

Information Requirements Table for Solid Waste

Application Tracking Number: [Click here to enter text.](#)
 Authorization Number: [Click here to enter text.](#)
 [insert company / project name]

Applicant Summary	
Application Tracking #	
Authorization #	
Applicant / Facility Name	

Ministry of Environment	
Prepared by:	
Title	
Date	

The *Information Requirements Table (IRT) for Solid Waste* is a tool used by Ministry of Environment staff to document specific guidance and instructions given to an applicant pursuing authorization to discharge under the *Environmental Management Act*.

Note - this document was developed to capture all the items and complexities concerning solid waste.

Accordingly, for any given application, not all the items will apply and not all required items will warrant detailed discussion of methods and other concerns.

As part of the Preliminary Application Phase, MOE will discuss with the applicant the items listed in this table to determine what will be required in support of their final application. A tick mark in the "Required" column of the table indicates an information item to be included into the application package as agreed to by both parties or as directed by MOE. Should it be determined that specific methods will be used to derive this information, this will be specified with a tick mark in the "Methods" column. Specific methods may not be necessary for applications that will not require a subject matter expert review. In cases where complex impact assessments are to be undertaken, agreement on the methods used will be required. For simple methods, the methods used could be discussed with the applicant in a meeting and noted as agreed to in the table. For more complex methods, the applicant may be required to submit a "Methods Package" by an agreed date for MOE review, comment and acceptance. Once methods are accepted by MOE they should be either described in the "Methods" column or a reference made to the document describing the Methods Package.

If required, this document will form part of an Application Instruction Document (AID) which documents application submission requirements for the applicant. The AID is issued by the Director after a preliminary application meeting has occurred.

The MOE will be assessing this application against this table and it is expected that the applicant does the same prior to any preliminary meetings and/or prior to any final submissions. The Ministry will be screening the final received application against the requirements noted in the AID to ensure it is complete before resources are dedicated to a full, detailed review.

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1. PROJECT DESCRIPTION			
1.1 Describe the application including the proposed facilities and processes.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.2 Identify the project location including site and surrounding land uses, watershed and water uses.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.3 Summary of the environmental setting including: geology, hydrology, hydrogeology and climatic conditions.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.4 Describe the project history and list related reports.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.5 Describe relevant regulatory processes outside of EMA (Environmental Assessment, Solid Waste Management Plan, concurrent applications, etc.).	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.6 Describe major activities, infrastructure and waste management related to: <ul style="list-style-type: none"> • Site preparation and Construction, • Operations, • Closure and Post-closure. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.7 Discharges and Treatment - Summary of the landfill design and filling plan, outlining proposed waste disposal types and volumes.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.8 Environmental Impact Assessment summary demonstrating: <ul style="list-style-type: none"> • Appropriate water quality criteria must be satisfied at and beyond the landfill site boundary or 150 m from the landfill footprint whichever is closer, • QP recommendations for the appropriate water quality criteria, compliance locations and provide related rational and justification, • All landfills having more than 100,000 tonnes of waste in place or receiving more than 10,000 tonnes per year are to submit a Landfill Gas Generation Assessment Report, • Groundwater and surface water impact assessment at the site boundary or within 150 m of the landfill footprint, whichever is closer, and beyond the landfill site boundary including current and planned future uses of groundwater and surface water within 1 km of the landfill footprint, • A summary of water quality monitoring results to date, up-gradient and down-gradient surface water and groundwater quality, identification of landfill parameters of concern, leachate quality, contaminant concentrations, mass loadings, trends, assimilative capacity and cumulative impacts. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.9 Provide a map of the project location and surrounding properties.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.10 Provide a site plan with all the discharge locations and monitoring points. Include table of monitoring locations, sampling frequency and parameters.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
1.11 AMENDMENT ONLY - Describe specific before and after conditions for permit amendment applications.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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2. ENVIRONMENTAL SETTING PART – HYDROGEOLOGY AND HYDROLOGY			
2.1 Provide a geologic map and geologic cross-section of the landfill site showing lithology and structural features. Cross-sections must be referenced to the geologic map and must be located to best portray geologic features relevant to the landfill site.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.2 Describe the natural geologic structure of materials underlying and adjacent to the landfill site.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.3 Describe aquifers and aquitards within and downstream of the facility property, including the geological units in which groundwater occurs and the units' characteristics.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.4 Describe the in-place hydraulic conductivity of soils immediately underlying the landfill footprint including: <ul style="list-style-type: none"> • Hydraulic conductivity data, in tabular form, for selected locations within the landfill footprint, • A map of the landfill site showing test locations where these hydraulic conductivity data were obtained, • An evaluation of the test procedures and rationale used to obtain these hydraulic conductivity data. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.5 Describe the perennial direction(s) of ground water movement beneath and adjacent to the landfill site and groundwater flux within the aquifer(s) beneath the landfill site, with piezometric contour maps depicting groundwater flow direction and hydro-stratigraphic cross-sections.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.6 Provide a map showing the location of all springs and groundwater discharge locations within 1 km of the landfill footprint	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.7 Conceptual Hydrogeological Model - Develop and provide methods and outcomes of a conceptual hydrogeological model (considering seasonal variation) of the project area.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.8 Conduct a study of surface water and contaminant transport over the earth's surface, and through near-surface soils within 1 km of the landfill footprint.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.9 Provide an evaluation, supported by water quality analysis, of the baseline water quality within 1 km of the landfill footprint.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.10 A map showing the locations of all wells including water supply monitoring, oil and gas wells, geothermal, etc. within 1 km of the landfill footprint	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.11 Provide well information , where available, for each water well indicated on the well map including, but not limited to: well construction, well logs, pump testing results, water quality etc.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.12 Describe current and allowed land uses within 1 km of the landfill footprint.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
2.13 Provide current and planned future uses of groundwater and surface water within 1 km of the landfill footprint including types of water use (drinking, aquatic life, irrigation and livestock watering, etc.).	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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2.14 Provide a detailed map with groundwater sampling locations, potential seepage areas, proposed or existing discharge points and potential areas of disturbance.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
3 ENVIRONMENTAL SETTING - GEOLOGY, METEROLOGY AND CLIMATE (can be part of the Development, Operations and Closure Plan - Physical Summary)			
3.1 Meterology and Climate: <ul style="list-style-type: none"> • Provide a detailed map showing the location of all site-specific and regional climate stations in relation to project facilities. • Describe relevant meteorological and climate information sources for parameters such as wind speed and direction, precipitation, temperature and evaporation. • Submit all climate data in an appendix (electronic preferred) including site photos, precipitation, temperature, etc. and provide monthly and annual summaries of relevant climatic parameters in this chapter Provide recurrence interval analysis of annual precipitation, short-term rainfall and/or snowmelt events (as appropriate). • Provide summary of Meteorology and general air quality from existing monitoring data. • Identify information gaps and describe site-specific meteorological data collection methods proposed to augment existing regional data. • Identify the potential impacts of projected climate change on the projects operations, closure and post-closure phases. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
3.2 Regional Geology <ul style="list-style-type: none"> • Provide an overview of the geology of the area with emphasis on the regional framework. This will include a description of the tectonic belt(s), terrain(s), physiography, and regional metamorphism and structure. • Describe geologic units or lithology in key areas of the project property such as landfill area, distance to bedrock, overburden type. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
3.3 Topography, Surface Drainage Features and Natural Hazards <ul style="list-style-type: none"> • Describe topography and surface drainage features. • Provide detailed maps showing all drainage basins (local and regional) that will be affected by the proposed facility, areas of groundwater discharge, wetlands and notable topographic features. • Provide information on natural hazards relevant to the site, such as snow avalanches, landslides and earthquakes. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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4 IMPACT ASSESSMENT – WATER			
4.1 A Groundwater and Surface Water Impact Assessment that includes: <ul style="list-style-type: none"> Groundwater and surface water impact assessment at the site boundary or within 150 m of the landfill footprint, whichever is closer, and beyond the landfill site boundary including current and planned future uses of groundwater and surface water within 1 km of the landfill footprint. A summary of water quality monitoring results to date, up-gradient and down-gradient surface water and groundwater quality, identification of landfill parameters of concern, leachate quality, contaminant concentrations, mass loadings, trends, assimilative capacity and cumulative impacts. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
5 LANDFILL CRITERIA CONFORMANCE REVIEW			
5.1 Detail the conformance status of existing landfill with the landfill criteria, including upgrading plan and schedule for all proposed upgrades.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6 DESIGN, OPERATION, AND CLOSURE PLAN			
6.1 Provide a site selection report addressing all relevant items in section 3.0 of the LANDFILL CRITERIA FOR MUNICIPAL SOLID WASTE, or indicating why a specific criteria is not applicable. The report should include alternative sites considered and rationale for selecting the preferred site.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
Provide a map of the landfill site and its surrounding region within 1 km of the landfill footprint showing elevation contours, natural ground slopes, drainage patterns, and other topographical features.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.2 A Geotechnical and Seismic Assessment of the landfill site that includes: <ul style="list-style-type: none"> Bearing capacity, differential settlement, slope stability during construction, operation, and post-closure, Seismic and fault activity risk assessment, Any effects on the landfill base liner and leachate collection system, Conclusions and recommendations regarding the suitability of the landfill site. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.3 Provide a summary of the Hydrology and Hydrogeology Characterization Study (see section 2 above)	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.4 Provide a Site Plan that for at least the area within 1km of the landfill footprint includes: <ul style="list-style-type: none"> The landfill property, landfill site boundary, landfill footprint, and buffer zone All applicable features in the siting criteria and corresponding distances from the landfill footprint Legal property boundaries, right-of-way and other easements Topographic contours (1.0 or 0.5 m) UTM Grid (100 -m spacing), north arrow and scale All existing structures and infrastructure Tree line areas 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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6.5 Provide a Site Layout Plan that includes: <ul style="list-style-type: none"> • The landfill site boundary, landfill footprint, and buffer zone • Current and final landfill contours, waste thickness and design volume • Landfill facilities including site entrance, fencing, roads, gatehouse, weigh scale waste and recyclable drop-off and recycling facilities, leachate management works, surface water management works, landfill gas management works, etc. • Landfill Design that demonstrates the landfill will satisfy all sections of the “Criteria”, along with necessary plans, specifications, drawings, elevations, sections, etc. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.6 Summarize the landfill design to demonstrate that the design meets all sections of the criteria, including: <ul style="list-style-type: none"> • Description of the landfill service life and the expected contaminating lifespan, • Description of the landfill base liner construction design and means of construction, • Detail the landfill base (including subsoil/foundation strata, water table depth and grading/drainage) and describe potential for settlement and consolidation, • Description of the landfill base liner construction design and means of construction, • Description of QA/QC inspection methods for any geomembrane installation, • Detailed specifications for the primary and secondary liners (including service life, thickness, composition, permeability etc.), • Description of the Leachate collection system constructed above the landfill base liner. Include all minimum design requirements for a leachate collection system listed in section 5.5. of the LANDFILL CRITERIA FOR MUNICIPAL SOLID WASTE, • Describe erosion control measures to be used to prevent active erosion of channel slopes and surfaces that contribute to run-off, • A plan that describes how soil gas concentrations at the landfill site boundary must will not exceed the lower explosive limit of methane (5 percent by volume) at any time and how combustible gas concentrations measured in on-site buildings will not exceed 20 percent of the lower explosive limit of methane (1 % by vol) at any time, • Description of how landfill gas must be managed to attain in accordance with all migration and health and safety requirements including WorkSafe BC and the Landfill Gas Management Facilities Design Guidelines, • Stability analysis demonstrating cover system will be stable under design storm conditions, • Analysis of landfill gas production and the need for venting of LFG from beneath the cover system, • Description of the Landfill final cover (compatibility with the end use planned, hydraulic conductivity, vegetative cover, etc.), • Hydrologic modeling of the “final cover” performance using the applicable climatic setting for the landfill site must be completed to demonstrate the final cover stability under design storm conditions and consistency with the Leachate Management Plan, 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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<ul style="list-style-type: none"> Description of how the maximum allowable leachate generation rate will not be exceeded in a Leachate Management Plan Description of plans for revegetation (seed mix to achieve erosion control, low maintenance, and end use objectives, periodic Reseeding and fertilization requirements how a sustainable vegetative cover will be determined) Description of the final contours of a landfill will affect landfill site capacity and the performance of the final cover system and consideration should include, slope length, soil type, grade, permeability, surface water controls, etc.). Electric bear fence or wildlife exclusion fence meets the definition of security fencing. Security fencing must be established around the entire perimeter of the operational footprint of the landfill. Details for the design of security fencing and access control must be provided. Landfill access roads layout and design details that provide all weather access to on-site facilities, and for conducting inspection and maintenance of the landfill site infrastructure. Provide a layout of surface water ditches to promote adequate drainage. Armoured ditches are recommended for roads sloped steeper than 2 percent. 			
<p>6.7 A Filling Plan showing planned development of individual phases and cover borrow areas in a sequence that provides for the practical development of the landfill, including volumes for each phase.</p> <ul style="list-style-type: none"> Full details on development of each phase, including cell geometry and size Engineered drawings 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
<p>6.8 A Progressive Closure Plan that documents how progressive closure will be implemented, including:</p> <ul style="list-style-type: none"> Phasing Plan showing areas to be progressively closed and plan area of each progressive closure, with schedule, Proposed cover system profile, defining materials and material properties for each cover system layer. Specifications for the revegetation strategy should also be included, Stability analysis demonstrating cover system will be stable under design storm conditions, A materials management plan indicating the quantity of each material required for closure, where it will be sourced, and where it will be stored on-site during closure construction. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
<p>6.9 A Lifespan Analysis table that projects the annual waste tonnage to be received, reused, recycled, burned, and landfilled and the annual air space consumed. The calculation must account for air space consumed by waste, cover, road material, settlement, and environmental control works including landfill base liner, leachate and landfill gas collection works, and final cover.</p>	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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6.10 A Contaminating Lifespan Assessment of the site for key contaminants. The assessment must demonstrate that the service life and contaminating lifespan will be satisfied for the facilities particularly those identified in the design criteria.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.11 A Surface Water Management Plan demonstrating a full understanding of the local and regional watershed and documenting how surface water will be managed on site including both run-on and run-off. The plan must describe how site works will: <ul style="list-style-type: none"> • Convey and direct surface water runoff away from the active operation area within the landfill footprint to minimize surface water contact with waste, • Minimize potential for on-site erosion and sediment loading to downstream water courses Control peak flows from the landfill to minimize the downstream flood risk, indicate the ability to retain a 1:100-year, 24-hour storm event, • Provide the meteorological data applicable to the site, results of the hydrologic modeling stipulated in Section 5.6 and the detail design of ditches, down-chutes, culverts, retention ponds, and other surface water control infrastructure, • Provide details for the design for all surface water management works including retention ponds, and outlet structures needed, • Provide details for control of run-on (diversion ditches and other control structures) to minimize clean surface water contact with the active waste disposal areas. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.12 A Leachate Management Plan including: <ul style="list-style-type: none"> • Leachate generation quantities (annual, monthly and peak flows), • Leachate chemistry profiles (actual and expected), • Landfill liner strategy (including leachate compatibility and lifespan), • Leachate collection strategy (including protection from clogging), • Leachate collection system efficiencies, • Treatment System Selection and Design, • Leachate Treatment system performance monitoring and maintenance, • Sludge Management Treatment system performance monitoring and maintenance, • Leachate discharge strategy, • Leachate management contingency plan, • Required approvals for implementation of the plan, • Off-site disposal and/or treatment. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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<p>6.13 An Environmental Monitoring Plan (EMP). Provide a detailed Environmental Monitoring Plan (EMP) for leachate, groundwater, surface water, and landfill gas must be prepared that includes:</p> <ul style="list-style-type: none"> • The EMP for groundwater must be developed based on the Hydrogeology and Hydrology Characterization Report, the Groundwater and Surface Water Impact Assessment, and the expected landfill performance. • The EMP for surface water must be developed to monitor the performance of the surface water control works constructed and operated on a landfill site. • Leachate monitoring is required to establish site specific leachate chemistry and contaminants and to ensure these contaminants are included in the groundwater and surface water monitoring. • Landfill gas monitoring is required to ensure the health and safety of the landfill operations personnel, the public and any other sensitive on-site and off-site receptors. 	<p>Required <input type="checkbox"/> Methods <input type="checkbox"/></p>		
<p>6.14 Prepare a Facility Operations Plan that demonstrates how the facilities will be operated in compliance with the operation criteria. The design of the nuisance control measures is to be included in the plan. The plan must include:</p> <ul style="list-style-type: none"> • Waste inspection and acceptance procedures, • Weigh scale records procedures, • Plans for management of specific types of waste (e.g. asbestos, hydrocarbon contaminated soil, SRMs, recyclables, etc.) A materials management plan indicating the quantity of each material required for closure, where it will be sourced, and where it will be stored on-site during closure construction, • Provide a plan for management of dust, noise, litter, odour, vectors and/or wildlife. Plans to control litter/scatter to ensure no litter migrates beyond the site boundary. 	<p>Required <input type="checkbox"/> Methods <input type="checkbox"/></p>		
<p>6.15 Provide a Closure Plan that documents how the facility will be operated and maintained post-closure and must include:</p> <ul style="list-style-type: none"> • Maintenance of the final cover including vegetation and the repair of damage due to erosion, leachate breakouts, slope failures, settlement and burrowing animals, • Where applicable, operation and maintenance of surface water management works, including repairs required due to settlement, • General site maintenance including maintenance of access roads and fencing, • Where applicable, operation and maintenance of leachate collection and on-site leachate treatment facility or leachate haulage program, • Where applicable, operation and maintenance of landfill gas management facilities, including repairs to infrastructure damaged by settlement, • An environmental monitoring program to be carried out during the contaminating lifespan, • contingency measures to address any failure of the works or non-compliance with the performance criteria. 	<p>Required <input type="checkbox"/> Methods <input type="checkbox"/></p>		

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6.16 Prepare a Fire Safety Plan that describes how fire risks will be minimized that includes: <ul style="list-style-type: none"> • an emergency response plan to quickly extinguish a fire, • identifies a suitable water supply, firefighting and heavy equipment resources. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.17 Provide an Emergency Response Plan that documents strategies for dealing with emergencies at the site including: <ul style="list-style-type: none"> • HAZ-MAT incidents, • spills, • power outages, and, • extreme climate events. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.18 Submit a Financial Security Plan .	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.19 Prepare a Contingency Plan that includes: <ul style="list-style-type: none"> • Possible failure and non-compliance scenarios of the leachate, surface water, and landfill gas management facilities, • Practical and implementable contingency measures to address any failure or non-compliance with the performance criteria. 	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.20 A land survey is required to identify and establish the location of the landfill site boundary and the landfill footprint	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.21 A LFG Management Plan that demonstrates the LFG management facilities will satisfy the "Criteria".	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.22 A Landfill Gas Generation Assessment that includes the detailed requirements provided under the Landfill Gas Management Regulation guidance documents.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		
6.23 A Landfill Gas Management Facilities Design Plan that includes the detailed requirements provided under the Landfill Gas Management Regulation guidance documents. The plan should include a monitoring program to measure the performance of the proposed measures in achieving compliance.	Required <input type="checkbox"/> Methods <input type="checkbox"/>		

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Guidance Documents to be considered when determining Information Items Required and appropriate Methods to be used:

- [British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, BC Ministry of Water, Land and Air Protection, January 2003¹](#)
- [Developing a Mining Sediment and Erosion Control Plan, BC Ministry of Environment, December 2014](#)
- [Guidance for Assessing the Design, Size and Operation of Sedimentation Ponds Used in Mining \(draft\), BC Ministry of Environment, Lands and Parks, May 9, 2001²](#)
- [Guidance on Applications for Permits Under the Environmental Management Act – Technical Assessment, BC Ministry of Environment, September 10, 2010³](#)
- [Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities, BC Ministry of Environment, April 2012⁴](#)
- [Manual of British Columbia Hydrometric Standards v.1, Ministry of Environment, March 12, 2009⁵](#)
- [Technical Guidance 6 on Contaminated Sites – Water Use Determination, Version 2, Ministry of Environment, July 2010.](#)
- [Terms of Reference Environmental Impact Assessment And Technical Assessment Report for Environmental Management Act Effluent Permit Applications, BC Ministry of Environment, 2014](#)
- [All guidance in the on the LANDFILL CRITERIA FOR MUNICIPAL SOLID WASTE: \[http://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/landfill_criteria.pdf\]\(http://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/landfill_criteria.pdf\)](#)
- [BC Landfill Gas Management Regulation](#)

¹ http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_pdfs/fld_man_03.pdf

² http://www2.gov.bc.ca/assets/gov/topic/C0188F632AEC266B044F8A2B756F055F/industrial_waste/settling_ponds.pdf

³ <http://www2.gov.bc.ca/gov/DownloadAsset?assetId=7AD12B8CF1B94CF29619BD9871FB5740&filename=assessment.pdf>

⁴ http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/groundwater_modelling_guidelines_final-2012.pdf

⁵ http://www.for.gov.bc.ca/hts/risc/pubs/aquatic/hydrometric/man_BC_hydrometric_stand_V1.0.pdf