

23 December 2019

Reference No. 19120797-004-L-Rev0

**Mr. Ben Van Nostrand, P.Ag.**

Team Leader, Environmental Health Services  
Columbia Shuswap Regional District  
PO Box 978  
555 Harbourfront Drive NE  
Salmon Arm, BC V1E 4P1

**LANDFILL CRITERIA CONFORMANCE REVIEW  
GOLDEN LANDFILL, GOLDEN, BC**

Dear Mr. Van Nostrand,

Golder Associates Ltd (Golder) is please to submit our Landfill Criteria Conformance Review for the Golden Landfill (Landfill) in the Columbia Shuswap Regional District. This conformance review was conducted per Golder's proposal dated 3 April 2019. The following provides a brief overview of the Landfill, the results of Golder's conformance review and the proposed upgrading strategy that would be required to address non-conformance issues. A selection of photographs that were collected during the site visit is included in Attachment 1.

## **1.0 SITE DESCRIPTION**

The Golden Landfill is located in the Columbia Shuswap Regional District (CSRD), just east of the Town of Golden as shown on Figure 1. The site is authorized under Operational Certificate 17006 which was issued 29 August 2012 and last amended 31 October 2019. The Landfill is authorized to accept waste from municipal, commercial and light industrial sources. Average annual precipitation is 467 mm per year based on Environment Canada Climate Normals recorded from 1981 to 2010 at the Golden Airport weather station (Climate ID 1173210).

The Landfill is a supervised facility that is open from Monday to Saturday, with the exception of statutory holidays. The most recent design, operations and closure plan for the facility was prepared in December 2019 (herein referred to as the 2019 DOCP). Landfill operations are undertaken by a local firm that is contracted by the CSRD. Waste is placed in lifts using the area filling method and compacted and covered on a daily basis. Daily cover consists of steel plates placed across the active face and augmented with soil cover placed around the plate edges.

The site has certain infrastructure components and operational practices that are intended to reduce nuisance impacts. Electric fencing has been erected around the site perimeter. Litter control netting has been established along the southern property boundary adjacent to the active Landfill phase. As previously mentioned, waste is compacted and covered at the end of each day to reduce litter, vector and odour issues.

A vehicle scale and scale house are located at the Landfill entrance adjacent to a public drop off facility that has a share shed, Recycle BC depot and roll off bins for self-haul customers. There are also designated temporary storage areas on-site for the following diverted materials:

- 1) household hazardous waste
- 2) household / car batteries
- 3) propane tanks
- 4) fridges and freezers
- 5) metals
- 6) wood waste
- 7) yard and garden waste
- 8) concrete/brick/porcelain
- 9) asphalt shingles
- 10) mattresses

The Environmental Monitoring Program for Landfill was updated in 2019. The plan identifies a series of groundwater monitoring wells that are to be sampled on a quarterly basis. Groundwater quality results are interpreted and documented by a Qualified Professional (QP) in an annual monitoring report. Landfill gas is also monitored at gas probes along the Landfill property boundary. The monitoring is conducted twice a year by Landfill staff. There are no surface water features on or near the site so surface water is not included in the monitoring program.

## **2.0 CONFORMANCE REVIEW**

The Ministry of Environment and Climate Change Strategy (MoECCS) issued an updated version of the Landfill Criteria for Municipal Solid Waste in June 2016 (the Criteria). These Criteria are intended to serve as guidance on environmentally sound landfilling practices and procedures. However, the Criteria are not mandatory requirements (unless incorporated into the operational certificate).

The Criteria suggest that a conformance review be undertaken to determine the status of existing landfills relative to the Criteria. This review should include an upgrading plan that identifies the steps required to address non-conformance issues.

The conformance review and upgrading plan are to be submitted to the MoECCS during the next solid waste management plan review or by June 2021, whichever occurs first. Golder was retained by the CSRD to develop the conformance review for the Golden Landfill.

Golder's conformance review is a professional opinion, based on a review of available information provided by the CSRD and visual observations at the time of a site visit. No sampling or subsurface investigations were undertaken as part of our scope of work. While a non-conformance issue may be identified in Table 1, this does not necessarily mean that action to address the non-conformance issue is recommended by Golder.

Golder conducted site visits to the Golden Landfill on 14 March and 28 May 2019. Table 1 summarizes the results of Golder's conformance review. Some of the abbreviations and acronyms used in the review are as follows:

CSRD:	Columbia Shuswap Regional District	MSW:	Municipal Solid Waste
Criteria:	2016 Landfill Criteria for Municipal Solid Waste	N/A	Not Applicable
DOCP:	Design, Operations and Closure Plan	O&M:	Operations and Maintenance
EMP:	Environmental Monitoring Plan	OC:	Operational Certificate
LFG:	Landfill Gas	QP:	Qualified Professional

**Table 1: Conformance with the 2016 Landfill Criteria**

Section	Criterion	In Conformance?	Comments
3	Siting Criteria	N/A	Not applicable per Section 2.1.2 of the Criteria since this site has an existing approved landfill footprint.
<b>4</b>	<b>PERFORMANCE CRITERIA</b>		
4.1	Groundwater and Surface Water Quality	Y	Annual monitoring conducted by a QP and an Environmental Monitoring Plan has been prepared that identifies appropriate water quality criteria.
4.2	LFG Management	Qualified N	LFG has been monitored at two soil gas probes located along the western property boundary since 2013. There is also a continuous gas monitoring detection unit in the scale house. The 2019 DOCP and EMP provided recommendations pertaining to the on-site share shed (monitoring LFG or improving ventilation) and installing and monitoring soil gas probes along the eastern property boundary.
4.3	Nuisance	Y	Systems and operational practices are in place to reduce nuisance impacts.
<b>5</b>	<b>DESIGN CRITERIA</b>		
5.1	Service Life and Contaminating Lifespan	Y	The default contaminating lifespan has been proposed by a QP.

Section	Criterion	In Conformance?	Comments
5.2 – 5.5	Site Layout, Landfill Base Design and Liner, Leachate Collection System	Y	Not applicable per Section 2.1.2 of the Landfill Criteria until such time as the CRD contemplates development of a new landfill phase outside the existing waste footprint.  The 2019 DOCP recommends a design for future phases that complies with the Criteria.
5.6	Surface Water Management	Y	The 2019 DOCP presents a suitable surface water management strategy. The plan is conceptual and will require further detailed design prior to implementing the various components.
5.7	LFG Management Works	N/A	The site is not a “regulated landfill site” according to the Landfill Gas Management Regulation.
5.8	Final Cover Design	Y	Final cover has not been applied yet. However, the final cover design proposed in the 2019 DOCP provides two options that conform with Section 5.8 of the Criteria.
5.9	Final Contours	Y	The 2019 DOCP presents a fill plan that proposes final contours that conform with slope requirements of Section 5.9 of the Criteria.
5.10	Site Security and Fencing	Y	Electric fencing, with cattle guards and lockable gates, surround the current waste footprint and the scales / public drop off facility.
5.11	Access Roads	Y	Current access roads are appropriate for this site.
5.12	Vectors and Wildlife	Qualified Y	Electric bear fencing surrounds the site and is operational. Waste compaction and covering is performed per OC requirements.  However, deer are able to jump over the fence after hours and dig up MSW. Birds are able to pick up the exposed MSW and take it off-site.
<b>6</b>	<b>OPERATIONAL CRITERIA</b>		
6.1	Authorized Wastes	Y	Waste visible at the disposal face appears to conform with OC requirements. Signs at site entrance indicate that disposal of hazardous materials and other materials is prohibited.
6.2	Landfilling of Wastes	Y	Operations at the active face are in general conformance with Section 6.2.
6.3	Cover Placement	Y	Soil and alternate daily cover are applied to the active face on a daily basis. Alternate daily cover consists of steel plates.  Some leachate breakouts were noted during the site visit. When a new lift is started along the outer slope of the landfill, the CSRD should consider stripping away the underlying intermediate cover to encourage the downward flow of leachate and thereby reduce the potential for leachate breakouts along the slope. This should only be done immediately prior to placing the overlying MSW in the new lift.

Section	Criterion	In Conformance?	Comments
6.4	Nuisance Controls	Y	Practices in place to address litter, odour and dust. At the time of the site visits, litter was prevalent in areas immediate adjacent to active filling operations. However, on-site litter collection occurs at least once per year.
6.5	Vectors and Wildlife Management	Y	Electric fence surrounds the site. Waste compaction and covering activities meet OC requirements.
6.6	Burning	Y	Open burning of waste is prohibited.
6.7	Landfill Fire Management	Y	The 2019 DOCP includes an appropriate Fire Safety Plan for this site.
6.8	Scavenging	Y	Scavenging of waste from the active face is prohibited.
6.9	Site Health and Safety Plan	Qualified Y	See footnote 1. The Landfill is operated by a contractor retained by the CSRD. The contractor has developed a health and safety plan with some hazard assessment provided by the CSRD.
6.10	Signage	Y	There is a sign at the Landfill entrance that provides the necessary information.
6.11	Weigh Scales	Y	Single vehicle scale and scale house located at the site entrance.
6.12	Records	Y	The CSRD maintains the records required under Section 6.12 of the Criteria including the OC, inspection records, plans and reports and waste quantities. They also maintain an on-line feedback and complaint submission form on their web site.
6.13	Operator Training	Qualified Y	See footnote 2. The Landfill is operated by an experienced landfill operator who is under contract to the CSRD. The operator is trained in the use of the equipment required to operate the Landfill and has sufficient knowledge gained through experience to fulfill the operational requirements stipulated in the OC. The CSRD may wish to encourage their contractors to pursue and continually maintain specialized training that is offered through various waste management associations.
<b>7</b>	<b>CLOSURE AND POST-CLOSURE</b>		
7.1	Closure Plan	Y	A closure plan forms part of the 2019 DOCP.
7.2	Progressive Closure	Y	Progressive closure is addressed in the 2019 DOCP.
7.3	Post Closure O&M	Y	The 2019 DOCP addresses the post-closure planning requirements listed in Sections 7.3 and 10.3.4. The discussion regarding contingency measures associated with failure of the works or non-conformance with the performance criteria during the post-closure phase is expected to be the same as for the operational phase.
7.4	Contaminating Lifespan	Y	The 2019 DOCP proposes the default 100-year contaminating lifespan which corresponds to a site with a landfill design capacity that is less than 1,000,000 tonnes.

Section	Criterion	In Conformance?	Comments
7.5	Contaminated Sites Regulation	Y	The proposed closure topography will limit post-closure land use options and will not be conducive to developing the site for a new purpose such as municipal park or industrial property. As such, it is likely that reporting requirements will be regulated under the closure plan. A site profile will need to be submitted 10 days prior to the Landfill reaching its design capacity.
8	<b>FINANCIAL SECURITY</b>	Y	The CSRD has a dedicated closure fund.
9	<b>MONITORING</b>		
9.0	Monitoring Criteria	Y	The 2019 Environmental Monitoring Plan includes groundwater and the potential for LFG migration. The monitoring plan does not include surface water and leachate as there are no surface water features on or near the site and leachate is not currently collected.
9.1	Leachate Monitoring	N	There is currently no leachate collection since the Golden Landfill is operated as a natural attenuation facility. Leachate monitoring and testing is not conducted, nor are leachate levels measured within the waste fill. However, the 2019 DOCP recommends that future phases of the Landfill be lined and the 2019 EMP recommends that leachate monitoring be initiated once the next lined landfill phase is developed and leachate collection begins.
9.2	Groundwater and Surface Water Monitoring	Groundwater (Y) Surface Water (N/A)	The 2019 EMP recommends that quarterly groundwater monitoring be conducted by a QP. The rationale for omitting surface water from the monitoring program is also addressed in the EMP.
9.3	LFG Monitoring	Y	The 2019 DOCP and EMP include recommendations that address monitoring LFG concentrations in on-site structures as well as the potential for LFG migration into off-site structures.
10	<b>PLANS AND REPORTS</b>		
10.1	Hydrogeology Report	Y	A comprehensive hydrogeological assessment was prepared in 2019.
10.2	Construction Reports	N/A	No significant landfill infrastructure has been constructed since the Criteria were issued in 2016.
10.3	DOCP	Y	A DOCP update was prepared in 2019.
10.4	LFG Generation Assessment	Y	The most recent LFG generation assessment was prepared in 2017.
10.5	LFG Management Facilities Design Plan	N/A	A LFG Management Facilities Design Plan is not required since the results of the LFG Generation Assessment indicate that the site generates less than 1,000 tonnes of methane per year.
10.6	Annual Operations and Monitoring Report	Y	Annual Operation and Monitoring reports are prepared by a QP.

- 1) The QP for this conformance report is not qualified to provide a professional opinion on compliance with all aspects of Work Safe BC regulations and is therefore unable to provide assurance that Landfill site operations meet all Work Safe BC requirements.
- 2) This statement is based on conversations with CRD staff. The QP for this conformance report did not conduct interviews or review records to independently assess the Landfill operator's qualifications.

### 3.0 UPGRADING PLAN

Table 2 presents the activities required to address the non-conformance issues listed in Table 1 in order to bring them into conformance with the updated Criteria. It is important to note that Golder is of the opinion that the Golden Landfill essentially conforms with the requirements of its OC and as such, is in regulatory compliance. Golder is not necessarily recommending that the actions listed below be implemented but is rather providing them for the CRD's consideration so that it is understood what steps would be required if it wishes to adhere to the guidelines offered by the Criteria.

Table 2: Upgrading Plan

Section	Criterion	Steps Required to Obtain Conformance
4	<b>PERFORMANCE CRITERIA</b>	
4.2	LFG Management	Expand the current monitoring program to include soil gas probes installed at the eastern Landfill site boundary.
9	<b>MONITORING</b>	
9.1	Leachate Monitoring	Include leachate monitoring in the next EMP update once leachate collection begins during the next phase of Landfill development and operation.

### 4.0 CLOSING COMMENTS

This report was prepared by Golder Associates Ltd. in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering profession currently practicing under similar conditions in British Columbia, subject to the time limits and physical constraints applicable to this report. The report relies on information provided to us; Golder did not independently check the accuracy or completeness of any of this information.

Thank you for the opportunity to prepare this Landfill Conformance Review on behalf of the CSRD. Should there be any questions or points requiring further clarification, please contact the Qualified Professional for this report, Michael Budzik, P.Eng., at 604-296-4200.

**Golder Associates Ltd.**



Michael Budzik, PEng  
Senior Solid Waste Engineer

Jan 6, 2020

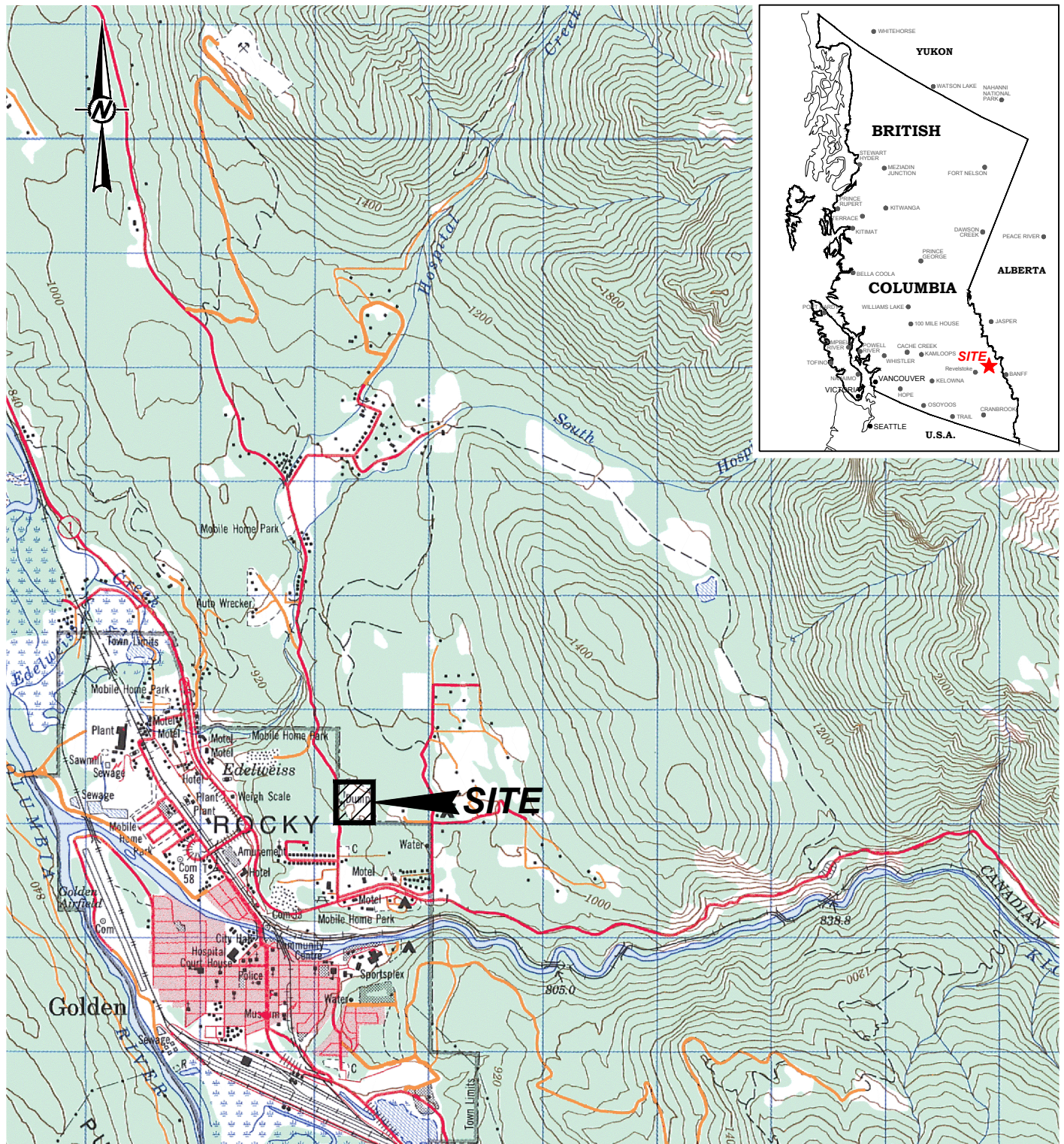


Colin Y. Wong, PEng  
Principal

MSB/CYW/smh

Attachment 1 – Site Photos





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**REFERENCE**  
BASE MAP FROM ETOPO, 1:50,000 NTS MAP 82N07, EDITION 4, UTM ZONE 11.

**CLIENT**  
COLUMBIA SHUSWAP REGIONAL DISTRICT

**CONSULTANT**      YYYY-MM-DD      2019-12-19

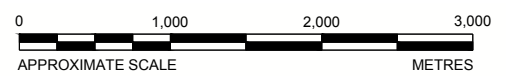
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APPROVED      MB



**PROJECT**  
GOLDEN LANDFILL  
LANDFILL CONFORMANCE REVIEW  
GOLDEN, B.C.

**TITLE**  
SITE LOCATION PLAN

PROJECT NO.      PHASE/TASK      REV.      FIGURE  
19120797      1000/500      0      1



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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

25 mm



**ATTACHMENT 1**

**Site Photos**



Photo 1: Site Entrance Sign (taken by CSRD)



**Photo 2: Vehicle Scales and Public Drop-off Area in the Background**



**Photo 3: Stockpiles for Diverted Materials**





**Photo 4: Storage Compound for Household Hazardous Waste**



**Photo 5: Electric Fence with Cleared Vegetation**





**Photo 6: Litter Control Netting Along Southern Property Boundary**



**Photo 7: Steel Plates Used for Daily Cover and Portable Litter Control Fencing the Background**





**Photo 8: Litter and Leachate Staining**



**Photo 9: Reuse Centre Adjacent to Public Drop-off Area**