

**APPENDIX E -- LANDFILL SITE CLOSURE PLANS**

## BLACKBURN ROAD LANDFILL CLOSURE PLAN

### INTRODUCTION:

The BC Ministry of Environment, by letter dated 18 July 1991, ordered Blackburn Road Landfill on Salt Spring Island permanently closed as of 31 December 1991. As a condition of closure, the permittees, Mr. N. Twa, the operator and owner, and the Capital Regional District are required to submit a Closure Plan for the landfill.

### BACKGROUND:

#### 1. SITE DESCRIPTION

Blackburn Road Landfill is located on private land approximately 6 km south of Ganges on Blackburn Road. The disposal area is 0.6 to 0.8 hectares in size and is described on Permit No. PR-1839 as a portion of land described as Lot 3, Section 14, Range IV North Salt Spring Island. A subsequent subdivision of Lot 3 places the disposal area on parts of Lots B and C, Section 14, Plan 40345 North Salt Spring Island.

The disposal site is situated at the headwaters of Blackburn Lake which discharges to Cusheon Lake. The average ground slope of this site is approximately 4% towards Blackburn Lake and groundwater flow appears to be towards Blackburn Lake.

#### 2. HISTORY

Blackburn Road Landfill has been accepting municipal solid waste since 1966. The landfill site is owned and operated by Norm Twa, however the Waste Management Permit was issued in the joint names of Mr. Twa and the Capital Regional District. The Capital Regional District has never been involved with the operation of the landfill but it provided a total subsidy of approximately \$20,000.00 from 1984 until 1987 towards the cost of providing daily cover.

The disposal site is unsupervised; people entering the site deposit their material at a designated point. A tracked machine pushes the accumulated refuse over the working face, either daily or less often as required. Cover material is placed as required from borrow pits adjacent to the disposal site. Demolition and land clearing wastes are stockpiled and burned during the spring and fall.

A groundwater monitoring program is not in place, however, tests of on-site and off-site surface water courses and existing water supply wells have been carried out by the Ministry of Environment. Elevated levels, with respect to background data, were found at the landfill site, but the off-site levels do not appear to be adversely affected by the landfill activities at this time.

With the landfill located upstream in a watershed shared by Blackburn Lake and Cusheon Lake, which are both used for water supply, local residents have expressed concern that landfill operations may have been affecting water quality. The Ministry of Environment has stipulated that the landfill be closed by 31 December 1991.

### CLOSURE PLAN:

#### 3. CLOSURE DATE

Blackburn Road Landfill shall be closed and cease accepting refuse as of 12:00 midnight, 31 December 1991. The land clearing waste stockpiled on site will be burned as weather permits or chipped as determined by the MOE.

4. FINAL ELEVATION

Final elevation of the disposal site shall be the height observed during the site meeting of 17 September 1991 (Schedule AA) excluding daily and final cover.

5. GRADING AND SLOPING

The plateau of the disposal site shall be graded to 2 to 3% slopes and the sides to a minimum of 3 to 1 slopes, with final shaping being approved by the MOE and CRD.

6. FINAL COVER

Final cover shall consist of a minimum of 600 mm (compacted to 95% proctor) of clay material over the entire active disposal area using overburden material from adjacent properties.

7. VEGETATION

The disposal site will be vegetated with native grass to prevent erosion.

8. VECTOR CONTROL

CRD staff will implement a vector control program one week prior to closure and monitor the results for two months after closure is complete.

9. SURVEY AND COVENANT

At the conclusion of grading and placing final cover and subject to approval by the MOE and CRD, the disposal site will be surveyed and a contour plan produced. In addition, a legal BCLS survey of the active site will be carried out and registered at the BC Land Registry under a covenant declaring the existence of a sanitary landfill.

10. LEACHATE MONITORING

Leachate monitoring will be carried out twice per year using existing surface water courses and water supply wells (Schedule A), and will follow the procedure outlined in Proposed Environmental Monitoring Program for Salt Spring Island (Schedule B).

The Region will endeavour to confirm the direction of groundwater flow and if it is found that the direction of flow is not as described in Sections 1 and 2 above, the CRD, in conjunction with the Ministry of Environment and the community of Salt Spring Island, will take appropriate action to rectify the situation, which may include the installation of additional wells.

11. TIMING

Burning or chipping of stockpiled woodwaste will commence in the fall/winter of 1991 and be completed by the spring of 1992.

Grading, covering and vegetating of the disposal site will commence in the spring of 1992 and will be completed by 1 October 1992. Leachate monitoring will be carried out in the spring and fall of 1992.

12. COSTS

A. Capital Closure

The estimated costs for the closure of the landfill are as follows:

(i)	Cover material (estimated at \$35,000.00)	\$ 35,000.00
(ii)	Equipment rental to reshape garbage and to haul, place, grade and compact cover material (\$53,240.00 + 3% GST)	54,837.00
(iii)	Vector Control	1,500.00
(iv)	Survey	<u>5,000.00</u>
	Sub Total	\$ 96,337.00
	Engineering & Administration	<u>5,000.00</u>
	<b>TOTAL</b>	<b><u>\$101,337.00</u></b>

B. Post Closure

The estimated first year post closure costs are as follows:

(i)	Repair cover and vegetation	\$ 1,000.00
(ii)	Vector control	500.00
(iii)	Leachate monitoring and report - MOE (estimated at \$10,000.00/year) - No Charge to CRD	0
(iv)	Contingencies	1,500.00
(v)	CRD site visits - 4 per year @ \$250.00	<u>1,000.00</u>
	<b>TOTAL</b>	<b><u>\$ 4,000.00</u></b>

**GALIANO ISLAND LANDFILL  
CLOSURE PLAN**

**BACKGROUND:**

The residents of Galiano Island, by referendum held on 19 October 1991, rejected a proposal for the purchase of land and associated costs for the continued operation of Galiano Landfill. The Galiano Club, being the permittee, has directed that the landfill be closed 31 October 1991 and has requested that the Ministry of Environment (MOE) cancel the permit. As a condition of closure the Galiano Club is required to submit a closure plan.

1. SITE DESCRIPTION

Galiano Island Landfill is located on private lands, owned by MacMillan Bloedel Limited, approximately 300 metres south of Porlier Pass Road and approximately 700 metres west of Galiano Way. The disposal area lies within a BC Hydro transmission line right-of-way, is approximately 0.2 to 0.4 hectares in size and is described on Permit No. PR-5559 as a Portion of District Lot (D.L.) 27, Galiano Island. It should be noted that the permit was issued for D.L. 27, however, the landfill is in the adjacent D.L. 17 and the landfill operation has been carried out outside the permitted area.

The site is situated near a drainage divide between Montague Harbour and Whaler Bay but the entire landfilled area drains toward Whaler Bay, some 2.5 km east of the site. There is no permanent water course between the site and Whaler Bay. An intermittent drainage ditch system exists along Porlier Road and then passes through a golf course to Whaler Bay.

The site has varied overburden and appears to be underlain by fractured sandstones. Landfill leachate would most likely move through the ground water flow system toward Whaler Bay. Depending on the subsurface stratigraphy, there is a remote chance for leachate moving toward Montague Harbour. At present, the nearest downgradient ground water usage is about 0.8 km in distance at both sides.

2. HISTORY

The landfill site has been operated by Galiano Club, a non-profit volunteer organization, since 1972 after the closure of the old landfill. Although solid waste disposal at the present site was started in 1972, the Ministry of Environment did not issue a Pollution Control Permit until 9 October 1979. The original permit (No. PR-5559) has never been amended since its issuance.

MacMillan Bloedel formally permitted the use of the land by the Galiano Club for the purpose of refuse disposal in 1980, eight years after commencing landfill operation. The agreement between MacMillan Bloedel and Galiano Club has been regularly renewed but it will expire on 31 October 1991.

The disposal site is unsupervised, people entering the site deposit their material at a designated point. A tracked machine pushes the accumulated

A recycling operation has also been carried out at the site by the Galiano Club. The equipment employed at the site for the recycling operation included a baler, a crusher and a diesel generator. Recyclable materials were sorted and stored at the site until shipment. These include baled cardboard, newspapers, sorted refundable beverage cans and bottles, colour sorted crushed glass, aluminum products, flattened non-refundable cans, batteries and white goods (appliances). White goods have been separated and placed at one side of the landfill until a buyer is found. However, these have often been landfilled due to the lack of buyers. There are two storage buildings, one for cardboard and the other for refundable cans and bottles.

A ground water monitoring program is not in place. Water sampled on 23 November 1990 at six wells downgradient from the landfill has been tested, however, the data is insufficient to assess possible leachate migration.

**CLOSURE PLAN:**

3. CLOSURE DATE

Galiano Landfill shall be closed and cease accepting refuse as of 12:00 midnight, 31 October 1991. The land clearing waste stockpiled on site will be burned as weather permits. The recycling appurtenances and recyclable materials will be removed from the site.

4. FINAL ELEVATION

The maximum final elevation of the disposal site shall be the height observed during the site meeting of 25 October 1991, excluding daily and final cover.

5. GRADING AND SLOPING

The plateau of the disposal site shall be recut and graded to 2 to 3% slopes and the sides to a minimum of 4 to 1 slopes, with final shaping being approved by the MOE.

6. FINAL COVER

Final cover shall consist of a minimum of 600 mm compacted clay type material over the entire active disposal area using on-site overburden material.

7. VEGETATION

The disposal site will be vegetated with native grass to prevent erosion.

8. VECTOR CONTROL

Galiano Club will implement a vector control program one week prior to closure and monitor the results for two months after closure is complete.

9. SURVEY AND COVENANT

At the conclusion of grading and placing final cover and subject to approval by the MOE, the disposal site will be surveyed and a contour plan produced. In addition, a legal BCLS survey of the active site will be carried out and registered at the BC Land Registry under a covenant declaring the existence of a sanitary landfill.

10. LEACHATE MONITORING

Leachate monitoring will be carried out by the MOE once per year using existing surface water courses and water supply wells.

11. TIMING

Burning of stockpiled woodwaste will commence in November 1991 and will be completed by 31 December 1991.

Removal of the recycling appurtenances and recyclable materials will commence in November and will be completed by 31 January 1992.

Grading, covering and vegetating of the disposal site will commence November 1991 and will be completed by 1 June 1992.

Leachate monitoring, using existing wells from selected sites, will be carried out by the MOE in the spring of 1992.

12. COSTS

(a) Capital Closure

The estimated costs for the closure of the landfill are as follows:

(i)	Cover material	\$15,000.00
(ii)	Equipment rental to reshape garbage 20 hrs @ \$80.00/hr	1,600.00
(iii)	Construct clay berm 250 yds @ \$10.00/yd	2,500.00
(iv)	Haul, place, grade and compact cover material 2,500 yds @ \$3.00/yd	7,500.00
(v)	Ditching	400.00
(vi)	Litter pickup	600.00
(vii)	Removal of recyclable materials	3,500.00
(viii)	Vector control	500.00
(ix)	Survey	1,000.00
(x)	Seeding	100.00
	Sub Total	\$32,700.00
	GST	2,000.00
	Contingencies, Engineering & Administration	1,300.00
	TOTAL	\$36,000.00
		=====

(b) Post Closure

The estimated post closure costs are as follows:

(i)	Repair cover and vegetation	\$ 500.00
(ii)	Vector control	100.00
(iii)	Leachate monitoring and report - MOE No charge to Galiano	0
(iv)	Contingencies	<u>400.00</u>
	TOTAL	\$ 1,000.00 =====



## SATURNA ISLAND LANDFILL CLOSURE PLAN

### BACKGROUND:

For the past two to three years residents of Saturna Island, anticipating the closure of the Island landfill, have been hauling their refuse to Hartland Landfill. The Saturna Community Club, being the permittee, has directed that the landfill be officially closed as of 01 July 1993, and the Community Club has requested that the Ministry of Environment (MOE) cancel the permit. As a condition of closure the Community Club is required to submit a closure plan.

#### 1. Site Description

Saturna Island Landfill is located on private lands owned by Mr. John Money, an Island resident, approximately 100 metres east of East Point Road and west of Mt. David. The disposal area is approximately 0.2 hectares in size and is described in Permit No. PR 2083 as the south one quarter of section 17, Saturna Island.

The site is situated at the toe of the western slope of Mt. David on a drainage divide between Lyall Harbour and the northern shore, and the landfilled area drains toward Winter Cove some 1.4 km northwest of the site. There is no permanent water course between the site and Winter Cove.

Although Saturna Island is mostly mountainous, the site has varied overburden and appears to be underlain by fractured sandstones. Landfill leachate would most likely move through the ground water flow system toward Winter Cove. At present, the nearest down gradient ground water usage is a well about 0.8 km in distance.

#### 2. History

The landfill site was operated by the community on Saturna Island for many years without a permit. On 14 June 1973 a Pollution Control Permit was issued by the Ministry to the Saturna Island Community Club for the operation of the landfill.

The disposal site was unsupervised; people entering the site deposited their material at a designated point. A tracked machine pushed the accumulated refuse over the working face as required. Cover material was placed every two to three months from on-site borrow pits. At present, the working face is overgrown with vegetation. Open burning of certain waste was carried out for the reduction of waste volume on a regular basis, except during the burning ban period in the summer.

Recycling was carried out at the site by the community until 1990 when the operation was relocated to the present recycling centre opposite the Saturna General Store on East Point Road. At present white goods, glass bottles and large plastic containers are being stored at the landfill site and will be removed for recycling or reuse.

A ground water monitoring program is not in place. Water sampled on 20 June 1989 at one well and two surface sites down gradient from the landfill has been tested by the Ministry, however, the data is insufficient to assess possible leachate migration.

**CLOSURE PLAN:**

3. **Closure Date**

Saturna Island Landfill shall be officially closed 01 July 1993. The appurtenances and recyclable materials will be removed from the active area.

4. **Final Elevation**

The maximum final elevation of the disposal site shall be the height observed during the site meeting of 20 May 1993, excluding daily and final cover.

5. **Grading and Sloping**

The plateau of the disposal site shall be recut and graded to 2 to 3% slopes and the sides to a minimum of 4 to 1 slopes, with final shaping being approved by the Ministry of Environment.

6. **Final Cover**

Final cover shall consist of a minimum of 600 mm compacted clay type material over the entire previously active disposal area using on-site overburden material.

7. **Vegetation**

The disposal site will be vegetated with native grass to prevent erosion.

8. **Vector Control**

Since the landfill has not been used for a few years a vector control program is not necessary.

9. **Survey and Covenant**

At the conclusion of grading and placing final cover and subject to approval by the Ministry of Environment, the disposal site will be surveyed and a contour plan produced. In addition, a legal BCLS survey of the previously active site will be carried out and registered at the BC Land Registry under a covenant declaring the existence of a sanitary landfill.

10. **Leachate Monitoring**

Leachate monitoring will be carried out by the Ministry of Environment once per year using existing surface water sources and a water supply well.

11. **Timing**

Removal of the recyclable materials will be completed by 31 December 1993.

Grading, covering and vegetating of the disposal site will be completed by 31 December 1993.

Leachate monitoring, using existing water sources downgradient, will be carried out by the MOE in the fall of 1993.

12. Costs

(a) Capital Closure

The estimated costs for the closure of the landfill are as follows:

(i)	Cover material	\$ 5,000.00
(ii)	Equipment rental to reshape garbage	2,000.00
(iii)	Haul, place, grade and compact cover material	4,000.00
(iv)	Ditching	1,500.00
(v)	Litter pickup	500.00
(vi)	Removal of recyclable materials	2,500.00
(vii)	Survey	1,500.00
(ix)	Seeding	<u>100.00</u>
	Sub Total	\$17,100.00
	GST	1,200.00
	Contingencies, Engineering & Administration	<u>1,700.00</u>
	TOTAL	<u>\$20,000.00</u>

(b) Post Closure

The estimated post closure costs are as follows:

(i)	Repair cover and vegetation	\$ 50.00
(ii)	Leachate monitoring and report - MOE (No charge to Saturna)	0
(iii)	Contingencies	<u>50.00</u>
		<u>\$ 100.00</u>