

# SWANA – Association of Regional Waste Management Authorities of Saskatchewan Presentation

## Landfill Capital and Operational Costs

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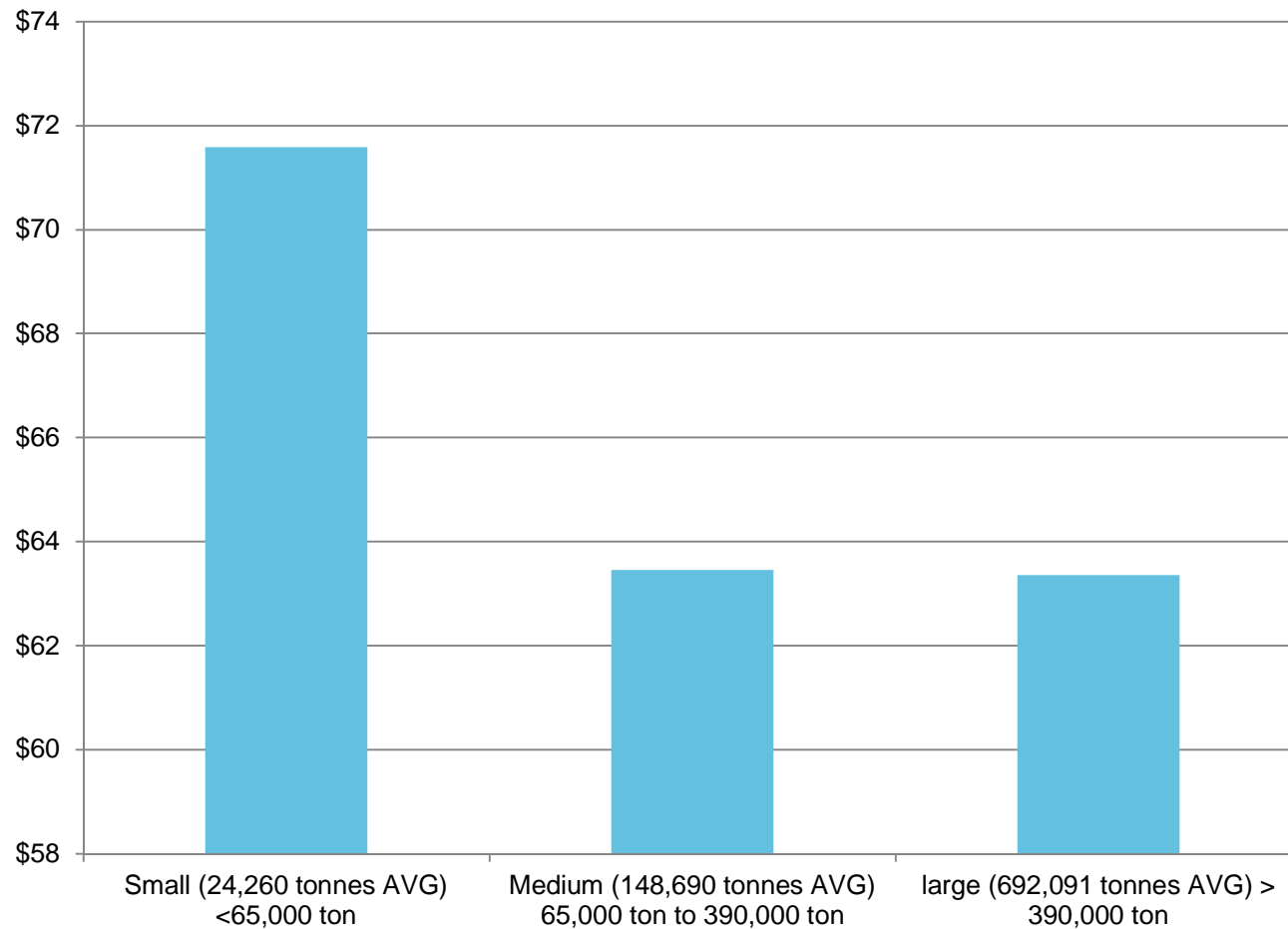
**AECOM**

## Introduction

- Canada and USA Tipping Fee Ranges
- Saskatchewan Tipping Fee Ranges
- Landfill Siting and Design Assumptions
- Range of Operational Costs Assumptions
- Tipping Fee Calculation Development
- Questions

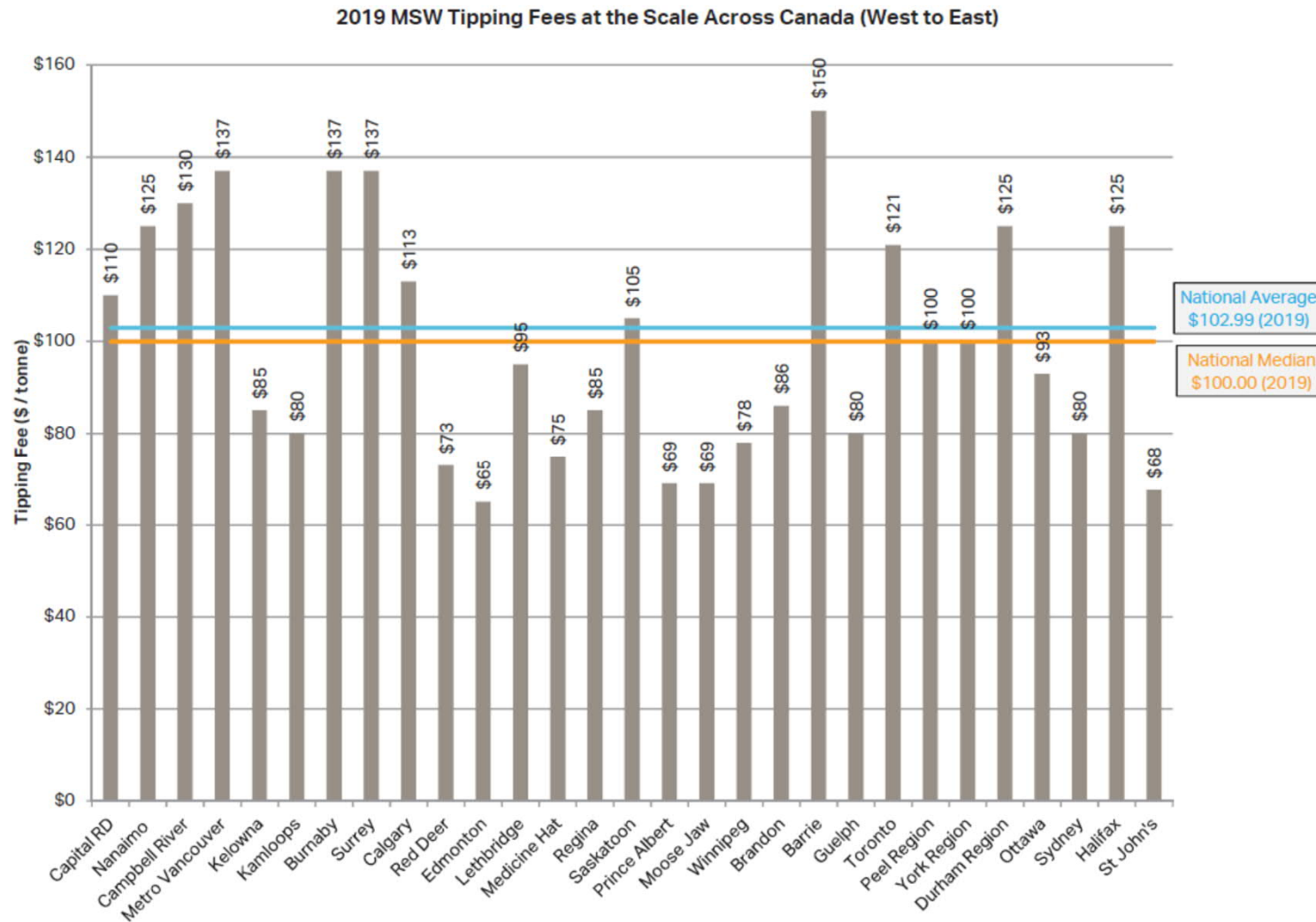
# Tipping Fee – EREF USA

- The Environmental Research and Education Foundation (EREF) compiled tipping fees for 397 landfills in the USA in 2018 (free online). Tipping fees are higher for smaller landfills because of limited economies of scale



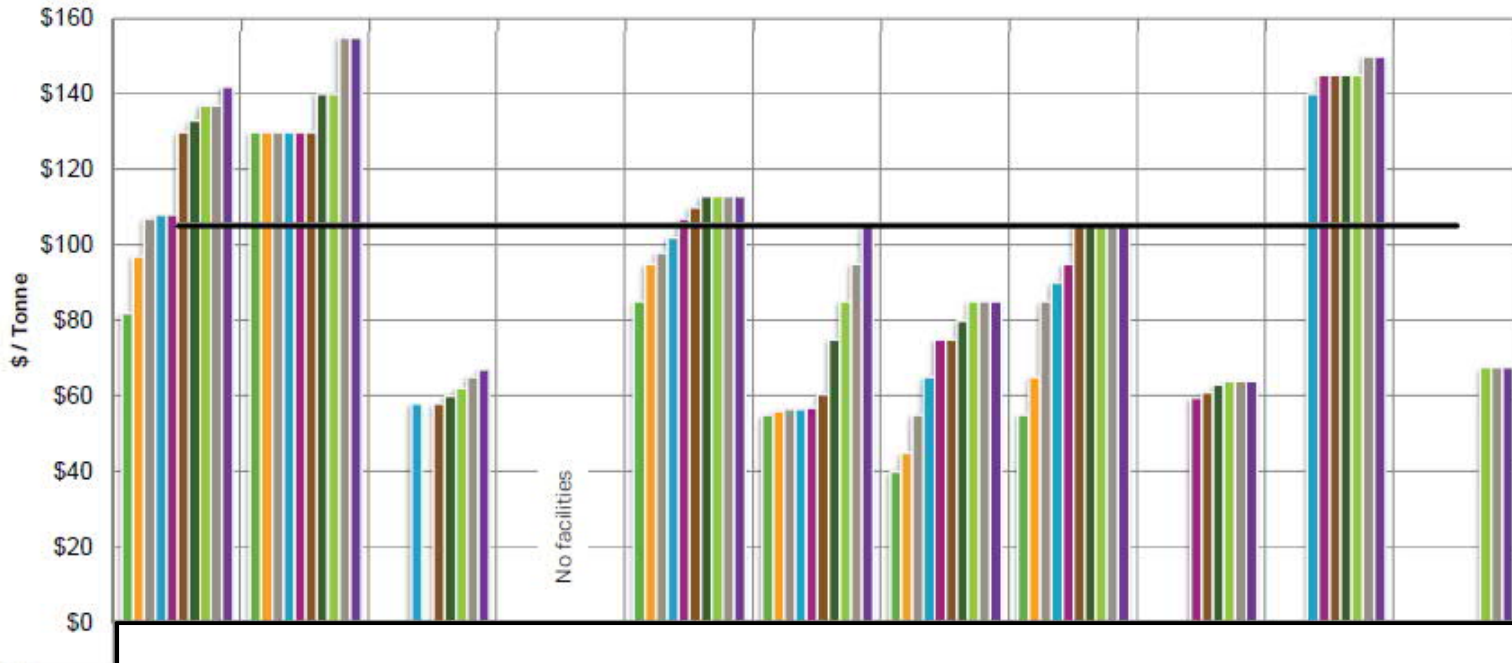
# Tipping Fee – NSWBI (Canada)

- The chart below provides tipping fees in some landfills across Canada from the National Solid Waste Benchmarking Initiative (NSWBI).



# Tipping Fee – NSWBI (Canada)

- National Solid Waste Benchmarking tracking of participants shows that tipping fees have been increasing over time



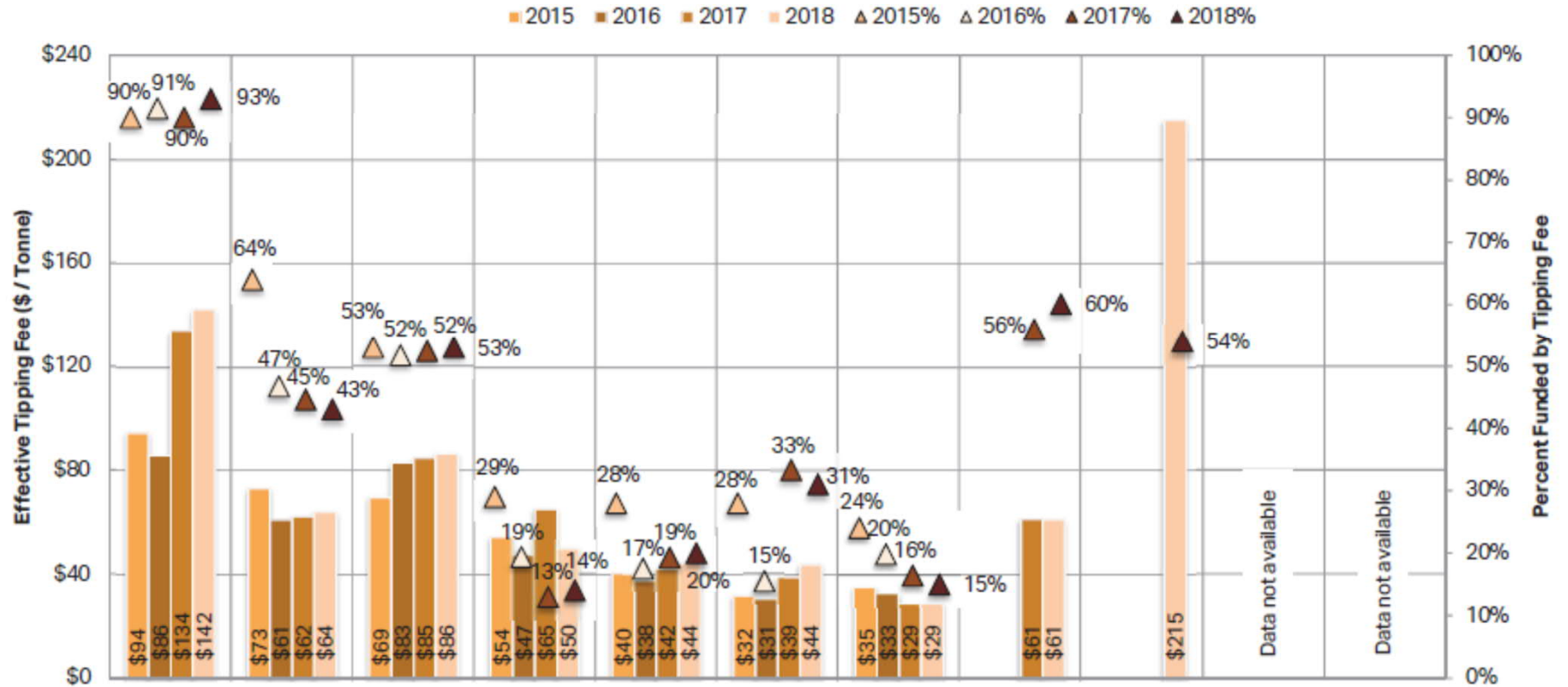
2010	\$82	\$130	\$-	\$-	\$85	\$55	\$40	\$55	\$-	\$-	\$-
2011	\$97	\$130	\$-	\$-	\$95	\$56	\$45	\$65	\$-	\$-	\$-
2012	\$107	\$130	\$-	\$-	\$98	\$57	\$55	\$85	\$-	\$-	\$-
2013	\$108	\$130	\$58	\$-	\$102	\$57	\$65	\$90	\$-	\$140	\$-
2014	\$108	\$130	\$-	\$-	\$107	\$57	\$75	\$95	\$60	\$145	\$-
2015	\$130	\$130	\$58	\$-	\$110	\$61	\$75	\$105	\$61	\$145	\$-
2016	\$133	\$140	\$60	\$-	\$113	\$75	\$80	\$105	\$63	\$145	\$-
2017	\$137	\$140	\$62	\$-	\$113	\$85	\$85	\$105	\$64	\$145	\$68
2018	\$137	\$155	\$65	\$-	\$113	\$95	\$85	\$105	\$64	\$150	\$68
2019	\$142	\$155	\$67	\$-	\$113	\$105	\$85	\$105	\$64	\$150	\$68
2019 Average	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105
2019 Median	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105	\$105

Note - Tipping fees 2010-2013 are not specific to size of load.  
Tipping fees after 2013 are for loads sized 501 kg - 1 tonne.



# Tipping Fee – NSWBI (Canada)

- Effective Tipping Fee



## Saskatchewan Tipping Fee Ranges

- <http://www.arwmas.ca/our-members/>
- Smaller municipal landfills, without a scale, charge by the load so can not compare to cost per tonne



## How do you develop your tipping fee?

- SWANA Manager of Landfill Operations (MOLO)
- Engineering Cost estimates for capital cost items
- Post closure cost estimates as required by GAP
- Operational cost estimates from – Previous year budget with % increase – Annual operation budget – Asset management plan – Fleet management plan – Financial modelling (waste projections, collection, landfill, diversion, revenue, etc.)

# Fictional Landfill – Siting and Design Assumptions

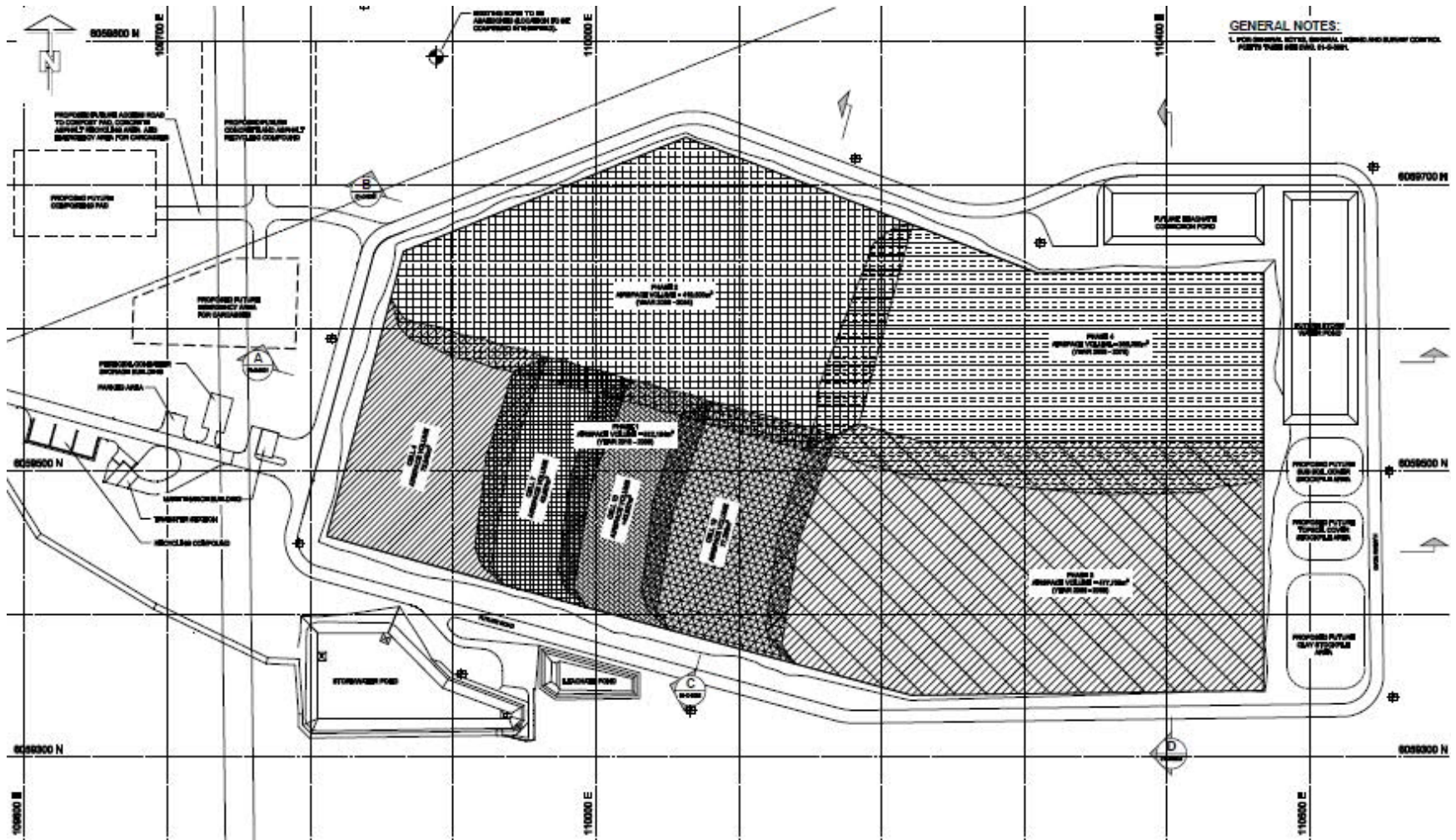
## Assumptions

- One quarter section appropriately sited and designed
- the following design criteria have been used to develop the airspace:
  - 25% (4 horizontal to 1 vertical) grade on waste side slopes, to a height of approximately 15 m;
  - 5% minimum grade on top of the landfill;
  - 1,825,000 m<sup>3</sup> of airspace (1,369,000 tonnes)
- Landfill Design Infrastructure
  - 1.0 m compacted clay liner (least cost option)
  - a tires shred leachate collection system (least cost option)
  - Stormwater pond
  - Leachate pond
  - Scale house and maintenance building
  - Front end transfer area and recycle area
- Miscellaneous
  - Contingency, legal appeals, regulatory applications, land purchase, power and utilities, engineering

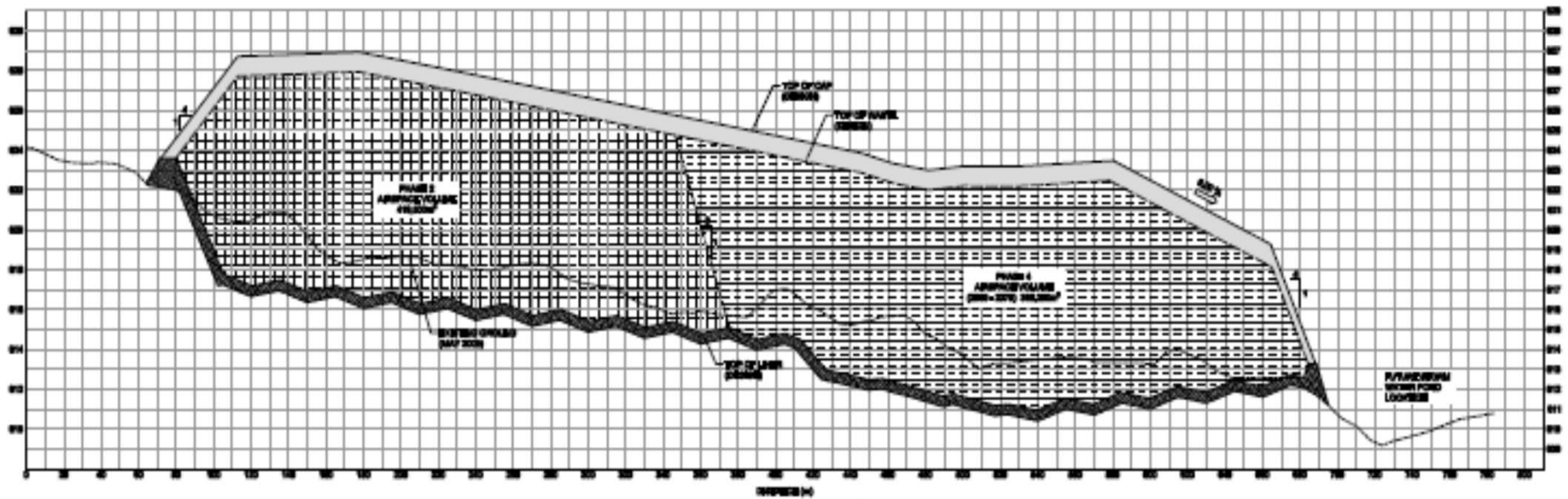
### Notes:

- 1) that capping not included in with Capital estimate
- 2) New and expanding landfill should develop a landfill Master Plan to outline the staged development of the landfill for regulatory and budgeting purposes.

# Fictional Landfill – Siting and Design Assumptions



# Fictional Landfill – Siting and Design Assumptions



# Fictional Landfill – Capital Costs

## Assumptions

- Estimate all landfill capital costs in 2020 dollars.
- Developed for low and high range for costs

## Capital Costs

# Fictional Landfill – Capital Costs

## Assumptions

- Divide total low and high range costs by the estimated 1,369,000 tonnes of waste disposed to determine the cost per tonne in 2020 dollars

Item	Units	Low Range	High Range
Capital Cost Range	\$	\$22,993,575	\$33,110,990
Designed Airspace	m <sup>3</sup>	1,825,000	1,825,000
Estimated Waste Tonnage at 750 tonnes/m <sup>3</sup>	tonne	1,369,000	1,369,000
<b>Landfill Design and Construction cost per tonne</b>		<b>\$17</b>	<b>\$24</b>

# Fictional Landfill – Operational Costs

## Assumptions

- Three case scenario`s for landfills taking 5,000 tonnes per year, 10,000 tonnes per year, and 20,000 tonnes per year
- Equipment – varied capital depreciation expense on hours and capital cost
  - Compactor
  - Dozer
  - Wheel loader
- Personnel – varied hours and vested hourly rates
  - Equipment operator
  - Scale operator
  - Manager
  - Laborer
- Operations costs -
  - Soil moving (cover)
  - Leachate disposal/treatment (assumed annual leachate generation and disposal cost range)
  - Environmental monitoring
  - Closure costs (capping)
  - Post-closure costs (25 years of environmental monitoring)
  - [SWANA 2015 - Regional System Landfill Capital and Operational Costs.xls](#)

## Fictional Landfill – Operational Costs Range

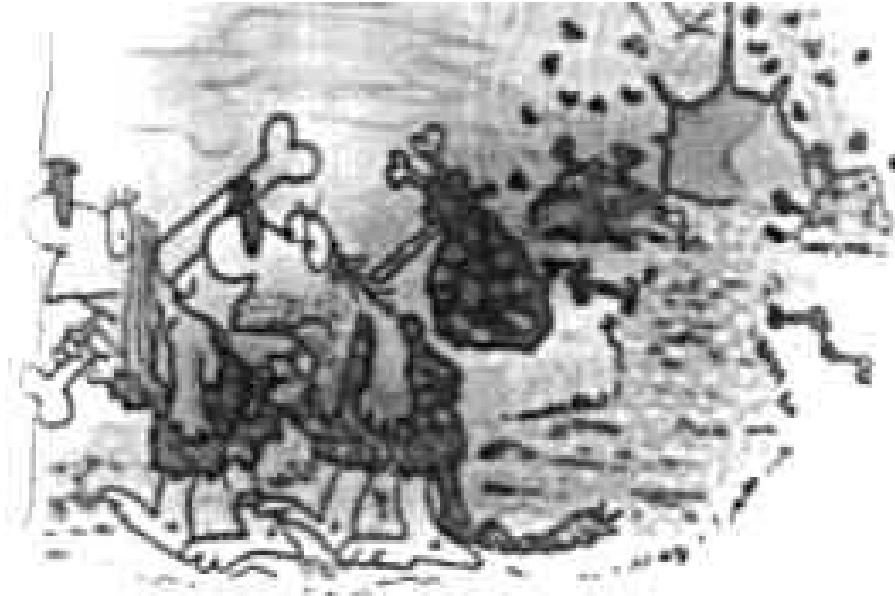
<b>Operational Costs</b>	<b>Low Range (\$/tonne)</b>	<b>High Range (\$/tonne)</b>
5,000 tonnes/yr	146	237
10,000 tonnes/yr	102	162
20,000 tonnes/yr	55	88



## Fictional Landfill – Tipping Fee Range

<b>Tipping Fee</b>	<b>Low Range (\$/tonne)</b>	<b>High Range (\$/tonne)</b>
5,000 tonnes/yr	163	261
10,000 tonnes/yr	119	186
20,000 tonnes/yr	72	112

# Questions



Thank You.

