

HALTON REGION LANDFILL TECHNICAL STUDY
NOISE ANALYSIS
SITE F
SCHEDULE J-F

Prepared for
THE REGION OF HALTON

Prepared by,



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September 11, 1986



HALTON REGION LANDFILL TECHNICAL STUDY

NOISE ANALYSIS

SITE F

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HALTON REGIONAL LANDFILL TECHNICAL STUDY

NOISE ANALYSIS

EXECUTIVE SUMMARY

SITE F

Development of a detailed site design for Site F has lead to a significant reduction in the area required for Landfill purposes relative to the original Environmental Assessment scheme previously prepared for Stage 2C . Figure 1 of the main report (after page 1) shows the proposed area of landfilling, the general area and the nearest residences. Instead of land filling operations starting at the southern end of the site and proceeding to the north, as per the Stage 2C report, it is now proposed that the landfilling commence in the middle of the site, proceed northward for 10 to 12 years, then start at the south end and proceed northward to the middle. For the residences most affected by the landfill noise, the three closest to the north end of the site, this operational plan results in the noise effects being greatest about one half way through the life of the site. Even during the noisiest two years, the sound of landfilling will only be slightly higher than the traffic noise already present in the area.

1) to start in middle + go north 10-12 yrs
2) then start at south end + go north to middle

3 residences will be most heavily affected 1/2 thru site life

but see P.2 where it says

landfill noise above background
"i start to dominate" background

the noisiest 2 years of landfilling will only be slightly higher than present traffic noise

Highway 403 and the railway corridor, located between the urban area of Burlington and the proposed landfill site will continue to produce a much larger quantity of sound energy than the landfill operation. These two sound sources generate sufficient noise to mask or cover the sound of the landfill virtually all the time in the noise sensitive areas in the urban area of Burlington to the south of the site. Areas to the east and west of the site, already developed or being planned for residential use are beyond 500 metres distance from the landfill activity. At this distance the sound levels will not exceed 55 decibels (dB) Leq (Leq represents a form of average sound level), the Ministry of the Environment's criterion for landfill noise in residential areas, and, as in the case of the homes to the south, will have noise levels dominated by sound from Highway 403.

what about quarry

*re population waste generation
new res. dev. near Site F?
500m away*

For the three closest residences located to the north of the site, the sound of initial excavation will be noticeable for several months, then the sound will drop below the background traffic noise for several years. By year 7 or so, the sound of the land fill noise will start to dominate the background sound, reaching a peak in years 10 and 11, when it will equal the Ministry of the Environment's 55dB Leq criterion. As landfiling shifts

*years 7-11.
4 years when landfill noise will dominate background sound*

to the south end of the site at about year 12, the sound levels at these residences will drop to well below the traffic noise to which they are exposed.

A concern at the time of the Stage 2C Environmental Assessment work was the effect of Saturday landfilling operations on some of the uses of Bayview Park located to the east of the proposed landfill site. Of particular concern was the horse ring. In the Stage 2C Noise report of the Environmental Assessment, it had been projected that the sound levels in the area of the horse ring on Saturdays would be sufficient to significantly affect the facility's usefulness. The concern has been addressed in review of actual Saturday operations at the current landfill site. Saturday landfilling operations involve mostly small vehicles and some 40 heavy vehicles or about 30% of the weekday level of noise energy generation. With this volume of traffic and only one compacting machine operating for a total period of one to two hours throughout Saturday, the sound levels in the Bayview Park at the horse ring will not exceed 55 dB Leq (the Ministry of Environment criterion for residential areas adjacent to landfill sites) on Saturdays. There will remain several Fridays each year when the horse ring is in operation. At the time when landfilling is closest to the facility, the

need p.
say 16
is that
per year

sound of landfilling will be as high as 60dB. This sound level, which would necessitate raised voices during conversation at 2^{metres}, will be present sporadically during years 10 and 11 assuming that the site is filled at the rate projected in the site design data. For the balance of the life of the site, the horse ring area will remain below 55 dB Leq (ie below the sound level requiring raised voices for short range conversation) at all times.

Due to the limited extent of inconvenience caused by the noise on only 16 Fridays, no special mitigation measures are being recommended to reduce the noise in the horse ring on Fridays. To limit the noise on Saturdays during the period that landfilling is within 500 m of the horse ring, it is recommended that the cover material to be used on Saturdays, be placed near the face of landfilling on the previous Friday. This measure will minimize the amount of equipment operating near the park on Saturdays. [It is no longer recommended that consideration be given to moving this facility as was noted in the Noise report for Stage 2C of the Environmental assessment report.]

16 Fridays?
ie a year?
and of 52?

likelihood of enforcement?

change from 2C.

Traffic noise impact of this site is minimal due to the large amount of traffic already present on Highway #403. The vehicles travelling along the North Service Road to

the landfill site represent a very small increment in sound energy relative to the sound of the high speed traffic on the highway.

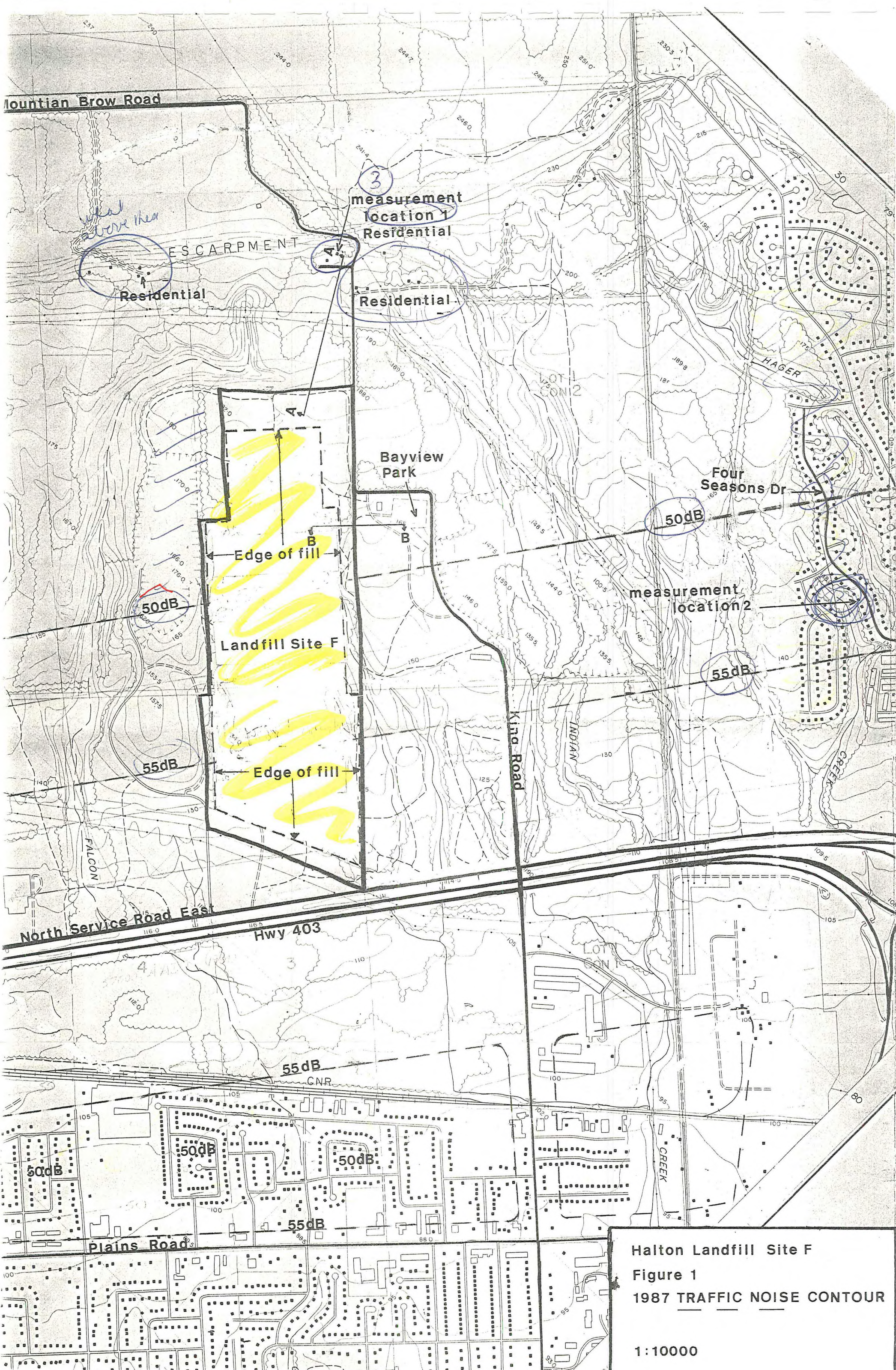
The site can be developed to meet the Ministry of the Environment noise criterion for landfill sites with only a very minor modification to the procedures that would be used to operate the site if there were no noise sensitive neighbours. As noted above, a minor operational change for 10% of the site's projected life is recommended to minimize the sound generated on Saturdays when there are horse ring activities in Bayview Park.

HALTON REGION LANDFILL TECHNICAL STUDY**NOISE ANALYSIS****SITE F****1.0 INTRODUCTION**

At the request of the Region of Halton, Barman Coulter Swallow Associates has carried out a noise analysis at Site F in Burlington located as shown in Figure 1. The site's potential for noise impact was reviewed as part of Stage 2C of the Environmental Assessment for the selection of Halton's new landfill site. This report goes into further detail on the various noise aspects of the site design, particularly in the residential areas to the north of the site and the park to the east.

The purpose of this report is to:

1. Determine the anticipated noise levels in the surrounding affected community,
2. Determine the areas where sound levels above the Ministry of the Environment guidelines might occur.
3. To recommend measures by which the site can be utilized without exceeding those guidelines.



Halton Landfill Site F
Figure 1
1987 TRAFFIC NOISE CONTOUR
1:10000

2.0 REVIEW OF THE STAGE 2C REPORT

In the Stage 2C Environmental Assessment Noise Report for noise, Site F was found to fall within the guidelines of the Ministry of the Environment for landfill noise in adjacent residential uses. The most sensitive residential locations were found to be the three closest homes to the north of the site. Also identified during the Stage 2C study was the potential for impact on the horse ring activity in the park to the east. Otherwise, the Environmental Assessment Report found that the other residential or sensitive uses in the general locale were either too far away to exceed the Ministry of the Environment's 55dB Leq (Average Sound Level) criterion and/or were already noisier than the landfill site would be due to the transportation corridor running south of the site.

①
② what about
- ① Park generally
- ② horse ring
- ③ model airplane club
- estimate of Park use

3.0 METHODOLOGY AND CRITERIA

The Ministry of the Environment requires that landfill sites should not produce Leq above the background traffic noise Leq or 55 dB, whichever is higher. The evaluation then, involves the determination of the background traffic

sound levels using the appropriate prediction procedures and on site noise monitoring and the projection of the sound levels that will be produced by landfilling activity using a combination of ^① prediction models and ^② confirming field measurements.

*what done
4 in
what
%?*

The traffic noise prediction procedure used for this report is the "Simplified FWHM Noise Prediction Method" published by the Ministry of Transportation and Communications as report #AE-82-05. This procedure was selected because of its relative simplicity while still permitting accurate assessments of the noise of traffic containing high percentages of heavy vehicles.

document

For evaluation of the impact of the landfill traffic noise on a community, one compares the sound level (actually Leq or L equivalent) of the traffic in the absence of landfill traffic to the traffic noise including the landfill traffic. It has been the Ministry of the Environment's (and most other recognized agencies) practice to consider traffic impact to be significant where the extra traffic will cause an increase of 3dB or more in residential or other sensitive areas.

← like a park?

4.0 EVALUATION OF BACKGROUND NOISE ENVIRONMENT IN SENSITIVE AREAS

The site is located adjacent to Highway 403 which carries about 43000 vehicles (Average Annual Daily Traffic (AADT)). Using the Ministry of Transportation and Communication's Simplified FHWA Noise Prediction Method (AE-82-05) for traffic sound level prediction, it is anticipated that daytime sound levels from this highway are projected on Figure 1. North of the highway, once the new site is opened, one would anticipate no other major noise sources other than landfilling at Site F with the possible occasional exception of noise from the quarry operation across King Road to the east. To the south are several other arterial roads and a major rail corridor. Figure 1 also shows the approximate daytime sound levels which would be found currently in private backyards or other sheltered areas throughout the area of higher population density south of Highway 403.

43000

To confirm the estimates of background sound levels in the areas considered most sensitive to the sound of landfilling, two locations were monitored for a period of several days. Locations 1 and 2 on Figure 1 are

represented in the Tables 1, 2, and 3. The time of importance is the period from 0800 to 1800 when the proposed landfill site would be in operation. The relevant index in the tables is the L_{eq} shown on an hour by hour basis. The other indices (L_{90} - $L_{0.1}$) represent the sound levels exceeded for the percentage of time indicated by the subscript. As an example, L_{10} represents the sound level exceeded 10% of the time. The L_{eq} or L equivalent represents the average sound energy averaged over a period of time, in this case, 1 hour. It has been found in sociological surveys that the L_{eq} is the best of the general sound indices in terms of correlating human response to environmental noise. Therefore, this index or its derivatives are the most commonly used indicators of outdoor noise used in setting noise criteria worldwide.

The sound levels measured to be 55 dB L_{eq} at Location 1, north of the proposed landfill area, are somewhat higher than predicted levels of less than 50dB. A review of weather records and consideration of the noise emanating from the current Regional Landfill operation did not provide a complete explanation for the discrepancy although the current landfill is likely causing sound levels in the order of 50 to 52dB L_{eq} at this site. The most likely explanation for the unaccounted for sound

no explanation

current landfill at 50-52dB

JOB NAME HALTON LANDFILL
 LOCATION 1870 KING RD BURLINGTON
 DATE 85.9.19

STARTING HOUR
 LAST FULL HOUR

14

4 DAYS

15

HE.

highest.

HOUR LEO L90 L50 L10 L1 L0.1

HOUR	DAY#	LEO	L90	L50	L10	L1	L0.1
14		53	51	53	55	56	60
15		52	50	52	54	57	62
16		51	49	50	52	55	59
17		52	49	52	54	57	60
18		53	49	51	53	57	70
19		51	43	46	52	58	72
20		51	48	50	52	55	58
21		52	51	52	53	55	58
22		54	53	54	55	57	58
23		54	53	54	55	56	57

DAY#

1

3b was exceed 10% of the time

0		55	54	55	56	58	60
1		55	54	55	56	59	65
2		55	53	55	56	58	60
3		55	54	55	56	58	59
4		55	54	55	56	60	62
5		55	54	55	56	57	59
6		54	52	54	55	57	59
7		53	50	52	54	58	70
8		54	52	54	56	57	67
9		55	53	55	56	58	60
10		58	55	56	59	65	71
11		55	53	55	57	59	66
12		55	52	54	57	61	63
13		55	53	55	57	60	62
14		55	53	55	57	61	67
15		54	52	54	56	59	63
16		53	50	52	54	58	62
17		52	49	51	54	60	68
18		53	47	49	52	61	73
19		49	42	44	50	57	71
20		50	45	48	51	57	67
21		51	48	49	52	56	67
22		52	49	52	53	54	56
23		54	53	54	55	56	57

DAY#

2

0		55	53	55	56	57	57
1		55	52	54	56	62	69
2		55	54	55	56	57	58
3		55	54	55	56	57	67
4		54	53	54	55	56	60
5		54	53	53	54	56	58
6		54	51	53	55	56	71
7		51	47	49	51	58	71
8		51	45	47	49	53	60
9		50	45	48	50	58	67
10		52	45	47	51	63	72
11		51	47	49	52	59	71
12		51	46	50	53	58	67
13		55	51	54	56	58	66
14		55	52	55	57	59	67
15		55	52	54	57	59	65
16		55	52	54	57	59	64
17		52	48	51	54	58	63
18		49	43	46	50	57	67
19		47	42	45	48	55	63

Table 2

JOB NAME HALTON LANDFILL
LOCATION 1860 FOUR SEASONS DR. BURLINGTON (N. SERVICE ROAD AND KERNS)

DATE 85,9,19

STARTING HOUR= 13

LAST FULL HOUR 1DAYS 13 HR.

OFFSET=43

HOUR	LEQ	L90	L50	L10	L1	L0.1
DAY#		0				
13	51	48	49	52	59	65
14	51	49	50	52	58	64
15	51	49	50	52	56	62
16	50	48	50	51	54	58
17	50	48	49	50	55	62
18	51	48	50	52	56	62
19	51	49	50	52	54	65
20	51	50	51	52	54	60
21	51	50	51	51	54	57
22	51	50	50	51	54	61
23	50	49	50	51	53	54
DAY#		1				
0	51	49	50	52	56	59
1	50	49	49	52	58	60
2	50	48	49	50	55	57
3	49	48	49	50	51	53
4	50	48	49	51	57	60
5	50	49	49	51	52	54
6	51	49	50	52	56	60
7	51	49	50	52	56	60
8	52	50	51	53	57	65
9	50	49	50	51	54	62
10	51	49	50	53	58	61
11	51	49	50	51	56	65
12	52	49	50	54	58	62
13	52	50	51	54	58	65

Site F

Table 3

JOB NAME

HALTON LANDFILL

LOCATION

1860 FOUR SEASONS DR. BURLINGTON (N. SERVICE ROAD AND KERI

)

DATE

85.9.20

STARTING HOUR=

15

LAST FULL HOUR

3DAYS

15

HR.

OFFSET=43

HOUR	LEQ	L90	L50	L10	L1	L0.1
14	54	48	49	50	51	51
15	50	49	49	51	52	56
16	51	49	50	51	55	66
17	53	49	51	54	63	69
18	50	49	50	51	55	59
19	51	50	51	52	53	60
20	51	50	51	52	53	54
21	51	50	51	52	54	55
22	52	50	51	53	56	59
23	53	51	52	54	57	60
DAY#		2				
0	54	52	53	56	57	59
1	51	50	51	53	54	56
2	51	50	51	52	56	61
3	51	50	51	52	54	55
4	51	50	50	51	53	57
5	51	49	50	52	60	61
6	52	49	50	54	60	63
7	52	50	51	53	59	63
8	53	51	52	54	59	62
9	51	50	51	52	55	61
10	52	50	51	53	55	66
11	52	50	52	54	57	64
12	51	50	51	52	56	61
13	51	49	50	52	58	62
14	51	49	50	51	58	63
15	53	49	50	52	62	72
16	52	49	51	53	61	67
17	53	49	50	55	62	63
18	51	49	50	52	54	59
19	53	52	53	54	55	57
20	54	53	54	55	55	58
21	53	52	53	54	55	56
22	53	52	53	53	54	55
23	52	49	52	53	54	55
DAY#		3				
0	52	49	52	53	55	59
1	52	49	52	54	56	56
2	53	49	52	55	56	57
3	53	49	53	55	56	57
4	53	49	53	56	57	57
5	55	52	55	56	57	59
6	56	54	56	58	59	61
7	56	54	56	58	59	61
8	52	50	51	53	55	59
9	50	49	50	51	54	58
10	51	49	50	52	57	62
11	51	49	51	53	56	61
12	51	49	50	51	53	57
13	52	49	50	52	57	71
14	51	50	51	53	55	61
15	53	51	52	54	57	62

Site F

energy is the variety and roughness of the terrain between the highway and the measurement point. The irregular ground surface would reduce the amount of attenuation due to "ground effect" (an attenuation caused by soft ground surfaces) for sound travelling up the escarpment from Highway 403. The result would be higher traffic sound levels than predicted by the noise prediction model. [The observer installing the monitoring equipment has indicated that the sound levels at this location were being affected to some extent by the current landfill site during the time he was in attendance.]

← accounts for
add. sound
energy

?!

Because of the finding of reduced ground effect in the propagation of highway noise, the prediction scheme used for the noise of landfilling referred to later in section 5.2 has been adjusted.

Monitoring location 2, located to the east of the proposed landfill site in a built up residential area, is relatively sheltered from Highway 403 by surrounding houses. The sound levels measured there reflect this shielding. The typical daytime L_{eq} is 50 dB L_{eq} , while the predicted value without shielding is 55 dB. The measured value should be representative of this area's background sound in private back yards.

5.0 EVALUATION OF LANDFILL SOUND GENERATION

5.1 Individual Source Sound Levels

The sources of sound on the landfill site include (in order of sound contribution):

1. Packers: Steel wheeled tractors with plows. The packers are used to push the waste into position and, by running over the waste, pack it down.
2. Scrapers: Large articulated vehicles with a bottom loading hopper. The scrapers are used for loading and emptying cover material (i.e. used to move cover material on top of the landfill waste).
3. Bull Dozers: These are used for grading and excavation
4. Trucks: Most of the trucks on site are those bringing waste to the site, unloading, and leaving.

The usual impression of landfill noise is dominated by the packers which move virtually constantly, up and down the open face, spreading and packing down the material. The

①

packers are powered by the same engines as bull dozers and other off-road equipment. Their priority on the list of noise sources stems mainly from their ubiquity and constant movement on the face of the landfill.

② The scrapers are not used as much as the packers, though when active, because of their height and the relatively high engine speed, they may be the dominant noise source for short periods. They may be particularly evident when operating near the property line dumping or picking up cover material.

③ Dozers are used to grade the site and assist in covering and excavation. Like the scrapers, they may be most evident when working on excavation or grading near a property line.

④ Trucks bringing landfill waste, in this case, are not significant contributors to the noise field until they are relatively north of Highway 403. Once on top of the landfill, they produce sound levels that are slightly below the other individual noise sources, and usually for only a relatively short time. At the face, idling, they produce only about 75 dB until they dump. The two items related to the trucks noticed by residents near the

① landfill are the backup safety warning signals, and the ② tailgate banging. Among the other sounds on site which are basically associated with the operation of large diesel engines, these two sounds are notable because of their different characteristics; the backup warning because of its tonality, and the tailgate because of its impulsive nature. These sounds add very little to the overall sound energy.

how often?
how loud?

impulsive noise

To confirm the information used to model the noise sources on the site, measurements of the sound levels from the equipment operating on the existing Regional landfill site were taken. All equipment was measured at 15m operating in the mode which would generate the highest sound levels (see Fig. 2). It was found that the equipment generated levels at, or just below the levels set out for off-road equipment under the Ministry of the Environment's NPC-115 "Construction Equipment" found in the Model Municipal Noise Control Bylaw, Final Report, August 1986. A typical piece of equipment such as a packer, bulldozer or scraper, produced maximum levels of 83 to 85 dB at 15m during our testing.

document

confirm all greater than 100 HP be 4 or 6 better than standard.

close to

Q built to a standard

Worksheet #1 shows the assumptions made for each of the major sources as they affect the sound emanating from the

model table under 100 HP.

> 100 HP

face. The truck volume is based on a peak day with 30 heavy vehicles arriving per hour. This corresponds to the 26 heavy vehicle per hour projected in the peak hour of 1996 in the Traffic Analysis Report (Schedule C-F), and allows for the other myriad small vehicles using the site.

To assemble an acoustical model one must include the source strength (in this case taken from modelling purposes as the sound level measured at 15m.), the source height, the duty cycle (percentage of time it generates high sound levels), the number of vehicles active at any one time, and the time it is in the landfill area.

5.2 Landfill Sound Propagation Source to Receiver

From the above, an average rate of sound emission can be calculated as per the Worksheet #2 (82 dB L_{eq} at 30m total source strength). This is the figure that forms the starting point for the sound propagation calculation. To establish the levels at distance, one must account for source strength, distance, any obstructions in the path (barriers), ground effect (a factor dependent on the "softness" of the ground and the height of the source and receiver), and in the case where ground or barrier effects

are significant, the modulation of these effects by wind and temperature gradients may also be important.

These factors are combined in the calculations shown in Worksheet #2. This prediction has been carried out for the worst case period at those residences and the portion of Bayview Park which would be most affected by a landfill at this site (see Sections in Figures 3 & 4). The sound level estimates apply from 0800 to 1800, Monday to Friday.

The results of the calculations show that the nearest residences to the north will be near or at 54dB Leq during the time when landfilling activity is closest. This condition is expected to occur about the eleventh or twelfth year of operation. The horse ring in the Bayview Park will reach 60 dB Leq when the landfilling is proceeding at the closest point.

*residences:
54 dB
at years
11-12*

*60 dB
at Park's
closest
point to
landfill.
how long?*

All other residences in the area are greater than 500m from the active face, and will thus be lower in sound level than the worst case residences to the north of the site as noted in Worksheet #1.

1870 King Road

1.5m receiver

el210

2m source
el180

550m

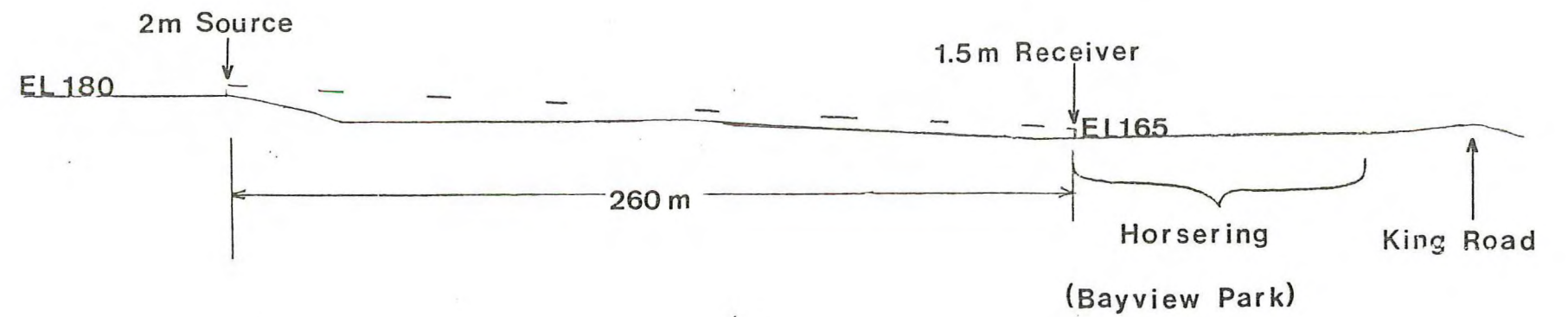
Halton Landfill Site F

Figure 3

Cross Section(A-A)

1:2000

(see Figure 1)



Halton Landfill Site F

Figure 4

Cross Section(B-B)

1:2000

(see Figure 1)

5.3 Long Term Sound Levels

While it is usual to review landfill noise on the basis of worst case, a secondary analysis scheme which looks at the long term sound exposure of a location can assist in the understanding of the noise impact. The proposed site operation scheme has been combined with the noise levels anticipated for the operational life and rehabilitation time of the site for the residents located to the north of the site. This is given in Figure #5.

Plotted on Figure #5 is the sound level anticipated from the proposed landfill site along with the anticipated background noise from traffic. The most notable noise will occur, as mentioned in Section 5.2 above, in about the eleventh and twelfth years. The sound will start with a few months of excavation, then reduce to below the background traffic Leq. It will gradually increase to a maximum as landfilling reaches the north end of the site, and then drop below the traffic noise for the balance of operations until the end of the landfilling operation. At some point, a final cover will be placed over the north end of the site, bringing the sound levels back to 55 dB Leq for a few weeks. This is shown at the twentieth year on Figure #5 but may occur before this time.

years
7 → 11

WRONG MAP

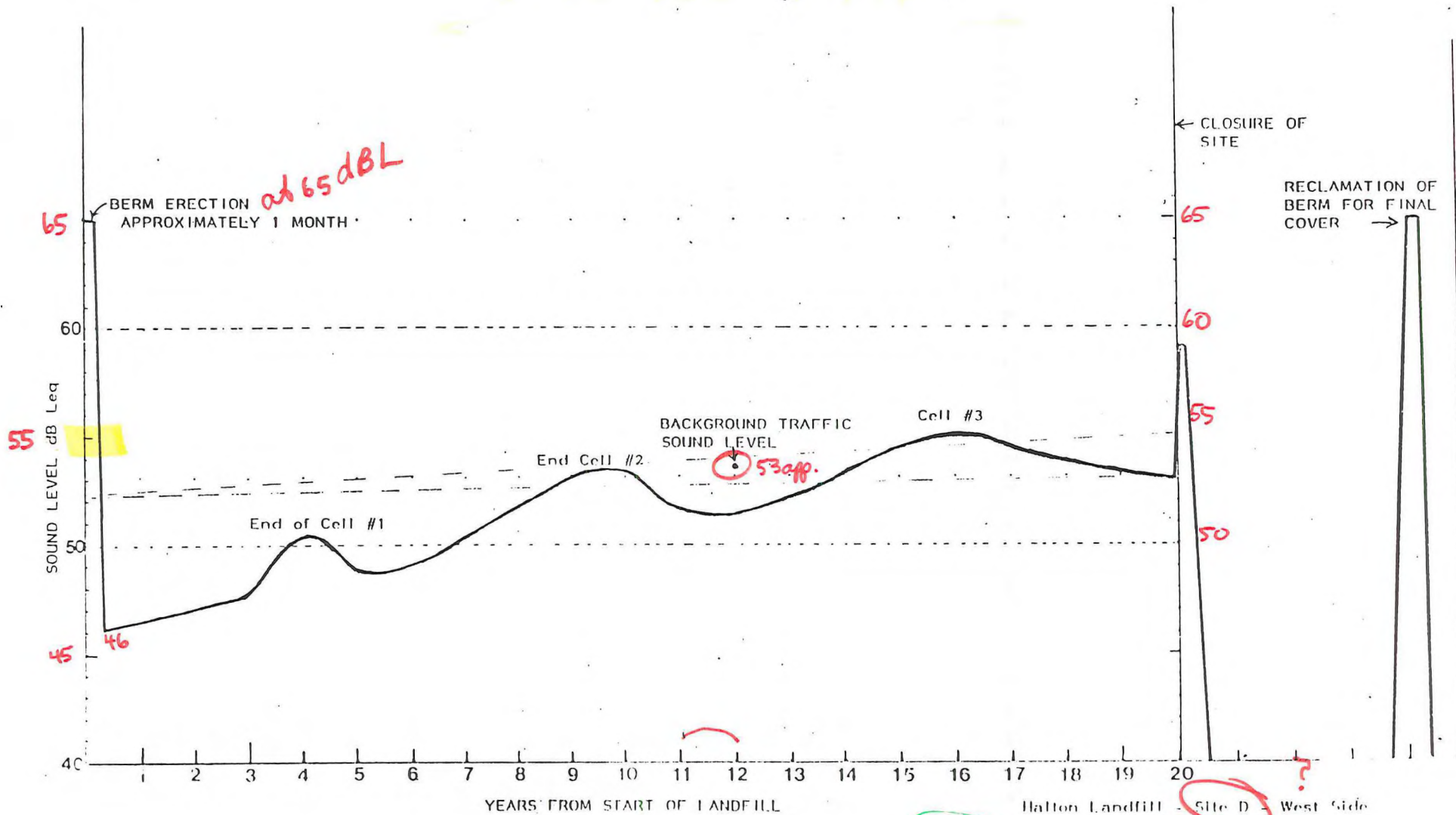


FIG. 4

Halton Landfill - Site D - West Side
Residences - NOISE EXPOSURE

5.4 Traffic Noise

The traffic generated by the site is already existent. The vehicles coming to the existing Regional landfill Site produce sound levels within 2dB of the maximum volume projected to use Site F. The heavy trucks will access the site from the North Service Road. The sound levels generated by this traffic only affect the immediate 30m or so, north of the North Service Road. In the immediate area of the site, there is, therefore no impact since there are no sensitive uses in this area.

← how many per hour how get there

do we agree?!

Further east, the Brant Street traffic is affected by the traffic exiting from the QEW, travelling up to the North Service Road, and then travelling west. The return trip reverses the route. Calculations on Worksheet #3 show that this traffic, which is already existent using the existing landfill site, adds only 1dB to the noise along Brant Street.

It is evident that with the high traffic volumes already present in the area, even excluding the existing landfill site's traffic contribution, the impact of the new landfill traffic on the area's sound environment is negligible. To be considered significant, the traffic would have to raise the sound levels by 3 dB or more. In

does MOE agree?
doesn't it say either 55 dB or exceeding raising levels by 3 dB?

this case, the levels do not increase by more than 1dB.

6.0. COMPARISON TO MINISTRY OF THE ENVIRONMENT CRITERIA

The criteria for sound levels on residential property in the vicinity of landfilling facilities is set by the Ministry of the Environment. Simply stated, the L_{eq} , or average sound level should not exceed 55 dB L_{eq} or the background sound level, whichever is higher. This applies within 30m of any residence.

Reviewing the noise projections, it can be seen that the nearest residences north of the site will be just below the 55dB criterion at the half way point of operations, returning briefly to that level when northern part of the site is rehabilitated. Of particular note is the fact that the weekends will be about 5 dB quieter than the weekdays for which Figure 5's data applies.

what's the margin of error in calcs. confidence interval? range of noise levels.

In the Stage 2C Noise Report, the Environmental Assessment, the Bayview Park's horse ring was identified as a potential conflicting use. The problem relates mainly to the ease of outdoor verbal communication for attendees of activities at the horse ring on weekends. The Saturday activity in the proposed landfill site is

anticipated to involve only about 40 heavy vehicles and a number of light vehicles (as compared to 210 heavy vehicles on a weekday). The large trucks must dump at the working face. The smaller vehicles leave their loads in bins located near the entry point from the North Service Road. The bins are periodically delivered to the working face through the day. To cover the landfill waste at the face, one packer will have to operate for a period of one to two hours. It is recommended that extra cover material be brought to the working face on Friday while the landfilling proceeds in the north end of the site within 500 m of the horse ring, so that the scrapers are not needed on Saturdays.

With the noise generating activity on Saturday reduced to one third the weekday level it is anticipated that sound levels 5dB lower than the normal weekday operation. At the horse ring, this would lead to sound levels of about 55 dB Leq occurring sporadically over a period of a year and a half to two years while landfilling is within 500 metres of the ring. Fifty five decibels is within a few decibels of the daytime traffic sound levels already present in the absence of landfilling. The maximum sound levels in the north end of the park will occur about half way through the life of the site. The 55 dB maximum Saturday sound

level in the horse ring area will not represent a significant impact on the horse ring activity and meets the MOE criteria for residential areas next to landfills. During the balance of the site's operation, the effect of landfilling on the horse ring will be even less.

There are approximately 8 Fridays each year in which the horse ring is used for competition. During the period when landfilling is within 200 to 300 metres of the horse ring, the sound levels are expected to reach 60 dB on these days. This sound would result in spectators and contestants having to raise their voices somewhat in order to communicate at distances greater than 2 m. In short conversation, the sound level would be no problem. Over the period of several hours, some people may find the noise an irritant. Considering the relatively small number of organized events that occur on Fridays (usually about 8 events per year), the relatively small excess above the Ministry of the Environment's residential noise criterion, and the fact that the problem will only occur sporadically over a period of about 2 years, are not recommending that special mitigation measures be taken for the Friday activity in the horse ring.

8 Fridays
200-300m



60 dB

what's
"short
conversation"

7.0 COMPARISON TO GENERAL NOISE CRITERIA

While the Ministry of the Environment insists that landfill sites must not exceed 55 dB Leq, this criterion is not the one generally used for stationary noise sources in Ontario. The most common criterion used for what is termed stationary noise sources is that the operation's Leq level should not exceed that of the traffic in the vicinity of residences. The amount of time the operation exceeds the background Leq is also significant.

Figure 5 of this report shows the projected sound levels of both the landfill noise and the traffic noise at the nearest residences to the north. It can be seen that the sound level is well below the traffic noise for most of the time, and exceeds the traffic noise Leq for a period of only about 18 months and then only by 1 to 2 dB. This impact on the three residences involved is quite low even by this relatively strict criterion.

for 18 months
landfill
noise will
exceed
traffic noise
by 1-2 dB!!

NOISE IMPACT SUMMARY CHART

TIME PERIOD YEARS	LANDFILL NOISE RESIDENCES	NOISE PARK	TRAFFIC NOISE
0-8 8-20	NIL	NIL	LOW
9 and 10	LOW	LOW	LOW

8. SUMMARY OF RECOMMENDED MITIGATION MEASURES

Only one mitigation measure is recommended on the basis of meeting the requirements of the Environmental Protection Act; that is, while landfilling is taking place within 500m of the horse ring in Bayview Park, cover material for use on Saturdays should be stockpiled at the working face on Fridays. In this manner, delivery of cover material to the face on Saturday can be eliminated.

The suggestion in the Stage 2C Noise Report of the Environmental Assessment that the relocation of the horse ring facility be considered, is no longer considered necessary in light of the findings of this report.

relocation
of
horse
ring no
longer
rec.

what about
noise impact
to other
park users

WORKSHEET #1

NOISE MODEL FOR SITE F

$$Leq = 10 * \log(10^{Lpn/10} * Pn)$$

where Lpn is the A-weighted sound pressure level
 Pn is percentage of time interval

Equipment type and duration of operation

2 packers @ 45 minutes each = 90 minutes

Sound level @ 15m = 84 dBA

assumed 84.

30 trucks @ 2 minutes each = 60 minutes

Sound level @ 15m = 84 dBA

2 scrapers @ 20 minutes = 40 minutes

Sound level @ 15m = 84 dBA

$\frac{84}{10}$ exponent
 $10^{8.4}$

1 COMBINED LEVELS

$$Leq = 10 * \log(10^{84/10} + 10^{84/10} + 10^{84/10})$$

= 89 dBA @ 15m

3 terms sources

2 Leq at 30m

$$Leq = 89 - 20 * \log(30/15) - 1 \text{ (ground effect over extra 15m)}$$

= 82 dBA

3 Leq at 500m

$$Leq = 89 - 20 * \log(500/15) - 8.9 \text{ (ground effect over 500m)}$$

= 50.5 dB

equation.

not make free
 analysis - not
 trace free
 band

* 3dB-least rec.
 [not cable]

1 machine increase 2

7 machines -

affect qual.

not
 written
 specifically.

88 idles
 (75)
 energy
 weighted.

SITE F

WORKSHEET #2

Sound Propagation - Site F

Leq at Receiver = Reference Sound Level at 30m

- Distance Attenuation

- Ground Effect

①

Bayview Park

(See Figure #4)

Distance = 280m

Distance Attenuation = $20 \times \log(280/30) = 19 \text{ dB}$

Effective Height = 20m

Ground Effect at 280m = 3 to 6 dB

Net Leq = $82 - 19 - 6 = 57 \text{ to } 60$

*Improper
neglected*
① no wind
② inv.
③ no free
④ equipment
forgotten
dtt gr.

②

1870 King Road

(See Figure #3)

Distance = 550m

Distance Attenuation = $20 \times \log(550/30) = 25 \text{ dB}$

Effective Height = 30m

Ground Effect = 3 dB

improper

Net Leq = $82 - 25 - 3 = 54 \text{ dB}$

SITE F
WORKSHEET #3

Brant Street Traffic Noise

1987 traffic volume=18000 Vehicles AADT

Assumed 5% Heavy Trucks, 5% Medium Trucks

Hourly Volume During Daytime

1013 Vehicles with 37 Heavy and 37 Medium Trucks

Current Landfill contribution

up to 20 Heavy trucks per hour

$$Leq = 10 \log [5.82 V * V * K * D^{-4.5}]$$

$$K = P * S / 1040 + Q / S / 9.8 + 28.5 * R / \sqrt{S}$$

V=TOTAL VOLUME PER HOUR

S=AVERAGE SPEED

D=DISTANCE FROM ROADWAY CENTRELINE

P=PERCENTAGE CARS

Q=PERCENTAGE MEDIUM TRUCKS

R=PERCENTAGE HEAVY TRUCKS

For difference in Leq assuming equal speed and distance

$$Leq1 - Leq2 = 10 * \log (V1 * V1 * K1 / V2 * V2 * K2)$$

$$= 1dB$$

APPENDIX

EXPLANATION OF TERMS

ENVIRONMENTAL NOISE DESCRIPTORS

Many indices have been proposed to describe sound levels in a neighbourhood. To simplify matters the following explanations are provided.

L₉₀

The L₉₀ describes the background noise or the lowest levels of sound in the neighbourhood. Only 10% of the time are the sound levels below L₉₀, and rarely by more than 2-3dB.

L_{eq}

The L_{eq} is an average sound level which is quite sensitive to short, loud sounds. Thus, it is sensitive to events which stick out of the "sound scape".

The following explanation is provided to assist in the assessment of changes in community sound levels where such changes are indicated by an increase in the L_{eq} or average sound energy index.

1dB CHANGE

For sounds presented to a listener one immediately following the other, a 1dB change is the smallest increment which can be reliably detected by most people. If the time delay between presentation of the sounds is more than a few seconds, the change is not reliably detected (ie. the community is not sensitive to a 1dB change occurring over 1 year's time). In environmental noise 1dB change occurs with an increase in traffic of 25% or typically every 5 years in stable growth areas.

3dB CHANGE

An increase in the L_{eq} of 3dB is reliably detected by most listeners and is the smallest change considered significant by most planning authorities. It is also the smallest change in the overall L_{eq} (all sounds combined) which can be reliably detected by standard noise monitoring techniques. A doubling of traffic in a community will cause a 3dB change if traffic is the only major noise source.

3dB is
the smallest
change in
 L_{eq} that
can be
detected
by
noise
monitoring
techniques

5dB CHANGE

An increase in the overall L_{eq} of 5dB represents a relatively significant impact in terms of overall L_{eq} , particularly if an area is already at, or above daytime L_{eq} of 55.

10dB CHANGE

A 10dB increase in overall L_{eq} represents a doubling in the loudness of the sound and represents a major impact on an urban community especially if the levels are already above 50 dB L_{eq} .