

Host Communities: siting and effects of facilities

An analysis of host community experience of the Burwood Landfill (Christchurch City)

by

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Acknowledgements

This case study has contributed considerable knowledge that is important to a better understanding of the effects which host communities can expect to experience from the operation of a sanitary landfill. The research would not have been possible without the co-operation of all those who were interviewed. The level of willingness to co-operate is worthy of acknowledgement - the research team met with no refusals. The research team wishes to express its gratitude to all those who participated in this case study - the nearby residents and those enjoying recreational opportunities in the vicinity of the Burwood landfill; also to the other key informants, the operators and administrators of the landfill.

It is to be hoped that this case study may also lead to further improvements in the management of the Burwood landfill, and to building a positive working relationship between those responsible for operating and overseeing the facility and members of its host community.

The research team also expresses its gratitude to the Foundation for Research, Science and Technology for its financial support of the research programme.

Table of Contents

A:	Introduction to this case study	1
	Public Good Science Fund Research	1
	Reasons for this research programme on facilities and their host communities	1
	Purpose of the case studies	2
	Methodology for the case studies	3
	Outputs of this research programme	4
	The research provider - Taylor Baines & Associates	4
B:	History and description of the facility	5
	Location	5
	Planning	6
	Site development and access	9
	The present situation (1999)	10
	Liaison between the facility and its host community	11
	Monitoring	11
C:	The host community	12
	Overview	12
	History of land development in the area	12
	Population change 1986-96	15
	<i>Residential sub-divisions 1986-99</i>	15
D:	Coverage of consultation and interviews	16
	Numbers and categories of interviewee	16
	Areas of residential interviews	17
	Interviews with recreational users of Bottle Lake Forest Park	18
	List of other key informants	19
E:	Operational effects of the landfill on neighbours	21
	Overview of residential responses	22
	Overview of recreational responses	22
	Noise	26
	Vibration	28
	Safety on the roads	29
	Heavy traffic patterns	31
	Litter	31
	Gas emissions	33
	Visual aspects	34
	Birds	35
	Vermin	36
	Dust	37
	Cats	37
	Hazards	38
	Landfill leachate	39
	Summary of responses	40
F:	Long-term effects of the landfill on settlement patterns and development in the locality	42
	Major changes in land use and settlement pattern	42
	The influence of the landfill on the way in which the community has developed in this part of Christchurch	43
	Property values	44

A: Introduction to this case study

Public Good Science Fund Research

The research team at Taylor Baines & Associates was contracted by the Foundation for Research Science and Technology to carry out a piece of social research concerning the siting decisions and community experience of solid waste facilities. The research has been funded out of the Public Good Science Fund.

Spread over three financial years - 1997 to 2000 - the research programme aims to assist the processes of urban and rural planning (as it applies to future solid waste disposal infrastructure) by developing a body of knowledge on social factors that are relevant to the siting and operation of solid waste facilities.

In total, the research programme is intended to answer three core questions-

1. Is there a systematic pattern of solid waste facilities siting in NZ. If so, how would you characterise this historical pattern from the social perspective of host communities?
2. How do actual effects compare with effects that were projected at the time of siting?
3. What have been the longer-term effects on host communities of solid waste operations?

This research on solid waste facilities is part of a longer-term research programme currently being funded by the Public Good Science Fund into the siting and social impacts of a range of facility types. During the period 1997 to 2000, research has been carried out on solid waste facilities - landfills and transfer stations. During 1998 to 2001 other research is focussing on waste water facilities. Please refer to the TBA website - www.tba.co.nz - for more information.

The research programme has received the strong endorsement of Local Government New Zealand, the New Zealand Water and Wastes Association, the Ministry for the Environment, as well as several territorial local authorities.

Reasons for this research programme on facilities and their host communities

It is a common experience that assessing the effects of solid waste facilities at the time of site selection is a contentious process. The debates that surround such assessment activities are often informed more by prejudice and a strategic selection of hearsay information than by well-founded evidence.

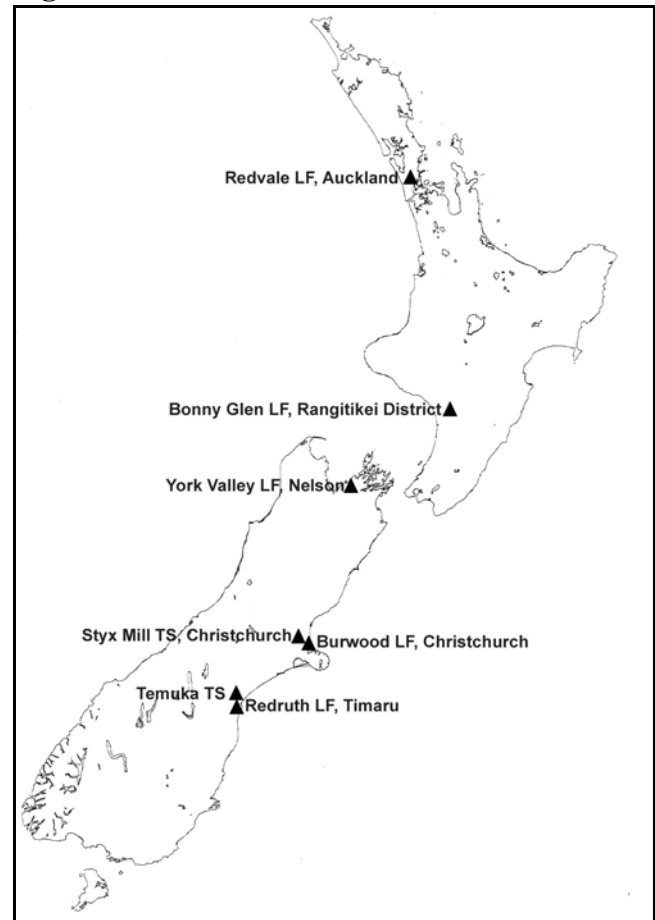
This research aims to address both questions of possible social bias in site selection and lack of experienced-based information relevant to New Zealand communities. It is to be hoped that these objectives will be served by carrying out the research in a setting which is removed from the tensions of resource consent applications, and by a team of independent researchers who have no organisational affiliation with either the developers of such facilities (usually but not always Territorial Local Authorities) or the host communities involved.

Purpose of the case studies

This case study on the Burwood landfill is one of seven such case studies being undertaken as part of this research programme¹, as shown in Figure 1. The case studies were selected to provide a range of relatively recent facilities, from large metropolitan landfills and a transfer station, to the kinds of facilities more familiar in smaller cities and rural areas. As a result, the experience documented in these case studies should provide useful insights into contemporary New Zealand experience.

Each case study has been conducted at a time which avoids conflicts with active resource consent proceedings. Care has been taken in the social assessment research method to provide accurate² and useful descriptions of the effects experienced by host communities, by canvassing a wide range of local observations, by accessing other relevant data sources where possible to corroborate the observations of neighbours, and by engaging in a process of feeding back preliminary findings for checking and validation by the research participants. As a result, the experience documented in these case studies should neither overstate nor understate the experience of the host communities involved. This is important, if the research is to assist participants in future planning.

Figure 1: New Zealand Case Studies



Nevertheless, the case studies each represent experience at a particular point in time. The research process itself, and the case studies resulting from the research, have the potential to trigger changes in the way the facilities are operated and managed. Thus it is important to interpret the findings of each case study in the context of the way the facility was operated and managed at the time of the case study fieldwork³.

It is also important to keep in mind the perspective of this research - the host community perspective. Primary emphasis has been put on capturing the experience of members of the host community - the community of residents and recreational users in relatively close proximity to the Burwood Landfill. It is their experience of the off-site effects such as odour, dust, litter and noise, and the impacts of such effects that will be useful to others contemplating the siting of a new solid waste facility. By the same

¹ The full list of case studies includes Burwood Landfill, Redruth Landfill, Bonny Glen Landfill, Redvale Landfill, York Valley Landfill, Styx Mill Transfer Station, Temuka Transfer Station.

² The use of percentage figures in this case study is not intended to imply statistical analysis. Rather it should be interpreted for comparative purposes merely as indicating the proportion of respondents in any particular area of interviewing who gave a specified response.

³ The fieldwork dates are noted explicitly in the case study report. Furthermore, the report attempts to describe as fully as possible the operating regime at the time of the case study.

token, there are likely to be some off-site effects such as risks to groundwater quality that will not necessarily be informed by a focus on neighbours' experience, simply because such phenomena are not often readily detectable to casual observation, even if they do occur.

Methodology for the case studies

The research method drew on the practical and theoretical approach to social assessment described in Chapter Four of "Social Assessment: theory, process & techniques" (Taylor et al., 1995). Stages in the research included scoping the particular cases to clarify the appropriate time frame and communities of interest, community profiling, a structured survey of nearby residents and business people, in-depth key informant interviews, and accessing a range of existing data sources.

A structured questionnaire was developed to gather detailed information about the experience of many individuals living in the host community. The questionnaire explored people's experience of day-to-day operational effects of the landfill, their perceptions of how the presence of the landfill has impacted on the longer-term development of the host community, and their knowledge of what has happened in their community during the years prior to and since the landfill was established. The detailed analysis is descriptive and sometimes quantitative, but not statistical in nature⁴.

In carrying out the comparative case assessments, the assessment team had to address several issues relevant to interpreting the results and their usefulness in providing valid comparative information. These included the debate about 'perceived' or 'real' effects, the need for corroboration, and the importance of timing or context as a potential influence on individual responses.

The assessments focussed on people's experiences of living or working near waste management facilities. The results are therefore based on a large body of individual perceptions of effects. In some feedback discussions, the distinction was made that these effects are "*only people's perceptions; they're not necessarily real.*" The question arises therefore as to what is the difference between a 'perceived' effect and a 'real' effect. Can 'perceived' effects ever become 'real' effects? In practical terms, the assessments identified clearly the proportions of those interviewed who experienced certain types of effects. Furthermore, wherever possible, the assessment sought to investigate these effects from other respondents and from independent sources (e.g. local key informants; secondary data records) or different perspectives (e.g. the facility operator)⁵. As researchers, it was pleasing to note how, in the great majority of cases, neighbours' experience was strongly corroborated by the perceptions and experience of the facility operator.

A number of factors have a bearing on individual experiences. Different people have different thresholds for noticing effects depending, for example, on their ability to hear or to smell, or on their perception of what is 'exceptional'. Increasing sample size addressed this factor. Different living or recreational patterns are likely to influence people's experience of effects - whether they are on the property all day, every day, or working off the property. Day-time interviewing addressed this factor by increasing the likelihood of including individuals with a relatively high rate of occupancy. People get used to effects

⁴ A statistically-based analysis would have increased the scale of field work and cost several fold.

⁵ As a matter of assessment methodology, we have adopted the stance that unless more than two individual neighbours reported and corroborated the same effect, or unless a neighbour's observation could be corroborated by an independent source, the effect would not be reported in detail, but simply noted. This reflects the stance that, while social assessment acknowledges the importance of individual observations, such observations still need to be subject to verification.

after a while - they can seem less exceptional. Following unprompted questions with prompted questions addressed this factor, by allowing interviewees ‘a second chance’ to respond.

Does the distinction between ‘perceived’ and ‘real’ effects matter? The primary purpose and value of comparative case assessment is to answer two types of questions - (i) if neighbours around a facility are experiencing certain effects, and finding that they have unacceptable impacts, what can be done to reduce or eliminate the effect, or make it less likely to happen? and (ii) if neighbours around Existing Facility A experienced certain effects and impacts from its operation, what is the likelihood that neighbours around Potential Facilities B, C or D will experience similar effects and impacts? In either situation, whether such effects are labelled as ‘perceived’ or ‘real’ is probably immaterial. However, from a “technical” perspective, replication of reported effects is important to their validation, while from a “political” perspective, the perceptions of just a few people affected can be sufficient to galvanise social action.

It is also important to remember that technical experts are not necessarily in a position to offer any more than assessments of ‘perceived’ effects. In the case of technical experts, their perceptions are derived with the aid of technical lenses (i.e. frameworks for analysis used by the technical expert). For example, an acoustical engineer can provide measures and predictions of likely noise levels at certain distances away from the source of the noise. The acoustical engineer is not usually in a position to draw any inferences as to likely social impacts associated with these levels of noise.

The tendency for potentially affected parties to distort or exaggerate the likelihood of effects when participating in EIA activities is not an uncommon experience for SIA practitioners. Indeed, in one of the comparative case studies, background documentation from an environmental tribunal declared this point explicitly. In these comparative case assessments, this factor was addressed by ensuring that all the case studies were carried out on facilities which had no consent applications or reviews in progress.

Outputs of this research programme

Outputs from this research have taken the form of public presentations and discussion sessions, as well as a range of hard copy formats.

The latter include a series of research Working Papers, conference papers, and an abbreviated summary document for each case study.

The research provider - Taylor Baines & Associates

Taylor Baines & Associates has been a private provider of research, consulting and training services since 1989. The firm specialises in social research and the application of social assessment methods to a wide variety of issues in community development.

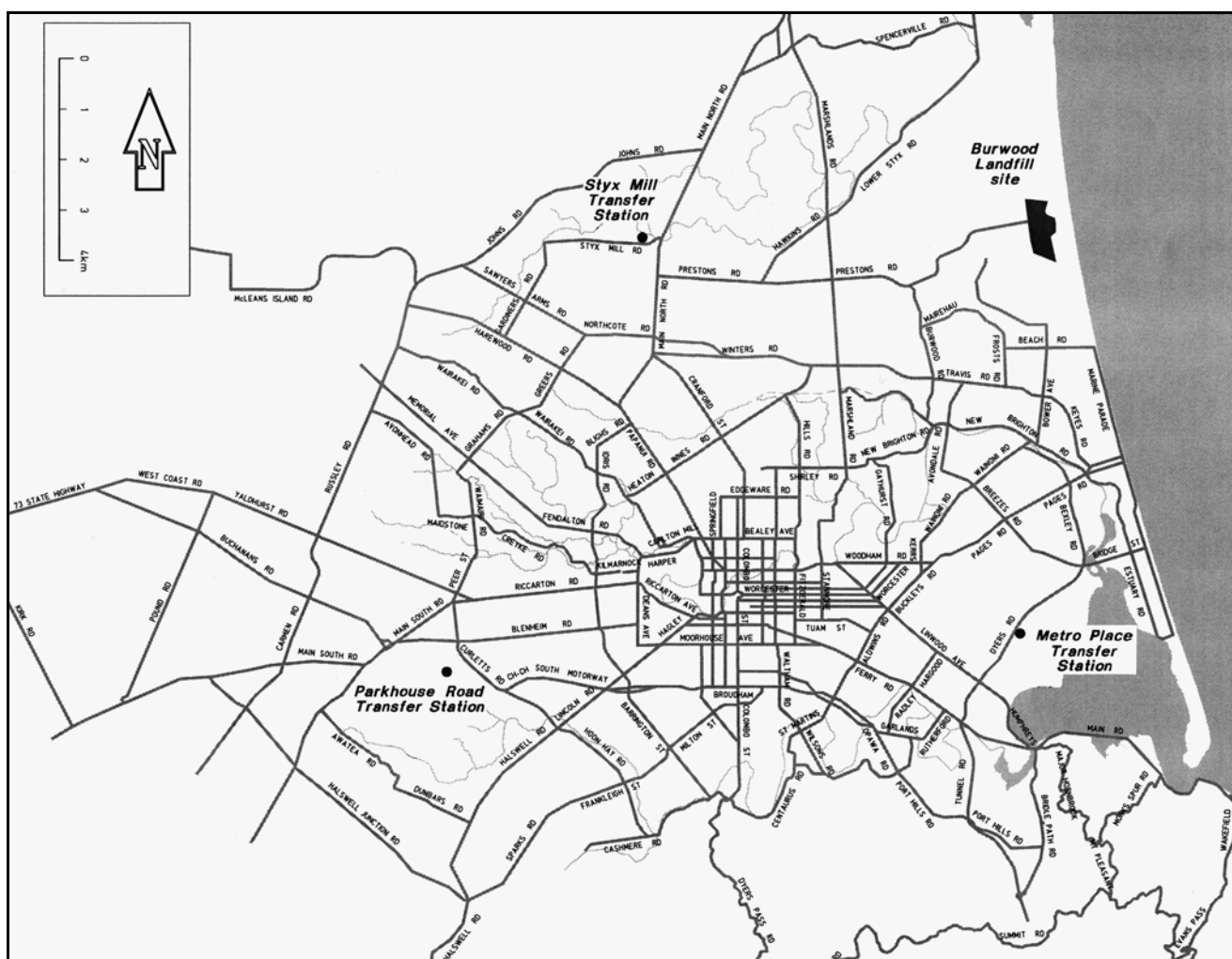
B: History and description of the facility

Location

The Burwood Landfill has been the principal refuse disposal facility for Christchurch waste since 1984. The landfill was sited within one kilometre of the coast, in the Bottle Lake Forest Park. The nearest residential suburbs are Parklands and Waimairi Beach, just over one kilometre to the south. The settlement of Spencerville is 4 km north of the new site. The landfill is served by three transfer stations located in the north, south west and south east of the City (see Figure 2). The whole site has an area of 92 hectares.

Figure 2: Christchurch's solid waste infrastructure

Source: CCC



Planning

Planning for the site began in 1971 when representatives from five metropolitan councils (Christchurch City, Waimairi District, Paparua District, Heathcote County and Riccarton Borough) began investigating a joint solid waste disposal scheme. These Councils formed a joint body, the Christchurch Metropolitan Refuse Disposal Committee (CMRDC), to manage refuse disposal on a metropolitan basis. In 1975, a 'greenfields' landfill site at Burwood was selected. In 1980 and 1982 the siting decision was revisited. Following investigation of fourteen possible sites (see Figure 3), the Burwood site was preferred again. The broad criteria used in site selection⁶ were-

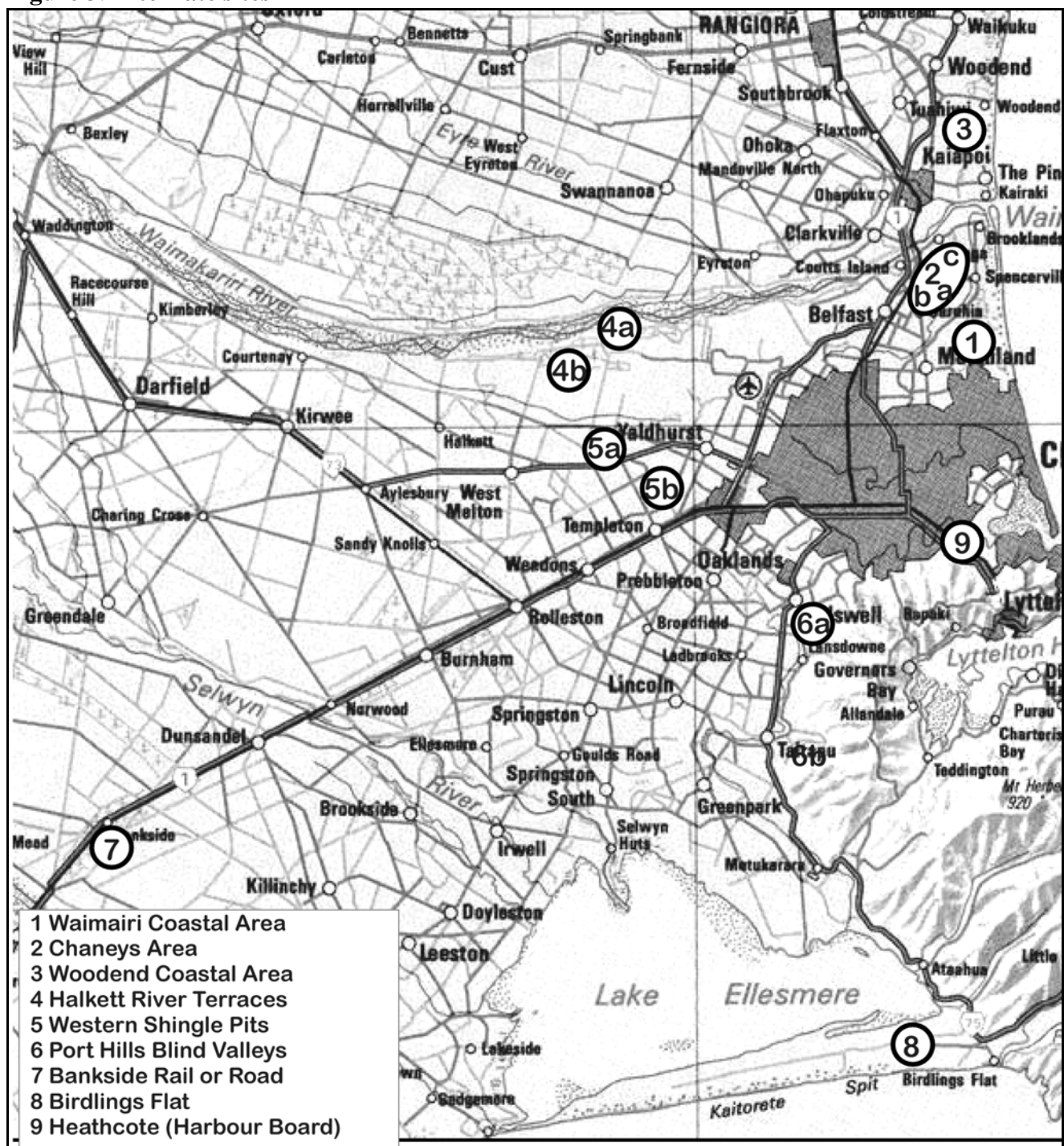
- the need to minimise the possibilities of contaminating the Christchurch domestic water supply
- the containment of transport costs within reasonable limits, given good general accessibility from three refuse stations in the urban area
- the desirability of avoiding interference with existing productive land uses as far as possible
- the use of refuse as a beneficial resource
- the desirability of reasonable separation between landfill/refuse disposal activities and existing residential, industrial or rural farming land uses
- the avoidance of undue traffic conflict and extraneous traffic in residential areas
- the ability to provide adequate buffer around the landfill area and to discourage general public access to the site during its use
- the development of an enhanced and visually attractive locality following rehabilitation.

The Burwood site was designated as an Interim Refuse Disposal Site in 1983, with land use designation covering all stages of future site development. The Draft Bottle Lake Forest Park Management Plan (1998) noted that -

“The use of the three 15 to 25 hectare blocks for landfill purposes is seen as an interim use of the land only and it is the Council’s policy that the land must revert to recreation and afforestation as soon as landfill operations in each sub-cell is completed. The scheme has been designed to assist in the improvement and enhancement of the area in order to yield a parkland environment as an extension of the Bottle Lake Forest Park and suitable for passive or active recreation use in the future. The refuse disposal work including the landfill is to be managed in a way that the area will be improved for this ultimate purpose providing a transition between more intensive production forestry in the west and the foredunes and beaches in the east.”

⁶ CMRDC (1982): Reassessment of alternative landfill sites. April 1982

Figure 3: Alternate sites



Source: TopoMap

Planning documents⁷ record the following environmental effects and issues projected for the Burwood site at the time of its selection -

- ***Leachate contamination of groundwater***
- ***Change in traffic character near the direct approaches to the landfill entrance and some heavy vehicle use of secondary roads*** until construction is complete of the planned southern motorway, and Northcote/New Brighton and Bexley expressways
- Increase in ***traffic noise for residents***
- ***Easier access for recreation into the Waimairi Coastal Area as tipping proceeds***
- ***Detraction for amenities (e.g. visual, odour, noise, windblown litter, etc.) for nearest residential areas, Parklands and North Beach***
- Landfilling will ***make the area unsightly and undesirable as a recreation spot both visually and through the likelihood of fires, rodents, birds and smell*** - the landfill is ultimately intended to create a better recreational resource of the area
- The risk of ***hazardous or toxic substances entering areas used by waterfowl*** - the landfill site is ultimately expected to incorporate a new wetland area, ie an additional ecological amenity
- Possible ***effects on foredune stability*** - the landfill operation is intended to stabilise the dune system in the long term

A subsequent assessment for consent renewal⁸ recorded the following projection of effects -

- Expects ***no significant off-site effects from the emission of landfill gas*** from the Burwood site, although ***odour*** and ***tree health effects*** may develop

⁷ Christchurch Metropolitan Refuse Committee (1977): Refuse Disposal for Christchurch including the Waimairi Coastal Area Recreation Development Plan. Environmental Impact Report. Volume 1 Commission for the Environment (1978): Refuse Disposal for Christchurch including the Waimairi Coastal Area Recreation Development Plan. Environmental Impact Audit.

⁸ Woodward-Clyde 1996; Landfill Gas: Burwood Landfill; prepared for Christchurch City Council.

Site development and access

The landfill site covers an area of 96 hectares, divided into three main stages⁹. Stage 1 comprises 11.4 hectares and contains approximately 1,100,000 m³ of refuse. Filling began in 1984 and was completed in 1988. Stage 2 commenced in 1987, covering an area of 43 hectares and is divided into two sections. Stage 2a was filled between 1987 and 1991 with a total volume of 1,070,000 m³ of refuse. The remaining Stage 2b was estimated in 1998 to have a capacity of over 1,400,000 m³ of refuse and was expected to have a further 5-6 years operation. Stage 3 covers an area of 42 hectares, with an estimated capacity of 4,200,000 m³ and a lifetime of 12-15 years. Recent results from consultants monitoring the site have revealed that “while Stages 1 and 2 are performing satisfactorily, proceeding with Stage 3 of the landfill in its planned location was likely to lead to levels of contaminant (leachate) in the groundwater that were above acceptable environmental standards.” The Burwood landfill was designed and constructed before liner systems were required in New Zealand landfills. Operations of the landfill are subject to a resource consent under the Resource Management Act for the life of Stage 2b only. This is anticipated to be until 2002.

The area formerly designated as Stage 3 will now be incorporated into the Landfill Park concept. Figure 5 shows the stages of landfill development just described.

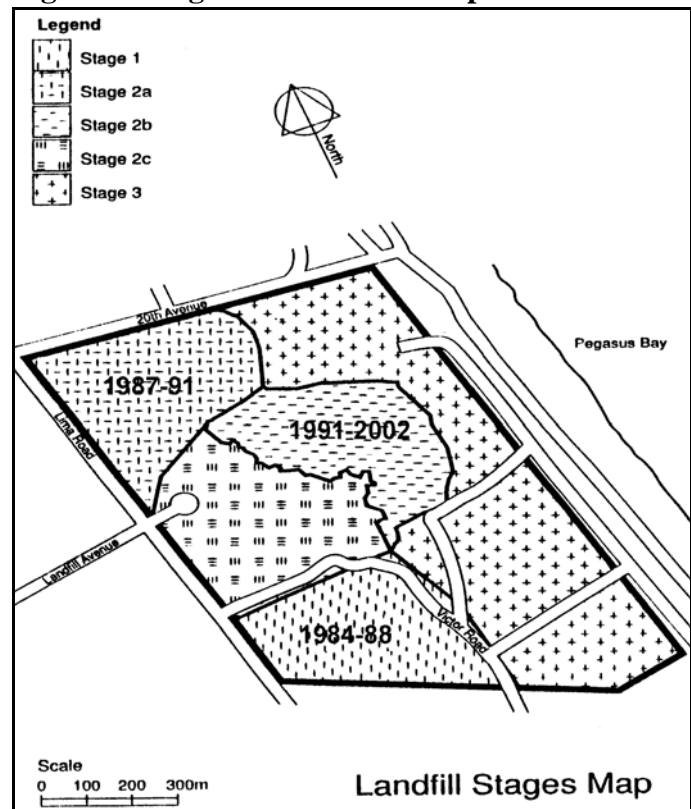
Under the terms of the present resource consents, the operators are not required to line the landfill or to collect landfill gas.

Access

Members of the public are not allowed access to the landfill and no casual tipping is permitted.

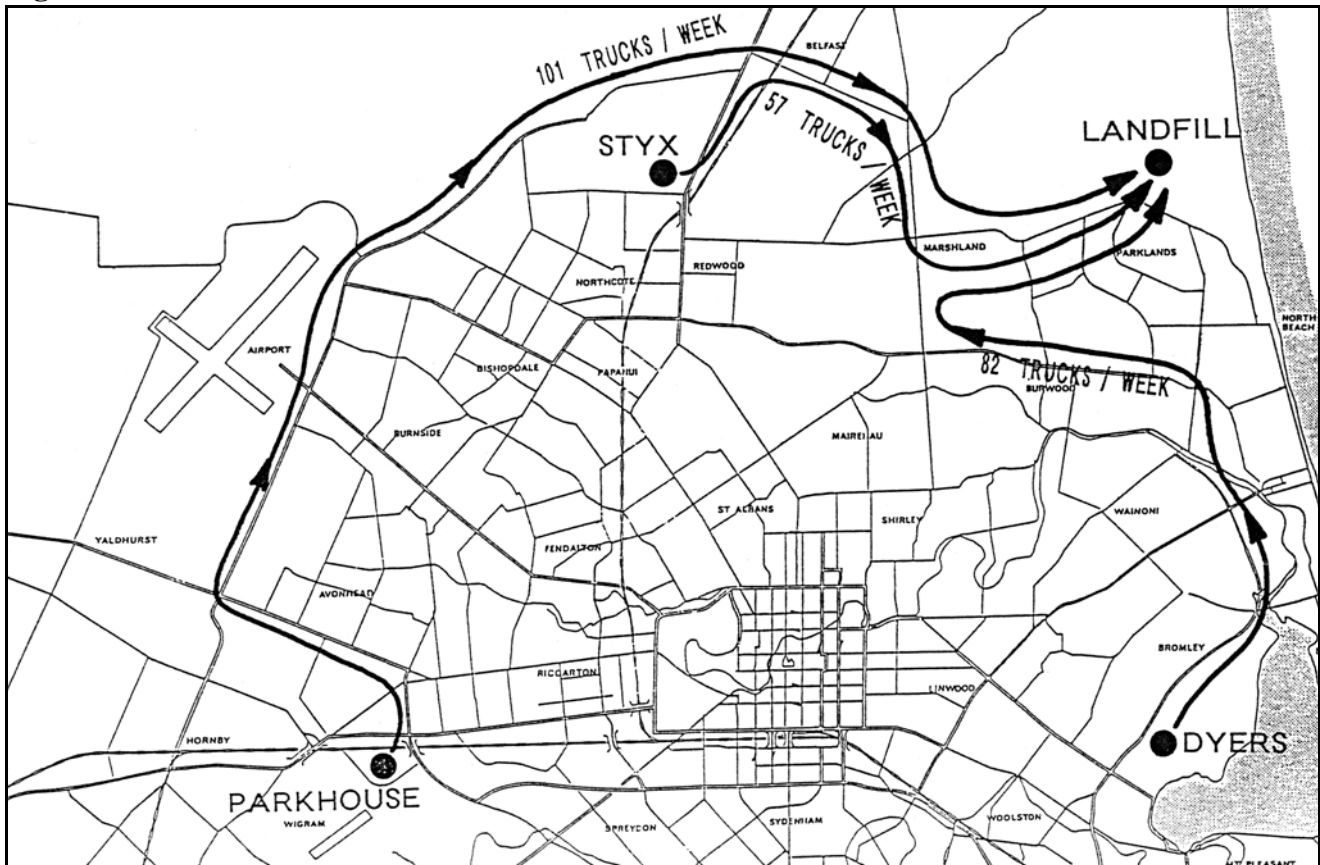
City Council compactor trucks bring solid waste from the three transfer stations via the routes indicated on Figure 6. Private contractors are not required to travel by any particular route.

Figure 4: Stages of landfill development



⁹

Summary taken from the Draft Bottle Lake Forest Park Management Plan (1998), pp.25-26.

Figure 5: Truck routes

Source: CCC

The present situation (1999)

Responsibility for site management rests with the Waste Management Unit of the Christchurch City Council. Plant for the landfill operation is provided through a five year contract (private contractor¹⁰) and includes a 30-tonne caterpillar compactor, D6 dozer, scrapers, water-cart and other miscellaneous equipment as required.

There are two City Council staff based at the landfill - the Site Manager and the kiosk operator. The private contractor has eight staff at the site on weekdays, and 4-5 at weekends. A night watchman, employed by the contractor, is on site until 9 pm daily.

The landfill is open seven days a week, from 7.30 am to 4.00 pm. Trucks from transfer stations are allowed to arrive until 5.30 pm. Ninety-eight per cent of private contractors (i.e. waste collection contractors) who deliver waste to the landfill have an account at the kiosk. The Manager indicated that there is usually flexibility in allowing some refuse materials to be brought direct to the landfill, rather than via the transfer stations. Council rubbish collection trucks usually¹¹ unload public kerbside collections at the transfer stations to be further compacted.

¹⁰ The same private contractor has been hired since the site opened.

¹¹ Except during 'double collection days in holiday periods.

The Landfill Manager reports 30-35 truck visits per day from transfer stations¹² and 20-25 truck visits per day from private operators. Typically, 600 tonnes of refuse are brought to the landfill each day. This quantity has dropped by about 10% since the introduction of kerbside recycling and composting.

The landfill does not have an impermeable liner. However, refuse is dumped on top of a layer of inert fill. Rubbish is further compacted on site and covered by inert materials throughout the day. Before the site is closed each day, all refuse delivered that day is covered.

The Burwood landfill is expected to close in 2002 when existing consents expire, being replaced by a new regional facility presently under investigation. The site is designated recreational and will be rehabilitated after 2002. Already there is a landscape gardener working almost full time on the completed stages.

Liaison between the facility and its host community

There is no formal liaison mechanism specifically between the landfill operation and its host community. The manager of the Waste Management Unit *“meets with the local community and liaises with them through the Shirley Community Board.”*

Similarly, the Plantation Manager (Selwyn Plantation Board) has no formal liaison with residents. He is however on the Bottle Lake Advisory Committee. Some local residents do not believe there is any effective liaison with the Selwyn Plantation Board.

Both the Landfill Manager and the Plantation Manager describe residents as *“watchdogs”*. They say that the Parklands Residents Association is active in the area. Residents phone the Shirley Community Centre about concerns, or approach community board members or councillors.

Monitoring

The Canterbury Regional Council contracts for the provision of ground water monitoring from a series of wells ‘downstream’ of the operation area, between the landfill and the sea.

The Canterbury Regional Council also operates a 24-hour hotline service which screens calls for complaints. A complaint call is dealt with by a monitoring officer who will determine whether to phone the complainant and then visit them, and if necessary will then visit the origins of the nuisance. CRC records have been stored on computer database during the past two years. In that time (till December 1998) one entry exists for an odour complaint from the Burwood landfill.

Whilst the Christchurch City Council does receive complaints about the landfill from time to time, there is no provision for computerised storage of such information at the present time. An Environmental Health Officer indicated that complaints are logged in a book and followed up by a complaints officer who will call the complainant. If the source of complaint is still evident, the complaints officer will make a visit to investigate further.

¹²

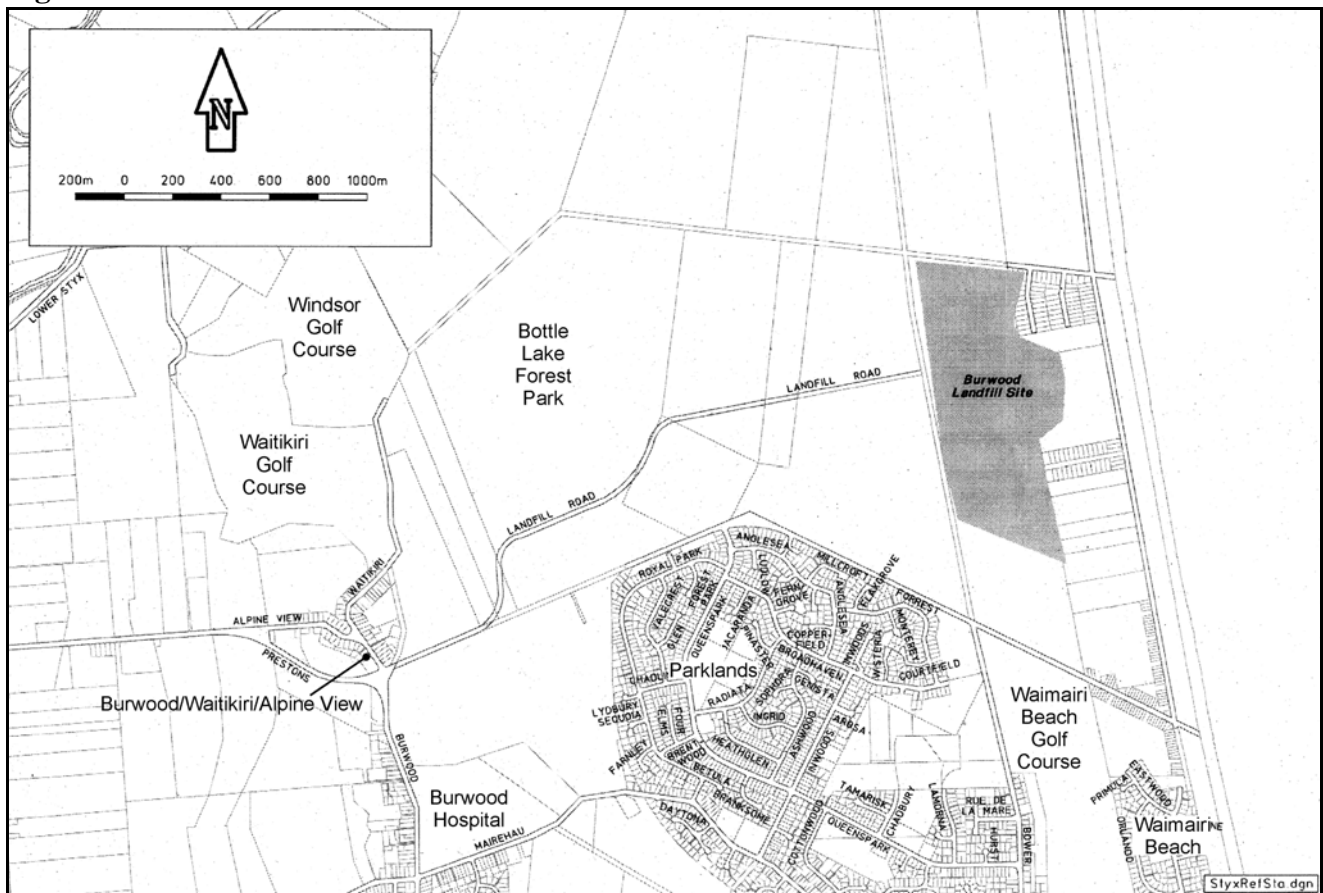
30-35 truck visits means 60-70 vehicle movements along the landfill route.

C: The host community

Overview

The host community is predominantly residential in character, comprising the residential suburbs of Waimairi Beach, Parklands and an area along Burwood Road, Waitikiri Drive, and Alpine View Road (refer to Figure 7). The locality also incorporates significant recreational amenity areas - Bottle Lake Forest Park (refer to Figure 8), three golf courses, and part of Waimairi Beach. Burwood Hospital is situated less than one kilometre to the south of the landfill entrance and one kilometre southwest of the suburb of Parklands.

Figure 6



Source: CCC

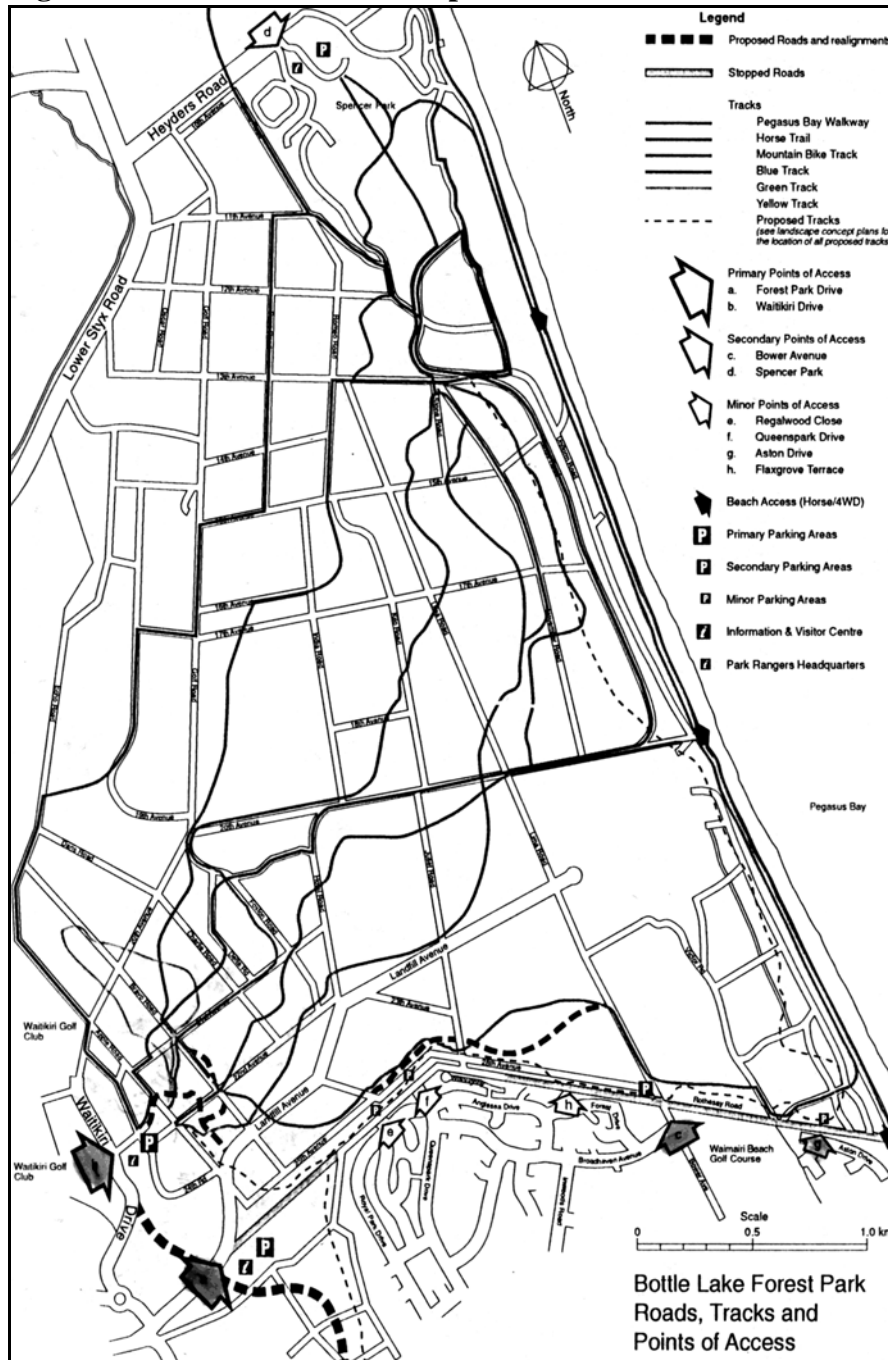
History of land development in the area¹³

Land Acquisition

In the period of early Canterbury settlement the area currently occupied by Bottle Lake, Chaney's and Kainga forests was part of the 'Sandhills' sheep run which included an extensive area of land from the Waimakariri River to New Brighton, and was let for grazing in 1853.

¹³

Extract from the Draft Bottle Lake Forest Park Management Plan (1998), pp.20-21.

Figure 7: Tracks and Access Map

Source: CCC

The original intention was to use the area for offal and nightsoil disposal, as it was considered remote enough from existing and potential population centres. However, the drainage farm set up at Bromley, the precursor of the modern sewage works, gave reprieve to this use and enabled the Council to lease the land for farming, which was to prove a disastrous practice.

Extensive over-grazing, assisted by introduced rabbits and hares, led to denudation of most of the vegetative cover, including the native sand binder pingao. Driven by high winds, the sand was free to move, hindered only by clumps of scrub where it accumulated forming mounds that eventually grew to sizeable dunes, smothering the remaining natural vegetation and young plantations already established.

Sand drifted inland, in places up to 2.4 km, and dunes attaining a height of 30 feet and burying pioneer plantations were not an uncommon sight.

Faced with the potential loss of the valuable and productive peaty market garden soil of Marshlands, the Council stopped grazing of the land in 1912 and actively pursued methods to prevent the accretion of sand along the shore line from moving inland and stabilise the masses of sand that had drifted inland from the shore.

Plantation establishment

Although small plantations of 20-30 acres had been established as early as 1883, it was not until 1912 that a plan of afforestation had been formulated as a means to stabilise the movement of sand inland.

Initial plantings were experimental, comprising various species of pinus oregons, spruce, redwoods, oaks and eucalypts. Most struggled in the harsh conditions with the spruce failing completely. Although all of the pines succeeded, it was soon realised that *Pinus radiata* was the most suitable species. Its quick growing qualities and tolerance of the harsh coastal conditions led to it being planted extensively from 1915 onwards.

Foredune establishment

The depression of the early 1930s brought a huge pool of unemployed, government funded relief labour. In 1932, Len Hal, Bottle Lake's first forester used this labour force and finance to address the source of the problems and the 'No. 13 unemployment scheme' began work at Bottle Lake Forest. To stabilise the coastal sand and as a means of protection, a continuous 'foredune' 4.5 km in length was constructed 40 m above the 'high water mark', parallel with the coast line.

Timber and Firewood Production

Soil establishment and extensive planting of *Pinus radiata* were the two most important activities of the depression period. But they were not the only works undertaken. Great advances were made during the middle and late thirties with the forestry practices of underscrubbing, high pruning and thinning. During this period upwards of 200 men were employed. The removal of undergrowth and lower branches of the trees reduced the risk of large scale destruction by fire. Firebreaks were constructed and roads were created along them with material for the latter being brought from the Burwood rubbish dump, which was being transformed into the modern Burwood Park.

In the 1940s and 50s, firewood was taken from the forest to fuel the furnace for the tepid baths in the inner city. The furnace burnt the inner city's combustible refuse to heat the swimming baths. The ash was laid on the forest roads including waste such as assorted metal, nightsoil, and so on.

Land Development

In the early 1970s land developers proposed the use of Bottle Lake Forest for residential development. However in 1977 the area was renamed Bottle Lake Forest Park, reflecting the Council's commitment to a new multiple use approach to the management of the forest.

Population change 1986-96

There has been a period of marked population growth in this locality since the 1980s, with exceptional growth in the suburb of Parklands itself, as shown in Table 1 which compares usually resident population and private dwelling numbers for the facility's host community with Christchurch City as a whole (the source community).

Table 1: Growth in Usually Resident Population and Private Dwellings

	UR population 1986	UR population 1996	Population growth 1986-1996
Parklands	4,455	5,757	29.2%
North Beach	4,329	4,430	2.3%
Parklands & North Beach	8,784	10,187	16.0%
Christchurch City	282,216	309,028	9.5%
	Private dwellings 1986	Private dwellings 1996	Growth in dwellings 1986-1996
Parklands	1,314	1,988	51.3%
North Beach	1,518	1,688	11.2%
Parklands & North Beach	2,832	3,676	29.8%
Christchurch City	101,694	116,621	14.7%

Source: Data from Statistics NZ, provided via Environmental and Planning Unit, CCC, December 1997

Christchurch City has been spreading and continues to do so, encroaching on rural areas around the fringes in many directions. In this locality on the northern fringe of the city, residential sub-division (existing, planned and intended) is occurring along much of the urban-rural boundary.

It can be seen from the results shown in Table 1 that between 1986 and 1996 there was a considerable influx of new residents in the area neighbouring the Burwood landfill, despite the presence of the landfill operation. Both population and dwelling numbers increased in the Parklands and North Beach suburbs at double the average rates for Christchurch City as a whole. This is reflected in the relatively small proportion (11%) of the residents who were interviewed having lived in the host community since before the landfill operations began.

Residential sub-divisions 1986-99

Since the late 1980s, extensive new residential subdivision has occurred in three areas - Parklands, North Beach (sometimes referred to as Waimairi Beach) and in the vicinity of Waitikiri Drive/Alpine View Road. One property developer has been responsible for a multi-stage sub-division advancing the suburb of Parklands northwards towards Bottle Lake Forest Park. At the present time, this area of development is bounded by the paper road - Rothesay Road - along the southern boundary of the Forest Park. However, the recently released City Plan has opened up areas for residential re-development north of Rothesay Road which were previously under plantation. When developed, these residential areas will be closer to the present landfill operational area than is currently the case. However, the landfill may have ceased disposal activities by that time.

D: Coverage of consultation and interviews

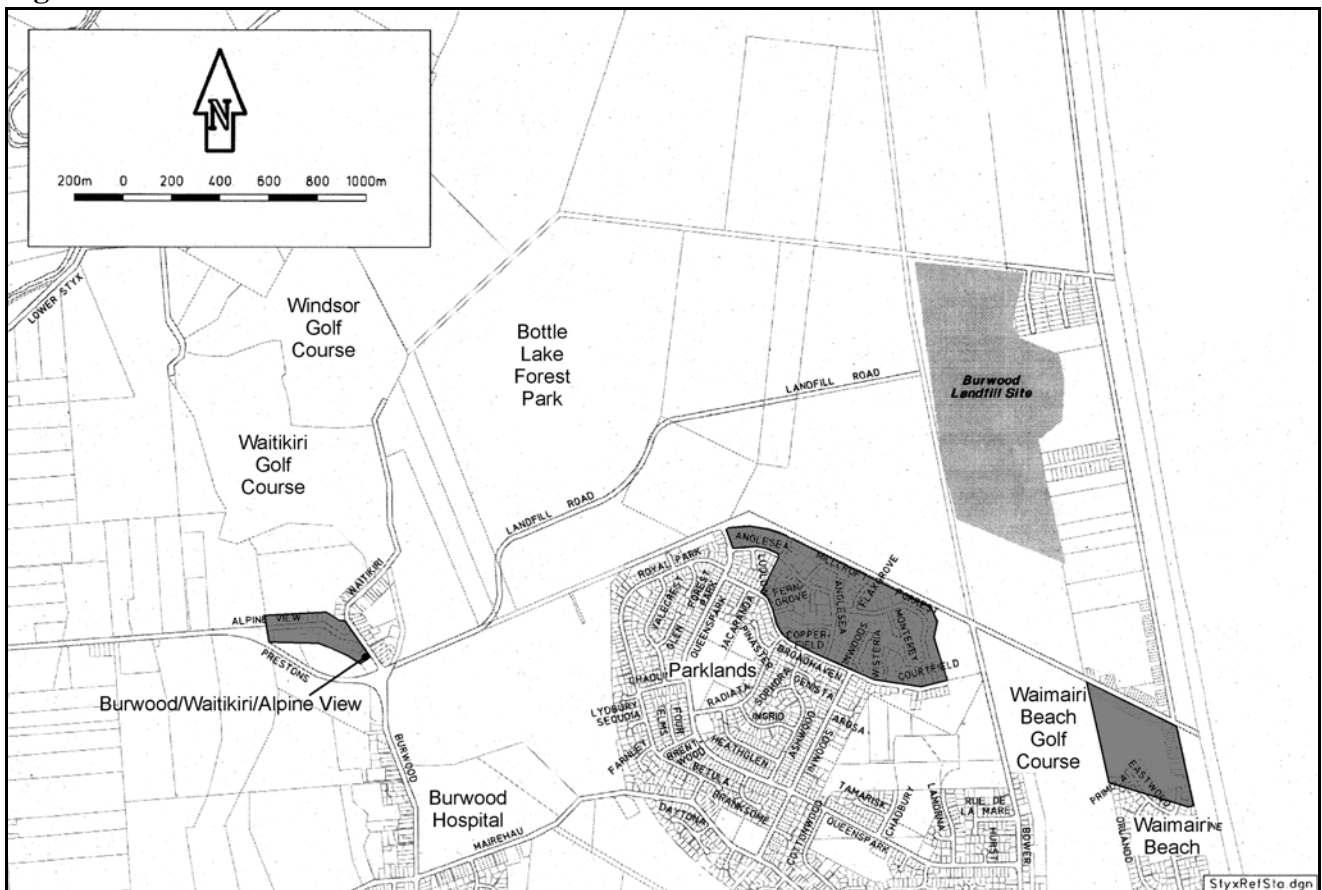
Numbers and categories of interviewee

Interviewing took place over three periods, from December 1998 to September 1999. Initial interviews with neighbouring residents and key informants were held in December 1998. A further round of interviews extending the coverage of neighbouring residents were held in April 1999, while interviews with residential users of Bottle Lake Forest Park took place in September 1999.

In all, 131 interviews were conducted, as follows -

- 83 residents - in 5 areas (see Figure 9)
- 36 recreational users of Bottle Lake Forest Park
- 12 other key informants

Figure 8: Areas of residential sub-division - 1986-1999



Source: CCC Planning 1999

The final decision to locate the landfill at the Burwood site was taken in 1983. The facility began receiving solid waste in 1984. Of the 83 local residents interviewed, only 9 (11%) had lived in the host community at their present place of residence since before landfill operations commenced.

Areas of residential interviews

Stage 2 of the Burwood landfill operations at the northern end of the landfill site has been in progress since 1987. Stage 1 at the southern end was completed in 1988 (refer to Figure 5). Interviews with residents neighbouring the landfill site were structured to provide responses across a range of separation distances, labelled “near”, “middle” and “far”.

The residential suburb of Parklands is the closest residential neighbourhood directly south of the Burwood landfill. Interviews here were divided into two areas -

A - Parklands “near”	900-1,200 m from Stage 2 (500-800 m from Stage 1)
B - Parklands “middle”	1,200-2,000 m from Stage 2

Further east lies the coastal residential suburb of Waimairi Beach, which is further from the landfill site than Parklands. Interviews here were divided into two areas -

C - Coastal “middle”	1,200-2,000 m from Stage 2
D - Coastal “far”	2,000-3,000 m from Stage 2

The entrance to the landfill property and site is from the west. Residential development exists both north of the landfill entrance (i.e. along Waitikiri Drive) and south of the entrance (i.e. along Burwood Road). This area of interviewing was designated as -

E - Entrance “far”	2,000-3,000 m from Stage 2
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Information about these interview areas is summarised in Table 2 following.

Table 2: Summary information for residential interviews

Sub-group	Inter-views	Streets	Distance to landfill operational boundary - Stage 2	Length of residence	Ownership status
A - Parklands “near”	20	Willoughby Lane Milcroft Place Forrest Drive Broadhaven Road Jacaranda St	900-1,200 m	10/20: <30 months 10/20: 3-6 years all developed since 1993	19/20: owned 1/20: rented
B - Parklands “middle”	31	Queenspark Drive Valecrest Ave Chadlington St Royal Park Drive Brentwood St Ashwood St Inwoods Rd Tamarisk St Chadbury St Bower Ave	1,200-2,000 m	8/31: <30 months 9/31: 3-6 years 7/31: 7-14 years 4/31: 15+ years 3/31: d/k	9/31: owned 22/31: d/k
C - Coastal “middle”	15	Eastwood St Primula Place Aston St Stout St Orlando Place	1,200-2,000 m	12/15: <30 months 3/15: 3-6 years	9/15: owned 1/15 rented 5/15: d/k
D - Coastal “far”	8	Larnach St	2,000-3,000 m	2/8: <30 months 2/8: 3-6 years 2/8: 7-14 years 2/8: 15+ years	5/8: owned 3/8: d/k
E - Entrance “far”	9	Burwood Road Waitikiri Drive	2,000-3,000 m	1/9: <30 months 5/9: 3-6 years 3/9: 15+ years	9/9: owned
All areas	83			40%: <30 months 35%: 3-6 years 11%: 7-14 years 11%: 15+ years 3%: d/k	61%: owned 2%: rented 37%: d/k

Interviews with recreational users of Bottle Lake Forest Park

Thirty-six recreational users of Bottle Lake Forest Park were interviewed during September 1999 for this research. All were interviewed in the parking area off Waitikiri Drive, near the primary point of access for most recreational users of the Park. Amongst the sample there was considerable experience (more than 180 person-years) of using the Park, with almost two thirds being regular users, more than once a week. Most are accustomed to passing within close proximity of the operational area (<500 m) during their visits, as shown by indications for their most recent visit.

When sorted by principal recreational activity, composition of the sample is summarised in Table 3 following.

Table 3: Summary information for recreational interviews

	bicycle riding	running	walking/ exercising dog	Total recreational users
Sub-sample (N)	20	12	4	36
Frequency of visits:				
>once a week	10	9	4	23
once /wk - once /fortnight	3	2	-	5
once/month or less	7	1	-	8
History of visiting:				
<3 years	8	6	2	16
3-6 years	9	4	1	14
7-14 years	1	1	-	2
15+ years	2	1	1	4
Closest point to landfill operational area on most recent visit:				
<500 m	19	11	3	33
>500 m	1	1	1	3

List of other key informants

- Solid Waste Engineer at the Christchurch City Council (CCC)
- Landfill manager (CCC)
- Environmental Health Officer (CCC)
- Team Leader of the Complaints Monitoring Officers at the Canterbury Regional Council (CRC)
- CRC 24-hour Hotline telephone operator
- Bottle Lake Forest Park ranger (CCC)
- residential sub-division developer with many years experience in the Parklands area
- representative (administrative) of Queenspark School
- representative of the Selwyn Plantation Board
- Community Technical Advisor - Community Relations - Burwood/Pegasus (CCC)
- representative of the Windsor Golf Club
- representative of Canterbury Health Ltd (Burwood Hospital)

Feedback meetings

Two feedback meetings were held for the purposes of discussing the preliminary findings of the field research.

The first meeting was an open meeting of the Burwood Pegasus Community Board on 16 May 2000. Eleven members of the Board were present including City Councillors and Community representatives. Most questions and discussion centred on the longer-term implications of the landfill operation and community attitudes towards any prospect that the landfill's operational life-time might be extended.

The second meeting, also held on 16 May 2000 was with 10 residents, most of whom were present representing various residents associations - Waitikiri Drive, Parklands and North Shore. This meeting endorsed the findings regarding odour, litter, vermin, birds, dust, cats and hazards as being fair and accurate. Residents near the entrance to the landfill also endorsed the emphasis given to effects from heavy traffic noise and safety. Several residents commented on visual effects, noting that while the landfill is generally well landscaped, the promised landscaping on the landfill mounds has not eventuated,

and the landfill has risen to heights that are becoming visible above the forest, and particularly visible from out at sea in Pegasus Bay. One resident pointed to the need for more thorough investigation of leachate effects and landfill gas effects.

E: Operational effects of the landfill on neighbours

The effect observed by the greatest proportion of both neighbouring residents and recreational users is unpleasant odours. Typical experience for immediate neighbours of the Burwood landfill is that such events are occasional, rather than frequent. Nevertheless, the experience can be distinctly unpleasant to the extent of inhibiting normal behaviour (e.g. remaining indoors with windows closed) on very rare occasions, and provoking complaints. However, such experience does not mean that proximity to the Burwood landfill dominates their quality of life in a negative way. With Burwood, other sources of odour may be compounding the effects experienced by neighbours of the landfill - proximity to market gardens, piggeries and chicken farms, and vents from the Kainga-Brooklands sewer line connecting to Bromley.

Three effects associated with heavy vehicles - noise, vibration and road safety - have been a significant concern to some residents living near the entrance to the landfill. Taken together, they create the most significant impact of the landfill operation for this area of residents. Road safety hazards linked to landfill trucks and logging trucks is also a concern to recreational users of Bottle Lake Forest Park.

The detraction from other amenity values (i.e. visual impacts, unsightly litter, noise for residents of Parklands and North Beach) and the creation of other nuisances and hazards (i.e. birds, vermin, cats, dust, fire) have either not occurred at all or not to any significant extent. Increased litter within the forest from recreational users is becoming apparent.

Few people are aware of gas emissions from the Burwood landfill. However this effect may require closer attention in the future, given the likelihood of increasing gas emissions and of greater recreational use of the Forest Park in the vicinity of the landfill.

Although not attracting wide-spread comment from residents at this stage, there remains a distinct underlying level of concern about the future extent of leachate escape from the Burwood landfill. This possibility is clearly acknowledged by the fact that the City Council is considering contingency provisions to remedy unacceptable off-site leachate migration should this be confirmed.

Overview of residential responses

Eight types of effect were reported unprompted by residents in the vicinity of the landfill -

- odour,
- noise,
- vibration,
- safety on the roads,
- heavy traffic patterns,
- vermin,
- litter,
- gas emissions.

In the unprompted situation, 58% of the sample of neighbouring residents interviewed reported no effects observed or experienced.

When prompted, more neighbours commented on -

- odour,
- noise,
- litter,
- safety on the roads,
- vermin,

as well as -

- visual aspects,
- birds,
- landfill leachate
- cats,
- hazards,
- dust.

In the prompted situation, 47% of the sample of neighbouring residents still reported no effects observed or experienced.

Assessment of likely impacts at the time of planning gave little or no attention to -

- road safety effects of landfill traffic,
- vibration from heavy vehicles accessing the landfill.

Some perceived positive effects of using the site as a landfill elicited no comment during the interviews, either in unprompted or prompted questioning -

- stabilising fore-dunes,
- making easier access for recreation into the Waimairi Coastal Area.

Overview of recreational responses

Five types of effect were reported unprompted by recreational users of Bottle Lake Forest Park in the vicinity of the landfill -

- odour,
- noise,
- safety on the roads,
- litter,
- visual aspects.

In the unprompted situation, 58% of the sample of recreational users interviewed reported no effects observed or experienced.

When <u>prompted</u> , more commented on - odour, noise, litter, safety on the roads, visual aspects	as well as - hazards birds, dust, landfill gas, easier access to coastal area, suitable recreational environment
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In the prompted situation, 28% of the sample of recreational users still reported no effects observed or experienced.

Assessment of likely impacts at the time of planning gave little or no attention to -
 road safety effects of landfill traffic,

The positive effect projected during planning of stabilising fore-dunes elicited no comment during the interviews, either in unprompted or prompted questioning. Nor did the projected negative effects of -
 vermin,
 flies,
 leachate escape.

Odour

What effect do they notice? Source of effect?

Twenty eight per cent (28%) of all the landfill neighbours interviewed commented (unprompted) on odour from the site, while prompted questioning raised the response level to 40%. Landfill odour is one of the effects observed most frequently by recreational users (19% unprompted, rising to 39% after prompting).

Most attribute the odour to smelly material that has been deposited in the landfill, while one resident described odour from smelly loads on passing trucks as they enter the landfill property. Residents report that noticing odour generally depends on the atmospheric conditions - still or light winds - several residents recounted an extreme event in 1998. The landfill manager reported that there have been two complaints regarding odour in the past two years (1997-98) from Parklands residents. The Canterbury Regional Council's database of complaints records one complaint received by its hotline service on 27 April 1998, regarding strong odour. The records indicate the complainant lived in area A¹⁴. The odour was attributed to chicken manure, leading to a strong smell in 'no wind' conditions.

The landfill manager acknowledged that chicken manure received into the landfill does cause a strong odour. However, observations from various other interviewees indicate that the landfill is not the only source of odour in the locality. The Forest Park ranger observed that, when residents in Parklands complained about the smell from the landfill, the wind was coming from a nor'-westerly direction. He attributed this smell to chicken manure from nearby poultry farms and effluent from the Belfast Meat Works. Residents in several of the interview areas (A,B and E) also made specific comment regarding pig-farm odours from piggeries west of Bottle Lake Forest Park. One resident in Parklands (B) attributed "*a pig-farm stink*" to odours coming from vents on the sewer trunk line which links the Kaianga-Brooklands area north of Bottle Lake Forest Park with the City's sewage plant at Bromley. This

¹⁴

Location is recorded as "Flaxgrove Park Area"

interviewee was “*given this explanation of the vents*” after making enquiries at the City Council some years earlier.

Thus there may be occasions when odours observed by residential neighbours of the landfill may not originate from the landfill itself. It is notable that some interviewees did express uncertainty regarding the source of odours experienced.

Spatial distribution?

Those most likely to report experiences of odour are residents living nearest to the landfill operation in Parklands (area A: odour reaching their properties), those living at Waimairi Beach (area C: experience odours mostly when out walking in the plantation or on the beach), and those living near the landfill entrance (area E: experience the odour when walking or biking in the forest around the landfill site). Recreational users are also more likely to experience odours because of their close proximity to the operational area when passing through the forest.

For residents, there does appear to be a distance-related pattern, as shown in Table 4 below. A large majority of those who notice odours (70% of those who report such observations) respond in simple descriptive language, reporting “*a smell*”, “*a general odour*”, “*not obnoxious*”. The remaining 30% recorded stronger reactions, including “*unpleasant*”, “*horrendous*”, “*bad smell*”, “*pig farm stink*”, “*vomit smell*”. This latter group included those who made specific reference to the pig farms and sewer vents.

Table 4: Percentage of residents (sampled) who experience odour from the Burwood landfill

Interview sample	%Unprompted + Prompted	Comments
Whole sample	40	70% simple comment; 30% strong objection
Area A: Parklands “near”	60	70% simple comment; 30% strong objection; most effects ON the interviewee’s property
Area B: Parklands “middle”	26	38% simple comment; 62% strong objection; several references to farm odours from pig farms and sewer vents
Area C: Coastal “middle”	40	83% simple comment; 17% strong objection; most effects OFF the interviewee’s property, while walking in plantation or on beach
Area D: Coastal “far”	25	no strong objection
Area E: Entrance “far”	56	no strong objection; reference to odours from market gardens; most effects OFF the interviewee’s property
Recreational users	39	75% simple comment; 25% strong objection

This distance-related pattern is reinforced by comments from recreational users, who confirm that they experience odour ‘*close to the landfill itself*’, “*along the perimeter*”, “*on the track adjacent to it*”, “*don’t recall the smell travelling beyond one hundred metres*”. Some were very specific in recalling locations - “*along the beach*”, “*Lima Road*”, “*on 20th Avenue*”.

Timing; frequency; trends?

Almost without exception, those who report experience of landfill odour on their properties describe it as ‘occasional’ (which ranges from once a month to once a year) regardless of area. The landfill manager reported that *“in the last two years there had been two complaints with regard to smell from Parklands”*. Enquiries to the Canterbury Regional Council Hotline reveal that one complaint has been logged in the last twelve months against the Burwood landfill. The record shows the complainant lived in Flaxgrove Lane (immediately adjacent to the boundary of the forest which surrounds the landfill, and in a southerly direction) and complained of *“chicken manure odour”*, noting there was *“no wind”*, but a *“strong smell”*. Queenspark School (located in area B: Parklands “middle”), report that *“offensive odour was noticed once this year”*.

In contrast, several respondents who use the forest park around the landfill, and therefore are much closer to the landfill operations, report that odour is always present - *“three to four times a week, when out biking”*; *“within 200 m range of the site itself, only been there that once, that was enough”*. However, responses from the sample of recreational users surveyed separately were very similar to the comments made by neighbouring residents on their properties - most described odour *“occasionally”*, *“once or twice a year”*.

Many residents say that wind direction - from the NE quarter - is a factor, and this is reinforced by the observations of recreational users. But residents also notice odour from the landfill in still or nearly still conditions. Some report that odour is more noticeable in certain seasons. However, there is no consensus on which season - winter, spring and summer.

Apart from one comment that odour has only become really noticeable since the intervening plantation was removed, there is no evidence to suggest that odour nuisance from the landfill has become more or less frequent over the years.

Mitigation attempts?

During the lifetime of the landfill, the presence of the forest surrounding the site has often drawn comment as being an effective buffer against several off-site effects. The principal real estate developer operating in the Parklands area concurred with a view expressed by one other resident, that the felling of trees to the south of the landfill site has not only opened up the landfill in a visually revealing way, but has also made landfill odour more noticeable.

Impacts?

There is little doubt that, on occasions, odour from the landfill can be very noticeable and offensive to nearby residents - *“can be horrendous”*, *“really stinks”*, *“smell it everywhere on these occasions but only when outdoors”*, *“can be offensive”*, *“couldn’t open the windows”* (in relation to the 1998 event) - to the point where residents do complain¹⁵. Such extremes appear to be very occasional events. More often, the odour effects are of a background nature. This is reinforced by observations from recreational users who were most inclined to comment *“doesn’t stop me from coming here”*, *“would expect some landfill associated issues such as smell; after all, it is a rubbish dump”* - although one did comment *“Well, I’m glad I’m away from it!”*. The landfill manager remarked that a residents’ watchdog group¹⁶ raises issues from time to time and the most recent issue raised was a problem of odour coming from the landfill.

¹⁵ On one occasion, the City Council Service Centre received a series of calls concerning odour thought to be from the landfill, which had then disappeared within three hours.

¹⁶ The Waitikiri Residents Association

Some described the odours from other sources such as market gardens and nearby chicken farms as far worse, while another respondent noted that the odour from Bromley (the WWTP) was easier to tolerate than the odour from the landfill. Experience and impact is clearly highly individual, since others in the same neighbourhood describe the impact as “*not of much consequence*” or “*just a fact of life*”. One respondent also noted that “*you can get desensitised*”.

A representative of the Selwyn Plantation Board observed that “*the landfill does not offend our staff; there are no complaints from odour*” from people working in the forest which surrounds the landfill itself.

Summary evaluation

There is always the risk of some unpleasant off-site odours from a landfill, associated with particular types of waste, such as animal manures. Typical experience for the immediate neighbours of the Burwood landfill is that such events are occasional, rather than frequent. Nevertheless, the experience can be distinctly unpleasant to the extent of inhibiting normal behaviour (e.g. remaining indoors with windows closed) on very rare occasions, and provoking complaints. However, the tenor of responses in this case study indicates that such experience does not mean that proximity to the Burwood landfill dominates their quality of life in a negative way.

For those residents who venture into the forest park for recreation, and therefore go closer to the landfill operation, the presence of landfill odours is commonplace, but still not sufficient to deter them from such activity in most instances. And recreational users who visit from other parts of Christchurch have come to expect occasional odours, which generally do not mar their recreational experience.

With Burwood, other sources of odour may be compounding the effects experienced by neighbours of the landfill - proximity to market gardens, piggeries and chicken farms, and vents from the Kainga-Brooklands sewer line connecting to Bromley.

Noise

What effect do they notice? Source of effect?

One-in-six of all neighbouring residents interviewed (16% unprompted) commented on noise associated with landfill operations. In prompted questioning, the level of response increased to 24%. Response rates for recreational users of Bottle Lake are lower, at 8% unprompted and 17% after prompting.

Several sources of noise were identified by residents. Noise is associated with truck engines and air brakes. These comments were often linked to the speed at which many trucks travel as they approach the entrance to the landfill and also as they travel along Forest Road, a stretch of road not open to the general public. This is the primary source of noise identified by recreational users. Noise also comes from the landfill site itself. People hear the high-pitched ‘beep’ noises which many trucks make when reversing to drop their loads. They also hear the engine noise of the large earth-moving equipment working on the site. (See also comments under ‘Birds’).

Spatial distribution?

The vast majority of responses regarding landfill-related noise came from residents either near the entrance (area E) or in the closest section of Parklands (area A). The responses from residents near the entrance to the landfill focussed on vehicle engine noise and brake noise - associated with speed and changes in speed. Two-thirds of the responses from Parklands focussed on the distant noise of site machinery or the beeps of reversing trucks, while the remainder related to the noise of trucks travelling through the forest to the site. Recreational users say they notice truck noise when they (the observers)

are at the entrance off Waitikiri Drive, on or near Landfill Avenue, or on 20th Avenue, close to the operational area.

Timing; frequency; trends?

Although trucks can access the landfill at any time during its hours of operation (nominated as 7.30 am to 5.30 pm) the additional comments suggest that truck noise is more of a nuisance early in the mornings. Some residents near the landfill entrance noted times of 5.30 am and 6.30 am. The landfill manager reported that there have been two complaints during the life of the landfill about heavy traffic movements early in the morning. He confirmed that three groups of vehicles do arrive before the scheduled opening time of 7.00 am. There are several private contractors who carry 'special wastes', and they have permission to bring these loads to the landfill at 6 am so that they can be disposed of before general waste loads arrive. Just prior to public holiday weekends, landfill hours are sometimes extended when trying to ensure that transfer stations are empty before closing for several days. Other vehicles belong to the landfill operations staff who arrive to prepare the site for the day's operations.

Table 5: Percentage of residents (sampled) who experience noise from the Burwood landfill

Interview sample	%Unprompted + Prompted	Comments
Whole sample	24	
Area A: Parklands "near"	60	two-thirds site operations and 'beeps'; one-third heavy vehicle engines
Area B: Parklands "middle"	3	negligible effect
Area C: Coastal "middle"	13	site operations and 'beeps'
Area D: Coastal "far"	0	nil effect
Area E: Entrance "far"	56	predominantly heavy vehicle engines and brakes
Recreational users	17	70% from trucks; 30% from bulldozer and site machinery

Some comments suggest that truck numbers have increased over the years as the number of private contractors has increased. The landfill manager confirms a slight increase in numbers in the past two years. He attributes this to increased volumes of demolition waste. A representative from Burwood Hospital commented on the noise from City Council trucks travelling from the Bromley transfer station and noted that *"when these trucks first started operating they were 'quiet running', but after some time their engines got noisier. More recently they have improved again and the noise is less noticeable."* He thinks these Council trucks may have been overhauled or been equipped with new engines.

While vehicle noise and site noise may occur throughout the working day, both sources of noise are discontinuous. When combined with varying wind and weather conditions, most neighbouring residents tend to be aware of such noise only on an occasional basis (the exception being residents near the entrance to the landfill - area E). Observations from recreational users indicate the same pattern - *"perhaps once in any visit"*. Several residents noted that the site noise (beeps and earth-moving machinery) had become more apparent with the recent felling of trees between the site and Parklands.

Impacts?

All the responses on vehicle noise by residents near the entrance to the landfill were unprompted. There is consensus that this truck noise has been a noticeable constant factor ever since the landfill opened - *"same as when we first arrived"* (3.5 years ago) *"constant since our arrival"* (6 years ago) *"always there"* (>30 years residence). Several of these neighbours have definitely found the noise (and vibration - see later discussion) to be *"an intrusion into our privacy"* and one noted having complained to the City

Council about the matter. There is an official complaints register held at the landfill. Some other staff at the City Council¹⁷ take calls as well.

In contrast, only half the observations about noise from residents in Parklands were unprompted. The apparent increase in noise levels audible from the site with the recent felling of trees between the site and Parklands suggests that the vehicle noise is a low-level background effect for residents of Parklands. It is probably noticed much less than the noise of chainsaws when areas of forest are being felled. Nevertheless, it may on occasions “*be annoying, when it disturbs the peace*” (resident’s property) or “*take away the tranquillity of the Bottle Lake Park*” (resident using the park for recreation).

Summary evaluation

The noise of heavy vehicles visiting the landfill has concerned a significant number of residents living near the entrance for as long as they have lived there. This concern is probably heightened by the fact that the vehicle noise is often associated with high speeds and therefore with another concern - road safety. Elsewhere, noise is not a significant concern for neighbouring residents.

Vibration

What effect do they notice? Source of effect?

One third of residents interviewed near the entrance to the landfill commented (unprompted) on the disturbance caused by vibrations from heavy vehicles passing in close proximity to their dwelling. One noted particularly the heavy compactor trucks operated by the City Council to bring compacted solid waste to the landfill from the city’s three transfer stations.

Spatial distribution?

This is an effect that would only be experienced at close quarters. Hence it is confined to residents near the landfill entrance, and particularly to those living along Burwood Road and at the southern end of Waitikiri Drive.

Timing; frequency; trends?

Noticed particularly when the heavy vehicles entered the landfill before 6.30 am. Generally, the pattern is reported as being unchanged over the years. One resident on Burwood Road commented that “*these days only occasional private contractors cause the problem with their speed*”.

Mitigation attempts?

One resident noted that after complaints to the City Council five years ago, the Prestons Road route was enforced. However, some private contractors continue to use Burwood Road.

Impacts?

In the extreme, this effect can be experienced as a definite “*intrusion into domestic life*”. In the particular case of disturbances early in the morning, while the vehicles responsible might be “*small in number, they are always there*”. Those experiencing the greatest intrusion are residents who have lived in the area since before the landfill was established.

¹⁷

e.g. Environmental Health Officers

Summary evaluation

This effect is significant for some individuals, but appears not to be significant at the community level - more people in a situation to be affected (i.e. very close to the landfill entrance) do not notice the effect or are not upset by the effect than do experience it.

Safety on the roads

What effect do they notice? Source of effect?

There are two circumstances where neighbouring residents may interact with the heavy vehicles at the Burwood landfill. One is on the public roads approaching the landfill entrance, roads which are used by the residents of area E and by recreational visitors to the Windsor and Waitikiri Golf courses and the Bottle Lake Forest Park. Concerns expressed by these residents relate to excessive truck speeds, whether entering the landfill property with heavy loads, or exiting, when *“they come out too fast”*. They report seeing dangerous situations at the intersection adjacent to the landfill entrance involving either school children travelling to school or visitors to the golf clubs. Several residents point to private contractors as being the main cause of concern now, although in earlier years the City Council’s large compactor trucks were the main focus of concern - concern that was heightened by their exceptional size.

The second arises on Landfill Avenue. Although not open to public traffic, this road intersects routes taken by people walking, jogging or riding in the Forest Park, some of whom are residents of neighbouring areas. Here again, truck speed has raised concerns for public safety. Some interviewees claim to have seen trucks exceeding 50 kph on Landfill Avenue. These observations are confirmed by recreational users, noting particularly sightings on Landfill Avenue. They invariably commented on the speed of the trucks - *“seen the odd brake skid”*, *“knocked a dog over”*. However, several recreational users reported that the source of this effect is not only landfill trucks, but logging trucks.

Spatial distribution?

Responses from neighbouring residents regarding this effect also show a distinct locational pattern, linked to distance - see Table 6 - and the likelihood that residents use the Forest Park for recreation.

Table 6: Percentage of residents (sampled) who experience heavy vehicle/road safety issues at the Burwood landfill

Interview sample	%Unprompted + Prompted	Comments
Whole sample	13	
Area A: Parklands “near”	20	during recreational use of Bottle Lake Forest Park
Area B: Parklands “middle”	10	during recreational use of Bottle Lake Forest Park
Area C: Coastal “middle”	7	during recreational use of Bottle Lake Forest Park
Area D: Coastal “far”	0	nil effect
Area E: Entrance “far”	44	significant concerns for local residents and golf-course (x2) traffic
Recreational users	22	recreational use, mainly in the vicinity of Landfill Avenue

Timing; frequency; trends?

Truck movements - the source of this effect - are spread throughout the day. One resident noted that the number of private contractors’ vehicles has increased over the years. However, the view was also expressed that *“these days only occasional private contractors cause problems with their speed”*. However, the risk of accidents involving other road users or pedestrians and cyclists depends on their

patterns of using the area as well. The actual frequency of dangerous situations may well be low, but the consequences are potentially very significant.

Residents near the landfill entrance describe the effect in various terms - *“been a constant feature”, “sometimes”, “a periodic concern; sometimes a constant concern”* Several other residents who use the Park for recreation describe the effect as *“always so”*.

Mitigation attempts?

The legal speed limit along Burwood Road, Prestons Road and also along Landfill Avenue is 50 kph. A ranger from Bottle Lake Forest Park noted that the effect of the landfill's operations he is most aware of is the traffic on Landfill Avenue - the road from the entrance to the actual landfill site itself. Recreational users of the forest park - mountain bikers, horse riders, runners and walkers - cross this road. He has taken a precautionary approach by erecting signs to make recreational users aware of the traffic they may encounter when crossing the Landfill Avenue. For their part, the recreational users suggest that *“the signs could be larger, and more of them”*, noting that the trucks *“need to go slower”*. Some try to avoid the road as much as possible. An orienteering club pointed out that if they were using the Park for a big event involving say 400 runners, they would *“put marshalls on the road to signal to runners to stop”*.

Residents report deliberately keeping their dog on a leash and keeping their children close by when in the Park. Some residents ask *“why do trucks enter the landfill at 6 am if the gates are meant to open at 7.30 am and close at 4 pm?”*¹⁸

Impacts?

As noted above, the actual frequency of dangerous situations may well be low, but the consequences are potentially very significant. Some residents have reported *“near misses at the intersection”*. As noted above, the risk is *“of constant concern”* to some residents near the entrance. Furthermore, there has probably been more effective control exercised over the behaviour of City Council vehicle drivers than private contractors.

The Forest Park ranger noted that there have been no reported accidents between the trucks serving the landfill and recreational users of the park during the seven years he has been a ranger. Even though there have been no reported accidents, residents using the Forest Park say that it is a constant concern when out walking, and that *“it takes away from the atmosphere of the forest walk”*. Recreational users are conscious of the need for extra care in the vicinity of the main truck route, some even altering their route selection to keep away from the potential danger area.

Summary evaluation

As the popularity of Bottle Lake Forest park grows as a recreational amenity, the risks of accidents involving heavy vehicles accessing the landfill also increases. Whilst no accidents have been reported yet, the comments from residents near the landfill entrance indicate that it remains the most significant factor contributing to personal stress related to landfill operations, and an issue which requires constant vigilance.

18

Refer to explanations given under 'Noise'.

Heavy traffic patterns

What effect do they notice? Source of effect?

There has been an expectation on the part of residents from the outset that heavy vehicles delivering solid waste to the Burwood landfill would use designated routes (Refer to Figure 6 in Section A). Several long-standing residents who live near the entrance to the landfill remarked on the lack of discipline by drivers in not adhering to these designated routes in the early years.

Spatial distribution?

This issue is of concern only to those who live near the entrance to Burwood landfill (area E).

Timing; frequency; trends?

The frequency of this was not quantified. However, there was agreement that, after complaints to the City Council in the early years of the landfill's operation, there was more effective enforcement of the use of Prestons Road as the designated access route in the immediate approaches to the landfill entrance. These days, only a few private contractors' vehicles use Burwood Road on occasions.

Mitigation attempts?

In response to resident complaints, any time that a complaint is received by the landfill staff about trucks using the wrong road, it is followed up by the Manager who will check with the driver for reasons. He says that normally the drivers "*stick very close to the designated routes*" but they sometimes deviate to avoid road works.

Impacts?

This issue is significant to the extent that it relates to other effects such as traffic noise, vibration from heavy vehicles, and road safety risks.

Summary evaluation

This issue does not appear to be a major concern now. However, it required residents' complaints in earlier years to have the designated routes enforced.

Litter

What effect do they notice? Source of effect?

Two effects are reported by neighbouring residents - "*garbage from unsecured loads*" on privately operated trucks near the landfill entrance¹⁹ or along Landfill Avenue within the forest, and windblown litter "*in the forest*" surrounding the operational area of the landfill. One interviewee reported seeing litter on the beach, but noticing much more litter near the fence line. One per cent (1%) of all neighbouring residents interviewed mentioned litter unprompted, while the figure rose to 8% in prompted questioning.

Recreational users who approach the operational area of the landfill within the forest are much more likely to observe windblown paper and plastic from the disposal site (17% unprompted, rising to 39% with prompting). However, one quarter of the recreational users who observed litter attributed what they saw to the actions of other recreational users - "*plastic drink bottles*", "*doggy poo bags*", "*lollies*", "*small group of youngsters on their own without a leader*", "*just dropped on the track*". Thus, the main

¹⁹

Specific mention is also made of Bexley and Prestons Roads

locations where they notice litter are either around the fence line of the disposal site (along 20th Avenue in particular) or at the carpark and along tracks used by recreationalists.

Spatial distribution?

The distribution of observations reflects location factors; the most frequent observations occur around the entrance, as shown in Table 7 following.

Table 7: Percentage of residents (sampled) who observe off-site litter related to the Burwood landfill

Interview sample	%Unprompted + Prompted	Comments
Whole sample	8	
Area A: Parklands “near”	10	windblown litter - during recreational use of Bottle Lake Forest Park
Area B: Parklands “middle”	3	windblown litter - during recreational use of Bottle Lake Forest Park or the beach
Area C: Coastal “middle”	0	nil effect
Area D: Coastal “far”	0	nil effect
Area E: Entrance “far”	44	black plastic bags, cartons, pieces of plastic, etc. - unsecured loads on their way to disposal in the landfill
Recreational users	39	windblown litter - during recreational use of Bottle Lake Forest Park

Timing; frequency; trends?

Litter around the entrance is not a continuous effect. Rather it is reported as occurring “*occasionally*”, in this case at a frequency of about once a month. Comments suggest also that the frequency of occurrence has not changed over the years.

Litter in the forest surrounding the operational area is noticed at greater frequency - perhaps on a weekly basis. Wind direction makes a difference. “*A blustery southerly picks up litter and drops it over the net, but a nor’westerly seems to cause no problems*”. The site manager believes that windblown litter “*seldom travels more than three to four rows of trees*”; the forest plantation appears to act as a very effective barrier. Nevertheless, the Park Ranger noted that “*windblown litter has consistently been an effect of landfill operations*”.

Recreational users are much more likely to comment that litter is “*usually always there*”, “*usually some there every day*”, “*all the time*”, or that they are “*not aware of the clean up*”. However, just as many of them observe litter “*occasionally*”, “*very occasionally*”, or “*one or two pieces of paper every ten kilometres*”. Furthermore, recreational users clearly note increasing litter related to visits by other recreationalists - “*powerade, not coke bottles - never used to have water bottles*”, “*especially around school holiday times*”.

Mitigation attempts?

The existence of established forest plantations around the landfill operational area has been effective in containing litter within the landfill property boundaries. There is a \$30,000 annual budget allocated for litter control. The landfill contractor pays a team of six locals to patrol the operational area fence-line for litter. Both the Park Ranger and the Plantation Manager noted that litter is collected quickly - “*within a day of letting them know*”. Some of the recreational users noted that they had seen the litter being picked up.

Impacts?

Litter is not reported on residents' private property. Nevertheless, when it is encountered in the Forest Park or on the beach it can be viewed as an unsightly nuisance. Half the recreational users who responded stated that the litter they encountered was not at such a level as to impact on their activity. Some do find the litter "*unsightly*" while others observed "*it doesn't spread too far, and I've come to expect it as it is a landfill*" or "*expect the occasional unsightliness; it is a huge downside of landfills, but I accept it*". Some recreational users found landfill litter distasteful, but also noted that an increasing proportion of litter encountered within the Forest Park can be attributed to recreational users themselves - "*uncalled for; bad habits, need to be better educated*".

Summary evaluation

Off-site litter does not create a significant impact on neighbouring residents. We conclude that this is not a significant concern, as indicated by the overall frequency of observations, and the fact that only one neighbour's observation was unprompted. Recreational users realise that they are more likely to encounter windblown litter since they regularly venture close to the operational disposal site.

Gas emissions

What effect do they notice? Source of effect?

Two residents raised concerns about the leakage of landfill gas, noticed when close to the operational area of the landfill, as did one recreational user.

Timing; frequency; trends?

Landfill gas emissions are expected to increase over time, as the solid waste matter decomposes in anaerobic conditions. This process will continue even after disposal activities have ceased at Burwood²⁰.

Mitigation attempts?

Escapes of landfill gas are not actively managed at all at present. Bi-monthly monitoring is undertaken, and investigations suggest that landfill gas may be killing some of the smaller trees. There is no active extraction or collection of the gas, nor does the resource consent require this.

Impacts?

The concern expressed relates to potential risks to people in the vicinity of the landfill disposal area, should concentrations of the gas rise to dangerous levels.

20

Landfill gas produced from decomposing waste comprises carbon dioxide and methane. At the Burwood landfill, low rainfall, and consequently low moisture levels with the refuse tends to limit the rate of gas production. However, as each tonne of refuse produces 200 m³ of landfill gas, a reduced rate of production would extend the time over which that volume is generated, which may be realistically expected to be in the order of 30 years or more. Gas composition at the site is 60% methane and 40% carbon dioxide. Early attempts at preventing gas escape were unsuccessful because of the permeable nature of the soil used for cover material, allowing gas to escape to the atmosphere. The lack of depth of cover material to allow growth prevented successful establishment of vegetation. The effect of the gases on the vegetation reduces the availability of oxygen concentrations in the root zone required. On site these effects have constrained the type of vegetation used in rehabilitating the completed fill areas. To overcome these difficulties an appropriate cap together with sufficient depth of growing medium is being constructed to provide a suitable growing environment. (Draft Bottle Lake Forest Park Management Plan, 1998, pp.26-27)

Summary evaluation

Not many people are aware of this effect. However, it may require closer attention in the future, given the likelihood of increasing gas emissions and of greater recreational use of the Forest Park in the vicinity of the landfill.

Visual aspects

What effect do they notice? Source of effect?

Generally, no negative effect is observed by neighbouring residents. Rather the positive amenity value of an effective screen, provided primarily by the existing plantation forest, and supplemented by the row of poplar trees along Rothesay Road, a paper road which runs between the Bottle Lake Forest Park and Parklands residential suburb. Twenty-three per cent (23%) of the whole sample of residents interviewed commented (all prompted) on the positive visual amenity. Several recreational users commented on the unsightliness caused by logging areas of the forest. Others however also noted positive aspects - *“most of the tracks are not near the landfill itself”, “the best place in Christchurch for cycling, running and exercising with families together”*.

One resident who uses the forest for recreation did say that the visual effect of the first stage of the landfill mounds was *“unattractive to those enjoying the forest, before they were landscaped”* The Park Ranger reported similar comments *“from a few visitors”* relating to the second stage.

The Shirley Service Centre has received several complaints about the unsightly nature of ‘contractors bins’, visible from the entrance of the landfill and the intersection of Prestons and Burwood Roads.

Spatial distribution?

Most of the prompted comments came from residents of Parklands who live nearest to the landfill property (area A) - 70% of those interviewed in this area..

Timing; frequency; trends?

The screening provided by the forest plantation has always been effective. This is particularly so in the case of Burwood where the plantations pre-dated the landfill operation and therefore provided the visual screen immediately. Only in the last couple of years has this situation altered, with the felling of trees on the south side of the landfill operational area, as well as the felling of some of the poplars growing along Rothesay Road, rendering the landfill visible.

Mitigation attempts?

Protection of a visual screen provided by the planted forest is considered essential by nearby residents. Nevertheless, the unusual circumstances of having a working forest within city limits should be noted. There is an issue of ownership and rights involved. The rights to log the plantation forests for commercial returns are owned by the Selwyn Plantation Board, not the City Council. There does not appear to have been adequate consultation between these two organisations regarding the need to maintain sufficient visual screening of the landfill operations. Several respondents suggested that the potential for confusion made for poor accountability over the issue, and considered that the Council should have taken a stronger lead in this matter.

Clearance of the poplars appears to have been a contentious issue amongst immediate neighbours living adjacent to Rothesay Road. These poplars are owned by the City Council not the Selwyn Plantation Board. Some residents wanted the poplars removed to allow in more light, while others wanted to

maintain the visual screen²¹. This is perhaps indicative of the effectiveness of the basic visual screen provided by the forest itself. However, there is a potential safety issue with aging tall trees too close to some dwellings. Some houses are subject to shade and leaf fall much more than others.

Regarding the visual impacts in the immediate vicinity of the mounds created by disposal of waste, it was suggested that signs should be erected near the landfill operating area to remind recreational visitors that *“it is their rubbish that has created the unpleasant visual effects”*.

Impacts?

For most of the lifetime of the landfill there have been absolutely no negative visual impacts from the landfill operations on neighbouring residents. The recent clearance of trees south of Stage 1 of the landfill area (no longer used for disposal) has opened up this area to long-distance views from some Parklands' properties.

Summary evaluation

There is generally strong endorsement by neighbouring residents of the value of forest plantations as effective visual screens for landfill operations. Concern has been expressed at the threat to this amenity from uncontrolled clearance of trees, even though it is a legal activity.

Birds

What effect do they notice? Source of effect?

Twenty-three per cent (23%) of all neighbouring residents and one recreational user commented on seagulls associated with the landfill, attracted by the smell and the prospects of food to be scavenged. None of these comments were unprompted.

Mostly residents observe the seagulls circling over the landfill. What they recollect is the noise, some noting that *“the seagulls can be noisier than the machinery at times”*. A couple of responses noted seagull droppings, and one resident reported an incident about 2 years ago (1997) involving up to 50-60 dead or dying seagulls on the beach *“in line with the landfill”* and attributed this to landfill operations - *“birds shot to scare them away, but not killed”*.

Spatial distribution?

It should be remembered that area A lies entirely within 2 km of the coastline, area B lies entirely within 2.5 km of the coastline, areas C and D lie within 400 m of the coastline, while area E lies within 3.5 km of the coastline.

Residents (40%) in the closest part of Parklands (area A) focus on the noise of seagulls. One in twenty commented on seagull droppings on the roof. The few comments from elsewhere (areas B and C) described very occasional flocks of gulls flying overhead, an observation corroborated by forestry workers. Residents in areas D and E made no comments at all regarding the presence of seagulls associated with the landfill.

21

One comment was critical of the efforts made by the City Council to consult nearby residents. It suggested that the leaflet drop did not cover all the householders or property owners, and the analysis of responses did not take into account where responses came from in relation to the trees (i.e. immediately adjacent to the forest boundary versus one street back from the forest boundary)

Timing; frequency; trends?

The presence of seagulls circling over the landfill is a regular and frequent phenomenon which has existed since landfill operations began at the Burwood site. Observations of seagull droppings are only occasional, while the incident of dead or dying seagulls on the beach is an isolated incident.

Mitigation attempts?

The landfill manager says that 'nuisance' materials that would particularly attract seagulls are buried straight away. Furthermore, the compactor driver at the tip face is licenced to carry a gun within the landfill boundaries. The driver can use the gun either to shoot seagulls with live rounds or to scare birds away with blanks²².

Impacts?

For most residents, the presence of seagulls creates no negative impacts at all. The occasional incident of seagull droppings on washing requires re-washing of the soiled items. However the likelihood of this happening has not been evaluated to see whether the level of reporting is above average for a seaside suburb.

It was reported that the incident involving dead or dying birds on the beach required control on dogs exercising on the beach at the time.

Summary evaluation

The presence of seagulls associated with the landfill operation is not a significant concern to residents, given that they have chosen to live in close proximity to the coastline. This conclusion is reinforced by the absence of unprompted observations.

Vermin

What effect do they notice? Source of effect?

Two per cent (2%) of all neighbours interviewed commented unprompted on vermin, the proportion rising to 9% with prompted questioning. Most comments describe mice or rats, and associate their presence with proximity to the forested land, not with the landfill operations. One comment described possums and stoats and attributed these to the same source.

Spatial distribution?

Most responses came from the area of Parklands adjacent to the Forest Park (30% in area A).

Timing; frequency; trends?

No trends were noted over time, and no exceptional frequency was noted (compared with general expectations of residents living near forested land).

Impacts?

In the minds of neighbouring residents, there is no clear association of vermin with the landfill operations. Rather, they tend to see it as a natural consequence of living in close proximity to a forested area. Forests do not carry the immediate connotation of elevated disease risks.

²²

These measures were adopted as a result of a study carried out by a Professor Harper from Lincoln University.

Summary evaluation

There are no negative effects on neighbouring residents associated with elevated levels of vermin sourced from the landfill. The association of vermin with forests rather than landfill operations appears to lead to the interpretation that vermin are an acceptable and expected phenomenon for nearby households.

Dust

What effect do they notice? Source of effect?

There were no unprompted responses from residents regarding dust, and 5% level of response when prompted. Observations were specific to pollen rather than dust, and therefore were attributed to the trees in the Bottle Lake plantation.

Recreational users have a different perspective, using areas within a working forest and sometimes close to the operational disposal site. Even so, the overall level of response was not high, at 11% (all prompted). As well as pollen from pine trees, dust was sourced to the disposal site and the trucks.

Spatial distribution?

The only comments came from areas A, B and D. This spatial distribution of responses reinforces the unlikelihood that the landfill operations are the source of any dust nuisance to neighbouring residents, given the direction and distances involved.

Timing; frequency; trends?

There is a clear seasonal pattern to the observations - spring, when the nor'westers blow.

Mitigation attempts?

The landfill contractor has a water cart on site for spraying daily to control dust at the tip face and around the operational area. It is also used for spraying the main access road within the Forest Park.

Impacts?

For residents, the dust (in fact pollen) is not associated with the landfill operations but with proximity to a forested area. There was no indication of unacceptability.

Summary evaluation

Dust caused by landfill operations does not cause any negative impacts on neighbouring residents or recreational users of the forest.

Cats

What effect do they notice? Source of effect?

From the whole sample of neighbouring residents interviewed, 4% commented on cats. One interviewee who has lived near the landfill for the past six years had observed two occasions when cats have been abandoned near the entrance to the landfill. Two other neighbours commented on cats coming onto their property from the forest plantation. One reported an abandoned domestic cat while the other reported wild cats. It is not clear whether the abandoned, domestic cats were attributed to the landfill operation (i.e. arriving in rubbish to be disposed) or to the fact that Bottle Lake forest was considered a convenient place to abandon them. The Landfill Manager acknowledged that "*a lot of wild cats inhabit the site*". The Forest Ranger observed that cats are brought in to the landfill in the waste trucks. Many of these cats then move away into the forest. As predators, they have "*reduced the numbers of native birds such as fantails, quails and owls*".

Spatial distribution?

Cats from the landfill were reported only by residents living near the landfill entrance (33% in area E).

Timing; frequency; trends?

Incidents that drew comment from residents occurred only very occasionally; averaging less than one incident each year amongst those interviewed. The Ranger's comment about the predatory impact of abandoned cats noted that *"it has been a growing problem for some years"*.

Mitigation attempts?

It was noted that the landscaper who sets traps to catch possums in the Forest Park *"catches the odd cat"*.

Impacts?

The interviewee who reported wild cats arriving from the plantation expressed annoyance. Others noted that wild cats are probably responsible for keeping the numbers of vermin in the forest in check, to the point where they do not cause problems for neighbouring residents.

Summary evaluation

While both domesticated and wild cats have been observed, generally they do not appear to be a significant source of nuisance for neighbouring residents. Their impact is observed more on the avifauna within the Forest Park.

Hazards

What effect do they notice? Source of effect?

The only type of hazard reported were fires. Three residents (4% of total sample; 15% of area A) reported fires deliberately lit by arsonists several years ago (about 1996/97) in the forest, not the landfill. The manager confirms that these events occurred outside the landfill boundary. One resident mentioned two fires from burning sawdust within the landfill. Again, the manager confirmed this source as a stockpile of saw dust which self ignited and smouldered, but never reached the stage of open flames. Several recreational users reported seeing the results of fire, including *"the big fire of 2-3 years ago"*. In each case they were unsure as to the cause.

The Plantation Manager expressed the view that the City Council *"should never have let sub-division be built so close to a working forest because of the fire risk"*. He expressed concern if the paper road (Rothsay Road) should be actioned and cars allowed to use it.

Spatial distribution?

The only residents' observations came from Parklands on the south side of the forest.

Timing; frequency; trends?

A very occasional event.

Mitigation attempts?

No waste contractors are supposed to enter the landfill unless equipped with a fire extinguisher and spark arresters on their vehicles. In extreme fire risk conditions, the Park Ranger asks the landfill entrance kiosk operator to monitor all trucks arriving at the landfill to ensure that they are equipped either with a fire extinguisher and/or a shovel. This is a precautionary measure to prevent fires in the Forest Park that might be caused by sparks from truck engines or loads. For fire control, the landfill site comes under the umbrella of the Selwyn Plantation Board, which has a Fire Plan monitored by forest rangers. The forest rangers are unaware of any fires that have ever been caused from waste contractors engines or loads. On

a number of other occasions, however, truck drivers have notified the ranger about fires caused from other sources²³. He noted that *“when the site closes in 2002, I will lose these ‘eyes and ears’”*.

Impacts?

Fires in the landfill have not caused concern to neighbouring residents. Recreational users have had to avoid certain areas from time to time - *“reduced our visibility”* (while orienteering), *“had to leave because it was so smokey”*, *“carried on, just biked fast away from it”*.

Summary evaluation

The potential for fires in the landfill operational area is not viewed as a significant risk by neighbours. However, proximity to a forest with active logging and high numbers of recreational visitors requires constant vigilance and the provision of fire control capacity.

Landfill leachate

What effect do they notice? Source of effect?

One interviewee (1%) raised this issue unprompted, although it appears that this was an indirect observation²⁴. After prompted questioning, the total response level rose to 12%. Some of the prompted responses were also of a speculative nature²⁵. Actual observations reported by residents include claims of *“scummy sludge on the sea opposite the landfill”*, *“the grey colour of the sand”* and *“the sluggish feel to the sand”* in a fan-shape pattern out on the beach from the landfill, also associated with sighting dead seagulls and fish, and an unusual *“taste of the seawater”* reported by surfers over the past 6 years. The remainder express concerns about the future leaching that they consider inevitable. The Plantation Manager referred to observations of *“seepage”*. Concern was expressed by several interviewees regarding the type of rubbish being dumped, especially since the landfill appears to be *“open to a lot more contractors these days, and there is no control on what they have in their 40-gallon drums.”*

Spatial distribution?

Actual observations are reported by residents living in the coastal area (area D) who use the beach for recreation.

Timing; frequency; trends?

There was little explicit comment on the timing of these observations. The one unprompted observation pointed to the effects being noticed *“over the past six years”*.

Mitigation attempts?

It should be noted that the Burwood Landfill was opened before requirements for a landfill liner became standard practice. Monitoring bores have been in place on the ‘downstream’ or seaward side of the landfill ever since disposal began. Evaluation of these monitoring data indicates the existence of off-site ‘plumes’ of elevated concentrations of dissolved chemicals or contaminants in the groundwater moving

²³ They have also reported incidents of vandalism, and helped to locate missing people.

²⁴ ‘Indirect’ in the sense that the interviewee was describing what had been discussed at other meetings rather than observed directly by the interviewee.

²⁵ In other words, some of the interviewees were expressing the view that leachate must have passed through to the beach, or that leachate would have harmful effects when it ultimately passes through to the beach.

towards the beach. However, there does not appear to be confirmed monitoring evidence that the leachate materials have yet reached the seawater in Pegasus Bay²⁶.

The City Council is currently investigating remedial measures should leachate concentrations at the landfill boundary be higher than anticipated or are unacceptable. The design work has been done for a series of wells and cut-off drains that would be installed along the eastern boundary of the site with the intention of intercepting contaminated water and recirculating it through the landfill. The Waste Management Unit manager indicated that such measures would only be activated if sudden increases in leachate concentrations were positively identified.

Impacts?

Although some of the interview responses were indirect observations or speculative in nature, this does not remove the potential for such perceptions to affect people's actual use of the area of beach and sea adjacent to the landfill.

Summary evaluation

Although not attracting wide-spread comment from residents at this stage, there remains a distinct underlying level of concern about the future extent of this effect. This possibility is clearly acknowledged by the fact that the City Council is considering contingency provisions to remedy unacceptable off-site leachate migration should this be confirmed.

Summary of responses

The following two tables (8 and 9) provide a summary of the proportions of those interviewed who discussed particular effects in their responses to the structured questionnaire. It is important to note that these percentages do **not** represent the proportions of neighbours who experienced significant off-site impacts.

²⁶

Monitoring is carried out annually by Woodward Clyde (NZ) Ltd, under contract to the Canterbury Regional Council, and reported to the Council.

Table 8: Levels of response

Effect reported	N ⁽¹⁾	% Unprompted	% Unprompted + Prompted
Vibration	9	33	33
Odour	83	28	40
Heavy traffic patterns ⁽²⁾	9	22	22
Noise	83	16	24
Safety on roads	83	7	13
Vermin	83	2	9
Gas emissions	83	2	2
Landfill leachate	83	1	12
Litter	83	1	8
Visual aspects	83		23
Birds	83		12
Dust	83		5
Cats	83		4
Hazards	83		4
No effects noticed	83	58	47

(1) N=83 for all neighbouring residents interviewed; N=9 for residents interviewed who live near the entrance to the landfill and therefore experience the immediate presence of all the heavy vehicles entering and exiting the landfill, and therefore the effects of vibration from heavy vehicles passing close by.

(2) Heavy traffic patterns = route selection

Reports of odour and noise effects display a distance-related pattern. As expected, they are more noticeable closer to the facility.

Table 9 Spatial distribution of residential²⁷ observations reported

Effect reported	% Unprompted + Prompted			
	Total sample (N=74)	'Near' areas (N=20)	'Middle' areas (N=46)	'Far' areas (N=8)
Odour	40	60	30	25
Noise	24	60	7	0

²⁷

Residents in the contiguous suburbs of Parklands and Waimairi Beach, i.e. not including residents near the entrance.

F: Long-term effects of the landfill on settlement patterns and development in the locality

There is a strong consensus among neighbouring residents, recreational users and other key informants that the presence of the Burwood landfill has not been detrimental to development of the residential or recreational amenities in its locality. However, concern was expressed about lack of coordination between the City and forest management over the way logging activities in Bottle Lake Forest Park may have detrimental effects in the future.

Although not a prime focus for this research, interviews still elicited considerable opposition to the notion of extending the life of the Burwood landfill.

The only area where possible property value impacts may have occurred is around the landfill entrance. This has not been corroborated by any analysis of property valuation and sales data. Elsewhere, the possibility of property value impacts has caused no significant concern up to the present time. Forest clearance that is now under way may alter this situation in the future.

In exploring the longer-term effects of the Burwood landfill, residents of the host community were asked for their observations on-

- the major changes that have occurred in settlement pattern in the locality over recent years, and
- whether the location of the landfill had influenced the way in which the community had developed.

There was also some comment on the issue of effects on property values.

Recreational users interviewed were also asked whether the landfill site and operations had influenced the way Bottle Lake Forest Park has developed for recreational use.

Major changes in land use and settlement pattern

The locality surrounding the landfill and the southern part of Bottle Lake Forest Park remains essentially a residential suburban community. The growth of suburban residential development was described in Section C.

The influence of the landfill on the way in which the community has developed in this part of Christchurch

Many of the neighbouring residents interviewed (34%) expressed categorical opinions that the Burwood landfill has not had a negative influence on the way in which the surrounding community has developed. A few (5%) are not so certain.

It is not unusual for residents to associate the landfill site with the wider area of Bottle Lake Forest Park, which has become a significant recreational amenity not only for immediate neighbours but also for residents in other parts of the City. As a combination, it means that the landfill is relatively *“unobtrusive”*. The recreational amenity *“more than compensates”*; compared with other landfills it has an *“an over-riding attraction - is well hidden - can go in a long way without knowing it is there”*. Despite the presence of an operating landfill, it is widely agreed among neighbouring residents that the Forest Park has still attracted many people to use the area.

Looking to the future, however, several residents wondered whether the presence of the landfill will inhibit future residential development in areas which are now part of the forest plantation. Local residents now have a much better idea of how close they are prepared to be to a landfill site to maintain acceptable environmental conditions. In one response, it was acknowledged explicitly that although *“all the street was opposed”* to the original siting decision, their opposition was based on *“completely unfounded fears”*.

There are clearly mixed views on the future use of this land. Some residents look forward to greater recreational use of the area - *“when the landfill is closed, it will have a huge impact on the community; 50 acres or more of land to play with for recreation”*. Those who hold this view tend to oppose the use of such land for more residential sub-division.

Other key informants reinforce the beneficial influence of the Forest Park around the landfill. The ranger expressed the view that, with the development of recreation infrastructure and tracks for a variety of recreational pursuits, the Forest Park has indeed had a much greater effect on the long-term development of this locality than the landfill; it has also brought more car traffic to this area.

Two thirds (67%) of the recreational users interviewed expressed the view that the presence of the landfill had not had a detrimental effect on the development of recreational activities at Bottle Lake Forest Park. These included several who commented that, although the landfill had influenced development in the locality, it had been a positive influence - *“a good use of the land”*, *“landfill has enhanced it; can see it as a source of revenue to do up the tracks in the forest”*. Many point to the popularity of the surrounding recreational locality - *“very popular”*, *“the forest is a good facility”*, *“well used spot”*, *“not aware that the landfill is there”*, *“still like to use the area”*. One remarked that *“recreational development has arrived after the landfill”*.

Nineteen per cent (19%) expressed a contrary view, based on the fact that the existence of the operational area precluded its use for recreational purposes because it was closed to the public at the present time - *“takes up part of the area we would like to use”*, *“the forest road means we have to be careful”*, *“part of the forest that is denied to cyclists”*, *“prevents expansion of cycling, walking and riding tracks”*, *“They do not want too much recreation near a landfill as more people around it could damage the site”*, *“have to walk around the landfill as some areas are unsuitable”*.

The remainder were unsure of the overall impact on recreation development.

Recreational users also expressed views about the future development of the area for recreation. Thirty-three per cent (31%) of responses favoured continued and expanded recreational use, while 17% expressed their opposition to the idea that the landfill might be extended or enlarged.

Property values

What effect do they notice? Source of effect?

The possible effect of the landfill location and its operation on property values was not raised in unprompted discussions at all. However prompted questioning elicited a 16% response rate, most of which dismissed the existence of such an effect. This view is endorsed by several other key informants interviewed. The most common view expressed was that the effective screening of the landfill operations provided by the pre-existing plantation forest meant that most people (residents or visitors) were unaware of the presence of the landfill - *“live too far away to be an issue”* (<2 km) *“a lot of people aren’t aware there is a landfill there”* (900-1,200 m)

Spatial distribution?

Prompted responses displayed a distinct locational pattern, as shown in Table 9 following.

Table 9: Percentage of residents (sampled) who commented on property value effects related to the Burwood landfill

Interview sample	%Unprompted + Prompted	Comments
Whole sample	16	ALL prompted responses
Area A: Parklands “near”	50	70% of these interviewees expressed the view that there had been no impact on their property values from proximity to the Burwood landfill operation
Area B: Parklands “middle”	3	no impact
Area C: Coastal “middle”	0	
Area D: Coastal “far”	0	
Area E: Entrance “far”	22	all of these interviewees expressed the view that there had been an impact on their property values (unquantified)

Timing; frequency; trends?

One quarter of those who commented on property value effects (most denying any effect existed at present) suggested that it would be different if more of the screening trees were removed to reveal the landfill operational area. The recently published Christchurch City Plan indicates the likelihood of areas of Bottle Lake Forest Park being converted to residential sub-division

Mitigation attempts?

The screening of landfill operations from neighbouring residential properties has been in place since Day One of disposal activities.

The property developer responsible for most of the residential sub-division in Parklands suggested that the City Council should be *“starting now to plant and beautify the area; not wait until the site closes, so that it gives trees a chance to grow”*. He expressed the view that *“the paper road should be beautified with low planting through to deciduous trees backed by conifers, so that no matter what happens to the plantation, the activity beyond will always be screened”*. This would have reduced the impacts of the recent logging of trees south of the operational area.

Impacts?

Landfill operations have not generally caused neighbours to be concerned about impacts on their property values, with the exception of some neighbours living near the landfill entrance. In one such instance, the resident was denied permission by the City Council to use the landfill road for access to develop the back part of the section, immediately bordering the Forest Park. In another instance it was acknowledged that such a negative impact was “*difficult to quantify*”.

Summary evaluation

The only area where possible property value effects have caused concern is around the landfill entrance (area E). This has not been corroborated by any analysis of property valuation and sales data. Elsewhere, the possibility of property value impacts has caused no significant concern up to the present time. Forest clearance that is now under way may alter this situation in the future.