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Subject:

Task Order No 5: Lorton Debris Landfill Closure Plan Review

Dear Mr. Kellas:

Date:  
April 12, 2018

Arcadis completed the review of the Lorton Landfill closure plan in accordance with the referenced task order. The review consisted of the following documents and information:

Contact:  
Doug Sawyers

- The Lorton Landfill approved Closure Plan, dated 2006;
- The August 2017 proposed Closure Plan;
- County Special Exception Amendment (SEA 80L/V-061);
- Virginia Solid Waste Management Regulations (VSWMR) found in 9 VAC 20-81; and
- Lorton Landfill's DEQ Operating Permit No. 331.

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703.465.4211

Email:  
doug.sawyers@arcadis.com

Our ref:  
02779052.0000

The information above was provided by the County, publicly available online, or obtained through a file review at the DEQ's Northern Regional Office.

Although the primary objective of the review was to identify substantive changes between the 2006 approved closure plan and the current proposed modifications (dated August 2017) we also compared and contrasted SEA requirements with provisions of the updated Closure Plan.

### Review Findings

The review indicated the modifications proposed in the August 2017 Lorton Landfill Closure Plan generally conform to applicable SEA requirements and are consistent in terms of intent and purpose with the previously approved Closure Plan.

Substantive changes, summarized in Table 1, includes final grades/maximum elevation, predicted settlement, and post-closure care maintenance. While these

changes are identified as substantive, our opinion is the changes proposed are beneficial to the long-term maintenance and monitoring of the landfill.

A general, high-level summary of the review related to the SEA is presented in Table 2. In some instances, when the proposed Closure Plan was found to not comply with explicit SEA requirements, no comparable VSWMR requirement was found. Public access and use features remain substantially the same. Comparing SEA requirements with the proposed Closure Plan identified two notable items:

1. SEA Requirement #23 – Gas-venting system. The required gas-venting system including collection layer beneath the cap and vent pipes is not shown on the proposed Closure Plan modifications. While this SEA requirement is not an explicit requirement under DEQ regulations, we recommend the County provide an appropriate comment to DEQ to consider in its review of the proposed Closure Plan.
2. The currently approved SEA Plat shows an “Alpine Hiking Trail”. This feature is not identified on the proposed revisions to the SEA Plat.

#### **LIMITATIONS**

These comments are provided to the County in response to our previously authorized Task Order which did not include evaluating the suitability of proposed landfill closure system components to protect public health and safety issues associated with proposed end use as a public park facility. It’s our understanding the Virginia Department of Environmental Quality (VDEQ) will perform its own evaluation of this matter pursuant to compliance with Virginia Solid Waste Management Regulations found in 9VAC-20-81-160 A, specifically as the regulation relates to eliminating uncontrolled leachate or waste decomposition products to the extent necessary to protect human health and the environment, as well as to minimize the escape of waste decomposition products to the atmosphere.

Sincerely,

Arcadis U.S., Inc.



Douglas E. Sawyers, PE  
Senior Vice President

Copies:  
S. Nesbitt, Arcadis

Enclosed:  
Table 1 – Comparison of August 2017 Proposed Modifications to 2006 Closure Plan  
Table 2 – Comparison of SEA Requirements and Proposed Closure Plan

**Table 1**  
**Comparison of August 2017 Proposed Modifications to 2006 Closure Plan**

Item	Detail	2006 Closure Plan	Proposed Modification (August, 2017)
Capacity	Airspace (million cubic yards (cy))	15.9	15.9
	Maximum Elevation (ft. amsl.)	438	Elev. 420 ft. amsl. final cap/ Elev. 412 ft. amsl., top of waste/pre-cap (page 20/1773 Closure Plan, not shown on drawings). Drawing should be modified to clarify grades shown are 'post-cap' and reflect variable thickness of vegetative support soils.
	Waste Acceptance Rate (tons per day (tpd))	5500	5000
Final Cover	Infiltration Layer	18" - $1 \times 10^{-5}$ cm/s OR 40 mil HDPE geomembrane.	18" - $1 \times 10^{-5}$ cm/s OR 40 mil HDPE geomembrane.
	Maximum Slope Angle (percent)	33	33
	Minimum Slope Angle (percent)	5	5
Stormwater Management	Design Event	25-yr; 24-hr	25-yr; 24-hr
		Post-Peak < Pre-development (2,- and 10-yr/24-hr storm event)	Post-Peak < Pre-development (2,- and 10-yr/24-hr storm event)
	Maximum Bench Spacing (vertical feet)	40	30 to 40
Settlement	Total (feet)	12.8	4.4
	Differential (percent)	3.016	0.36
	Strain (percent)	0.16	0.05
Stability	Gross Factor of Safety (FOS)	$1.5 < F.S. < 1.7$	1.68
	Veneer FOS	$F.S.=1.29 > 1.25$	1.38
Groundwater Monitoring Network	Up-Gradient (No. Wells)	1	2
	Down-Gradient (No. Wells)	7	7
	Total (No. Wells)	8	9
PCC Inspection, Maintenance & Monitoring Frequency	Inspection	Correspond with Monitoring Events	Correspond with Monitoring Events
	Monitoring	Quarterly/Semi- /Annual	Quarterly/Semi- /Annual
Post-Closure Land Use	Land Use Plan	N/A - passive	Public Park Space

**Table 2**  
**Comparison of SEA Requirements and Proposed Closure Plan**

No.	SEA Requirement	Closure Plan	
		Description	Compliant
<b>Category 1 - Intent</b>			
	No items of non-conformance found		Yes
<b>Category 2 - General Conditions</b>			
6	No construction of recreational facilities except trails as depicted on SEA Plat until:		
	GRB Determination re Acceptability of Residual Post-Construction Settlement	Both total and differential post closure settlement of the waste mass can be anticipated.	County to coordinate with GRB and confirm acceptability.
	Fire and Rescue acceptability of nature and extent of corrosion-producing properties, generation and escape of combustible gas and potential fire hazards.	MSW decomposition by-products including leachate and landfill gas may cause corrosion, generation and escape of combustible gas and potential fire hazards.	County to coordinate with Fire and Rescue and confirm acceptability.
<b>Category 3 - Conditions on the Operation of the Landfill</b>			
23	A coarse aggregate gas collection layer with collection pipe and gas vents above breathing zones shall be installed as part of the cap in areas that are proposed for recreational use, including parking areas, exercise stations, the overlook, the amphitheater, the pavilion, and the kite flying area as reviewed and approved by DPWES.	Closure Plan/LFG Management Plan does not commit to specific methods of venting. Design drawings do not indicate any form of gas collection venting layer and/or passive vents other than surrounding the base of waste mass which is not protective of public health in other areas where recreational use is proposed.	No
26	A list of landfill equipment operators, telephone numbers available to County's Emergency Operations Center and kept current by the landfill operator.	Although Closure Plan Appendix A Table 1 provides a comprehensive list of emergency contacts (which would comply with VSWMR requirements) the document does not contain a list of equipment operators as specifically required by the SEA. However, this is typically an Operations Plan requirement and not usually required by VSWMR for Closure/Post-Closure Care and Maintenance Plans.	No
<b>Category 4 - Buffer, Landscaping and Screening Conditions</b>			
32	All permanent berms landscaped to satisfaction of Urban Forest Management DPWES and conform to landscaping standards of Article 13 of the Zoning Ordinance	Landscaping Plan and details provided in Closure Plan Appendix R shows proposed planting along perimeter of waste mass side slope benches or 'berms'.	County to Confirm conformance to own standards.
33	Maintain undisturbed buffer of existing trees along north boundary as depicted on the SEA Plat.	Landscaping Plan and details provided in Closure Plan Appendix R Sheets 1 to 3 shows pond planting areas along north boundary. No details provided re whether or not existing tree buffer maintained.	Unable to confirm extent and adequacy without site visit.
34	100' ft. width landscaped buffer along south property boundary.	Landscaping Plan details provided in Appendix R Sheet 3 shows reforestation area along south-west perimeter.	Unable to confirm extent and adequacy without site visit.
<b>Category 5 - Transportation Conditions</b>			
38	Landscaping shall be maintained in good health. Any such landscaping that should die shall be replaced within 6 months of its death.	Landscaping Plan and details provided in Closure Plan Appendix R does not provide any details concerning maintenance and replacement of vegetation.	No. Landscaping Plan should be updated to include notation depicting replacement of dead vegetation per SEA requirement.
41	Additional soil shall be placed on top of the final cover in those locations where planting of trees is proposed.	Closure Plan drawings (plan and detail) show cap cross section with variable thickness, presumably to accommodate additional vegetative support soil. Landscaping Plan Sheet 7 provides tree planting guidelines/details concerning specified thickness of cover soil corresponding with various proposed types of vegetation. However this does not correspond with closure plan narrative Section 2.5.2.	Yes.
41a	The final location, depth and composition of the additional soil shall be subject to review and approval by UFM and DEQ.	Closure Plan drawings (plan and detail) show cap cross section with variable thickness, presumably to accommodate additional vegetative support soil. Landscaping Plan and details provided in Closure Plan Appendix R provides details concerning specified thickness of cover soil corresponding with various proposed types of vegetation. Recommended UFM and DEQ review.	Yes. Subject to review and approval by UFM and DEQ.
<b>Category 6 - Park Conditions</b>			
52	All park improvements to be as depicted on SEA Plat and constructed pursuant to FCPA standards in consultation with FCPA staff.	Park Plan and details provided in Closure Plan Appendix R and S.	Yes. County to confirm compliance with SEA Plat and FCPA standards.
56	Proposed restroom installation to be coordinated with and approved by Health Department if served by non-public sewer and water.	Park Plan and details provided in Closure Plan Appendix R shows waterless toilets.	Yes. Will require approval by Health Department.