

The Impact of Landfills on Rural Communities

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2005

**For Primary Industry Council/Kellogg Rural
Leadership Programme**

Executive Summary

A modern landfill bears little resemblance to its predecessor the rubbish dump or tip with its poor environmental standards. The landfill is likely to be located in an easily accessible rural area. A site is carefully chosen to ensure that it meets the requirements of the Resource Management Act (1991). Landfill developers are required under the Act to obtain a number of resource consents to develop and operate the landfill. These consents give the host rural community considerable protection against any environmental impact of a neighbouring landfill.

Property owners in a host community should participate in the consultation process required under the RMA. The concerns of the host community can be worked through with the developer and changes made to the landfill design to mitigate the effects before the resource consents are applied for.

There are both negative and positive impacts on a rural community of having a landfill located in its area.

The biggest problem reported for host communities with existing landfills is the production and smell of landfill gas. The installation of a gas collection system can collect over 75 percent of the gas produced from the site. The gas can be either flared or used for electricity generation.

During the consent process and development phase of a landfill the property market is impacted. Properties in the host community become difficult to sell and may reduce in value. In areas where modern landfills have been developed, the property market has returned to normal once the landfill is operating and the perceived risks have not eventuated.

Positive impacts of a landfill include employment opportunities and the economical benefits of the landfill business to the host community. Improved road access to the site and cheaper waste disposal costs are other benefits.

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INTRODUCTION

The word landfill for many conjures up a picture of the historical rubbish dump or tip with the trail of rubbish along the roadside, getting increasingly worse the closer you get. A flock of scavenging seagulls hover in the air marking the site. When you arrive and open your vehicle door the horrific smell and a swarm of flies greet you.

Generally a rubbish dump was sited on the edge of town and usually located in either a river margin or an old shingle pit. The leachate or contaminated liquid coming out of the dump seeped through the sand and shingle base of the dump and mixed with ground and surface water.

A modern day landfill bears little resemblance to its predecessor the rubbish dump or tip. Compacted waste is transported to the landfill from transfer stations in sealed trucks. The general public do not have access to the site. There are no seagulls hovering above, and spraying controls the flies. At the end of each day the waste is covered with a layer of dirt or clay that, prevents any rubbish being blown around the site and greatly reduces the smell and also vermin.

Technically viable landfill sites have become a scarce resource. The selection of potential sites now requires careful consideration of the environmental impact of the landfill on the surrounding host community.

The possible impacts on the host community include:

- Traffic hazards
- Noise
- Unpleasant odours or smell
- Windblown litter and dust
- Increased numbers of vermin and wild cats
- Water supply contamination.

The end result is that now landfills tend to be located more than 5 kilometres from the nearest urban population in rural areas. This creates the problem of the rural community being asked to accept the risk associated with the disposal of the refuse from the whole community.

Currently in New Zealand there is 800 kilograms of waste per person that is disposed of in landfills each year. This includes commercial and industrial waste. Everyone is in agreement that the waste has to go somewhere provided it is "Not in My BackYard". (The NIMBY approach)

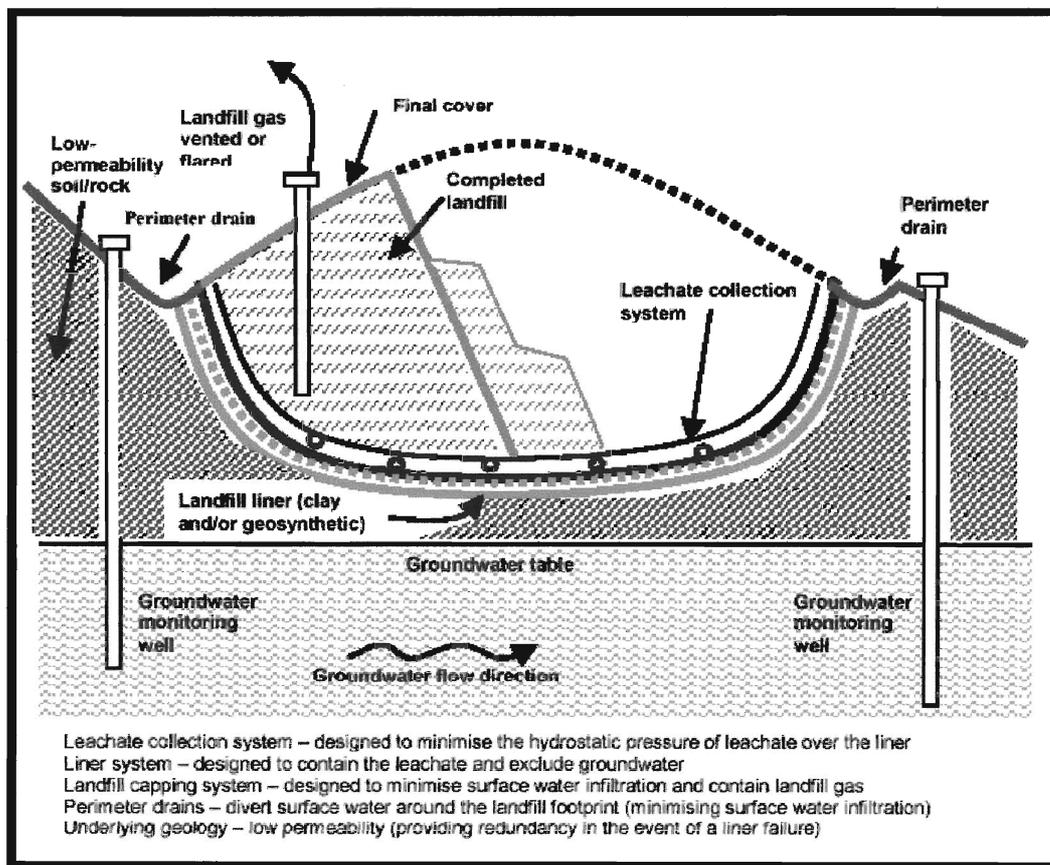
This paper will look at the site selection process and construction of the modern day landfill and what the impact is on the local rural community.

Landfill Siting and Design

To assist with the siting and design of a new landfill, the Centre for Advanced Engineering at Canterbury University has published a practical guide called "Landfill Guidelines". The guidelines have been written to assist landfill developers meet the requirements of the Resource Management Act (1991).

The Ministry for the Environment has endorsed these guidelines as good practice.

Figure 1: Landfill siting, design and operation



A good landfill site is one that provides a high level of natural containment and is located where it causes a minimum disruption to the local community.

The initial site investigation should consider the following factors:

- Geology
- Hydrogeology
- Surface hydrology
- Stability
- Access and traffic
- Surrounding land use

These factors can minimise the environmental impact of a landfill.

1. Geology

The geology of a site is important for the long-term containment of leachate. A site with low permeability soil or rock beneath the landfill is preferred. This reduces the chance of leachate ever entering the groundwater even if there is a failure in the leachate liner.

Leachate is the liquid effluent resulting from water percolating down through the landfill waste and will turn black when exposed to air.

2. Hydrogeology

It is essential that groundwater be protected from any system failure at the landfill. A landfill should not be located in an area with a high water table or near a water aquifer used for drinking water.

3. Surface hydrology

The site should not be in or near a waterway. There should be no risk of surface water being contaminated.

4. Stability

Sites with active geological faults or geothermal activity need to be avoided. Similarly, areas where landslides or subsidence may occur should also be excluded.

5. Access and Traffic

The local roading network has to be able to handle the extra traffic generated by the landfill.

6. Surrounding land use

It is desirable to have a buffer area around a landfill to preserve and protect the surrounding area. This buffer area should be under the control of the landfill operator.

Technically viable landfill sites are becoming an increasingly scarce resource. Due to the high cost of establishing and operating a modern landfill, there are now fewer but larger landfills operating. These large modern landfills service several regions rather than just the local town or city. Potential landfill sites that meet the above criteria are most likely to be found in rural areas.

Landfill Legislation

In October 1991 the Resource Management Act (1991) became legislation and since then has had a huge impact on the siting and design of new landfills.

The purpose of the Act is:

‘ To promote the sustainable management of natural and physical resources.’

Landfills that were established before 1991, and the Resource Management Act, were able to claim existing use rights.

Existing Use Rights

Landfills established before 1991 would have been granted land use consents under the Town and Country Planning Act (1977) and granted water rights under the Water and Soil Conservation Act (1967). They can only continue to operate as landfills under existing use rights provided they do not expand.

Any landfill established after 1991 has to comply with the Resource Management Act (1991).

Resource Management Act (1991)

Under the Act the following 5 consents are related to landfills.

- Discharge permit
- Water permit
- Land use consent
- Coastal permit
- Subdivision consent

1. Discharge Permits

The Act requires landfills to have resource consents (discharge permits) for discharges to land, air and water.

a) Discharge to Land:

The discharge permit will contain conditions relating to the location and quantity of waste as well as the liner and leachate system.

b) Discharge to Water:

The permit will cover clean and possibly contaminated surface stormwater as well as groundwater. Regular monitoring of surface and groundwater is required.

c) Discharge to Air:

Landfill odour and dust are the two main air discharges. Historically smoke from the burning of rubbish also created problems, however this practice became illegal with the introduction of the Resource Management Act (1991).

The decomposition of waste creates landfill gas, which is mostly methane and carbon dioxide. A gas control system is required to prevent the odour becoming a problem for the neighbours. The gas can be flared or utilised (eg. for power generation).

2. Water Permits

A water permit is required for the diversion or damming of natural streams or the diversion of stormwater around a landfill site.

3. Land Use Consent

Consent is required for the deposit of any substance in or on the land. The consent is likely to contain conditions relating to, noise, roading and traffic, litter, nuisance from birds, flies and vermin and site rehabilitation.

4. Coastal Permit

A coastal permit would be required before a landfill could be developed in the coastal marine area or if there is likely to be any discharge into the coastal marine area.

5. Subdivision Consent

This maybe required where there are roads to vest in the council or reserves to be set aside with the landfill development.

Consultation

Under the Resource Management Act (1991) consultation with likely affected parties is a critical requirement:

The local and regional authorities need to be consulted with from the start. They will have requirements that have to be met before they will grant Resource Consents. Similarly the local community also needs to be involved from day one to discuss the likely effects on them and the local environment. Suggestions from these discussions can then be included in the final proposal. This helps mitigate any adverse affects and hopefully will speed up the consent process. There is also a special requirement that the tangata whenua need to be consulted with.

Process

The landfill developer applies to the District and Regional Councils for the necessary consents.

The consent applications are publicly notified and submissions are called for. A public hearing is held to consider the applications and to give submitters the opportunity to be heard in front of the Hearing Committee consisting of the District Council Hearing Commissioners and the Regional Council Hearing Committee.

The Hearing Committee will then consider all the information and give a decision.

Submitters or the applicant can appeal the decision to the Environment Court.

Rural Community Impact

Landfills constructed since 1991 that meet the requirements of the Resource Management Act have far less impact on the host rural communities than their predecessors. However any industry or business operating in a rural area will have some effect on their host community.

The impacts that are likely to be of greatest concern to the host community include:

- noise
- visual
- smell
- traffic
- litter
- vermin
- and water contamination.

These factors combined or individually can result in a reduction of property values in the vicinity of the landfill.

1.Noise

Machinery operating in any environment will create some noise. The location of the landfill relative to the neighbouring properties has to be taken into consideration during the site selection and assessment phase.

When a site has been chosen then the hours the landfill operates will be part of the resource consent. This should be one of the topics discussed and agreed to during the community consultation.

The level of acceptable noise at any property boundary, measured in decibels, is likely to be already stipulated in the local District Council Plan.

2.Visual

When looking at the suitability of a landfill site any dwellings in a direct line of site have to be taken into consideration. The planting of trees around the site can help provide a screen for these dwellings.

A buffer zone or green belt around the site, controlled by the landfill operator, will greatly reduce the possibility of having dwellings within a 1-kilometre radius or in a direct line of sight.

Limiting the size of the landfills active working area, at any one time, will also help.

The final landform or contour of the site when the landfill closes will be required to be in keeping with the surrounding area.

3. Smell

This is a major problem for every landfill. Environment Waikato stated that approximately 75 percent of the complaints they receive on landfills relate to smell or odour. These complaints are mostly from older style landfills that are still operating rather than from the modern landfill sites.

Research work undertaken by Taylor Baines & Associates in the late 1990's found that any houses located within a 1-kilometre radius of a landfill, were far more likely to be affected by landfill gas as well as dust and noise. This particularly applied to houses on the prevailing wind side and those topographically below the landfill (further down a valley).

Landfill smells are from three sources: landfill gas, the working face, and odorous loads. Rubbish that has been transported some distance, especially in warm weather, can become very odorous. These loads have to be spread, compacted and covered as quickly as possible at the site. The size of the working face or tip area should be kept small and be covered at the end of each day to minimise the odour. The capping or sealing of the site with clay reduces the odour by approximately 75 percent.

Landfill gas produced as the decomposition of the waste occurs consists of mainly methane and carbon dioxide. It also contains trace amounts of organic compounds such as esters, phenols, organic acids, solvents and sulphur compounds. It is these organic compounds that give landfill gas its characteristic smell. The type of waste, the moisture level and the age of the landfill determine the volume and rate of landfill gas production.

The installation of horizontal collectors and vertical extraction wells in the landfill can collect over 75 percent of the gas produced from the site. All the gas collection pipes are connected to a vacuum pump that sucks the gas to a central point. The gas collected can then be either flared or used for electricity generation.

4. Traffic

The landfill site should be close to a major road or highway. The road servicing the site has to be able to cope with a large number of truck and trailer movements daily. A turning lane at the intersection of the servicing road and the major road or highway is required as well as one into the landfill access road.

5. Litter

This is a major concern for neighbouring property owners. Waste arriving at the site from transfer stations needs to be partly compacted and transported in fully enclosed or covered vehicles. On windy days water sprayed on the operating face will help reduce wind blown material and also dust. The erection of nets, 4-5 high, around the operating area is required to help catch any wind blown material.

The consent is likely to include a requirement that the adjoining area and access roads be patrolled regularly to collect litter.

6. Water Contamination

The floor and sides of the landfill site have to be sealed to prevent leachate entering the groundwater system. The base geology should be non-porous and then covered with a 600mm clay liner. A synthetic liner is then placed on top of the clay. Above the synthetic liner is sand and then gravel with drainage pipes to collect the leachate. The waste is then spread and compacted above the leachate collection system. Surface water is diverted away from the site to prevent any possible contamination.

The landfill liner, leachate collection system and method of treatment are specified in the resource consent.

Currently most modern landfills transport the leachate to a sewage treatment plant. Alternatively the leachate can be put through a leachate evaporator and then incinerated at very high temperatures. The high temperatures ensure that there is no air pollution. The residual sludge is then returned to the landfill.

The above factors, or potential environmental impacts, demonstrate how important the selection of a suitable landfill site is. The modern day landfill, operating with consents that have been approved under the Resource Management Act, has far less impact on the host community than its predecessor the town dump or tip.

Property Values

Currently the property market reacts to a proposed landfill site resulting in an adverse effect on values. The perceived or real risk of the landfill has an effect on the local community. Buyers are reluctant to purchase in the area because of the proposal. Those people having to sell are only likely to at a discounted price.

However in areas where landfills are operating, once the landfill has been established and the perceived risks have not eventuated, then the property market has returned to normal. At Redvale, 30 kilometres north of Auckland, there has been substantial expenditure on housing and other property assets since the Redvale landfill opened in 1993. The quality of houses being constructed is relatively high. The large landfill there, which has a 30-year consent, has had no long-term impact on property values.

Similarly at Tirohia, near Paeroa, there has been no long-term adverse effect on property values in this rural area since a landfill opened there in 2001.

In rural areas because the number of property sales is less than in an urban area it is difficult to accurately measure the impact on property values.

However it does appear that the market will retreat when a landfill is first proposed in an area.

When the perceived risk does not eventuate the market returns as can be seen at Redvale and Tirohia.

Positive Impacts

While we tend to focus on the negative impacts, there can be positive impacts on a host community as well such as: employment, economic, improved roads and lower rubbish disposal costs.

Economically the landfill will bring a lot of new business to the area. During the construction phase there will be a lot of work for both local and outside contractors. Once operating there will be an on going requirement for contractors both for maintenance and further development. There will also be employment opportunities for permanent staff to operate the landfill.

The road access to the landfill site will most likely need to be upgraded to handle the additional traffic. This will also be a positive impact for the host rural community.

The cost of rubbish disposal for the host community will be lower due to the short distance refuse has to be transported.

Conclusions

This paper has considered the siting and design requirements of a modern landfill and then looked at the likely impact on the local community.

The Resource Management Act 1991 has had a huge impact on the siting and design of modern landfills. The RMA has come in for a lot of criticism because of the additional costs the Act has incurred on developers. These additional costs have to be recovered somehow and results in the end user paying more for landfill charges.

However it has also resulted in a vast improvement in environmental standards. The RMA has protected the interests of host communities.

The initial reaction of a community to the news that a landfill is planned in their area is that it will be an environmental nightmare. This reaction is due to a perception based on the historic rubbish dump or tip and its lack of environmental standards.

Public outcry and media involvement can result in an adverse impact on property values. Properties in an area where a landfill has been proposed become difficult to sell because of the perceived environmental risk or impact. Property values can fall if someone is forced to sell.

However in areas where there are modern landfills now operating, the property market has returned to normal as the perceived environmental impacts have not eventuated. A drop in property prices tends to be temporary. At Redvale north of Auckland high value properties are now being built in the vicinity of the landfill.

Property owners in the area of a proposed landfill, where the site meets the requirements set out in the "Landfill Guidelines" should make maximum use of the consultation process. It is in everyone's best interest to discuss the concerns and impacts of the landfill on the local community before the various consents required are applied for. This way the host communities concerns can be taken into consideration when the final design plans are drawn up and before the resource consents are applied for

The developer will be keen to work with the community at this stage to prevent a long drawn out and expensive consent process going through the Environment Court. The local community can protect their environment and property values by working with the developer to have the necessary changes made to the landfill design to mitigate their concerns.

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Acknowledgements

A big thankyou to the following people who assisted me with information used in putting this paper together.

Dennis Crequer - Environment Waikato

Barry Campbell - Environment Waikato

Chris Purchas - Ministry for the Environment

Eric Souchon - H.G Leach & Co