

Re-evaluating the Life Expectancy of a Landfill

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Saskatoon, SK

Introduction

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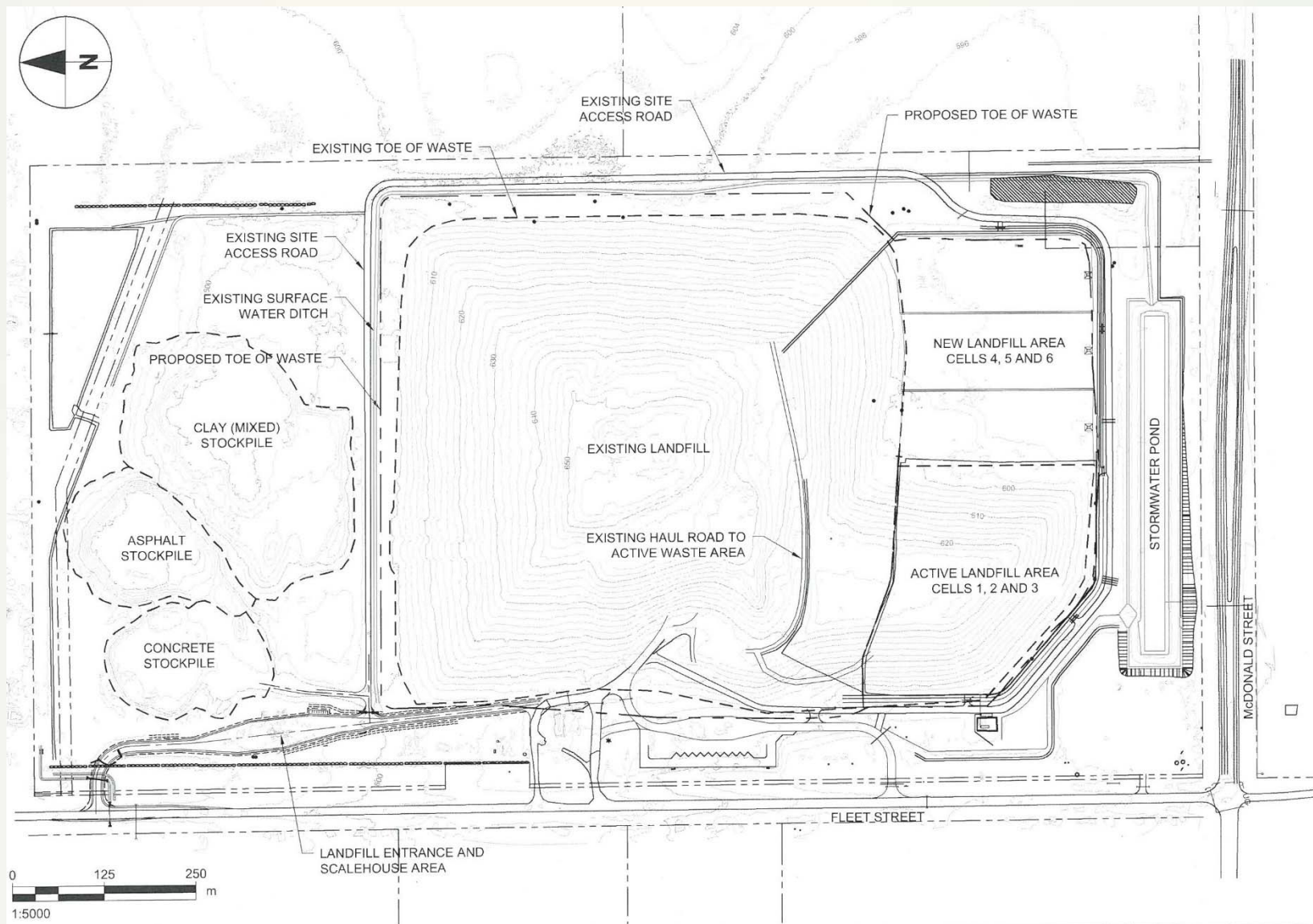
Prior to 2015, I worked in consulting

- Contaminated Sites
- Containment Structures
- Earthworks



City of Regina Landfill

- Fleet Street Landfill
 - Began operation in early 1960s
 - Initially a box cut and disposal
 - Currently operating on 6 engineered cells
 - 1st expansion 2009
 - 2nd expansion 2015
 - Annual disposal of approximately 250,000 tonnes/year



1987



2009



2012



2016



City of Regina



REGINA
Infinite Horizons

Landfill Life and Closure Plans

- General understanding of closure plan
- General understanding of expansion plan
- Preliminary plans had been in place since 1993



History of Expansion and Closure Reports (Only the Important Ones)

- Fleet Street Permit to Operate a Waste Disposal Ground, Saskatchewan Ministry of Environment, 2016;
- Fleet Street Landfill, Landfill cells 4, 5 and 6 – fill plan review, AECOM, 2015;
- Expansion of the Municipal Sanitary Landfill – completion of Phase 1 – project record manual, AECOM, 2015;
- Annual Landfill Reports, 2004-2015;
- Solid Waste Disposal and Recovery Facility Phase 1 – Stage 1 Operations and Maintenance manual, AECOM, 2011;
- Landfill Expansion – Phase 1 Stage 1, Hazco, 2011;
- Environmental Impact Statement (EIS) for the 3-phased Landfill expansion, AMEC, 2009;
- Report for City of Regina Fleet Street Solid Waste Disposal and Recovery Facility Life Expectancy Evaluation.....
- Annual Ground-truthing and Slope Stability Monitoring Reports, 2007/08/09, by AMEC Earth & Environmental;
- City of Regina Fleet Street Landfill Test Cover Program – Year Three Performance Monitoring Report
- Project Proposal for the Expansion of the City of Regina Municipal Landfill:
- Final Report for Fleet Street Landfill Life Expectancy Evaluation 2005, Earth Tech (Canada) Inc., 2005;
- City of Regina Existing Landfill Site Groundwater Monitoring Program, Municipal Engineering, 1986-2007;
- Regina Landfill Gas Assessment Fleet Street Landfill, Conestoga-Rovers & Associates, 2003;
- Fleet Street Landfill Planning Report, Engineering & Works Department, 2002;
- Fleet Street Landfill 2001 Landfill Planning, Earth Tech (Canada) Inc., 2001;
- Landfill Emissions Study Final Report, Faculty of Engineering, University of Regina, 2001;
- Fleet Street Landfill Optimization Study Final Report, Reid Crowther, 1995; and
- Fleet Street Landfill Proposed Closure Plan, Reid Crowther, 1993.



Boxes upon Boxes



We have been thinking about this for a while!

What we “Knew”

- The north portion of the landfill was ready for closure
 - We had reached maximum extent to the North and East
 - We could not go higher
- Side slopes shall not exceed 4:1
- The landfill would run out of capacity by approximately 2030
- An expansion across Fleet Street was imminent



What we “Knew”

Life Remaining

Table 4.1 Estimated Landfill Life for Phase 1

Description	Maximum Elevation	Estimated Available Space (m ³)	Estimate Life using Annual Acceptance Rate of 250,000 m ³ /year	Estimate Life using Annual Acceptance Rate of 300,000 m ³ /year
Cells 1, 2 and 3	615 m	1,125,000	4.5 years	3.7 years
Cell 4	625 m	1,000,000	4.0 years	3.4 years
Cell 5	635 m	1,000,000	4.0 years	3.4 years
Cell 6	645 m	1,025,000	4.1 years	3.5 years
Total	645 m	4,150,000	16.6 years	14.0 years

Time to Close and Expand

- Request for proposal issued for cap and closure activities issued in 2015
- Scope was
 - Final design for historic landfill
 - Preliminary closure for Phase I expansion
 - Gas well expansion
 - Revised groundwater monitoring system



Proposal Evaluation

- Several consulting firms submitted
- Standard cap and closure proposals were received
- One identified the potential to get more airspace while providing a good cap and closure design
- Awarded to AECOM



Reassess the Plan

- First step was to compile the information already existing
- Quickly became clear that more space was available than currently believed
- Some design parameters were based upon assumptions, some were lost in a stack of paper others were lost in staff transition



Dig Deeper

- Can we go higher?
- Are we at final extent or is additional footprint available?
- Can we increase the side slope?
- Can we improve upon proposed final geometry?
- Once closed, there is no coming back to these questions



Maximum Landfill Height

- Based on the EIS, we are not at maximum elevation
- We can go approximately 15 m higher
- The landfill will be taller than City Hall!





600 m

70 m

1100 m

City Hall
68 m Tall

Are we at the Final Extent of the Footprint?

- Turns out we aren't!
- There is approximately 3 m more space beyond our current footprint in the historic landfill



Can we Increase the Side Slopes?

- Needed a geotechnical investigation to prove this
- Most of our slopes aren't even 4:1
- We can increase our side slopes to as steep as 3.3:1 to 3.5:1 (we are still working on that)



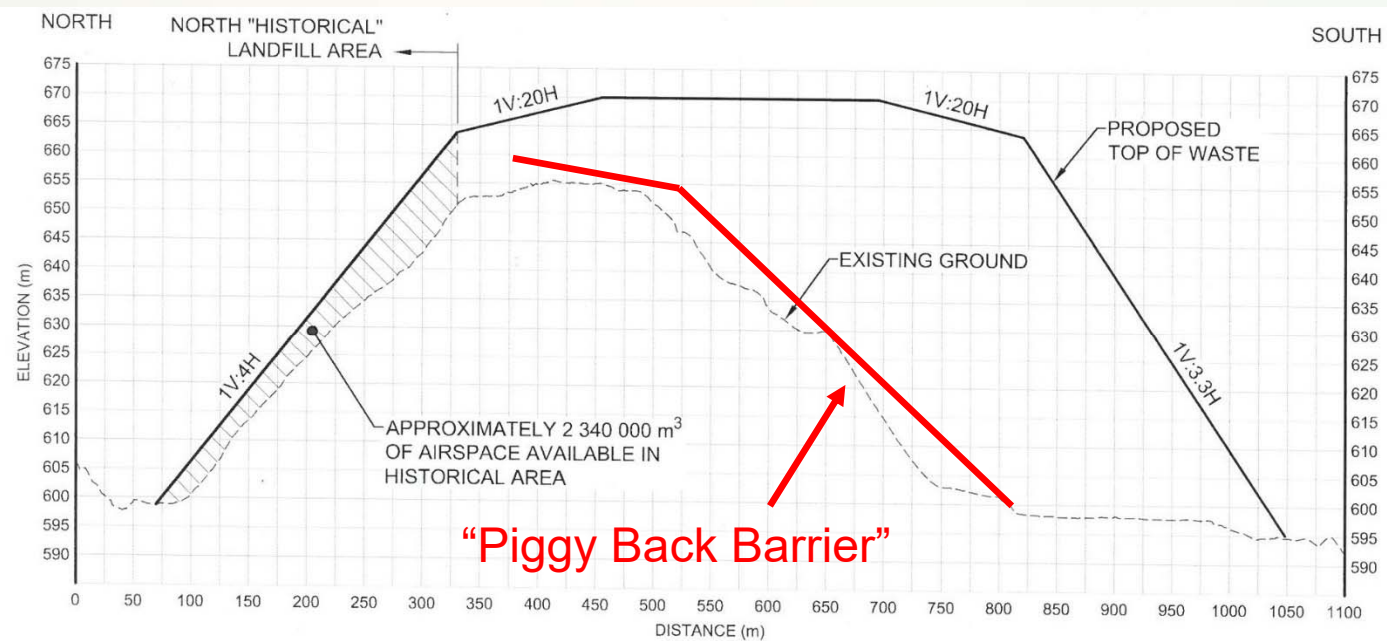


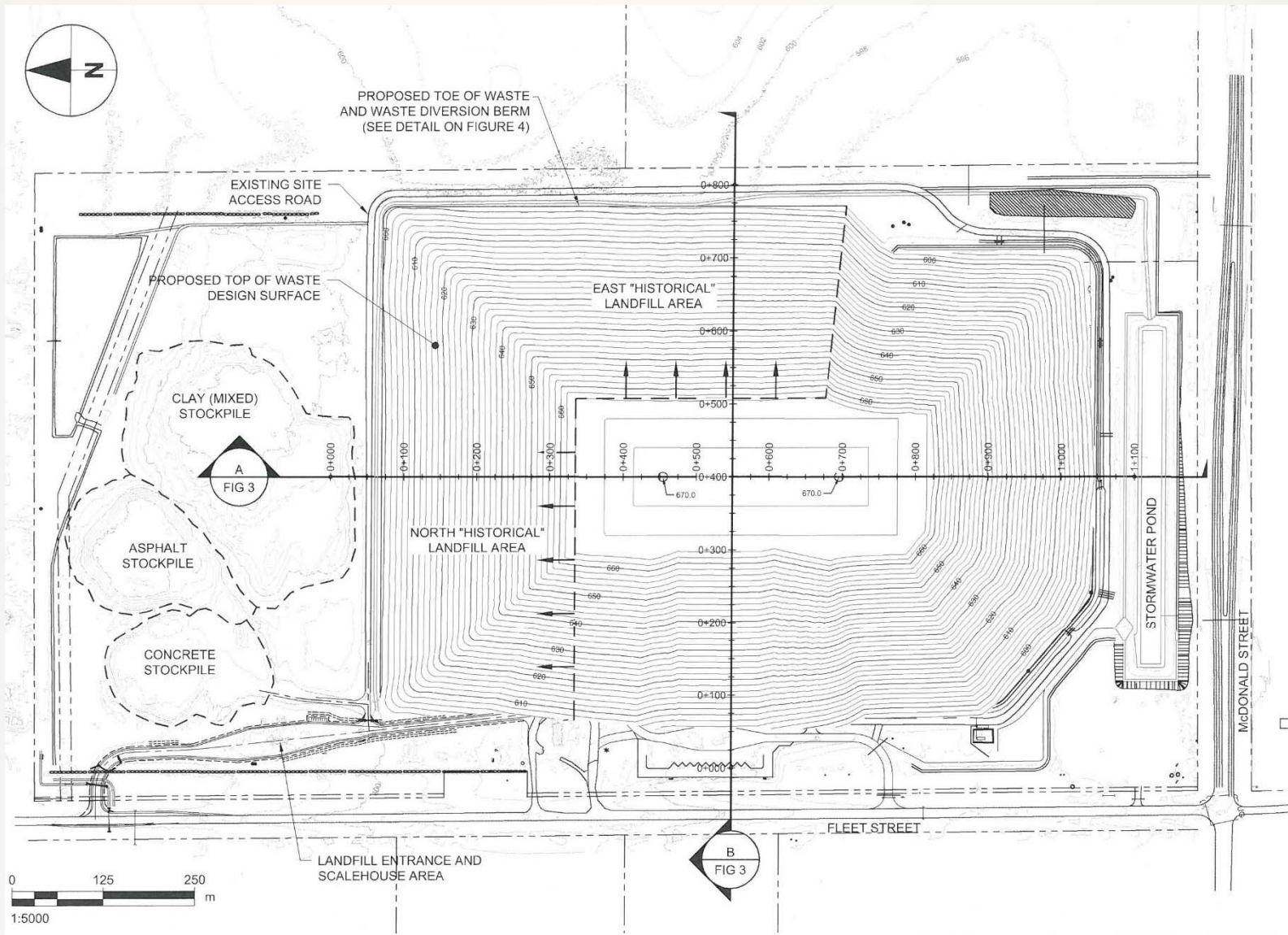
Can we Improve upon Final Geometry?

- All previous items improve the geometry of the landfill
- How do we maximize the space over the historic landfill?
 - “Piggy Back” up and over the historic landfill so that leachate is properly dealt with



Final Geometry





0 125 250
1:5000 m

So was it Worth it?



Absolutely!

- By asking these questions we have extended the life of our landfill by approximately 15 years from what we thought
- Historic knowledge was combined into a single document
- Clear path forward



Deliverables – What we wanted from the start

- We are getting a preliminary cap and closure design
- We are getting a gas well expansion plan
- We are getting a cost estimate to help determine our liability
- We are getting a re-designed groundwater monitoring plan for the current operation but that also transitions into closure

Deliverables – What Else we are Getting

- A design for the Piggy Back barrier layer
 - A revised footprint with perimeter berm design
 - A revised final geometry
 - A fill plan
-
- 15 more years of capacity!



Does This Apply to Other Landfills?

- A clear plan is valuable at any landfill
- This is scalable – On a landfill our size it is obvious but similar extension of life can be realized on any landfill
 - 1 year = 250,000 tonnes in Regina
 - There is value in the airspace but also in delaying an expansion
 - Smaller landfills can extend their life significantly with less “new” airspace



Other Initiatives to Save Airspace

- Waste Diversion initiatives
- Air Space Efficiency Audit
- Optimizing equipment
- Optimizing soil cover activities



Lessons Learned

- This can be applied to any landfill
- More information is not necessarily better information
- Engineering reports and documents need to be translated into an actual plan to ensure continuity
- Trust but verify – avoid the myths
- Things change, so reassess – sometimes you need to bring in others to confirm what you suspect



Thank You



City of Regina



Questions????