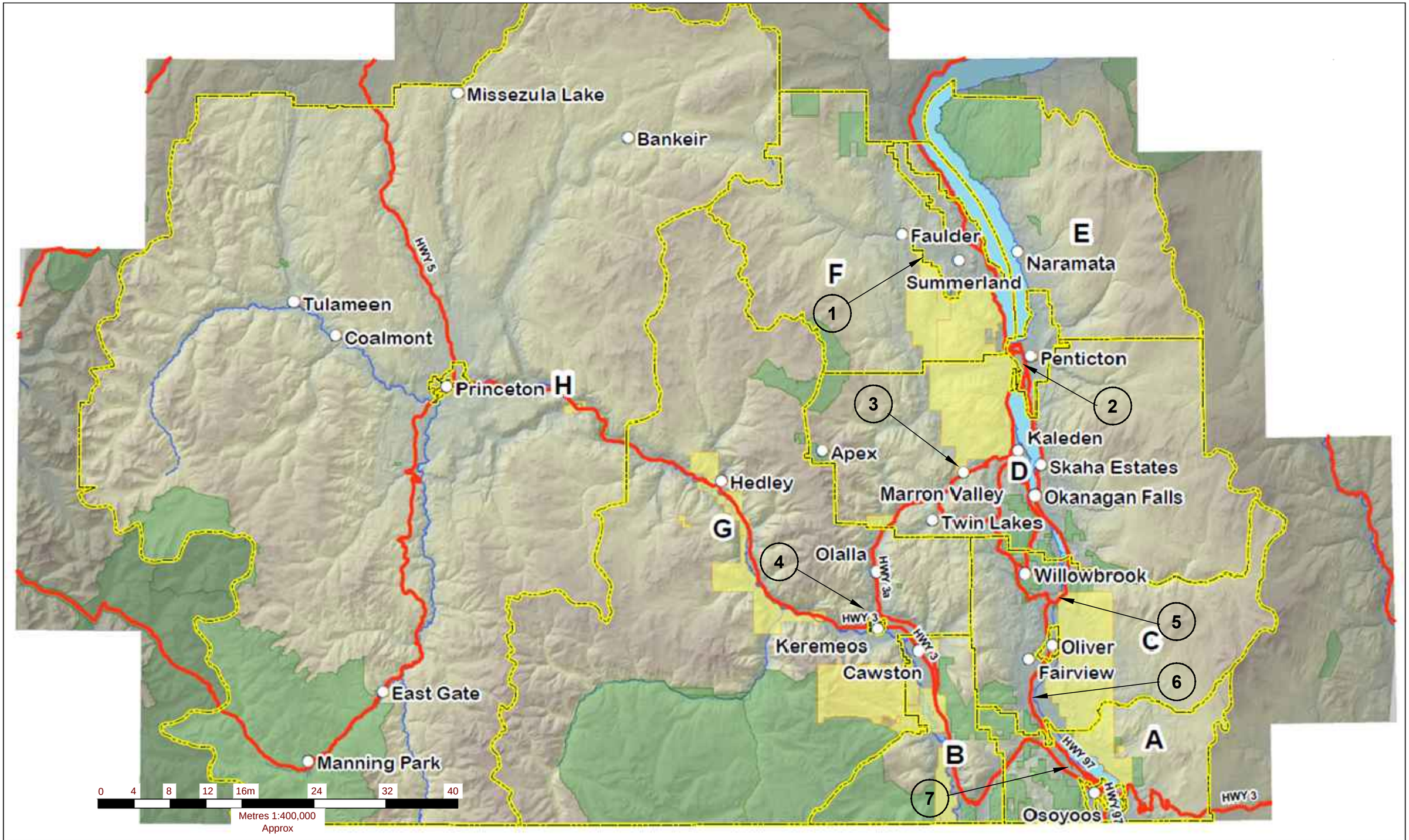


LEGEND

NOTE: PLAN SHOWS ALL FACILITIES USED ACROSS A VARIETY OF TRANSFER & PROCESSING SCENARIOS.

SITES:
1. SUMMERLAND LANDFILL
2. PENTICTON W.W.T.P.
3. P.I.B. LOCATEE SITE
4. KEREMEOS LANDFILL
5. GOLDEN MILE ORGANICS SITE
6. OLIVER LANDFILL
7. OSOYOOS LANDFILL

| Revision | Drawn By | Chkd By | Date | Comments |
|---|---|---|---|---|
| 0 | PS | BA | 25.07.16 | First Issue. |

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Project: ORGANIC WASTE PROGRAM DEVELOPMENT

Drawing: **LIFE CYCLE ANALYSIS EXISTING / PROPOSED FACILITIES**

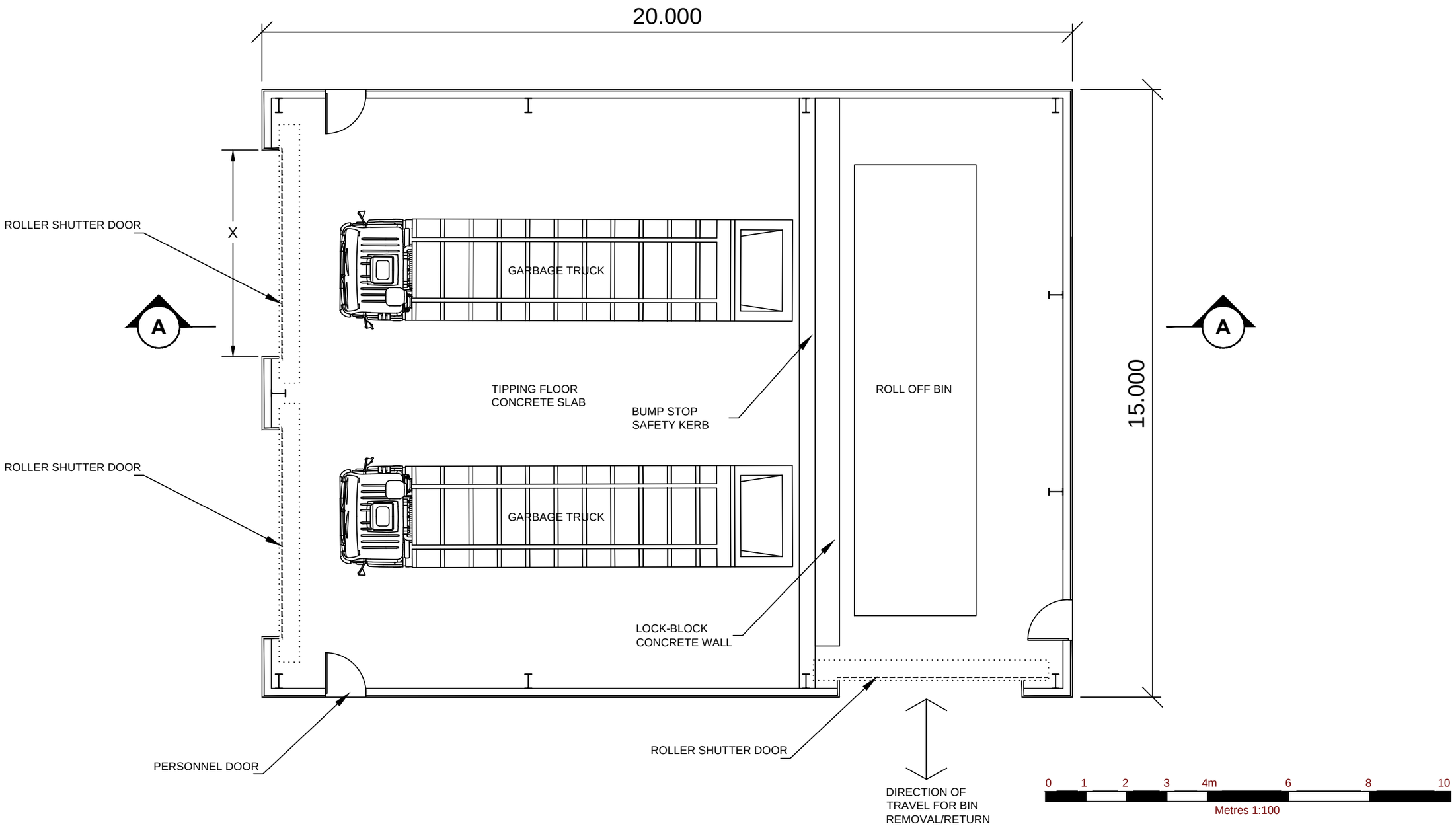
Date: JULY 2016

Drawing Number: **Figure 2**

Revision: **0**

Scale: 1:400,000 @ A3

4CA.00999.00080.Figure 2.0 Location Map.dwg




NOTES

GENERIC DESIGN - FOR PRELIMINARY BUDGET ESTIMATION.
ALL DIMENSIONS IN METRES.

| Revision | Drawn By | Chkd By | Date | Comments |
|---|---|---|---|---|
| 0 | PS | BA | 21.07.16 | First Issue. |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Site: RDOS

Project: ORGANIC WASTE PROGRAM DEVELOPMENT

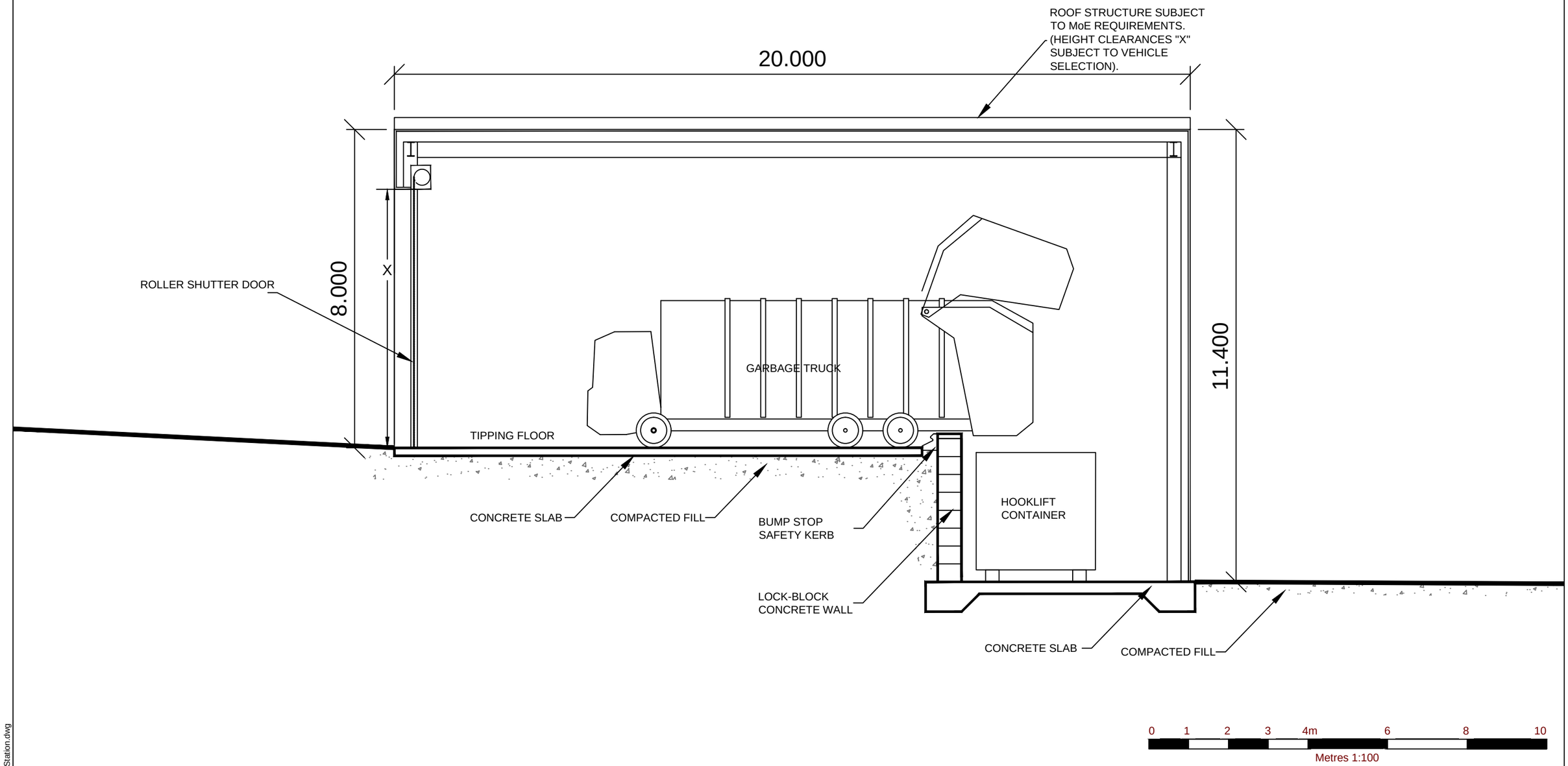
Drawing: **GENERIC DESIGN - TRANSFER STATION PLAN**

| Date | Drawing Number | Revision |
|---|---|---|
| JULY 2016 | **Figure 3** | **0** |

Scale: 1:100 @ A3

FINAL DRAFT

4CA.00999.00080.Figure 3.0 Figure_4.0 Generic Transfer Station.dwg




NOTES

GENERIC DESIGN - FOR PRELIMINARY BUDGET ESTIMATION.
ALL DIMENSIONS IN METRES.

| Revision | Drawn By | Chkd By | Date | Comments |
|---|---|---|---|---|
| 0 | PS | BA | 21.07.16 | First Issue. |

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Site: RDOS

Project: ORGANIC WASTE PROGRAM DEVELOPMENT

Drawing: **GENERIC DESIGN TRANSFER STATION SECTION A-A**

| Date | Drawing Number | Revision |
|---|---|---|
| JULY 2016 | **Figure 4** | **0** |

Scale: 1:100 @ A3

FINAL DRAFT

4CA.00999.00080.Figure 3.0 Figure_4.0 Generic Transfer Station.dwg

Appendix 1

**RDOS - Organics Consultation**

**Conceptual Cost Estimate: Grade-Separated Two-Bay Organics Transfer Station (rev1)**

| Item | Unit | Quantity | Unit Rate | Cost | Sub-Total | Comment |
|---|---|---|---|---|---|---|
| **1 General** | | | | | | |
| 1.1 Contractor mob/demob, profit/overhead, bonding, construction management, H&S, small tools/vehicles etc. | lump sum | 1 | $ 42,720 | $ 42,720 | | Allow 10% of construction cost (items 2 through 6) |
| | | | | **Total Section 1** | **$ 42,720** | |
| **2 Site Works** | | | | | | |
| 2.1 Clear and Grub | m2 | 4,025 | $ 7.50 | $ 30,188 | | Assume strip 55m x 55m for building site + 10m x 100m for roadways = 4025m2 |
| 2.2 Supply and place engineered fill for rough grades for building | m3 | 630 | $ 25.00 | $ 15,750 | | Assume site is flat and that fill needs to be imported to produce grade-separation within building footprint. Allow fill volume of 2m x 15m x 15m = 450m3, plus an additional 180m3 for a 4H 1V slope around raised portion of building perimeter. Assume fill available at zero purchase cost within about 1/2 hour haul distance of site |
| 2.3 Supply and place engineered fill for rough grades for roads | m3 | 500 | $ 25.00 | $ 12,500 | | Assume site is flat and that fill needs to be imported to produce elevated access road to organics delivery doors. Allow fill volume of (50m x 2m x 10m) x 0.5 = 500m3 |
| 2.4 Cut drainage swales around building site perimeter | m3 | 338 | $ 15.00 | $ 5,063 | | Allow for 3 runs of ditching x 50m each. 3m wide x 1.5m deep v ditch = 337.5m3 |
| 2.5 Rough grading around building site | m2 | 2,200 | $ 5.00 | $ 11,000 | | Assume rough grade 50m x 50m area less building footprint (20m x 15m) = 2200m2 |
| 2.6 Separator geotextile for road base | m2 | 1,000 | $ 3.00 | $ 3,000 | | Assume 100m x 10m = 1000m2 |
| 2.7 Road granulars | m3 | 350 | $ 50.00 | $ 17,500 | | Assume 100 m x 10m x 0.35m = 350m3 |
| 2.8 600 mm CSP culvert across site entrance | l m | 12 | $ 300.00 | $ 3,600 | | Includes granular bedding |
| 2.9 Excavate trench for sanitary sewer connection | $m^3$ | 75 | $ 113.00 | $ 8,475 | | Assume trench 50 mlong x 1m wide x 1.5m deep = 75m3 |
| 2.10 Sanitary sewer connection pipe | lin.m | 50 | $ 100.00 | $ 5,000 | | Assume 300mm non-perf HDPE |
| 2.11 Backfill trench | $m^3$ | 75 | $ 5.00 | $ 375 | | |
| 2.12 Allowance for electrical service and yard lighting | allowance | 1 | $40,000 | $ 40,000 | | Based on 2015 tender price for similar facility. Includes trenching and underground ducting, service pole at connection to grid, three light poles with 6 light heads, and electrical inside transfer station. |
| | | | | **Total Section 2** | **$ 152,450** | |
| **3 Lock Block Grade Separation** | | | | | | |
| 3.1 Excavate for wall foundation | $m^3$ | 4.5 | $ 15.00 | $ 68 | | Excavation = 15m x 0.3m x 1m = 4.5m3 |
| 3.2 Place and compact granular foundation | $m^3$ | 4.5 | $ 50.00 | $ 225 | | Backfill = 15m x 0.3m x 1m = 4.5m3 |
| 3.3 Separation geotextile behind wall | $m^3$ | 75 | $ 3.00 | $ 225 | | Allow 5m geotextile x 15m wall length = 75m2 |
| 3.4 Perforated drainage pipe behind wall | lin.m | 20 | $ 35.00 | $ 700 | | Allow 150mm perforated HDPE |
| 3.5 Granular backfill behind wall | m3 | 30 | $ 50.00 | $ 1,500 | | Allow 1m wide column of granular from base of wall to top along entire length of wall = 2m x 1m x 15m = 30m3 |
| 3.6 Place and compact engineered backfill | tonne | 30 | $ 90.00 | $ 2,700 | | allowance = 15m x 2m x 2m x 0.5 = 30m3 |
| 3.7 Supply and place lock blocks | no. | 32 | $ 480.00 | $ 15,360 | | Assume blocks are 1.5m x 0.75m x 0.75m. For a 2m high wall allow 3 rows blocks; for 15m wall allow 10 blocks per course = 30 blocks total. Add 2 half blocks to maintain lock. Unit rate based on PRRD Dawson Creek Transfer Station upgrades |
| 3.8 Geogrid tie-back between block courses | m2 | 90 | $ 5.00 | $ 450 | | Allow 3m tie back length for each course for entire wall length = 3m x 15m x 2 = 90m2 |
| | | | | **Total Section 3** | **$ 21,228** | |
| **4 Floor Slabs and Footings** | | | | | | |
| 4.1 Supply and place separator geotextile beneath subgrade and granular | m | 300 | $ 3.00 | $ 900 | | Allow 20m x 15m = 300 m2 |
| 4.2 Place and compact granular base beneath slabs and footings | m | 105 | $ 50.00 | $ 5,250 | | Allow 20m x 15m x 0.35m = 105 m3 |
| 4.3 Supply , place, concrete footings | m3 | 6 | $ 1,000.00 | $ 6,000 | | Allow for 0.3 m thick footing reinforced with 12mm bars at 200 mm centres. Footing volume = 20 footings x 0.3m x 1 m x 1 m = 6 m3 |
| 4.4 Supply , place, finish concrete slab | m3 | 75 | $ 1,000.00 | $ 75,000 | | Allow for 0.25 thick slab reinforced with 12mm bars at 200 mm centres, 30 Mpa type 50 concrete. Slab volume = 20m x 15m x 0.25m = 75m |
| | | | | **Total Section 4** | **$ 87,150** | |
| **5 Transfer Station Building** | | | | | | |
| 5.1 Supply & erect pre-engineered building shell | lump sum | 1 | $ 73,000.00 | $ 73,000 | | Preliminary quotation from Olympia Steel Buildings for supply of a 50' x 65' x 32' high building = $73k excluding windows and roll-up doors. Quote reflects a 'level 4' building which is for 'essential services' use (e.g. fire station, etc.) which has heavier primary/secondary steel than levels 1-3. Reflects standing seam roof (no perforations for fasteners), 26 ga siding, stainless steel fasteners throughout |
| 5.2 Building assembly/erection | m2 | 300 | $ 107.00 | $ 32,100 | | $10/sq ft converted to metric = $107/sq m |
| 5.3 Roll-up Overhead doors | unit | 3 | $ 2,000.00 | $ 6,000 | | Preliminary quotation from Olympia Steel Buildings for a 12' x 16' insulated sectional roll-up door. |
| 5.4 Person doors | unit | 2 | $ 1,000.00 | $ 2,000 | | Preliminary quotation from Olympia Steel Buildings for a 3' x 7' door. |
| 5.5 Ventilation and biofilter allowance | allowance | 50,000 | $ 1.00 | $ 50,000 | | Allowance for ventilation system to create negative pressure with exhaust through basic biofilter |
| | | | | **Total Section 5** | **$ 163,100** | |
| **6 Miscellaneous** | | | | | | |
| 6.2 Hydroseed and mulch application to all bare soil surfaces | m2 | 2,725 | $ 1.20 | $ 3,270 | | Allow application to 55m x 55m surface, less building foot print = 2725m2 |
| | | | | **Total Section 6** | **$ 3,270** | |
| | | | | **Construction Subtotal** | **$ 469,917** | |
| | | | | **Estimating Contingency** | **$ 140,975** | Allow 30% of construction cost (items 1 through 6). |
| | | | | **Total Estimated Contractor Cost** | **$ 610,892** | |
| | | | | **Allowance for Design, Tender, Construction Oversight and Contract Administration** | **$ 100,000** | |
| | | | | **Total Estimated Project Cost** | **$ 710,892** | |

Notes:

1 Excludes land acquisition and planning/permitting costs.

2 Excludes applicable taxes.

Appendix 2

## APPENDIX A

## Cart manufacturers questionnaire

| **Question** *(& qualifying details on how response will be evaluated)* | **Suppliers response** | **Suppliers qualifying statement** |
|---|---|---|
| **Q.1** Does your company have any experience in supplying carts for organic waste collections? | Yes / No *(please delete as appropriate)* | |
| • Separate food scraps only | Yes / No | |
| • Separate yard waste only | Yes / No | |
| • Mixed food sraps and yard waste only | Yes / No | |
| • Both separate and mixed food and yard waste | Yes / No | |
| • No relevant experience | Yes / No | |
| | | |
| **Q.2** Does your company have any information available (either from yourselves or your customers) on cost differentials between the two approaches, i.e. separate versus mixed collection systems for food scraps and yard waste?<br><br>Where possible, please provide a breakdown of CAPEX and OPEX for collection systems as well as material resale values. | Yes / No *(please delete as appropriate and provide additional information in the next column)* | |
| • Separate collection of food scraps and yard waste | Yes / No | |
| • Mixed collection of food scraps and yard waste | Yes / No | |
| | | |
| **Q.3** In your experience, have you found that there are typical preferred cart capacities for these services in North America, and if so, what sizes are the most popular among your customers for each of the collection scenarios? | Yes / No *(please delete as appropriate)* | |
| • Separate food scraps | Yes / No | |
| • Separate yard waste | Yes / No | |
| • Mixed food scraps and yard waste | Yes / No | |
| | | |
| **Q.4-1** Based on the response above, would your company be in a position to provide indicative prices for the supply of containers to c. 42,000 properties across the Regional District of Okanagan-Similkameen for each of the collection scenarios? | Yes / No *(please delete as appropriate and provide additional information in the next column)* | |
| • Separate food scraps and yard waste *(Please specify assumed cart capacity)* | Yes / No | |
| • Mixed food scraps and yard waste *(Please specify assumed cart capacity)* | Yes / No | |
| | | |
| **Q.4-2** For the indicative price estimate above, would there be a cost implication for purchasing the containers in batches, and if so, what would be the cost implication of purchasing the containers in 3 separate batches (i.e. c.14,000 properties x 3) for each of the collection scenarios? | Yes / No *(please delete as appropriate and provide additional information in the next column)* | |

| | | |
|---|---|---|
| • Separate food scraps and yard waste *(Please specify assumed cart capacity)* | Yes / No | |
| • Mixed food scraps and yard waste *(Please specify assumed cart capacity)* | Yes / No | |
| | | |
| **Q.5** Does your company have any information available on typical contamination levels experienced by customers for any of the two approaches? (Where possible please provide an indication of contamination as a percentage of material collected.) | Yes / No *(please delete as appropriate and provide additional information in the next column)* | |
| • Separate food scraps only | Yes / No | |
| • Yard waste only | Yes / No | |
| • Mixed food scraps and yard waste | Yes / No | |
| | | |
| **Q.6** In your experience, how do customers rate each of the following key factors when contemplating a move to a cart-based collection system? | (*e.g. Low, Medium, High Importance; please delete as appropriate and provide additional information in the next column*) | |
| • Cost / affordability | Low / Medium / High | |
| • Complexity / operational flexibility | Low / Medium / High | |
| • Convenience | Low / Medium / High | |
| • Containment | Low / Medium / High | |
| • Space requirements | Low / Medium / High | |
| • Any other key factors? *(Please state)* | Low / Medium / High | |
| | | |
| **Q.7-1** In your experience, have you found whether new customers are tending to opt for automated collection systems or whether they are happy to continue using manual rear loading? | Yes / No *(please delete as appropriate and provide additional information in the next column)* | |
| Customers prefer automated collections | Yes / No | |
| Customers prefer manual rear loading | Yes / No | |
| | | |
| **Q.7-2** Of those customers who have made the switch to an automated collection system, what elements of the change have they found to be positive or beneficial?<br><br>What elements of the change have been less favourable? | N/A *(please provide response in the next column)* | |
| | | |
| **Q.8** Is there any other relevant information that your company can provide that in your opinion would enhance / assist us in our study? | Yes / No *(please delete as appropriate and provide additional information in the next column)* | |
| | | |

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