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Project name:
RDOS Organic Waste Management System

Project ref:
60660870

From:
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Date:
May 25, 2023

Technical Memorandum

Subject: Organic Waste Composting Facilities – Conceptual Designs

The intent of this technical memorandum is to provide conceptual design options for the development of an organic waste composting system for the Regional District of Okanagan-Similkameen (RDOS). The conceptual design will be comprised of the following key elements for each composting process option:

1. Process descriptions
2. Site layouts
3. Cost estimates

1.0 Background

AECOM has been engaged by the RDOS to develop conceptual designs for an organic waste (food and yard waste) composting facility to be located on land referred to as 1313 Greyback Road. A portion of this property lies within Agricultural Land Reserve (ALR) lands. In January 2023, the RDOS was unsuccessful in its appeal of an Agricultural Land Commission's (ALC's) decision to not allow the conversion of the ALR land to non-farm use. Due to this restriction, the available footprint on the site can only accommodate residential organic waste and not wastewater treatment solids.

As part of our work for the RDOS, AECOM has developed three composting options for consideration, based on the following technologies:

1. Sustainable Generations (Gore) system
2. Aerated windrows inside of a building
3. Aerated bunkers

Option 3 has been further divided into two sub options; one that will accommodate organic waste only, and one that can be expanded to process both organic waste and wastewater treatment solids. The later sub option is being investigated as a means of showing that the required footprint may not fall completely within the useable space.

2.0 Process Descriptions and Sizing

The three options noted above are designed for the 2040 organic feedstock volumes, using green waste, and food waste and compostable paper only. With the exception of a sub-option of Option 3, wastewater solids will not be included in the design concepts for following two reasons:

1. The funding received by the RDOS is for food waste only.
2. There are other options for the raw wastewater solids, such as hauling to a third-party contractor.

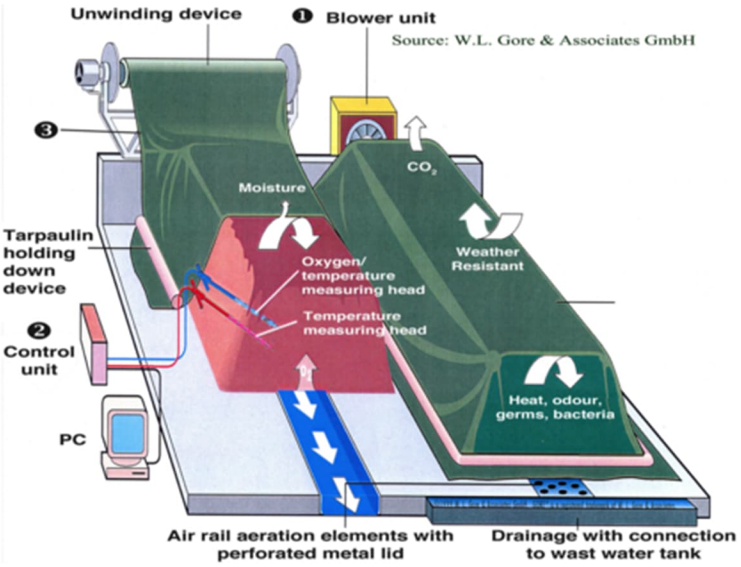
The compost facility sizing for the three options is based upon 2040 design capacity that was provided in the February 2020 Tetra Tech report entitled, *Regional District of Okanagan-Similkameen British Columbia Organics Facility Feasibility Assessment.* This capacity is represented by the following table from this report.

Table I-1: Total Organics Feedstocks at CMLF

Organic Material	2018		2040	
	Average Annual	Peak Month	Average Annual	Peak Month
Green Waste	10,200	1,273	11,900	1,485
Biosolids	5,900	885	*6,900*	*1,038*
Bulking Agent Amendment	2,950 – 4,800	443 – 525	3,450 – 5600	569 – 617
Food Waste & Compostable Paper	7,400 – 9,100	742 – 913	8,600 – 10,600	865 – 1,065
Total Feedstocks	**26,450 – 30,000**	**3,343 – 3,596**	**30,850 – 35,000**	**3,957 – 4,205**

2.1 Sustainable Generations (OPTION 1)

The Sustainable Generations technology is based on a variation of an in-vessel composting system that utilizes loading organic feedstock into bunkers that contain aerated floors. The piles are developed inside of the bunkers and then covered with a fine pore material (Gore-Tex) tarp. This allows for the containment of odours and humidity while allowing CO_2 to pass through the membrane during the aeration of the compost pile. This system also allows for the retention of heat within the process, that further accelerates the destruction of the volatile fraction of the waste.



The process is controlled with the use of oxygen sensors that allows for the cycling of the process blowers based on the required oxygen demand. The entire composting process cycle time is generally in the order of eight weeks.

2.1.1 Process Sizing

It was noted that there is a slight discrepancy in the sizing of the Sustainable Generations process in the two Tetra Tech design/costing documents (2020 report and 2023 technical memorandum). The compost facility sizing in the 2023 Tetra Tech technical memorandum includes six bunkers measuring 9 m wide, 50 m long and 3.7 m high, where the sizing in the 2020 report included windrows that are 50 m long, 8 m wide and 3.5 m high. As the costing information was based on the 2020 report, AECOM has carried forward the dimensions generated in the 2020 report as the basis of our analysis/design.

Given this information, the volume capacity of the six windrows inside the building in the Tetra Tech design is 50 m x 8 m x 3.5 m x 0.66 (shape factor) x 6 windrows = 5,544 m^3. Assuming a bulk density of 700 kg/m^3, the capacity of the system is 3,881 tonnes (5,544 m^3 * 700 kg/m^3 / 1000 kg/tonne).

The actual capacity is lower than the full capacity because additional space is required to allow for loading and unloading the material. Given that one week is required to load one windrow, and that the technology requires that the windrow be loaded and covered before the aeration system is turned on, the available capacity is reduced by approximately 1/6th. The capacity of the system as designed in the Tetra Tech documentation is 3,881 tonnes x 5/6 = 3,234 tonnes.

Based on the six-week process as described in the Tetra Tech document, the 3,234-tonne capacity includes a six-week process, therefore 539 tonnes of material can be loaded per week, or 28,028 tonnes per year. The monthly process capacity then equates to 2,336 tonnes, which is slightly more than the 2040 design peak monthly requirement of 2,250 tonnes per month (yearly average divided by 12 months x 20% peaking factor).

2.2 Aerated Windrows Inside of a Building (OPTION 2)

This second option includes aerated windrows inside a building. The design is similar to the Sustainable Generation system with the exception that bunker walls are not required within the building.

The aerated windrow design that incorporates a biocover layer has the following odour control advantages when compared with the Sustainable Generation technology:

1. The use of biocover provides an 80-98% VOC (Volatile Organic Carbon) reduction; compared to the 80% achieved with a Gore micropore cover (Option 1). The VOCs include odorous sulphur containing compounds, which are linked to the more objectionable odours that originate from organic waste composting facilities.
2. The aerated windrow design allows the material in the windrow to be covered with the biocover and aerated as the pile is being constructed, rather than having to wait until the pile is completed and the cover placed over the pile, as is the case with Option 1. This substantially reduces the odour risk resulting from anaerobic conditions being established on the interior of the material as the windrow is being constructed.
3. The aerated windrow design provides superior aeration of the composting material as there are no walls on each side of the pile that restrict air from entering the base of the piles. Although both concepts include forced aeration, an aerated pile benefits from an “aspiration effect” where the forced air blowing through the floor results in a greater volume of air entering from the sides at the base of the pile.

From a cost perspective, the aerated windrow design has the following advantages relative to Option 1:

1. Construction cost is lower, as there are no bunker walls necessary inside the buildings.
2. Equipment cost is lower, as there are no membrane covers or cover winding mechanism required.
3. Aeration control is based on timer and temperature feedback, which is less costly than aeration control based on oxygen concentration.
4. Operational cost is lower, as the membrane covers, and the oxygen sensors have a limited life and are costly to replace or repair.

2.2.1 Process Sizing

To provide a similar capacity as the Sustainable Generation system, the aerated windrows can be slightly larger (3.7 m high and 9.1 m wide), which in turn reduces the windrow length to 43 m. This reduces the active composting building footprint from 3,850 m^2 to 3264 m^2.

2.3 Aerated Bunkers (OPTION 3)

The third option utilizes aerated bunkers inside a building rather than aerated windrows inside a building (the figure below shows how aerated bunker designs range from partially enclosed bunkers to fully enclosed bunkers with doors, or enclosed bunkers inside a working hall).

The advantages of this concept relative to Options 1 & 2 include:

1. Smaller footprint resulting in less costly site preparation
2. Smaller bunkers requiring less loader travel inside potentially steamy environments
3. Smaller biofilter as the composting space can be isolated more effectively and the building itself will be smaller
4. Combining the receiving building biofilter with the aerated bunker biofilter reduces cost and increases efficiency

This technology has also been successfully utilized for wastewater solids composting at facilities in BC and Alberta.

2.3.1 Process Sizing

The third option includes aerated bunkers that are 9.1 m wide and 20 m long, with material piled to 3 m high. Eight aerated bunkers will provide a similar capacity as the Sustainable Generation design and allows for two of the bunkers to be empty or being filled at all times in the process cycle.

There are several advantages to this option including:

- The building footprint is reduced from 3,850 m^2 to 2,200 m^2. The building requirement could be further reduced to 1,665 m^2 if the space between the aerated bunkers was not covered.
- The biofilter footprint is reduced from 1,625 m^2 to 720 m^2.
- Operating cost for the biofilter is lower as significantly less air is required to be exhausted.
- The biofilter for the receiving building could be eliminated as the receiving building air would be incorporated into the active composting exhaust. This is beneficial for the microbes in the biofilter as it provides cooling of the exhaust from the composting buildings and warming of the receiving building air.

- The distance required for the loaders to operate is significantly reduced as the length of the bunkers is less, and they are closer to the receiving building.
- The hot and wet composting air is more contained and directed to the biofilter, compared with filling the entire building space. This is very important, particularly during the winter months, when the condensation (fog) inside the building makes equipment operation more challenging.

The disadvantage to this option is that the capital cost is per m^2 of operating space is higher. There are a number of options that can be incorporated to reduce cost including:

- Roof design
- Whether the space between the bunkers needs to be enclosed.
- Choice of building and roof materials

2.3.2 Additional Process Considerations

Screening

We recommend screening the product to approximately ¾" minus immediately after removal from the aerated bunkers. We also recommend that this be completed inside a building for the following reasons:

- Screening the material after active composting removes much of the non-compostable plastics that are likely to be blown around the site if they remain in the material when outside.
- Screening the material after active composting reduces the curing space requirement by approximately 50%.
- Dust, odour and plastics are contained inside an enclosed space.

We recommend that the screening occur in a separate building, which could be located to the north of the active composting area, or to the east of the active compost area if the aerated bunkers are chosen.

Secondary Composting

We further recommend turned and aerated composting on an outdoor pad for the secondary composting process. The primary composting process will eliminate the primary composting odours. The screener will reduce the plastics that are likely to blow around. The composting material needs to have moisture added and will benefit from aeration and turning.

We propose a four-week curing process for the screened material following the primary composting process.

The volume of material that needs to be cured is estimated to be approximately 1,500 m^3 per month (3,216 m^3 per month entering the compost process, 10% volume reduction during primary composting, and 50% volume reduction after screening = 1,448 m^3 per month)

This can be achieved using four 40 m long x 6 m wide x 2.5 m high curing windrows that are aerated through the floor. Moisture addition and turning is achieved with a compost turner. The space required between the aerated windrows is 1 m. The size of the curing pad is 30 m wide x 55 m long.

2.3.3 Wastewater Solids Addition (OPTION 3a)

AECOM has developed a sub-option of OPTION 3 (referred to OPTION 3a) that will allow for the addition of wastewater solids into the aerated bunkers' processing stream, while still generally keeping the facility footprint with the available lands. There are economies of scale that can be achieved by processing the wastewater solids in the same facility as the food waste. We recommend that the wastewater solids be composted separately from the food waste for the following three reasons:

1. Wastewater solids are easy to mix, have little or no plastics or other non-compostable material, and produce a very clean product. The overs can be easily recirculated in the composting process after screening as bulking agent for incoming wastewater solids.
2. Wastewater solids cannot be included in the composting process if compost that is approved for organic use is one of the objectives with the food and yard waste composting.
3. Concerns regarding PFAS compounds may limit the distribution of the wastewater solids compost.

With this option, we assume the following:

1. Wastewater solids can be mixed with bulking agent in the same mixer that is used for the food and yard waste. However, a cleanout procedure is recommended.
2. The wastewater solids/bulking agent mix will be composted separately from the food waste.
3. Wastewater solids compost can be screened using the same screener as the food and yard waste. However, a cleanout procedure is recommended.

Process Sizing and Considerations

The wastewater solids capacity of the facility is designed for the 2040 peak monthly tonnage as per the information provided in the Tetra Tech report (1,038 tonnes per month). The moisture content of the wastewater solids is assumed to be 80% and requires an additional 1,038 tonnes of bulking agent to be blended before composting. The moisture content of the bulking agent is assumed to be 40%. The resulting mix is 2,717 m^3 per month having a moisture content of 65% and a bulk density of 764 kg/m^3.

This additional volume of composting material can be accommodated with four additional bunkers that are similar in size to the bunkers as outlined in Option 3. The composting time in the aerated bunkers can be reduced to approximately three weeks, instead of the four weeks for the food and yard waste composting.

After the 21 to 24 days of primary composting, the product is screened. The fine material is further composted on the aerated floor. It is rewetted using the compost turner. The overs, which can be up to 65% of the volume of the material from the aerated bunkers, can be recycled by blending with the incoming wastewater solids. This provides three benefits:

1. The recycled overs have an active microbial community that speeds up the wastewater solids composting process,
2. The amount of space required for secondary composting/curing is much lower, and
3. The volume of wood waste to be used as bulking agent is dramatically reduced.

3.0 Site Layouts

Based on the design criteria noted in the previous section, a site layout has been prepared for all options. These layouts provide a depiction of how challenging it will be to construct and operate the organic waste composting facility within the available land. The building dimensions and site contours were used to develop assumed grading surfaces to eliminate quantities that will then be used to develop the cost estimates. The site layouts for the four options are depicted on the following pages.

4.0 Cost Estimates

Estimates have been developed for both capital and operating costs to allow for the further development of an annualized cost for each option. This annualized cost is presented on a dollar per tonne of material processed basis, which is the benchmark that the RDOS has been using in their decision-making process.

Class 5[1] capital cost estimates were developed for each of the options with the following basis being used in developing the capital cost estimates:

- Equipment supply and installation costs are based on other recent projects undertaken by the Engineering Team and verified with recent RDOS projects
- Site civil and structural foundation estimates derived from site layouts
- The direct construction costs are estimated for each option
- A 30 percent contingency is applied to the base project costs
- Engineering and construction management services, and the RDOS's internal costs have not been included in the project costs
- Construction escalation has not been included in the estimates with all estimates baselined in 2023 dollars
- A Class 5 estimate requires 0 percent to 2 percent engineering to be complete and yields an estimate accuracy of -20 percent to +50 percent

Operating cost estimates have been developed and will include the following broad categories for each of the process options:

- Electricity
- Fuel
- Labour
- Maintenance

The revenue from the sale of produced compost from the facility has not been included in the annual operating.

The total annualized cost will be the combination of the annualized capital cost and the annual operating cost estimate. The annualized capital cost will account for the $11Million grant that the RDOS has available to partially fund this project. This annualized cost is divided by the annual projected quantity of material to be processed, to arrive at a per tonne of material processed cost. These quantities are noted in Section 2 of this technical memorandum.

[1] AACE International Recommended Practice No. 56R-08, Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Building and General Construction Industries, August 2020.

OPTION 1

N

CURING PILE
9 m x 50 m

CURING PILE
9 m x 50 m

CURING PILE
9 m x 50 m

CURING PILE
9 m x 50 m

CURING PILE
15 m x 30 m

CURING PILE
15 m x 30 m

676.50

CURING PILE
18 m x 25 m

55.5 m

21.0 m

65.0 m

70.0 m

BIOFILTER

ACTIVE
COMPOST
BUNKER

26.0 m

30.0 m

RECEIVING
BUILDING

PROPOSED
POND

PROPERTY BOUNDARY

0 12.5 25 m

1:500

AGRICULTURAL LAND RESERVE
(GREEN HATCH)

OPTION 2

N

40.0 m

30.0 m

SECONDARY CURING

676.50

PROPOSED POND

PROPERTY BOUNDARY

48.5 m

21.0 m

26.0 m

30.0 m

RECEIVING BUILDING

ACTIVE COMPOST BUNKER

70.0 m

BIOFILTER

65.0 m

5.0 m

AGRICULTURAL LAND RESERVE (GREEN HATCH)

0 12.5 25 m

1:500

OPTION 3

N

SECONDARY CURING

40.0 m

30.0 m

676.50

PROPOSED POND

PROPERTY BOUNDARY

BIOFILTER

36.0 m

10.0 m

40.0 m

RECEIVING BUILDING

26.0 m

30.0 m

ACTIVE COMPOST BUNKER

55.0 m

SCREENING AREA

15.0 m

30.0 m

2.5 m

BIOFILTER

10.0 m

36.0 m

0 12.5 25 m

1:500

AGRICULTURAL LAND RESERVE (GREEN HATCH)

OPTION 3A

N

40.0 m

30.0 m

SECONDARY CURING

676.50

PROPOSED POND

PROPERTY BOUNDARY

40.0 m

BIOFILTER

11.5 m

61.0 m

21.0 m

EXTENSION

15.0 m

40.0 m

PREVIOUS BUILDING DIMENSION

SCREENING AREA

30.0 m

55.0 m

ACTIVE COMPOST BUNKER

26.0 m

RECEIVING BUILDING

30.0 m

40.0 m

BIOFILTER

11.5 m

0 12.5 25 m

1:500

AGRICULTURAL LAND RESERVE (GREEN HATCH)

A summary of the costs are provided in the tables below, with the details for each option given in the appendix of this technical memorandum.

CAPITAL COSTS

ITEM	OPTION 1	OPTION 2	OPTION 3	OPTION 3a
General Requirements	$80,000	$80,000	$80,000	$80,000
Site Civil	$5,527,657	$4,056,585	$2,923,764	$3,085,217
Structural	$4,435,920	$2,796,000	$2,988,336	$3,817,704
Buildings	$2,332,500	$2,087,500	$1,765,000	$2,067,500
Process Mechanical	$6,212,525	$3,169,125	$2,582,550	$2,758,725
Mobile Equipment	$1,440,000	$2,190,000	$2,190,000	$2,190,000
Electrical / Instrumentation	$657,253	$669,825	$552,510	$591,745
Direct Construction Cost	$20,685,855	$15,049,035	$13,082,160	$14,590,891
Contingency (30%)	$6,205,756	$4,514,711	$3,924,648	$4,377,267
Total Capital Cost	**$26,900,000**	**$19,600,000**	**$17,100,000**	**$19,000,000**

OPERATING COSTS

ITEM	OPTION 1	OPTION 2	OPTION 3	OPTION 3a
Electricity	$65,910	$65,910	$72,270	$81,906
Fuel for Mobile Equipment	$144,000	$144,000	$115,200	$172,800
Labour	$374,400	$374,400	$374,400	$374,400
Maintenance and Replacement	$620,576	$451,471	$392,465	$437,727
Direct Operating Cost	$1,204,886	$1,035,781	$954,335	$1,066,833
Contingency (30%)	$361,466	$310,734	$286,300	$320,050
Total Operating Cost	**$1,566,352**	**$1,346,516**	**$1,240,635**	**$1,386,883**

ANNUALIZED COSTS

ITEM	OPTION 1	OPTION 2	OPTION 3	OPTION 3a
Annualized Capital Cost[2] (including grant funding)	$1,386,234	$749,787	$531,826	$697,476
Operating Cost	$1,566,352	$1,346,516	$1,240,635	$1,386,883
Total Annualized Cost	$2,952,586	$2,096,303	$1,772,461	$2,084,359
Cost Per Tonne Processed	**$109**	**$78**	**$66**	**$50**

5.0 Recommendation

Based on the design options, the restrictions associated with land available for this facility, and our financial estimates, AECOM recommends that OPTION 3 be carried forward by the RDOS as a basis of design. OPTION 3 can also be readily expanded in the future should some of the adjacent ALR land become available, which could allow for the accommodation of the City of Penticton's wastewater solids into the composting operation. This option provides a more compact footprint and one that will allow for more efficient foul air collection and treatment. It's proximity to the landfill may also accommodate shared resources and provide an area for the use of the compost as landfill cover.

With regards to the project delivery schedule, it is assumed that the following timelines would be applicable a project of this scope and complexity:

- Design Procurement – one month
- Preliminary Design – 4 months
- Value Analysis (procurement and workshop) – 2 months
- Detailed Design – 8 months
- Tender Period (document preparation and tender period) – 2 months
- Award and Approvals – 2 months
- Construction – 18 months
- Commissioning and Start-up – 3 months

[2] 20-year life at 6% discount rate

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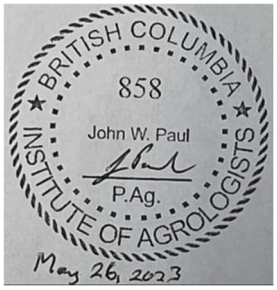

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APPENDIX – COST ESTIMATE DETAILS

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 1 - Sustainable Generations Composting System

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
	Sub-total:				**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,651	m2	$16	$106,416	clearing and stockpiling site and clearing access road
.2	Rough Grading	49,363	m3	$12	$592,356	cut and fill quantities
.3	Blasting	45,064	m3	$70	$3,154,480	
.4	Subgrade Preparation	29,885	m2	$6	$179,310	scarifying and recompacting
.5	Surfacing - Aggregate	7,254	m3	$85	$616,590	
.6	Surfacing - Geogrid	11,630	m2	$10	$116,300	
.7	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.8	Ditches	5,180	m2	$60	$310,800	for access road
.9	Potable Water Connection	1	LS	$20,000	$20,000	
	Sub-total:				**$5,191,877**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
.1	Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
.2	Active Compost Bunkers	1165.5	m3	$1,600	$1,864,800	55.5m x 70.0m x 0.3m
.3	Curing Piles	810	m3	$1,600	$1,296,000	(two @ 15.0m x 30.0m x 0.3m) (four @ 9.0m x 50.0m x 0.3m)
.2	Compost Bunker Walls					
.1	End Walls	50.4	m3	$1,800	$90,720	six @ 8.0m x 3.5m x 0.3m
.2	Longitudinal Walls	450	m3	$1,800	$810,000	twelve @ 50.0m x 2.5m x 0.3m
	Sub-total:				**$4,435,920**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	3885	m2	$500	$1,942,500	fabric covered building
	Sub-total:				**$2,332,500**	
5.0	**MECHANICAL**					
.1	Sustainable Generations System	1	LS	$4,500,000	$4,500,000	assumes covers, blowers and control system
.2	Cover Winder	1	LS	$160,000	$160,000	
.3	Biofilter	1365	m2	$250	$341,250	assumes 2m deep biofilter (1m of media and 1m of liner, header pipes and drain rock) and lock block walls
.4	Biofilter Blowers	2	Unit	$40,000	$80,000	assumes FRP fans
.5	Building Ventilation (including foul air ducting)				$466,500	20% of building costs
.6	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.7	Installation				$564,775	10% of equipment cost
	Sub-total:				**$6,212,525**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
	Sub-total:				**$1,440,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$621,253	10% of process mechanical and building ventilation costs
.2	Instrumentation				$36,000	assumed to be included in Sustainable Generations costs, except for scales and biofilter blowers (20% of process mechanical costs)
	Sub-total:				**$657,253**	
SUB-TOTAL					**$20,350,075**	
CONTINGENCY (30%)					**$6,105,022**	
TOTAL PRICE (Excluding GST)					**$26,455,097**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 2 - Indoor Windrow Composting System

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
Sub-total:					**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,651	m2	$16	$106,416	clearing and stockpiling site and clearing access road
.2	Rough Grading	30,062	m3	$12	$360,744	cut and fill quantities
.3	Blasting	28,268	m3	$70	$1,978,760	
.4	Subgrade Preparation	27,690	m2	$6	$166,140	scarifying and recompacting
.5	Surfacing - Aggregate	6,887	m3	$85	$585,395	
.6	Surfacing - Geogrid	9,435	m2	$10	$94,350	
.7	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.8	Ditches	5,180	m2	$60	$310,800	
.9	Potable Water Connection	1	LS	$20,000	$20,000	
Sub-total:					**$3,718,230**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
.1	Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
.2	Active Compost Bunkers	1018.5	m3	$1,600	$1,629,600	48.5m x 70.0m x 0.3m
.3	Secondary Compost	495	m3	$1,600	$792,000	30.0m x 55.0m x 0.3m
Sub-total:					**$2,796,000**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	3395	m2	$500	$1,697,500	fabric covered building
Sub-total:					**$2,087,500**	
5.0	**MECHANICAL**					
.1	Aeration System (infloor piping, aeration blowers, control)				$1,200,000	
.2	Biofilter	1365	m2	$250	$341,250	assumes 2m deep biofilter (1m of media and 1m of liner, header pipes and drain rock) and lock block walls
.3	Biofilter Blowers	2	Unit	$40,000	$80,000	assumes FRP fans
.4	Building Ventilation (including foul air ducting)				$626,250	30% of building costs
.5	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.6	Installation				$821,625	35% of equipment cost
Sub-total:					**$3,169,125**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	Medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
.4	Windrow Turner	1	LS	$ 750,000	$ 750,000	
Sub-total:					**$2,190,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$633,825	20% of process mechanical and building costs
.2	Instrumentation				$36,000	assumed to be included in compost system supplier costs, except for scales and biofilter blowers (20% of process mechanical costs)
Sub-total:					**$669,825**	
SUB-TOTAL					**$14,710,680**	
CONTINGENCY (30%)					**$4,413,204**	
TOTAL PRICE (Excluding GST)					**$19,123,884**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 3 - Aerated Bunker Composting System

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
Sub-total:					**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,114	m2	$16	$97,824	clearing and stockpiling site and clearing access road
.2	Rough Grading	23,035	m3	$12	$276,420	cut and fill quantities
.3	Blasting	13,150	m3	$70	$920,500	
.4	Subgrade Preparation	26,470	m2	$6	$158,820	scarifying and recompacting
.5	Surfacing - Aggregate	6,772	m3	$85	$575,620	
.6	Surfacing - Geogrid	8,860	m2	$10	$88,600	
.7	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.8	Ditches	5,180	m2	$60	$310,800	
.9	Potable Water Connection	1	LS	$20,000	$20,000	
Sub-total:					**$2,544,209**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
.1	Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
.2	Active Compost Bunkers	660	m3	$1,600	$1,056,000	40.0m x 55.0m x 0.3m
.3	Secondary Compost	495	m3	$1,600	$792,000	30.0m x 55.0m x 0.3m
.4	Screening Area	135	m3	$1,600	$216,000	15.0m x 30.0m x 0.3m
.2	Compost Bunker Walls					
.1	End Walls	65.52	m3	$1,800	$117,936	eight @ 9.1m x 3.0m x 0.3m
.2	Longitudinal Walls	240	m3	$1,800	$432,000	sixteen @ 20.0m x 2.5m x 0.3m
Sub-total:					**$2,988,336**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	2750	m2	$500	$1,375,000	fabric covered building
Sub-total:					**$1,765,000**	
5.0	**MECHANICAL**					
.1	Aeration System (infloor piping, aeration blowers, control)				$1,200,000	
.2	Biofilter	720	m2	$250	$180,000	assumes 2m deep biofilter (1m of media and 1m of liner, header pipe and drain rock) and lock block walls
.3	Biofilter Blowers	2	Unit	$40,000	$80,000	assumes FRP fans
.4	Building Ventilation (including foul air ducting)				$353,000	20% of building costs
.5	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.6	Installation				$669,550	35% of equipment cost
Sub-total:					**$2,582,550**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	Medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
.4	Windrow Turner	1	LS	$ 750,000	$ 750,000	
Sub-total:					**$2,190,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$516,510	20% of process mechanical and building costs
.2	Instrumentation				$36,000	assumed to be included in compost system supplier costs, except for scales and biofilter blowers (20% of process mechanical costs)
Sub-total:					**$552,510**	
SUB-TOTAL					**$12,702,605**	
CONTINGENCY (30%)					**$3,810,782**	
TOTAL PRICE (Excluding GST)					**$16,513,387**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 3a - Aerated Bunker Composting System (with wastewater solids)

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
Sub-total:					**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,017	m2	$16	$96,272	clearing and stockpiling site and clearing access road
.2	Rough Grading	26,060	m3	$12	$312,720	cut and fill quantities
.3	Blasting	16,500	m3	$70	$1,155,000	
.4	Subgrade Preparation	27,175	m2	$6	$163,050	scarifying and recompacting
.5	Surfacing - Aggregate	6,873	m3	$85	$584,205	
.6	Surfacing - Geogrid	9,365	m2	$10	$93,650	
.7	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.8	Ditches	5,180	m2	$60	$310,800	
.9	Potable Water Connection	1	LS	$20,000	$20,000	
Sub-total:					**$2,831,322**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
.1	Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
.2	Active Compost Bunkers	1006.5	m3	$1,600	$1,610,400	40.0m x 55.0m x 0.3m
.3	Secondary Compost	495	m3	$1,600	$792,000	30.0m x 55.0m x 0.3m
.4	Screening Area	135	m3	$1,600	$216,000	15.0m x 30.0m x 0.3m
.2	Compost Bunker Walls					
.1	End Walls	98.28	m3	$1,800	$176,904	eight @ 9.1m x 3.0m x 0.3m
.2	Longitudinal Walls	360	m3	$1,800	$648,000	sixteen @ 20.0m x 2.5m x 0.3m
Sub-total:					**$3,817,704**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	3355	m2	$500	$1,677,500	fabric covered building
Sub-total:					**$2,067,500**	
5.0	**MECHANICAL**					
.1	Aeration System (infloor piping, aeration blowers, control)	1	LS	$1,200,000	$1,200,000	
.2	Biofilter	920	m2	$250	$230,000	assumes 2m deep biofilter (1m of media and 1m of liner, header pipe and drain rock) and lock block walls
.3	Biofilter Blowers	2	Unit	$50,000	$100,000	assumes FRP fans
.4	Building Ventilation (including foul air ducting)				$413,500	20% of building costs
.5	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.6	Installation				$715,225	35% of equipment cost
Sub-total:					**$2,758,725**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	Medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
.4	Windrow Turner	1	LS	$ 750,000	$ 750,000	
Sub-total:					**$2,190,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$551,745	20% of process mechanical and building costs
.2	Instrumentation				$40,000	assumed to be included in compost system supplier costs, except for scales and biofilter blowers (20% of process mechanical costs)
Sub-total:					**$591,745**	
SUB-TOTAL					**$14,336,996**	
CONTINGENCY (30%)					**$4,301,099**	
TOTAL PRICE (Excluding GST)					**$18,638,095**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 1 - Sustainable Generations Composting System

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
	Sub-total:				**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,651	m2	$16	$106,416	clearing and stockpiling site and clearing access road
.2	Rough Grading	49,363	m3	$12	$592,356	cut and fill quantities
.3	Blasting	45,064	m3	$70	$3,154,480	
.4	Subgrade Preparation	29,885	m2	$6	$179,310	scarifying and recompacting
.5	Surfacing - Aggregate	7,254	m3	$85	$616,590	
.6	Surfacing - Geogrid	11,630	m2	$10	$116,300	
.7	Asphalt Surface	3,260	m2	$103	$335,780	cummalative unit price includes asphalt, gravel sub-base and geogrid
.8	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.9	Ditches	5,180	m2	$60	$310,800	for access road
.10	Potable Water Connection	1	LS	$20,000	$20,000	
	Sub-total:				**$5,527,657**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
.1	Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
.2	Active Compost Bunkers	1165.5	m3	$1,600	$1,864,800	55.5m x 70.0m x 0.3m
.3	Curing Piles	810	m3	$1,600	$1,296,000	(two @ 15.0m x 30.0m x 0.3m) (four @ 9.0m x 50.0m x 0.3m)
.2	Compost Bunker Walls					
.1	End Walls	50.4	m3	$1,800	$90,720	six @ 8.0m x 3.5m x 0.3m
.2	Longitudinal Walls	450	m3	$1,800	$810,000	twelve @ 50.0m x 2.5m x 0.3m
	Sub-total:				**$4,435,920**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	3885	m2	$500	$1,942,500	fabric covered building
	Sub-total:				**$2,332,500**	
5.0	**MECHANICAL**					
.1	Sustainable Generations System	1	LS	$4,500,000	$4,500,000	assumes covers, blowers and control system
.2	Cover Winder	1	LS	$160,000	$160,000	
.3	Biofilter	1365	m2	$250	$341,250	assumes 2m deep biofilter (1m of media and 1m of liner, header pipes and drain rock) and lock block walls
.4	Biofilter Blowers	2	Unit	$40,000	$80,000	assumes FRP fans
.5	Building Ventilation (including foul air ducting)				$466,500	20% of building costs
.6	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.7	Installation				$564,775	10% of equipment cost
	Sub-total:				**$6,212,525**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
	Sub-total:				**$1,440,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$621,253	10% of process mechanical and building ventilation costs
.2	Instrumentation				$36,000	assumed to be included in Sustainable Generations costs, except for scales and biofilter blowers (20% of process mechanical costs)
	Sub-total:				**$657,253**	
SUB-TOTAL					**$20,685,855**	
CONTINGENCY (30%)					**$6,205,756**	
TOTAL PRICE (Excluding GST)					**$26,891,611**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 2 - Indoor Windrow Composting System

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
	Sub-total:				**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,651	m2	$16	$106,416	clearing and stockpiling site and clearing access road
.2	Rough Grading	30,062	m3	$12	$360,744	cut and fill quantities
.3	Blasting	28,268	m3	$70	$1,978,760	
.4	Subgrade Preparation	27,690	m2	$6	$166,140	scarifying and recompacting
.5	Surfacing - Aggregate	6,887	m3	$85	$585,395	
.6	Surfacing - Geogrid	9,435	m2	$10	$94,350	
.7	Asphalt Surface	3,285	m2	$103	$338,355	cummalative unit price includes asphalt, gravel sub-base and geogrid
.8	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.9	Ditches	5,180	m2	$60	$310,800	
.10	Potable Water Connection	1	LS	$20,000	$20,000	
	Sub-total:				**$4,056,585**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
	.1 Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
	.2 Active Compost Bunkers	1018.5	m3	$1,600	$1,629,600	48.5m x 70.0m x 0.3m
	.3 Secondary Compost	495	m3	$1,600	$792,000	30.0m x 55.0m x 0.3m
	Sub-total:				**$2,796,000**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	3395	m2	$500	$1,697,500	fabric covered building
	Sub-total:				**$2,087,500**	
5.0	**MECHANICAL**					
.1	Aeration System (infloor piping, aeration blowers, control)				$1,200,000	
.2	Biofilter	1365	m2	$250	$341,250	assumes 2m deep biofilter (1m of media and 1m of liner, header pipes and drain rock) and lock block walls
.3	Biofilter Blowers	2	Unit	$40,000	$80,000	assumes FRP fans
.4	Building Ventilation (including foul air ducting)				$626,250	30% of building costs
.5	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.6	Installation				$821,625	35% of equipment cost
	Sub-total:				**$3,169,125**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	Medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
.4	Windrow Turner	1	LS	$ 750,000	$ 750,000	
	Sub-total:				**$2,190,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$633,825	20% of process mechanical and building costs
.2	Instrumentation				$36,000	assumed to be included in compost system supplier costs, except for scales and biofilter blowers (20% of process mechanical costs)
	Sub-total:				**$669,825**	
SUB-TOTAL					**$15,049,035**	
CONTINGENCY (30%)					**$4,514,711**	
TOTAL PRICE (Excluding GST)					**$19,563,746**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 3 - Aerated Bunker Composting System

CAPITAL COST ESTIMATE

Item			Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**						
	.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
	.2	Survey	1	LS	$20,000	$20,000	
	.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
	Sub-total:					**$80,000**	
2.0	**CIVIL SITEWORKS**						
	.1	Clearing Topsoil	6,114	m2	$16	$97,824	clearing and stockpiling site and clearing access road
	.2	Rough Grading	23,035	m3	$12	$276,420	cut and fill quantities
	.3	Blasting	13,150	m3	$70	$920,500	
	.4	Subgrade Preparation	26,470	m2	$6	$158,820	scarifying and recompacting
	.5	Surfacing - Aggregate	6,772	m3	$85	$575,620	
	.6	Surfacing - Geogrid	8,860	m2	$10	$88,600	
	.7	Asphalt Surface	3,685	m2	$103	$379,555	cummalative unit price includes asphalt, gravel sub-base and geogrid
	.8	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
	.9	Ditches	5,180	m2	$60	$310,800	
	.10	Potable Water Connection	1	LS	$20,000	$20,000	
	Sub-total:					**$2,923,764**	
3.0	**STRUCTURAL**						
	.1	Building Slabs and Footings					
		.1 Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
		.2 Active Compost Bunkers	660	m3	$1,600	$1,056,000	40.0m x 55.0m x 0.3m
		.3 Secondary Compost	495	m3	$1,600	$792,000	30.0m x 55.0m x 0.3m
		.4 Screening Area	135	m3	$1,600	$216,000	15.0m x 30.0m x 0.3m
	.2	Compost Bunker Walls					
		.1 End Walls	65.52	m3	$1,800	$117,936	eight @ 9.1m x 3.0m x 0.3m
		.2 Longitudinal Walls	240	m3	$1,800	$432,000	sixteen @ 20.0m x 2.5m x 0.3m
	Sub-total:					**$2,988,336**	
4.0	**BUILDINGS**						
	.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
	.2	Active Compost Bunkers	2750	m2	$500	$1,375,000	fabric covered building
	Sub-total:					**$1,765,000**	
5.0	**MECHANICAL**						
	.1	Aeration System (infloor piping, aeration blowers, control)				$1,200,000	
	.2	Biofilter	720	m2	$250	$180,000	assumes 2m deep biofilter (1m of media and 1m of liner, header pipe and drain rock) and lock block walls
	.3	Biofilter Blowers	2	Unit	$40,000	$80,000	assumes FRP fans
	.4	Building Ventilation (including foul air ducting)				$353,000	20% of building costs
	.5	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
	.6	Installation				$669,550	35% of equipment cost
	Sub-total:					**$2,582,550**	
6.0	**MOBILE EQUIPMENT**						
	.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	Medium size, e.g. Cat 966H
	.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
	.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
	.4	Windrow Turner	1	LS	$ 750,000	$ 750,000	
	Sub-total:					**$2,190,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**						
	.1	Electrical				$516,510	20% of process mechanical and building costs
	.2	Instrumentation				$36,000	assumed to be included in compost system supplier costs, except for scales and biofilter blowers (20% of process mechanical costs)
	Sub-total:					**$552,510**	
SUB-TOTAL						**$13,082,160**	
CONTINGENCY (30%)						**$3,924,648**	
TOTAL PRICE (Excluding GST)						**$17,006,808**	

RDOS - Organic Waste Composting Facility (Conceptual Design Opinion of Probable Cost) **Project #: 60660870**
OPTION 3a - Aerated Bunker Composting System (with wastewater solids)

CAPITAL COST ESTIMATE

Item		Quantity	Unit	Unit Price	Total Cost	Notes
1.0	**GENERAL REQUIREMENTS**					
.1	Mobilization/Demobilization	1	LS	$50,000	$50,000	
.2	Survey	1	LS	$20,000	$20,000	
.3	Start-up and Commissioning	1	LS	$10,000	$10,000	
Sub-total:					**$80,000**	
2.0	**CIVIL SITEWORKS**					
.1	Clearing Topsoil	6,017	m2	$16	$96,272	clearing and stockpiling site and clearing access road
.2	Rough Grading	26,060	m3	$12	$312,720	cut and fill quantities
.3	Blasting	16,500	m3	$70	$1,155,000	
.4	Subgrade Preparation	27,175	m2	$6	$163,050	scarifying and recompacting
.5	Surfacing - Aggregate	6,873	m3	$85	$584,205	
.6	Surfacing - Geogrid	9,365	m2	$10	$93,650	
.7	Asphalt Surface	2,465	m2	$103	$253,895	cummalative unit price includes asphalt, gravel sub-base and geogrid
.8	Surface Water Pond HDPE Liner	5,625	m2	$17	$95,625	
.9	Ditches	5,180	m2	$60	$310,800	
.10	Potable Water Connection	1	LS	$20,000	$20,000	
Sub-total:					**$3,085,217**	
3.0	**STRUCTURAL**					
.1	Building Slabs and Footings					
	.1 Receiving Building	234	m3	$1,600	$374,400	26.0m x 30.0m x 0.3m
	.2 Active Compost Bunkers	1006.5	m3	$1,600	$1,610,400	40.0m x 55.0m x 0.3m
	.3 Secondary Compost	495	m3	$1,600	$792,000	30.0m x 55.0m x 0.3m
	.4 Screening Area	135	m3	$1,600	$216,000	15.0m x 30.0m x 0.3m
.2	Compost Bunker Walls					
	.1 End Walls	98.28	m3	$1,800	$176,904	eight @ 9.1m x 3.0m x 0.3m
	.2 Longitudinal Walls	360	m3	$1,800	$648,000	sixteen @ 20.0m x 2.5m x 0.3m
Sub-total:					**$3,817,704**	
4.0	**BUILDINGS**					
.1	Receiving Building	780	m2	$500	$390,000	fabric covered building
.2	Active Compost Bunkers	3355	m2	$500	$1,677,500	fabric covered building
Sub-total:					**$2,067,500**	
5.0	**MECHANICAL**					
.1	Aeration System (infloor piping, aeration blowers, control)	1	LS	$1,200,000	$1,200,000	
.2	Biofilter	920	m2	$250	$230,000	assumes 2m deep biofilter (1m of media and 1m of liner, header pipe and drain rock) and lock block walls
.3	Biofilter Blowers	2	Unit	$50,000	$100,000	assumes FRP fans
.4	Building Ventilation (including foul air ducting)				$413,500	20% of building costs
.5	Weigh Scale	1	LS	$100,000	$100,000	including kiosks
.6	Installation				$715,225	35% of equipment cost
Sub-total:					**$2,758,725**	
6.0	**MOBILE EQUIPMENT**					
.1	Wheel Loader	2	LS	$ 260,000	$ 520,000	Medium size, e.g. Cat 966H
.2	Mixer and Conveyor	1	LS	$ 270,000	$ 270,000	
.3	Screener and Contaminant Removal	1	LS	$ 650,000	$ 650,000	
.4	Windrow Turner	1	LS	$ 750,000	$ 750,000	
Sub-total:					**$2,190,000**	
7.0	**ELECTRICAL / INSTRUMENTATION**					
.1	Electrical				$551,745	20% of process mechanical and building costs
.2	Instrumentation				$40,000	assumed to be included in compost system supplier costs, except for scales and biofilter blowers (20% of process mechanical costs)
Sub-total:					**$591,745**	
SUB-TOTAL					**$14,590,891**	
CONTINGENCY (30%)					**$4,377,267**	
TOTAL PRICE (Excluding GST)					**$18,968,158**	