

The Blue Mountains Landfill

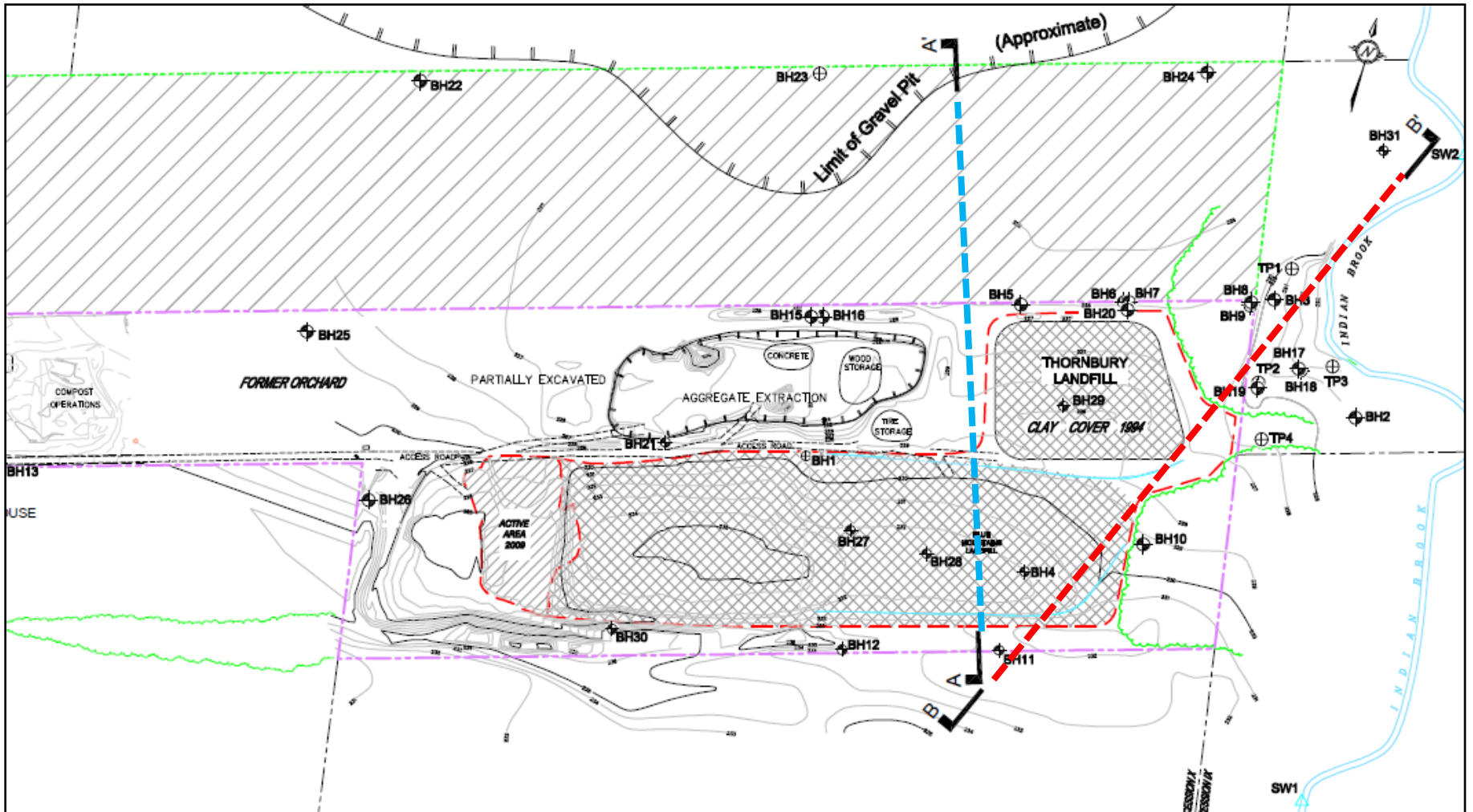


Landfill Expansion and Mining Environmental Screening Process Update

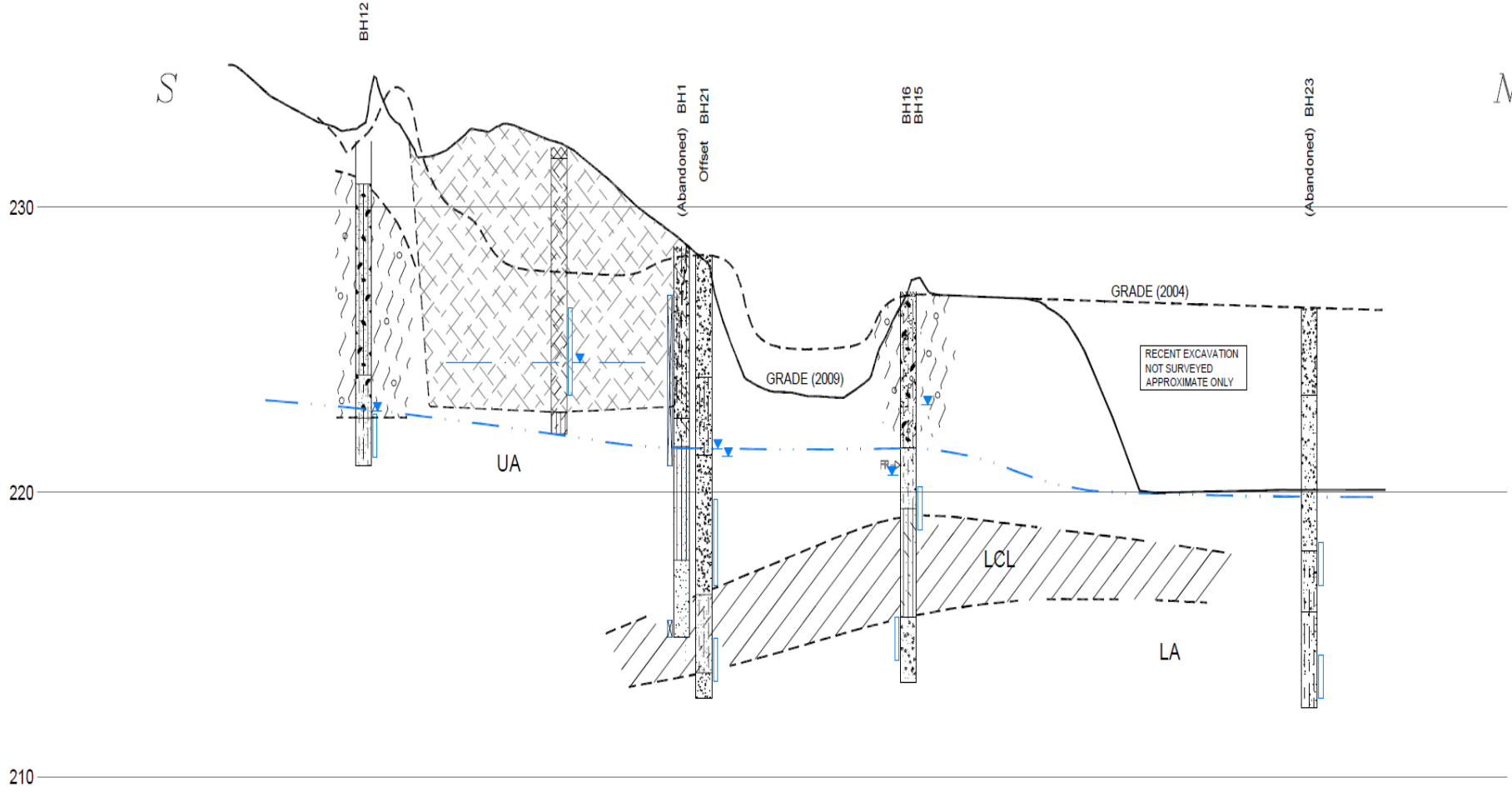


- Overview of Existing Site Conditions
- Expansion and Mining Scenarios
- Future Site Life Assessment
- Environmental Impact Studies & Assessment Results
- Feedback on Saugeen Ojibway Nation (SON) Technical Review
- Financial Considerations – Construction and Leachate
- Next Steps
- Questions



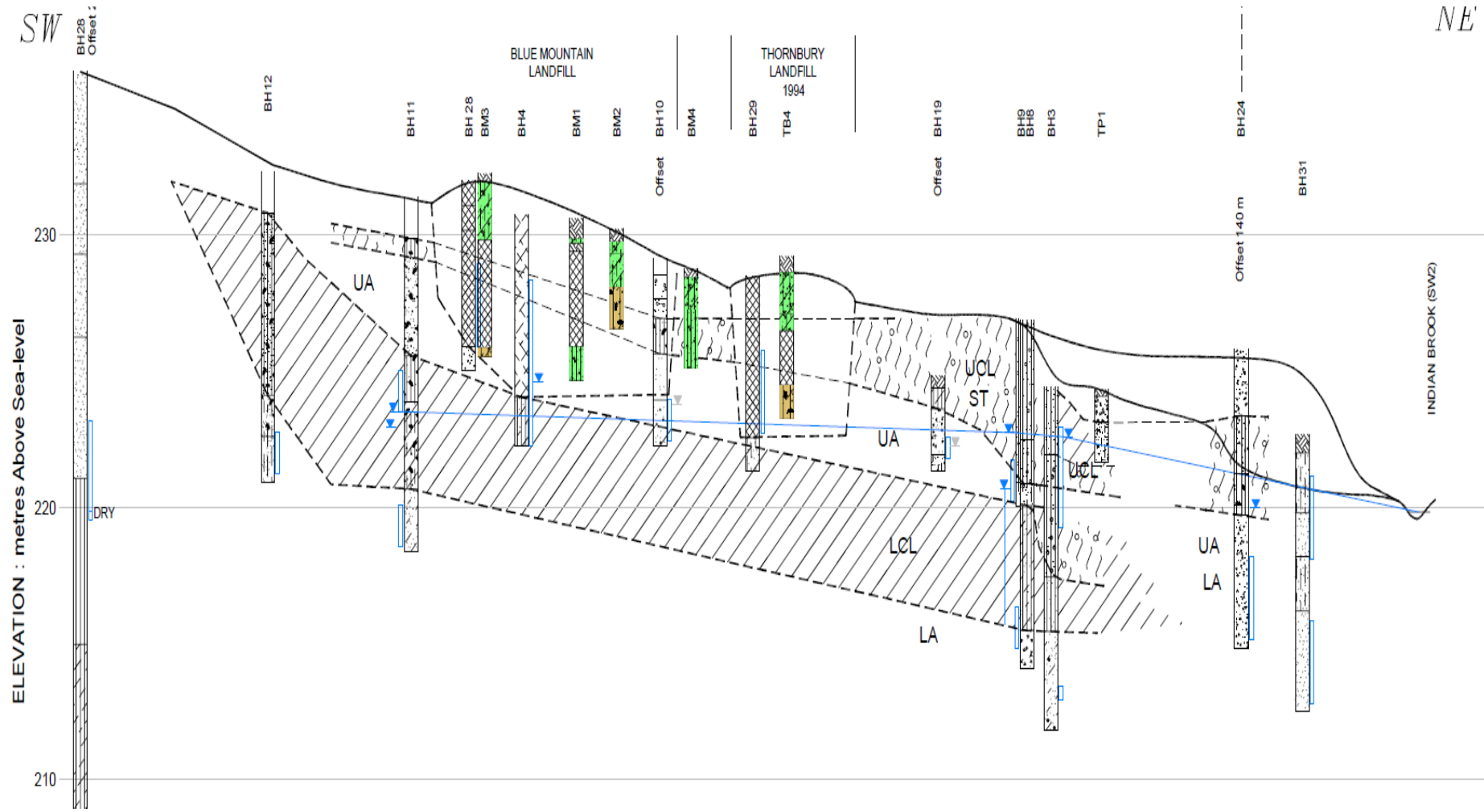


ELEVATION : metres Above Sea-level



SW

NE



ELEVATION : metres Above Sea-level

210

220

230

BH28
Offset 1

BH12

BH11

BH28
BM3

BH4

BM1

BM2

BH10

BM4

BH29

TB4

BH19

BH8
BH3

TP1

BH24

BH31

BLUE MOUNTAIN
LANDFILL

THORBURY
LANDFILL
1994

Offset

Offset

Offset 140 m

INDIAN BROOK (SW2)

UA

UCL

ST

UA

UCL

UA

LA

LCL

LA



■ **Known Environmental Impacts**

- Impacted groundwater from Thornbury Landfill is migrating eastward and towards Indian Brook.
- Impacts as defined by low to moderate concentrations of chloride are observed in the Lower Aquifer north of Thornbury and the Blue Mountains Landfill.
- The RUC for nitrate is exceeded to the north and south of the Landfills. Based on other indicator parameters, impacts are not considered to be landfill related but more likely related to agricultural practices.
- Town has obtained Contaminant Attenuation Zones.
- Known or potential impact pathways need to be addressed in long term site management and any expansion design.



In order to address the Town's long term waste management needs, landfill expansion/mining was proposed.

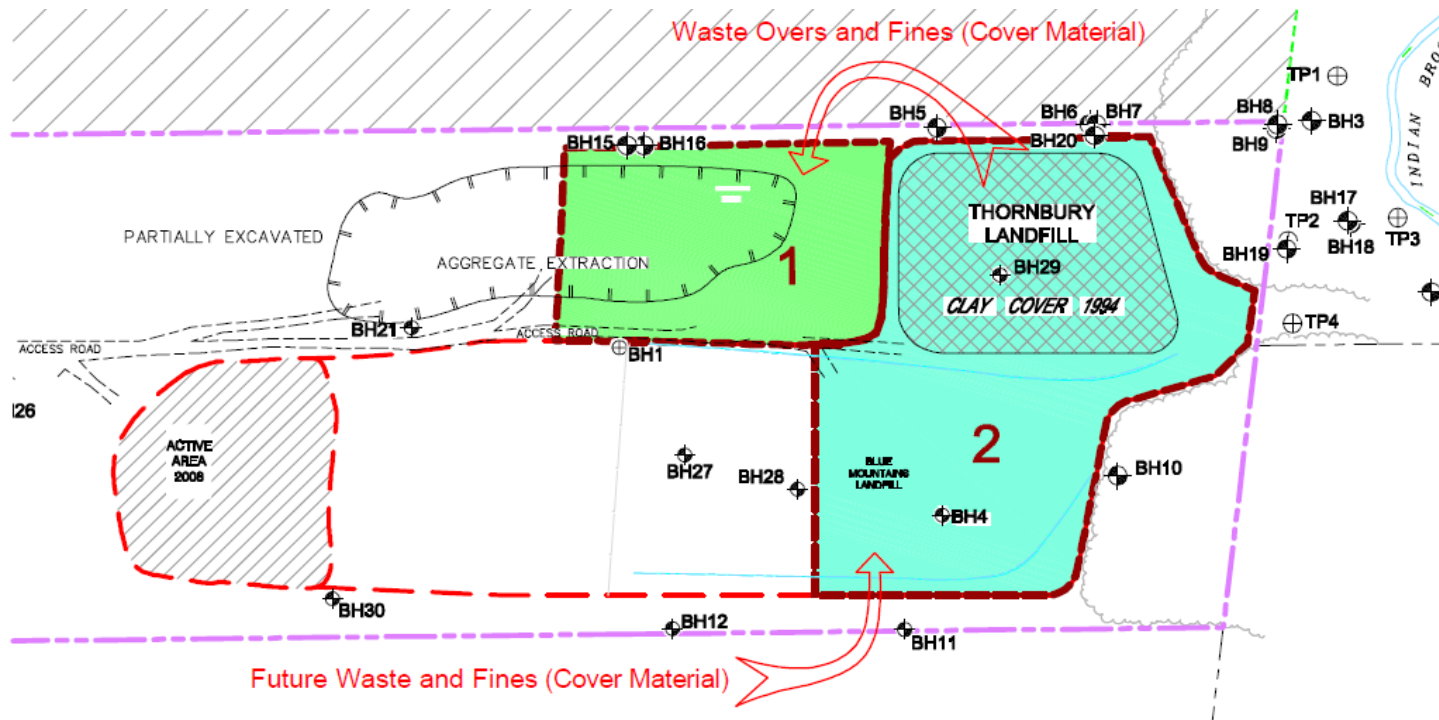
Four scenarios were developed based on the following criteria:

- *100,000 m³ maximum expansion;*
- *Mining of previous waste disposal areas to gain a maximum 100,000 m³ without increasing the original total waste disposal volume of the landfill site;*
- *Address known or predicted impacts and pathways;*
- *All scenarios also assessed based on constructing cells with and without liner.*



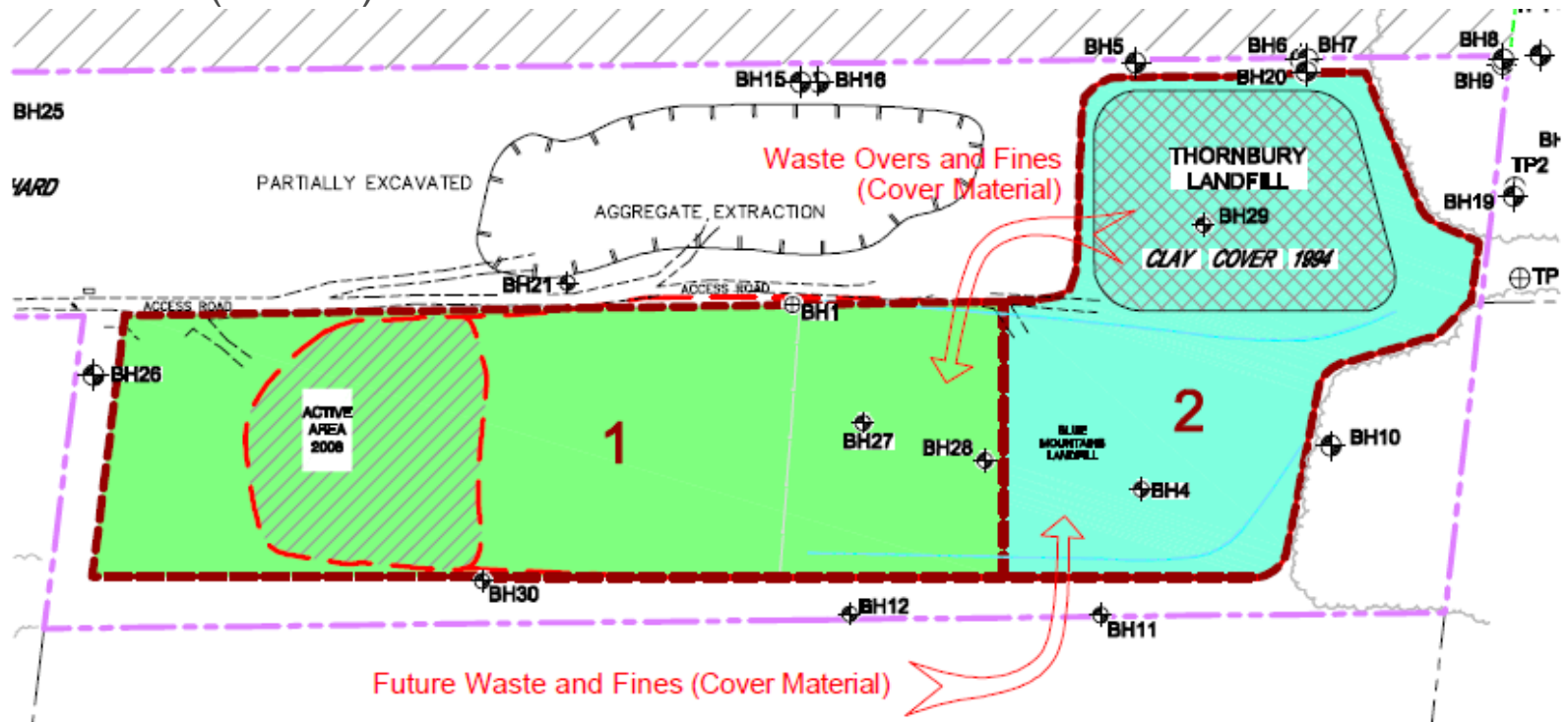
■ Scenario 1 – Northern Expansion and Mining:

- Construct a new 100,000 m³ landfill cell (Area 1)
- Mine 200,000 m³ - Thornbury Landfill and the eastern Blue Mountains Landfill (Area 2).



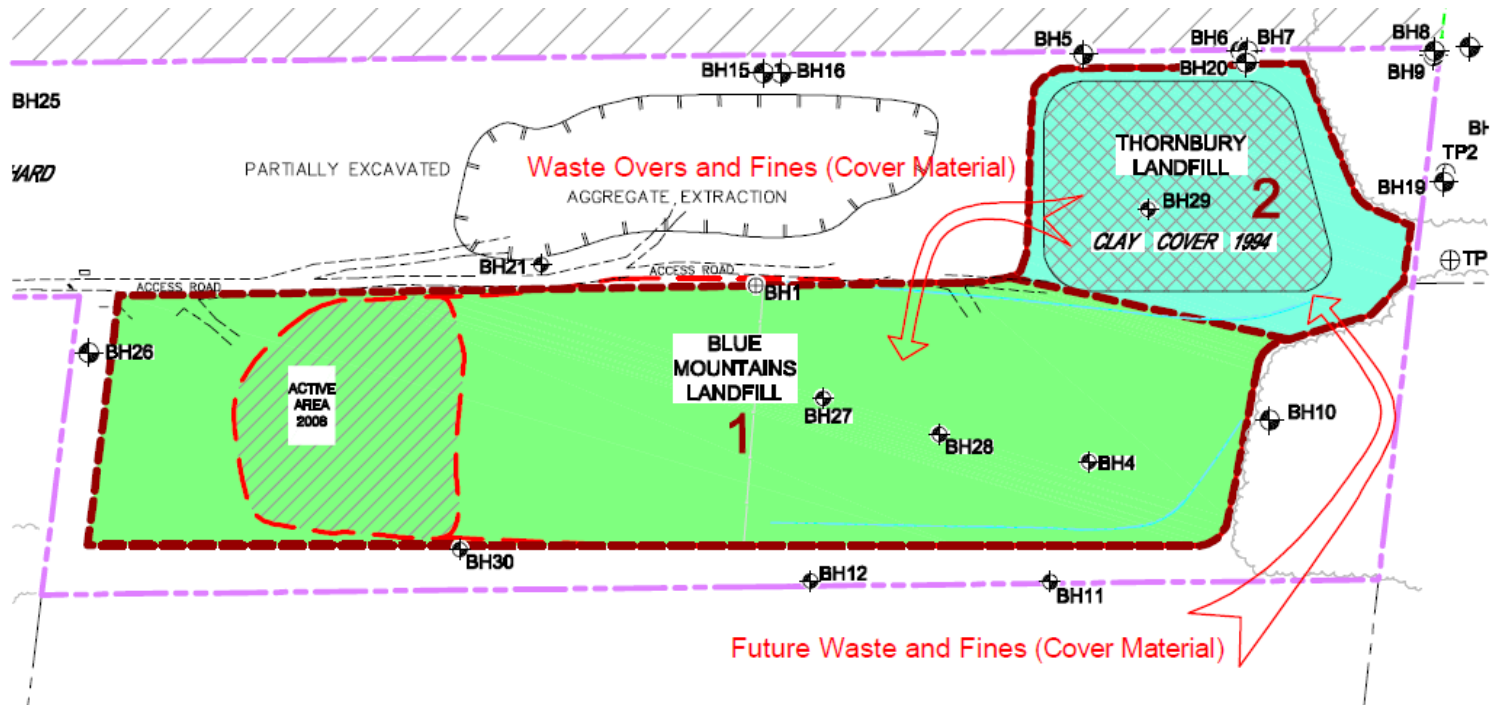
■ Scenario 2 Vertical Expansion and Mining:

- Vertical (2 metre) expansion (100,000 m³) of the existing Blue Mountains Landfill (Area 1).
- Mine 200,000 m³ - Thornbury Landfill and the eastern Blue Mountains Landfill (Area 2).



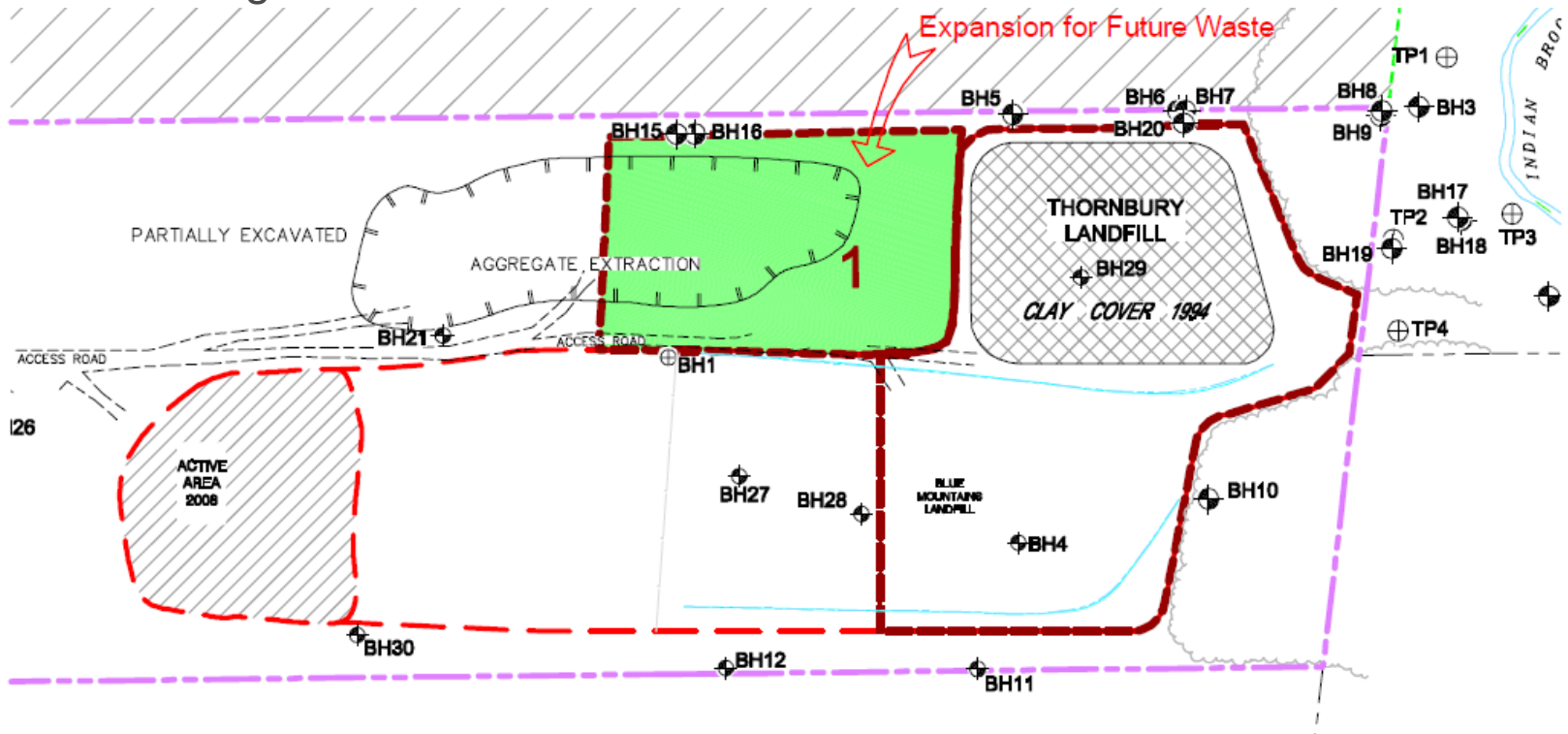
■ Scenario 3 – Vertical expansion and Mining only Thornbury:

- Mine Thornbury Landfill (Area 1);
- Vertical (1.5 m) expansion (100,000 m³) of the existing Blue Mountains Landfill (Area 2)



■ Scenario 4 – Expansion Only:

- Expansion of the landfill by 100,000 m³ by:
 - Expand to the north **or** Expand vertically
- No mining



Existing Factors affecting current Site Life:

- Low Waste Compaction Densities:
 - 373 kg/m³ in 2009
 - 275 kg/m³ in 2010
- Landfill sites similar to BML achieve compaction densities in the order of 550 to 750 kg/m³
- In 2009, Construction & Demolition Waste was 1,965 tonnes of the total 4,772 tonnes disposed at the Site
- In 2009, the Site received 10,853 tonnes of Contaminated Soil and used 3,151 tonnes of cover soil.
- In 2010, Construction & Demolition Waste was 1,997 tonnes of the total 4,010 tonnes disposed at the Site.



Scenario Site Life Calculation:

- Assumed an conservative (low end) waste compaction density of 550 kg/m³.
- No change in the waste disposal stream (i.e., municipal & ICI).
- Fines from mining process used as daily cover, offsetting capacity lost to import of clean soil from off-site sources.

Capacity and Site Life calculations has a range of potential:

- Scenarios 1 and 2 will provide an additional estimated **17 to 40** years
- Scenario 3 will provide an additional estimated **11 to 32** years
- Scenario 4 will provide an additional estimated **7 to 13** years of site life.



Factors to extend Site Life:

- Increase Waste Compaction Densities by:
 - Improved waste placement & compaction practices
 - smaller waste placement lifts
 - Increased number of compaction passes
 - Diversion of “bulky waste”
 - Larger and Heavier Landfill Compactor
- Prevent excessive use of daily cover material
- Offset importation of daily cover with fines from Mining Process
- Diversion of Contaminated Soil / Fill from the Site
- Reduce, Recycle or Diversion of Construction & Demolition Waste.



■ Environmental Impact Considerations:

- Landfill leachate migration to groundwater and surface water (Indian Brook)
- Groundwater model developed to assess potential impacts of each of the four scenarios.
- Modelling results for each developed scenario were compared to:
 - *Reasonable Use Criteria (groundwater) at the northern site boundary .*
 - *Provincial Water Quality Objectives (Indian Brook).*
- Chloride, ammonia, lead, toluene, and benzene used as “typical” indicators.
- Lined and unlined site conditions simulated for each scenario.
- The model used to predict the potential increase in concentration of leachate parameters at the site boundaries (considered conservative);



Environmental Impact Assessment Conclusions:

- For all Scenarios, it was predicted that unlined cells would result in exceedance of the compliance criteria.
- Since current impact exceeds compliance criteria, lining was recommended for landfill expansion
- Removal of the waste and the lining of the Thornbury and the eastern portion of Blue Mountains will provide an opportunity to address the environmental concerns closest to Indian Brook.



- SON Contacted in December 2010.
- July 21, 2011 - Agreement with SON to complete a technical review by SON Consultants.
- SON Technical Review Objectives
 - Cultural Heritage (i.e., archaeological concerns)
 - Natural Heritage (i.e., wildlife species and plants)
 - Hydrogeology (i.e., groundwater and surface water)
 - Aquatic Ecosystems and Limnology (i.e., Indian Brook Aquatic Species)
- Environmental Screening Process information provided to reviewers on July 21, 2011.
- November 18, 2011 - review comments received from SON.



■ **Cultural Heritage Recommendation**

- No further cultural heritage assessment required.

■ **Natural Heritage Recommendations**

- Seasonal wildlife surveys and monitoring of aquifer health (5 year audits and monitoring data review)
- Multidisciplinary document review
- Evaluation of groundwater and surface water monitoring data (5 year intervals)

■ **Hydrogeology Recommendations**

- Site Visit & Technical review of reports
- Integration of groundwater assessment with biological assessment

■ **Aquatic Ecosystems and Limnology Recommendations**

- Site Visit
- Review government data on fish populations in Beaver River & Indian Brook



- Letter of Agreement
- Ongoing Consultation
- Concerns with cumulative effects, but not objecting to project

| Scenario | Description | Estimated Costs |
|------------|--|-----------------|
| Scenario 1 | Northern Expansion and Mining of Thornbury & BML East | \$8,709,700 |
| Scenario 2 | Vertical Expansion of BML and Mining of Thornbury & BML East | \$7,549,900 |
| Scenario 3 | Vertical Expansion and Mining of only Thornbury | \$3,670,800 |
| Scenario 4 | Northern Expansion | \$1,304,300 |

Note: Based on 2010 construction cost rates



- **Estimated Annual Leachate Generation Rates:**
 - Pre Landfill Closure 0.40 m³ per m²
 - Post Landfill Closure 0.24 m³ per m²

- **Estimated Annual Leachate Generation:**
 - Pre-Closure ranged from 6,000 to 20,000 m³ per year
 - Post Closure ranged from 4,000 to 12,000 m³ per year

- **Estimated annual costs to haul leachate from the Site:**
 - Pre-Closure ranged from \$91,500 to \$305,000 per year.
 - Post Closure ranged from \$55,000 to \$183,000 per year



- **On-site leachate treatment not feasible due to:**
 - Discharge Criteria and Quality (i.e., Indian Brook)
 - Costs (construction, maintenance, operation and labour)
- **Leachate Pumping Options:**
 - Two feasible routes were investigated
 - Route 1 – 5.9 km (along Grey Road 13 and 40 up to 7th Line Road)
 - Route 2 – 4.5 km (across adjacent vacant lands & along Grey Road 2 and 40 up to 7th Line Road)
 - 75 mm dia. Forcemain
- Estimated Costs ranged from \$924,000 for Option 2, to \$1,138,000 for Option 1
- Most feasible long-term leachate management option at the Site

- **Debt Repayment**

- 6% on taxation to cover change in annual cost requirements
 - 3% in 2012, 5% in 2013, 5% in 2014
- Net cost \$315/tonne

| Annual Costs | Scenario 2 |
|--|-------------|
| Waste Disposal | |
| <i>Landfilling Operations</i> | \$348,150 |
| <i>Leachate - WWTP Cap. Charge</i> | \$3,600 |
| <i>Leachate Treatment Operating</i> | \$220,850 |
| <i>Leachate Treatment Post Closure</i> | \$99,400 |
| Capital Costs | |
| <i>Expansion and Mining Debt Repayment</i> | \$412,200 |
| <i>Post Closure Capping</i> | \$28,100 |
| Total | \$1,012,900 |



- Two PIC's September 8 and 10 to discuss Scenario costs and options considered.
 - Low attendance

- Survey – put expansion and export to a popular vote.
 - Paper poll 19, Electronic poll 72 = Total 91
 - 98% in support of expansion
 - 2% in support of export



The following provides an overview of the remaining ESP project activities:

- SON Review Complete (*estimated February 2012*)
- Completion of Environmental Screening Report (*January 2012 – February 2012*)
- Notice of Completion of Environmental Screening Report (*estimate March 2012*)
- 60 days Environmental Screening Report Review Posting (*March– April 2012*)
- Design & Operations Plan and C of A Application (*January 2012 – April 2012*)
- SON Review Period of Design and Operations Plan (*April 2012 – June 2012*)
- MOE Review & Approval Period (*June 2012 –November 2012*)
- Future Waste Management Option Implementation (*November 2012*)

- ***Remaining Site Life based on December 2011 site survey***
 - Emergency C of A Application (*December 2011*)
 - MOE Review period (*January 2012 – June 2012*)



Questions?

