



Host Communities: siting and effects of facilities



An analysis of host community experience of the Redvale Landfill (Auckland Region)



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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 very few refusals.

The research team wishes to express its gratitude to all those who participated in this case study - the residents, businesses and those enjoying recreational opportunities in the host community of Dairy Flat; also to the other key informants in the host community, representatives of the Rodney District Council and the Auckland Regional Council as well as the operators and administrators of the landfill.

It is to be hoped that this case study will further enhance the positive working relationship which exists 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.

Acknowledgement is also due to Mr Erik Norder for his considerable effort and initiative in producing this publication.

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	5
B:	History and description of the facility	6
	Location	6
	Planning	6
	Site development and access	8
	The situation in December 1999	12
	Links between the facility and the host community	12
	Monitoring	14
C:	The host community	16
	Overview	16
	Land Use	16
	Dairy Flat community focus	20
	Recent developments	22
	Population change 1971-96	22
D:	Coverage of Consultation and Interviews	23
	Numbers and categories of interviewee	23
	Areas of interviewing	23
	List of other key informants	25
	Feedback meetings	25
E:	Operational effects of the landfill on neighbours	26
	Main Conclusions	26
	Effects projected and reported	27
	Comparing case study survey responses with complaints	27
	Structure for reporting the effects experienced	28
	Odours	29
	Operational Noise	35
	Financial contributions	41
	Visual effects	42
	Changes in traffic volumes, traffic noise and road safety	45
	Dust	50
	Litter	53
	Other effects observed	56
	Summary of Responses	57
F:	Longer-term effects of the landfill on settlement patterns and development in the locality	62
	Main conclusions	58
	Major changes in land use and settlement pattern	59
	The influence of the landfill on the way in which the community of Dairy Flat has developed	59
	Property values	62
	References	63
	Appendix I Traffic Accident Summary on SH1 - data from the Land Transport Safety Authority	64
	Appendix II Listing of Odour Issues examined by the Task Group	67

LIST OF TABLES

Table 1:	Summary information for interviews	24
Table 2:	Effects projected and reported	27
Table 3:	Percentage of residents (sampled) who experience odour from the Redvale landfill	29
Table 4:	Frequency bands for observing effects	31
Table 5:	Spectrum of impact severity for odour effects	34
Table 6:	Percentage of residents (sampled) who experience operational noise from the Redvale landfill	35
Table 7:	Spectrum of impact severity for noise effects	39
Table 8:	Percentage of residents (sampled) who experience visual effects from the Redvale landfill	42
Table 9:	Percentage of residents (sampled) who experience traffic effects from the Redvale landfill	45
Table 10:	Percentage of residents (sampled) who experience dust from the Redvale landfill	50
Table 11:	Percentage of residents (sampled) who experience litter from the Redvale landfill	53
Table 12:	Summary table of responses by neighbours of Redvale (N= 86)	57
Table 13:	Spatial Distribution of observations reported	57

LIST OF FIGURES

Figure 1:	New Zealand Case Studies	2
Figure 2:	Location Map	6
Figure 3(a):	Aerial Photo of Redvale Landfill	9
Figure 3(b):	Aerial Photo of Redvale Landfill	10
Figure 4:	Redvale fill sequence	11
Figure 5:	Frequency of local complaints	15
Figure 6:	Frequency over time	15
Figure 7:	Dairy Flat Primary School Role	21
Figure 8(a):	Rodney Council/District	22
Figure 8(b):	Dairy Flat/Redvale	22
Figure 9:	Areas of interviews	23
Figure 10:	Comparing survey responses with complaints	27
Figure 11:	Frequency of experiencing off-site odours	31
Figure 12:	Odour Catchment	32
Figure 13:	Severity of odour impacts	34
Figure 14:	Noise catchment	37
Figure 15:	Frequency of experiencing operational noise	38
Figure 16:	Severity of noise impacts	40
Figure 17:	Dust effects offsite	52
Figure 18:	Litter effects	55
Figure 19:	Landfill's influence on community?	59
Figure 20:	Landfill's influence on community?	59
Figure 21:	Trends in capital values	62
Figure 22:	Trends by location	62

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 social research concerning the siting decisions and community experience of Solid Waste facilities. The research has been funded from 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 waste disposal infrastructure) by developing a body of knowledge on social factors that are relevant to the siting and operation of solid waste facilities.

This case study addresses part (Questions 2 & 3 below) of the overall research objectives. 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 has focussed on waste water facilities. From 2000 to 2002, additional types of facilities are being investigated (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 or poor 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 expected that these objectives will be served by carrying out the research in a setting which is removed from the tensions of

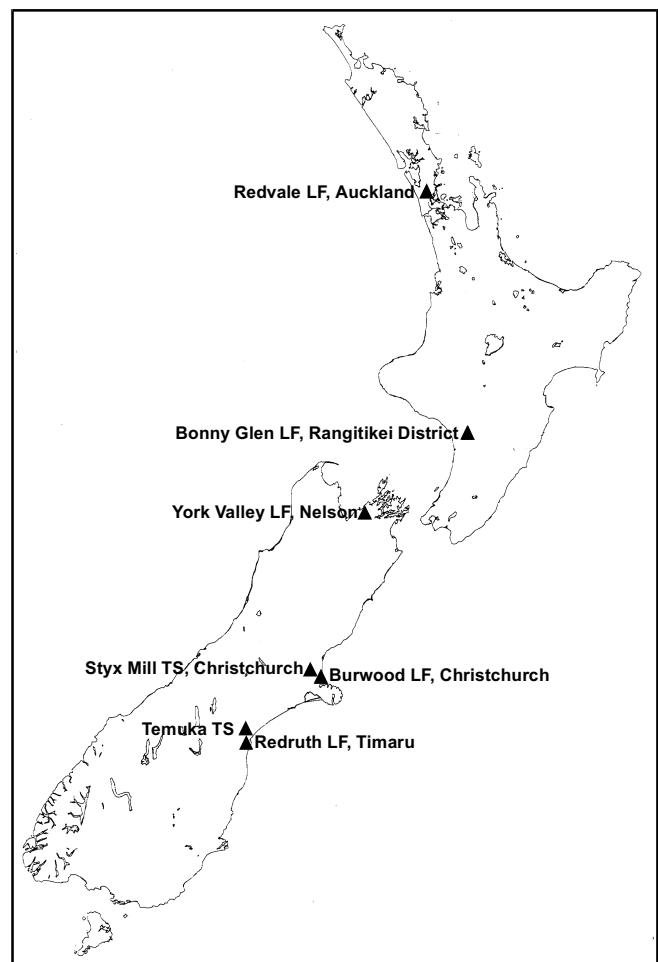
resource consent applications, and by a team of independent researchers who have no organisational affiliation with either the developers of such facilities (usually but not always Territorial Local Authorities) or the host communities involved.

Purpose of the case studies

This case study on the Redvale 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 common 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

¹ The full list of case studies includes:-
 Burwood landfill (Christchurch City) - Working Paper FS4
 Redruth landfill (Timaru District) - Working Paper FS5
 Bonny Glen landfill (Rangitikei District) - Working Paper FS6
 Redvale landfill (Auckland Region) - Working Paper FS8
 York Valley landfill (Nelson City) - Working Paper FS9
 Styx Mill transfer station (Christchurch City) - Working Paper FS3
 Temuka transfer station (Timaru District) - Working Paper FS7

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.

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 businesses in relatively close proximity to the Redvale 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 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

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.

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.

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 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. All are available from Taylor Baines & Associates⁶ on request. Full case study reports (Working Papers FS3-FS9) are available for the cost of reproduction

⁶ Taylor Baines & Associates, PO Box 8620, Riccarton, Christchurch. www.tba.co.nz, ph/fax (03) 3433-884

and postage, while conference papers and abbreviated summary documents for each case study are available free of charge, and can be downloaded from the website www.tba.co.nz.

The research provider - Taylor Baines & Associates

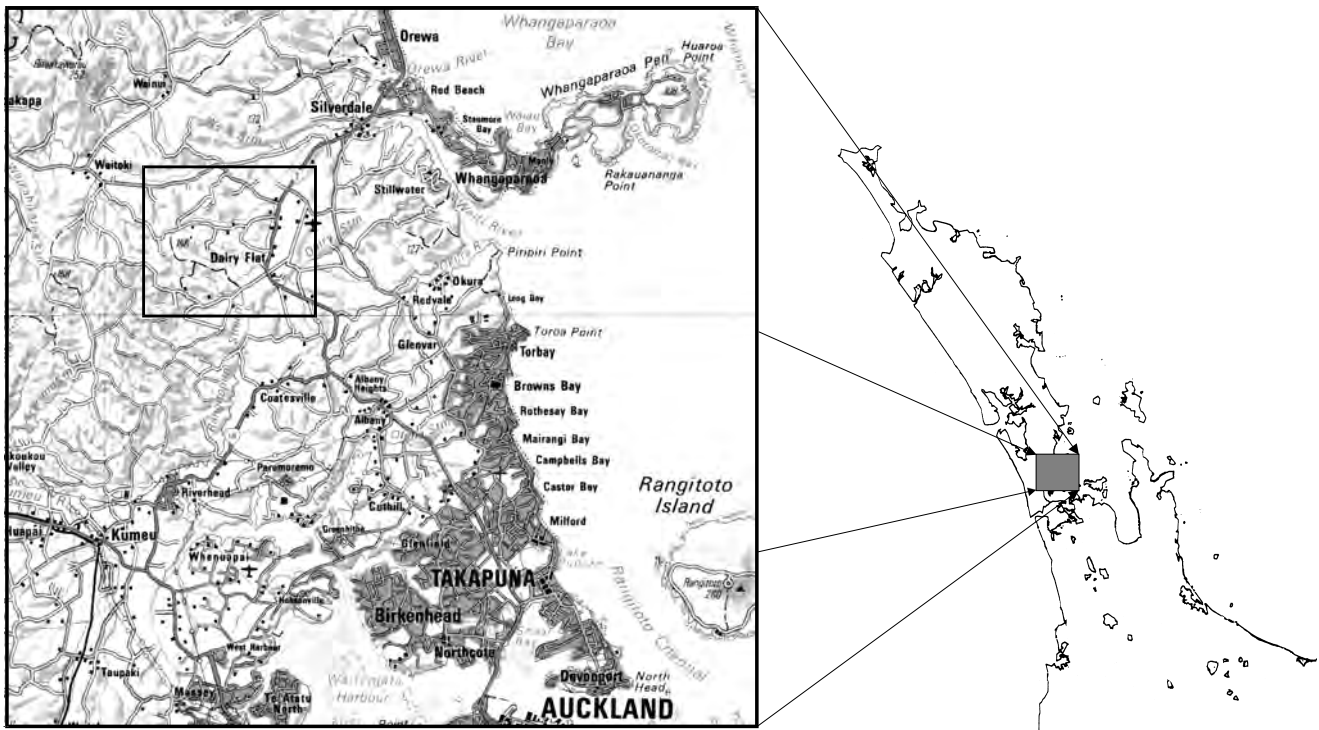
Taylor Baines & Associates has been a private provider of research, consulting and training services since 1989. The firm specialises in social research and the application of social assessment methods to a wide variety of issues in community development.

B: History and description of the facility

Location

The Redvale Landfill has been one of the principal refuse disposal facilities for the Auckland metropolitan area and Auckland region since it opened in August 1993. The landfill is located 1 km west of SH1, some 6 km south of Silverdale in the community of Dairy Flat. It is approximately 25 km north of Auckland City (see Figure 2).

Figure 2: Location Map



Planning

The Redvale Sanitary Landfill is owned and operated by Waste Management NZ Ltd (WMNZL). Planning for the development of the site began with the purchase of the land in 1988. The site involved a lime quarry which had been in existence for twenty years and which is still in operation. The quarry is expected to close in 2005. The quarry operator will be able to extend quarrying into the western area of the landfill site, which requires excavation prior to filling, by arrangement with the landfill operator.

The Redvale landfill accepts only “non-hazardous residential, commercial and industrial solid waste” (EIS, p.35). It has a land-use consent from the Rodney District Council for a term of 30 years, with 30 years of post-closure care required. WMNZL applied to the Auckland Regional Council in 1994 for an Air Discharge Permit. They finally heard the application and made decisions granting the permit in 1998. The Regional Council has reserved the right to review the permit conditions in

respect of the western end of the site⁷. The Redvale Quarry continues to operate under ‘existing use’ rights which were established before the Resource Management Act (1991) came into force. Thus it has significantly less restrictive operating conditions in respect of off-site effects than does the Redvale Landfill.

Planning documents⁸ record the following environmental and social effects and issues projected for the Redvale site:

- **surface water discharges from contaminated rainfall and diverted (uncontaminated) rainfall** will be insignificant and will approximate existing conditions
- **leachate impacts on groundwater** are likely to be insignificant because of restricted groundwater circulation and site geology dominated by low permeability rocks
- there should be no adverse impacts from **landfill gas** at the site; there should be no **visual impact from the flare** due to distance from the nearest dwelling
- **road safety impacts** can be managed satisfactorily; **traffic noise impacts** and **traffic volume effects** are existing problems which will not be significantly altered
- the problem of **airborne litter** will be minimised by the use of daily cover over the active fill areas, portable fencing to contain loose paper and other **windblown refuse** and litter “pickers” who will patrol the landfill recovering such material
- proposed management techniques will be effective in preventing **bird nuisance** and any consequent **hazard to aviation activities** of members of the North Shore Aero Club.
- **the impact of vermin** will be limited to the point of minimal nuisance due to the relative isolation of the site
- the isolation of the Dairy Flat site will significantly reduce the potential of **fly nuisance** and the consequent risk of **transmitting pathogens to humans**
- for most of the time, **noise levels from operating equipment** would not be considered excessive but would have some impact on the noise environment of houses on Horsehoe Bush Road, with little impact for houses along SH1; since noise levels generated by SH1 traffic would generally have as much impact as that generated by landfill traffic, only houses immediately adjacent to the intersection of the site access road and SH1 would experience **noise impacts from landfill traffic** and then only of a minor nature
- the landfill would be **visually evident** but not particularly intrusive
- consultations did not reveal any knowledge of the presence of **waahi tapu or other sites of cultural significance** within the survey area; **violation of cultural or spiritual values** and **impacts on sources of kai moana** were also investigated

⁷ The western end of the site is intended for development as Phase 10 of the landfill sequence (refer to figure 4 following).

⁸ Waste Management NZ Ltd (1990): Redvale Sanitary Landfill - Volume 1: Summary and Environmental Impact Statement. June 1990.

Site development and access

The site for the sanitary landfill occupies approximately 80 hectares and is situated in an area of low hills with elevations ranging from approximately 50m to 150m above mean sea level (see Figures 3(a) and (b)). Essentially, the landfill is back-filling with compacted solid waste the hole excavated in the quarrying of lime. Currently the site services the needs of both quarry and sanitary landfill operations. In recent time, the quarry operation has been associated with up to 500 trucks/day, although there is no regulated limit. This compares with the landfill's maximum of 400 trucks/day. At present, the quarry company is doing the quarrying and overburden removal, while the landfill operator is responsible for the final cut to carefully specified levels.

Machinery on site at the Redvale landfill includes:

- landfill compactor - caterpillar 826C or equivalent
- bulldozer - caterpillar D9 or equivalent
- hydraulic excavator
- articulated trucks
- motorgrader
- water truck
- towable sheepsfoot rollers and harrowing discs
- miscellaneous equipment such as road sweepers

Buildings on site include a weighbridge office and administration buildings, as well as an equipment maintenance facility. Each building is serviced with:

- telephones for outside communication
- radios for on-site communication
- toilet facilities
- drinking water supplies

Effluent collection and disposal is by way of a holding tank and off-site disposal.

The site will be developed in ten stages (see Figure 4).

Dumping of solid waste began at the Redvale site in August 1993. By early 1996, landfill gas was emerging in significant quantities under natural pressure. This 'passive' extraction was associated with 5 gas wells around the site, each of which was flared. 'Active' gas extraction⁹ with a central flare was installed in November 1998, and the gas flaring station was shifted in June 1999 when the use of gas for leachate evaporation was introduced. By December 1999, approximately 2,200 cu.m./hour of gas was being extracted in this manner. Installation of a gas-fuelled generator in late 1999 signalled the beginning of electricity production at the rate of about 1 MW, with the first exports of surplus electricity occurring in April 2000. Technology has been selected that is capable of running on 25% methane, although the landfill gas being produced is typically about 45%-55% methane. WMNZL is aiming for better than 90% gas extraction, the remainder escaping as 'fugitive' discharges through small cracks in the surface of the landfill. It is expected that electricity

⁹ With 'active' extraction, the landfill gas is sucked out of the landfill by fans which create a slight vacuum throughout a network of buried pipes.

Figure 3(a): Aerial Photo of Redvale Landfill



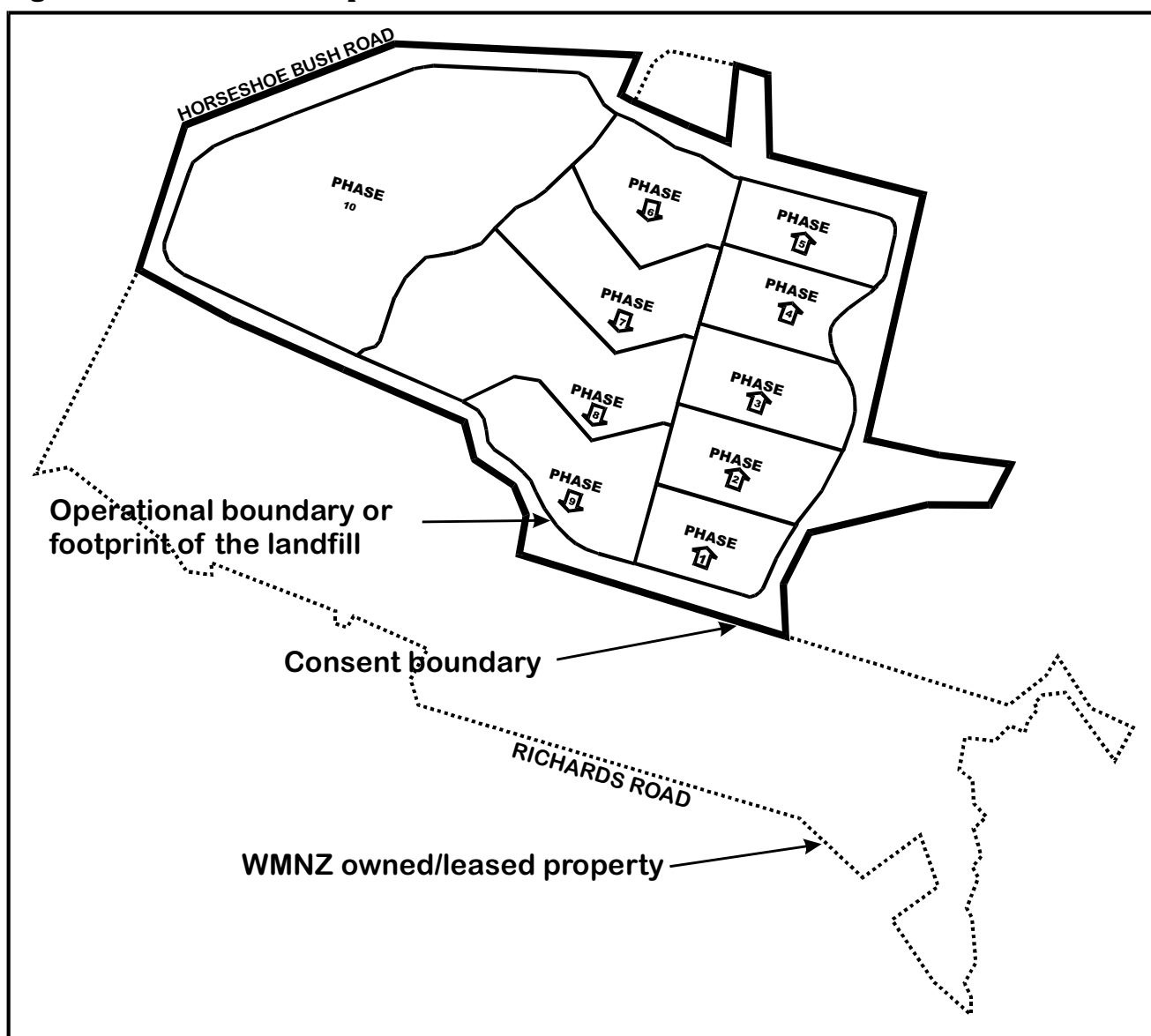
Figure 3(b): Aerial Photo of Redvale Landfill



production from landfill gas will peak at about 15 MW¹⁰, with another 25 MW of heat which could be utilised for heating or cooling purposes. WMNZL is considering local supply, in discussions with the electricity retail industry. At present, rural consumers around the Dairy Flat area experience about 100 'outages' each year¹¹. Electricity from Redvale could offer a more reliable supply to local consumers since the electricity would not have to travel throughout the whole rural network.

Initially, leachate produced during the decomposition of waste in the landfill was collected in a holding sump, and then transported off site by road tanker for treatment and disposal at Mangere. In mid-1999, WMNZL installed a plant to evaporate the leachate, using landfill gas to heat the leachate in a sealed chamber. The water vapour from this chamber then passes through the flare, while solids and metal salts left behind after evaporation are returned to the landfill. This process is described as an improvement over conventional treatment systems because no metals or organics can find their way into any receiving waters, either on site or off site.

Figure 4: Redvale fill sequence



¹⁰ Current estimates by WMNZL indicate that 15 MW would be sufficient to power all domestic electricity consumption in Rodney District.

¹¹ Some of these outages may last only a fraction of a second, but are still sufficient to disrupt sensitive electronic equipment such as computers.

Both the operator and a representative of the technical Peer Review Committee confirmed that land on the south-west side of the present landfill site is not technically suitable for extending landfill operations.

Access to Redvale Sanitary Landfill for waste disposal is strictly controlled to authorised bulk haul vehicles that meet site entry requirements. No public access is allowed and no casual tipping.

The situation in December 1999

Approximately 85% of the landfill traffic approaches from the south. However, the proportion of waste coming from the north is growing with the pace of residential development that is occurring north of Auckland. Vehicle counts¹² suggest that the quarrying operation involves more than twice as many heavy vehicle movements per day on average as the landfill operation. On average, between November 1998 and October 1999, the maximum number of trucks visiting the landfill was 123, compared with 270 estimated for the quarry.

The normal hours of operation are from 6.00 am till 6.00 pm, Monday to Saturday. There can be times when landfill and equipment maintenance continue until 9.00 pm. By contrast, the lime quarry may be operated on a 7 days/week basis, and may indeed do so for up to 24 hours/day.

Continuous security is provided via closed-circuit TV monitoring.

Daily operation of the landfill is under the direction of the Landfill Manager. Up to 4 landfill equipment operators are required for earthworks - excavation, liner construction, refuse placement and cover operations. In addition, full-time operations staff include a weighbridge attendant and a mechanic, and part-time staff include a financial controller/office manager and litter pickers. The full complement of staff is 32, of whom 29 are full time and 3 part-time. Six staff presently come from Dairy Flat, while most of the remainder live on or near the Whangaparoa Peninsula. The landfill manager lives on site.

Links between the facility and the host community

Two bodies have been established formally which provide on-going links between the landfill operators and the host community - the Redvale Landfill Community Liaison Committee and the Dairy Flat Community Trust. The establishment of the Community Liaison Committee was required by the Rodney District Council as a condition for granting the land-use permit.

Furthermore, a condition of employment for the Landfill Manager was that the manager should live in the local community, in order to put the relationship between company and neighbours on a more human footing and try to overcome the “*us and them*” criticism. Many people interviewed in the course of this research made the point that locals are encouraged to contact the Landfill Manager directly whenever issues arise. Many also commented on the willingness of the Manager to respond to such contacts in a very timely manner. It should be noted that out of almost a hundred local people interviewed, one person experienced a lack of liaison and communication in the early years

¹² Based on monthly data for maximum daily vehicles entering the landfill over a 12-month period from November 1998 to October 1999. These estimates assume that 30 vehicles per day visiting the landfill are not trucks (e.g. staff cars and visitors). Furthermore, since the records are taken during landfill operating hours, trucks servicing the quarry after 6pm will not be included.

of the landfill operation, and also expressed concerns that *“others are keeping quiet”* or had been *“bought off”*. Nevertheless, there is a strong consensus among those interviewed that the landfill manager invites co-operation and *“treats people who complain like sensible adults”*.

The Redvale Landfill Community Liaison Committee comprises twelve members and meets quarterly. Currently, more than half the Committee members are local residents of Dairy Flat, and the current chairperson also holds the designated position of Resident Liaison Officer. The Auckland Regional Council, the Rodney District Council and the Peer Review Committee each has one representative, and the Landfill Manager is a member of the Committee. The Committee’s role “is to allow issues and concerns relating to the operation of the landfill to be debated and negotiated.” Interviews during the course of the research indicated that not all locals make use of the Liaison Committee to raise their concerns or air their grievances or suspicions. Residents do sometimes approach committee members *“but they’re just as likely to go straight to the Manager”*. A few people suggested that the Liaison Committee should try to be more pro-active from time to time, and not always wait to respond to complaints. While *“meetings are open - anyone can turn up, but they don’t”*. Nevertheless, the chairperson of the Committee expressed the view that *“the function of the Committee is to keep them honest”*, adding that he would be *“quite prepared to blow the whistle if I thought something was amiss”*. He noted that one of the most vehement original objectors is also a member of the Committee.

The Dairy Flat Community Trust currently has six trustees¹³, one of whom is also a member of the Community Liaison Committee. The Landfill Manager also attends Trust meetings, which are held five times a year. The Dairy Flat Community Trust is a charitable trust set up to administer and distribute monies provided for the community of Dairy Flat¹⁴ by WMNZL. During the first seven years of the landfill’s operation (1993-1999), \$453,000 was gifted to the Trust to distribute, an average of \$65,000 per annum. Over that time, major recipients have been the Dairy Flat Primary School, the North Harbour Trotting Club, the Dairy Flat Community Hall, the Dairy Flat Tennis Club, the Dairy Flat Pony Club, Horse Trials, and the North Harbour Sports Trust. Numerous other community groups in the immediate community, as well as some in the wider Hibiscus Coast area that are seen to contribute to the general welfare of Dairy Flat residents¹⁵ have also received grants. In 1999, seven post-secondary education scholarships were awarded to young people from Dairy Flat families.

Another community liaison mechanism which came with the establishment of the Redvale landfill is the Dairy Flat Newsletter. This community newsletter is produced four times a year under the auspices of the Community Liaison Committee and the Community Trust. It is published by WMNZL and delivered by a local organisation, the Matea Trust. The newsletter serves a variety of functions:

- notifies the names and contacts for the Community Liaison Committee and the Community Trust, and publishes the decisions on Trust funding allocations,
- provides a way for the landfill manager to let locals know what is happening in landfill operations, and also quarry operations,
- conveys news from a range of local clubs and organisations,
- provides a comprehensive local business telephone directory.

¹³ Trustees are elected for two-year terms, with two retiring by rotation, although they can be re-elected if others do not come forward.

¹⁴ The criterion used to define the area of Dairy Flat community is the geographical area from which Dairy Flat School children are drawn. At present, approximately 800 families live in the Trust’s catchment area.

¹⁵ e.g. Age Concern, Silverdale St John, Orewa Girl Guides, Hibiscus Coast Victim Support.

The November 1999 edition of the newsletter noted the frequent requests from members of the public (mainly local residents) regarding tours of the landfill. The first 'open day' was held on 5 December 1999 as a result of this interest, attended by about 40 people.

Monitoring

Peer Review Committee

A Peer Review Committee was established initially to audit the construction of the landfill - looking at excavation standards, land stability issues and liner construction standards - to ensure that all engineering works achieved design specifications. Established under consent conditions by both the Rodney District Council and the Auckland Regional Council, its role has evolved into that of a general technical 'watchdog' even though it has no responsibility for environmental compliance. The Peer Review Committee holds 2-monthly meetings, during which any complaints are received and the response by the operator reviewed. The monitoring reports prepared by the operations staff for the Committee cover landfill gas monitoring¹⁶; odour complaints; leachate quantity, quality and incidents; birds; vermin; litter; fires; vehicle numbers; fuel handling; wheel and truck wash activities; silt retention ponds; tree planting; fencing; site-generated wastes¹⁷; staff training; health and safety issues.

Auckland Regional Council

The Auckland Regional Council (ARC) administers a range of consents or permits for the landfill. The Air Discharge Permit for Redvale landfill covers discharges of landfill gas, odours, dust and maintaining roads clean of material which might be deposited from passing trucks¹⁸. Its conditions specify monitoring requirements, obligations on wheel and truck wash facilities, maintenance of a complaints log, and the provision of monthly monitoring reports and an annual summary of monitoring results. Monthly reports are held only from February 1999, after the permit became operative. The ARC is also responsible for overseeing the integrity of provisions designed to avoid any uncontrolled discharges into groundwater or neighbouring surface waters. These are provided for via four permits to divert, dam and discharge stormwater and silt to a tributary of the Rangitopuni Stream; one permit to take water from four sediment ponds and/or the quarry sump within the Rangitopuni River catchment for on-site use; one permit to take groundwater from below the landfill and one permit to discharge leachate from a non-hazardous wastes landfill to ground soakage. ARC also issues various permits to control sediment discharge associated with construction works on-site when needed. The permit to discharge leachate to groundwater has some important controls on what can and cannot be disposed of in the landfill (together with the land-use permit).

Rodney District Council

As the territorial local authority, the Rodney District Council (RDC) administers land-use consents. Noise, and the condition of roads also come under its jurisdiction. The District Council maintains a computerised log of public complaints.

¹⁶ Including in-ground probes, weekly walk-over inspections, quarterly surface emission monitoring and gas flares.

¹⁷ e.g. lead-acid batteries, sewage, used oil.

¹⁸ Such materials might include liquid or solid waste discharges from truck contents, as well as dust or mud from vehicles entering or leaving the landfill site.

Operator's Complaint/comment Register

Having noted early that local residents are encouraged to notify the landfill manager if they experience some off-site effect to which they object, the register maintained by WMNZL at the Redvale landfill has logged 145 complaints from members of the public between January 1993 and December 1999. One hundred and twenty of these complaints (87%) were received from people living within 1 km of the landfill site boundary, with most of the remainder coming from members of the passing public on State Highway 1 or regulatory authorities such as the ARC and RDC. In twelve cases, it is clear that multiple reports (complaints) have been received, with two or three people reporting the same incident.

Thirty-seven local households were responsible for the 120 local complaints, although the distribution/frequency of complaints is not uniform. Almost half the complaints (46%) have come from properties within 500m of the landfill boundary in the quadrant from north to east of the site, and almost three quarters (72%) from properties within 1 km in this quadrant. The five households who have registered complaints on more than 10 occasions during this period are all in this north-east quadrant and between them have averaged 15 complaints on the WMNZL register (see Figure 5).

The complaints have focussed on nine specific types of effect, although by far the greatest number have concerned experiences with off-site odour (102). Noise (16), litter (7), mess on the road from trucks (7), and the behaviour of truck drivers (4) are the other effects most commonly reported. The higher numbers of complaints in recent years have been associated with odour effects from various sources (see Figure 6).

Figure 5: Frequency of local complaints

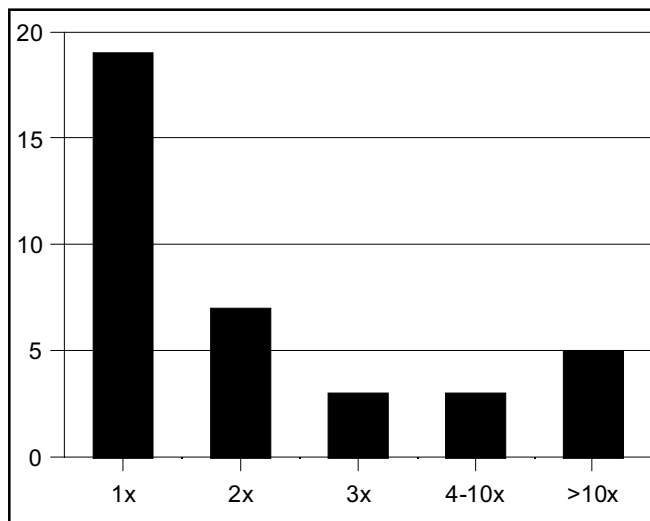
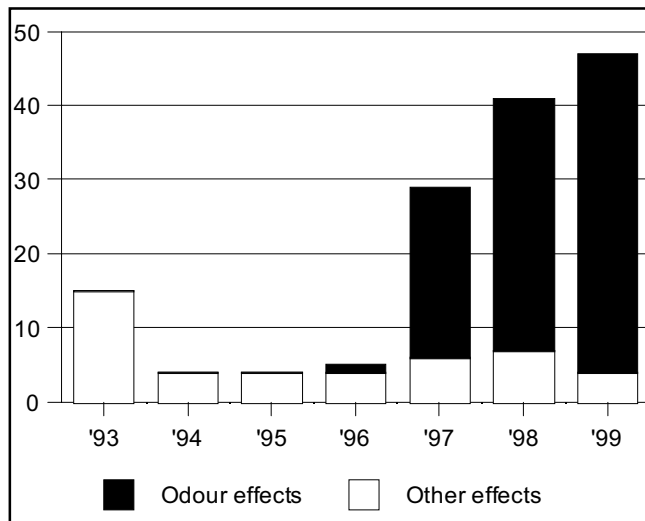


Figure 6: Frequency over time



C: The host community

Overview

The rural community of Dairy Flat straddles State Highway 1 some 25 km north of Auckland City and 6 km south of Silverdale. Kahikatea Flat Road, which joins SH1 at the main intersection in Dairy Flat, is a major through road from Kaukapakapa and Helensville in the west. While the north-south highway traffic has been a dominant feature of Dairy Flat for many years, this was due to change abruptly just after the fieldwork for this case study was completed in December 1999 with the opening of the northern motorway extension as far as Silverdale.

The Environmental Impact Statement (EIS) prepared for the Redvale landfill (Gysberts Burn Ltd, 1990) contained the following description of the host community -

“The Dairy Flat locality embraces a tightly-knit rural community. The social fabric of the area is woven from the threads of the relatively unified economic nature of the district with its foundation on pastoral farming and horticulture, the rural service industry, the cultural and recreational activities centred on the Dairy Flat Hall and the central role of the local primary school. Long-standing family connections with the district are reinforced by local marriages and, while the district has passed through the eras of gum diggers, orchardists and farmers to the “10-acre block” residents of the present, the unifying “country community” spirit has continued.”

These general features of the host community were confirmed by information and comments gathered during the research.

Land Use

Although agriculture and horticulture occupy considerable tracts of land in the locality, the land around Dairy Flat has never been considered prime productive land because of its underlying soil types. This area used to be ‘gum country’ from ancient Kauri forests. Local real estate agents pointed to poor drainage and frequent saturation in winter, but noted that it dries out quickly in the summer heat, limiting the kinds of trees that can grow well.

The major influence of the roading network has already been alluded to, with some local residents describing the impact of SH1 traffic as “*a real blight*”. Another resident commented that “*It’s not really rural living when your kids can’t walk up the road to school safely*”. There is a sizeable truck depot near the junction of Kahikatea Flat Road and SH1, on the edge of the commercial area of Dairy Flat. The landfill is a relatively recent arrival. The lime quarry operated by the Redvale Lime Company occupies a central location in Dairy Flat, and has the most obvious effects on the local community. Another major land use in the locality is the North Shore Aerodrome, reported to be the busiest of its kind in New Zealand. As noted in the EIS for the Redvale landfill (Gysberts Burn Ltd, 1990, p. 23):

“Increasingly, the district has become a rural/residential area for urban workers. Rural subdivision in the 1970s has resulted in a large number of “10-acre blocks” which now provide a rural living environment for many who have left the traditional residential

areas of Auckland City. These relative newcomers to the district bring with them new attitudes and values and this evolution is reflected in the nature of the emerging land uses including the shift to horticulture. The result is a more varied social fabric than has previously been the case but one which retains the traditional elements of rural unity.”

State Highway 1

Data presented in the WMNZL's EIS document (p. 56) and based on Transit NZ files showed that the section of SH1 in the vicinity of the landfill site carried approximately 12,000 vehicles per day (vpd) at that time (1990). These data were confirmed by data collected by the Rodney District Council in 1988 which showed a five-day average of 12,440 vpd and a seven day average of 12,650 vpd. Information available at that time showed that periods of peak week-day traffic flow occurred between 8.00 am and 9.00 am (900 vph) and between 6.00 pm and 7.00 pm (1,090 vph).

It was estimated that heavy commercial vehicles comprised six to seven per cent of the daytime traffic. ‘Platooning’ of traffic is a common occurrence because of the slowing effect of heavy commercial vehicles.

Ministry of Transport records showed that 18 injury accidents (none fatal) were reported on SH1 between Richards Road and Horseshoe Bush Road between 1980 and 1987. No injury accidents were reported as having occurred at the intersection of SH1 and the quarry access road (actually referred to as ‘Lime Access Road’) during that period.

Data on road accidents are also available from the Land Transport Safety Authority (LTSA). These were provided for three sections of SH1 - the length of SH1 immediately spanning the landfill entrance¹⁹, a section of SH1 to the south, and a section of SH1 to the north - and for two periods - 1988-92 (before the landfill began operating) and 1994-98 (after the landfill began operating). These data are summarised in Appendix I, along with maps of the accident locations. Analysis of these data by the LTSA produced a conclusion, regarding the increasing number of accidents over time, that “there is little to suggest they are associated with the landfill or lime works access.”

In December 1999, after the case study field work had been completed, the motorway extension north of Albany was opened, resulting in a substantial reduction in vehicle numbers along this section of SH1.

Redvale lime quarry

According to the EIS for Redvale landfill (Gysberts Burn Ltd, 1990):

“..... it was in 1967 that the (Redvale Lime) company moved to its present quarry site in Dairy Flat. Throughout its years of operations, the company has produced not only lime for agricultural purposes, but also for construction purposes such as roading material, building bases, fill material and driveways. A recent growth area is in the field of decorative stone.”

In 1999, the lime quarry experienced some particularly busy months providing fill material to several sections of the northern motorway extension under conditions of some urgency.

¹⁹ From the intersection with Postman Road and Blackbridge Road to the south of the landfill, to the intersection with Kahikatea Flat Road to the north of the landfill.

As noted in Section A, the Redvale lime quarry continues to operate to conditions determined before the RMA was passed. Local residents have observed that the quarry sometimes operates all night, with the crushing mill typically operating 3-4 nights per week and the consequent loading of trucks at this time, particularly during the busy season²⁰ for agricultural lime applications. Numerous comments from locals about the lime quarry operation were far from complimentary. The principal externalities of the operation have been noise, dust and the impact on road traffic of vehicles entering and leaving the site. Although the contrast between the quarry and landfill operations is obvious to many locals, they realise that different conditions apply in either case. Nevertheless, it is considered by some that the landfill “*tends to cop a lot of flak*” for the impacts which people experience from the quarry operation. This is reinforced by the fact that, to outside observers, the two operations appear to take place on the same site.

North Shore aerodrome

Owned by the North Shore Aero Club Incorporated, the land for the aerodrome was acquired in 1963 and was first used for flying operations in 1965 (Gysberts Burn Ltd, 1990). In 1990 the club had a membership of 700 with 60 light aircraft, making it the second largest flying club in New Zealand. At that time the club operated 22 light aircraft itself, with six full-time pilots. Membership has shown gradual increases since 1990 at about 3%-4% per annum. It is the principal general aviation aerodrome to the immediate north of Auckland and caters for pilot training, private and leisure flying, charter and agricultural operations. An active parachuting club is also based at the aerodrome. In 1983, just over 6,000 hours were flown by club members and, although aircraft movements were not recorded, it is estimated that 25,000 movements were involved in that year. During the remainder of the 1980s flying hours rose to around 8,000-9,000 hours²¹. Since then, flying hours have declined to about 5,000/year, a trend explained by the club’s manager as attributable to the rising relative costs of flying as a recreation, competing recreational opportunities, and more people working at weekends. In general, use of the aerodrome is divided evenly between weekend and weekday flying.

The capacity of the present facility is estimated at approximately 30,000 movements per annum. The aerodrome has two runways, with the NE-SW runway having more use (80%) than the E-W runway.

The airfield is also the home of North Shore Helicopters Ltd (since 1982) and a base for Great Barrier Airlines (since 1983), a small private commuter airline which averages two flights a day over the year²². North Shore Helicopters operate seven helicopters with five full-time staff and casual pilots, offering passenger flights, aerial photography and other commercial services.

Overall, there are currently between 20 and 30 full-time staff working at the aerodrome.

The presence and operation of the aerodrome has resulted in the inclusion in the Rodney District Scheme of land use restrictions around it. These restrictions are controls over the heights of adjacent natural features and structures within specifically defined areas (fans) which lie to either side of the extended centre-lines of the two operational runways. In addition, a further restricted area defined by an irregular circle imposes general height controls on all land surrounding the aerodrome and beneath this restriction (Gysberts Burn Ltd, 1990). The re-zoning of land in the vicinity

²⁰ Described as being between November and April.

²¹ The number of flying hours is considered a reasonable indicator of the number of aircraft movements.

²² This frequency does fluctuate, with busy times coinciding with holiday periods.

of the aerodrome for 'countryside living' has led to some "niggling" pressure from recent arrivals. At the time this research was conducted, a plan change to allow the development of a 70-section residential aero-park surrounding the aerodrome was in the final stages of its statutory process at the Environment Court. The 'own-your-own' sections would come with covenants protecting the future interests of the aerodrome's users, and thus were intended to provide a buffer zone of aviation-minded residents.

Rural sub-division

Diversification of more traditional rural land use patterns began well before the landfill was first mooted in the late 1980s. In the early 1980s, the Dairy Flat locality began to attract 'alternative lifestyle' people - a progressive extension of the same kind of rural development that had been moving north from the city of Auckland for some time. Although parts of the locality have always had good prospects²³, most of it was never considered "*million dollar properties*". Real estate agents interviewed describe it as fitting into the 'average' range of rural lifestyle properties. They also described it as "*very much horse country*", following a trend that has been well established in Coatesville to the south for some time. Gysberts Burn Ltd (1990) noted

"The general locality of Dairy Flat is a pastoral rural area. The area supports a mixture of dairy and beef herds and sheep flocks with a growing trend towards intensive horticulture, greenhouses and horse breeding. This varied pattern of land use is evident throughout the district and results in a variegated landscape of pasture, horticultural plantings, some afforestation and buildings."

The stock market crash in 1987 had severe repercussions from which the rural property market was not immune²⁴. Many of the buyers in the years following the crash were people who wanted to become self sufficient or self-employed from their properties. Several new shade-house enterprises sprang up in the locality - along Horseshoe Bush Road, Postman Road and SH1. Again, Gysberts Burn Ltd (1990) noted

"The area now supports a wide range of horticultural projects such as flower growing, while other, non-traditional pastoral land uses which have been recently introduced include goat milking, deer farming and the raising of Angora goats herds. This trend of pastoral land use development from large holdings to smaller units is most evident on the closely subdivided, flat to easily rolling land lying between State Highway 1 and Postman Road and on the lots immediately north of Blackbridge Road. In contrast, there has been little change in the land use pattern for the area to the west of State Highway 1. The exceptions to this are the North Harbour Trotting Club development and the deer farming enterprise at Richards Road, both of which are adjacent to the quarry site. At the same time, there have been several recent subdivision applications which could result in the further establishment of sites for horticulture and/or greenhouses on the flatter land in the vicinity of the quarry site."

In 1992, relatively inexpensive properties were sub-divided along Lascelles Road. In the view of real estate agents, this encouraged people with less capital to develop the land²⁵. However, with the

²³ Blackbridge Road, Escott Road and some areas at the south end of Postman Road. These areas were sub-divided into 10-acre blocks 20 years ago and have experienced significant capital growth. This appears to mark the limit of the first wave of lifestyle development in the Dairy Flat locality.

²⁴ A combination of over borrowing and unexpected redundancy forced many sales.

²⁵ The seller put a restriction on transporting old houses from elsewhere to these plots.

passage of time, wealthier people are moving out from the city to areas such as Dairy Flat. More buyers of rural lifestyle properties now come from the North Shore, wanting to escape in-fill housing and buy space and privacy from their neighbours. Different from earlier waves of lifestyle buyers, they do not necessarily want animals to bolster the concept of rural living. Many are younger and richer, sometimes with two incomes.

Other factors have influenced recent rural development and patterns of property sale. Plan Change 55, passed by the Rodney District Council in 1992/93, signalled the acceptability of 'countryside living' by allowing rural sub-division for lifestyle blocks down to 2 hectares. Traditionally sub-division incurred reserve fund contributions and contributions to roading upgrades. In 1995, the RDC brought in Variation 62, which is described as imposing "*additional costs on developers - up to \$5,000 per lot*". According to one local real estate agent, this has "*held up sub-division since*". Another agent noted that Plan Change 55 had been superseded east of SH1 by an airport noise zone, inside which people are required to insulate new houses against noise.

Another pattern observed by real estate agents is that many lifestylers come for only 7-15 years. When their children leave home, many parents leave too. They report "*lots of turn-over*", "*some properties have sold three or four times in ten years*".

Dairy Flat community focus

As a result of these developments over recent decades, the community of Dairy Flat comprises several distinct groups - 'locals' or 'old timers', new lifestylers and itinerants. It is said by some locals that "*some lifestylers don't contribute much, and may be gone in ten years when their children have left home*".

There are several points of community focus within the Dairy Flat locality. Most prominent amongst these are:

- the shops and commercial premises at the junction of SH1 and Kahikatea Flat Road,
- the Dairy Flat Primary School, near the entrance to the landfill and quarry site,
- the Dairy Flat Tennis Club and Community Hall, on the corner of SH1 and Postman Road, and
- the North Harbour Trotting Club, adjacent to the landfill and lime quarry site.

Dairy Flat School

The WMNZL EIS gave the following description in 1990 (Gysberts Burn Ltd, 1990, p. 23)

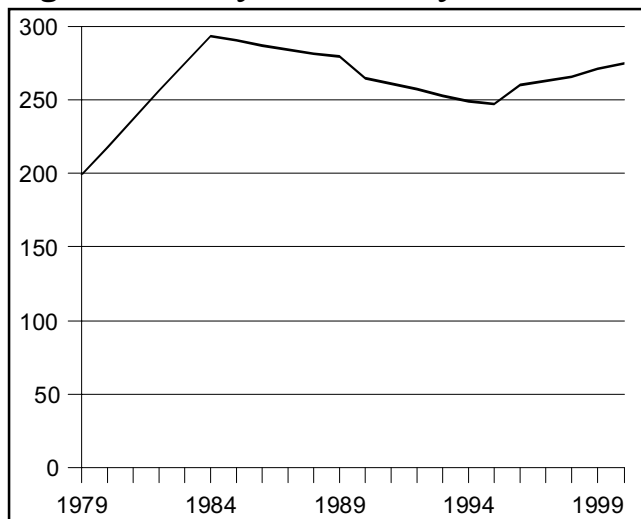
"The Dairy Flat Primary School is a significant local land use which has been a part of the district for over a century. Over this period of time, the school has been a focal point for the community and has a special character because of this fact. In 1988, the district celebrated 110 years of schooling in Dairy Flat and the events which took place brought together the families of the district."

The present Dairy Flat Primary School is located some 100 metres south of the entrance to the quarry site on the eastern side of State Highway 1. Its catchment area extends widely through the rural area of Dairy Flat and includes the land surrounding the quarry site. The school roll has

shown some fluctuations over recent years (see Figure 7²⁶). Early growth was fuelled by the conversion of farms to 10-acre blocks. Although the school is a full primary school²⁷, some parents have chosen to take their children out at the end of the Standard 4 year and send them to intermediate schools, which are seen as better resourced and offering a wider subject range.

Currently, the school has ten classrooms, nine teachers and a non-teaching principal. Its facilities are used frequently out of school hours - art and music programmes for the students as well as hiring the hall out to a range of groups from the Hibiscus Coast such a dance group, motor cycle club and rock'n'roll club. Locals also use the school facilities for activities such as basketball, badminton and brownies.

Figure 7: Dairy Flat Primary School Role



There is a recycling centre located at the front of the school grounds, intended for the use of locals and administered by the local Lions Club. The principal commented that “*it is grossly misused at times*” by passers by, and does not operate well from the school’s point of view, requiring regular attention by the school’s caretaker to keep it tidy.

The school has received substantial grants from the Community Trust (\$60,590 since 1993) which has contributed to a variety of resources and amenity improvements. Nevertheless, the school is not considered ‘*overly well provided*’ as a result.

Five years ago, the Education Board initiated moves to remove the four school buses servicing Dairy Flat School. A parent interviewed noted that the manifest danger to children from the traffic on SH1 finally convinced the authorities not to proceed.

Dairy Flat Tennis Club and Community Hall

These facilities have existed for a considerable period. As with many such facilities in rural areas with small populations, it can be difficult to afford adequate maintenance and sometimes usage falls away. However, in the case of Dairy Flat, as a result of capital maintenance and improvements financed by grants from the Community Trust²⁸, they have become very well used facilities. Every afternoon and evening during the week the hall is used by various groups. On Saturdays it is frequently hired out for dances and private parties. Every second Sunday the hall hosts a ‘flea market’.

North Harbour Trotting Club

This facility, near the entrance to the landfill and quarry site, with its ‘old fashioned bar’ and other recreational facilities, is popular with quarry workers and operations staff from the landfill. The Dairy Flat Pony Club, with over 30 riding members, also has premises adjacent.

²⁶ Interpolated from data provided by the school.

²⁷ New Entrants to Form II.

²⁸ The Tennis Club has received \$36,300 since 1993 to instal two astro turf courts and lighting, as well as renovate existing facilities. The Community Hall has received \$49,000 since 1993 to address overdue maintenance, upgrade the kitchen and toilet facilities, and replace furniture and fixtures.

Recent developments

At the north eastern end of Dairy Flat several developments were in progress at the time of the case study fieldwork. These included a new restaurant on the corner of Horseshoe Bush Road and SH1, and another shade-house development opposite on the east side of SH1. Further north along SH1 two lots of sub-division were occurring opposite Kahikatea Flat Road.

In the central part of Dairy Flat, several developments have taken place recently which consolidate the area's association with horse riding. An equine hospital has been established on the corner of Landfill Access Road, and horse trials facilities have been developed on WMNZL land immediately adjacent to the south side of the landfill and quarry site. Known now as Redvale Park, the facility includes a cross country track designed to international standards. As a result, the Waitemata Area Horse Trials Inc. were able to host the 1999 National Championships at Redvale.

Population change 1971-96

The population numbers of the Dairy Flat locality are a component of the Dairy Flat/Redvale area unit. In Figures 8(a) and 8(b), the usually resident population of the Dairy Flat/Redvale area is compared with the equivalent data for Rodney County (1971-1986) and Rodney District (1986-1996).

The Redvale landfill was clearly signalled as a potential activity in 1990 and began operations in 1993. Between 1991 and 1996 the population of the Dairy Flat/Redvale area increased by 45% compared with 21% for the district as a whole.

Figure 8(a): Rodney Council/District

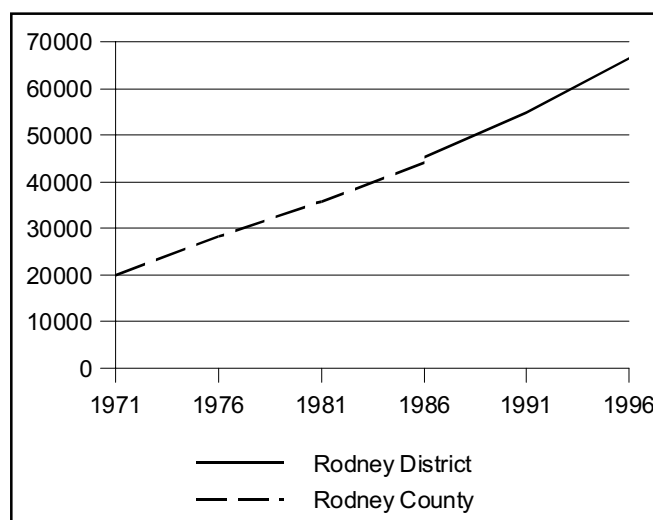
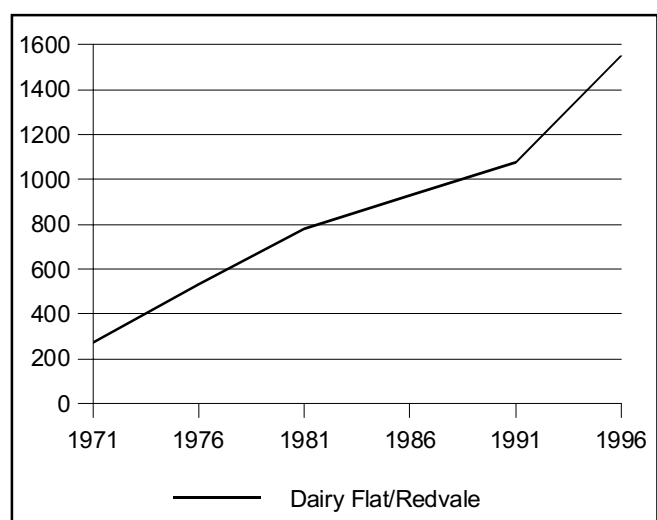


Figure 8(b): Dairy Flat/Redvale



D: Coverage of Consultation and Interviews

Numbers and categories of interviewee

In all, 100 interviews were conducted for this case study. A structured interview schedule was applied to 86 interviews in the vicinity of the Redvale landfill, including 20 businesses. In addition to these, 14 key informants were interviewed using a semi-structured format.

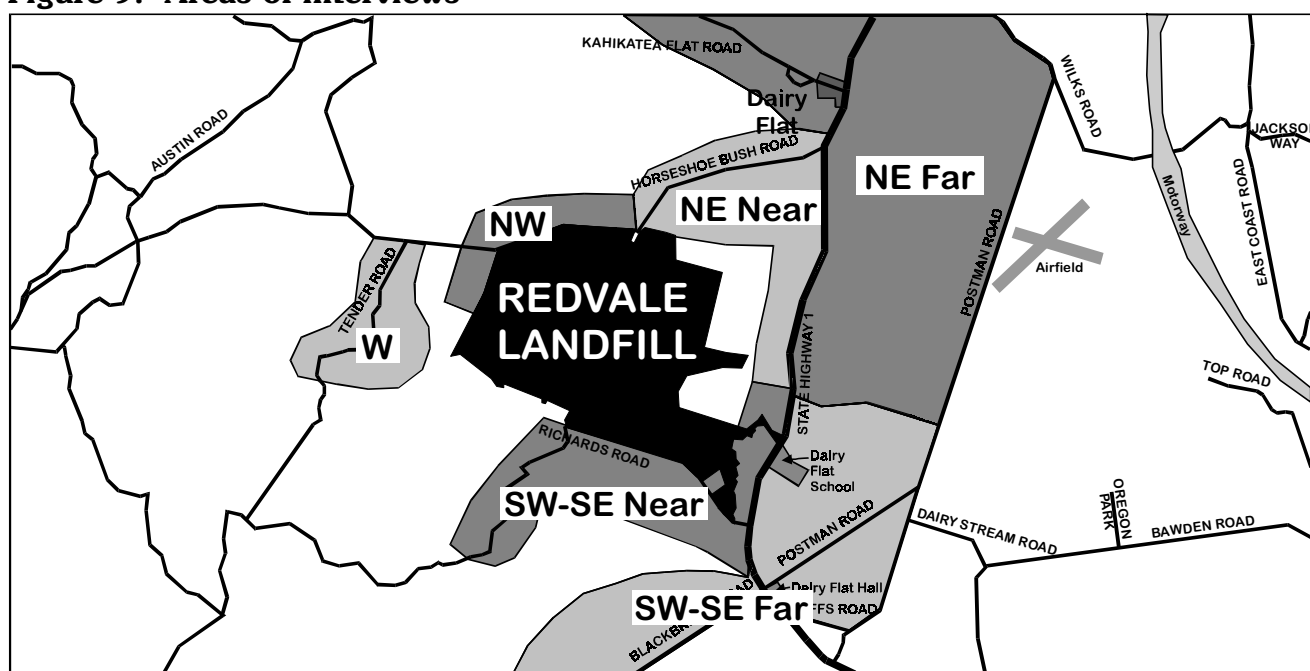
All interviews were conducted during the period 7 to 16 December 1999.

Areas of interviewing

Interviews with neighbours of the landfill were structured to provide responses across a range of separation distances, labelled “near” and “far”. Reflecting the fact that many off-site effects from landfills are influenced by weather conditions, particularly wind speed and direction²⁹, interviews were conducted on properties all around the landfill. The greatest emphasis was on properties to the north east of the landfill, since this area is ‘downstream’ during predominant south west winds. There are very few occupied properties south west of the landfill that might be affected by the other dominant wind direction from the north east.

Nearest residential properties are found in an arc from south east round to north west, on the northern side of the landfill. Information about the six differentiated areas of interviewing is summarised in Table 1 following, and also indicated in Figure 9.

Figure 9: Areas of interviews



²⁹

Records from the on-site weather station at the Redvale landfill during the 1999 calendar year show that the NE-SW axis predominates for wind direction. Almost 80% of the time, wind is blowing either from the NE quarter (36%) or from the SW quarter (43%)

Table 1: Summary information for interviews

Sub-group	Interviews	Area description	Distance to landfill operational boundary	Length of occupation ³⁰
W	7 total 7 res.	both sides of Tender Road, south from its intersection with Horseshoe Bush Road	residents:1200-1500m ³¹	6/7: <7 years 0/7: 7-12 years 1/7: >12 years
NW	8 total 8 res.	north side of Horseshoe Bush Road between its intersection with Lime Access Road and the north west corner of the landfill property; property on south side of Horseshoe Bush Road immediately adjacent to the landfill	residents:450-850m ³²	5/8: <7 years 1/8: 7-12 years 2/8: >12 years
NE near	17 total 14 res. 3 bus.	west side of SH1, from a point due west of the stormwater retention pond, north to the intersection with Horseshoe Bush Road; both sides of Horseshoe Bush Road west as far as the intersection with Lime Access Road	residents:300-650m business:450-900m	6/16: <7 years 2/16: 7-12 years 9/16: >12 years
NE far	28 total 17 res. 11 bus.	east side of SH1 and west side of Postman Road, from a point due west of the stormwater retention pond, north to the intersections with Wilks Road; both sides of Kahikatea Flat Road west from its intersection with SH1	residents:550-2100m business:600-2200m	10/29: <7 years 3/29: 7-12 years 12/29: >12 years 3/29: d.k.
SW-SE near	10 total 7 res. 3 bus.	west side of SH1, from a point due west of the stormwater retention pond, south to the intersection with Richards Road; both sides of Richards Road west from SH1	residents:500-1100m business:450-700m	6/10: <7 years 1/10: 7-12 years 3/10: >12 years
SW-SE near	10 total 7 res. 3 bus.	west side of SH1, from a point due west of the stormwater retention pond, south to the intersection with Richards Road; both sides of Richards Road west from SH1	residents:500-1100m business:450-700m	
SW-SE far	16 total 13 res. 3 bus.	east side of SH1 and west side of Postman Road, from a point due west of the stormwater retention pond, south to their intersection; west side of Jeffs Road between its intersections with Postman Road and SH1; north side of Blackbridge Road west from SH1	residents:750-1700m business:1300-1600m	10/16: <7 years 2/16: 7-12 years 3/16: >12 years 1/16: d.k.
Total	86 total			50%: <7 years 10%: 7-12 years 35%: >12 years

³⁰ The time frames used in this analysis reflect the date when the landfill began operation (1993: i.e. <7 years) and when the site was purchased by WMNZL (1988: i.e. 7-12 years). People with >12 years occupation in the locality arrived before the landfill was ever an issue.

³¹ Distances to current operational area. When Phase 10 proceeds, which is much closer to these properties, separation distances will reduce to 450-900m.

³² Distances to current operational area. When Phase 10 proceeds, which is much closer to these properties, separation distances will reduce to 150-300m.

List of other key informants

- Redvale Landfill Community Liaison Committee chairperson
- Dairy Flat Community Trust chairperson
- Redvale Landfill Peer Review Committee member
- Dairy Flat Primary School principal and past secretary
- North Shore Aero Club manager
- North Shore Helicopters manager
- Rodney District Council consent administrator and enforcement officer
- Auckland Regional Council consent monitoring officer
- Ngati Whatua Resource consent advisor
- Three real estate agents
- Dairy Flat Pony Club president

Feedback meetings

Two feedback meetings were held in Dairy Flat on Thursday 8 June 2000 for the purposes of discussing the preliminary findings of the field research.

The first meeting involved representatives from WMNZL (3), the Auckland Regional Council (2), and the Redvale Landfill Community Liaison Committee (2).

The second meeting involved three members of the local community³³, each of whom was an immediate neighbour of the Redvale landfill.

The community meetings endorsed the preliminary findings as accurate and reflecting an appropriate balance. A few, very minor comments have been added into the discussion provided in Section E.

³³

Every person who had been interviewed for the research was sent a letter of invitation to the community meeting. The Dairy Flat Primary School weekly newsletter also carried a notice about the meeting in the edition immediately preceding the meeting date. Ten out of 86 letters were returned unopened. Two letters were received after the meeting was held requesting copies of the preliminary findings.

E: Operational effects of the landfill on neighbours

Main Conclusions

The three most significant off-site effects of the landfill operations experienced within the host community of Dairy Flat are odour, operational noise and the benefits from financial contributions spread broadly throughout the community.

Several other off-site effects of landfill operations are also experienced - visual, traffic-related, dust and litter. The landfill's contributions to the first three of these are minor, with the lime quarry also contributing. Litter effects are occasional and minor. The dust effects were not anticipated in the EIA, although the potential risks were addressed at the time of the consent decisions.

No negative impacts were reported from bird activity due to the presence of the landfill.

Of the potential landfill effects projected during planning, the following elicited no adverse comments at all or no corroborated observations -

- leachate effects on groundwater
- bird hazard to aviation (despite the presence of a busy airfield nearby)
- cultural effects
- increase in vermin
- increase in flies

The spatial pattern associated with effects such as odour, operational noise, dust and litter reflect the predominant NE-SW axis of wind direction.

In unprompted questioning, 57% of respondents had observed no effects at all, while in prompted questioning 37% still recalled no effects. None of these effects is experienced at distances greater than 1,000m from the operational boundary of the landfill.

As noted above, some off-site effects are due partly to the operations of the lime quarry on the same site. This is an industrial activity which pre-dated the landfill and therefore has a much less restrictive operating regime, a legacy of existing use rights from pre-RMA planning decisions.

Effects projected and reported

The following table provides a summary analysis of the effects reported during the community-based fieldwork, and compares neighbours' responses with expert projections.

Table 2: Effects projected and reported

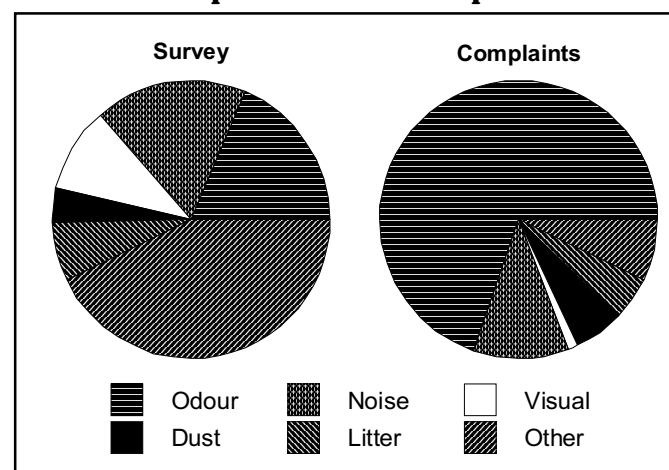
Effects projected	Effects reported unprompted	Effects reported after prompting	Effects projected but not reported or without corroboration ³⁴	Effects reported but not projected
<ul style="list-style-type: none"> • odour • operating noise • visual effects • traffic volumes • traffic noise • litter • birds • road safety • surface water effects • ground water effects • aviation hazard • cultural effects • vermin • flies 	<ul style="list-style-type: none"> • odour • operating noise • financial contributions • visual effects • traffic volumes • traffic noise • dust • litter • birds • road safety 	<ul style="list-style-type: none"> • odour • operating noise • visual effects • traffic volumes • traffic noise • litter • birds • road safety • surface water effects 	<ul style="list-style-type: none"> • groundwater effects • aviation hazard • cultural effects • vermin • flies 	<ul style="list-style-type: none"> • financial contributions • dust

In unprompted questioning, 57% of respondents had observed no effects at all, while in prompted questioning 37% still recalled no effects³⁵.

Comparing case study survey responses with complaints

Comparing the responses to the case study survey of neighbouring residents and businesses (168 separate responses from 86 individuals) with the log of complaints held by the operator (145 complaints from 45 individuals) provides some degree of corroboration. Odour and operating noise are clearly the effects that have been most noticeable outside the site boundary, with litter and dust³⁶ also standing out from 'other' subjects of complaint. The 'other' category in the survey includes a range of positive effects noticed by neighbours³⁷ which have no equivalent in any log of complaints. Also, it includes small numbers of responses to a range of specific prompts. Hence 'other' effects is a much more substantial proportion of the survey responses than it is of the complaints log.

Figure 10: Comparing survey responses with complaints



³⁴ Corroborated observations means cases where there are more than two observations from different local observers, or where an individual observation can be corroborated by other sources of data.

³⁵ This suggests that interviewing generally reached the boundaries of observed effects.

³⁶ Under complaints, dust and road mess - mud from trucks which dries to dust - have been combined.

³⁷ e.g. financial contributions to the local community, positive aspects of landscaping, etc.

Structure for reporting the effects experienced

Detailed analysis of each effect experienced by neighbours of the Redvale landfill is reported under the following sub-headings:

What effect do they notice? Source of the effect? Timing, frequency and trends?

Mitigation?

Impacts?

Summary evaluation

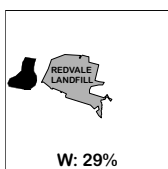
Odours

While one-in-three of those interviewed reported noticing odours from the landfill, the proportions varied considerably between different areas. Table 3 shows this variation between areas. The percentage figures in Table 3 (which are shown also in the mini-maps) indicate the proportion of those interviewed in each specific area who discussed odour, whether unprompted or prompted. These percentage figures do **not** indicate proportions who reported significant impacts from the odours. Within each sub-heading, mini-maps identify the specific areas first discussed in Figure 9 and Table 1.

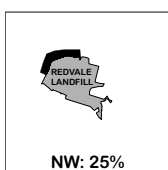
Table 3: Percentage of residents (sampled) who experience odour from the Redvale landfill

Interview sample	% Unprompted + Prompted	Comments
Whole sample	37	
W: both sides of Tender Road	29	When travelling along Horseshoe Bush Rd General rubbish odour
NW: Horseshoe Bush Road (western section)	25	When on Horseshoe Bush Rd or nearby property General rubbish odour
NE Near: western side of SH1 (northern section) + both sides of Horseshoe Bush Road (eastern section)	76	Mostly outside on properties, but some inside too General rubbish + special wastes (sewage screenings, offal, chemicals and solvents) + odour suppressants + landfill gas
NE Far: eastern side of SH1 and western side of Postman Road (northern section) + both sides of Kahikatea Flat Road	25	Outside, on properties General rubbish + odour suppressants
SW-SE Near: western side of SH1 (southern section) + both sides of Richards Road	70	Outside, on properties General rubbish + special wastes
SW-SE Far: east side of SH1 (southern section) + west side of Jeffs Road + northern side of Blackbridge Road	6	Outside, on properties General rubbish + landfill gas

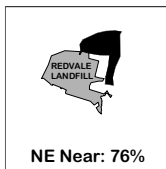
What effect do they notice? Source of effect? Timing, frequency and trends?



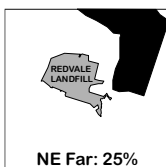
Two residents of Tenders Road have observed a general landfill odour (one unprompted) but not on their properties. Both described noticing the odour as they travelled along Horseshoe Bush Road on their way to work in the morning, and one attributed this to the removal of the temporary capping prior to the day's disposal activities. Both respondents said they noticed the landfill odour only very occasionally - *"twice in six months"* or *"five times a year"*. No trends were described.



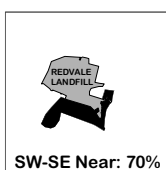
Two residents of Horseshoe Bush Road have observed a general landfill odour (both unprompted) - one on their property, the other *"at the bridge when travelling to and from Dairy Flat"*. One described the observations as *"infrequent"* (early morning or evening), noting that they smelled the odour only in an easterly which is not a common wind direction. The other said *"once a week; could be more, could be less"* (night time), and pointed to the need for calm and still conditions. No trends were described.



Thirteen unprompted responses reported a variety of distinct odour experiences, partly to do with differing intensities of smell and partly to do with different sources of smell. Four described relatively mild general rubbish smells in terms of - *“stale rubbish”*, *“stale smell”*. Two described more intense rubbish smells - *“horrible smell”*, *“nasty smell”* - but still attributed it to general landfill rubbish. Four cited particularly odorous loads of rubbish being delivered as responsible for off-site smells - *“like sewage (screenings) or fish offal”* or *“solvents and chemical smells”* as well as the *“disinfectant smell”* of chemicals *“they use to hide the rubbish smell”*. Some nearby residents are able to link off-site odour events with specific truck-loads of waste delivered. They described hearing *“the truck tipping out, and five minutes later we get the solvent smell”*. Two others described *“a gas smell”*, referring to landfill gas while one reported having smelled the leachate. Most respondents report experiencing the odours out of doors on their property. However, two of the nearest residents (within 400m) mentioned that the smells were noticeable inside their homes as well. Half of the comments from respondents in this NE area suggested that the most common experience is of morning-time smells, but two made comments to the effect that the smells *“can last all day; they can linger”*. Several noted the dependence on weather conditions, particularly *“calm or low-speed wind from the west”*. There also appears to be contrasting experience regarding the frequency of odour events. For example, four respondents spread across this area (i.e. NE Near) reported very frequent observations - *“in the early days - everyday, near enough”*, *“can be every day prior to six months ago”*, *“was very frequent up until 1999”*, *“every few days, especially in summer”*. However, another four respondents whose properties are interspersed with the previous four, reported infrequent observations - *“occasional”*, *“six times since it opened”*, *“ten times a year”*. Six of the respondents also report notable changes during the six years of operation. Of these, two described changes due to the development sequence of the landfill site - *“lasted for 18 months”* until the eastern bund was constructed; *“it has got better, but where they are working is further away; was worse when close to us”*. One reported how landfill gas first became evident during 1995. The other three referred specifically to reductions in the incidence of smelling landfill gas during 1999, as a result of introducing active gas extraction and thus reducing the quantities of *“fugitive gas”* escaping through the surface of the landfill cap.



Seven respondents (six unprompted) described a variety of odour experiences, out of doors but on their properties. Two described a *“sickly smell”* or *“yucky smell”* with one³⁸ attributing it definitely to wastes that are brought to the landfill, while the other suggested that *“there are lots of farm smells in the area”*. Three others described noticing extremely mild smells - *“wonder what the smell is”*, *“a faint whiff”*, *“a puff - very mild - doesn’t last”* attributing this to opening up the disposal area in the morning. Two others described *“rubbishy smells”* or *“perfume combined with the smell of rotting debris”* referring to garbage combined with odour suppressant. All who specified timing noticed the odours in the (early) mornings. Most described infrequent observations, ranging from two to twelve times a year, and in still conditions or when there is a light breeze from the south or westerly quarter. One respondent no longer noticed any odours and another reported that off-site odour is becoming less frequent. However, a third expressed the opposite perception, linking this with the fact that more recent landfill operations have been located closer to the north eastern corner of the site

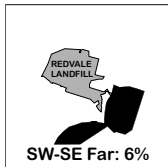


Responses from this quarter were very varied. With one exception, they were all unprompted. Three reported a general landfill smell or *“the odd scent”* (attributed to a load of fermenting sludge); one described *“stale air”*, another *“a stale hay, musty smell”*, while another described *“a gas smell”*. One reported *“a stink”*. In all cases,

³⁸

A farming property which actually spans both NE Far and NE Near areas.

the smells were noticed only outside dwellings. Reports of odours in this SW-SE quarter ranged from infrequent (once a month) to “occasional” or “very seldom”. Indeed, one respondent recalled “four times in the last six years” and another had only ever experienced a smell once. This corresponds with the fact that winds blow infrequently from the north or north-west. At this frequency, no trends were reported over the years. Regarding the timing of odour events, two indicated “day-time”, while one described them as “random” and another was specific about “early morning, when they open up the cells”.



One resident (unprompted) reported “a faint smell - a combination of rotting smell and gas smell” outside their house “by the garage”. This person noticed the smell about six times a year, and said “it might have got less frequent over the years”. The smell was most likely to be noticed “In the morning; going to work” or “At night, out of doors when greeting visitors”.

To summarise responses about the frequency of experiencing odours, it is helpful to distinguish different frequencies of occurrence by relating quantitative indicators to the qualitative descriptors used by respondents, as follows:

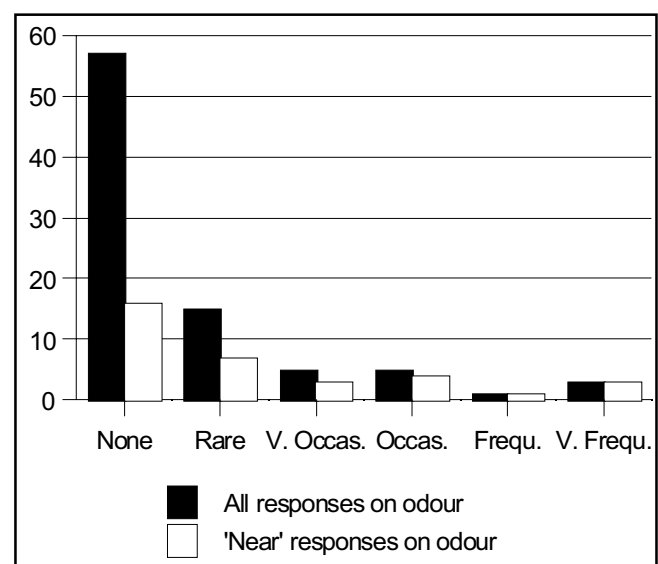
Table 4: Frequency bands for observing effects

Level - descriptor	Frequency range	Frequency on a monthly basis
0 No observations reported	Nil	Nil
1 Rare, irregular	Few times a year	<0.5x/month
2 Very occasional	Once a month	1x/month
3 Occasional	Twice a week to twice a month	2-8x/month
4 Frequent	Several times (>2x/week)	8-30x/month
5 Very frequent	Daily	30x/month

For all those interviewed, the distribution of frequencies is shown in Figure 11. Corresponding data for the ‘near’ areas are included for comparison.

The landfill manager pointed out that landfill gas was not present in significant quantities for the first 12-18 months of operation. During this period, neighbours would have been most aware of the odours coming from the large quantities of general rubbish, the smell of particularly odorous loads (either organic or chemical in origin), or the smell of odour suppressants used by some contractors to try to mask the bad smells. From 1996 onwards, landfill gas became increasingly dominant as a source of odour noticed by neighbours of the landfill, leading to the decisions to install technology for active gas extraction and subsequently for electricity generation (as described in Section A).

Figure 11: Frequency of experiencing off-site odours



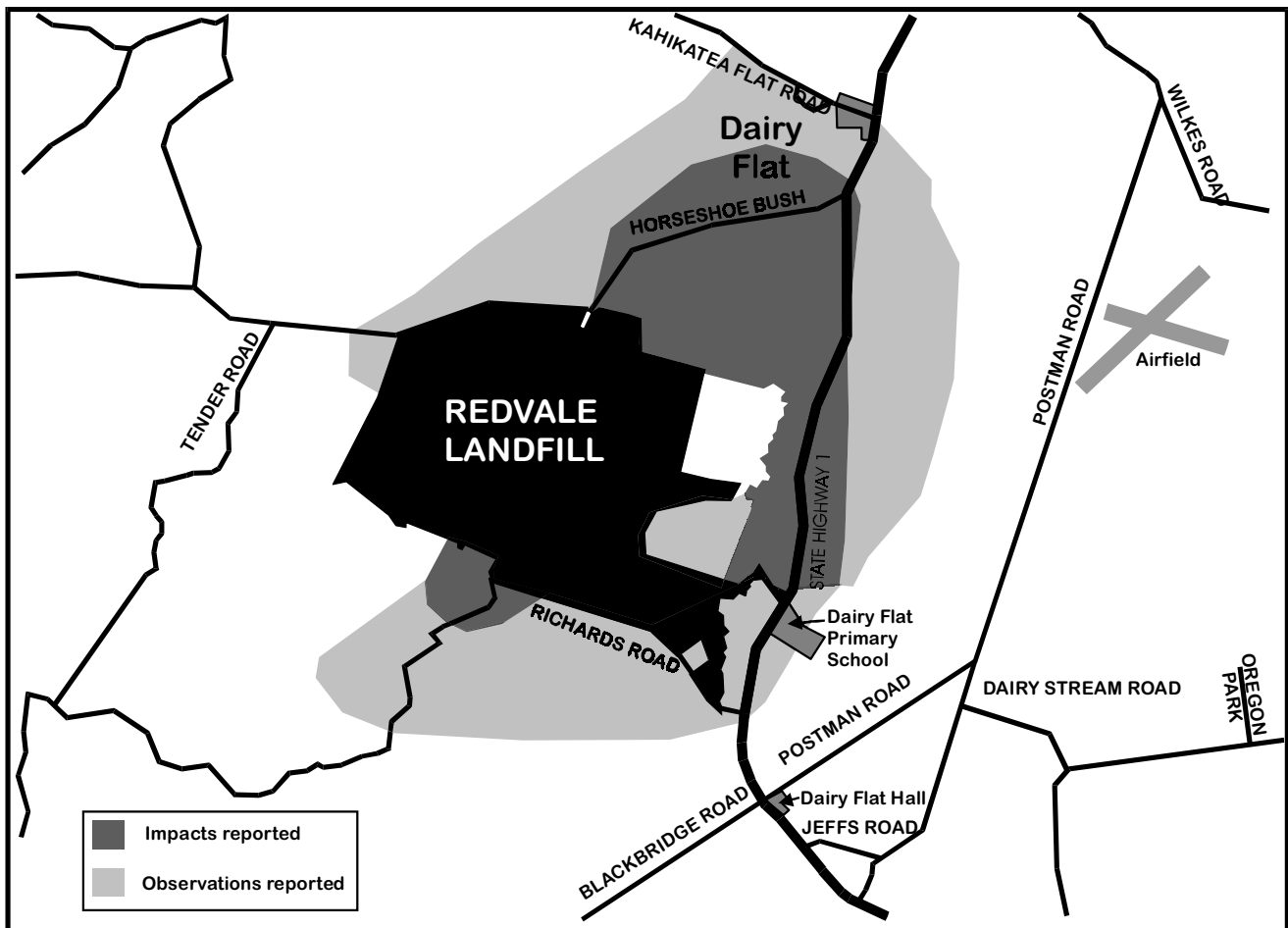
The landfill manager described the “on-going battle” against particularly odorous wastes. The most extreme odours come from three sources:

- (i) sewage sludge - having an “off”, “rotten” or “foul” stench,
- (ii) chemical-based wastes - organic sludges, heavy metal combinations, grease trap contents which are all “cocktails” of chemicals having penetrating ammonia odours, and
- (iii) solvents - which tend to be sweet smelling, and can be very persistent.

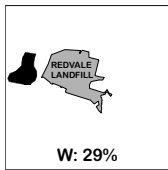
Mitigation?

Considerable efforts have been made to reduce the incidence of off-site odours via the establishment of a special Task Group. From time to time, particular attention has been paid to different odour issues, as outlined in Appendix II. In respect of the odour issues specifically, four of the neighbours in this area acknowledged the landfill manager’s initiatives to “put a stop to smelly stuff coming in” as well as to install the new technology for extracting landfill gas and using it to generate electricity. Refusal to accept an odorous waste is at the discretion of the landfill manager, a right which has been exercised on occasions. In recent years this has happened about 10-12 times a year when waste loads exceed the acceptance criteria. This is usually on the basis that the loads exceed threshold values of specific contaminants, or are considered likely to cause exceptional odours. At the community feedback meeting it was stated by several immediate neighbours that construction of the bund around the disposal area had reduced the incidence of refuse odour for some nearby residents.

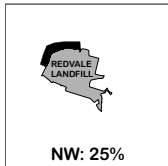
Figure 12: Odour Catchment



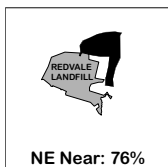
Impacts from the odours?



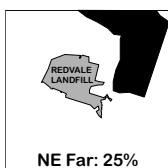
Neither respondent described a negative impact. One noted *"I only notice it when motorcycling to work"*. Neither had ever contacted the operators or the Council.



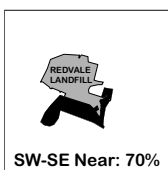
One noted that *"It doesn't affect us at our house"*, while the other described it as *"fairly diluted at the moment"*, but expressed concerns that the odour might affect them more when land-filling operations move further west over the ridge. Neither had ever contacted the operators or the Council.



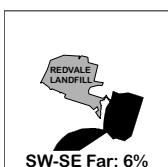
Respondents described a variety of impacts and concerns arising from their experience of the odours which come across the landfill boundary onto their nearby properties. These include social concerns and loss of amenity values - *"go inside to escape it"*, *"was embarrassing to have friends over for a BBQ"*, *"a nuisance"*; health concerns - *"developed a rash"*, *"felt unwell"*, *"not sure of the effect of the gas, so it is frightening; the gas would give me a sore throat"*, *"the gas would wake one of us at night"*, *"didn't like the thought of the smell still being there - don't like the odour, and don't like the vanilla smell which disguises the real odour"*, as well as concerns about the lack of scientific knowledge - *"concerned about the possible effects of chemical smell"*, *"don't like chemicals"*. Several noted that they no longer held these concerns since they had stopped smelling the odours. Seven of these neighbours had contacted the landfill operators (some on numerous occasions) with their concerns.



Three had experienced no impacts from odour at all - *"none"*, *"no bother"* - while two more registered these occasional smells as *"just a country smell"* or *"we're aware of smells as we keep an eye on other sprays around in case the cucumber crop is knocked by spray drift"*. Two others expressed acceptance of the infrequent smells *"because it comes from the mass and we accept that they can't bottle it in; they're doing quite well"*; *"that's just one of the drawbacks; would drive us inside if we were having a BBQ - but we don't BBQ in the morning"*. Three of the respondents said they had contacted the landfill manager regarding smells.



With the exception of one respondent, who had only ever noticed a smell on one occasion in six years - *"it was really bad, but we knew it was beyond Waste Management's control"*, all others commented that the odours were at a level which caused no real impact - *"not offensive; just there"*. Four of the respondents said they had contacted the landfill manager regarding smells.



The one response noted that if the smell was evident, *"it might attract a comment from our visitors"*.

Another way of summarising these responses on the impacts of off-site odours is to relate them to a spectrum of impact severity, based on respondents descriptions, as follows:

Table 5: Spectrum of impact severity from odour effects

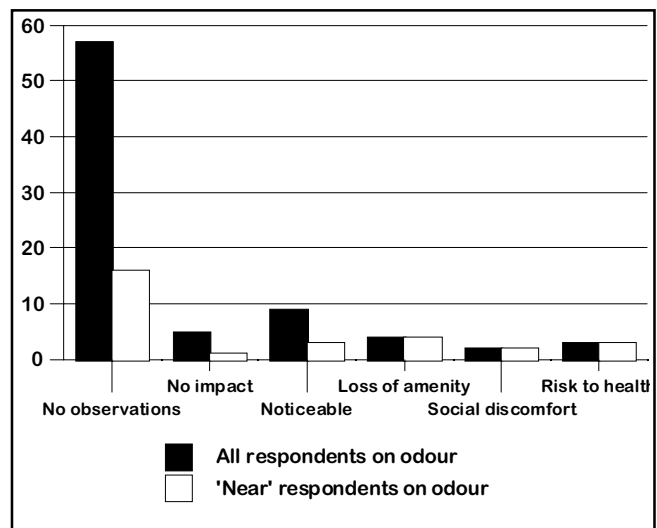
Level	Description	Illustrative comments
0	No observations reported	
1	No impact at all	
2	Noticeable, but not unbearable	- not offensive, just there - you just accept it - no bother - aware of the smells
3	Loss of personal residential amenity; very unpleasant	- go inside to cope with it - feel tainted - a nuisance
4	Social discomfort or embarrassment	- visitors comment - embarrassing to have friends over
5	Impacts on personal health and well being	- feeling unwell - wakes us at night - get a sore throat - don't like what the chemicals might do

For all those interviewed, the distribution of severity experienced is shown in Figure 13. Corresponding data for the 'near' areas are included for comparison.

Summary evaluation

Neighbours from the area 'NE Near' appear to have been most affected by off-site odours and are most discriminating in their descriptions of the effects. There appear to have been some distinct trends over the years since the landfill began operation. Waste odours were most noticeable to begin with, until landfill gas volumes became significant. With the introduction of active landfill gas extraction, the odour of landfill gas has become much less noticeable for most nearby residents; only a few immediate neighbours (within 400m) continue to observe landfill gas. While 37% of all those interviewed commented on odour, the proportion who actually reported experiencing

personal concerns or one of a variety of social impacts was less than half of this, at 15%. All accounts of odour impacts occurred within 1km of the landfill boundary. Remaining off-site odour effects are relatively infrequent or sometimes at the limit of human detection³⁹.

Figure 13: Severity of odour impacts

³⁹

At relatively low concentrations where some people can smell them while others cannot.

Operational Noise

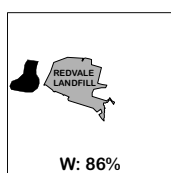
The overall level of responses about operational noise was similar to that for odours. Similarly, there was considerable variation between specific areas, as shown in Table 6.

Table 6: Percentage of residents (sampled) who experience operational noise from the Redvale landfill

Interview sample	% Unprompted + Prompted	Comments
Whole sample	35	
W: both sides of Tender Road	86	Distant machinery noise from landfill and quarry
NW: Horseshoe Bush Road (western section)	50	Machinery noise from landfill and quarry All-day construction-phase noise initially
NE Near: western side of SH1 (northern section) + both sides of Horseshoe Bush Road (eastern section)	53	Machinery noise from landfill and quarry All-day construction-phase noise initially
NE Far: eastern side of SH1 and western side of Postman Road (northern section) + both sides of Kahikatea Flat Road	21	Machinery noise from landfill and quarry All-day construction-phase noise initially
SW-SE Near: western side of SH1 (southern section) + both sides of Richards Road	20	Trucks on the access road
SW-SE Far: east side of SH1 (southern section) + west side of Jeffs Road + northern side of Blackbridge Road	6	Stockpiling cover material on property to the west

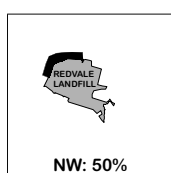
[Note: The noise experienced from truck traffic is discussed in a separate section later in this report.]

What effect do they notice? Source of effect? Time, frequency and trends?



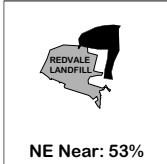
Six respondents (five unprompted) have experienced the noise of heavy vehicle engines and machinery operating on the site. Some describe this simply as “*machine noise*”, “*the engines of the heavy machinery*”, “*the humming noise of trucks*”. One also reported “*the beep of reversing trucks*”. Much of the time, such noises will be partially masked by the intervening terrain, for those living to the west of the site.

Most acknowledge that the noise they hear is probably from the operations of the limestone quarry as much as from the landfill operations. They report hearing the noise outside on their properties, or inside if the windows are open. These respondents reported only daytime noise. Indeed, they tend to notice it mostly in the morning or “*very early morning*” and in easterly or very calm conditions. However, for these residents, the noise is noticed relatively infrequently, with most reporting that they noticed it once or twice a month - “*very infrequent, and only on an easterly wind*” and “*not often, and not much*”. They reported no trends over time.



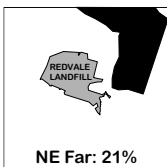
Four respondents (two unprompted) reported a variety of site noises, including a general “*hum*”, “*clangs and bangs*” and “*machinery noise*”. They also were inclined to attribute such noise as much to the quarry operation as the landfill operation. One described specifically “*the noise from construction*”, referring to a period when landfill operations first commenced and boundary work and bunding for the later phases of landfilling (phase 10) had to be completed so that landscape planting could be put in place early

on. One reported hearing the noise inside the house, while the others heard it only out of doors. General day-to-day operating noise was reported during daytime hours as being either very infrequent or infrequent. However, half of the respondents described how noise had been much more noticeable during the construction period - *"in early days - all day"* and described the improvement when general land-filling operations began.

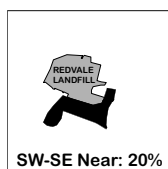


Nine responses (six unprompted) from this area cover the full range of noise effects experienced elsewhere in the host community - *"heavy machinery motors and bangs from emptying trucks"*, *"beeps"*, *"a high whine"*. Commenting on the source of the noise, one of the closest residential neighbours stated that *"It's hard to say because of the quarry noise, particularly the crushers. We do hear the trucks dumping near us"*.

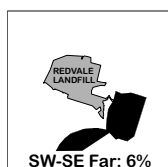
Generally, these neighbours hear the noise outside, but some report a background *"growling"* heard indoors on occasions. These neighbours were particularly aware of the 'construction' activity - *"growling of bulldozers"*, *"ten big excavators working at once"*, *"lots of truck and dozer movements"*, *"in the early days, the quarry site changed and came closer to us"* - when the eastern end was being opened up for refuse and large quantities of cover material were being moved elsewhere on site. Being as close as these neighbouring properties are to the landfill - some within 300m to 400m of the operating area - some residents are aware of operating noise whenever the landfill is open. During the construction period, some neighbours reported hearing site noise on a continuous daily basis. Subsequently, their awareness of operating noise depended on which part of the landfill was being used. It would appear that several who still report 7-day-a-week operating noise or noise at night are hearing quarry noise rather than landfill noise. Half the respondents in this area noted a significant lessening of noise since the early construction phase was completed. One claimed to have *"lost four summers to the construction activity"*, beginning in 1992. Others report major reductions in noise level experienced from the site - *"got much better; noise level now is not much different from a farming operation"*, *"major construction has eased - only one tenth of the noise it was"*, *"it's stopped now"*.



These six respondents (three unprompted and three prompted), at a greater distance from the landfill site, also reported noticing machinery noise - *"diggers working"*, *"machinery moving around on the hill"*, *"engine hum"*. Two of the unprompted responses referred to the high-pitched *"beep noise"* made by trucks and heavy mobile machinery when backing, while another reported hearing the *"clanging and banging of the lime-works crushing plant"*. Three respondents referred to *"early morning"* events. However, it is clear that at least one of these must have been hearing the quarry operations - *"between 4.30 and 5.00 in the morning"*. Half of the responses also noted that the noises were most noticeable in calm conditions - *"still calm days"*, *"still air"* while several noted westerly wind conditions. Several associated hearing the landfill operations only when other noise sources were least evident - *"no traffic"*, *"more frequent at the weekend when other vehicles are quieter"* - or when operations were in elevated parts of the landfill. With one exception, who noticed the noise on a daily basis (the quarry noise as well), all respondents described only very occasional noise events now - no more than half a dozen times a year. A couple of respondents had noted a decrease over the years - *"super busy during the construction phase"* and *"with the height of the landfill bund"*. The timing of the occasional events would indicate that the quarry was the source of the noise.



Two prompted responses could not distinguish between landfill and quarry operating noise. Also, being closest to the access road into the landfill and quarry sites, they tended to be more aware of the noise of trucks visiting the site. The noise from this particular operation - the transfer and storage of cover material - was reported as occurring *“three years ago, but not now”*. It was mainly noticed in calm weather or north easterly conditions.



One resident, on rising ground to the south of the landfill site reported hearing *“the constant driving of diggers creating the hill”*, a reference to the transfer of large quantities of soil from the current operating area to temporary storage on land west of the quarry site⁴⁰.

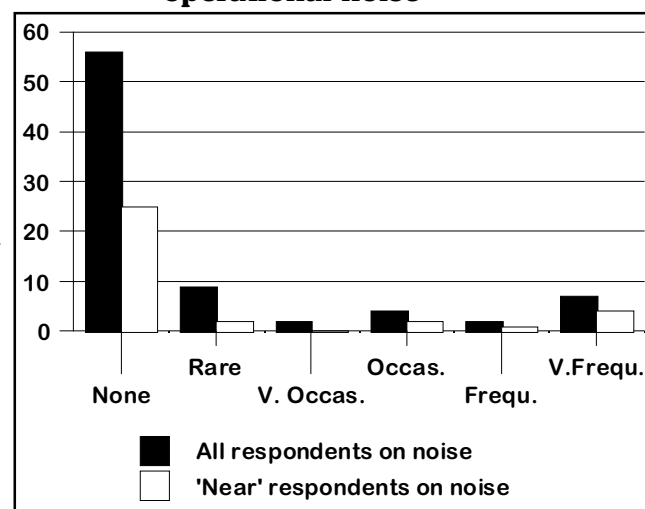
Using the same frequency categories described previously for odour experience, the following Figure 15 summarises the responses on operational noise experienced from the site.

Mitigation?

The landfill manager described a variety of measures taken to minimise the impacts of noise off site. Since noise from vehicle engines is proportional to the engine’s power rating, WMNZ selected a D6 bulldozer rather than a D8. Engine fans have been muffled, and the volume on vehicles’ reversing beepers has been turned down to the lowest of three settings consistent with OSH requirements for site safety. The peripheral bunds which have been constructed around sections of the landfill provide a physical barrier when machinery is working within the landfill. At the community feedback meeting, several neighbours expressed the view that relatively dense tree planting in some areas had helped to mask operating noise from the landfill.

It should also be noted that the resource consents allow different noise limits during construction periods from normal operating conditions.

Figure 14: Frequency of experiencing operational noise

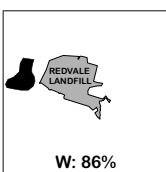
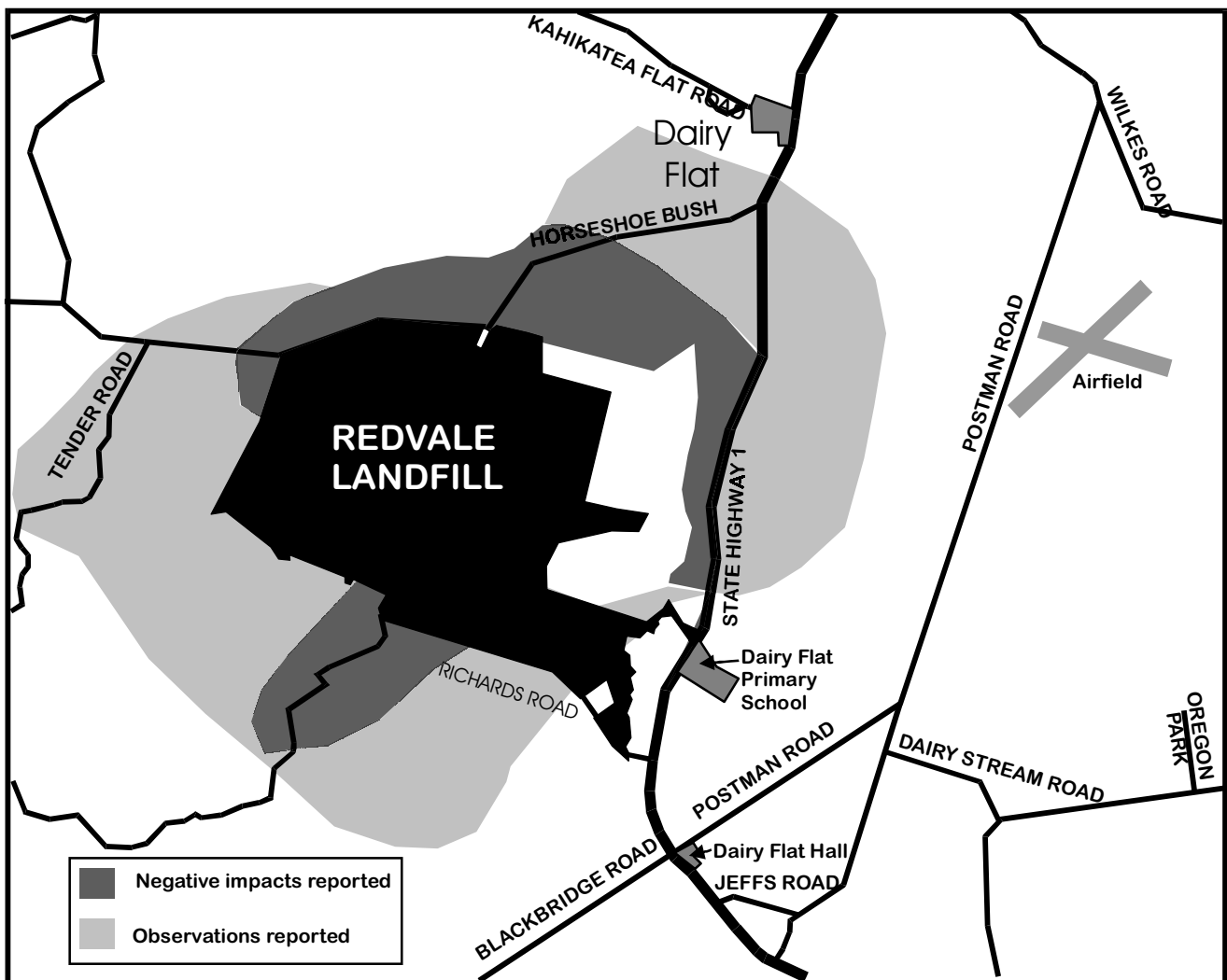


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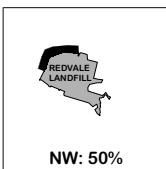
In 1996, WMNZ purchased a neighbouring property for the purposes of storing 900,000 m³ of existing site materials to be used as cover material in future, thereby avoiding the need to bring similar quantities of cover material in from elsewhere by truck.

Impacts from operational noise?

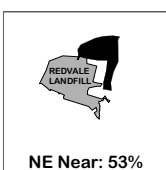
Figure 15: Noise catchment



These rural residents are not impacted at all by the operational noise they hear from the landfill site, passing comments such as *“nothing to worry about, cows are louder”, “not a complaint, the sheep make more noise”, “not noisy enough to irritate me, I hear more from the trucks and traffic on SH1”, “not at all, compared with cars on Tenders Road”*.

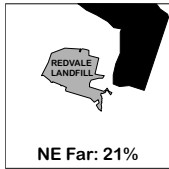


None of these respondents find operating noise a nuisance now, but one commented that *“it was really hard to deal with all day long, with young children”* when the construction activity was in progress. Another expressed concerns that *“it could get noisier when the landfill moves over this side”* during the latter stages of development.

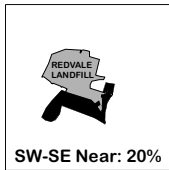


The responses amongst this group of nearest neighbours varied right across the range from *“intrusive”* and *“unacceptable in the countryside”* to *“not a bad thing”, “notice it, but not a nuisance”* or *“acceptable”*. For those who have been most affected, the impacts included sleep disturbance, headaches and irritability. Several commented specifically on the worst times during the more intense construction period - *“we had no concept of the size of the construction, and how on-going it was; they worked long hours - made*

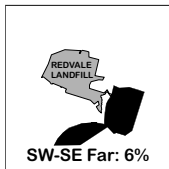
us want to sell” and “I felt helpless, and the Council didn’t seem interested; I felt as if I had no rights as an individual”. Since SH1 is also very close to some properties⁴¹, several respondents described the operational noise impacts in relation to traffic noise - “road traffic is worse”, “doesn’t annoy me as much as traffic noise”. However, SH1 has now been relocated⁴², prompting one respondent to express “concern that we will hear more once the main road is no longer the motorway”.



One respondent, who was referring to quarry noise impacts as well, described it as “a little irritating”. Otherwise these local residents maintained that operational noise from the landfill no longer has any negative impact on their households.



They have found the quarry noise annoying in the very early mornings.



The noise, which ceased three years ago, “didn’t affect us”.

A spectrum of noise impact severity, based on respondents’ descriptions, is presented below in Table 7.

Table 7: Spectrum of impact severity for noise effects

Level	Description	Illustrative comments
0	No observations reported	
1	No impact at all	
2	Noticeable, but not unbearable	<ul style="list-style-type: none"> - not as annoying as traffic noise - acceptable - cows are worse - not as noisy as a chainsaw next door
3	Loss of personal residential amenity; very unpleasant	<ul style="list-style-type: none"> - unacceptable in the countryside - irritating
4	Social discomfort or embarrassment	<ul style="list-style-type: none"> - visitors comment
5	Impacts on personal health and well being	<ul style="list-style-type: none"> - disturbed our sleep - intrusive, felt helpless - hard with young children - made us want to sell

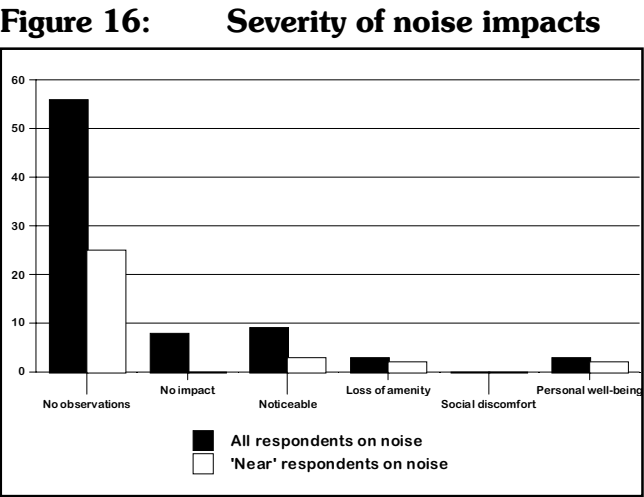
⁴¹ The nearest properties in this area of interviewing are adjacent to SH1 and in some cases their dwellings are no more than 30m from the highway.

⁴² Recall that the extension to the northern motorway out of Albany opened two weeks after interviews were completed.

For all those interviewed who reported experiencing noise effects, the distribution of severity experienced is shown in Figure 16. Corresponding data for the ‘near’ areas is included for comparison.

Summary evaluation

Significant negative impacts have been experienced by nearby neighbours of the landfill, particularly during major construction phases. Off-site noise from the present operation of the landfill remains noticeable and occasionally intrusive for some living within 400m of the landfill boundary. In almost all areas of interviewing, landfill operating noise is confounded by noise from quarrying operations. While quarrying and landfilling are clearly linked activities on this site, the important distinction is that the two operations are bound by quite different operating regimes and constraints, because they were established at different times. It would appear that much of the on-going noise nuisance experienced within the host community is attributable to quarrying operations since these tend to be noticeable at night and in the early morning. Furthermore, SH1 acts as a noise barrier/filter for properties east of the road. This element of the noise environment will change with the opening of the motorway extension.



Financial contributions

What effect do they notice? Source of effect?

One in six of all those interviewed (16%) made unprompted comments about the contribution of financial resources to the host community from the revenues of the landfill operation via the Community Trust Fund. Several aspects drew comment. One noted that generally the financial contributions are *“for the community but not the individual”*. It was noted that financial contributions have been made to a range of community organisations - the community hall, tennis club, local sports groups - as well as to various aspects of local development - the horse trial facilities and roadside plantings. One respondent focussed on the fact that some money *“goes into the next generation”* through contributions to the Dairy Flat School, scholarships for tertiary education and funds to children’s groups such as scouts. One respondent pointed to the establishment of *“a community newspaper”*.

Another respondent noted that some local businesses also benefit financially with regular patronage from landfill staff - e.g. the Trotting Club near the entrance to the landfill.

Mitigation?

As noted in Section A, the Dairy Flat Community Trust was established specifically as part of the resource consent conditions for the new landfill, as a mechanism for channelling financial resources into the host community. It is an explicit form of compensation aimed at the community as a whole, rather than at individual property owners.

Impacts?

Most respondents who commented on this effect saw it as *“a positive contribution to the community”* or *“not a direct input to us but good for the community”*. One said *“It makes it easier to put up with the inconveniences because the landfill gives financial support”* while another suggested that *“all businesses should give something back into the community”*. One respondent expressed the view that *“It’s a bribe - for all the trucks turning near the school, so they give money to the school. They are very powerful in the community”* while another acknowledged that *“children at the school do benefit as a result”*.

Summary evaluation

The existence of the Community Trust Fund and the benefits that accrue to groups within the host community are widely acknowledged - and generally viewed positively. Most people have a clear understanding that this source of local financial contributions was part of the deal struck with WMNZL, and a few local residents still express resentment over this fact and the negative connotations it has for them. One of the strengths of the trust fund contributions is that they have been experienced across the whole community - many locals perceive that the community does derive benefit from this funding, even if they have not been compensated individually.

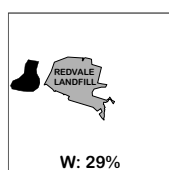
Visual effects

At one-in-five, the overall level of responses about visual effects was substantially less than for odour and operational noise, as shown in Table 8. Again, there was considerable variation according to lines of sight and viewing distance.

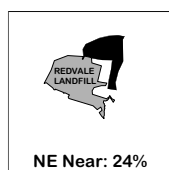
Table 8: Percentage of residents (sampled) who experience visual effects from the Redvale landfill

Interview sample	% Unprompted + Prompted	Comments
Whole sample	19	
W: both sides of Tender Road	29	Stockpiling cover material Perimeter fence and native planting
NW: Horseshoe Bush Road (western section)	0	
NE Near: western side of SH1 (northern section) + both sides of Horseshoe Bush Road (eastern section)	24	Tipface Litter on the fence Clouds of dust Screen planting
NE Far: eastern side of SH1 and western side of Postman Road (northern section) + both sides of Kahikatea Flat Road	11	Tipface
SW-SE Near: western side of SH1 (southern section) + both sides of Richards Road	50	Screen planting and landscaping Old quarry buildings
SW-SE Far: east side of SH1 (southern section) + west side of Jeffs Road + northern side of Blackbridge Road	6	Quarry face

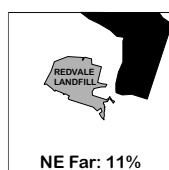
What effect do they notice? Source of effect? Timing, frequency and trends?



One respondent commented on *“the wire fence along the perimeter, topped with barbed wire”* and acknowledged that this was necessary in order to meet the requirement on the operator to fence the landfill property securely. Another described the long-distance view of the stockpile of cover material - *“see it on the horizon”* - and also commented on the native planting of tree lucerne around the perimeter as *“really pretty in spring when they flower”*. The starkness of the wire boundary fence was described as having *“grown less over the years as the plantings have established and now mask it”*. Both respondents referred to the prompt planting at the start.



Three unprompted responses all focussed on the *“rural view”* as seen from their dwellings. One commented on the rows of casuarina trees planted to screen the site, while another described the *“forms of the hills; very well screened; trees are high; looks presentable”*. One noted that the tip-face was visible. One further prompted response reported seeing *“rubbish on the fence”* and *“clouds of dust”* that were sometimes visible over the site, while another commented on the lack of screening earlier in its development - *“could have planted before they started”*. The rubbish around the fence line⁴³ and the clouds of dust were described as occasional incidents.

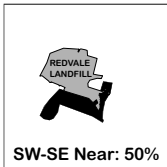


Two reported seeing from their dwellings *“the exposed dirt of the working landfill and trucks on it”* while one other expressed concern that they might see *“a mountain at the landfill in future years”* although they see nothing at the present time. It is very likely that these observations have been of the lime quarrying activity rather than the

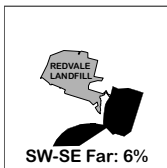
⁴³

This is a mesh fence deliberately erected to contain as much windblown litter on site as possible. The respondent noted that the litter had not been seen off the site.

landfill disposal activity, since it is the quarrying that is removing material from the highest points on the site. The quarrying activity has exposed larger areas of hillside over time.



Having lived close to the quarrying activity and its access road for some years, these neighbours all reported improvements after WMNZL arrived - *“marvellous; before it was grotty; Waste Management made a big difference to the visual impact”*, *“very tidy”*, *“extensive planting around the perimeter by Waste Management; also the stone wall at the entrance and planting along Landfill Access Road”*. One described the old lime works buildings as *“an eyesore”*. Several respondents noted how the visual benefits of the planting *“get better as the trees mature”*.

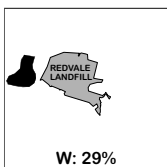


One response from this more distant vantage point described seeing *“the exposed quarry face clearly”* but pointed out that it is difficult to screen the quarry excavations from view completely, particularly from high ground some distance away. These long-distance views are a permanent effect of elevated sites.

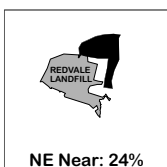
Mitigation?

Mitigation of visual impacts has involved landscaping - changing ground form and planting - along extensive sections of the landfill property boundary. Green screen netting has more recently been used for litter containment, so that it does not become a strong visual element itself. However, the original screen netting was orange in colour.

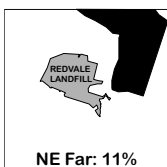
Impacts from the visual effects?



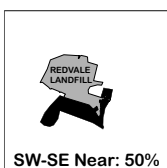
To begin with, the barbed wire fence *“heightened the sense of industrial intrusion; was horrified to begin with”*. However, the respondent acknowledged that there was no need to do anything now since the effect had disappeared.



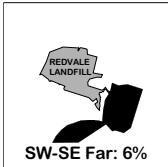
Only one of the five respondents expressed a negative view - *“out of place in a rural environment”*. The others indicated no negative impact, with one pointing out that *“we planted our own trees as well”*.



One response noted that it will look better when grassed and planted again in future. Otherwise, negative impacts were not suggested⁴⁴.



Responses indicate positive attitudes to the visual changes which have occurred since WMNZL arrived - *“looks good, “attractive”*.



The one respondent commented *“rather it wasn’t like this, but I don’t fret about it, and visitors never comment”*.

Summary evaluation

Overall, the advent of a landfill operation has created only very minor negative visual impacts within the host community, while also contributing some positive visual improvements, particularly near to the entrance way. Visual impacts vary, depending on distance from the landfill site - greater distance to the east on rising land affords long-distance views of the tipface/quarry face. For such a sizeable industrial operation in relatively close proximity to neighbours, the presence of existing trees, combined with the planting of additional trees has kept visual impacts to a relatively minor level.

Changes in traffic volumes, traffic noise and road safety

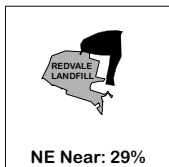
The overall frequency with which traffic effects were observed was one-in-seven respondents - refer to Table 9.

Table 9: Percentage of residents (sampled) who experience traffic effects from the Redvale landfill

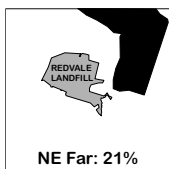
Interview sample	% Unprompted + Prompted	Comments
Whole sample	14	
W: both sides of Tender Road	0 (volume) 14 (noise)	
NW: Horseshoe Bush Road (western section)	0	
NE Near: western side of SH1 (northern section) + both sides of Horseshoe Bush Road (eastern section)	29 (volume) 24 (noise) 6 (safety)	More traffic Traffic congestion at intersection
NE Far: eastern side of SH1 and western side of Postman Road (northern section) + both sides of Kahikatea Flat Road	21 (volume) 4 (noise) 4 (safety)	More traffic Traffic congestion at intersection
SW-SE Near: western side of SH1 (southern section) + both sides of Richards Road	0 (volume) 20 (noise)	
SW-SE Far: east side of SH1 (southern section) + west side of Jeffs Road + northern side of Blackbridge Road	14 (volume) 6 (noise) 6 (safety)	More traffic

What effect do they notice? Source of effect? Timing, frequency and trends?

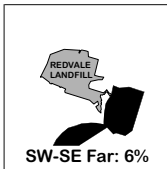
Traffic volumes



Five respondents (three unprompted) reported more traffic on the main road, while two further prompted responses included descriptions of congestion at the corner of SH1 and Landfill Access Road. One acknowledged that increasing quarry traffic is also part of the picture - *“the lime works have contracts to supply the motorway - quarry traffic is more noticeable than landfill traffic”*. Responses make it clear that these traffic-related effects are experienced on a daily basis - *“and all day”*. One respondent suggested that *“the congestion has improved with re-design of the intersection”*.



Six respondents (five unprompted) also described increasing numbers, and congestion at the intersection of SH1 and Landfill Access Road. Half of these responses referred to the combination of quarry and landfill trucks. Speed differences were suggested by several responses - slower, as they approach full, and faster, as they exit empty. As for NE Near, responses make it clear that these traffic-related effects are experienced on a daily basis, and all day. One respondent (north of the landfill entrance) suggested that traffic volumes along SH1 have been getting worse for the past five years. This may reflect the faster population growth that has been occurring in the north, even though the majority of landfill trucks arrive from the south. Another suggested that other sources of traffic in this locality have been increasing too (e.g. more two income families) and that there is more pressure on *“contractors racing to keep to their times”*.



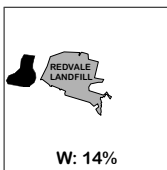
One unprompted response reported additional traffic on SH1 with the advent of the landfill, particularly in the vicinity of the entrance to the landfill. No trends were noted over time.

SH1 through Dairy Flat was a very busy route (at the time the case study research was carried out), carrying the bulk of the traffic north of Auckland City. Kahikatea Flat Road, which joins SH1 at the Dairy Flat intersection, is a main link road to Kaukapakapa in the west, and there is another quarry along Kahikatea Flat Road as well as a transport depot near the junction. There is also a bus depot at the intersection of Wilkes Road and Postman Road.

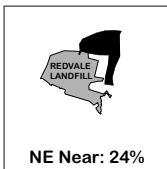
Several key informants point to a common trend amongst truck drivers in Auckland to operate more at night, in order to achieve better utilisation of their vehicles, whilst also staying off the roads when other traffic is at its busiest. The landfill manager reported that truckies will sometimes come in to use the weighbridge facility at the landfill, even though they are not dumping; it is a convenience.

At the community feedback meeting, several neighbours emphasised the effects of the quarry traffic as having substantial impacts on local residents.

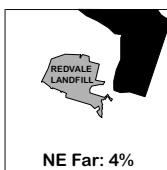
Traffic noise



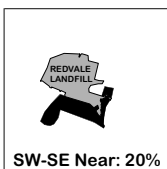
One unprompted comment referred to the engine noise from trucks *“when putting up the stockpile of cover material”* on the recently acquired property to the west of the main landfill operational area. Truck noise was noticed every day, while the stockpiling was in progress. It has now ceased.



Four respondents (three unprompted) described hearing additional engine noise of the landfill trucks, particularly as they pass up the access road. One commented on the reversing beeps (see also previous discussion under ‘Operating Noise’). Only one respondent indicated a change in truck noise level, suggesting that the re-design of the intersection had improved the flow of vehicles. Another suggested that truck noise is likely to become more noticeable when the motorway is opened.



This comment referred specifically to the noise of heavily laden lime trucks as well as landfill trucks observed passing over a bump in SH1 north of the landfill entrance. The effect was reported as becoming more frequent over the past five years - a combination of increasing vehicle numbers and deteriorating road surface.



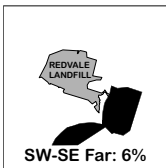
Two responses described four sorts of noise effect - the beeping of vehicles reversing in the disposal area (see also the earlier discussion under operational noise), machinery noise from the disposal area, the louder rumble of *“trucks that are empty and leaving the site, making a noise”*, and *“particularly engine brakes or air brakes”* from trucks leaving the site very early in the morning⁴⁵. Two of these respondents reported

hearing the truck noise inside their dwellings. The reverse beepers used to be heard *“once a week*

⁴⁵

While early morning departures are often lime trucks, one respondent insisted that heavy landfill vehicles departed daily, between 4am and 5am. This was confirmed by the landfill manager, who indicated that two of the transfer vehicles which bring waste up from the Pike Point Transfer Station in Onehunga are usually parked at the landfill overnight, because the drivers live locally. They leave empty on most days between 4.00 and 4.30 am in order to avoid peak traffic and return by the time the landfill opens to receive loads of waste at 6am. These trucks will normally do four round trips each day.

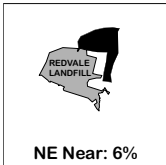
in the early days, but we never hear it now - they responded". The early morning departures were noticed 2-3 times a week "and it's got busier over the past five years". This respondent acknowledged that the increases recently would have been attributable to the lime quarry operations rather than the landfill, which has only two vehicles involved at this time of day⁴⁶.



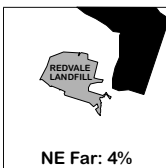
One respondent (unprompted) noticed the same effect of "banging when trucks go over the bump on SH1 - a ledge in the road" as was reported above in area NE Far⁴⁷. In this case, the respondent did not distinguish landfill trucks, but referred to "general truck traffic - they all speed". No trends over time were noted.

Several key informants also commented on perceived differences between WMNZL trucks and quarry trucks. The former were described as generally being "immaculately clean and well covered", "quieter and cleaner", "don't bang and clatter", "better driver behaviour" whereas the latter "bounce a lot and make a lot of noise" and "the mud tracking on the roads is more from the quarry vehicles".

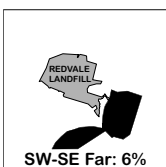
Road safety



One prompted response reported that "originally the corner was inadequately designed - no island, no slip lanes". This respondent commented that "since the intersection was re-designed, it's improved", nevertheless suggesting that "it still needs a bigger slip lane".



One unprompted response expressed general concerns about the daunting size of trucks on the highway, without specifying landfill trucks in particular. This was described as a permanent effect, with no trends noted over time.



One unprompted response referred to difficulties experienced entering and exiting properties off the main highway because of the general traffic speed - "at any time of the day". No trends were noted over time.

Interviews with primary school personnel revealed the extent of concern about road safety in general - "It's a constant nightmare at the school". Two children have to be physically walked by an adult across SH1 to catch the public bus service. There is a clear protocol for parents and caregivers about getting right off the main road when dropping off or picking up children at the school. No accidents involving school children since the landfill opened were reported, nor any traffic-related injuries.

Data provided by the Land Transport Safety Authority (LTSA) from its accident database indicate clearly that some sections of SH1 in the vicinity of Dairy Flat experienced a definite increase in accident frequency between the period 1988-92 (pre-landfill opening) and the period 1994-98 (post-landfill opening). While the section between Wilkes Road to the north of Dairy Flat and Blackbridge Road to the south of Dairy Flat experienced a substantial increase in the number of

⁴⁶ In fact, since the case study field research, the early morning departures of WMNZL transfer vehicles have reduced with the departure of one of the drivers who lived locally.

⁴⁷ These responses were confirmed as referring to the same effect; the properties are close together, even though they fall into two separate interview areas.

truck-related accidents between these two periods⁴⁸, LTSA staff said their records indicated “little to suggest they are associated with the landfill or lime works” specifically.

Mitigation?

Vehicle noise

Measures to reduce beeper volumes on trucks reversing in the disposal area have been described previously.

It was accepted some years ago by the Ministry of Education that general traffic noise experienced on the school premises and in the buildings was growing to an unacceptable level. As a result, the Ministry provided two relocatable classrooms which were placed in such a way as to provide a sound barrier along the school frontage.

Road safety

Two areas were the principal focus of road safety initiatives - the intersection of SH1 and Landfill Access Road, and the Dairy Flat Primary School.

The original intersection involved introducing a slip lane for trucks entering the site from the south. The access road was re-shaped and sealed in 1993.

WMNZL paid for the forming and sealing of a large off-road parking area in front of the school, which is adequate for accommodating normal daily needs. However, for major events at the school such as concerts and pet days, the overflow of visitors' parking still stretches a considerable distance along SH1. Alternatively, a neighbouring landowner across the road from the school allows visitors to park their cars on his property, although this still necessitates crossing the main highway.

It should be remembered that the new northern motorway extension from Albany to Silverdale opened to traffic two weeks after the case study field work was complete.

Impacts from increased traffic?

Traffic volumes

Several have become accustomed to the high volumes of traffic on the highway - “*nothing to worry about*” and “*don't really notice it - you switch off to it - been near the main road all the time*”. Others do notice it - “*when you cycle on the Main Road to the local shops, you notice the speed and size*” - and several expressed annoyance at the inconvenience of having to wait to enter the traffic stream. One described having to adopt particular strategies when going to drive into Auckland - “*I divert around the intersection islands to get past. Also I plan to leave early to go places - to take longer*”. Another described encountering lots of landfill traffic when dropping children off at school in the mornings.

Traffic noise

For the most part, these respondents did not describe any adverse impacts. Responses indicated that people are just as likely to ignore the truck noise as “*part of the traffic*” or “*nothing to worry about*” as they are to be annoyed by it. In all, three cases referred to sleep disruption. In one

⁴⁸ 1988-92: 2 truck-related accidents, 1994-98: 18 truck-related accidents.

household, it was reported that the truck noise had “*unsettled the baby*” once or twice, after which they complained to the landfill manager. In another household within 100m of the Landfill Access Road, the early departures sometimes “*made it hard to get back to sleep; you get used to it, but the odd extra-ordinary one you really notice*”. A third household close to SH1 heard heavy vehicles at night - “*sometimes get a shock; can wake us up*”. All these cases of relatively high impact occurred in dwellings within 100m of SH1.

Road safety

While one respondent accepted that the traffic effects were simply part of the public’s use of the highway, the other two expressed concerns about the perceived risks to young children, mentioning in particular the primary school location and the situation where young children riding horses need to cross the main road.

Summary evaluation

Most traffic effects in the vicinity of the landfill on SH1 are dominated by the existing level of traffic. Similarly, traffic noise from the landfill vehicles is confounded by similar effects from quarry traffic or other heavy vehicles using the highway. The relatively low level of comment on traffic volumes suggests that the actual additions to traffic resulting from the establishment of the landfill in Dairy Flat have barely been detectable for most locals⁴⁹. The even lower level of comment on traffic noise and road safety suggests that the advent of the landfill has not been perceived as a significant or outstanding contributor to these local issues, given the mitigation that has been put in place to address some of the road safety concerns. There is no doubt that road safety has been a major issue for the community of Dairy Flat, straddling as it has done the main highway north out of Auckland City. The underlying issue is likely to be resolved with the opening of the motorway extension in December 2000.

⁴⁹ While the presence of WMNZL trucks in their distinctive colours is very obvious, the impacts on highway vehicle speeds, platooning and waiting times to enter the traffic stream have probably been far less noticeable.

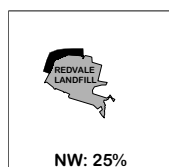
Dust

Fewer than one-in-ten of those interviewed commented on off-site dust, all of whom live within 1 kilometre of the landfill - refer Table 10.

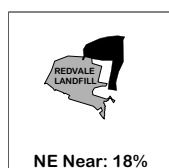
Table 10: Percentage of residents (sampled) who experience dust from the Redvale landfill

Interview sample	% Unprompted + Prompted	Comments
Whole sample	9	
W: both sides of Tender Road	0	
NW: Horseshoe Bush Road (western section)	25	Particularly during construction phase nearby Not since
NE Near: western side of SH1 (northern section) + both sides of Horseshoe Bush Road (eastern section)	18	Landfill construction and operation, and quarry operation
NE Far: eastern side of SH1 and western side of Postman Road (northern section) + both sides of Kahikatea Flat Road	0	
SW-SE Near: western side of SH1 (southern section) + both sides of Richards Road	30	Stockpiling cover material Lime trucks
SW-SE Far: east side of SH1 (southern section) + west side of Jeffs Road + northern side of Blackbridge Road	0	

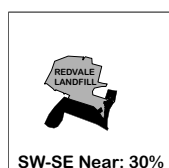
What effect do they notice? Source of effect? Timing, frequency and trends?



Two nearby residents experienced “grubbiness on the road side of the house” and “dust on the windows during construction”, referring to the initial construction activities which concentrated on the north west corner of the site (phase 10 area). This was a period when “they changed the whole landscape” immediately on the south side of Horseshoe Bush Road where the landfill site boundary comes to within 50m of some dwellings. Both said they had only noticed the excessive dust outside. At the time, southerly wind accentuated the problem of dust for these households. However, both indicated that dust was much less now - indeed, one said “none now”.



Three nearby residents experienced dust - “seeing clouds of dust” and “more dust on the roof”. Two attribute it to a combination of the landfill (particularly during construction) and the quarry operation. One noted that it is the movement of “vehicles in unsealed areas” which causes the dust. Seasonal dryness in the summer, and south westerly winds have been the key factors. One noted that it is never a problem in the winter because of the wetness while another indicated that the dust has “reduced a lot in the last two years.”



Three nearby residents on the south side of the landfill property have noticed dust. It is reported as coming from the landfill - when they were transporting cover material for stockpiling within the site, and from lime quarry trucks travelling along Landfill Access Road. One respondent actually notices the “continuous washing of the road” rather than the dust which is removed by the washing. The landfill complaints register records two dust complaints during the past six years. One was in 1993 about lime dust on the access road before it was sealed; the other was in 1996 and concerned the stockpiling activity. Both

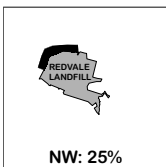
respondents indicated that the dust nuisance was a dry season effect, not occurring at all in winter, and ceasing when the stockpiling ended. The washing of Landfill Access Road was described as “seven days a week” and produced a result that was said to be much cleaner than in the days when it was the sole responsibility of the lime quarrying company.

Mitigation?

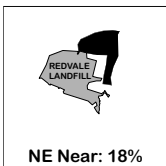
Even though the EIA document did not anticipate dust effects, they were addressed at the time of the resource consent decisions. In part, this was why water take permits were issued by the ARC in order to allow for dust control measures.

The landfill manager described the use of water sprays and a water cart⁵⁰ for dust suppression, as well as a vehicle wheel wash, with sprays directed at truck tyres. The Landfill Access Road was resealed with a bituminous overlay in 1999.

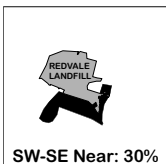
Impacts from off-site dust?



One reported that they had to clean the house down more often. One had complained to the landfill manager.



One reported having to clean their glass-houses a lot more in the early years, while another reported noticeable amounts of dust falling into their pool and onto their roof. One had complained to the landfill manager.



One respondent commented that “it was difficult at the time, but they tried their best”, referring to the period when there was a major effort to stockpile cover material for future use at the landfill. No complaints were reported to the landfill manager.

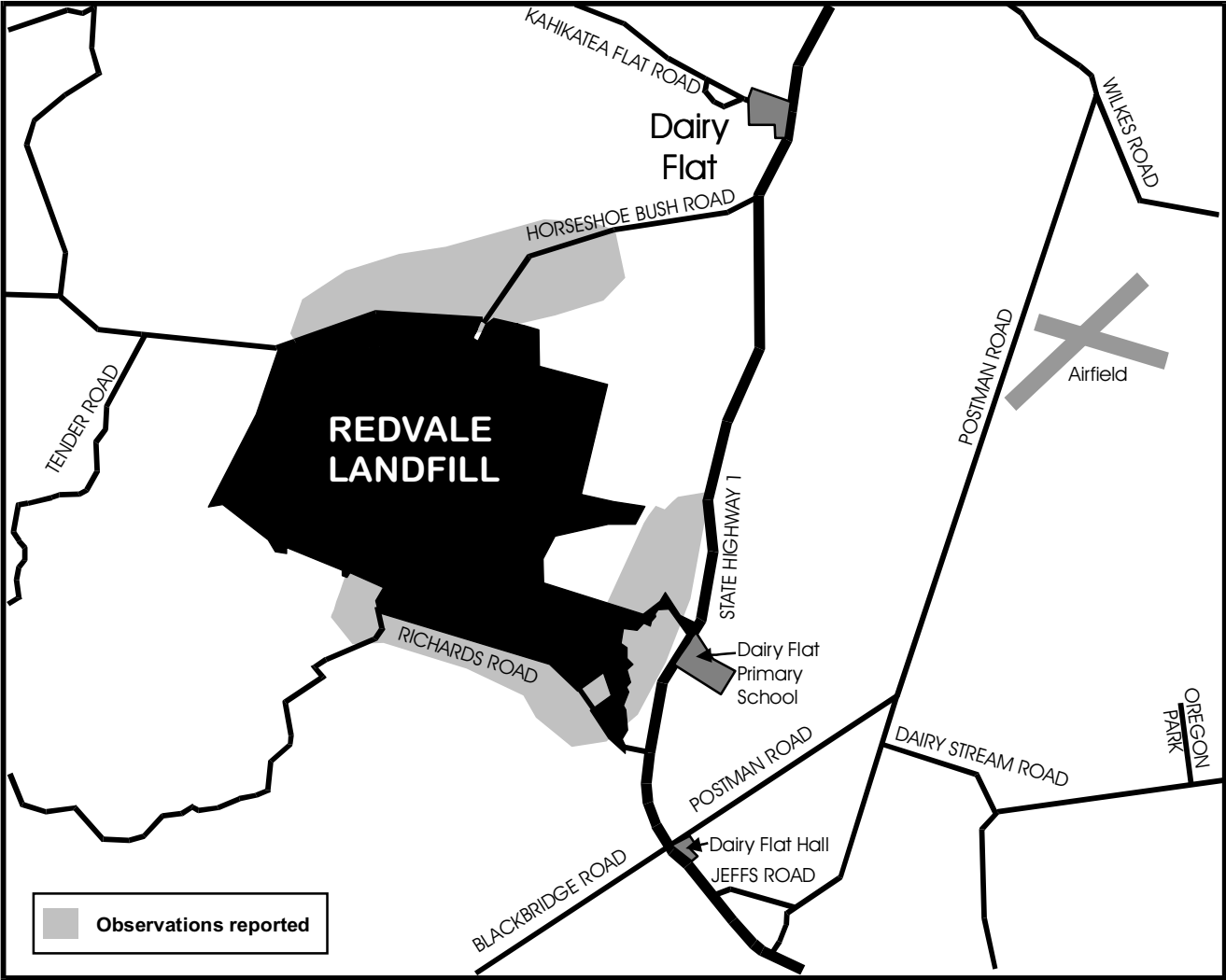
Summary evaluation

Even though relatively few in number, all responses about dust were unprompted. It would appear to have been a real nuisance to a few households at times - within a distance of 500m of the landfill boundary. The effect appears to be episodic (e.g. mainly associated with construction or stockpiling activities) and related to wind conditions (refer to Figure 17). For most neighbours of the landfill, off-site dust is negligible or non-existent.

⁵⁰

The Redvale Lime Company purchased a water cart for dust suppression in 1999.

Figure 17: Dust effects offsite



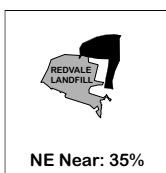
Litter

Overall, one-in-eight respondents commented on litter. As Table 11 and Figure 18 show, the effect was very localised.

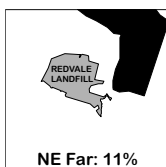
Table 11: Percentage of residents (sampled) who experience litter from the Redvale landfill

Interview sample	% Unprompted + Prompted	Comments
Whole sample	13	
W: both sides of Tender Road	0	
NW: Horseshoe Bush Road (western section)	0	
NE Near: western side of SH1 (northern section) + both sides of Horseshoe Bush Road (eastern section)	35	Mainly windblown plastic from the landfill
NE Far: eastern side of SH1 and western side of Postman Road (northern section) + both sides of Kahikatea Flat Road	11	Rubbish from trucks
SW-SE Near: western side of SH1 (southern section) + both sides of Richards Road	20	Rubbish from trucks
SW-SE Far: east side of SH1 (southern section) + west side of Jeffs Road + northern side of Blackbridge Road	0	

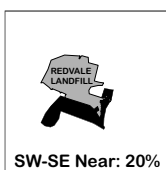
What effect do they notice? Source of effect? Timing, frequency and trends?



Five out of these six respondents (four unprompted) described windblown litter from the landfill site itself - “plastic bags and chunks of plastic”, “white plastic bags on the orange fencing”. These are all residents who have seen such litter on their own properties. The sixth observation from this area was of litter “coming out of the top of tall trucks” and falling onto the State Highway. There is no consensus about how frequently such windblown litter is noticed off site. Neighbours’ estimates range from “very occasional, even early on” and “twice during 1999” to “every now and again - as recently as last week” to “weekly over the last three or four years” and “more than once a month.” One respondent said he had “seen the orange fence collapse with the volume of plastic on it”, while another said “Only noticed it when Clinton came” and yet another observed that “I get more off the road than ever came from the landfill itself”. Half of the respondents agreed that it took strong winds from the southerly quarter to carry the plastic litter as far as their properties - “only in very strong winds”, “really strong southerly - winter gales”. Two immediate neighbours noted improvements over time - “never happened since the fences went up” and “improved with the netting to catch it”.



Three respondents (one unprompted) reported seeing rubbish blown off trucks and lying on the verge of SH1 - “a few scraps off some trucks”, “the odd bit flies off the trucks on SH1”. Responses consistently indicated this as an occasional effect - from once a month to “a few times only over five years”.



One respondent reported litter spilt off trucks and landing on the verges of SH1, while another noticed litter thrown from passing cars by members of the public and lying in the adjacent paddock - “nothing to do with the landfill”. These observations were occasional - once or twice a month - “sometimes nothing; very variable”.

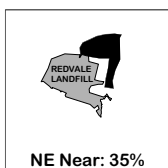
At the community feedback meeting, the landfill neighbours present expressed the view that the road-side rubbish “is probably worse; more noticeable than the windblown rubbish from the landfill”.

Mitigation?

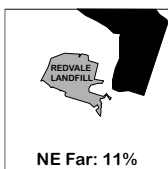
Mitigation conditions required by the consents include ensuring that all refuse is covered at the end of each working day, and keeping the size of the working face to a minimum. Apart from the mesh screens erected specifically to contain windblown litter, the landfill manager explained that staff, working on the disposal area, are individually responsible to clear the perimeter fences of litter at the end of each day. They can place movable fences close to where they are working, or rely on the perimeter fences. There is a good level of personal motivation in this arrangement. Beyond the perimeter fences, litter pick ups are carried out on neighbouring properties. The landfill manager stated that in the previous three years, a couple of litter pick ups had occurred outside the perimeter fence and five litter runs had been carried out along SH1 in response to complaints. Typically, there are about 20 days a year when staff have to pay particular attention to clearing the litter from the perimeter fences - mainly during the October-November period when south westerly winds predominate. The landfill manager is empowered to close the landfill, if wind becomes so strong that windblown litter could be a danger to those working on the site. To date, this has never occurred, although he acknowledged coming close to it on one occasion.

The landfill Complaints Register records one report of windblown litter from the site itself. All other litter complaints refer to litter from trucks on the road.

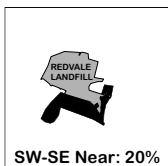
Impacts from off-site litter?



Two registered annoyance at the litter, while one described a concern that “horses might swallow it” and another acknowledged that “a guy picks it up on local properties if they’re told about it”. However, only one had contacted the landfill manager about the litter.



Two respondents suggested little impact - “not perfect, but not bad for the amount of stuff going in there”, “seen the litter come out when travelling behind, but no worse than the general public”. One respondent expressed the view “I just don’t like to see the roads littered - more care should be taken to cover trucks”. One had contacted the landfill manager about the litter.

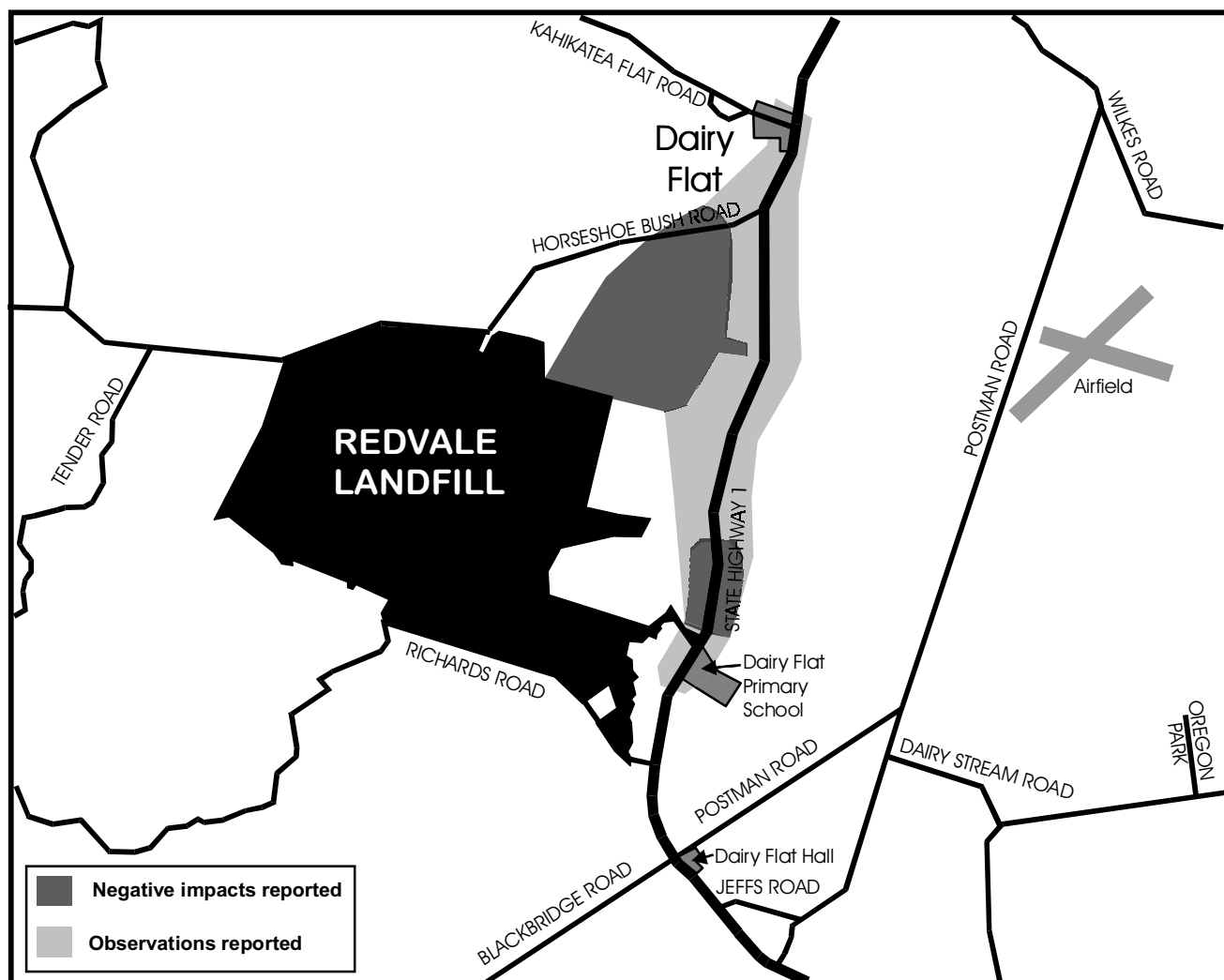


One respondent simply notices the occasional litter, while the other expressed concern that cattle might eat the plastic litter, although they have “never lost any cattle” nor have they ever actually witnessed cattle eating plastic rubbish, despite being inquisitive about it. One had contacted the landfill manager about the litter.

Summary evaluation

Relatively few members of the host community interviewed expressed concerns about litter associated with the Redvale landfill. Most observations have been of litter which falls off trucks rather than litter blown off the landfill disposal area⁵¹. It is unlikely that any landfill can ever totally contain litter under all weather conditions, unless the buffer zone within the boundary is sufficiently large. In this case, litter blown off site has been noticed up to about 800m in a north easterly direction. While not totally absent, the off-site impacts are occasional and minor.

⁵¹ From a host community perspective, such a distinction is largely irrelevant. However, it does identify where responsibility lies for remedying the cause of the effect.

Figure 18: Litter effects

Other effects observed

The presence of birds in the neighbourhood drew comment from four respondents. Single, uncorroborated observations about vermin and flies in this rural area were not analysed any further. A single observation was reported of surface water contamination by a neighbour whose property is bounded by the Rangitopuni Stream.

Birds and bird strike:

Four respondents mentioned birds - seagulls and mynah birds - but only one expressed a definite association with the landfill, the others commenting that there was nothing exceptional *“because we live in the countryside”* and *“there are lots more trees now”*. No negative impacts were reported.

The landfill manager described their policy of applying adequate cover material to prevent birds from being attracted to scavenge, and the use of coloured streamers overhead as another deterrent. Since the few gulls which do visit are not a protected variety, shooting them is an option as well.

Interviews at the nearby airfield revealed that *“even though we did object at the time because of the perceived risk, it has turned out to be a non event. No members have ever reported flocks of birds near their planes and they regularly pass over the landfill at one thousand feet.”* Both fixed wing and helicopter interests indicated that birdstrike problems which occurred at the airfield are from birds on the grassed areas around the runway itself, mainly plovers.

Surface water pollution:

One respondent reported having observed a *“muddy side stream - at the confluence with the Rangitopuni Stream”*. The event occurred during construction activity on the landfill site, and had never been observed since. It was regarded at the time as being *“not enough to influence stock water use”* and was not reported to the landfill manager or the Regional Council. Nevertheless, a member of the technical Peer Review Group interviewed confirmed that there had been a few periods of non-compliance for surface water during construction, before the silt traps had been formed. This problem is now monitored by the Auckland Regional Council, whose records indicate several spillage⁵² and sediment events which have occurred on site.

⁵² Two of these events actually occurred at the lime quarry facility, although this is technically described as being on the Redvale landfill property.

Summary of Responses

The following two tables 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. They allow a comparison of the relative experience of different effects, and also a comparison between facilities.

Table 12: Summary table of responses by neighbours of Redvale (N= 86)

Effect reported	% Unprompted	% Unprompted + Prompted
Odour	34	37
Operating noise	22	35
Financial contributions	16	16
Visual effects	12	19
Changes in traffic volumes	10	14
Traffic noise	9	12
Dust	9	9
Litter	6	13
Road safety effects	3	5
Birds	2	5
Surface water effects		1

There are directional and distance-related patterns to the observation of effects that are most likely to be influenced by wind direction and speed - odour, operational noise, dust and litter.

Table 13: Spatial Distribution of observations reported

Effect reported	% Unprompted + Prompted						
	Total sample (N=86)	W (n=7)	NW (n=8)	NE Near (n=17)	NE Far (n=28)	SW-SE Near (n=10)	SW-SE Far (n=16)
Odour	37	29	25	76	25	70	6
Noise	35	86	63	59	21	20	6
Dust	9	0	25	18	0	30	0
Litter	14	0	0	35	11	20	0

These patterns reflect the predominant NE-SW axis for wind direction⁵³.

⁵³

Wind data for 1998/99 from the on-site weather station indicated that typically for 43% of the time (12 months) the wind comes from the SW quarter and 36% of the time from the NE quarter.

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

Main conclusions

Generally, the community's worst expectations about what would happen when the landfill operation arrived have not eventuated. Many are very aware of the 'quid pro quo' involved - accepting the benefits that result from the distribution of financial assistance throughout the host community in return for accepting the facility in their midst. They also expressed their support of the WMNZL operation in their community with explicit and unprompted compliments, particularly focussing on the manager and the manner in which he has discharged his responsibilities. There are a few who express the view that the landfill has helped to enhance the community focus of Dairy Flat.

Nevertheless, despite the broadly-based expressions of support, there is no doubt that the proposal to locate the landfill in Dairy Flat did divide the local community deeply at the time. A decade later, much of this division appears to have healed - but not all. There remain a few locals who continue to be aggrieved because they continue to experience an intrusion into their lives from operations at the landfill. This situation exists only within a very limited distance from the site, generally within 500m and certainly no more than 1km. There are also a few pockets of genuine cynicism remaining in neighbours attitudes towards the company.

In exploring the longer-term effects of the Redvale 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.

Major changes in land use and settlement pattern

The locality surrounding the landfill remains essentially a rural community. The continuation of existing trends in rural sub-division, market gardening enterprises and horse riding-related activities was described in Section C. Indeed, the last decade has been notable for the acceleration of growth in the population of the Dairy Flat locality.

The influence of the landfill on the way in which the community of Dairy Flat has developed

Analysis of responses to the question on whether or not the presence of the Redvale landfill has influenced the development of Dairy Flat community indicated an absolute majority who believe the facility has either not had any negative influence or, indeed, has had a positive influence. If non-responses are removed from the sample, then these views outnumbered perceptions of a negative influence by 8-to-1, as shown in Figure 19.

When the responses are analysed separately for 'near' and 'far' locations⁵⁴, a somewhat greater proportion of 'near' respondents expressed negative perceptions - see Figure 20.

Of those who expressed a viewpoint, the largest proportion (51%) held the view that the landfill operation has not had a negative influence on local development, although some did acknowledge a period of uncertainty and disruption at the beginning -

"It hasn't been as bad as we expected"
"people selling and buying as much as ever"

Figure 19: Landfill's influence on community development?

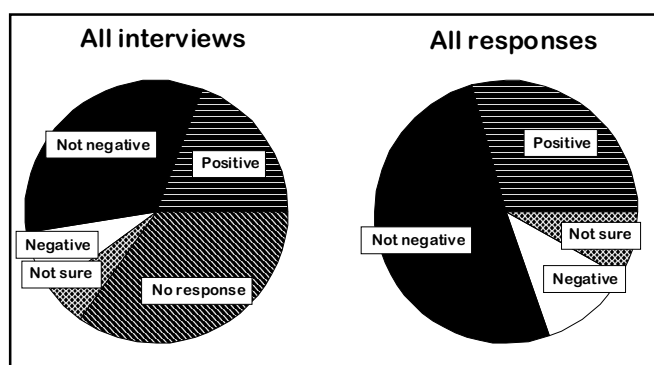
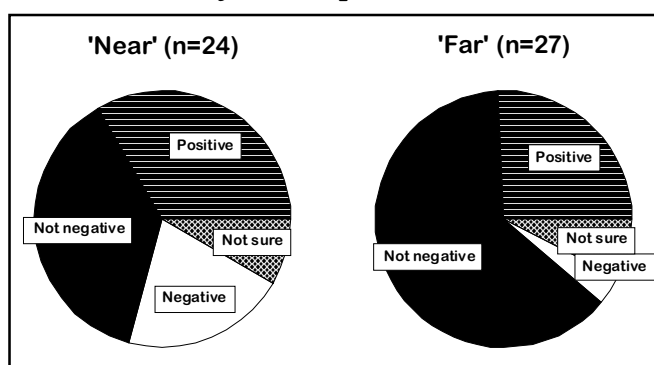


Figure 20: Landfill's influence on community development?



⁵⁴

'Near' = NW, NE Near, and SW-SE Near; 'Far' = W, NE Far, and SW-SE Far

“some moved out when the landfill was announced - there was ‘panic selling’; then once the fuss died down, the new owners sold on and made a killing”

Just over one quarter (29%) expressed positive perceptions of the influence of the landfill operation, generally attributed to the financial returns to the community and the opportunities for representation and community focus that have resulted from these -

“New organisations have developed because of the financial assistance”

“Been a positive experience for the community”

“Helped quite a few people”

“brought dollars into the area”

“better facilities have attracted more people”

“landscaping and tree planting a positive feature”

“community has become more upmarket”

“bringing more business to Dairy Flat - equestrian centre, equine hospital, petrol outlet”

“the district is very vibrant”

“community togetherness - a ‘street party’ each year”

Negative perceptions were expressed by 12% of respondents. These comments related to two themes - the difficulties that some people had experienced with uncertainty, and the divisions which were created within the community for a variety of reasons. Uncertainty tended to be reflected in comments about property dealings -

“it did for a time; we weren’t aware of what was proposed”

“a period when it was difficult to sell property”

“six years ago we tried to sell at the same time as the landfill was being built - made it difficult to sell”

A number of local residents described their experiences of community divisions, which arose at the time when WMNZL was proposing the landfill site at Dairy Flat. The divisions were brought about for various reasons - different views and attitudes to the proposal itself, and conflicting views on how best to respond to the proposal as a community - *“caused rifts in families”, “division between those on either side of the main highway - feelings ran high, in both camps”*.

Later on, some individuals experienced a lack of support when fighting for clean air and a healthy environment and expressed the view that many people in the community have had their values compromised by the compensation the community is receiving, with the result that people were reluctant to speak out - *“feelings of helplessness, fighting against such a mega organisation”, “felt overlooked and powerless”*.

Others who now are very positive about the facility were strongly opposed in the beginning, and found themselves criticised for ‘giving in’. Faced with the perception that there was no stopping the proposal, some in the community’s opposition action group - the Dairy Flat Protection Society - adopted an approach aimed at getting as much as possible in the way of compensation for the community out of the negotiations, a stance for which they have been maligned by some since. Divisions were heightened for some by the amount of money they had put in to fight the landfill.

Latterly, some have formed a view that there are *“those who gain from the financial distributions and those who don’t”*.

Local experience of dealing with WMZNL is reported as having changed markedly between the planning stages of the landfill and the operational phase - *“felt persecuted by WMNZL at the planning*

stages because they wanted some of my land”, “the pressure and tactics of American Waste Management was not pleasant”, “very aggressive”. A member of the action group reported finding the WMNZL negotiators as “arrogant at the time, and not very considerate”.

Since then, however, WMNZL has earned many plaudits from throughout the host community, most attributable to the performance of the site manager and his team -

“The manager goes out of his way to get to know the residents; goes out of his way to rectify things”

“Always onto complaints quickly”

“Very well managed landfill site”

“a very good PR person; responds to any complaint”

“Management are excellent to deal with”

“WM did their best to make it not so stressful by building a buffer - the buffer works well but a lot of growing still to do”

“A very personable person”

“Accepted now because of the quality of its operation”

“Very happy to listen to a complaint; never fobbed off”

“Came to the conclusion that the management were keen to keep in with the neighbours and have proved so; will answer any questions we need to ask”

“They’ve been as good as their word”

“Encourages you to report any event; generally quick to check it”

“WM had to make this a success - to have any chance anywhere else in new Zealand - environmentally pleasant; good for the community”

In summary, many of those interviewed in this case study thought that their worst fears about what would happen when the landfill operation arrived have not materialised - and said so explicitly. Many are also very aware of the ‘quid pro quo’ involved - accepting the benefits that result from the distribution of financial assistance throughout the host community in return for accepting the facility in their midst. Many also expressed their support of the WMNZL operation in their community with explicit and unprompted compliments, particularly focussing on the manager and the manner in which he has discharged his responsibilities. Some wondered how it might be different when this manager leaves. At the community feedback meeting, the neighbours re-iterated the view that support for the WMNZL operation is not necessarily support for the Company, but rather for the present manager. They acknowledged his exceptional “people skills”, and expressed concerns that because he is so knowledgeable and experienced, the Company may take him away to manage another facility. They also expressed the view that the biggest long-term concern is the potential effect of the landfill on the environment “in fifty years time, when it is closed”.

There are a few who express the view that the landfill has helped to enhance the community focus of Dairy Flat.

Nevertheless, despite the broadly-based expressions of support, there is no doubt that the proposal to locate the landfill in Dairy Flat did divide the local community deeply at the time. A decade later, much of this division appears to have healed - but not all. There remain a few locals who continue to be aggrieved because they continue to experience an intrusion into their lives from operations at the landfill. This situation exists only within a very limited distance from the site, generally within 500m and certainly no more than 1km. There are also a few pockets of genuine cynicism remaining, not least because the experience of WMZNL in operational mode has been very different from WMNZL in planning mode. Several people interviewed recalled being subjected to instances of aggressive and confrontational behaviour, which contrast markedly with their present-day experience of WMNZL personnel.

Property values

Four respondents living to the north east of the landfill made unprompted comments about its effect on their property values. Three real estate agents operating in the locality were also interviewed, yielding some common perceptions. They agreed that there had been an immediate downward impact on property values when WMNZL's intentions were first made public. One suggested that *“panic set in for the nearby residents as soon as it was known that Waste Management was interested in the site”* with the immediate impacts of loss of property value, actual inability to even sell, and *“lots of worry and anxiety for the property owner - often reflecting particular circumstances such as financing risk and being over-stretched and unable to pay.”* From an agent's perspective, some properties became more difficult to sell - *“you'd have to go through hundreds of potential buyers rather than the ten or twenty that is more typical”*. The real estate agents also seem to agree that *“the threat of severe effects is often worse than the actual effects”*, reporting that sales and values have now picked up again.

Although not a full analysis of property value effects observed, some preliminary indication of these effects has been gained by analysis of data provided by one resident of Dairy Flat. A fuller analysis will be carried out as part of the next phase of research funded by the Foundation for Research Science and Technology. Data were provided for the capital value of eight properties in the locality from valuation rolls compiled in 1989, 1992 and 1995. Corresponding data were obtained by the researchers for 1998⁵⁵. Six properties are in the NE Near interviewing area (three along SH1 and three along Horseshoe Bush Road) and two are outlying properties (one on Blackbridge Road (SW-SE Far) and one on Kahikatea Flat Road (NE Far)).

The results have been aggregated to correspond to 'near' and 'far' locations. Figure 21 shows trends in the capital values of these groups of properties since 1989. The 'near' properties appear to have lost value, relative to the 'far' properties, even before the landfill operations began on site. While all property values have been growing since 1992, the gap appears to have widened.

While properties on Horseshoe Bush Road typically have higher values than those on SH1 in these small samples, Figure 22 indicates that properties on Horseshoe Bush Road may have been more affected than those on the west side of SH1 during the early years of landfill development and operation.

Figure 21: Trends in capital values

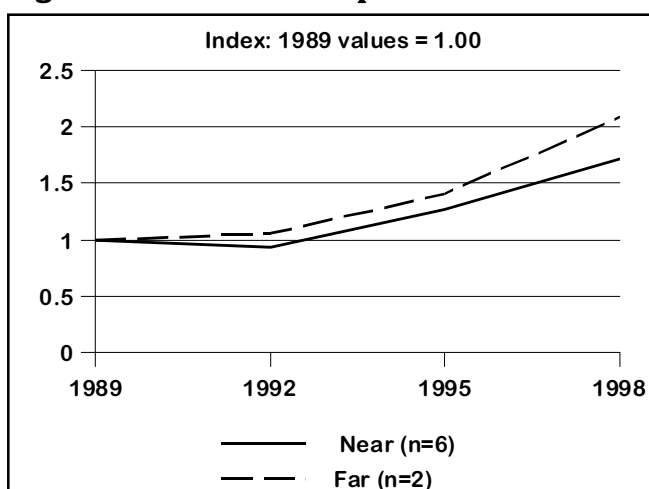
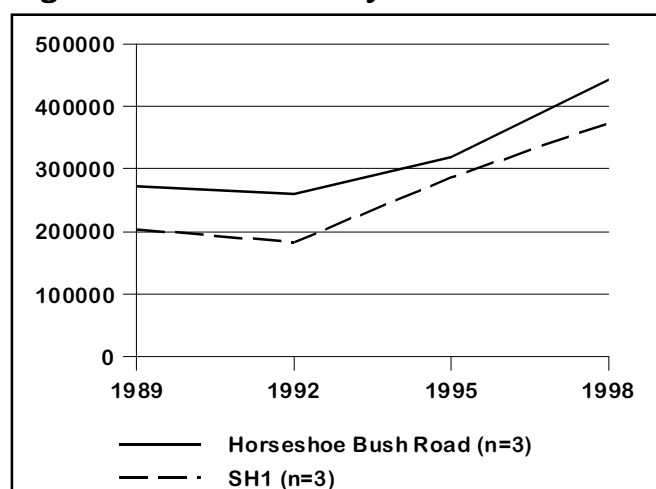


Figure 22: Trends by location



⁵⁵

The data were prepared for the Air Discharge Consent hearings by a local resident, and extended to the 1998 valuation year by consultation with Quotable Value NZ.

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- Taylor, C. Nicholas; Goodrich, Colin G. and Bryan, C. Hobson. 1995. Social Assessment: theory, process and techniques. 2nd Edition. Taylor Baines & Associates, Christchurch, New Zealand.

Appendix I Traffic Accident Summary on SH1 - data from the Land Transport Safety Authority

Data on traffic accidents were provided by the Land Transport Safety Authority (LTSA) from its accident database. The data covered three areas:

Area A: SH1 immediately north and south of the landfill entrance, between the Kahikatea Flat Road intersection to the north, and the Postman Road/Blackbridge Road intersection to the south.

Area B: several kilometres of SH1 south of the Postman Road/Blackbridge Road intersection.

Area C: several kilometres of SH1 north of the Kahikatea Flat Road intersection.

Comparative data were provided for two periods of time:

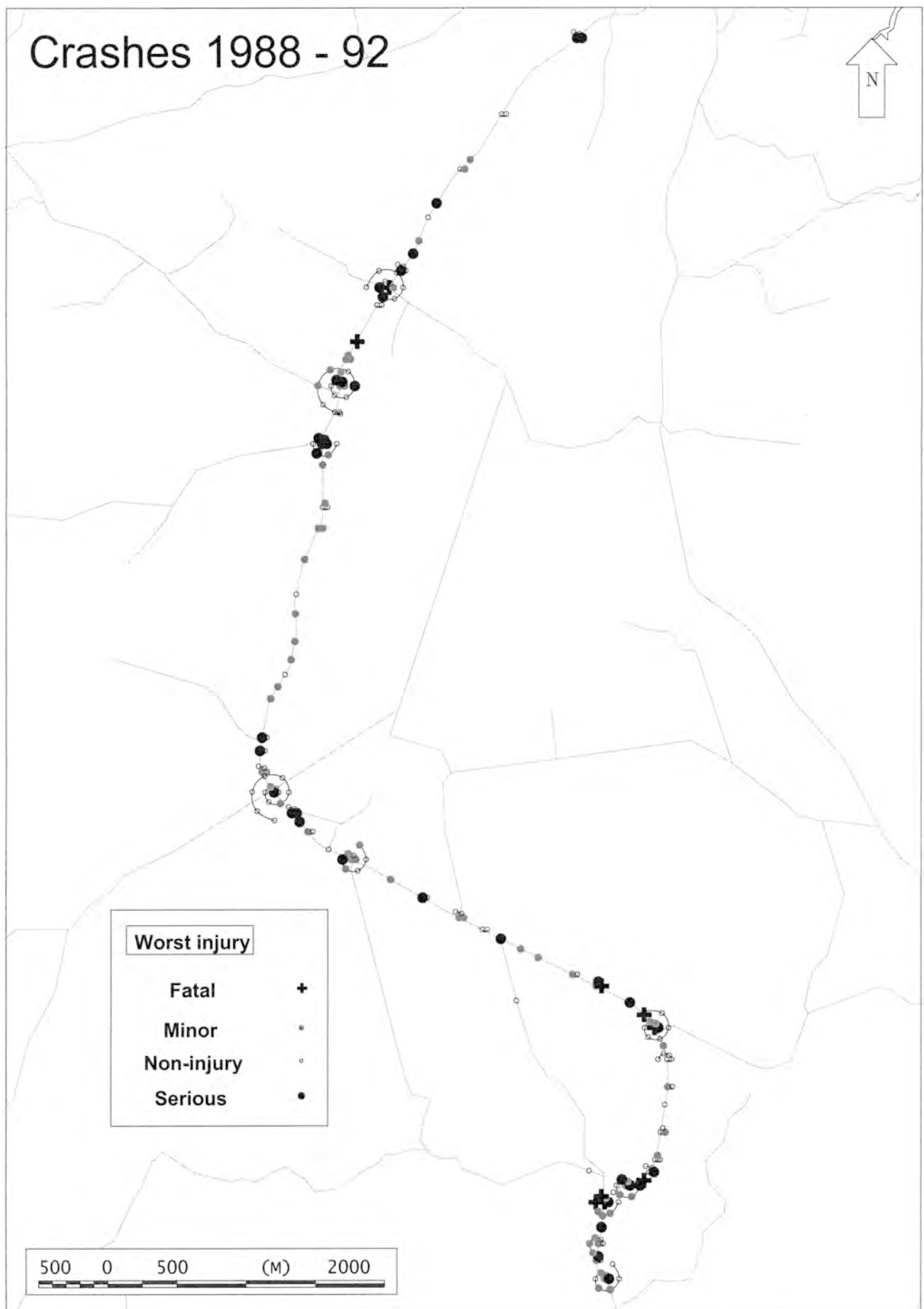
1988-92 Before the landfill opened.

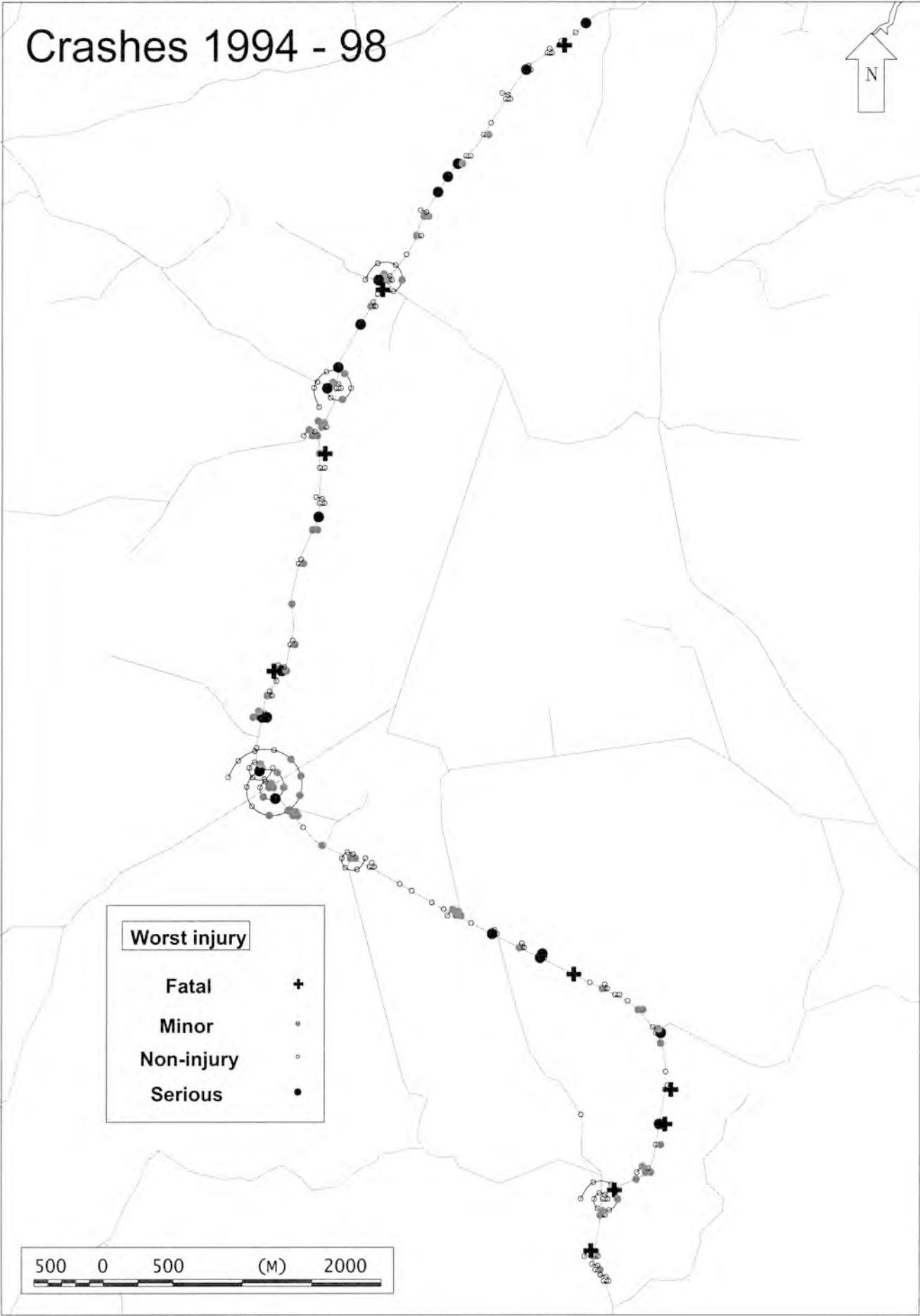
1994-98 After the landfill began operating.

The following table summarises data on injury and non-injury crashes.

Area	1988-1992			1994-1998		
	Injury	Non-injury	Involving trucks	Injury	Non-injury	Involving trucks
Area A	35	28	2	41	44	18
Area B	61	46	12	38	56	13
Area C	12	18	3	18	29	4
All Areas	108	92	17	97	129	35

Corresponding data showing accident locations are provided on the following two pages.





Appendix II Listing of Odour Issues examined by the Task Group

The Odour Task Group identified the following ten principal odour sources or odour events and investigated work practices, products and systems to address each one.

ODOUR ISSUE 1

Odour from working face during the day.

ODOUR ISSUE 2

Unexpected odorous load.

ODOUR ISSUE 3

Odorous general waste in morning.

Transfer vehicles left full overnight. Bins after long haul from out-of-town.

ODOUR ISSUE 4

Daily cover removal. Odorous gas rising. Removal of cover over old waste.

ODOUR ISSUE 5

Overnight bubble of gas drifting off in still air in morning.

ODOUR ISSUE 6

Odorous special waste.

ODOUR ISSUE 7

Odour from a hole dug for special burial e.g. asbestos.

ODOUR ISSUE 8

Landfill gas from covered areas.

ODOUR ISSUE 9

Flare outages due to mains power failure.

ODOUR ISSUE 10

Gas leakage from leachate collection system.

ODOUR ISSUE 11

On-site management.