5.4.3 Option 3 - Expand Existing Landfill Site to Modified Landfill

Option 3 involves planning and constructing a 20 year modified landfill in the vicinity of the existing open dump/landfill site.

The existing open dump/landfill site is located on the south side of the access road. This site is approximately 600 m from the ocean and slopes towards the ocean. The existing landfill site is bound on the west by the sewage lagoon and the north by the access road however it could be expanded to the south towards the ocean and to the east.

As discussed in Section 4.3 the approximate footprint of land required for a 20 year modified landfill in Clyde River is 170 m by 170 m or 29,000 m2. The modified landfill site would consist of the following:

- Designated areas for placing municipal waste, hazardous wastes, and construction debris.
- The existing dump/landfill area would be incorporated into the new site and the landfill site would be significantly expanded.
- A gravel road system would be constructed within the site.
- Granular cover materials would be stock piled on site.
- Fencing would be constructed around the site
- Soil berms could be constructed around the site.
- The landfill berms and fencing could be constructed in two phases (two 10 year cells) to reduce immediate capital costs of constructing berms and fencing.
- The existing bulky waste landfill site could be closed and covered and an area could be designated within the new site OR the bulky waste site could continue to operate as a separate facility.

5.4.4 Option 4 - Modified Landfill Northwest of Existing Waste Sites

Option 4 involves planning and constructing a 20 year modified landfill northwest of the existing waste sites. There are a couple suitable areas northwest of the existing sites which would involve extending the existing access road approximately 450 m to 700 m depending on the exact area which is selected.

This area is further from the community however this option would involve disturbing an area of land which is currently not impacted.

As discussed in Section 4.3 the approximate footprint of land required for a 20 year modified landfill in Clyde River is 170 m by 170 m or 29,000 m2. The modified landfill site would consist of the following:

- Designated areas for placing municipal waste, hazardous wastes, and construction debris.
- The existing access road would be extended 450 m to 700 m to the chosen site.
- A gravel road system would be constructed within the site.
- Granular cover materials would be stock piled on site.

- Fencing would be constructed around the site
- Soil berms could be constructed around the site.
- The landfill berms and fencing could be constructed in two phases (two 10 year cells) to reduce immediate capital costs of constructing berms and fencing.
- The existing bulky waste landfill site could be closed and covered and an area could be designated within the new site OR the bulky waste site could continue to operate as a separate facility.
- The existing open dump/landfill would be closed and covered.

6.0 COST ESTIMATES OF SOLID WASTE FACILITY OPTIONS

This section provides the capital and operating cost estimates of the four proposed solid waste disposal options.

6.1 Capital Costs

This section provides a summary of the capital cost estimates of the proposed solid waste disposal options. The major capital costs associated with options 2, 3, and 4, which involve constructing a modified landfill, include:

- Constructing access roads within the site
- Berm construction
- Fencing
- Final capping
- Final closing/capping of existing waste site

Table 6-1 provides a summary of estimated capital costs for design and construction of the proposed waste disposal options, including an allowance of 15% for engineering design and 15% for construction contingency. These costs do not include GST. These costs do not include the cost of land acquisition. These costs are for planning purposes only and must be refined during the design stages of the project. The detailed capital costs are presented in Appendix B.

Table 6-1 Capital Cost Summary

	Option 1 - Open Dump/landfill with Burning at Existing Landfill	Option 2 - Expand Existing Bulky Waste Site to Modified Landfill	Option 3 - Expand Existing Landfill Site to Modified Landfill	Option 4 - Modified Landfill Northwest of Existing Waste Sites
Extend Access Road	na	na	na	$247,000
Site works	na	$62,000	$62,000	$62,000
Internal Site Roads	$13,700	$33,000	$33,000	$33,000
Soil Berms	na	$372,000	$372,000	$372,000
Fencing	$7,500	$98,000	$98,000	$98,000
Final Site Closure	$460,000	$1,196,000	$1,196,000	$1,196,000
Subtotal Landfill Cost:	**$481,000**	**$1,761,000**	**$1,761,000**	**$2,008,000**
Existing Waste Site Closure	na	$122,000	$122,000	$122,000
Subtotal:	$481,000	$1,883,000	$1,883,000	$2,130,000
Engineering/Contingency (30%)	$144,000	$565,000	$565,000	$639,000
TOTAL (not including GST):	**$625,000**	**$2,448,000**	**$2,448,000**	**$2,769,000**

*Site Works includes: site preparation and grading, ditching, signage, and culverts.
na - not applicable

6.2 Operating Costs

This section provides a summary of the yearly operating costs estimated for the proposed solid waste disposal options. The operating costs associated with options 2, 3, and 4 for a modified landfill include:

- Stock piling cover material,
- Compacting and covering wastes,
- Road maintenance including summer grading and winter snow clearing and sanding,
- Fence repair,
- Berm maintenance.

Table 6-2 provides a summary of estimated operating costs of the proposed waste disposal options, including an allowance of 20% for contingency. These costs are for planning purposes only and must be refined during the design stage of the project. These estimates do not include costs for waste collection. The detailed operating costs are presented in Appendix C.

Table 6-2 Operating Cost Summary

	Option 1 - Open Dump/landfill with Burning at Existing Landfill	Option 2 - Expand Existing Bulky Waste Site to Modified Landfill	Option 3 - Expand Existing Landfill Site to Modified Landfill	Option 4 - Modified Landfill Northwest of Existing Waste Sites
Stock piling soil	$10,000	$16,000	$16,000	$16,000
Compacting and covering wastes	$20,000	$30,000	$30,000	$40,000
Road Maintenance	$12,000	$20,000	$20,000	$80,000
Fence & Berm maintenance	$1,000	$19,000	$19,000	$19,000
Subtotal:	$43,000	$85,000	$85,000	$155,000
Contingency (20%)	$9,000	$17,000	$17,000	$31,000
TOTAL:	**$52,000**	**$102,000**	**$102,000**	**$186,000**

na - not applicable

6.3 20 Year Cost Summary

In order to analyze the long term cost of these SWM options it is necessary to look at the overall cost over a period of time. The expected life for a new facility is 20 years. Table 6-3 presents the 20 year cost of the four proposed options including capital costs and 20 years of operating costs.

Table 6-3 20 Year Cost Summary

	Option 1 - Open Dump/landfill with Burning at Existing Landfill	Option 2 - Expand Existing Bulky Waste Site to Modified Landfill	Option 3 - Expand Existing Landfill Site to Modified Landfill	Option 4 - Modified Landfill Northwest of Existing Waste Sites
Capital Cost	$630,000	$2,450,000	$2,450,000	$2,770,000
Yearly Operating Cost	$52,000	$102,000	$102,000	$186,000
20 year operating Cost	$511,000	$1,001,000	$1,001,000	$1,826,000
20 year Cost	**$1,141,000**	**$3,451,000**	**$3,451,000**	**$4,596,000**

7.0 EVALUATION OF SOLID WASTE FACILITY OPTIONS

7.1 Development of Evaluation Criteria

During the community visit, the Foreman, SAO, and Mayor were interviewed and comments were documented. The SAO and Mayor later met with the hamlet Council regarding the solid waste site options and their comments were forwarded to Dillon. Based on these comments and others which have been raised in similar studies in the past, the issues were grouped into the following broad themes which can be used to evaluate the solid waste management (SWM) options:

1) Community support
2) Proximity
3) Regulation and Environmental Impacts
4) Capital and O&M Costs

Community support

This criteria is based on the notion that if a SWM system is to succeed in the long and short term, it must be supported by the community. Public attitude towards this issue has historically been one of involvement, and many comments suggest that strong opinion on acceptable SWM solutions exist.

People generally appreciate solicitation of their opinion. Public support is critical to long term solutions. Particular to the north are the traditional values the people have with respect to SWM practices, thus communication throughout the process is essential.

Proximity

This criteria is based on the proximity of the solid waste site to the community. Issues of visibility, aesthetics, odour, and public health and safety are included in this criteria. Community comments focused on where people did not want the facility, specifically not near:

- recreational/camping facilities,
- the community,
- water reservoir,
- development and road system,
- the road from the airport.

Regulation and Environmental Impacts

This criteria deals with locating the solid waste facility in an area which meets regulators requirements. This criteria also takes into account the environmental impacts of the site.

Capital and Operating Costs

The cost criteria is a quantitative method of comparing the solid waste options.

7.2 Option & Criteria Analysis

A matrix tool is helpful in identifying the importance and relevance of each criteria and how each option satisfies the criteria. A matrix is a decision making tool that is useful in assessing a variety of options against several competing criteria. As indicated on the attached matrix, the criteria are shown along the left side of the matrix and the SWM options are shown across the top of the matrix.

The preliminary step in the matrix analysis is to set the relative importance of each of the criteria. This method allows the identification of which criteria are of greater importance. Each criteria is assigned a rank between 1 and 10, determining how important each criteria is compared to the others, where 1 is the least important and 10 is the most important.

For each criteria, the options are defined by giving each a rating between 1 - 4, 1 being the worst options that satisfies a particular criteria, and 4 being the one that best satisfies a given criteria. This process is done one criteria at a time.

The product of the criteria rank and the option rank is the weighted score, and the sum of the weighted score for each option is the total weight for each option. **Hence, the option with the highest score is the one that best satisfies the criteria.**

Table 7-1 presents the results of the matrix developed by Dillon which ranks the solid waste disposal options.

Table 7-1 Option & Criteria Analysis

Criteria	Weight	Options			
		Option 1 - Open Dump/landfill with Burning at Existing Landfill	Option 2 - Expand Existing Bulky Waste Site to Modified Landfill	Option 3 - Expand Existing Landfill Site to Modified Landfill	Option 4 - Modified Landfill Northwest of Existing Waste Sites
Cost: - O&M and Capital	10	4	2.5	2.5	1
	SCORE	40	25	25	10
Proximity: - aesthetics - water supply - recreation impacts - community impacts - health & safety	10	1	3	2	4
	SCORE	10	30	20	40
Community Support: - Long Term Solutions - Implementation	9	1	3	2	4
	SCORE	9	27	18	36
Regulation and Environmental Impacts	9	1	4	3	2
	SCORE	9	36	27	18
TOTAL		**68**	**118**	**90**	**104**

The matrix analysis resulted in the following rankings:

1st place ranking - Option 2: Expand Existing Bulky Waste Site to Modified Landfill

2nd place ranking - Option 4: Modified Landfill Northwest of Existing Waste Sites

3rd place ranking - Option 3: Expand Existing Landfill Site to Modified Landfill

4th place ranking - Option 1: Open Dump/landfill with Burning at Existing Landfill

7.3 Discussion of Analysis Results

The following is a discussion of the results of the solid waste option rankings. Each criteria is discussed to indicate the rationale on the rankings.

Cost

The ranking of the cost is straight forward as it is quantitative, therefore the most expensive received the lowest score and the least expensive received the highest score.

The most expensive option was Option 4: Modified Landfill Northwest of Existing Waste Sites because this site involves extending the access road approximately 0.5 Km which also increases O&M costs for road maintenance. This option received the lowest score for costs.

The least expensive option was Option 1: Open Dump/landfill with Burning at Existing Landfill as this option basically involves very little change from the existing landfilling practice. This option received the highest score for costs.

Proximity

The ranking of the proximity of the solid waste site to the community was fairly straight forward as this criteria also involves issues of visibility, aesthetics, odour, and public health and safety.

The site which is farthest from the community and would result in minimum visibility, aesthetics, and odour is Option 4: Modified Landfill Northwest of Existing Waste Sites therefore this site received the highest score of 4.

The site which received the second highest score of 3 is Option 2: Expand Existing Bulky Waste Site to Modified Landfill. This site is slightly further from the community than the other two options. This option is expected to have less impact on the ocean as the land does not slope steeply towards the ocean as the other options. The impact on the ocean directly relates to recreation and community health and safety.

The site which received the lowest scores is the existing landfill site in which Option 3: Modified Landfill scored higher than Option 1: Open Dump/landfill with Burning. Option 1 scored the lowest as it would have the greatest impact on aesthetics, odours, and health & safety due to open burning.

Community Support

The ranking of the options for community support was based on comments received from interviews with local officials and councillors.

The option which scored the highest for community support is Option 4: Modified Landfill Northwest of Existing Waste Sites because this site is the furthest from the community.

The site which received the second highest score of 3 is Option 2: Expand Existing Bulky Waste Site to Modified Landfill. This site is slightly further from the community than the other two options. This option is expected to have less impact on the ocean as the land does not slope steeply towards the ocean as the other options.

The site which received the lowest scores is the existing landfill site in which Option 3: Modified Landfill scored higher than Option 1: Open Dump/landfill with Burning. Option 1 scored the lowest as it would have the greatest impact on aesthetics, odours, and health & safety due to open burning. The community officials would prefer an organized landfill over existing practices.

Regulation and Environmental Impacts

This criteria deals with locating the solid waste facility in an area which meets regulators requirements. This criteria also takes into account the environmental impacts of the site. Therefore the site which is expected to best meet regulations and have the least impact on the environment was ranked highest.

The site ranked the highest score for this criteria is Option 2: Expand Existing Bulky Waste Site to Modified Landfill. This site ranked higher than Option 4 because the site is already environmentally impacted by the bulky waste landfill, municipal landfill/dump, and sewage lagoon whereas Option 4 involves building a landfill on an unimpacted/clean site. Option 2 is ranked higher than Options 1&3 because these options are located closer to the ocean and the land slopes towards the ocean.

The site which received the second highest score is Option 3: Expand Existing Landfill Site to Modified Landfill. This site ranked higher than Option 4 because the site is already environmentally impacted by the bulky waste landfill, municipal landfill/dump, and sewage lagoon whereas Option 4 involves building a landfill on an unimpacted/clean site.

The sites which received the lowest scores are Option 4: Modified Landfill Northwest of Existing Waste Sites and Option 1: Open Dump/landfill with Burning. Option 1 scored the lowest as it would have the greatest impact on the environment and would be least likely to meet regulations due to: open burning, lack of berms and drainage, lack of organization and safety, and is not a prudent 20 year long term SWM plan.

8.0 SUMMARY & RECOMMENDATIONS

Summary

This report describes the process in which a method of solid waste management (SWM) was recommended and sites were selected for a SWM facility and the process of evaluation of these sites.

The method of SWM which is recommended is a modified landfill for the following reasons:

- Modified landfilling is an organized method of disposing of wastes which poses less of a health risk to workers and community than open burning and open dump/landfill.
- Modified landfill poses less of a threat to the environment than open dump/landfill with burning as: the waste is placed in an organized manner and compacted and covered which reduces risk of leaching from hazardous wastes, berms and fencing may be installed to mitigate against waste and runoff leaving the site, and there is no open burning of waste therefore air emissions are reduced.
- There is adequate land available in Clyde River for the construction of a modified landfill.
- Modified landfilling is more economical than sanitary landfill, incineration, baling, etc.

In order to locate suitable sites for a modified landfill facility, the size of the facility was required. The sizes of the landfill was determined using a projected population of 1289 for the year 2023 and the MACA waste generation rate formula. Suitable locations for the facility were limited due to buffer zones such as residential, aquatic, and airport zones. After discussions with local officials and conducting site visits, the following SWM options were proposed to be further evaluated:

Option 1 Continue Open Dump/landfill with Burning at Existing Landfill
Option 2 Expand Existing Bulky Waste Site to Modified Landfill
Option 3 Expand Existing Landfill Site to Modified Landfill
Option 4 Construct Modified Landfill Northwest of Existing Waste Sites

Option 1 is basically a "do nothing" approach and is not a recommended method for long term SWM. It was included for further evaluation for comparison purposes only.

Preliminary capital and operating cost estimates were prepared for each of these options. These options were evaluated using a matrix tool which ranked each of the SWM sites with respect to the evaluation criteria. The criteria which were used to rank the options were formed based on Clyde River officials comments and past SWM reports and include:

- Community support
- Proximity
- Regulation and Environmental Impacts
- Capital and O&M Costs

The matrix resulted in the following site option ranking:

Ranking	Option Description	Major Reasons for Ranking
#1	Expand Existing Bulky Waste Site to Modified Landfill (Option 2)	• Capital cost is middle of the range; • Least impact on the environment; • Sensitive to aesthetics, water supply, recreation, and community.
#2	Modified Landfill Northwest of Existing Waste Sites (Option 4)	• Sensitive to aesthetics, odour, and water supply as it is the furthest from the Community; • Maximum community support. • Highest capital cost; • Impacts unimpacted land.
#3	Expand Existing Landfill Site to Modified Landfill (Option 3)	• Capital cost is middle of the range; • Located on land which slopes towards the ocean and is closer to ocean than other two options.
#4	Open Dump/landfill with Burning at Existing Landfill (Option 1)	• Although this option has the lowest cost, it ranked the lowest for proximity (aesthetics, odour, health & safety), community support, and regulations/environmental impact.

The SWM option of constructing a modified landfill at the existing bulky waste site was found to be the preferred option. The design and construction of this facility is expected to cost approximately $2.45 million. The annual operating and maintenance costs are expected to be approximately $102,000.

Next Steps

1) Until a new landfill can be constructed the following is recommended:
   - Conduct a spring clean-up of the existing landfill/dump site.
   - Compact the existing waste using hamlet tractor and covering with a layer of soil.
   - Organize the site for convenient waste disposal by:
     - designating areas for municipal wastes, hazardous wastes, construction debris, etc
     - keeping the access road cleared,
     - installing signage instructing people where to place the wastes.
   - Repair the fence located on the south end of the site.
   - Continue to expand the site to the east of the existing dumping/burning area.

2) Pursue funding for detailed landfill siting, detailed design, and construction of the modified landfill facility including.

3) Submit applications to appropriate government departments for site approvals.

4) Complete the detailed landfill locating, detailed design, and construction of the facility.

5) Develop a progressive closure plan for the active landfill areas.

6) Prepare an operations and maintenance plan for the landfill facility.

7) Provide solid waste management and safety training to landfill operator and SAO.

8) Verify the remaining treatment life for the contaminated soil pile. Determine if this soil can be used for cover material.

9) Pursue the development of a waste recycling program such as metal recycling.

10) Conduct community education on solid waste disposal covering items such as:
   - correct disposal of household hazardous waste
   - reduction of waste

References

1) Gary W Heinke, PhD, P. Eng., Jeffrey Wong, "Guidelines for the Planning, Design, Operation, and Maintanance of Solid Waste Modified Landfill Sites in the Northwest Territories, GNWT, Department of Municipal and Community Affairs", 1990.

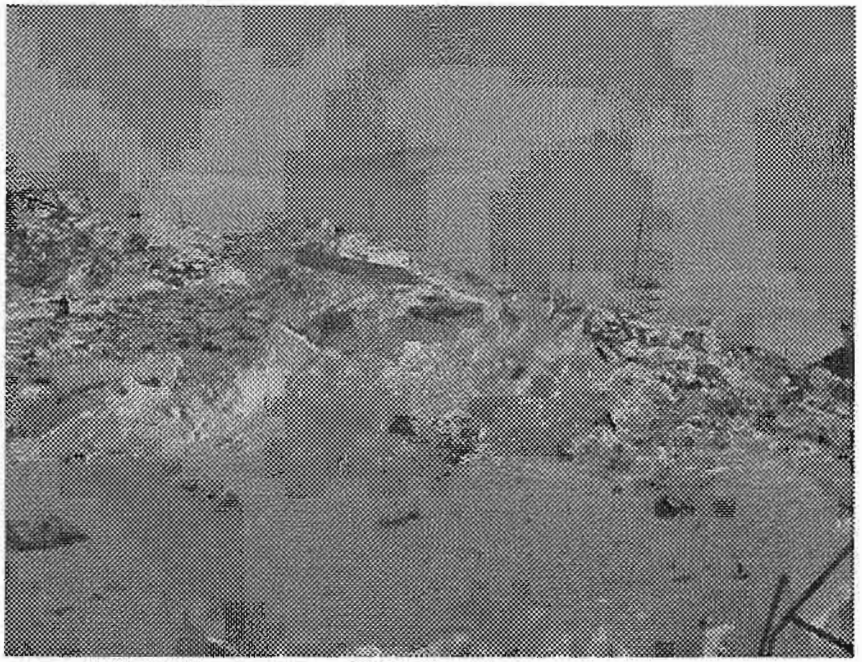
2) Gary W Heinke, PhD, P. Eng., Jeffrey Wong, "An Update of the Status of Solid Waste Management in Communities in the Northwest Territories, GNWT, Department of Municipal and Community Affairs", 1990.

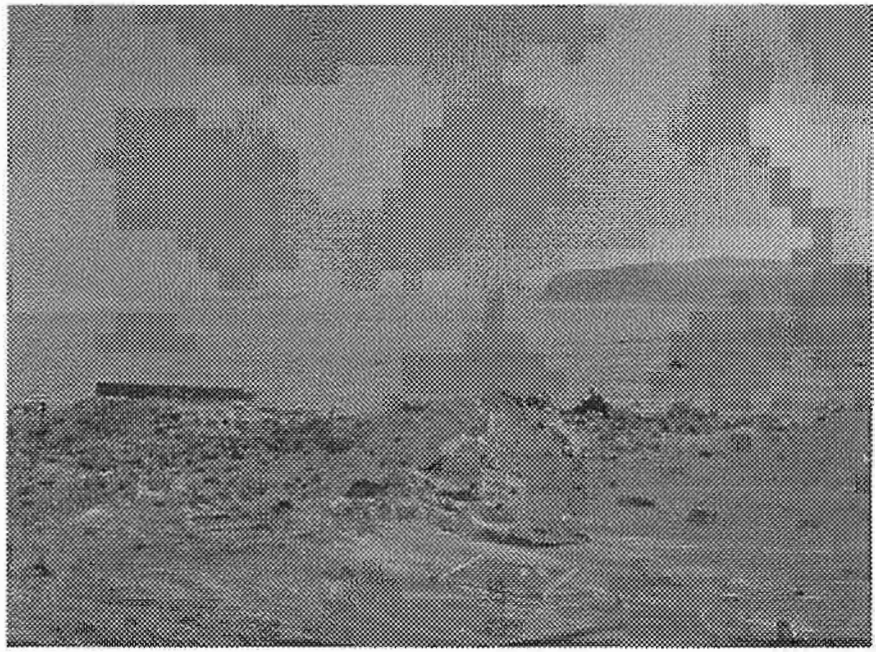
3) Transmode Consultants, "Guidelines for the Siting of Solid Waste Disposal Sites in the Vicinity of Community Airports in the Northwest Territories, GNWT, Department of Municipal and Community Affairs", 1990.

4) American Society of Civil Engineers, "Cold Regions Utilities Monograph, Third Edition",1996.

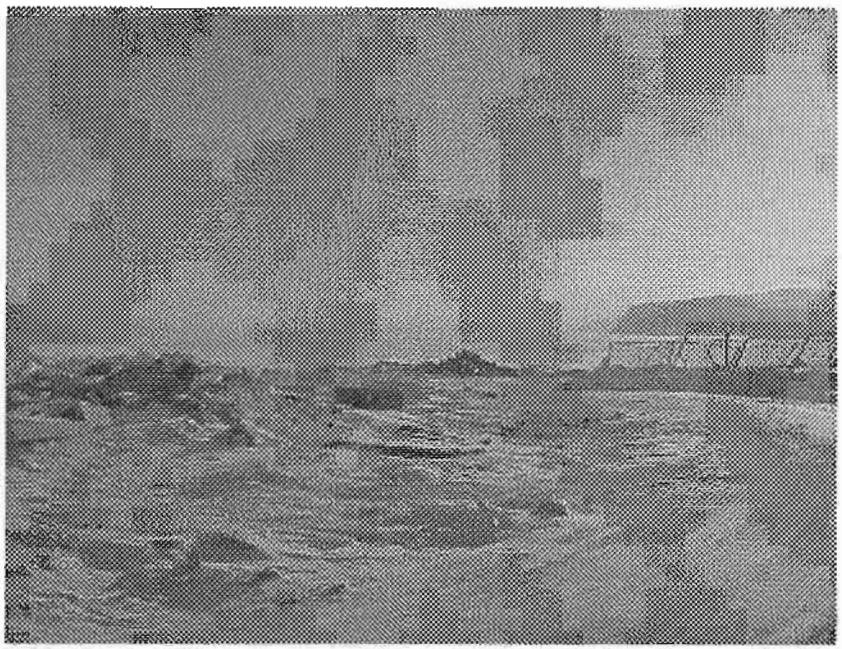
APPENDIX A
Photos of Waste Sites

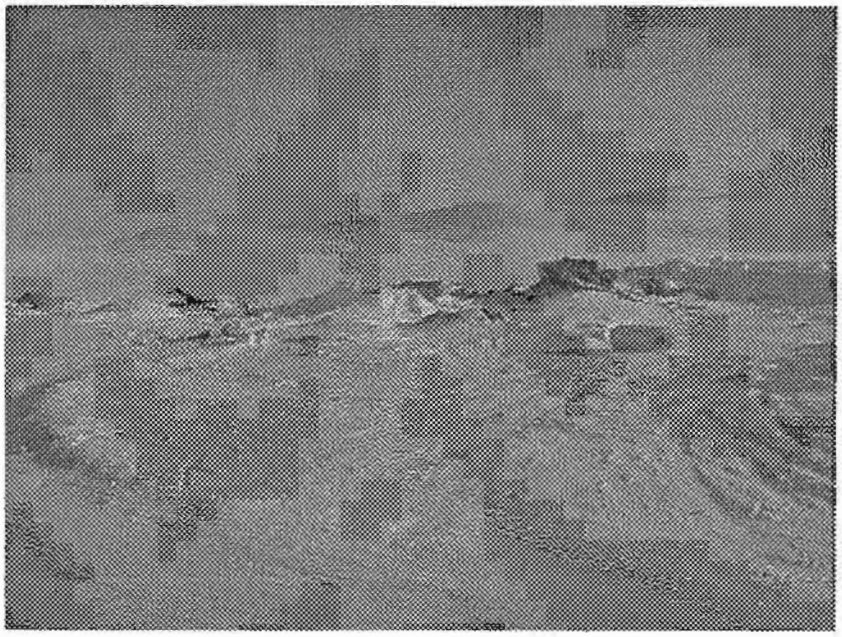
EXISTING OPEN DUMP/LANDFILL - Waste Pile & Fence

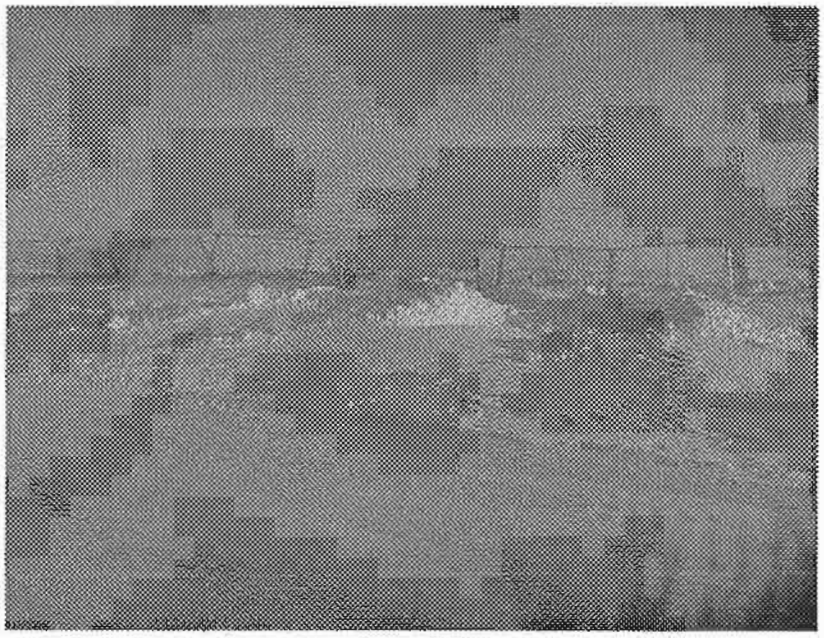




EXISTING OPEN DUMP/LANDFILL - Surrounding area & Contaminated Soil Site

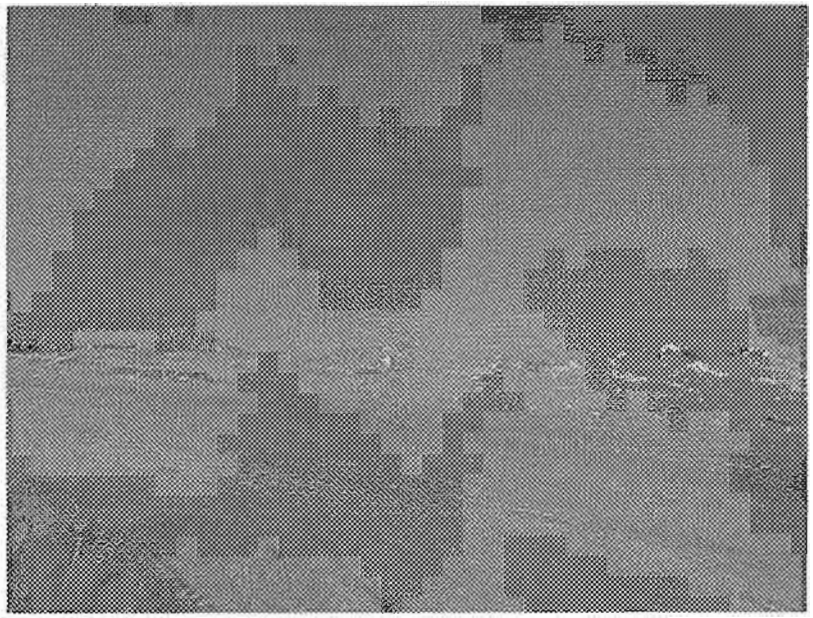






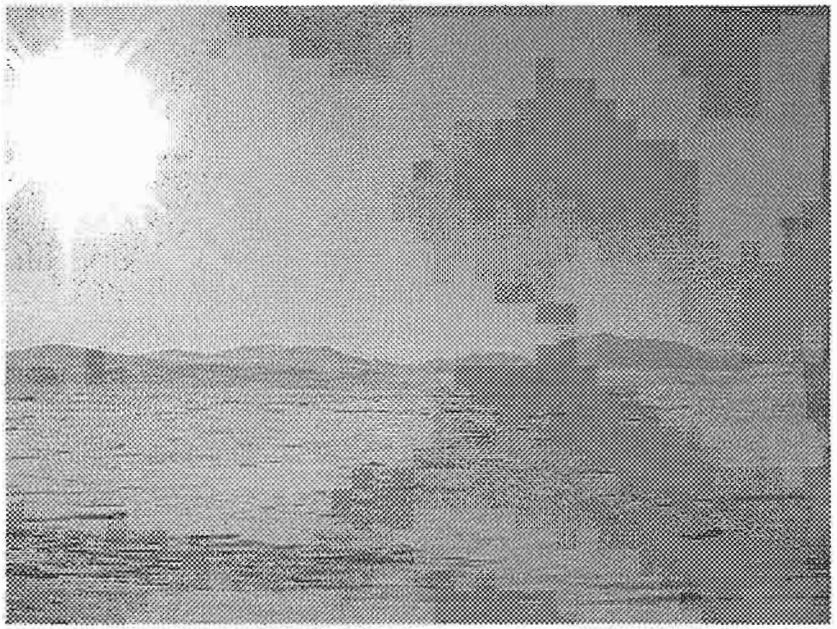
Turn Around Area Between Landfill & Contaminated Soil Area

BULKY WASTE SITE & SURROUNDING AREA



BULKY WASTE SITE & SURROUNDING AREA

LANDS TO THE NORTH-WEST OF THE EXISTING WASTE SITES



APPENDIX B
Capital Cost Details

Cost Summary

	Option 1 - Open Dump/landfill with Burning at Existing Landfill	Option 2 - Expand Existing Bulky Waste Site to Modified Landfill	Option 3 - Expand Existing Landfill Site to Modified Landfill	Option 4 - Modified Landfill Northwest of Existing Waste Sites
Capital Cost	$630,000	$2,450,000	$2,450,000	$2,770,000
Yearly Operating Cost	$52,000	$102,000	$102,000	$186,000
20 year operating Cost	$511,000	$1,001,000	$1,001,000	$1,826,000
20 year Cost	**$1,141,000**	**$3,451,000**	**$3,451,000**	**$4,596,000**

interest rate of:	8.0%
interest factor for 20 years:	9.8181

CAPITAL COST ESTIMATE
Option 1 - Open Dump/landfill with Burning at Existing Landfill

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Continued Expansion of Landfill**					
	0.1 Extend Site Roads (50 m)					
	Common Fill supply and place (300 mm)	m^3	$60.00	53	$3,200	
	Class B supply and place (250 mm)	m^2	$20.00	350	$7,000	
	Class A supply and place (100 mm)	m^2	$10.00	350	$3,500	
	0.2 Extend Debris Fencing at south face (2.0 m)	m	$150.00	50	$7,500	
						$21,000
2	**Final Site Closure**					
	0.1 Cover material (300 mm)	m3	$40.00	3,000	$120,000	
	0.2 Low permeability soil liner (300mm)	m2	$22.00	10,000	$220,000	
	0.3 Native cover material (300 mm)	m3	$40.00	3,000	$120,000	**$460,000**
	SUBTOTAL COST:					**$481,000**
	Engineering/Contingency (30%)					$144,000
	TOTAL (nic applicable taxes)					**$625,000**

CAPITAL COST ESTIMATE
Option 2 - Expand Existing Bulky Waste Site to Modified Landfill

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Modified Landfill with Berms & Fencing**					
	0.1 Preparation/Grading	m^2	$2.00	21,904	$43,800	
	0.2 Site Roads (120 m)					
	Common Fill supply and place (300 mm)	m^3	$60.00	126	$7,600	
	Class B supply and place (250 mm)	m^2	$20.00	840	$16,800	
	Class A supply and place (100 mm)	m^2	$10.00	840	$8,400	
	0.3 Berm Construction (common fill)	m^3	$60.00	6,201	$372,100	
	0.4 Ditching & Drainage	m	$35.00	400	$14,000	
	0.5 Debris Fencing (2.0 m)	m	$150.00	650	$97,500	
	0.6 Access Controls/Signage	ls	$500.00	1	$500	
	0.7 Concrete Culverts (500 mm)	m	$150.00	25	$3,800	
						$565,000
2	**Final Site Closure**					
	0.1 Cover material (300 mm)	m3	$40.00	7,800	$312,000	
	0.2 Low permeability soil liner (300mm)	m2	$22.00	26,000	$572,000	
	0.3 Native cover material (300 mm)	m3	$40.00	7,800	$312,000	**$1,196,000**
	TOTAL LANDFILL COST:					**$1,761,000**
3	**CAPPING OF EXISTING MUNICIPAL WASTE SIT**					
	0.1 Low permeability soil liner (300mm)	m2	$22.00	3,600	$79,200	
	0.2 Native cover material (300 mm)	m3	$40.00	1,080	$43,200	**$122,000**
	Subtotal all Items					**$1,883,000**
	Engineering/Contingency (30%)					$565,000
	TOTAL (nic applicable taxes)					**$2,448,000**

CAPITAL COST ESTIMATE
Option 3 - Expand Existing Landfill Site to Modified Landfill

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Modified Landfill with Berms & Fencing**					
	0.1 Preparation/Grading	m^2	$2.00	21,904	$43,800	
	0.2 Site Roads					
	Common Fill supply and place (300 mm)	m^3	$60.00	126	$7,600	
	Class B supply and place (250 mm)	m^2	$20.00	840	$16,800	
	Class A supply and place (100 mm)	m^2	$10.00	840	$8,400	
	0.3 Berm Construction (common fill)	m^3	$60.00	6,201	$372,100	
	0.4 Ditching & Drainage	m	$35.00	400	$14,000	
	0.5 Debris Fencing (2.0 m)	m	$150.00	650	$97,500	
	0.6 Access Controls/Signage	ls	$500.00	1	$500	
	0.7 Concrete Culverts (500 mm)	m	$150.00	25	$3,800	
						$565,000
2	**Final Site Closure**					
	0.1 Cover material (300 mm)	m3	$40.00	7,800	$312,000	
	0.2 Low permeability soil liner (300mm)	m2	$22.00	26,000	$572,000	
	0.3 Native cover material (300 mm)	m3	$40.00	7,800	$312,000	$1,196,000
	TOTAL LANDFILL COST:					**$1,761,000**
3	**CAPPING OF EXISTING MUNICIPAL WASTE PILE**					
	0.1 Low permeability soil liner (300mm)	m2	$22.00	3,600	$79,200	
	0.2 Native cover material (300 mm)	m3	$40.00	1,080	$43,200	$122,000
	Subtotal all Items					**$1,883,000**
	Engineering/Contingency (30%)					$565,000
	TOTAL (nic applicable taxes)					**$2,448,000**

CAPITAL COST ESTIMATE
Option 4 - Modified Landfill Northwest of Existing Waste Sites

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Extend Access Road (550 m)**					
	0.1 Preparation/Grading	m^2	$2.00	4,400	$8,800	
	0.2 Common Fill supply and place (300 mm)	m^3	$60.00	1,700	$102,000	
	0.3 Class B supply and place (250 mm)	m^2	$20.00	4,400	$88,000	
	0.4 Class A supply and place (100 mm)	m^2	$10.00	4,400	$44,000	
	0.5 Access Controls/Signage	ls	$500.00	1	$500	
	0.6 Concrete Culverts (500 mm)	m	$150.00	25	$3,800	
						$247,000
2	**Modified Landfill with Berms & Fencing**					
	0.1 Preparation/Grading	m^2	$2.00	21,904	$43,800	
	0.2 Site Roads					
	Common Fill supply and place (300 mm)	m^3	$60.00	126	$7,600	
	Class B supply and place (250 mm)	m^2	$20.00	840	$16,800	
	Class A supply and place (100 mm)	m^2	$10.00	840	$8,400	
	0.3 Berm Construction (common fill)	m^3	$60.00	6,201	$372,100	
	0.4 Ditching & Drainage	m	$35.00	400	$14,000	
	0.5 Debris Fencing (2.0 m)	m	$150.00	650	$97,500	
	0.6 Access Controls/Signage	ls	$500.00	1	$500	
	0.7 Concrete Culverts (500 mm)	m	$150.00	25	$3,800	
						$565,000
3	**Final Site Closure**					
	0.1 Cover material (300 mm)	m3	$40.00	7,800	$312,000	
	0.2 Low permeability soil liner (300mm)	m2	$22.00	26,000	$572,000	
	0.3 Native cover material (300 mm)	m3	$40.00	7,800	$312,000	$1,196,000
	TOTAL LANDFILL COST:					**$2,008,000**
4	**CAPPING OF EXISTING MUNICIPAL WASTE SITE**					
	0.1 Low permeability soil liner (300mm)	m2	$22.00	3,600	$79,200	
	0.2 Native cover material (300 mm)	m3	$40.00	1,080	$43,200	$122,000
	Subtotal all Items					**$2,130,000**
	Engineering/Contingency (30%)					$639,000
	TOTAL (nic applicable taxes)					**$2,769,000**

APPENDIX C
Operating Cost Details

ANNUAL OPERATING COSTS

Option 1 - Open Dump/landfill with Burning at Existing Landfill

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Cover & Compaction**					
	0.1 Cover Material	m3	$40	250	$10,000	
	0.2 Costs for Cover & Compaction	ls	$20,000	1	$20,000	$30,000
2	**Fence Repair**	m	$5	100	$1,000	$1,000
3	**Road Maintenance**					
	0.1 Grading - summer	m	$80	70.0	$6,000	
	0.2 Snow Removal & sanding	m	$80	70.0	$6,000	$12,000
4	**Berm Maintenance**	m	$25	0	$0	$0
	Subtotal all Items					$43,000
	Contingency (20%)					$9,000
	TOTAL ANNUAL O&M:					$52,000

ANNUAL OPERATING COSTS
Option 2 - Expand Existing Bulky Waste Site to Modified Landfill

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Cover & Compaction**					
	0.1 Cover Material	m3	$40	400	$16,000	
	0.2 Costs for Cover & Compaction	ls	$30,000	1	$30,000	**$46,000**
2	**Fence Repair**	m	$5	650	$3,000	**$3,000**
3	**Road Maintenance**					
	0.1 Grading - summer	m	$80	120.0	$10,000	
	0.2 Snow Removal & sanding	m	$80	120.0	$10,000	**$20,000**
4	**Berm Maintenance**	m	$25	650	$16,000	**$16,000**
	Subtotal all Items					**$85,000**
	Contingency (20%)					$17,000
	TOTAL ANNUAL O&M:					**$102,000**

ANNUAL OPERATING COSTS
Option 3 - Expand Existing Landfill Site to Modified Landfill

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Cover & Compaction**					
	0.1 Cover Material	m3	$40	400	$16,000	
	0.2 Costs for Cover & Compaction	ls	$30,000	1	$30,000	**$46,000**
2	**Fence Repair**	m	$5	650	$3,000	**$3,000**
3	**Road Maintenance**					
	0.1 Grading - summer	m	$80	120.0	$10,000	
	0.2 Snow Removal & sanding	m	$80	120.0	$10,000	**$20,000**
4	**Berm Maintenance**	m	$25	650	$16,000	**$16,000**
	Subtotal all Items					**$85,000**
	Contingency (20%)					$17,000
	TOTAL ANNUAL O&M:					**$102,000**

ANNUAL OPERATING COSTS
Option 4 - Modified Landfill Northwest of Existing Waste Sites

	Item	Units	Unit Cost	Quantity	Total Estimated Cost	Total Estimated Item Cost
1	**Cover & Compaction**					
	0.1 Cover Material	m3	$40	400	$16,000	
	0.2 Costs for Cover & Compaction	ls	$40,000	1	$40,000	$56,000
2	**Fence Repair**	m	$5	650	$3,000	$3,000
3	**Road Maintenance**					
	0.1 Grading - summer	m	$60	670.0	$40,000	
	0.2 Snow Removal & sanding	m	$60	670.0	$40,000	$80,000
4	**Berm Maintenance**	m	$25	650	$16,000	$16,000
	Subtotal all Items					**$155,000**
	Contingency (20%)					$31,000
	TOTAL ANNUAL O&M:					**$186,000**

MUNICIPALITY OF CLYDE RIVER
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August 2, 2002

Sameh Elsayed
Dep't. of Community Government
and Transportation
Government of Nunavut
Cape Dorset, NU

Re: Dillon Consulting report - Clyde River Solid Waste Siting Studies

Council read the final report dated July 8, 2002 at their regular meeting held on August 1, 2002 and decided that their original recommendation of Option 3 whereby the solid waste site be relocated to the northwest of the present site be the top priority and would like funds to be identified for this. The community expansion is such that smoke and fumes of the burning garbage drifts towards the residential houses.

Sincerely,

Raymond Kaslak
Senior Administrative Officer

COMMUNITY & GOV'T SERVICES
MAY 2 8 2009
Directorate
POND INLET, NU

COMMUNITY & GOV'T SERVICES
MAY 2 8 2009
Project Division
POND INLET, NU