

**West's Road RDF & Waste Management
Community Reference Group
AOC
26th Meeting
Accepted Notes
19 October 2017
Conference Rooms C & D**

Present:

Cr Peter Maynard	- Councillor (Iramoo Ward), Wyndham City Council
Cr Walter Villagonzalo	- Councillor (Chaffey Ward), Wyndham City Council (left the meeting at 5:30pm)
Karen Hucker	- Community representative
Jacqui Scott	- Community representative
Kimi Pellosis	- Community representative
Lisa Field	- Community representative
Caroline Lavoie	- Community representative
Lindsay Swinden	- Community representative
Simon Clay	- Manager Refuse Disposal Facility, Wyndham City Council
Liza McColl	- Business Analyst Refuse Disposal Facility, Wyndham City Council
Bruce Turner	- Independent Chair

Visitors:

Dr Melissa Salt, Tonkin Consulting

Apologies/ absent:

Cr Tony Hooper	- Councillor (Harrison Ward), Wyndham City Council
Harry Van Moorst	- Environment group representative (WREC)
Peter Haddow	- Community representative
Julian Menegazzo	- Adjoining landowner representative
Michelle Lee	- Planner, Metropolitan Waste and Resource Recovery Group (MWRRG)
Stephen Thorpe	- Director City Operations, Wyndham City Council

The meeting commenced at 4.30 pm. No conflicts of interest were declared

1. Welcome and introductions

Bruce welcomed members to the meeting and noted the apologies. He introduced Melissa Salt who was present to give a presentation on the phytocap trial.

2. Notes and actions from the previous meeting

The notes from the 25th meeting, were circulated prior to the meeting however Bruce distributed a hard copy of some further revisions to the draft notes for consideration by the CRG members. The notes from the 25th meeting distributed at the meeting were accepted and will be published on the Council's website.

Bruce noted the delay in circulating the draft notes of the previous meeting and committed, with Liza's support, to have the draft of the notes of the present meeting circulated by the end of the following week (ie 27 October 2017).

An 'action tracker' document with the status of outstanding actions from previous meetings was handed out. Bruce ran through outstanding actions:

ONGOING ACTIONS – FROM MEETINGS PRIOR TO 31 AUGUST 2017		
Action M17-7.1	<i>Provide data on recycling from the transfer station</i>	Officers currently working setting up online performance dashboard as discussed at Meeting 25. This data to be included in the dashboard.
Action M18-6.2	<i>Circulate the auditor's report on the phytocap trial when it becomes available</i>	An audit is yet to be done on the design documents (the latter are to be discussed at today's meeting at item 4)
Action M19-5.1	<i>Circulate a copy of the Wyndham Vale Buffer Study and ESO to the CRG members</i>	Buffer Study circulated. ESO not yet available for public circulation.
Action M23-3.5:	<i>Council to look at the opportunity to use locally indigenous species, for educational purposes, eg at the entrance to the RDF.</i>	Progressing. Revised landscape plans received and currently with Council's Tree Planner for review.
Action M23-5.1	<i>The Residual Procurement Initiative to be made a standing item on the Agenda and the Manager of the Residual Procurement Project to be invited to a future CRG meeting.</i>	No update on the project is available. Michelle Lee is currently on long service leave and MWRRG is an apology for today's meeting.
Action M23-7.2	<i>Simon to provide a report on work underway to address/respond to the Audit Report findings.</i>	Simon was aiming to provide this report to the October CRG meeting, but it was not available in time – to be included with the notes.
Action M24-2.1	<i>Simon to ask the design consultant of the phytocap to pay specific attention to the potential failure of the phytocap and the necessary precautionary measures.</i>	Phytocap trial reports were circulated before the meeting. To be discussed at Agenda Item 4. (Closed)
Action M24-3.2	<i>Council to provide the CRG with an update on the status and timeline for the redevelopment of the Transfer Station.</i>	Deferred. Transfer Station Redevelopment Plan needs to be reconsidered.
Action M24-3.3	<i>Council to identify the implications of the loss of the tip vouchers on the Transfer Station and whether there are any alternatives to only charge for the waste going to landfill.</i>	The issue of tip tokens is being considered by Council as part of a series of briefing papers being prepared by the Environment Sustainability Team in relation to implementation of the Waste and Litter Strategy.
Action M24-5.2	<i>Council to invite Lend Lease to a future meeting of the CRG to discuss how best to represent the interests of future residents of the Harpley Estate in the CRG process (and wider community engagement).</i>	Not completed. Matter is yet to be discussed with Lend Lease.
Action M24-5.3	<i>Council to pursue opportunities for screen planting along the Princes Freeway (in the road reserve in collaboration with VicRoads and/or on private land) to improve the view from the freeway.</i>	Discussions between council officers and VicRoads ongoing. VicRoads provided Council with a copy of their landscaping guidelines to set design parameters and scope of works.
Action M24-6.1	<i>Council to outline the 'process' for</i>	To be discussed today at Agenda Item 7e.

	<i>development of a long-term plan for the rehabilitation/ future use of the site at the next meeting.</i>	
Action M24-7.1	<i>Simon to keep the CRG informed of the 'RDF Artist-in-Residence Program'.</i>	Update to be provided at today's meeting at revised Agenda item 7f.
NEW ACTIONS FROM LAST MEETING –31 AUGUST 2017		
Action M25-2.1	<i>Simon to distribute Phytocap Design Report to CRG committee members for comment before it goes to the auditor. Simon to provide auditor with CRG's comments for consideration, including Harry's request for further information about contingencies for a cap failure.</i>	As per M24-2.1. To be discussed today at Agenda Item 4. (Closed)
M25-3.1	<i>Liza to circulate a copy of the presentation that was given at the meeting, on the status of the Wyndham Waste and Litter Strategy to CRG members.</i>	Completed. Copy of presentation circulated via email to CRG members on 18 October 2017.
M25-5.1	<i>Liza to circulate the response to the WREC submission to CRG members.</i>	Completed. Circulated to CRG members via email on 1 September 2017,
M25-7.1	<i>Simon to consider CRG's feedback in further consideration of the composting trial at the RDF and consult further with the CRG about any decisions on whether to agree to the trial/ EPA R&D approval application.</i>	To be discussed today at Agenda Item 7d.
M25-7.2	<i>If the composting trial proceeds at the RDF, CRG members to be given opportunity to review R&D application before it is submitted to EPA.</i>	To be discussed today at Agenda Item 7d.
M25.9.1	<i>Liza/Simon to include a graph that shows tonnage by month in future performance dashboard reports.</i>	Graph prepared and to be circulated and discussed at Agenda item 7b.

3. Strategic waste management and resource recovery

a. Collaborative Residual Procurement Project Update - MWRRG

Michelle Lee from MWRRG is currently on annual leave and her proxy for the meeting was an apology, so no report was available. Bruce advised that he was aware that the MWRRG were continuing their consultation with local Government.

4. Cell 1B-3 Cap Design

Council has engaged Tonkin Consulting to prepare a design for a rehabilitation cap for cells 1B, 2A, 2B and 3. The draft technical specification, trial monitoring plan and CQA (Construction Quality Assurance) Plan were made available to CRG members via the CRG fileshare, prior to the meeting.

Dr Melissa Salt from Tonkin Consulting attended the meeting and gave an overview of the rehabilitation process, the trial lysimeter, the proposed phytocap or ET cap for cells 1B, 2A, 2B and 3 and answered a number of questions. A copy of the presentation is attached to the minutes. Melissa outlined the different types of caps. She noted that the design of the phytocap is based on an extremely conservative water modelling scenario with no allowance for run-off and no consideration or inclusion of the interim capping. She highlighted the safety factors in the design of the phytocap and that the

phytocap will have a monitoring plan and infrastructure, unlike the conventional cap. A lysimeter will be installed to monitor the moisture within the cap. The monitoring plan will detect any problems and they can be remedied.

In Harry's absence, Bruce noted that Harry had raised concerns at previous meetings about providing a contingency as a backup in the event that the phytocap failed. He asked Melissa to explain why a liner cannot be put underneath the cap. Melissa advised that if you put a liner underneath the phytocap, then it would be a conventional cap and the use of the liner would constrain the type of vegetation that could be grown in the cap and in effect, set up the cap for failure. Only shallow-rooted grasses and shrubs can be grown on a conventional cap. No large trees could be grown. This type of vegetation and the lack of trees would significantly reduce the performance of the phytocap. You can't do a combination of the two cap types because they function differently. It was noted that conventional caps generally result in grassed areas that need to be mowed (which can be very costly for the large areas involved). Melissa detailed a long list of contingencies for phytocaps (see presentation).

There was a further question about why tree roots don't damage a phytocap. Melissa noted that tree species selection will be very important. Melissa explained that trees don't generally grow into waste, which is saline and porous. Trees don't like having air around their roots. Melissa also noted that a tree falling over will not damage the phytocap at depth because the damage is usually confined to the area around the root ball at the immediate sub-surface.

Kimi asked whether you could put stock on a grass covered cap. Melissa commented that you could possibly put sheep to graze but you could not put any livestock for human consumption. In any event a risk assessment would be needed.

The members of the CRG did not indicate that they had any concerns with the proposed trial and use of a phytocap on the four cells involved. Simon explained that the design documents will now be submitted to an Auditor for review, following any further feedback from the CRG members. The auditor reviewed documents will then be submitted to EPA for approval. This is not a public process, but the Cell Rehabilitation will remain a standing agenda item so that the CRG will be kept informed.

Action M26-4.1 Liza to distribute a copy of Melissa's presentation with the minutes from the meeting, to all members of the CRG.

Action M26-4.2 CRG members to forward Simon/Liza any further questions that they would like Melissa Salt from Tonkin, to provide an answer to.

Action M26-4.3 Cell Rehabilitation to be made a standing agenda item.

5. Strategic planning context

Nothing to report.

6. EPA Works Approval

EPA issued a Works Approval for the extension of the West's Road landfill on 11 October 2017. A copy of the approval was circulated with the agenda and hard copies available at the meeting (refer copy attached). The approval gives the Council permission to extend the current operation of the landfill. Based on current volumes, the landfill will continue to operate for approximately 26 years, to the year 2043.

The approval contains approximately 22 conditions precedent for plans and/or works that must be completed prior to the commissioning of Cell 5 or in the near future. These include the construction of a stormwater pond, litter netting and upgrade of wheel wash.

Simon noted that Council must still get EPA approval to commence the design for each new cell, EPA need to approve the design and works. The cell design is not a public process however further community involvement is required by Condition WA_R1 (d) of the approval as follows:

d) in respect of each new cell, details of how you have informed the community through the Refuse Disposal Facility Community Reference Group (RDFCRG) or alternative engagement activities of the progress regarding the construction of cells and leachate pond and the progressive rehabilitation of the landfill. This information needs to be provided with the application for a new cell approval and must include explanations about how any issues or concerns raised have been considered;

The application to prepare a design for a new cell also requires Council to demonstrate that the cell is needed and accords with State Waste Planning Policy. If the demand for landfill disposal reduces in the future, this will impact (reduce) the size of future cells.

Jacqui asked why a landfill cell can't be constructed at a standard size and just take longer to fill. Simon noted that EPA's standard for the life of a landfill cell is 2 years because of concerns about the levels of leachate and gas generation for landfill cells that were open longer than 2 years.

There was also a question about why the transfer station is shown on the premises plan in the Approval if Council intends to relocate the transfer station. Simon noted that the premises plan reflects existing conditions. If the transfer station is relocated, the premises plan would need to be amended.

There was a question about how the approval complements the achievement of the target of 90% diversion away from landfill in the Wyndham Waste and Litter Strategy. Simon advised that the approval gives the facility the ability to secure a waste stream and investment required for alternative waste treatment facilities, with only the residual going to landfill.

Submitters have until the 31 October 2017 to lodge an appeal with VCAT.

7. RDF Update

a. 'Hot Spot' temperature probe results

Simon circulated details of temperature probe locations and results (attached). He reported that the temperature probe results taken in early October found that the average temperature range in cell 4 was 68-75°C (down from 200°C originally). The results look promising in that the temperature has reduced significantly and is almost back to normal levels (which would be approximately 55°C)

Simon indicated Council will keep monitoring the methane-carbon dioxide ratios in the landfill gas wells in cell 4, as an indicator of possible combustion activity to decide whether any additional temperature probe tests are required in the short term. If there is no indication of combustion activity, temperature probe tests will be done again in 4-6 months' time.

Simon advised that the gas extraction system in cell 4A, which was closed to reduce the risk of pulling air into the hotspot, will soon be turned back on.

b. Performance dashboard

Incoming tonnage

A new graph showing incoming tonnage by month, as requested at the last CRG meeting, was handed out at the meeting (refer copy attached). The graph was requested to see whether there was any seasonal variation. The graph did not indicate that there is a seasonal variation. Lindsay noted that the current incoming tonnage was a little lower than in the last two financial years. Simon noted that the City of Whitehorse stopped bringing their municipal kerbside waste to the RDF in March 2017 and some incoming tonnage from one of the RDF's largest commercial customers is currently going to a competitor's landfill. Council is currently not prepared to lower the gate fee to match the other landfill.

c. EPA Compliance Summary (landfill gas, daily odour, leachate)

Landfill Gas

A graph showing the landfill gas capture at the RDF for the last two months was handed out at the meeting (refer copy attached). Simon advised that Council has entered into a new contract with LMS Energy in relation to the landfill gas at the RDF. Now that the contract is finalised, LMS have immediately started installing a new engine at the power plant. The new engine will see an immediate increase in the amount of gas being captured and converted to energy, and a reduction in the amount of gas that is flared. The new engine should be operational early in 2018.

The CRG responded that this was very good news.

Annual Performance Statement 2016-2017

Simon reported that the Annual Performance Statement (APS) was submitted to EPA at the end of September. Refer copy attached.

M26-7.1 Liza to circulate a copy of the APS to all CRG members.

d. Updates on waste diversion concepts/ trials (eg mattresses, composting, baling)

Simon said he had not heard any more from the company that had been interested in doing the composting trial.

Council awarded the Hard Waste Tender to the existing contractor, Four Seasons. Four Seasons do not propose to use any of the waste to manufacture Processed Engineered Fuel. They will however be taking the waste to a different transfer station with better recycling options.

The Mattress Recycling Tender had not yet been determined.

Simon was still waiting on the consultant to finalise the business case for the Baling of Waste at the RDF.

e. Process for development of long-term rehabilitation plan (Action M24-6.1)

Item deferred to the December meeting. It was felt that Stephen Thorpe should be present for this discussion, having initiated the action.

f. RDF Art in Residence Program

The Artists-in-Residence will be presenting their artwork at an exhibition called 'Wadda Loada', to be held from 9 November to 24 December 2017 at the Wyndham Art Gallery. Promotional postcards and invitations were handed out to the members of the CRG. More information about the exhibition can be found at <https://www.wyndham.vic.gov.au/whats-on/wadda-loada>.

8. Members' Report

Lisa shared that she used the Transition Wyndham network to provide community members with an opportunity to go on a tour of the RDF on the 18 October 2019. Twelve people attended the tour which was organised on site by Evan Lockhart, Council's Waste and Litter Education Officer. Attendees were all adults, however there was interest from parents with young children in a future tour with their children. She was also contacted by a member of a local teachers' network who is interested and Lisa has put her in contact with Evan.

Lisa noted that Evan did a fantastic job presenting relevant and interesting information. She also noted that it was an extremely hot and windy day, and the air quality on site was poor as was the amount of litter. Simon noted that the landfill had to be closed one day last week due to extreme wind conditions.

Lisa informed the group that she forwarded a question to Council in September asking when Council was going to stop using single-use plastics for catering. Council provided a general response about the diversion targets in the *Wyndham Waste and Litter Strategy* which Lisa said was not particularly inspiring.

Caroline informed everybody about a community initiative called the 'Community Grocer', which is a no-waste fresh fruit and veggie market, providing young people with work experience, held every Thursday from 3pm-6pm near Aquapulse.

Caroline shared that she organised/held a children's birthday party with the aim of producing minimal waste. They put out bins and boxes for guests to separate the wastes for recycling and composting/chicken food. Guests were invited to bring home-made gifts or pre-loved items. No single-use plastics were used. Her guests were quite inspired. Caroline has also contacted her children's child care centre to encourage and initiate better recycling initiatives.

The CRG members noted the use of single-use plastics at the CRG meeting and asked if this could be addressed.

Action M26-8.1 Liza to ensure that all future CRG meetings avoid single-use plastics.

Kimi noted that she has been working on an audit of coffee cups in the city. Coffee cups are a huge issue in terms of the amount of waste generated and, until recently, being unable to be recycled.

Jacqui shared that she is aware of a situation where a resident who visited the RDF with recyclables and waste separate was instructed by RDF staff to put everything in the pit to go to landfill. Simon advised that the up-skilling of staff at the RDF is an area of ongoing attention.

9. Other business

a. Community Engagement Strategy

Liza reported that the working group (Karen, Jacqui, Lisa and Liza) had held one meeting. The Group considered and agreed to use a methodology developed by the Metropolitan Waste and Resource Recovery Group to develop the strategy. The group are currently working on a Context Analysis Paper. It was agreed to set aside time at the next meeting to discuss this.

b. Attendance by Lend Lease at a future meeting

M26-9.1 Liza to invite Lend Lease to December meeting.

c. East Werribee Employment Precinct

Karen referred to the development of botanic/ community gardens in the East Werribee Employment Precinct and asked to what extent the management of waste and resource recovery had been considered. The CRG members felt that Council could use this as an opportunity to improve waste outcomes and suggested Council should talk to the developer about this (if not already occurring). Simon advised that the main way that Council has influence on waste management in new developments is through the planning scheme and permit process.

Next meeting

The next meeting is at 4.30 – 7.00 pm on Thursday 14 December 2017. It was noted that Councillors will be unable to attend this meeting.

Final Cap Design for Wests Road RDF

Melissa Salt

October 2017



Outline

- Final Capping Objectives
- Cap Types
- Phytocap Design for Wests Road RDF
- Why Use Phytocaps?



Final Capping Objectives

Environmental Aspect	Objective	Final Cap Mechanism
Groundwater	Minimise leachate generation	Minimising drainage through the cap
Surface water	Prevent contact of runoff with waste	Providing a long-term stable barrier
Human Health	Prevent contact with waste or impacted water	Providing a long-term stable barrier
Air	Prevent uncontrolled escape of landfill gas	Providing a barrier and/or oxidising fugitive gas emissions
Amenity	Provide land suitable for its intended after use	Site specific



So why do we cap landfills?

The main objectives given in the Landfill Guidelines prepared by the various state regulators are focussed around:

- Covering the waste mass to prevent impacts on human health either through direct contact or via vectors, such as mosquitos and vermin
- Minimising water and air movement through the waste to reduce the potential for contamination of surface and groundwater by runoff and leachate and reducing air pollution from landfill gas emission;
- Providing a final surface for post-closure land uses.

Additional objectives, usually from the site owners but may also be from the community or other stakeholders can include:

- maximising landfill air space by minimising the cover thickness;
- Minimising resource use and the costs of cap construction;
- Reducing the burden of long-term maintenance requirements

Capping Types

PHYTOCAP

a landfill cover comprising a planted soil layer which uses evapotranspiration to minimise infiltration of water into the underlying waste layer

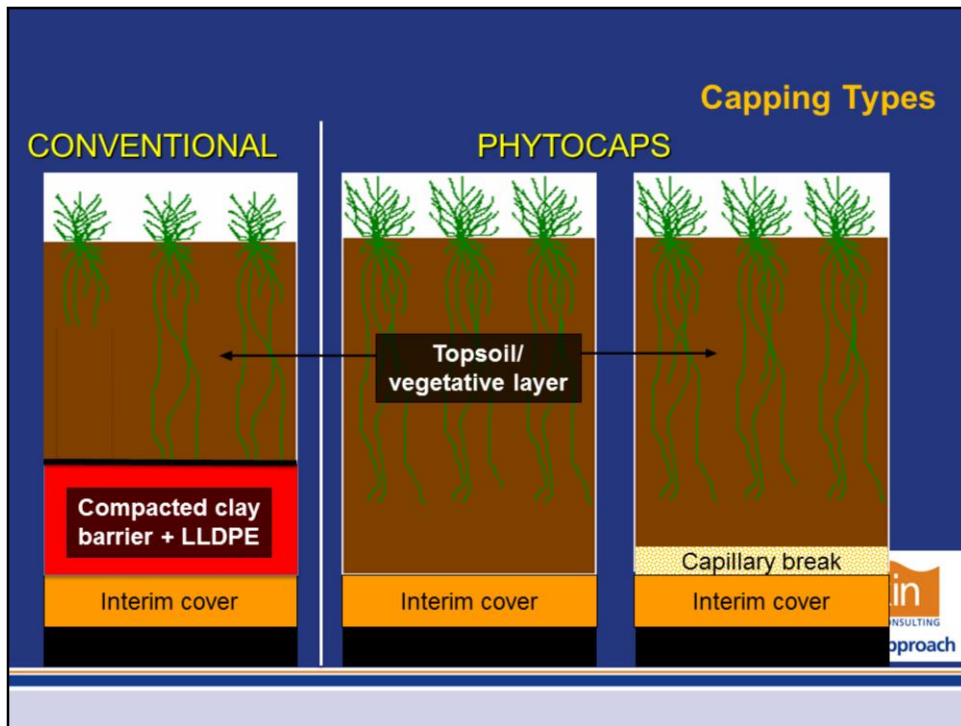
A.k.a.

ET, Store-Release, Alternate Cap

CONVENTIONAL and COMPOSITE

currently-accepted landfill cover usually comprised of impermeable geosynthetic &/or clay layer under a bulk fill layer





Conventional barrier cap – can limit root depth and hence plant growth.

Barrier compromised by:

- penetration of roots or burrowing animals,
- shearing from differential settlement of landfill
- crack formation during wetting and drying cycles

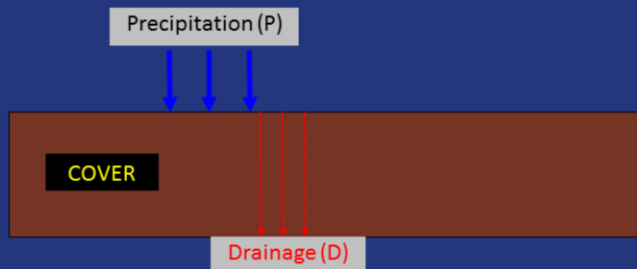
Using shallow rooted grasses can result in moisture increasing above the liner which can lead to land slips and slides

Phytocaps – soil stores moisture and plants and sunlight extract

Addition of capillary break to increase volume of water able to be stored by profile before drainage

The Water Balance – Capping Goal

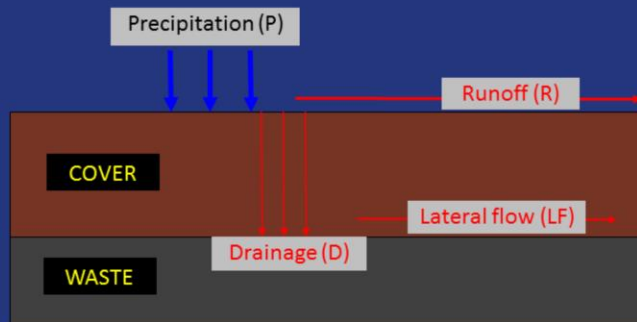
- $P \neq D$



One of the main objectives, regardless of cap type, is to minimise or prevent drainage from entering the material and generating contaminated leachate.

The Water Balance – Barrier Caps

- $P \rightarrow R + LF + D$



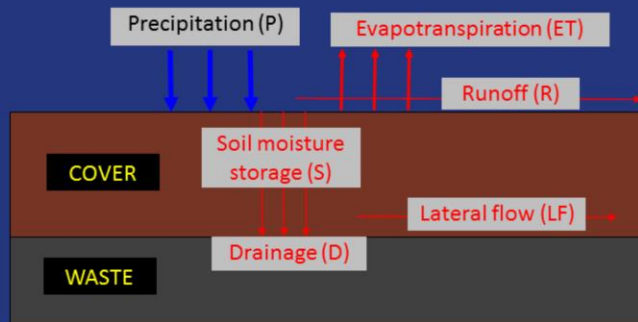
For many barrier caps, the design (whether realised or not) assumes rainfall is dealt with by the stormwater collection system and landfill gas is dealt with by the gas collection system.

But is this what really happens?

Is this the best way to deal with moisture and gas?

The Water Balance - Phytocaps

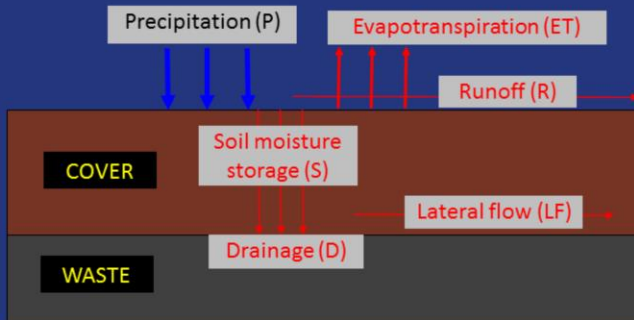
- $P = ET + R + LF + D + \Delta S$



-Phytocapping technologies look at the entire water balance. The barrier is removed and precipitation is mainly removed by the sun and wind, through evaporation, and by plants through transpiration with a temporary storage compartment of the soil. Runoff and lateral flow may still occur but are a lesser component.

The Water Balance – Natural Environment

- $P = ET + R + LF + D + \Delta S$



- As %P (annual)
 ET – >75%
 R – 0-10%
 LF – 0-5%
 D – 0-20%



The advantages are immediately obvious when you look at the typical water balance for a natural system. The largest loss of precipitation is evapotranspiration so if we can increase this, even by a small amount, we can have a large impact on reducing runoff, which affects surface integrity,
 Reducing lateral flow, which affects geotechnical stability and
 Reducing drainage, which potentially increases leachate generation.

Considerations for Capping

- Compacted barriers dry out and are likely to crack
- Drainage through compacted barriers is difficult to predict
- Phytocaps can control drainage
- Phytocaps can recover from vegetation loss
- Seasonality of rainfall and plant growth are important factors in the performance of phytocaps
- Phytocaps out-perform compacted clay barriers in oxidising fugitive LFG and minimising “hot spots”
- Phytocaps are:
 - more complex to design – but Guidance available!
 - sustainable and predictable performance from phytocaps
 - performance is observable through plant growth
 - improvements in performance are relatively easy



The Australian Alternative Cover Assessment Program found a number of issues that need to be considered for capping.

For a start, clay barriers are not all they are cracked up to be or in this case they are.

Because the drainage through the clay barriers is related to shrink-swell, prediction of long-term performance using water balance models is more difficult and less accurate.


By using more natural analogues, being the phytocaps, we can control drainage. Also as shown, phytocaps can fully recover from functional damage, in the case shown it was loss of vegetation, while conventional clay barriers do not fully recover after drying.

Finally, regardless of the design of the containment system, it is important to understand the seasonality of rainfall. For phytocaps it is also important to understand plant water use, growth seasons and rooting depths.

Overall, phytocaps are more complex to design as they require an understanding of soil hydraulic and plant growth properties and the interaction of these with one another and the weather. That said, WMAA produced the guidelines promised from the A-ACAP and these involved regulator input.

Two of the big advantages of phytocaps is that their performance is partially observable through plant growth – if the plants die then you can almost guarantee the system is not working. However the other advantage is that the performance can be easily improved by changing vegetation types and density and/or soil hydraulic properties.

Phytocap Design

- **Climate**
 - rainfall, evaporation, temperature, humidity
 - seasonality and variability
- **Soil**
 - Texture (sand, silt, clay)
 - Structure (aggregation)
 - Dry Density
 - Moisture Retention
 - Hydraulic Conductivity
- **Vegetation**
 - Rooting depth
 - Water use
 - Seasonality and survival mechanisms



To design a phytocap we look at a number of aspects of the environment.

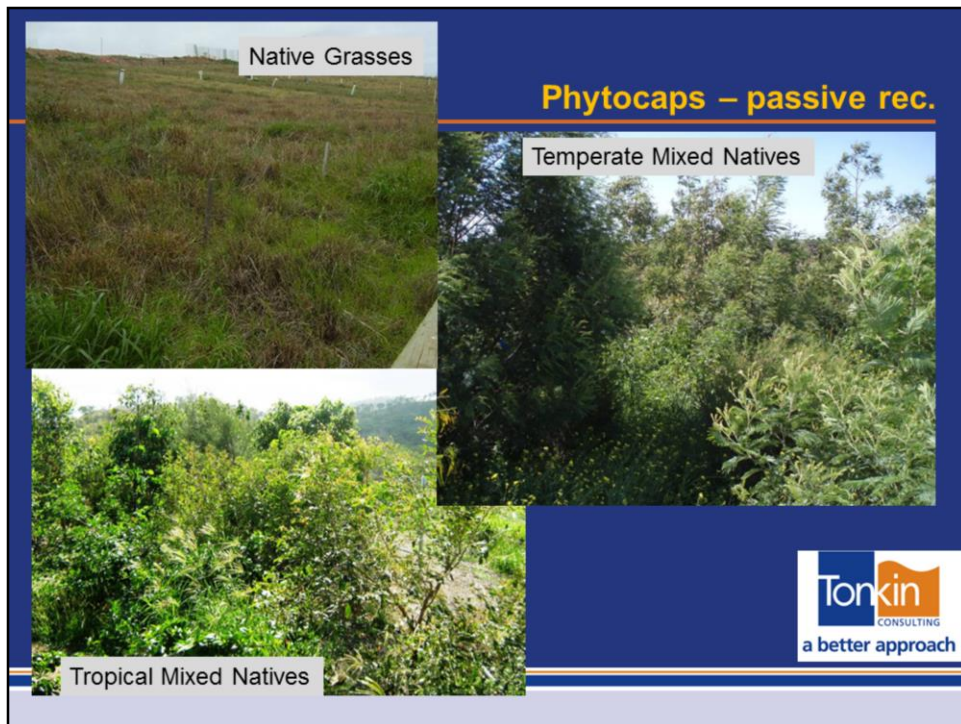
Conventional Caps



Shallow-rooted Grasses or shrubs



Conventional caps are limited to shallow-rooted grasses or shrubs and are difficult to develop for anything else



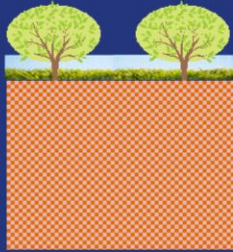
Phytocaps can support a range of vegetation and hence passive uses

Phytocaps - Recreation



Or phytocaps can be converted to more active recreational uses

West's Road Phytocap



Native trees shrubs and grasses
(as specified in Landscaping Plan)

1.5 m loam to clay soil

- **Safety Factors in Design**
 - Conservative modelling – no runoff
 - No consideration of interim capping
 - Monitoring of cap performance



Current Constructed Phytocaps

- Southern Waste ResourceCo (SA)
- SRWRA (SA)
- Port Lincoln RRC (SA)
- Northward Fill (SA)
- Rockhampton (Qld)
- Wollert Landfill (Vic)
- Melbourne Regional (Vic)
- Ballarat (Vic)
- Maryborough (Vic)
- Wyrallah Rd (NSW)
- and many more....



Construction Comparison

Conventional

- Level 1 Supervision
- Low tolerance to variability
- High compaction
- Many lifts
- Traffic only controlled during liner construction
- Cost >\$30/m²
- No trial required
- Issues with penetrations for gas capture

Phytocap

- Level 2 Supervision
- Higher tolerance to variability
- Low compaction
- Minimal lifts
- Traffic control for all lifts
- Cost \$15-25/m²
- Trial – approx. \$250k
- Penetrations easily accommodated



After Care Monitoring

- **Phytocaps (\$5-10/m²):**
 - Surface Integrity: better vegetation = less erosion
 - Landfill Gas: phytocaps better oxidation than conventional and easier installation and repair of infrastructure
 - Leachate: should be the same with the same drainage requirements
- **Conventional (5-12/m²)**
 - As above + slashing and liner repairs
- **Phytocaps (\$30k/yr for trial duration):**
 - Moisture Movement
 - Vegetation



Contingency Actions

Conventional

- Excavate and replace
- Repairs to LFG are difficult

Phytocap

- See next.....



Phytocap Contingency

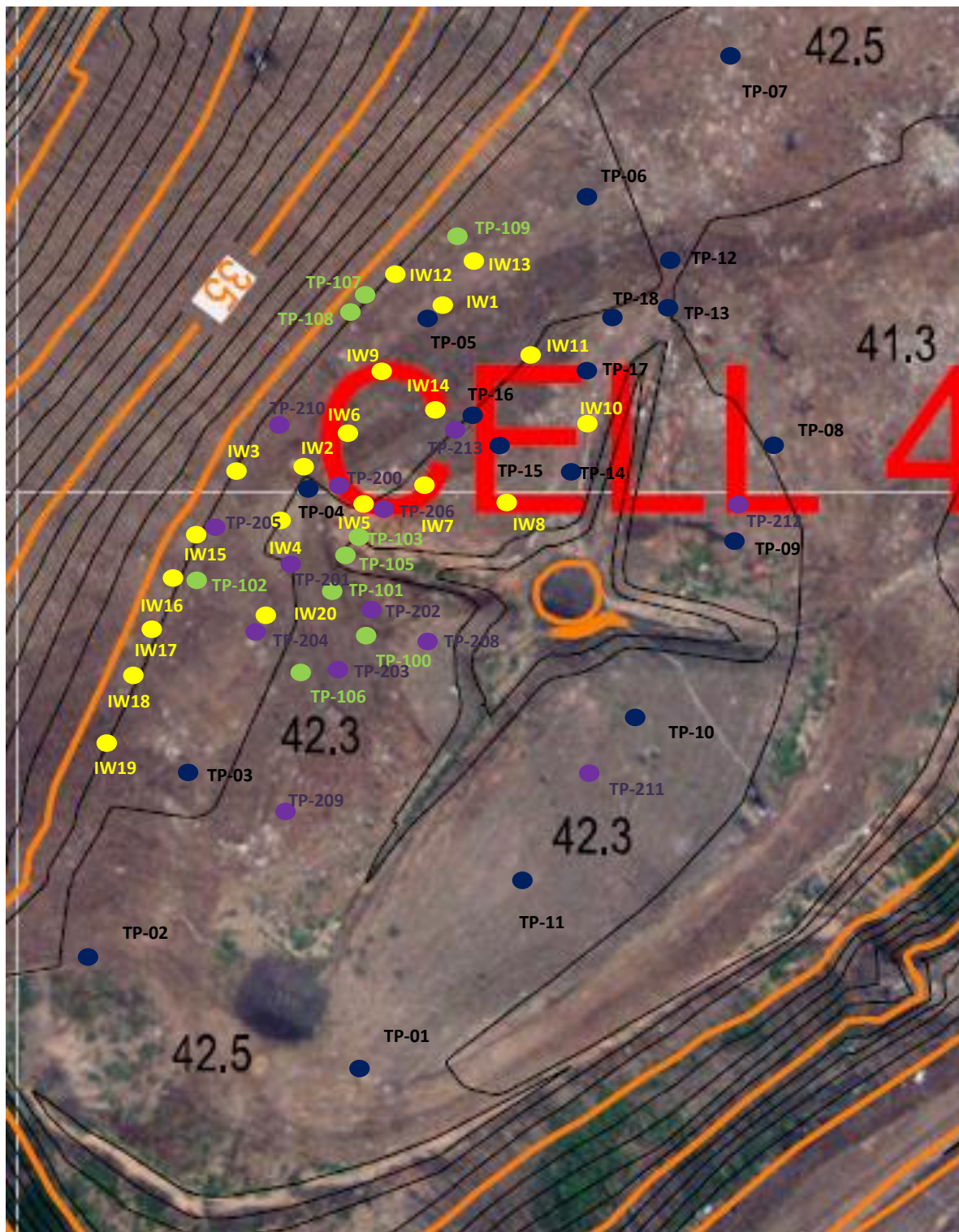
- Diverting rainfall as runoff in a highly controlled manner
- Increasing the depth of the phytocap by topdressing
- Incorporating mulch / compost into the topsoil
- Topdressing to correct soil chemical imbalances
- Irrigating to overcome plant stress and improve growth
- Oversowing with deeper rooted grass species
- Planting or increasing the planting density of trees and shrubs
- Controlling weeds and / or pests
- Replanting species removed during plant succession.
- Reapirs to LFG only require replanting

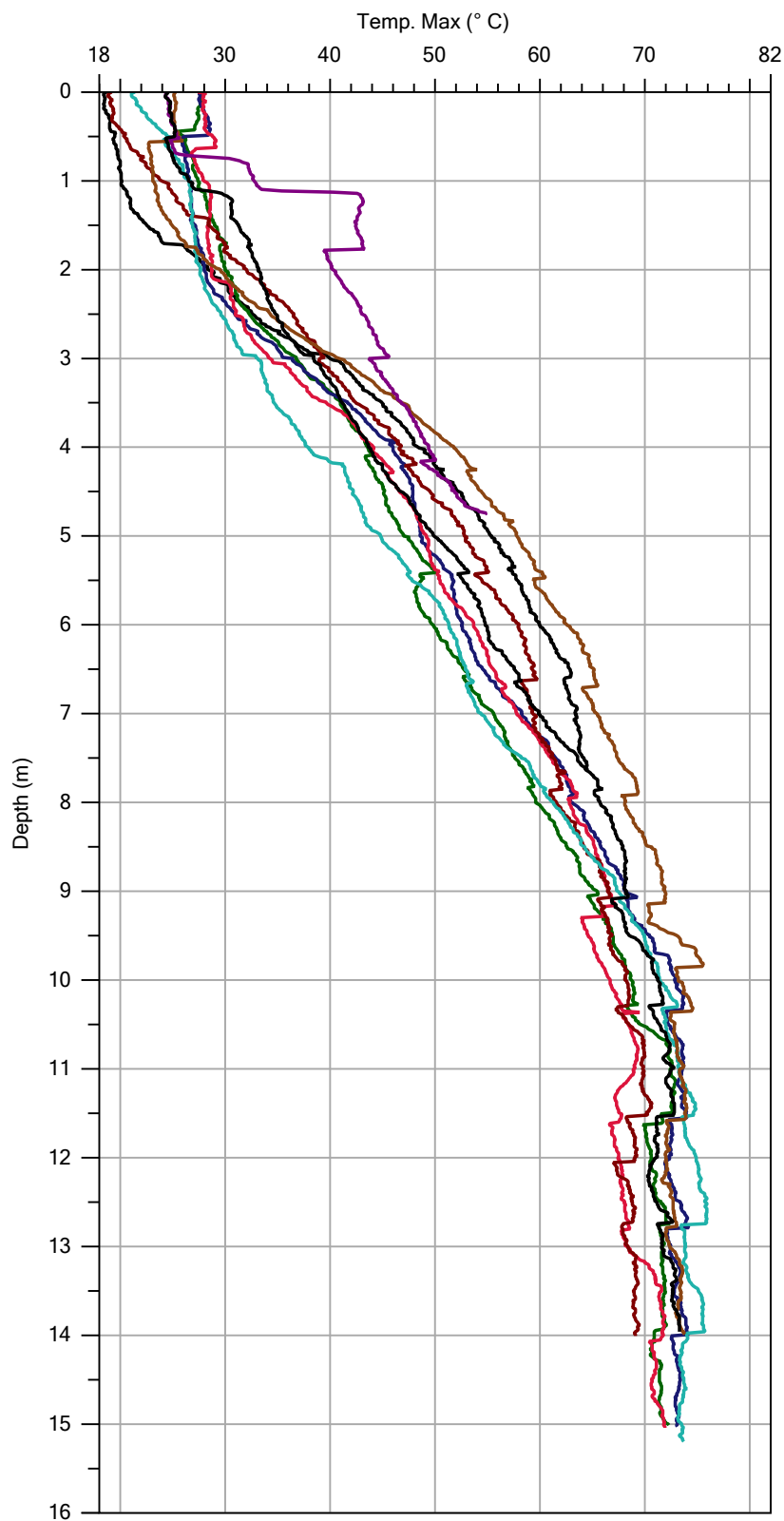




I need to acknowledge the contribution of the A-ACAP sponsors and participants and for supporting the research presented and also providing me opportunities to visit some of the most picturesque landfills in the world - not Henderson or Taylors Road but this one in Polson Montana which overlooks Kerr Creek, the outflow from Flathead Lake and has a beautiful backdrop of the Rocky Mountains. A phytocap was trialled at this site.

Thank you for listening.

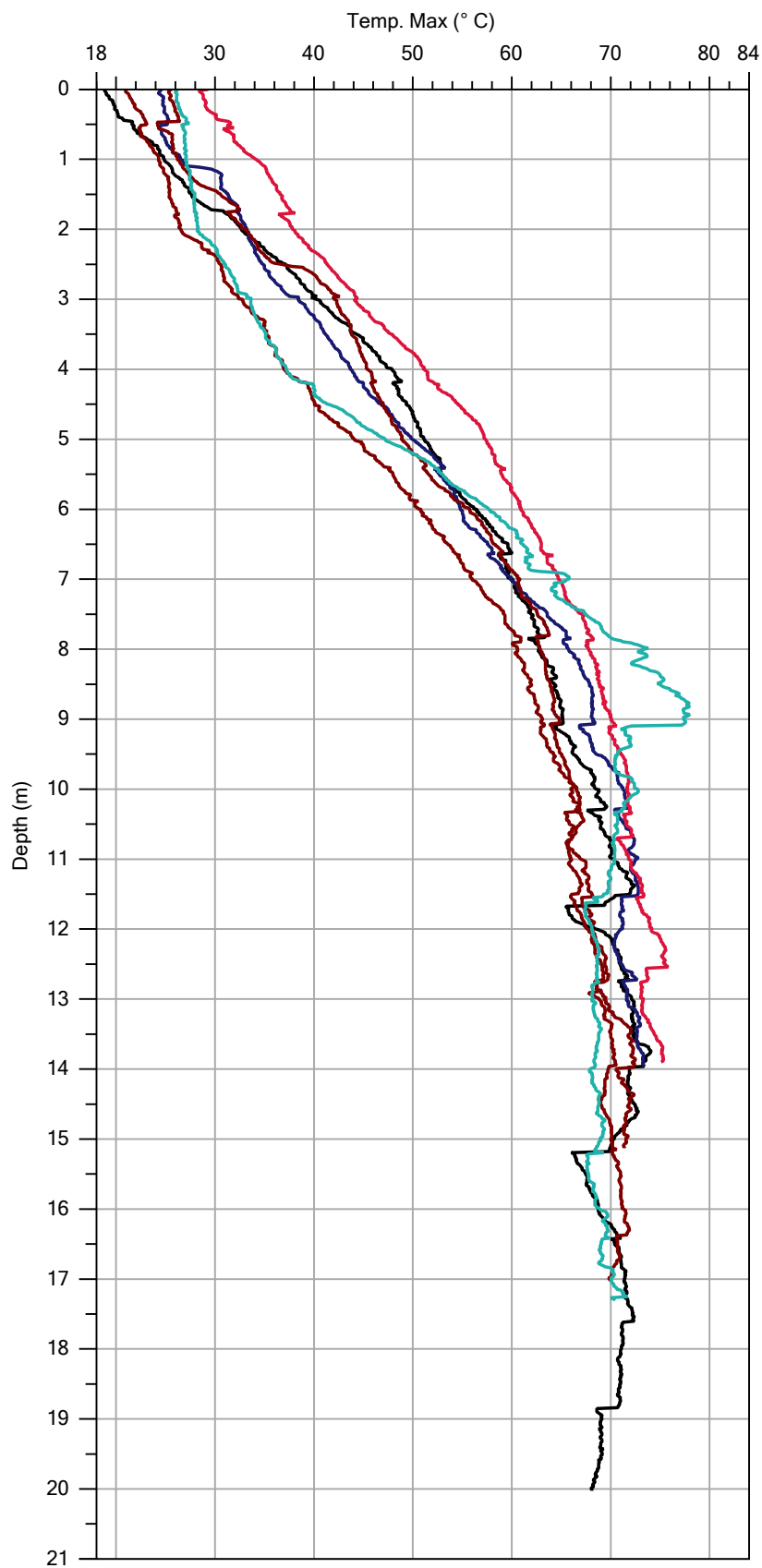




Company: Numac
Project ID: Wyndham Refuse Disposal Facility

Operator: Barry Molloy
Client: Wyndham City Council

TP-200.MIP	4/10/2017
TP-201.MIP	4/10/2017
TP-202.MIP	4/10/2017
TP-203.MIP	4/10/2017
TP-204.MIP	5/10/2017
TP-205.MIP	5/10/2017
TP-206.MIP	5/10/2017
TP-207.MIP	5/10/2017
TP-208.MIP	5/10/2017



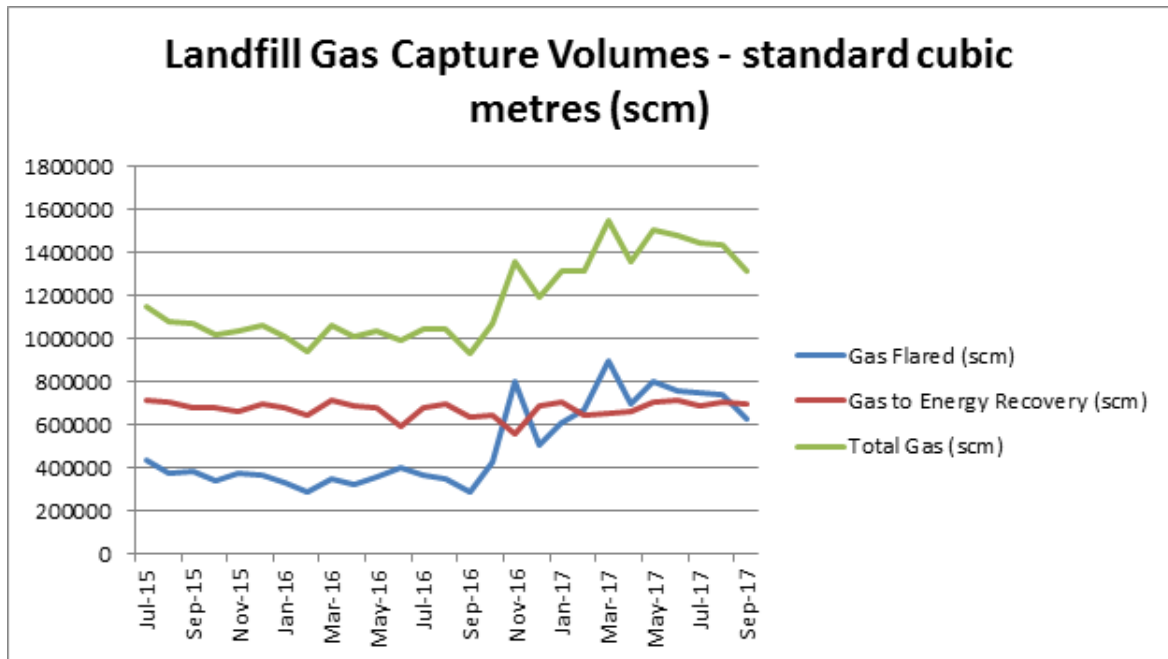
Company: Numac
Project ID: Wyndham Refuse Disposal Facility

Operator: Barry Molloy
Client: Wyndham City Council

TP-211.MIP 6/10/2017
TP-208.MIP 5/10/2017
TP-209.MIP 5/10/2017
TP-210.MIP 6/10/2017
TP-212.MIP 6/10/2017
TP-213.MIP 6/10/2017

West's Road Refuse Disposal Facility Community Reference Group
Meeting 26 - 19 October 2017
Agenda Item 7 - Performance Dashboard

Landfill Gas Capture Volumes



Incoming Tonnage by Month 2015-2016 and 2016-17

