

Engineering Pathways to Unlocking Potential for Additional Landfill Airspace

Quality | Employee Ownership | Mastery | Staff Centricity | Teaming | Impact

senversa

Unlocking Potential Airspace





How can we modify the Final Landform to better align with current site conditions and current guidance, while potentially creating additional airspace and extending the operational time?

Image sources: https://geosynthetics.textiles.org/2025/10/13/trends-in-the-geotextiles-industry/, https://www.eib.org/en/press/all/2025-001-ukraine-eib-provides-eur4-7-million-for-waste-management-improvements-at-lviv-s-hrybovychi-landfill

Think About a Landfill Site!

- What is the current condition?

Image sources: https://www.researchgate.net/publication/265055032_Remote_sensing_in_environmental_police_investigations_Aerial_platforms_and_an_innovative_application_of_thermography_to_detect_several_illegal_activities

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- What is the current condition?
- How long does it have left?

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- How long does it have left?
- Where is the filling progression heading?

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Environmental Regulators

Queensland	Queensland Government | Department of the Environment, Tourism, Science and Innovation
Victoria	EPA VICTORIA | Environment Protection Authority Victoria
New South Wales	nsw EPA
South Australia	EPA South Australia
Northern Territory	ntepa Northern Territory Environment Protection Authority
Tasmania	epa TASMANIA ENVIRONMENT PROTECTION AUTHORITY
Western Australia	GOVERNMENT OF WESTERN AUSTRALIA | Environmental Protection Authority

Image sources: https://www.detsi.qld.gov.au/ , https://www.epa.vic.gov.au/ , https://www.epa.nsw.gov.au/ , https://www.epa.sa.gov.au/ , https://ntepa.nt.gov.au/ , https://epa.tas.gov.au/ , https://www.epa.wa.gov.au/

Environmental Regulators

Queensland	Queensland Government | Department of the Environment, Tourism, Science and Innovation
Victoria	EPA VICTORIA | Environment Protection Authority Victoria
New South Wales	NSW EPA
South Australia	EPA South Australia
Northern Territory	ntepa Northern Territory Environment Protection Authority
Tasmania	epa TASMANIA ENVIRONMENT PROTECTION AUTHORITY
Western Australia	GOVERNMENT OF WESTERN AUSTRALIA | Environmental Protection Authority

Image sources: https://www.detsi.qld.gov.au/ , https://www.epa.vic.gov.au/ , https://www.epa.nsw.gov.au/ , https://www.epa.sa.gov.au/ , https://ntepa.nt.gov.au/ , https://epa.tas.gov.au/ , https://www.epa.wa.gov.au/

Case Study

Location: Victoria

Approved Landforms:

1. Planning Endorsed
2. EPA Approved

Designed over 25 years ago, is it still aligned with today's guidelines?





Estimated Airspace Left:

1. ~ about three years
2. ~ about one year

Image sources: https://freshkillspark.org/blog/construction-details-on-east-mound-landfill-capping, https://www.reuters.com/world/us/aerial-surveys-show-us-landfills-are-major-source-methane-emissions-2024-03-28/

What's next?

Let's build a new landfill?

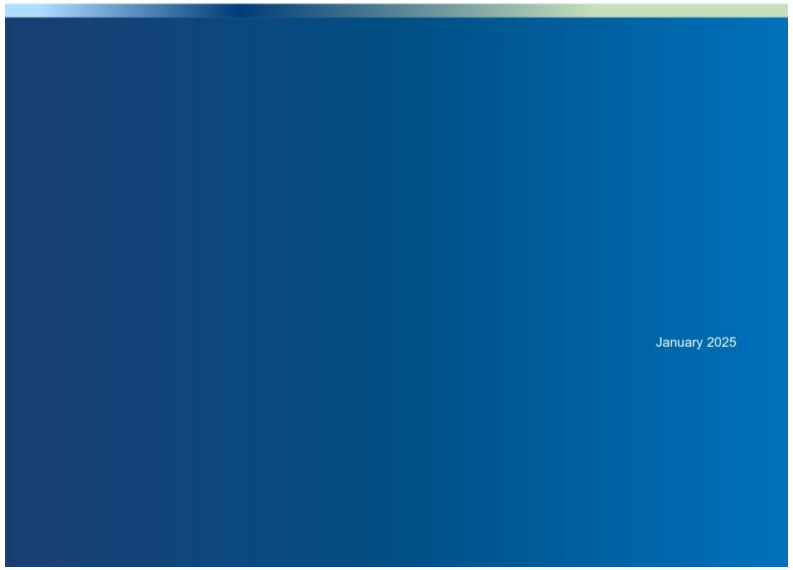
- Site procurement
- Approvals
- Design and Construct
- Start Filling



Image sources: https://hallaton.com/markets/solid-waste-landfill/

What's next?

There is a pathway…..



EPA Victoria Interim Guidance for changes to Pre-Settlement Contours in Victorian landfills

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WORKING DRAFT

Image sources: https://www.epa.vic.gov.au/amend-licence-permit-or-registration

Engineering Pathways

Proposed Amendment

Description of the Proposed Amendment
Supporting Plans
Comparison of Existing vs Proposed

Design Information

Engineering Assessments
Material Properties

BPEM Compliance

Comparison with BPEM

Required Assessments

Existing Cell Infrastructure Capacity
Maximum Waste Height
Landfill Cap and After-use Considerations
Landform – Batter and Plateau Gradients
Stability – Global and Veneer
Stormwater Management Plan
Landfill Gas Risk Assessment

Construction Information

Construction Plant and Methodology
Landfill Gas
Interim Capping
Final Capping and Rehabilitation

Image sources: https://hallaton.com/markets/solid-waste-landfill/

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Case Study





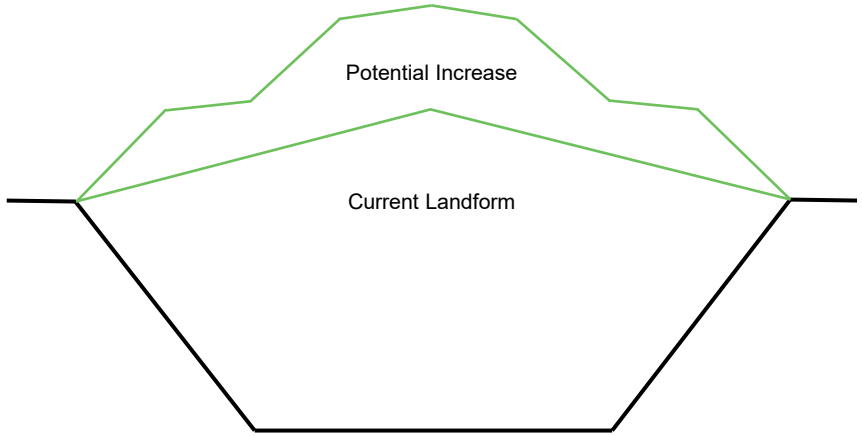
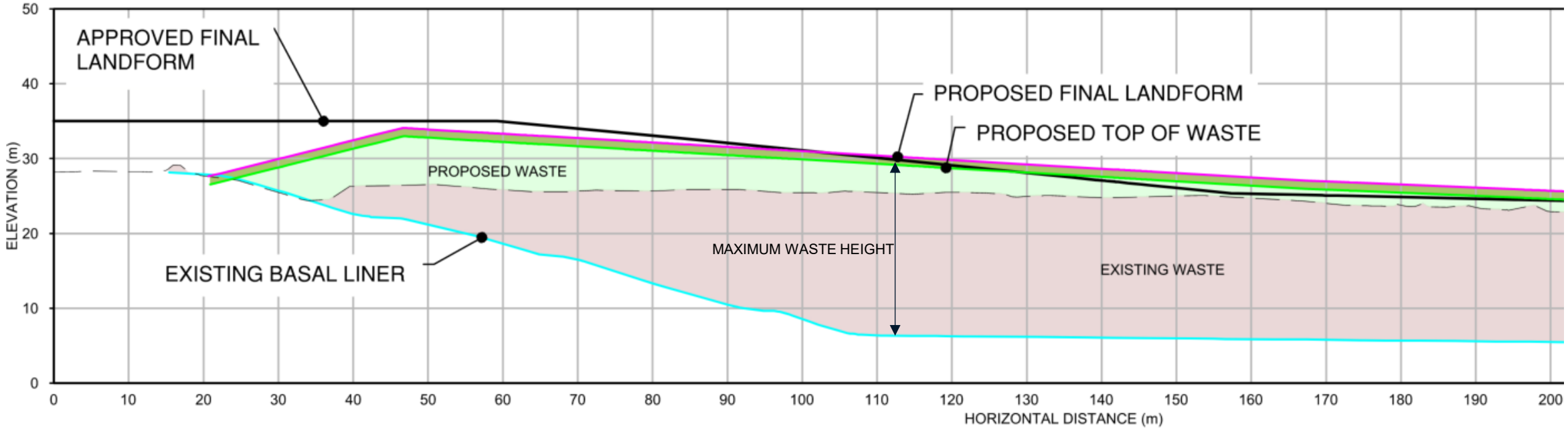


Image sources: https://ejatlas.org/conflict/waste-to-energy-and-ghazipur-landfill-closure-threaten-livelihoods-of-informal-recyclers-delhi-india, https://en.wikipedia.org/wiki/Payatas_dumpsite#/media/File:Payatas_Dumpsite_(Quezon_City)(2017-12-04).jpg, https://www.manilatimes.net/2024/06/06/photos/power-producer/1950275

Existing Cell Infrastructure Capacity

Legacy design and construction information:

- Maximum Waste Height



Existing Cell Infrastructure Capacity

Legacy design and construction information:

- Maximum Waste Height

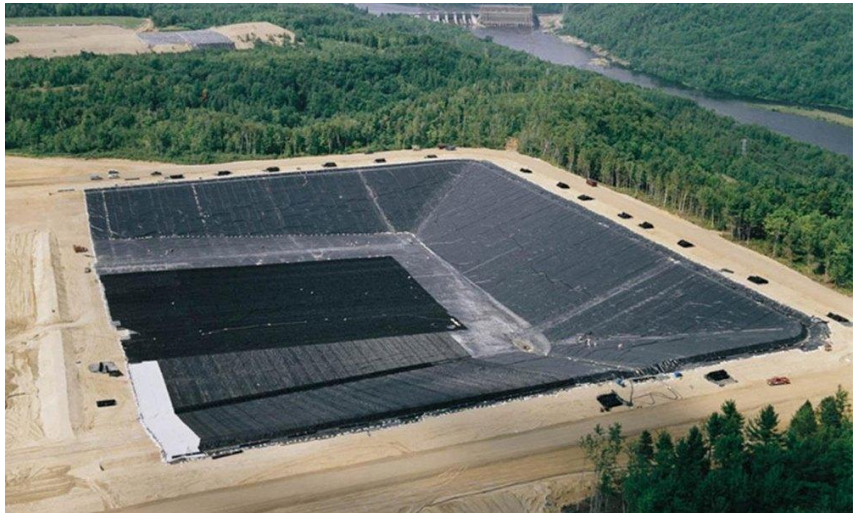






Image sources: https://www.indiamart.com/proddetail/construction-geo-membrane-24739830512.html, https://www.johnpaul.ie/case-studies/daa-apron-5h-enabling-works/, https://matrix-piping.prod01.sydney.platformos.com/pages/hdpe-landfill-leachate-poly-piping

Existing Cell Infrastructure Capacity

Legacy design and construction information:

- Landfill Cap and After-use Considerations





Solar Panels on a Closed Landfill





Image sources: https://www.vabeach.com/virginia-beach-things-to-do/amusement-parks/mount-trashmore-park/, https://www.newmoa.org/wp-content/uploads/2023/08/closed_landfill_bmps.pdf, https://www.ayresassociates.com/project/glendale-landfill-modifications/, https://re-formlandscape.com/projects/127

Existing Cell Infrastructure Capacity

Legacy design and construction information:

- Landform – Batter and Plateau Gradients
- Stability – Global and Veneer

<u>Suggested Measures from BPEM (2015)</u>

'DESIGN THE CAP GRADIENT TO BE BETWEEN FIVE AND 20 PERCENT'

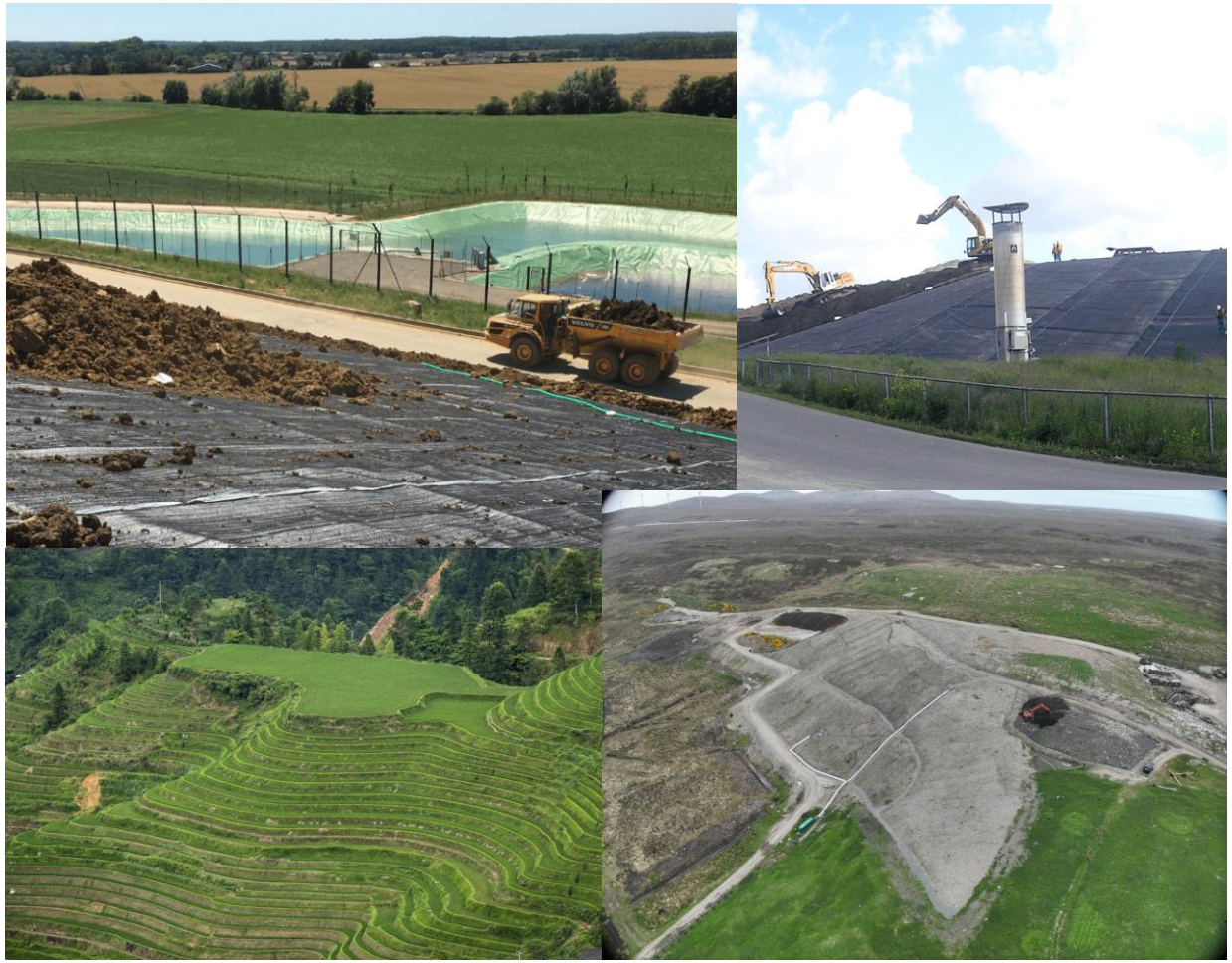


Image sources: https://enkasolutions.com/applications/veneer-stabilization/, https://enkasolutions.com/applications/landfill-gas-venting/, https://www.theglobeandmail.com/life/travel/destinations/a-sweeping-sea-of-green-guangxis-rice-paddies-also-feed-the-soul/article24821783/, https://abg-geosynthetics.com/case-studies/landfill-containment-and-drainage/landfill-capping-steep-slopes-bennadrove-lfs-isle-of-lewis-uk/

Surface Water Management

Site Surface Water Management Plan

Does the current infrastructure align with the Final Landform? Would it satisfy the design criteria applied today?

Design rainfall conditions from the 1990s may differ from today. Could the site accommodate a more extreme event?

Have we effectively managed environmental risks?





Image sources: https://www.bethlehemlandfill.com/services-and-rates, https://knowledgeauckland.org.nz/media/1s0d3tit/gd2016-005-3-erosion-and-sediment-control-guide-land-disturbing-activities-in-auckland-with-amend-3.pdf

Landfill Gas Risk Assessment

Landfill gas extraction system:

- Vertical wells, or
- Horizontal wells

How does the system integrate with the Final Landform?

Is there a current Landfill Gas Risk Assessment?



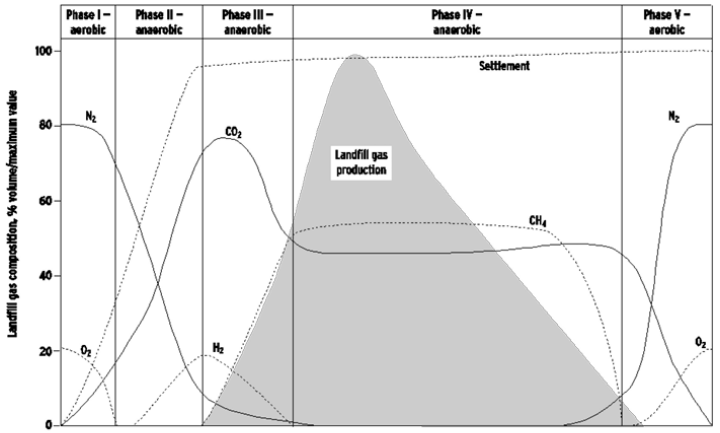


Figure B.3: Idealised representation of landfill gas generation

Note: Reproduced with permission from *Guidance on the management of landfill gas*, Environment Agency 2004.

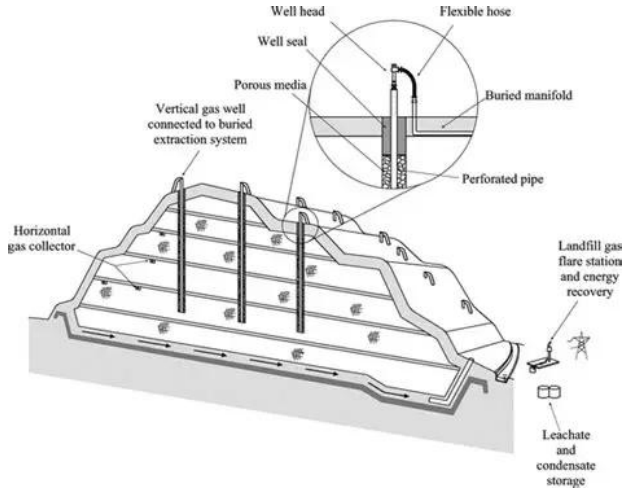


Image sources: https://landfill-gas.com/best-practices-in-odour-control-using-landfill-gas-extraction-systems, https://www.epa.vic.gov.au/sites/default/files/epa/publications/788-3.pdf, https://link.springer.com/chapter/10.1007/978-1-4939-2662-6_13, https://www.geograph.org.uk/photo/3500576

Case Study

How can we modify the Final Landform to better align with current site conditions and current guidance, while potentially creating additional airspace and extending the operational time?

<u>Potential Pathway</u>:

An integrated landform designed to achieve better environmental outcomes while potentially maximising available airspace.



Image sources: https://www.erosioncouncil.org/erosion-control-photo-gallery/

Key Takeaways

- **Know Your Site**

If ownership changes, you inherit the legacy conditions and obligations that come with it.

- **Record the Details**

Document important information – choices made decades ago may become important

- **Think Beyond Today**

Prepare your site for the future, decisions you make today will influence future opportunities and possibilities.





Remember - Sow the seeds today, reap the rewards tomorrow!

Image sources: https://www.sechicagohistory.org/archive/browse/aerial-photo-of-waste-management-cid-landfill/ , https://www.scsengineers.com/23639-2/

Now – Think About the Landfill Site!

Circle back to the questions from the beginning of this presentation:

- What is its condition today?
- How much life does it have left?
- Where is the filling progression heading?
- What Final Landform is it working towards?
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Now - Think About the Landfill Site!



If you reassessed your historically approved Final Landform against current site conditions, regulatory requirements and guidance, would it remain appropriate?



Image sources: https://comanco.com/desoto-county-landfill-progress-as-of-21910/, https://agruamerica.com/our-projects/berkeley-county-landfill/ , https://www.cbpenvironmental.com/scales-road

Now – Think About the Landfill Site!



And if not, is there an opportunity to amend it to address current site conditions and applicable requirements?

Will you then be able to effectively manage risks and achieve a better environmental outcome?



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Thank you

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