



# 2019 International Public Works Conference

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### Strategy for management of former landfills within an urban area

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- Introduction to Whitehorse
- Rubbish, Rubbish and more Rubbish
- The Legacy of Landfills
- What's the risk?
- Our approach
- Next Steps



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# Whitehorse

## City of Whitehorse

64sq km

177,000 residents

Deliver 100+ Services

Manage \$1.3 Billion in constructed assets

Annual Budget

Total - \$210M; \$70M – Capital Works Program





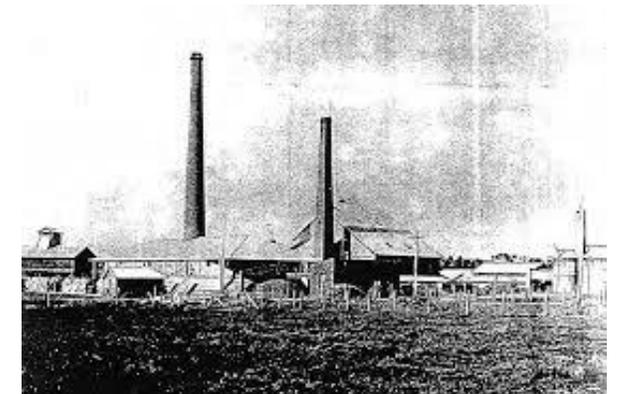
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# Whitehorse

## Modern City of Whitehorse



## 60-70 Years ago - Fruit orchards, rural industries & brickworks





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# Rubbish





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# Rubbish





# Rubbish

- Late 18<sup>th</sup> century - Private refuse treatment – privy's at rear of homes / Lime. Re-use of valuable items.
- 19<sup>th</sup> century - Municipal concerns over public health led to creation of shared open tips.
- 20<sup>th</sup> century – Incineration facilities or fill and cover tips.
- 21<sup>st</sup> century – Recycling, managed cell landfills, alternative technologies



# Legacy of Landfill

- 1920's – 1970's – Incineration facilities or municipal tips.
- Incineration facilities – residue disposed of close to facility and covered with soil / permeable layers.
- Large number of small, local landfills operated by municipal Councils and other authorities.
- Landfills - Excavate, fill, clay cap cover and re-cover with soil/permeable layers.
- Initial concern was land level changes through subsidence with later emergence of management of landfill gases i.e. methane
- Poor record keeping



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# BENNETTSWOOD RESERVE - Current





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# BENNETTSWOOD RESERVE - 1945





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# BENNETTSWOOD RESERVE – Early 1960's





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# BENNETTSWOOD RESERVE – 1996





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# BENNETTSWOOD RESERVE - Current





# Context

- Increasing encroachment on former landfills through urban development, housing and community facilities.
- Increasing regulatory interest – EPA Guidelines and Best Practice Notes plus Auditor General Report
- Legal precedent *Yarra v MFB* (2017)
- Increased demand for additional open space and increased intensity of use of existing open space.



# Our Approach

2012 Council endorse the Environmental Management Strategy for Former Council Landfill Sites

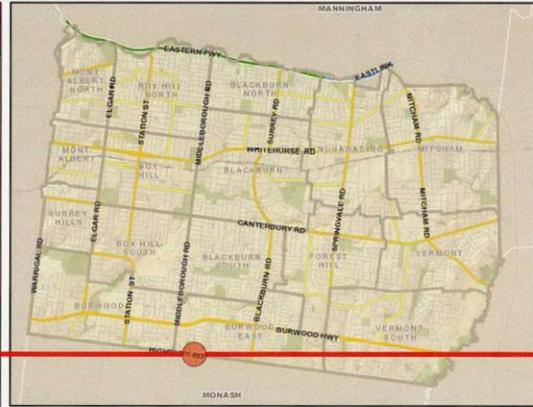
## Guiding Principles

- Council is and will continue to be responsible land owners and managers.
- Council will at all times be aware of and manage the risk associated with former landfill sites.
- Council will remediate and utilise former landfill sites for appropriate community activity where it is safe and reasonable to do so.



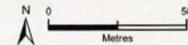
# Our Approach – Risk Identification

- 2013 Desktop Audit
  - 12 priority sites identified
- Further investigations of these 12 sites (2014/15)
  - Archive Research
  - Soil Sampling
- Environmental Scorecards (2015)



**Bally Shannassy Sample Locations**

- Legend**
- Groundwater/LFG monitoring bore (T&T 2014)
  - Landfill gas (LFG) monitoring bore (T&T 2014)
  - Soil borehole (T&T 2014)
  - LFG monitoring bore (SKM 2013)
  - Exploratory borehole (SKM 2013)
  - Site Boundary (Approximate)



GDA 1994 MGA Zone 55  
 [Data Source: Vicmap (DEPI 2015), Ausimage Imagery (2009), Jacobs (2015)]

Site Details	Description
Property Address	467 Highbury Road Burwood East, VIC, 3151
Grid Reference	335940.5 N 5808492.8 E (GDA 1994 MGA Zone 55)
Map Reference	Melway Map 61 F8 (ed. 38)
Municipality	Whitehorse City Council
Lot/Plan	Lot RES1 LP74959 - Majority of site - Public Park Recreation Zone (PPRZ). Lot 29 LP74960 - North eastern corner of site - Public Park Recreation Zone (PPRZ).
Elevation	110 m AHD
Estimated Site Size	3.35 Ha
Current uses of the site.	Sporting ground with carpark and sporting pavilion in south-east corner
Key features	<p>Key features pertinent to this study are listed as follows:</p> <ul style="list-style-type: none"> <li>• The site is bounded on all sides by residential buildings (zoned General Residential Zone - Schedule 1 (GRZ1)). The site has vehicular access from Highbury Road (southern border of site) and pedestrian access from Crow Street (eastern border) and Smith Street (western border). Access can also be made from the pathways at the end of Smith Street on the western boundary and a vacant block off Crow Street in the north-east corner.</li> <li>• A car park is situated on the south side of the site. A sporting pavilion building is also located in the south-east corner is built on land at slightly lower elevation to the rest of the site.</li> <li>• Topography is relatively flat, however, the soccer pitch surface itself is very uneven. Anecdotal evidence of stormwater runoff flowing towards Highbury Road suggests the site is sloped from north to south.</li> <li>• Houses on the eastern border are located on a slight rise (1- 2m).</li> </ul>
Type of proposed use—in the context of the categories detailed in Schedule 61 of NEPM	Recreation / open space - Sporting ground with carpark and sporting pavilion in south-east corner
Type of users, e.g. residents (adults and children), workers, ecological.	Variety of casual recreational users, dog walkers, recreational use of the sporting pitch, Neighbouring residents: Organised sporting events such as soccer and cricket matches; Maintenance and council workers.
Site conceptual model	Description
Geology / hydrogeology	Clayey capping layer, waste material and then highly weathered siltstone (weathered to clay) and becoming fresher with depth (Silurian aged Andersons Creek Formation), fractured rock aquifer (likely to be confined to semi-confined). TDS range between 1,600 and 6,600mg/L based on field EC x 0.65 conversion factor (segment C)
Groundwater level in relation to base of landfill	Groundwater elevation between 109 and 112 mAHD (between 10 and 14 rbgj). Base of landfill estimated to be at approximately 110 mAHD. Therefore groundwater elevation is above the base of the landfill.
Groundwater flow direction	Radially out from centre and western boundary towards the north, east and south
Landfill type	Municipal (putrescible) waste (Type 2) (unlicensed)
Estimated Period of Filling (age of waste)	Approximately 10 years of filling between 1962 and 1975 (therefore waste is approximately 40 years old)
Main pathway (s)	Migration of methane vapour through cap, lithology, and/or underground utilities
Main sensitive receptor (s)	Ecological: Damper Creek, approximately 320 m south west of the site. Human: site workers & adjacent residents (residential land uses surrounding the site (within 5m of inferred landfill boundary))



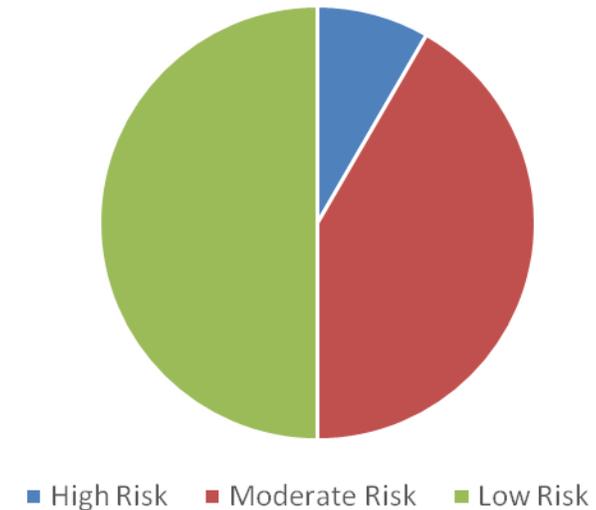
# Our Approach - Detailed Investigations

- Installation of monitoring wells
  - Groundwater & Leachate
  - Landfill Gas
  - Soil Sampling
  - Landfill Cap analysis

# Detailed Investigations Results

- One site identified as a high risk contaminated site.
- Five sites identified as former moderate risk landfill sites.
- Six sites identified as low risk.
- Priority actions developed based on risk assessment

Priority Sites





# Our Approach - Information

- Briefing of Councillors – Strategic briefings
- Briefing of internal stakeholders – Council staff, contractors
- Individual project consultations – Residents, User Groups
- External stakeholders - EPA



# Our Approach - Remediation

- LAMP with action items progressively developed for the five moderate risk former landfill sites.
- Remediation works
- Ongoing monitoring
- Turf management



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# Our Approach - Remediation





# Our Approach - Reporting

- Status report annually to Council
- Status report bi-annually to Executive Management
- Internal Audit Committee – Former Landfill sites management
- Strategic Risk Committee



# Our Approach - Funding

- Funding Sources

Years	Capital	Operational	Total
2012-2018	\$5.195 Million	\$2.575 Million	\$7.770 Million
2019-2023	\$1.630 Million	\$0.826 Million	\$2.456 Million
<b>Strategy Cost</b>	\$6.825 Million	\$3.401 Million	<b>\$10.226 Million</b>



# Next Steps

- Complete site remediations (LAMP)
- Ongoing management of risk (Monitoring Program)
- Managing change of land use over time
- Impact on Planning – Buffer Zones; Planning Scheme