INVESTIGATION BRIEF

Title: Houghton Bay Leachate Mitigation
Date: September 2014
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Purpose and Scope

The purpose of this investigation is to gain an understanding of the effect of mitigation options on leachate discharge into Houghton Bay from the closed Houghton Valley landfill.

The scope is to provide an assessment of the effects on leachate production of different surface water management techniques and leachate and landfill gas management. An indication of costs and a timeline for implementation is also required for each component.

Background

The Houghton Bay landfill was operated in two phases. The first landfilling operation filled the lower reaches of Houghton Valley up to the playing fields by Houghton Valley School (Chief Engineers File, 1970). Landfilling began in 1950 and was completed in 1963, during which time 698,000 m^3 of refuse was deposited over 4.8 hectares. The approximate maximum depth of fill as a result of this operation is 18 metres.

The second stage of landfilling formed the playing fields from the old Horse Grounds up to Sinclair Park, and operated between 1963 and 1971. A total of 764,550 m^3 of refuse was deposited over 3.9 hectares to an approximate maximum depth of 36 metres.

Houghton Valley is a south-facing valley on Wellington's south coast. Immediately behind the fore-dune and road is a small residential area. The residential development extends up the eastern side of the valley. The western side of the valley is largely open space. The closed landfill forms the current valley floor. The stream that flowed through Houghton Valley was piped under both stages of the landfill.

The landfill is unlined.

There are 3 sources of water resulting in the generation of leachate at Houghton Valley via percolation through the landfill body.

- Rain directly onto the surface and from hillsides
- Stormwater from urban areas
- Groundwater seeps/springs

Additional to leachate a range of other substances are produced, including methane, and carbon dioxide.

The stormwater main under the landfill receives some stormwater directly from the east of the catchment and residential properties. Stormwater from the east of the catchment is also indirectly discharged to the closed landfill surface from road sump leads and diffuse sources.

Several small permanent streams flow from the western side of the catchment to the closed landfill surface and are either directed into intakes leading to the storm water main, or infiltrate the surface from a wetland area established by the community.

The original stream used to discharge onto the beach at Houghton Bay. Some of the leachate-contaminated water still does. It is important to note that Houghton Bay sits within the Taputeranga Marine Reserve.

A strong pungent odour comes directly from the pipe outlet and open grates along the roads and drains round the edges of the fields. Odour associated with fresh water seepage occurring up to 100m either side of the pipe terminal may suggest leachate within groundwater.

In 1992 a jumping weir was constructed on the main stormwater culvert running under the closed landfill, approximately 150m from the outfall. The purpose of the weir was to divert all dry weather flow from the stormwater to the sewerage system. This is because the leachate cannot be considered stormwater, as it does not meet the regional rules for stormwater. The jumping weir has been adjusted to different heights over the years. It doesn't always work, leading to occasions of discharge of leachate to the beach and into the sea.

The flushing of iron bacteria from the landfill body causes the bulk of the leachate discharge to have a bright orange discolouration. Council files record correspondence from Houghton Bay residents and the Houghton Bay Residents Association regarding the leachate discharge across the beach. Apart from potential environmental damage, residents have expressed concerns about potential ill effects to children paddling in the water on the beach, and to dogs drinking water from the outflow.

Lifting the Creek Project

Houghton Valley Residents are working on a broader vision plan for water in Houghton Valley, encapsulated by the concept of *Lifting the Creek*. Leachate mitigation forms a part of this. The goals of the *Lifting the Creek* project are:

- To embrace Wellington's Biophilic City aspirations
- To build community and develop local systems of care
- To provide education opportunities for school and community
- To manage ground and stormwater in a water sensitive manner
- To mitigate environmental damage from the closed landfill
- To enhance recreational access and enjoyment

Regarding leachate mitigation, a working group of community members and council officers have identified several ways to reduce water percolating through the landfill body (and therefore reduce leachate production at the source) as well as how to deal with other leachate issues. There may be other ways not yet identified. However it is important that the other goals of the community project are considered in any solution.

Remediation Solutions

Below are the discussed remediation solutions to reduce water percolation:

Remediation 1 – Rainwater falling on the surface of the landfill can be directed to a water-collection system at the sides. This involves re-contouring the general landfill surfaces. (What about flat playing fields?) The water-collection system will be largely but not exclusively on the western side of the valley and take the form of a constructed, lined channel imitating a natural watercourse. The channel will need to be away from active play areas, but can be more of a feature in less used fields.
Remediation 2a – Stormwater from the road and buildings can be piped or channelled to the water-collection system around the fields. Wetland areas and swales placed strategically up the landfill system will be necessary to regulate peak water flow, and channel winding and rocks will slow water velocity.
Remediation 2b – An alternative option is to take stormwater out of the equation and pipe it down Houghton Bay Road. This option is not favoured by the community, but is a more traditional solution from the Council's perspective.
Remediation 3 – Groundwater seeps emerging above the level of the landfill surface can be collected in a constructed watercourse or wetland as described above. It is not deemed viable to capture groundwater seeps below the surface of the landfill unless water emerges at a steep face.

Below are other discussed solutions to deal with general water, leachate and other substance management:

Remediation 4 – The construction of a new pipe down Houghton Bay Road from the bottom of the landfill to capture all uncontaminated water and direct it to the sea.
Remediation 5 – The construction of an in ground dam at the bottom of the landfill to capture all leachate and direct it into the existing leachate pipe.
Remediation 6 – The creation of a permanent connection at the jumping weir to direct leachate to the sewer system.
Remediation 7 – Flaring or filtering of landfill gas.

The Brief:

Provide an assessment of the above-mentioned surface water, leachate and landfill gas management solutions in terms of the effective minimisation of leachate production in the valley and elimination of discharges to the sea.

Comment on the positives and negatives of the various solutions and rank them according to effectiveness, bearing in mind the full scope of community aspirations. Suggest and assess alternate options as appropriate.

Engage with community groups and other stakeholders *early in the process* through workshops and meetings to assess the best solutions independent of price i.e. non-price Multi Criteria Assessments. Budget for engagement costs. Groups are to include but are not limited to:

- Local residents and community organisations including Friends of Buckley Road, Houghton Valley Progressive Assoc. Inc., Houghton Valley Home and School Assoc.; HVS Board of Trustees, Houghton Valley Playcentre and The Kaye Miller Trust;
- Iwi;
- Tapu te ranga Marine Reserve Trust;
- Recreational groups including surfers, divers, swimmers, dog walkers and sports organisations.
- Department of Conservation
- Wellington Regional Council

Offer an indication of costs and a timeline for incorporating various solutions or stages.

Where appropriate calculate water volumes and flows diverted from the landfill.

Assess the effects on park users and local residents.

For the stormwater main along Houghton Bay Road (Remediation 2b and possibly Remediation 4), review options for treatment of stormwater via proprietary devices, prior to discharge to the CMA/ marine reserve.

Confirm that, when a combination of all/or some solutions are implemented the volume of leachate directed to sewer will not compromise the capacity of the sewer main downstream.

The project is an ideal vehicle to promote understanding and awareness of the connection between land, water and the community, as well as current trends in sustainable development, water sensitive urban design and civic respect for water and the natural environment. This work is in collaboration with the community, so consideration of the integrated amenity and benefits of the solutions should also be commented on.

Teams are initially required to provide a proposal including fees, team and methodology to achieve the project tasks. This is to be submitted and agreed

to before any further work proceeds. Preference will be given to multi-disciplinary teams offering greater innovation in their assessment of options.

Team should include expertise in:

- Closed Landfills
- Geoscience
- Civil Engineering
- Hydrology
- Landscape architecture
- Ecological Engineering
- Participatory development techniques and inclusive consultative approaches

Issued to: