

Module 4

Landfill Operations and Maintenance Part B: Best Practices

Module Goal

To share and discuss best practices for operating a landfill site within a First Nation community

Module Objectives

By the end of this module,
you will be able to:

- Describe best practices for O&M
- Apply O&M processes to your community landfill



What Are Your Top 5 Landfill Site Management Issues?

- Managing the fill area
 - Trench/area method
 - Compaction
 - Cover
 - Equipment
- Monitoring and Reporting
 - Environmental monitoring
- Reporting to Council
- Illegal burning
- Vermin
- Contingency plans
- Staffing
- Gating
- Hours of operation



Managing the Fill Area



If the active face is not well defined,
waste is simply deposited anywhere.

Ideal Conditions for Fill Area

- Active face size – at small sites, should be able to accommodate 5 or more vehicles at any one time
- Access road to face is in good condition – no protrusions to puncture tires
- Built against existing cells to assist with compaction
- Ground sloping away from the face for drainage

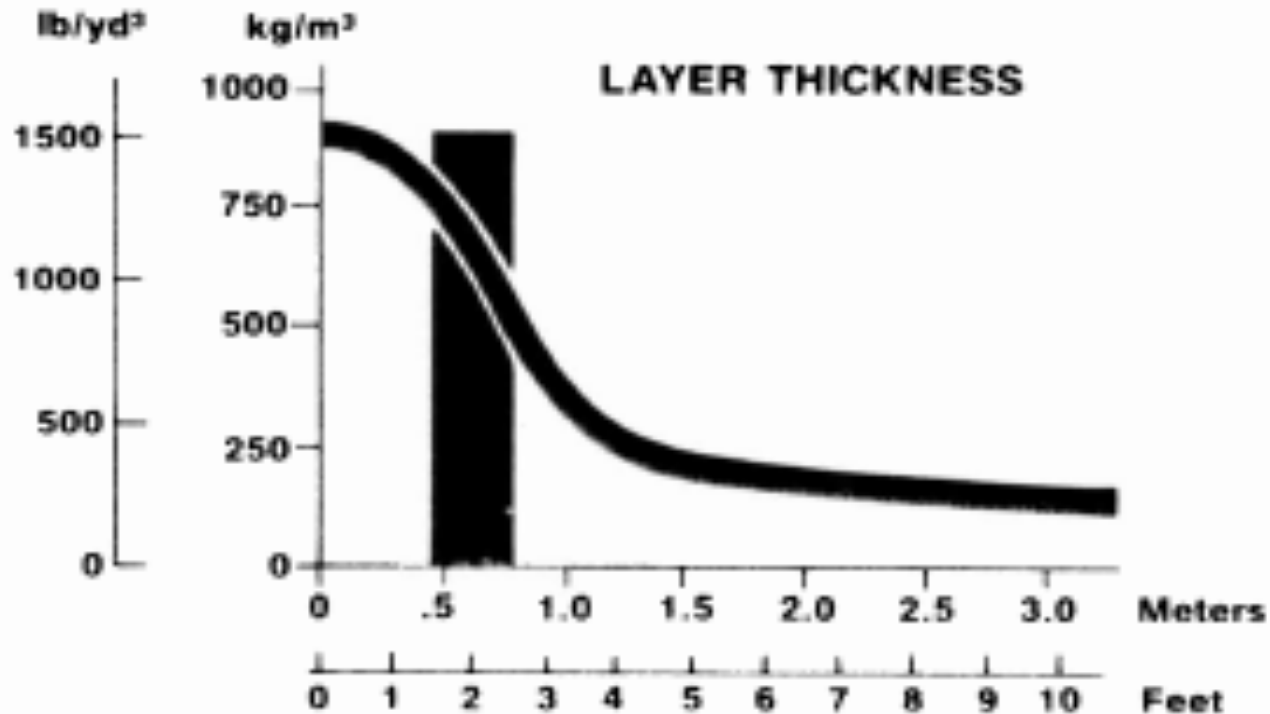


Cell Structure



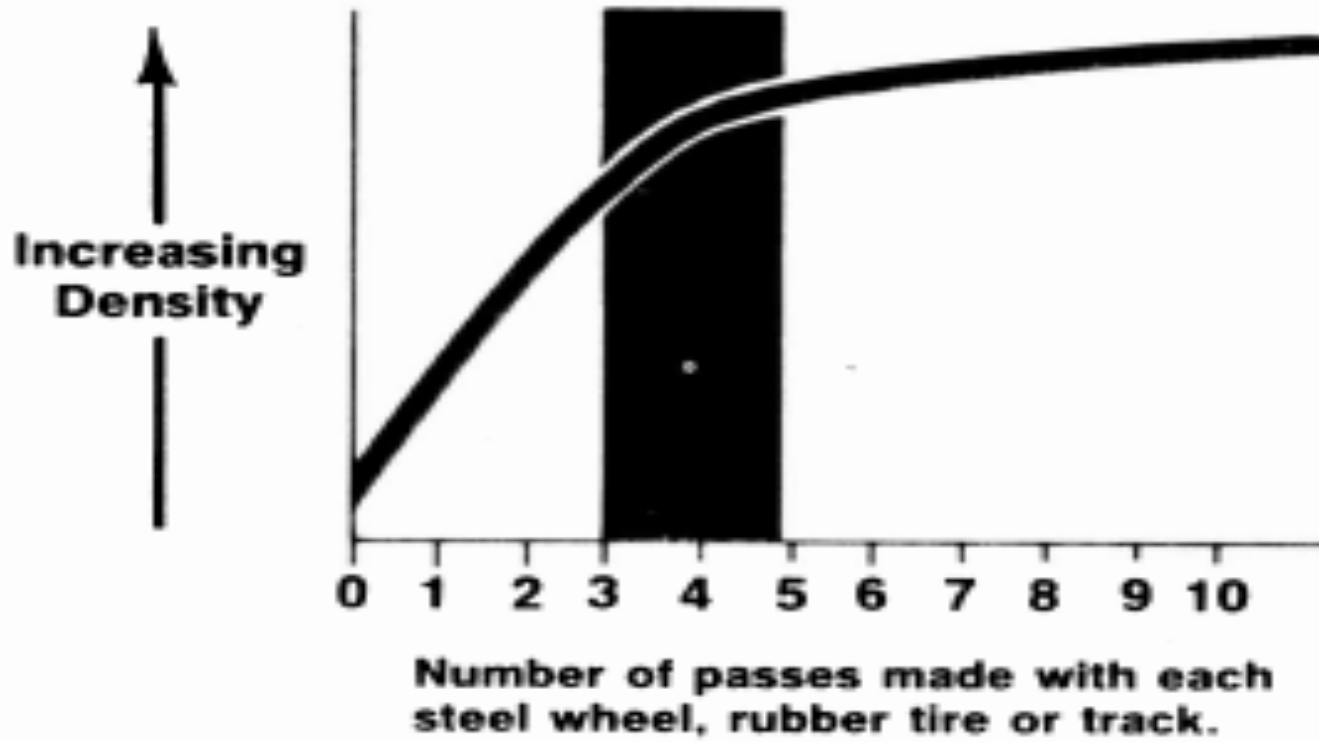
Compaction

Optimum Lift Thickness



Source: Caterpillar Performance Handbook. 15th ed.

Optimum Number of Passes



Source: Caterpillar Performance Handbook. 15th ed.

Best Practices for Daily Cover

- Applied on weekly or daily basis to control odours, vermin, vectors and other nuisance predators
- Minimum cover thickness is 150 mm (6 inches)
- Soil stockpiles should be kept near active face
- Alternative Options



Cell, Compaction and Cover Equipment

Equipment

Type of equipment	Function	Cost
Landfill compactor	Spreading and compacting solid waste, moving waste into the active cell, and applying daily cover. Most efficient when on flat surface. Should not be operated on a slope steeper than 4H:1V for safety.	New \$500,000
Crawler tractor or Bulldozer	Same functions as compactor but tracks of dozer used instead of steel wheels. Most common equipment at most sites. More versatile than compactor and is readily available from any excavation company.	New \$ 275,000
Track loaders	Best suited to trench method because it can excavate daily cover.	New \$200,000
Excavators/backhoe	Used for reshaping waste sideslopes, drainage ditches, moving material stockpiles.	New \$150,000

Crawler Tractor Specifications

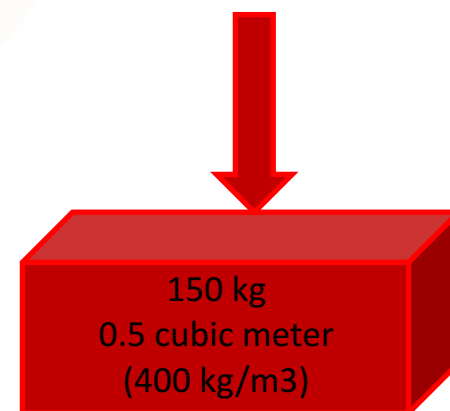
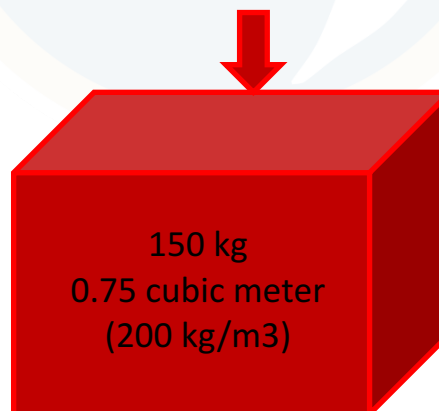
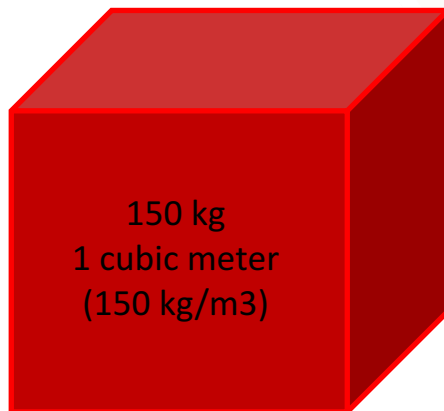


Compactor Specifications

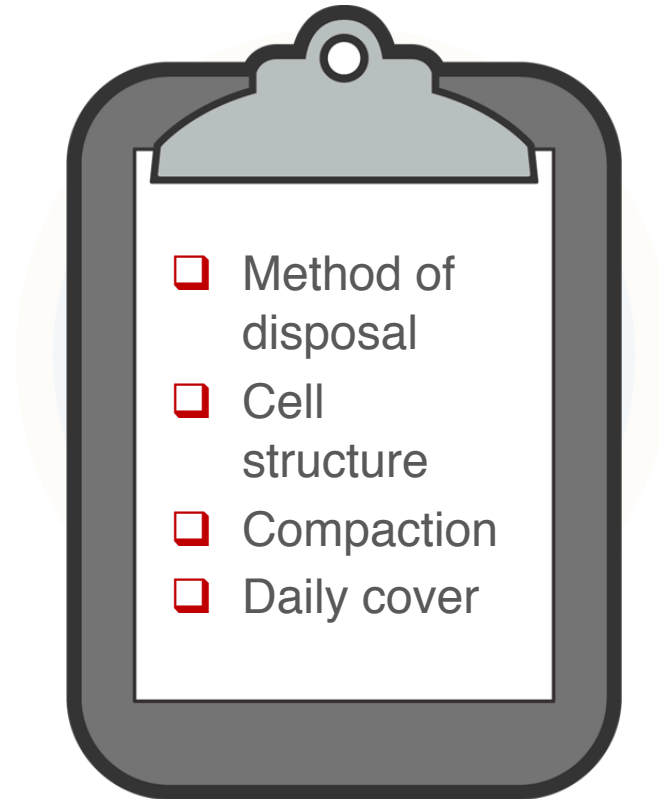


Compaction affects Service Life

Households	Waste per Household per Year (kg)	Waste per Year (kg)	Compaction Rate (kg/m ³)	Volume per Year (m ³)	Landfill Capacity (m ³)	Site Life (yrs)	Change (%)
560	600	336,000	150	2,240	40,000	18	
560	600	336,000	200	1,680	40,000	24	33%
560	600	336,000	400	840	40,000	48	167%
560	600	336,000	800	420	40,000	95	433%



Managing the Fill Area





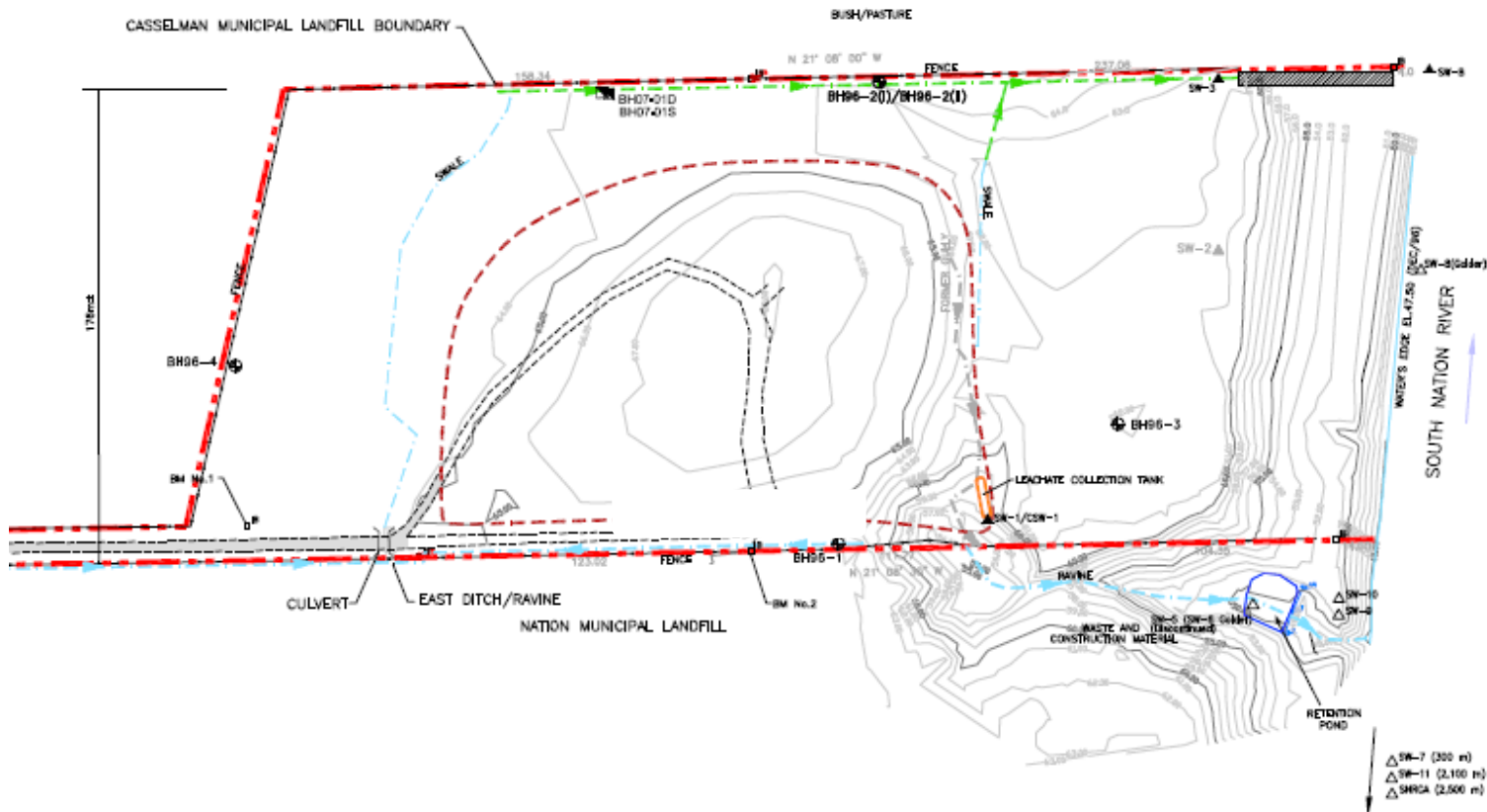
Monitoring and Reporting

Environmental Impact

- Environmental impacts are inevitable but manageable
 - remedial measure for off-site contamination - engineered collection systems, or natural attenuation
- Monitored regularly
 - surface water - creeks, streams, ditches, etc.
 - groundwater - monitoring wells, piezometers
 - Residential wells
 - landfill gas - at monitoring wells, visual, smell
- Impacts are managed through proper site operations ...



Monitoring Locations





Monitoring Groundwater

O. Reg 903 – 00/03



Monitoring Surface Water

Laboratory Parameters

QUANTITY	PARAMETER	UNIT PRICE	EXTENDED COST
66	Package Price, Includes:	172.00	11,352.00
66	ICP 28 Element Scan		
66	Cr(VI) - water		
66	ANION Scan - 6		
66	Alkalinity		
66	Hardness - Calculation		
66	BOD5		
66	COD		
66	DOC		
66	TKN - water		
66	N-NH3 - water		
66	TDS - (COND-CALC)		
66	TSS		
66	Hydrogen Sulfide		
66	Turbidity		
			Sub Total: 11,352.00
			GST (7%): 794.64
			Total Cost: 12,146.64



**Burning:
Do you allow
burning at your
site?**



Why Garbage Should Not Be Burned

Safe Burning Practices

- Supervise fire until extinguished
- Have the correct equipment to extinguish fire should weather conditions change
- Fire should only be done in small manageable stockpiles and setback from trees (30m or more)
- Do not burn over previous waste
- Schedule burning when landfill is closed
- Have a contingency plan
- Inspect all wood before burning to ensure no containers that can explode are hidden



Vermin: Do you
have issues
with vermin at
your site?

Best Practices for Controlling Vermin

- Cover waste at least weekly – schedule covering to follow days when site is open
- Maintain fences in good condition to keep large (wild or domestic) animals away
- Encourage residents to do backyard composting to minimize organics at the landfill
- Bury dead animals (most sites prohibit dead animal carcasses).
- Use a pest control specialist to implement a bait program to control rats



Contingency
Plan: Do you
have one in
place?



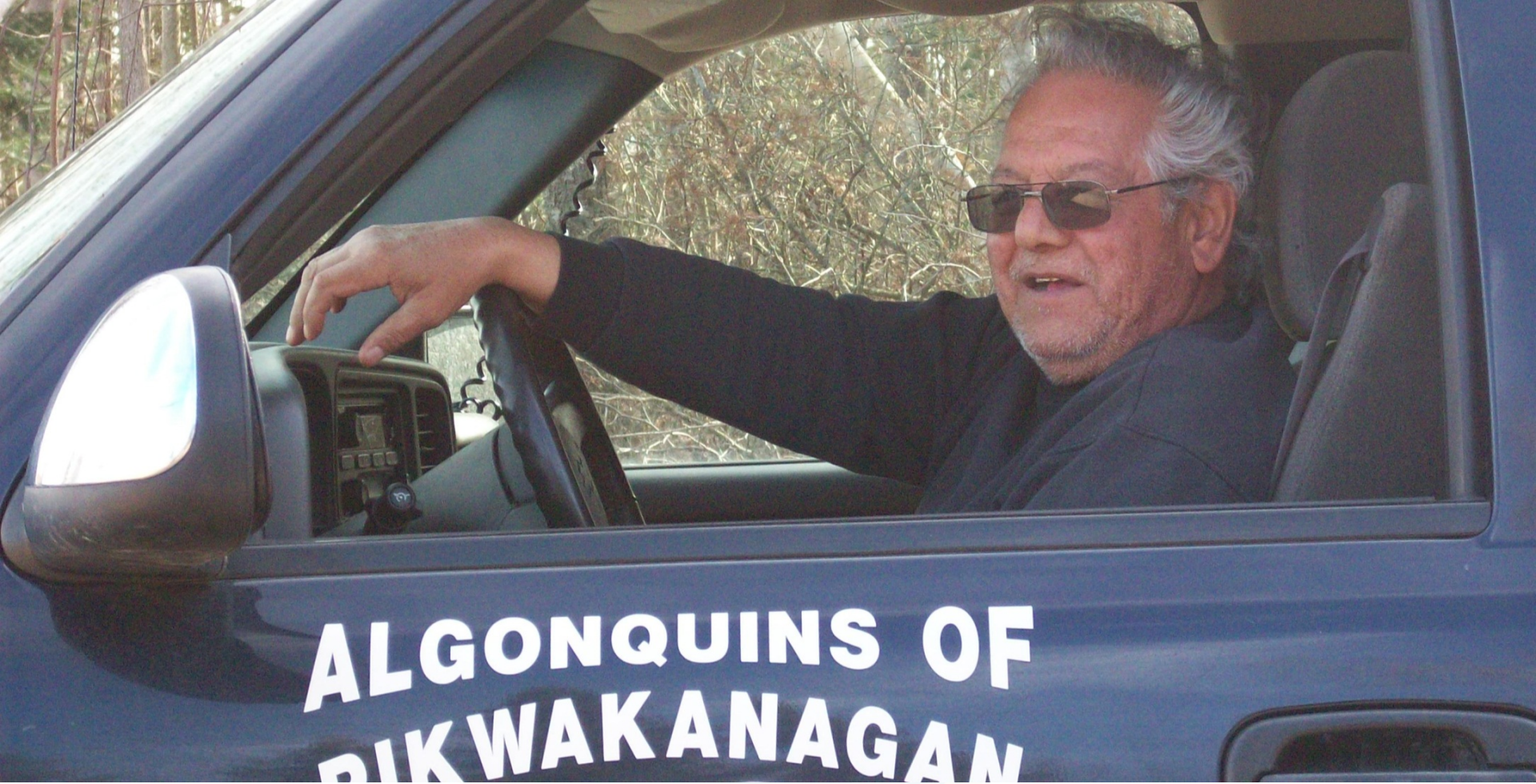
Types of Contingency Plans



Winter Operations



Staffing



**ALGONQUINS OF
DIKWAKANAGAN**

Supervision



COPIE

Project Name: Transfer Station Inspection Report

Date: 18/11/2009

Site Supervisor: Pierre Villemaire

Reviewed by: [Signature]

Date: Dec 8 2009

Weather: Wed./Sunny — Sat./Sunny — Sun./Sunny

Item	Objective	Observation Wednesday	Observation Saturday	Observation Sunday	Other Observations/Action Required /Additional Comments
Entrance	Is site locked during non-operating hours?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	Does entrance have a neat appearance?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Gate	Access restricted through padlock & limited # of keys?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	Gate in good condition?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	Any evidence of forced entry?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Main Entrance Sign	Sign to display; Name of site; C of A Number, Operation authority and their telephone number; Hours of operation; Emergency telephone number; Waste types accepted; warning against unauthorized access and dumping outside of site	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Hours of Operation	Hours are posted on entrance sign?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Supervision	Number of staff on site	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	
Fence	Completed monthly inspection of fences?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Transportation	Road Surface appropriate for uses vehicles?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Custodian Shelter	Condition of Shelter: Information/signs provided for safety and emergency procedures, telephone locations and emergency contact names and numbers; fire	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Daily Operations Checklist



Health and Safety



Training

Workplace Hazardous Materials Information System (WHMIS), First Aid and CPR training, site specific Health and Safety training, and be current with their tetanus vaccine



Site Closure

Best Practices for Site Closure

- Follow guidelines for final slope
- Close progressively
- Apply a final cover
- Continue to monitor



Other Considerations (Housekeeping)

LANDFILL SITE

HOURS OF OPERATION

MON. & THURS. 8AM. - 7PM.

SAT. & SUN. 10AM. - 2PM.

WARNING

DO NOT DUMP GARBAGE
BY TRAILER AFTER HOURS
OR YOU WILL BE FINED
UNDER BY-LAW #19=B-04
SECTION 11-1

VIDEO SURVEILANCE
DUMP IS MONITORED

Chippewas of Georgina Island

Georgina Island

Hours of Operation



Unacceptable Waste and Load Inspection

Waste Screening

- Landfill operator responsibility
- Direct waste to proper area of landfill/diversion
 - Public off-loading to proper location (active face or transfer containers)
 - C&D waste, large bulky items,
 - Blue Box materials
- Watch out for prohibited wastes
 - hazardous waste (ignitable, corrosive, reactive, toxic)
 - liquids
 - septage
 - radioactive waste
 - blood borne pathogen waste (medical)





Facilities



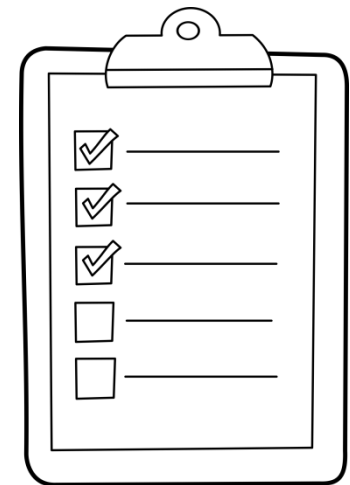
Daily Site Inspection



Litter Control

Record Keeping

- Applies to active disposal and transfer station sites
- Keep accurate records of materials brought to the site
 - # of bags
 - # of truck or trailer loads
 - # of appliances, tires
 - record of fees paid, name, license plate
- Keep record of daily operations
 - weather, temperature
 - vectors, litter
 - complaints & refusals, etc.



Report to Council/Community

- Monthly summary of operational issues at the landfill
- Prepared by the person responsible for waste management
- Should include any of the following:
 - Labour problems with employees
 - Incidents where an injury occurred
 - Mechanical breakdown with equipment
 - Issues with suppliers or contractors
 - Significant improvements needed to building
 - Complaints or illegal dumping

Report to Council/Community

- An Annual report prepared by a qualified person summarizing...
 - site plans and cross-sections
 - the landfill capacity used and the remaining capacity
 - quantities of recyclable waste transferred
 - An interpretation of the environmental quality data (surface water and groundwater, gas)
 - An assessment of the impact of the site on the natural environment
 - Recommendations respecting the requirement for any remedial works or contingency actions based on the monitoring results or operation of the Site.

Module Activity

Module Discussion

- ✓ Managing the Fill Area
- ✓ Common Issues
- ✓ Contingency Plans
- ✓ Staffing and Supervision
- ✓ Health and Safety
- ✓ Site Closure
- ✓ Monitoring and Reporting



Ontario First Nations
Technical Services
Corporation



OFNTSC
Environment

Thank you!

Please Complete the Evaluation Form

Contact information for OFNTSC

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