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Staff Report

Infrastructure and Public Works

Report To: Committee of the Whole
Meeting Date: January 14, 2019
Report Number: CSPW.19.001
Subject: Disposal Site Leachate Management Overview
Prepared by: Jeffery Fletcher, Manager of Solid Waste and Special Projects

A. Recommendations

THAT Council receive Staff Report CSPW.19.001, entitled "Disposal Site Leachate Management Overview" for their information.

B. Overview

This report provides an overview of the landfill capacity upgrades at the Disposal Site and Leachate Management Environmental Assessment (EA). The EA was undertaken to determine the preferred solution to treat generated leachate which became the construction of a pump station and forcemain to the Thornbury Wastewater Treatment Plant. Given community concerns, this Report provides additional detail on several options in addition to a pumped solution. This Report concludes that even with the loss of the Municipal GHG Challenge funding proceeding with the construction of a leachate pumping station and forcemain has merit and will result in annual reductions in operating costs.

C. Background

An Environmental Screening Process was completed in 2012 to consider options for managing the Town's solid waste. Following that process, a new landfill cell was commissioned in October 2015 at the Solid Waste Disposal Site. This new cell and the next phase of expansion will provide waste disposal capacity for approximately 25 years. In accordance with provincial requirements and environmental protection requirements, the new cell utilizes a liner and leachate collection system whereby all leachate is collected. The leachate produced from rain, snow and moisture from incoming waste is currently removed from the cell by tanker truck and hauled for treatment at the Craigleith Wastewater Treatment Plant.

The management of leachate was considered during the Environmental Screening Process. It found that trucking was a viable temporary solution until the Town implemented a permanent solution. The Environmental Screening Process was a public process that included a Public Information Centre and a public review period. Leachate must not only be managed while the landfill cell is operational but perpetually after closure while leachate is produced that requires treatment. To determine the long-term solution for leachate management, the Town

completed a Municipal Class Environmental Assessment in July 2017, which after studying various options, the preferred solution as determined by the study findings and adopted by Town Council was pumping leachate from the Disposal Site to the Thornbury Wastewater Treatment Plant (WWTP). The public consultation process mandated by legislation was conducted during the EA. On-site treatment and disposal options were considered but due to higher estimated costs, natural environment concerns and regulatory compliance challenges regarding discharge to groundwater or surface water bodies, these concepts were not preferred.

In anticipation of leachate being conveyed to the Thornbury WWTP a recent renewal of the plant's Environmental Compliance Approval (ECA) included a conceptual study of the WWTP's ability to process leachate. The study concluded that the WWTP has the capacity to effectively process the leachate based on the leachate characteristics and the existing treatment process at the WWTP. A flow pacing study would be required during the final design of the leachate pumping station to ensure that leachate is fed to the WWTP at a controlled rate to maximize treatment efficiency.

The Town initiated the preliminary design of the pumped solution in September 2017. Meanwhile, the Town applied for and was successful in securing 90% of eligible costs for the design and construction of the project in the amount of $2.3 million from the provincial Municipal GhG Challenge Fund. A subsequent transfer payment agreement was executed with the province for the monies. This funding enabled the Town to proceed without having to determine an internal or debt funding source. Construction was planned to commence in early 2019.

The Town received correspondence July 10, 2018 from the Ministry of Environment, Conservation and Parks (the "Ministry") that the Municipal GhG Challenge Fund program had been cancelled and that the grant monies were withdrawn. On July 31, 2018 Council supported the submission of a proposal to the Ministry for wind-down funding sufficient to support completion of the design phase as outlined in Staff Report CSPW.18.063. As of November 26, the Province has indicated that only an additional $52,000 would be extended to the Town for project wind-down expenses. The Town is also able to keep the initial grant payment of $103,575 which was used for forcemain design.

Unlike some other Town activities that may be discretionary, the Disposal Site will continue to generate leachate essentially in perpetuity and as such the Town has a regulatory obligation to responsibly manage and treat its leachate. Within the next 8 to 10 years a second landfill cell is planned for consideration and could be phased in and leachate generation would increase. Over the next 25 years 330,000 cubic metres of leachate is expected to be generated - equivalent to 16,000 truck trips – that must be adequately treated for disposal to the natural environment. The estimated average annual generation of leachate, using normal trending, is 12,200 m^3 (33.4 m^3/d) however, as shown in Attachment 1 this can vary greatly based on dry or wet climatic conditions. A wet year can be double that of an average year. Installation of a termination berm has cut off groundwater infiltration and greatly reduced leachate production in 2018 compared to 2017 and 2016. A leachate management system must be able to adapt to this range in leachate generation. The range is compounded when a single day is considered.

To illustrate the wide range in leachate flows that are expected, the long term average is 12,200 m^3/yr but the maximum expected annual amount for Phase 1 is 20,000 m^3 and respectively 30,000 m^3 for Phase 2 (from Attachment 1). Those figures are the yearly totals. Within any one year some days will be higher than others. The peak day flow is generally between 2.5 and 3.0 times that of the annual average. If the 2.5 factor is used, the daily peak flows become 84 m^3/d (12,200 m^3 / 365 x 2.5PF) over the long range, 137 m^3/d at the end of Phase 1 and 205 m^3/d at the end of Phase 2. The daily flows become even higher during extreme storm events. There are abilities to utilize the storage volume inherent in the lined cell during high periods of leachate production but there is a limit to that strategy from volume and odour standpoints. The summary is that the volume of leachate generated can vary substantially. Any process put in place must be flexible enough to manage the full range of flows.

An additional and demanding issue related to leachate management is odour control. Leachate releases hydrogen sulphide which has a noxious odour and is dangerous in high concentrations. The Town had complaints from residents neighbouring the Craigleith Sewage Pumping Station where the trucked leachate is received. Town Staff implemented a temporary pre-treatment system at the Disposal Site that involves aeration in trailer tankers and chemical treatment. This ad hoc solution has worked effectively to eliminate off-site odours. The process is however labour intensive and involves approximately 8 staff hours for tank transfer, dosing and monitoring each week. The current system has also had to be winterized increasing operational challenges. The Ministry has endorsed these temporary measures while the Town implements a permanent leachate management solution.

Figure 1. Temporary aeration tankers situation beside landfill cell wet well

Another challenge the Town needs to consider is that the inflow of leachate to a wastewater plant has to be carefully managed to not shock load or exceed the treatment capacity of the plant. The plant may be forced out of regulatory compliance by "killing" the treatment process. The flow to the Craigleith WWTP is restricted to a maximum of 84m^3/day (4 tri-axle truck loads). There are though operational constraints at the Disposal Site, the WWTP and with the haulage contractor that result in the amount of hauled leachate not always being the maximum permitted.

The Town is currently able to manage the leachate internally. But during wetter periods when the Craigleith WWTP can't accept the amount of leachate generated, Staff have arranged to haul leachate to the Collingwood Hauled Waste Receiving Station. The Town is currently unable to utilize capacity at the Thornbury Wastewater Treatment Plant due to regulatory restrictions and lack of receiving facilities. These constraints can be removed with appropriate applications, approvals and the construction of receiving facilities.

D. Analysis

The Town is responsible to manage its leachate while at the same time being aware of the financial implications of its choices. The cancellation of the Municipal GHG Challenge Fund grant dramatically affected the Town's financing plan for the project.

Since the Town has already completed the Municipal Class EA process where a pumped solution for leachate management was preferred, in order to consider another solution, the Town will be required to undertake a review of the EA prior to provincial approvals being issued. To initiate the review process, Council would need to determine that there has been a sufficient change in the underlying environmental, economic and social/culture factors such that a review of the EA is warranted. Afterwards a consultant would need to be retained to undertake the review. The Review will consider all options including those that were previously considered, have come forward since the EA was completed in 2017 or may be identified during the EA Review. In the end, the EA Review may not find that there has been sufficient change in the underlying factors to change the preferred solution away from a pumping station and forcemain. The Review will be subject to the Part II Order Request provisions in the Municipal Class Environmental Process where an individual can request the Ministry of Environment, Conservation and Parks to elevate the EA. The cost to undertake a basic EA Review on this scale of project is expected to be in the range of $50,000 but may increase dramatically if additional specific studies are required.

The following is a brief outline of the principal options available to the Town for the management of leachate at the Disposal Site. Costing calculations are provided in Attachments 2 thru 5 and summarised in Table 1 at the conclusion of the option discussion.

1. <u>Do Nothing</u>:

   Leachate requiring treatment will continue to be generated over the 25 year active life of the landfill plus a significant period afterwards. If the Town truly did nothing to deal with leachate, the lined landfill site will ultimate fill with leachate and become unusable

as a landfill. Prior to that happening, the province would order the Town to comply with its Environmental Compliance Certificate (ECA) to properly operate the Disposal Site and manage leachate. As such, this is not a viable solution.

2. Continue As Is:

In this option the ad hoc leachate treatment and trucking solution currently in place would continue. Although this solution is functional in the short-term, over a longer term this solution will raise regulatory challenges particularly with respect to compliance with the Site's current approvals. The Ministry is aware of the Town's temporary efforts to pre-treat leachate at the landfill for odour control while the design and construction of a permanent solution is underway, and thus is willing to allow the Town to manage leachate as it is. If the implementation of a long range solution is delayed significantly, the Town should expect to be required to bring the pre-treatment system into compliance or be ordered to undertake additional works by the Ministry. This will trigger improvements that have unknown costs, however Staff conceptually estimate capital costs to be in the range of $250,000 to $300,000 (based on Staff's experience and current understanding of needs) to satisfy minimal provincial regulatory requirements. Essentially, the ad-hoc Works would be replaced with permanent infrastructure that will be more cost effective than the temporary solution. The Site's Environmental Compliance Approval would need to be revised accordingly.

The abilities of the Craigleith WWTP to receive and treat leachate is limited as described previously. This becomes a particular problem during wetter periods when the amount of leachate generated exceeds the plant's treatment capacity. Staff will maximise the amount of leachate stored at the Disposal Site but must remove leachate once on-site storage available within the leachate collection system is exceeded. This excess leachate will be trucked to the Collingwood Hauled Waste Receiving Station. Based on a review of precipitation diurnal curves and year over year data, the Town can expect to haul approximately 2,000m^3 annually to Collingwood. Staff is not aware of an upper limit of the amount of leachate that Collingwood can receive however if their treatment system process is adversely affected, the Town will have to divert excess leachate to another location.

3. Permanently Haul Leachate:

Instead of continuing with the ad hoc system currently implemented at the landfill, the Town can construct works to effectively and efficiently haul leachate permanently. Under this option, facilities will be constructed at the landfill to store and pre-treat leachate before it being hauled.

At a conceptual level of accuracy, the cost of a permanent hauled leachate solution as described which is also operationally efficient will range from $750,000 to $1,000,000 for capital costs. This includes reviewing the EA, engineering, construction and contingency. Any leachate in excess of the Craigleith WWTP's capacity will have to be disposed of at Collingwood's Receiving Station or an alternate location.

It will be possible to make improvements to one or both of the Town's WWTP's to receive, store and feed leachate into the plant at a controlled rate to maximise the leachate able to be treated at Town facilities. For the purpose of this Report though this sub-option has not been costed.

4. Leachate Pumping Station and Forcemain:

This option is the construction of the leachate pumping station and forcemain (5km) from the Disposal Site to the Thornbury WWTP as envisioned in the EA and the design work completed to date. The efforts on this solution are well advanced. The province and relevant agencies are accepting of the solution subject to final approvals. Figure 1 below provides the proposed forcemain route.

Figure 1 – Forcemain Route

A flow pacing study of leachate into the Thornbury WWTP is still to be completed to address setting the leachate inflow rate and other operational measures warranted. As a general rule of thumb given by the province, leachate can be introduced at 2% of domestic wastewater flow without compromising the treatment system. The average inflow rate was 2,773 m^3/d to the plant in 2017 and the peak day was 7,617 m^3/d. Two percent of these figures are 55 m^3/d and 152 m^3/d respectfully. The long range average

leachate flow is 12,200 m^3/yr (33 m^3/d). The figures indicate that the inflow to the Thornbury WWTP is reasonably able to absorb incoming leachate and the project team is confident a flow pacing study can establish the feed rate under a range of flow conditions including peak and low flow conditions.

Some pre-treatment prior to sending the leachate to the Thornbury WWTP may be necessary at the Disposal Site however the majority of treatment is expected to be accomplished by the installed works at the Plant. The Thornbury WWTP Headworks is currently in the design phase for a significant upgrade in capacity and equipment replacement. Part of that work is odour control for incoming sewage which can easily be modified to manage leachate odours.

5. <u>On-site Treatment and Disposal</u>:

In this option, the Town would construct a treatment plant and dispose of leachate effluent in close proximity to the Disposal Site. This option was evaluated during the 2017 EA but in the end was not preferred. The costs identified were higher than the cost of the forcemain option. The EA also considered the environmental challenges involved in finding a receiving stream or building an appropriate infiltration bed in the area of the landfill. In addition, the regulatory uncertainty of even being able to get approval for surface or infiltration discharge in near proximity to the Indian Brook or the Beaver River which are both cold water fish nurseries.

To re-visit this option would include reviewing the EA as discussed previously however there would be additional costs to evaluate this option. They relate to the environmental and assimilative capacity studies required to evaluate disposal options, and to address the increased scrutiny by regulators, agencies and interested parties such as First Nations. An allowance of at least $100,000 should be used to undertake a full review of the EA to consider on-site treatment and disposal. Regardless, there is no assurance that this option would be the preferred solution.

In an effort to understand the experience of other municipalities with leachate treatment systems, Town Staff contacted a number of municipalities with active disposal sites using on-site treatment. Information was gathered and conversations were had with Town of Kincardine, Township of McDougall and City of Toronto. All of these municipalities manage landfill leachate via on-site treatment however each solution is unique to the site and situation. The major factors, aside from plant cost, that influenced the selection of on-site leachate treatment were:

- distance to an existing wastewater treatment plant;
- ease of connection or construction;
- availability of existing plant capacity
- a willing host if in a different municipality;
- scale of operation – volume of leachate production; and
- availability of adequate receiving water body.

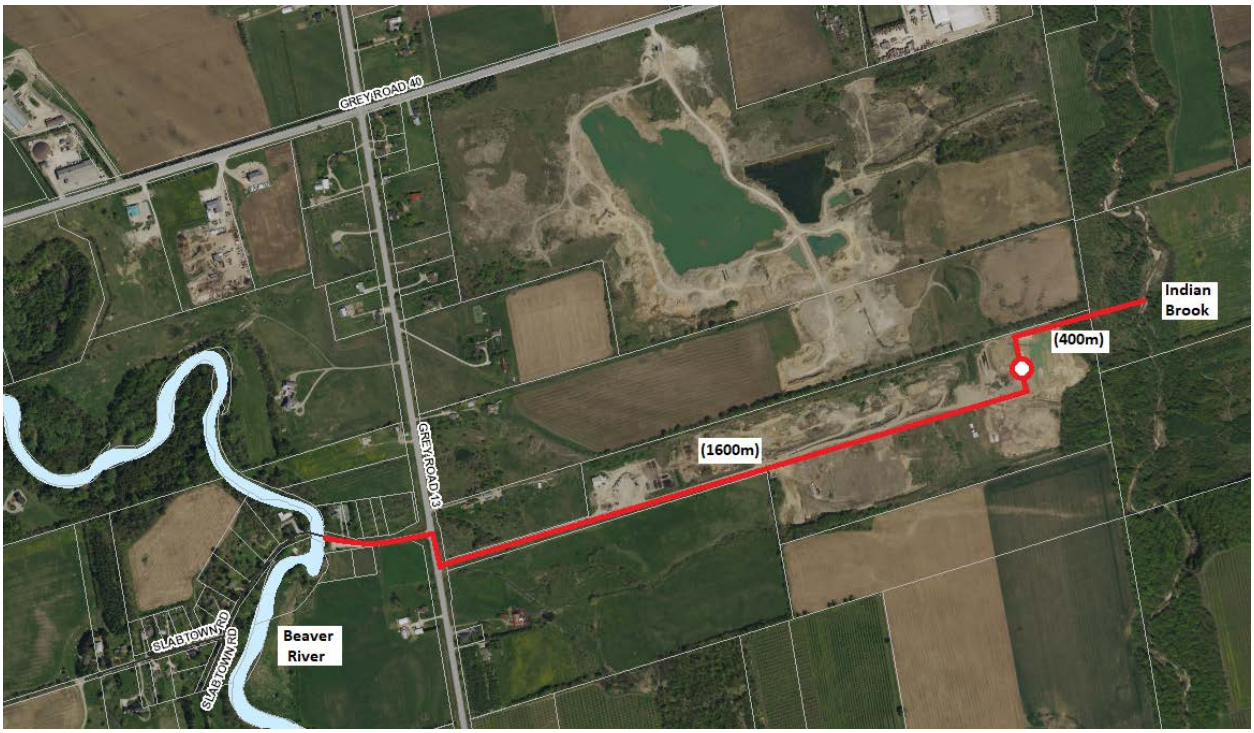
Kincardine and McDougall have built on-site plants as they faced the challenge of other treatment plants being 13 and 11 kilometres away respectively, and McDougall also had bedrock and an unwilling host to contend with. The Town of Kincardine which constructed a $2.8M leachate treatment plant 3 years ago is considered the Town's best comparator. Their construction and operating costs are used to estimate the cost of an on-site treatment plant at the Town's Disposal Site.

Simcoe County, who is responsible for landfill operations in Collingwood, connected to Collingwood's sewage collection system which was 3 km from the landfill.

Aside from cost, the availability of a receiving body and assimilation capacity to meet discharge objectives may be an obstacle for the Town Site because the Indian Brook (400 metres away) does not have the available year round flow to absorb the effluent and is a sensitive cold water creek. Another option would be to pipe final effluent to the Beaver River (1.6 kilometres away) at an increased cost. Both solutions would require a pumping station and a forcemain to an outfall. Figure 2 below provides conceptual routes and outfalls for effluent forcemains to surface waters.

Another option for effluent discharge is underground. An engineered infiltration bed and groundwater discharge is used in McDougall, and could be a viable solution for the Town. However, additional land and filter bed construction are expenses not currently included in any options.

Figure 2 – Effluent Forcemains to Surface Waters



A point to understand that Staff learned in discussions with the operator of the Kincardine Plant is that the wide variability in leachate strength, characterises and inflow makes operating an extended aeration plant challenging to stay within legislative requirements. Special efforts such as maintaining a separate feed stock are needed to avoid killing off or adversely changing the biological process. Other treatment technologies are available which don't rely as heavily on a bacteria but they have higher capital costs and would require further review as well.

Cost Comparison

Table 1 below provides a cost summary of the various options. The lowest cost when considered on an annual operating and lifecycle basis is to pump the leachate to the Thornbury WWTP. Although the hauling options have lower initial capital costs, the higher annual operating costs more than offset the initial lower capital cost in lifecycle evaluations.

Table 1
Cost Summary

Opt.	Description	Initial Capital	Annual Ops.	Lifecycle[(1)]
1	Do Nothing	not viable		
2	Continue As Is	$300,000	$245,991	$6,899,769
3	Permanently Haul Leachate	$1,000,000	$226,049	$6,651,219
4	Pumping Station and Forcemain	$2,388,073	$119,300	$5,370,573
5	On-Site Treatment and Disposal	$4,812,031	$217,838	$10,257,973

Notes:
1. Based on 25 year lifecycle.

The cost of treating leachate at the Craigleith WWTP in 2018 and for years previously has been $6.50 per m^3. Staff have learned that the Town's leachate is stronger than what has been previously hauled to the Craigleith WWTP from other municipalities. The exact reasons are unknown but Staff feel it may have to do with the amount of groundwater or surface water diluting the leachate's strength. Regardless, the Water and Wastewater Services Division (W/WW Division) has experienced an increase in energy demand and chemical use when treating the Town's leachate. As a result, the W/WW Division is undertaking a cost analysis and comparison with other municipalities to establish the actual cost of treating the Town's leachate. It is appropriate therefore to do a cost sensitivity analysis. The per m^3 cost would have to increase from $6.50/$m^3$ to $22.25/$m^3$ for the lifecycle of the pumped solution (Opt 4) to match the on-site treatment solution (Opt 5). This rate is not entirely out of the question given that Collingwood's rate is $18.32/$m^3$ but it would be extreme on a strictly cost recovery basis. The W/WW Division will be presenting the revised rate for leachate treatment as part of the budget deliberation process and will be used in the evaluation of the leachate pumping station and forcemain project budget.

Conclusion

The pumped solution for leachate management has the lowest 25 year life cycle cost for the Town. The lowest life cycle cost however should not be the sole evaluation criteria since there are also environmental and social/cultural factors to consider. When the non-economic factors are significantly adverse, the EA proponent may wish to pay a premium to responsibility implement the solution with the highest net benefit to the community. In the absence though of other significant factors, the solution with the lowest life cycle cost generally becomes preferred. The Leachate Pumping Station and Forcemain Project however has the lowest cost without posing undue environmental risks or causing social/cultural concerns, and thus continues to be recommended by Staff as the preferred long-term leachate management solution.

The loss of grant funding from the province though limits the Town's ability to advance the construction of the forcemain without substantial internal debt financing. However, the loss of the funding does not change the conclusion of the EA but it can delay its implementation for cash flow reasons.

Staff has reconsidered the solution of a pumping station and forcemain for landfill leachate management. The options considered during the EA in 2017 were re-examined and municipal examples were compared. For lifecycle cost, operational simplicity, and natural environment protection reasons, Staff believe a forcemain is the best approach. Staff have included the leachate pumping station and forcemain construction project for consideration in the 2019 Town Capital Budget deliberations.

E. The Blue Mountains Strategic Plan

Goal #5: Ensure Our Infrastructure is Sustainable
Objective #3 Implement Best Practices in Sustainable Infrastructure
Objective #4 Ensure that Infrastructure is Available to Support Development

F. Environmental Impacts

This project represents a significant effort to reduce GHG and carbon emissions associated with diesel truck haulage of leachate. A goal of the Town's (identified in the Sustainable Path) is to reduce the Town's corporate carbon emissions to 40% below 2005 levels by 2025. Removing over 700 truck trips annually represents 2% of the Town's corporate 2025 GhG reduction target. A leachate pumping station eliminate 559 tonnes of eCO2 in the first year of operation and 25,143 tonnes of eCO2 from Town emissions over the life of the project.

A total of 668 and 730 truck trips have occurred in 2016 and 2017 respectively. An estimated 500 truckloads will be haul in 2018. This project has the additional benefit of reducing the truck traffic congestion at the Craigleith Hauled Waste Receiving Station located at the busy intersection of Lakeshore Road and Highway 26 adjacent to the Georgian Trail crossing. A significant amount of new residential development is planned nearby. Compatibility concerns

with trucks hauling leachate and nuisance odours may occur from time to time despite the best efforts of Staff.

G. Financial Impact

At the direction of Council, the 2019 proposed Town Budget will include a capital project to complete the detailed design in 2019 and construct in 2020. Without carbon tax related funding, the proposed project will be long term debt financed.

The tables below give some details on the estimated costs.

Engineering Costs

Item	Amount
Spent on project engineering	$172,700
Remaining engineering (treatability study)	$171,182
Premium due to project delay	$15,000*
Total Engineering and other	**$358,882**

*Due to the delay in advancing the design an additional cost of $15,000 will be incurred due to the general increase in hourly wages and ramp-up time to re-start the project.

Construction Costs

Item	Amount
Application Fees, Easements and Other	$90,000
Pump Station and Forcemain Construction	$1,813,290
Plant Charge	$125,901
Total Construction	**$2,029,191**

Total Construction and Engineering	**$2,388,073**

Once the forcemain is in operation the Town will defer $124,850 per year over the current system of pre-treatment and truck haulage of leachate and an estimated savings of $259,178 annual over an on-site treatment system.

Staff will continue to monitor funding and grant programs as they come available to determine if this project fits their criteria.

H. In Consultation With

Shawn Everitt, Interim CAO
Ruth Prince, Director of Finance & IT Services / Treasurer
Sam Dinsmore, Deputy Treasurer/Manager of Accounting & Budgets
Allison Kershaw, Manager of Water and Wastewater Services

I. Public Engagement

The topic of this Staff Report has not been subject to a Public Meeting and/or a Public Information Centre as neither a Public Meeting nor a Public Information Centre are required. Comments regarding this report should be submitted to managersolidwaste@thebluemountains.ca

J. Attached

1. Estimated Annual Leachate Generation Rates – Phase 1 and 2
2. Cost Chart for Leachate Management Option 2 – Continue As Is
3. Cost Chart for Leachate Management Option 3 – Permanently Haul Leachate
4. Cost Chart for Leachate Management Option 4 – Leachate Forcemain
5. Cost Chart for Leachate Management Option 5 - Re-open the Environmental Assessment

Respectfully submitted,

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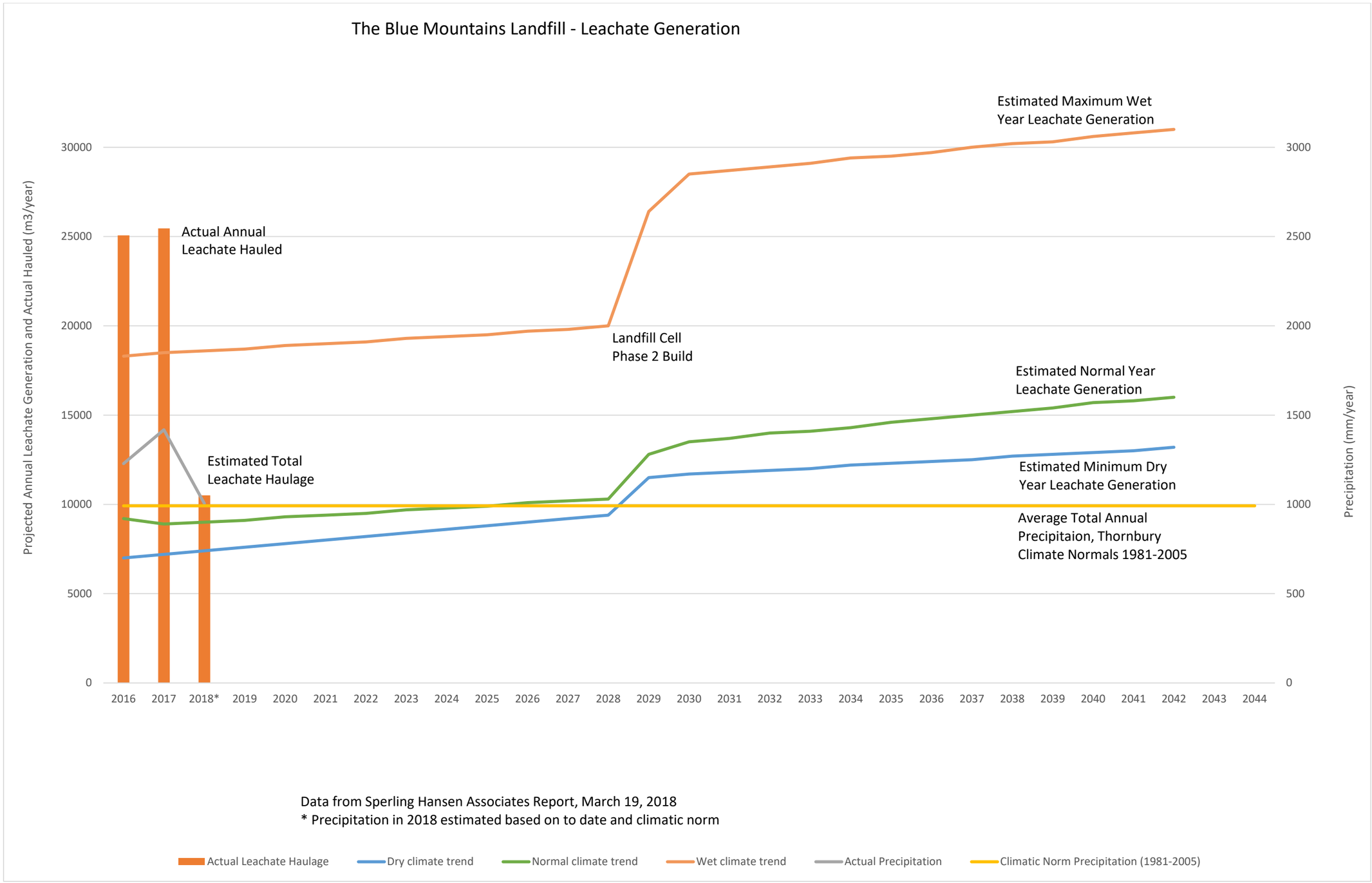
The Blue Mountains Landfill - Leachate Generation
Projected Annual Leachate Generation and Actual Hauled (m3/year)
Precipitation (mm/year)
30000
25000
20000
15000
10000
5000
0
3000
2500
2000
1500
1000
500
0
2016
2017
2018*
2019
2020
2021
2022
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2043
2044
Actual Annual
Leachate Hauled
Estimated Total
Leachate Haulage
Estimated Maximum Wet
Year Leachate Generation
Landfill Cell
Phase 2 Build
Estimated Normal Year
Leachate Generation
Estimated Minimum Dry
Year Leachate Generation
Average Total Annual
Precipitaion, Thornbury
Climate Normals 1981-2005
Data from Sperling Hansen Associates Report, March 19, 2018
* Precipitation in 2018 estimated based on to date and climatic norm
Actual Leachate Haulage
Dry climate trend
Normal climate trend
Wet climate trend
Actual Precipitation
Climatic Norm Precipitation (1981-2005)

Leachate Management Option 2 - Continue As Is

Item	Quantity	Unit	Unit Price	Ann. Cost	Lifetime
Operational Cost [1]					
Haulage to Craigleith WWTP	10,200	m^3	$7.00	$71,400	
Treatment at Craigleith WWTP	10,200	m^3	$6.50	$66,300	
Haulage to Collingwood[2]	2,000	m^3	$8.00	$16,000	
Treatment at Collingwood WWTP[2]	2,000	m^3	$18.32	$36,640	
Chemical Treatment	12,200	m^3	$1.55	$18,910	
Equipment Allowance	12	month	$1,508.00	$18,096	
Staff Time Allowance [3]	52	week	$245.00	$12,740	
Fuel Allowance	12	month	$250.00	$3,000	
MOECP Manifest Fee	581	truck load	$5.00	$2,905	
Sub-Total Operating Costs				**$245,991**	**$6,149,769**
Capital Cost					
Pre-Treatment System [4]				**$30,000**	**$750,000**
Total Cost				**$275,991**	**$6,899,769**

Notes:

1. All costs are in 2018 dollars and no allowance has been made for general inflation or specific escalations for haulage or treatment costs.
2. Allowance that on average about 2,000 m3/year of leachate will be disposed of at Collingwood Hauled Waste Receiving Station.
3. Based on hourly cost of operating staff of $30.58/hr for approximately 8 hours per week.
4. Capital cost of $300,000 spread over 10 years based on expected life of equipment expanded to 25 life cycle cost.

Leachate Management Option 3 - Permanently Haul Leachate

Item	Quantity	Unit	Unit Price[3]	Ann. Cost	Lifetime
Operational Cost[1]					
Haulage to Craigleith WWTP	10,200	m^3	$7.00	$71,400	
Treatment at Craigleith WWTP	10,200	m^3	$6.50	$66,300	
Haulage to Collingwood[2]	2,000	m^3	$8.00	$16,000	
Treatment at Collingwood WWTP[2]	2,000	m^3	$18.32	$36,640	
Chemical Treatment	12,200	m^3	$0.78	$9,516	
Equipment Allowance	12	month	$754.00	$9,048	
Staff Time Allowance	52	week	$245.00	$12,740	
Fuel Allowance	12	month	$125.00	$1,500	
MOECP Manifest Fee	581	truck load	$5.00	$2,905	
Sub-Total Operating Costs				**$226,049**	**$5,651,219**
Capital Cost					
Pre-Treatment System [4]				**$40,000**	**$1,000,000**
Total Cost [5]				**$266,049**	**$6,651,219**

Notes:

1. All costs are in 2018 dollars and no allowance has been made for general inflation or specific escalations.
2. Assumed haulage to Collingwood Hauled Waste Receiving Station.
3. Assumed that chemical, equipment, staff and fuel costs are 50% of "Continue As-Is" Option
4. Capital cost spread over 25 years based on expected life of equipment.
5. Long term environmental impact costs due to GhG release not accounted for.

Leachate Management Option 4 - Forcemain					
Item	**Quantity**	**Unit**	**Unit Price**	**Ann. Cost**	**Lifetime**
Operational Cost[1][3]					
PS and Forcemain Operating Allowance[2]				$40,000	
Treatment at Thornbury WWTP	12,200	m^3	$6.50	$79,300	
Sub-Total Operating Costs				**$119,300**	**$2,982,500**
Capital Cost					
Land Easements			$90,000		$90,000
Design			$358,882		$358,882
Construction			$1,813,290		$1,813,290
Plant Charge	33	eq. unit	$3,778		$125,901
Sub-Total Capital Cost					**$2,388,073**
Annual Equivalent Capital Cost [4][5]				**$31,841**	
Total Cost				**$151,141**	**$5,370,573**

Notes:

1. All costs are in 2018 dollars and no allowance has been made for general inflation or specific escalations.
2. Operating premium from EA for forcemain and leachate pumping station paid to wastewater operating group.
3. Assumed that no planned haulage to Collingwood Hauled Waste Receiving Station.
4. Capital cost spread over 75 years based on an expected life of the forcemain system.
5. No allowance for residual value at end of 25 years which if included would reduce the comparisaon cost more.

On-Site Treatment and Infiltration

Leachate Management Option 5 - On-Site Treatment and Disposal					
Item	**Quantity**	**Unit**	**Unit Price**	**Ann. Cost**	**Lifetime**
Operational Cost[1]					
Plant Operations and Treatment [2]	12,200	m^3	$17.86	$217,838	
				$217,838	**$5,445,942**
Capital Cost					
EA Review			$100,000		$100,000
Land Purchase - Infiltration Bed			$200,000		$200,000
Design [3]					
Plant Construction [4][5]	30,000	m^3/yr cap	$138.73		$4,162,031
Infiltration Bed & PS Construction [6]			$350,000		$350,000
Sub-Total Capital Cost					**$4,812,031**
Annual Equivalent Capital Cost [7]				**$192,481**	
Total Cost				**$410,319**	**$10,257,973**

Notes:

1. All costs are in 2018 dollars and no allowance has been made for general inflation or specific escalations.
2. From Municipality of Kincardine for operation of Kincardine Leachate Treatment Plant.
3. Design is considered included in construction cost.
4. From Municipality of Kincardine for construction of Kincardine Leachate Treatment Plant.
5. Plant capacity is the average inflow in a wet year which is conservative low and as such would necessitate haulage during periods when inflow exceeds plant capacity.
6. Infiltration is considered the most likely onsite disposal method that would be viable.
7. Capital cost spread over 25 years based on an expected life of the mechanical plant systems.