
REPORT ON SOUTH WESTLAND AVIATION NOISE ISSUES AND PUBLIC HEALTH

3 December 2008

This report does not constitute the opinions or approval of the local public health provider or the Ministry of Health.

Vern C. Goodwin

Environmental Noise Analysis and Advice Service
Ministry of Health

P.O. Box 18885, Christchurch 8641, New Zealand

Phone 03-388 8536

Fax 0832-68899

Cellular 027 4353 269

E-mail-noise@chch.planet.org.nz

South Westland aviation noise & health report_3 Dec 08 with apx.&erratum.pdf
4 dec amends paragraph 101

Table of contents	page
Summary	3
Introduction	3
Scope of report	3
Glossary	4
Limitations	4
Key issues.....	4
Locally based aviation and other aviation.....	4
Control of helicopter noise and exemption for overflying.....	5
Effects of aviation noise and land use planning.....	6
Nature of noise emissions from helicopters	7
Standard for assessment of helicopter noise	9
Planning for helicopter noise.....	11
Noise problems in Franz Josef?	11
Noise in and near Franz Josef	15
Helicopter pad removal from Franz Josef	15
Helicopter noise near the school	16
Helicopter noise near the holiday park.....	16
Helicopter noise near the Scenic Circle Hotel	17
Helicopter landing areas at Tatare.....	18
Noise in and near Fox Glacier township	18
General	18
Eastern edge of the town	19
Main commercial area.....	20
Residential area North-East of commercial area.....	20
Hotel and motels.....	20
School and church	21
Residential Zone Pekanga Drive area	21
Helicopter noise and effects on people	22
Hearing impairment.....	22
Stress related health effects	22
Sleep disturbance.....	22
Speech interference	22
Annoyance as an adverse effect of noise	24
Findings and recommendations.....	24
Appendix A Exemption for overflights	27
Glossary	31
Maps	32

Report on South Westland aviation noise issues and public health

Summary

This report addresses the question of whether sound exposure from aviation noise in Franz Josef and Fox Glacier township environs has an adverse effect upon public health. Measurements and observations made during several visits have determined typical sound exposure levels in appropriate locations to enable an evaluation of sound level impacts on people and communities. The findings are that sound exposure levels in parts of Franz Josef are higher than desirable but are moderated by attitudinal factors because of the co-dependence of air and ground-side tourism. Sound exposure in Fox Glacier township environs is at lower levels. In both areas aviation noise is long established and is part of the various amenity values in the localities. Helicopter noise is not a direct health risk at current levels. The district plan review should include consideration of better land use planning measures to sustainably manage future aviation developments. Much of the noise arises from aircraft in flight away from arrival and departure manoeuvres and as a matter of law is outside jurisdiction of the council.

Introduction

1. Environmental Noise Analysis and Advice Service, (ENAAS), Ministry of Health agreed with the local public health service, Community and Public Health, to assist Westland District Council with investigations into noise aspects of aviation in South Westland, particularly noise effects from helicopter operations in the vicinity of Franz Josef and Fox Glacier townships.
2. The work was done because of the mutual interest of Council and the local public health service, in protecting the health of peoples and communities from the potential adverse effects of environmental noise from aviation activities. As the work was done without cost to the Council, it depended on the availability of ENAAS staff committed to higher priority work for the Ministry of Health or other public health services nationwide.
3. Since the commencement of work on this project, Council gave notice to operators that the existing landing areas on Council land West of Franz Josef township would cease on 30 November 2008. A heliport determination pursuant to Rule Part 157 of the Civil Aviation Rules has been issued for a proposal to relocate the Franz Josef heliport to a site near the oxidation ponds North-West of the township. An interim report was prepared in August 2007 to provide some interim comment to Council on the Franz Josef environs.
4. Originally it had been intended to seek some comment from operators on aspects of this report but a notice of requirement for designation for the Franz Josef helipads and an application for resource consent introduced confounding factors. In addition Council wanted an independent perspective so no consultation was undertaken on the matters covered by this report.
5. This report has addressed some of the issues relevant to the notice of requirement but that matter is incidental to the purposes of this report.

Scope of report

6. This report discusses noise aspects of aviation in South Westland, particularly noise effects from helicopter operations in the vicinity of Franz Josef.

7. It includes examination of some aspects of a possible proposal to establish helicopter landing areas North-West of the oxidation ponds, behind the former Tourist Hotel Corporation hotel site, about 1.5 km North-West of Franz Josef township.

8. This report considers application of acoustical standards, the character of helicopter noise, legal jurisdiction over noise and findings in relation to effects of noise upon people.

Glossary

9. A glossary is attached to explain some of the terminology.

Limitations

10. This report does not include comment on aviation safety matters or noise effects upon amenity values associated with the national park or other Department of Conservation land with reserve or conservation status in the vicinity of the Franz Josef or Fox Glacier township environs. It is recognised that flight-seeing within the park is closely related to flight operations in the South-Westland Area.

11. Whether Council should promote private or public ownership of helicopter landing facilities in the region has no bearing on noise affecting peoples' health or amenity values.

12. Comments made about a possible helicopter landing area near the oxidation ponds are not to be construed as support for that location or whatever scale of use might possibly result if such a facility was established and used, or if any other location, such as the airstrip or a development at Tatara was used as an alternative to the existing landing areas at Franz Josef.

13. For the purposes of this review helicopter noise in the environs of Fox Glacier township could be affected by several different scenarios that might result from changes to usage of or relocation of the existing helipads at Franz Josef. Expertise in aviation planning could be sought to define some options and provide guidance.

Key issues

14. The key question for this review is whether existing utilisation of helicopter landing areas near the Franz Josef township are a risk to public health because of their proximity to residential and commercial areas.

15. A secondary question is what are the scale of effects in Fox Glacier township and its environs, but this is limited to reporting on current sound exposure, as future scales of activity could be affected by decisions made by operators currently using the Franz Josef helipads.

16. A third issue is what would be some of the noise considerations if a helicopter landing area was established near the oxidation ponds?

Locally based aviation and other aviation

17. In the course of visits to the area in 2005 and 2007, aircraft not based in the area have been seen in various airspace locations and on flight paths not normally flown by locally based aircraft familiar with Mount Cook and Westland National Parks Resident Air User Group protocols. Flights into Franz Josef helipads, over Franz Josef and Fox Glacier townships and in the locality have been seen occasionally to exhibit relatively low altitude flight compared to locally based aircraft, as well as disregard for normal "fly neighbourly" behaviour in approach and departure path selection and blade-slap minimisation. Such

aberrant airmanship may be responsible for some of the annoyance that is reported at times. Such conduct is also contrary to CAA good aviation practice publications, eg.

For noise abatement, maintain at least 3000 feet in the vicinity of the Fox township and do not overfly the town.¹

18. The spatial relationship of the wide Fox and Waiho Rivers' uninhabited river beds provides a natural corridor for flight paths between the glacial valleys and the townships. It is evident that flight paths to and from the various landing areas and destinations have been selected, where practicable, to minimise overflight of noise-sensitive locations such as dwellings and accommodation facilities. The Mount Cook and Westland National Parks Resident Air User Group has, in conjunction with Civil Aviation Authority (CAA) developed protocols for good aviation practice when flying in the environs of these glaciers and other airspace. Publications include advice that:

Peak operating times for tourist flight operators The buses usually arrive late in the day and depart early the next day, so most tourist flights take place late in the afternoon, or early in the morning. Helicopter traffic in the area between Fox and Franz Josef will be particularly busy during these times, and will be climbing to, and descending from, as high as 13,000 feet.²

and,

Due to locally agreed noise abatement procedures, it is recommended that itinerant pilots landing at Franz Josef and Fox aerodromes approach from the west to avoid flying over the townships. Joining traffic should be vigilant for traffic operating from a small private airstrip located to the southeast of Franz Josef aerodrome.³

19. These measures are intended to promote safety in congested airspace and to minimise noise effects on people and communities on the ground. Land use planning and aviation rules must coexist and changes in one regime must consider the implications for the other.

Control of helicopter noise and exemption for overflying

20. Noise from helicopters is mainly caused by flight operations. The Civil Aviation Act 1990 consolidated the law relating to civil aviation which regulates aircraft operations. Section 30 of the Act provides for rules for the certification of aircraft for a number of purposes. Certification procedures for all helicopters manufactured overseas include standards of performance for noise. However there are no specific restrictions on actual operation unless specific rules are made for that purpose.

21. CAAs area of responsibility is restricted to aviation safety and security. Noise is not generally considered a safety issue, and the CAA has limited jurisdiction on the topic.

22. However Section 29B of the Civil Aviation Act 1990 empowers the Minister to make ordinary rules prescribing flight rules, flight paths, altitude restrictions, and operating procedures for the purposes of noise abatement in the vicinity of aerodromes. An example of such rules are those which apply for noise abatement reasons, to heavy commercial aircraft using Wellington Airport.

23. Among the other provisions of the Civil Aviation Act 1990 is s.97. It excludes any actions for nuisance in respect of;

"the noise or vibration caused by aircraft or aircraft engines on an aerodrome if the noise or vibration is of a kind specified in any rules,"

¹ In, Out and Around Mount Cook, Civil Aviation Authority, October 2005.

² *ibid* p.25

³ *ibid*, p.27

The Act also seeks to exclude any actions for trespass, or in respect of nuisance, from overflying, so long as the overflying is reasonable and there is compliance with any relevant aviation rules.

24. Extensive litigation occurred under the former Town and Country Planning Act 1977 over planning approvals for helicopter landing areas, and this has continued under the Resource Management Act 1991. The Planning Tribunal held in 1992, after noting the limited exemption for aircraft in s.326(1)(a), that there is nothing in the Resource Management Act which indicates that noise generated by aircraft is exempt from the application of that Act generally.⁴

25. An important distinction must be made for resource management purposes between helicopter or fixed-wing aircraft noise associated with flight operations on and near a particular site, and overflight of land or water away from the defined area of a particular site. This is not a simple matter and arises because aircraft flight operations fall partly within two separate and distinct bodies of statute law – aviation law and resource management law. Annex A to this report explains the legal issues about the exemption for aircraft in the Resource Management Act 1991 and the relationship with civil aviation law.

26. A reserved decision of the High Court is pending on the outcome of legal proceedings heard on 26 November for leave to appeal a decision of the High Court on grounds which include interpretation of s.9 (8) of the Resource Management Act 1991. The High Court had found in *Dome Valley District Residents Society Inc. v Rodney District Council*⁵ that the Environment Court had made no error in law by basing on s.9(8) its decision to ignore the noise effects of overflying aircraft in hearing an appeal of a resource consent granted by the Rodney District Council to establish and operate a new heliport near Warkworth. The Court considered it wrong to suggest an aircraft, once lawfully airborne, was somehow engaged in s.9(1) "use of land" which, by s.9(4) was terrestrially based. It was the clear intention of Parliament that s.9 prohibitions could not extend to overflying aircraft except in the area of noise controls imposed in relation to airport.

27. The Court found that after take-off or landing, in particular when the aircraft was operating over 500 ft above land, the effects lay outside the ambit of the RMA.

28. A decision on leave to appeal is expected during December and whatever eventuates will assist in clarifying the law and application of the Resource Management Act 1991 by local authorities.

Effects of aviation noise and land use planning

29. Where effects of noise from use of land as an airport or heliport are under consideration in any resource management related context, the limits to jurisdiction addressed in decisions of the Courts should be treated as authoritative and respected. If a resource consent application was at issue, section 104 (1) directs a consent authority considering such an application to have regard to any actual and potential effects on the environment of allowing the activity for which consent is sought.

30. Effects of noise from the airfield are not limited by the site boundaries or the necessity to reach any particular minimum safe altitude. CAA rules do not require an aircraft approaching an airport or landing area to maintain a specified minimum height above ground

⁴ Antunovich v Marine Helicopters A005/95, 4 NZPTD 155, p.5.

⁵ Dome Valley District Residents Society Inc. v Rodney District Council, 01/08/2008, Priestley J; High Court, Auckland, CIV-2008-404-587 (subject to a pending decision on leave to appeal as at 3 Dec 08)

during those manoeuvres or to maintain that height beyond the boundaries of the site during those manoeuvres. CAA rules expressly allow aircraft to operate at less than otherwise applicable minimum altitudes above ground during such manoeuvres.⁶

31. So effects of noise emitted by aircraft as received on the ground by people are limited to noise emitted while the aircraft is on the ground, or in the process of transitioning between airspace and ground during arrival and departure manoeuvres.

32. It remains uncertain at what point in airspace the transition between civil aviation rules and application of the RMA s.9(8) exemption actually occurs. Based on review of decisions of the Courts, it is not at the airspace boundary of the site containing the land area and not necessarily at the point where the aircraft attains whatever minimum altitude may be applicable according to CAA rules. While this matter is clearly a legal issue, it is not critical for consideration of noise effects because of the nature of noise emissions from aircraft, and helicopters in particular.

Nature of noise emissions from helicopters

33. Sound emissions from a helicopter in flight are usually received by a listener standing on the ground by a direct propagation path unobstructed by barriers. Unlike many fixed-wing light aircraft which can often make a landing approach with little engine noise, rotary wing aircraft are particularly noisy during both landing and take-off manoeuvres.

34. The sound energy from an aircraft is usually quantified by expressing its acoustical energy not just in terms of its highest level of intensity, but also by its duration. The acoustical metric, Sound Exposure Level, abbreviated SEL, expressed in decibels, abbreviated dB, and with the A-frequency weighting, in this report abbreviated as dB ASEL, is commonly used to express the sound energy of transient high level noisy events such as aircraft flight. Based on decibels, which are a logarithmic scale, sound levels more than about 10 dB below the highest level during an event make an insignificant contribution to the overall sound level.

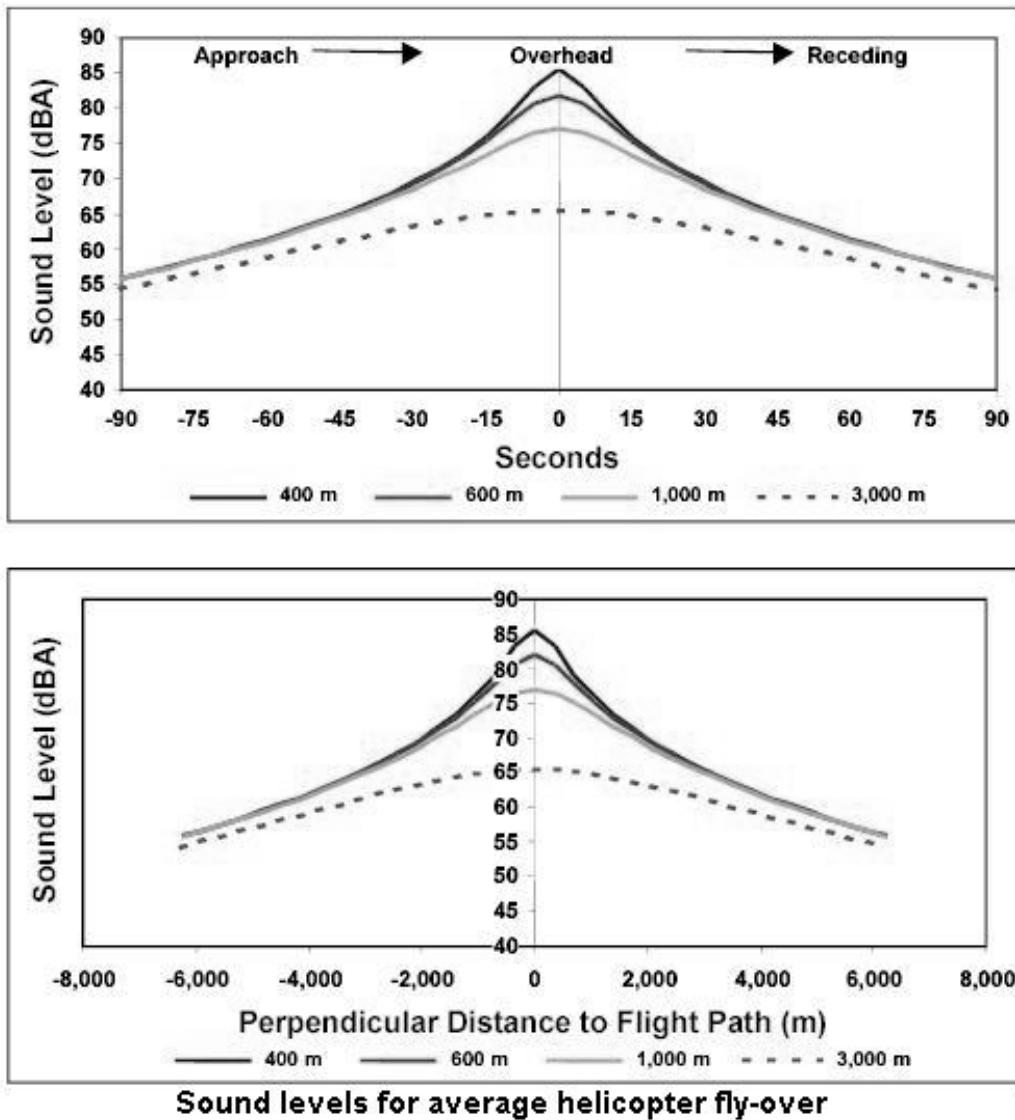
35. ASEL can be used to calculate sound exposure limits used internationally to describe aircraft noise over time. Abbreviated as L_{dn} , the “day-night average sound level” is the night-weighted sound exposure level, where a penalty of 10 dB between 10pm and the following 7am applies to reflect the greater annoyance of aircraft noise at night-time. While this might seem inappropriate for Westland where night-time flight is rare, the metric is in common use in New Zealand district plans for land use planning provisions and rules about airport and port noise. As the night-time weighting does not in practice apply. Apart from during bad weather, daily total sound exposure levels are mostly controlled by road and air traffic noise.

36. L_{dn} provides a single number value which can be used for the purposes of comparison and to assess helicopter noise against NZS 6807:1994 *Noise management and land use planning for helicopter landing areas*⁷. Noise from individual aircraft is characterised by its transient nature – it comes and goes, and is generally at its highest sound level at its closest point to a listener on the ground. Figure 1 illustrates the propagation of sound onto the ground from an overflying helicopter and shows how the sound level varies with both distance and time from the projected ground track of a flight-path.

⁶ Civil Aviation Rules Part 91.311

⁷ NZS 6807:1994 *Noise management and land use planning for helicopter landing areas*, Standards New Zealand, November 1994.

Figure 1 helicopter overflight sound level and duration relative to distance



37. Closer to the aircraft, the difference between the highest sound level at the closest point to a listener on the ground and the sound levels before and after that closest point is more pronounced. These characteristics make measurement of aircraft noise relatively easy as only the highest sound levels associated with any noise event need be measured to adequately describe the acoustical energy received at a point on the ground of interest, eg. in the vicinity of a landing area, or a location that is overflown.

38. Such locations will usually be relatively closer to the landing area than some undefined point in airspace where Resource Management Act 1991 jurisdiction ceases. For a helicopter where the highest sound levels are at take-off and landing, these points are closest to any listener on the ground than are sounds from the helicopter at higher altitudes further away from the landing area, before or after such flight manoeuvres occur.

39. For the helicopter landing area at Franz Josef, the flight paths are towards the South-West across the river flat and from the North-West over the river flats. Outside Fox Glacier township the several landing areas generally have flight paths designed to minimise overflight of inhabited areas.

Standard for assessment of helicopter noise

40. Helicopter noise is treated differently for assessment purposes than ordinary noise. Noise in the Westland district is assessed, according to the District Plan, on the basis of NZS 6802:1991 *Assessment of environmental sound*, except where otherwise stated in the plan, eg. in relation to construction noise. NZS 6802:1991 explicitly excludes from its scope, sound from sources of transportation noise,⁸ ie;

"Assessment of specific sources of transportation, construction, and impulsive sound (such as gunfire, and blasting), requires special measurement and assessment techniques that are generally outside the scope of this Standard, but within the scope of others...."

41. A new edition⁹ of NZS 6802, was published by Standards New Zealand in May 2008 after an extensive review, and the limitation to its scope remain as in the 1991 edition.

42. NZS 6807:1994 *Noise management and land use planning for helicopter landing areas* is not cited as a reference or otherwise referred to in the Westland District Plan. This standard specifically addresses procedures for the measurement and assessment of noise from existing and proposed helicopter landing areas and recommends land use planning measures where these are necessary to mitigate the adverse effects of noise on land uses surrounding the helicopter landing area. The standard is intended to apply to helicopter landing areas used for ten or more movements in any month, or where flight movements are likely to result in a sound level in excess of 70 dB L_{AFmax} at night-time or 90 dB L_{AFmax} during daytime in any residential zone or within the notional boundary of a rural dwelling, (defined as a line 20m from any side of a dwelling or the legal boundary where this is closer to the dwelling.)

43. The standard is not intended to apply to flight operations for emergency purposes such as search and rescue or transportation of medical personnel or casualties in medical emergencies.

44. The standard has limited application to the existing helicopter landing areas in the district. Most landing areas are subject to existing use rights pursuant to s.10 of the Resource Management Act 1991 or enjoy land use without conditions related to noise or to the application of this particular standard as a method of assessment. Some helicopter landing areas, eg. the McBride helicopter landing area off Greens Road, Tatara are subject to specific conditions of land use consents imposing noise limits where assessment of noise is based on provisions of the standard.

45. It should be noted that neither the Standards Act 1988 nor the Resource Management Act 1991 gives New Zealand standards a status that would bind a consent authority to use them as the basis for deciding a resource-consent application¹⁰. Further, as the Court observed in *Skyworks*,¹¹ parties to resource-consent proceedings are not bound to accept that compliance with a New Zealand standard will avoid adverse effects that should be taken into account in deciding whether consent should be granted or refused, as happened in the East Coast Moeraki boulders helicopter case.¹²

⁸ NZS 6802:1991, clause 1.2

⁹ NZS 6802:2008- *Acoustics-Environmental noise*, Standards New Zealand, May 2008

¹⁰ *McIntyre v Christchurch City Council* A 15/96 2 ELRNZ 84, NZRMA 289, 1 NZED 149

¹¹ *The Dome Valley District Residents Society (Inc) v Rodney District Council*, A099/2007 under appeal as at 4 Feb 2008.

¹² *Minister of Conservation et al v Waitaki District Council*, C65/91(a case under s.69, Town and Country Planning Act 1977)

46. Where an assessment of the effects of helicopter noise is required to be made for any purpose within the scope of NZS 6807:1994, it will generally be appropriate to consider the application of that standard as it is the only national standard specifically designed for assessment of helicopter noise and associated land use management issues. It includes recommended daily noise limits which,

“represent the minimum acceptable degree of protection for public health and the environment.”¹³

47. The noise limits are found in Table 1 and are as follows.

Table 1 - Limits of acceptability

Affected land use	E _{dn} night-weighted* sound exposure Pa ² s	L _{dn} day-night average sound level dBA	L _{max} night-time maximum sound level dBA
Industrial	1000	75	n/a
Commercial	100	65	n/a
Residential	3.5	50	70
Rural (at notional boundary	3.5	50	70
Residential (internal)	0.3	40	55

* The hours for night-time L_{AFmax} shall be defined by the local authority. In the absence of any specific definition by the local authority for helicopter landing areas, the hours 10:00 pm to 07:00 am the following day shall be defined as night-time for the purposes of this Standard.

48. In Franz Josef and Fox townships and their immediate environs, the relevant noise limits are potentially all the above excluding the industrial category, and probably the internal residential level, which is normally only used where assessment outside a building is impracticable.

49. The table includes three metrics. The Pa²s night-weighted pascal-squared seconds units are a unit of sound exposure and an alternative to the L_{dn} units which are the day-night sound exposure level expressed in decibels. Both cover the full 24 hours and both include a night weighting. An additional metric which applies only during night-time hours is L_{AFmax} and this has the sole purpose of protecting people against sleep disturbance. This is largely irrelevant for the flight operations in South Westland conducted between the daytime hours of civil twilight, (a legally defined aviation term).

50. These noise limits are not intended to cover irregular flight operations for emergency purposes which is the only usage of the Fox Glacier and Franz Josef landing areas likely to occur within the night-time hours.

¹³ clause 4.1.1

51. The guidelines are for the minimum acceptable degree of protection for community health, amenity and the environment. The Standard also provides that a greater degree of protection may be appropriate when taking into account community expectations, local conditions, or the maintenance and enhancement of amenity values.

52. The limits of acceptability in table 1 are recommended daily limits and are subject to additional provisions of the standard such as clause 4.2.3 about high background sound levels, and clause 4.3 about limitations for the averaging of daily limits over a week.

53. The metric used to quantify aircraft noise over 24 hours or more is the “day / night-weighted sound exposure level,” NZS 6807:1994 specifies a limit of acceptability of 50 dBA L_{dn} at notional boundaries of rural land uses and at any point within any Residential land use category (Zone), or 65 dBA L_{dn} within any Commercial land use category the boundary of any site. If the background sound level L_{AF95} exceeds 45dBA at the notional boundaries, (as is the case for example, for houses in close proximity to road traffic on the State highway or local roads. NZS 6807 permits the limit to be relaxed up to the existing background sound level plus 5dBA, provided that is compatible with planning objectives for the area.

Planning for helicopter noise

54. This report does not include consideration of land use planning matters beyond those relevant to assessment of potential adverse noise effects. The observations of the Court about the District Plan and aviation in past cases do not go as far as to tell the Council what it should do. That is a matter for the Council itself to determine through the plan review or other processes, including consultation with the helicopter operators. However, concerning helicopter noise, Council would do well to consider the parts of the helicopter standard that provide guidance for land use planning methods to mitigate adverse noise effects through effective land use compatibility planning provisions in District Plans through objectives, policies and rules. The decision of the Court in *Mount Cook Group*,¹⁴ included suggestions that helicopters be addressed in the review of the District Plan, and it is recommended that the next review include this topic and that substantial consultation be undertaken with the local aviation industry and ground side-infrastructure interests and the affected communities.

55. It is sufficient to say that if it is proposed to relocate the Franz Josef helicopter landing area to another location, or to otherwise consolidate helicopter landing areas in the Fox Glacier/Franz Josef localities, the guidance in the standard will, if applied, ensure that a balance is struck between the needs to protect people from helicopter noise and the need to provide for aviation services for the tourism industry, including its reasonable growth, thus enabling sustainable management of land use activities associated with the established district-wide helicopter industry.

Noise problems in Franz Josef?

56. This locality is somewhat unique in that its helipads are very close to the township. CAA publications describe the scale of activity as “intensive.”¹⁵ Despite this proximity, there is understood to be a general acceptance of the near omnipresence of helicopter noise by the nearby business community on virtually every day suitable for flying. The scenic features which attract tourist “flight-seers” make the helicopter of vital importance in enabling a

¹⁴ *Mount Cook Group Ltd v Westland District Council*, W034/95, 4 NZPTD 406

¹⁵ Civil Aviation Rules AIP NZFH AD2-52.1 25 effective Nov 2004

person to walk from the township's commercial area onto a glacier or other mountain feature after just a few minutes helicopter flight. See attached maps.

57. Assessments of the soundscape in Franz Josef have been made on several occasions to check the helicopter noise and other key noise sources such as road traffic noise. Analysis of measurement data indicates, except close to the highway, helicopter noise is more significant than road traffic noise during daytime and is almost continuously audible throughout days where there is flying. The reason for this is the close proximity to the township's commercial area, the high demand for tourist flights, the number of flights, and the fast turn around between flights.

58. Quantifying the noise is a matter requiring some care because the contribution of road traffic noise has to be "subtracted" from measurements of helicopter noise. Based on observations while noise data was being acquired, there appeared to be a correlation between the number of flights and the volume of road traffic, even though most passengers walk from the commercial area of the township to the helipads.

59. A typical one hour sample period during a busy flying day, a Friday in March 2005 illustrates the extent of helicopter operations and is shown in Figure 2. The "peaks" in sound level are mostly attributable to airborne helicopter noise which generally has significantly higher sound levels than noise from traffic on the highway. One noisy bus is shown to indicate how a noisy vehicle on the road can have similar sound levels to a helicopter using a nearby landing area. The graphic also shows noise when helicopters are in the distance, generally over the river, as distinct from actually making an approach to, or departure from, the helipads.

60. Such graphics show no information about the character of the sound from helicopters other than time history of events as they occur in the context of the area including all the other sounds, whether from other helicopters or sources such as road vehicles. But the helicopters are with few exceptions, the dominant manmade sound in this soundscape when they are operating if an observer is not too close to passing road traffic.

61. For persons used to the sound, it will be perceived as part of the total or "ambient sound" in the locality and not perceived as unwanted so it will not be treated as environmental noise. However for persons unfamiliar with the sound, or for whom proximity means some recurring interference or inconvenience, the sound may be considered as an unwanted intrusion which is an unpleasant and annoying feature of the locality and which is to some extent resented, tolerated or considered intrusive and detracting from personal perceptions of what should be the local soundscape.

62. Visits and measurements during 2005-2007 tend to show similar patterns in fine weather whenever helicopter activity is busy.

63. Figure 3 shows the time history for the entire 24 hour period which includes the one hour portion shown in Figure 2. For this same day and location the total sound exposure due to all sources was 64 dBA L_{dn} .

64. During the 10 hour daytime period 8am-6 pm when helicopters were using the landing area or present in the airspace over the town, total sound exposure level due to helicopter noise alone was 63 dBA L_{dn} . This quantification of sound exposure received at a location on the ground as dBA L_{dn} can be better appreciated if it is realised that typical noise limits in New Zealand district plans are 55 dBA L_{AF10} daily for the period 7am to 10pm and 45 dBA L_{AF10} for night-time, ie 10pm to 7am the following day. If these values were expressed in L_{dn} terms they would be equal to 55 dBA L_{dn} .

Figure 2 One hour time history Franz Josef

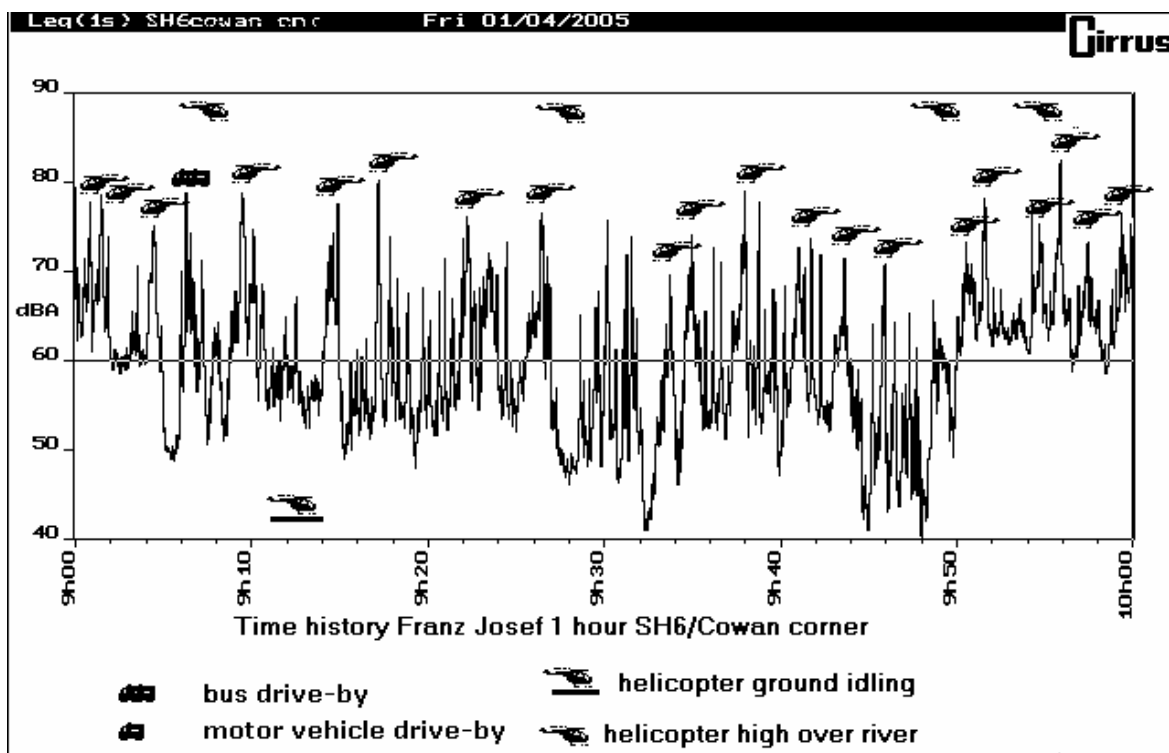
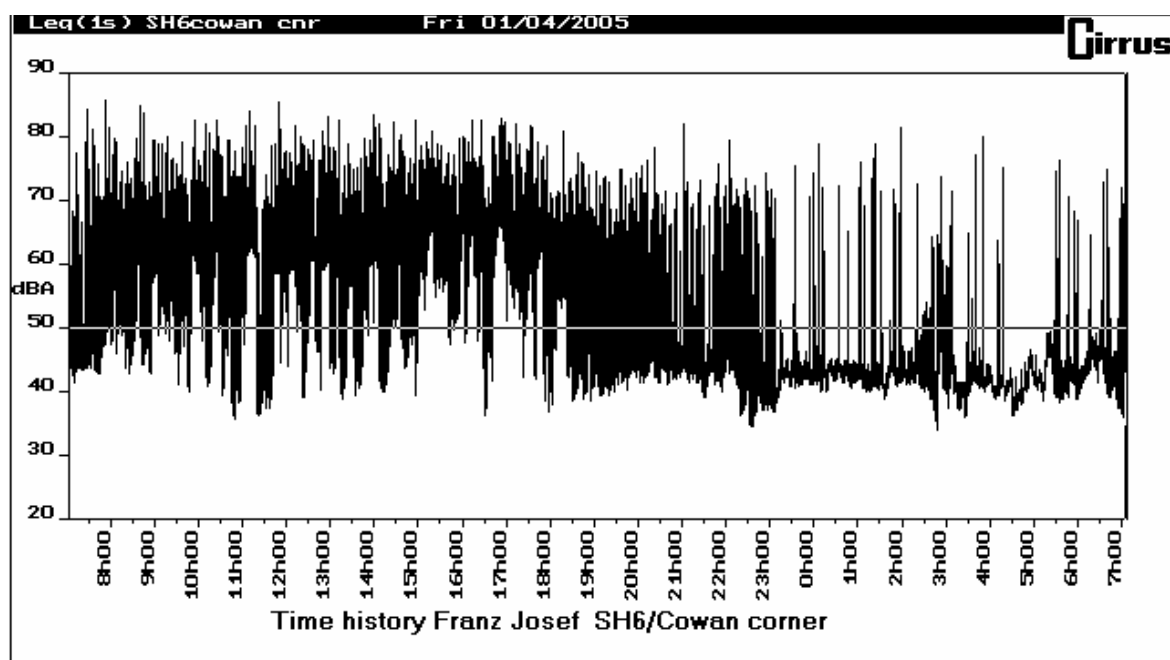


Figure 3 24 Hour time history Franz Josef



65. For each event such as a helicopter take-off, landing, or fly-by, the maximum sound level of the event, can be seen in the time history as a one second Leq value. The maximum sound level L_{AFmax} or L_{Amax} can only inform about the momentary single highest level during a specific noise event and cannot express either the total energy of the event or its duration, which are all factors in annoyance and other potentially adverse effects of noise upon people.

66. NZS 6807:1994 is also intended to apply where daytime maximum sound levels as received in any residential zone, or within the notional boundary of any dwelling exceed 90 dB L_{AFmax} . The L_{AFmax} metric is of not much significance for daytime flights except very close to helipads. Daytime L_{AFmax} sound levels in the Franz Josef township on footpaths, near existing houses, shops or hotels/motels have been measured at well below that limit, except immediately next to the highway when road loud traffic is passing. Since at night-time, ie after 10pm, flights do not occur, the 70 dB L_{AFmax} limit for night-time is irrelevant. People on land near the helipads will receive transient sound levels greater than 90 dB L_{AFmax} but nobody lives that close to the helipads or under the approach or departure flight paths in the immediate vicinity of the landing area.

67. The combination of road and helicopter noise is a cumulative effect, although it is likely that people who live in the area will have habituated to and accepted road traffic noise, (except when an individual vehicle has characteristics or is driven in a manner that attracts attention, eg., hoonish behaviour). Similarly, people in business premises alongside the highway will also have habituated to the road traffic noise.

68. For people in the residential area, unless they have a significant commercial interest in the adjacent business community, it is unlikely there will be anything like the same level of habituation to helicopter noise. This is because it is different in character and not so easily mitigated by the screening effects of buildings which act as a barrier to sound propagation and screen vehicles on the state highway from the residential areas East of Cron Street. As an aerial source, noise from a helicopter passes over most buildings or reduces their effectiveness as barriers to propagation of sound.

69. In the same way that aberrant vehicle noise will attract attention even to persons well habituated to the presence of road traffic noise, there are characteristics of helicopter operations that will attract attention. Start-up and shutdown have characteristic sounds which are distinctive and intrusive in the environment. Take-off and landing operations place helicopters in the air close to the township at high power settings. Approach manoeuvres are sometimes accompanied by “blade-slap” as the helicopter changes attitude and slows to transition from forward flight to hover before setting down on the small helipads. Pilots have a role in minimising such noise effects.

70. Typical sound exposure levels as received within shop frontages in the commercial area of Franz Josef township are shown in Table 1:

Table 1 Franz Josef commercial area noise events

Noise event	dB ASEL
Helicopter idling	62
Helicopter departure	74-80
Helicopter arrival	79-87
Hoon drive-by	94
Bus drive-by	92

71. ASEL dB is the sound exposure level in dBA during a single event and quantifies the total acoustical energy received at a single measurement location from a discrete noise event, but the metric does not convey information about the duration of the event took or the character of the sound. However, different events and sound sources can be compared as to their different sound exposure level. ASEL is the basis for calculation of L_{dn} .

72. If flights for emergency purposes occur at night-time, the standard does not apply and such events are understood to be rare in South Westland and have been disregarded as matter requiring any further comment in this review.

Noise in and near Franz Josef

73. In Franz Josef, the main assessment location was a relatively exposed position with direct unobstructed line-of-sight to some of the helipads. It was outside a hotel bedroom, on the North-East corner of the intersection of Cowan Street and the highway. As the hotel is used for temporary accommodation there is no significant risk to health for its transient guests. Measurements made during periods of intensive helicopter activity indicate sound levels 120 m further East, ie East of Cron Street, are significantly less than the exposed hotel corner location, from sound of both the helicopter activities and/or vehicles on the highway.

74. At a site 250m from the hotel, and just inside the edge of the bush East of the residential area, the daily sound exposure was found to be 55 dBA L_{dn} . Since this included some chainsaw noise intermittently during the daytime, the sound exposure would not be all due to helicopter noise, but spot measurements indicted that vehicle noise is unlikely to be a significant contributor either. Typical individual helicopter movement events measured at the hotel corner were about 75-81 dB ASEL, but at the bushline measurement site, 250m further East, the levels were reduced to about 67-71 dB ASEL for typical helicopter movement events at the helipads.

75. This reduction means the exposure of the dwellings and accommodation buildings East of Cron Street from helicopter noise is more than about 55 dBA L_{dn} . Interpolation of data between the hotel corner and bushline measurement sites, would mean sound exposure from helicopter noise received East of Cron Street would be not more than about 60 dB L_{dn} for the houses nearest the Cowan/Cron Street intersection, and about 57 dB for the houses to the North and South where there is some screening of noise from the landing area afforded by buildings West of Cron Street. These exposure levels correlate to busy flying days and represent the highest likely sound exposures from helicopter noise.

76. On days where no flying takes place, the sound exposure is greatly reduced to about 50 dBA L_{dn} for normal road traffic, but in the low season this may be less than 40 dBA L_{dn} . For comparison, on a rainy day with no flying and with the sound level mainly controlled by the sound of rain on buildings about 20 m distant, and on vegetation, the L_{dn} was 56 dBA. Under a shop canopy, with no road traffic noise the typical sound level was a constant 70 dBA during heavy rain.

77. Overall reduction in sound level in the housing area East of Cron Street is mainly due to the greater distance from the highway as the cumulative effects of helicopter noise and road vehicle noise diminish and helicopter noise dominates, with the exception of occasional abnormally loud road vehicles.

Helicopter pad removal from Franz Josef

78. Because of various proposals which could possibly result in relocation of the present helipads to locations well away from the township, it is relevant to consider the possible change in helicopter noise for the township. Assuming the relocated pads were no closer

than, for example, near the oxidation ponds, the township would continue to receive the same helicopter noise as at present from helicopters high over the river going up and down the valley, and the same level from the occasional helicopters passing East of the township. However there would be a major reduction in overall sound exposure level and in the number of potentially intrusive noise events from start-up, approach, departure, and idling noise from helicopter operations no longer happening only 100-300m West of the commercial area.

79. estimate the reduction would be from 64 dBA L_{dn} at the hotel corner, to about 56 dB L_{dn} controlled by passing traffic on the highway. East of Cron Street the reduction would be to about 48 dBA L_{dn} , probably controlled by the combination of road traffic noise on the highway and helicopters in the distance over the vicinity of the river. I have not considered the possibility that road traffic flow patterns might change significantly as a consequence of any relocation of the helipads.

Helicopter noise near the school

80. This matter arises because of the possible relocation of the helipads to the oxidation pond area. The matter is more fully discussed in the report of Hegley Acoustics Associates about the notice of requirement. The school is about 780 m from the possible helipad site and about 30m from the road. The soundscape at the school is presently, and will remain, dominated by road traffic noise, even if the helipads were relocated to near the oxidation ponds. Helicopter noise events would be more noticeable than at present but would partially masked by passing road traffic. The helicopter noise would not increase the sound exposure level at the school because it would be insignificant compared to that created by road traffic, however the distinctive character of the sound of helicopters would be noticeable as an intrusive event.

81. Direct overflight of the school by fixed-wing and helicopter aircraft has been observed, at about 1000-2000 feet altitude, so aircraft sounds are already an element in the soundscape.

Helicopter noise near the holiday park

82. This matter also arises because of the possible relocation of the helipads to the oxidation pond area and is more fully discussed in the report of Hegley Acoustics Associates about the notice of requirement. The holiday park is beside the highway and extends back to within about 580m of the possible relocated helipads site. The present soundscape within the environs of the holiday park is dominated by highway traffic noise.

83. If the helipads were relocated to near the oxidation ponds, helicopter noise events would be more noticeable than at present but would be partially masked by the closer noise source of road traffic on the highway. The Hegley Acoustics Associates report predicts L_{dn} 50-55 exposure due to helicopter noise for parts of the holiday park. Since the park is for transient accommodation, normal residential standards of protection from noise do not apply. Travellers in short-stay accommodation always have to adapt to their new temporary environment and therefore generally have a higher tolerance for strange new sounds, even if they are considered intrusive.

84. Noise data near the roadside at Tatare is available for a full 24 hours, for a section of the road where the speed limit is 100 kph. Outside the holiday park the speed limit is reduced, because of the school, but from observations is only complied with by motorists when police cars are visible or at the start and end of a school day. The roadside data for the Tatare traffic on a weekday in 2005 was 64 dBA L_{dn} . The same traffic passes the school and holiday park area a minute or so earlier or later. At the rear of the holiday park site the road traffic sound exposure would be about 44 L_{dn} dBA without helicopters and within the 50-55

L_{dn} dBA contour predicted by Hegley Acoustics Associates if helicopters operated from near the oxidation ponds.

85. Because of the setback from the road for much of the park, road traffic noise will not mask helicopter noise throughout the accommodation area. Towards the rear of the site, helicopter events would be very noticeable if the helipads were relocated to near the oxidation ponds. This can be compared with the present situation where helicopter noise (other than overflights), associated with the approach to the current Franz Josef site is at its closest, about 700m from the Southern boundary of the holiday park site and when not masked by passing traffic noise, is noticeable only during gaps in the passing road traffic. This potential intrusion is unlikely at its worst, to be more than “slightly annoying” to people who will be only there for a short stay.

Helicopter noise near the Scenic Circle Hotel

86. This matter arises also because of the possible relocation of the helipads to the oxidation pond area and is more fully discussed in the report of Hegley Acoustics Associates about the notice of requirement. The Scenic Circle Hotel is off the highway and 600m from the possible helipad. The closest guest accommodation to the possible helipad site is about 140m off the highway, and the nearest section only about 40m. The main accommodation block is 100-150m off the highway.

87. A manager’s residence is situated 120m West of the hotel site. This house is 500m from the possible helipad site. The house is partly acoustically screened from road traffic noise on the highway by dense bush and the bulk of the hotel buildings. The present soundscape within the environs of the holiday park is dominated by highway traffic noise and helicopter noise.

88. Helicopters approaching the existing Franz Josef helipads from the South-East and South turn onto their final heading toward the helipads directly in front of the main hotel block and about 250-400m distant. Sometimes the banking turns are accompanied by blade - slap which increases annoyance. A typical banking turn 358m from the lawn in front of the main hotel block measured 88 dB ASEL on 12 June 2007. Another helicopter turned only 116m from the hotel front lawn, ie 136m from the main accommodation building with a measured ASEL of 94 dB, and another at 198 m was measured at 89 ASEL dB. These examples clearly show a high existing level of transient helicopter noise for guests in this hotel.

89. It is understood flight paths to and from the possible site near the oxidation ponds have not yet been assessed by the Mount Cook and Westland National Parks Air User Group as the relocation is only a possibility at this time. However, I understand there is recognition that approaches to Franz Josef aerodrome may raise air space management issues. If the helipads were relocated to near the oxidation ponds, the flight paths towards the Franz Josef glacial valley would probably be no closer than 380m to the main accommodation block on departure assuming departures were direct towards the glacial valley, however “Fly Neighbourly” best practice would more likely set departure paths further South which would perhaps double the distance between the direct-line path and the likely path to about 750m from the main hotel frontage.

90. Compared to the 94 dB ASEL fly-by event measured on 12 June 2007, there would be a reduction in ASEL of about 16 dB to 78dB ASEL. Current departure noise of helicopters leaving the existing Franz Josef helipads 1km South of the hotel is audible when not masked by traffic noise on the highway. A metal truck passing on the highway was measured at the

same location as the helicopter measurement site at 63 dB ASEL. A metal truck driving along the stop bank access road to the oxidation pond area measured 71 ASEL dB.

91. If the helicopter operations were moved to the possible site near the oxidation ponds and the number of helicopter noise events remained the same, it is likely the most noisy events would significantly decrease compared with the present sound exposure, ie from 88-94 dB ASEL for each approach to the present helipads, to about 78 dB ASEL for possible new flight paths. However the departure and idling events which formerly occurred 1 km away would now be only 600m away and would seem about twice as loud.

92. Idling noise would be well screened by thick bush but the former approach flight path towards Franz Josef would now be the departure track, but perhaps further to the South, and the approach to the relocated helipads would be from the South-West and some 600m distant.

93. The manager's house would be the closest noise-sensitive location to the possible site of the relocated helipads and without the bush screening which would reduce idling noise. The Hegley Acoustics Consultants report for the notice of requirement predicts a sound exposure level of about 55 dBA L_{dn} at this house. Vehicle noise would need to be added to this as a potential impact if the access was along the stop bank track as at present.

94. The current approach flight-path to the Franz Josef helipads is generally about 200-350m from the manager's house, so sound exposure levels are much like the present exposure at the hotel main block, but with less highway noise present. If the helipads were relocated to near the oxidations ponds, the main departure flight-path would be closer than it would be for the hotel. If activity levels were as at present for the Franz Josef helipads, individual helicopter departure event numbers would be the same as current approach events and at about the same sound exposure level. However sound from approach events to the relocated helipads would be 500m distant rather than 1.1km as at present, so noise from approaches would be perceived as more noisy than current departures from Franz Josef helipads.

95. If the access to the relocated helipads was along the stop bank track there would a large increase in vehicle movements along the track to and from the helipads. The track is only about 20m from the Western façade of the staff house.

Helicopter landing areas at Tatare

96. There is currently a proposal for a helicopter landing area in the Tatare environs. If this became a base for operations of flightseeing presently conducted from the Franz Josef helipads, then noise in the town would reduce from helicopters and probably also road traffic noise. It would not be expected to have any effect upon helicopter or other aviation noise in Fox Glacier Township. This and similar proposals that might eventuate clearly have planning implications similar to those addressed in the McBride case.

Noise in and near Fox Glacier township

General

97. Unlike Franz Josef where the helipads are concentrated in a small area close to the township, in the environs of Fox township the helipads are spread along Cook Flat Road and there is in addition the private airstrip used by fixed-wing aircraft, mainly for parachutist transport to the drop zone several kilometres West of the township.

98. Subdivision for residential purposes and motel developments along Cook Flat Road mean assessment of helicopter noise has to consider the other land use activities close to the

individual landing areas rather than the total noise effect in the township and this is an important difference to the situation in Franz Josef because of its close proximity to ten helipads. See the attached maps.

99. The commercial area and residential areas are about 1.5 km from the main flight paths over the Fox River to and from the glacial valley at about 2000 feet altitude when over the bridge. Helicopters passing East of the town to or from places to the North including Franz Josef tend to be at about 1 km to the East of the Fox Glacier township at about 2000 feet altitude. Helicopters flying to and from the Mountain Helicopters helipad at the aerodrome and sometimes The Helicopter Line landing area further down Cook Flat Road tend to be ascending or descending East of the town and at lower altitudes, typically 800 -1200 feet.

100. Helicopter noise in the commercial area and residential area around the intersection of the Highway and Cook Flat Road is mainly from helicopters in flight as ground running on helipads is relatively distant and partly masked by far louder passing road vehicles.

101. Helicopter noise in the environs of the Fox Glacier township could be affected if the helipads at Franz Josef were relocated to near Fox Glacier Township. However it is unlikely there would be much change in helicopter noise in the commercial area alongside of the highway and the residential and accommodation areas East of the highway. The reason is that in the commercial area of Fox Glacier township, helicopter noise is predominantly from overflights to the East and the South, and the nearest helicopter landing area to the commercial area is at the airfield about 400m from the highway/Cook Flat Road intersection. Compared to Franz Josef's commercial area, while road traffic noise is more or less the same in both locations, the helicopter noise is greatly reduced in Fox Glacier Township.

Eastern edge of the town

102. Noise measured at the edge of the Fox Glacier Campervan Park off Sullivan Road at the South-Eastern edge of the township includes helicopter noise from the flight paths East and South of the township. Daily sound exposure levels of 44 dBA L_{dn} were measured in June 2007 on a busy flying day which was similar to spot measurements made in January 2007 on a busy day. The location is affected by road traffic noise as the highway is 100m to the West and the level can be considered as the cumulative sum of road traffic, fixed-wing parachute lift aircraft and helicopter noise. When near to the highway, traffic noise tends to mask aircraft noise, during drive-by events.

103. The site is also subject to noise from fixed-wing aircraft using the airstrip, both during take-off, climb to the East and later when the aircraft emerges from behind the mountains to pass high over the river on the way to the parachute drop zone. However while the sound exposure level of these events is about the same as that received from passing traffic, the take-off run, power climb and turn reflected off the moraine and the distinctive "snarl" as the aircraft climbs heading East before it disappears for ten minutes behind the mountains emerging again high over the river valley still climbing towards the drop zone, is an intrusive noise event because of the character of the noise.

104. From this location helicopters are audible in the distance winding-up for takeoff, idling or landing at the various landing areas unless masked by passing road traffic noise or the parachute lift aircraft, if flying in the environs. The closest helicopter flight path is that to the East of the town and is used by aircraft on the Fox Glacier Valley - Franz Josef flight path, or the valley-aerodrome landing area. The sound exposure level of such events is similar to heavier traffic passing on the highway.

Main commercial area

105. In the main commercial area road traffic noise is dominant and helicopter noise is only audible when there are gaps in traffic. Fixed wing aircraft take-offs are also partially masked by traffic noise but are obvious during gaps in traffic, both during take-off and the climb to the East and later when passing high South of the township. Table 2 shows typical sound exposure levels for transient events in the commercial area.

Table 2 Fox Glacier commercial area noise events

Noise event	dB ASEL
Helicopter departure airfield helipad	69
Helicopter transit to East (613 metres)	70
Cessna A185F take-off	75
Cessna A185F high over river heading West	69
Hoon drive-by (Mazda RX)	90
Empty metal truck drive-by	91

Residential area North-East of commercial area

106. This area, partly Residential Zone and partly Tourist Zone is either side of the highway and subject to road vehicle noise at higher speeds than in the commercial area. Consequently the road traffic noise dominates and is made worse at times by trucks using exhaust brakes on the down slope.

107. The dense bush reduces some of the sound from parachute lift aircraft or flight seeing aircraft taking-off at the aerodrome but the distinctive snarl while climbing towards the East, including the reflection of the sound off the moraine, is intrusive. Helicopters passing this area on the aerodrome helipad-Glacial valley flight path are at lower altitude than when passing the commercial area, so the transits are of shorter duration but at slightly higher sound levels. The thick bush tends to reduce slightly take-off, idling and landing noise at the aerodrome helipad to the West for the houses in the Residential Zone on the North side of the highway. Houses also within the Zone but on the South-Eastern side of the highway, some 400m from the helipad, receive the same noise as for the houses in the Residential Zone near Pekanga Drive as discussed in paragraph 115.

Hotel and motels

108. A measurement site was selected in the vicinity of the Fox Glacier Hotel and the Rainforest Motel to represent sound exposure in that locality from aircraft noise rather than road traffic noise. Twenty four hour surveys combined with daytime observations found similar sound exposure levels of 48 dBA L_{dn} in both January and June on busy flying days. The location is 410m from the helipad at the aerodrome and 880m from the nearest helipad to the West off Cook Flat Road. The site is further West than the site discussed above at the Eastern side of the Fox Glacier Campervan Park.

109. It is 440m from the aerodrome runway, so is exposed to fixed-wing parachute and flight-seeing aircraft noise both during take-off and during higher altitude flyovers South of the town. Helicopters are audible most of the time somewhere in the environs if the weather is good for flying if there is no local masking noise such as most commonly from road traffic on the Highway or Cook Flat Road, and vehicles in the hotel and motel car parks, or fixed-wing aircraft noise, or sounds of local domestic or local farming activities.

110. Other visitors' accommodation is closer to helipads. Misty Peaks Motel is only 120m from Fox and Franz Josef Heliservices landing area and 120m from The Helicopter Line landing area on the North side of Cook Flat Road. The Sunset motel is slightly further East. The Glacier Helicopters landing area is 390m further West of the Franz Josef Heliservices landing area.

111. The closest landing area to a public place, the road, is The Helicopter Line landing area on the North side of Cook Flat Road, 370m West of the intersection with Kerrs Road. The nearest helipad is about 20m from the sealed road. The other two operators' bases are about 250m South of Cook Flat Road.

112. There are other homestays, motels and camping grounds in the locality and all will be exposed to varying helicopter and fixed-wing aircraft noise when weather is suitable for flying. Occasional lulls in activity from up to about 10 minutes duration are the only times between about 7.30am and 6pm when aircraft noise of one kind or another is not audible somewhere in the area on a busy flying day. Since aviation activity has been a feature of the area for many years, its sounds have also become part of the of the acoustical component of all types of amenity values in the locality, whether residential or commercial.

School and church

113. The School and "Our lady of the snows" church are about 320m from the two landing areas and 500m from the aerodrome runway. The most intrusive noise event at these two places of assembly is fixed-wing aircraft take-offs from the aerodrome. During outdoor education or in hot weather with doors and windows open, noise from fixed-wing aircraft taking off at the aerodrome will be intrusive at sound levels above that from passing traffic. Measured sound level during take-off of Cessna A185F, ZK-WHJ carrying parachutists was 75 dB L_{Amax} and with a sound exposure level for the event of 88 dB ASEL measured beside the road between the church and the school, well above the normal 65 dBA threshold for speech interference with communications albeit as a transient event.

114. For comparison, a speeding motorcycle measured 50m setback from the road had a sound level of 57 dB L_{Amax} , with the sound exposure level for the event of 70 dB ASEL and two typical cars passing the same spot measured 54 dB L_{Amax} with a sound exposure level for the event of 67 dB ASEL.

Residential Zone Pekanga Drive area

115. There is land zoned Residential on the Northern exit from town and around Pekanga Drive, with room for more development beyond the existing road end and towards the South and South-West. Comment about noise at the North end of town is found in paragraph 106 above.

116. Surveys were undertaken in January and June 2007 at the Western edge of this Residential Zone. The day-night average sound level was 48 dBA L_{dn} in January and 45 dBA L_{dn} for similar flying conditions and weather in June, but with about half the number of flight operations – in effect the same day-night sound exposure level allowing for the difference in aircraft movements.

Helicopter noise and effects on people

117. World Health Organisation guidelines underpin New Zealand strategies for a healthy physical environment and the “*Guidelines for Community Noise*,” 2000¹⁶ are appropriate baseline guidance for identifying critical health effect thresholds for people and communities. Noise is an important factor in the physical environment affecting health, sleep and daily functioning. The adverse effects of environmental noise exposure are underpinned with sufficient scientific evidence.^{17,18} Exposure-response relationships are known for long-term exposure to aircraft noise. Some of these relationships are well established, others are of a preliminary nature. Effects among adults, for which such relationships exist, includes the adverse effects discussed below and comment is made on their relevance to helicopter noise in Franz Josef township.

Hearing impairment

118. Hearing impairment, which is an increase in hearing threshold levels, could not occur as a result of exposure to helicopter noise in the living environment because the critical threshold recognised by World Health Organisation of more than 70 dB Leq (24 hr) for eight hours long-term is nowhere exceeded.

Stress related health effects

119. Reactions to a stressor can be psychological, behavioural and somatic in nature. Cardiovascular effects such as ischaemic heart disease and hypertension commence where long-term exposure levels exceed 70 dB L_{dn} but such levels are well in excess of the daily sound exposure of persons working in the commercial area or living permanently in hotels or in residences at Franz Josef or Fox Glacier. Some degree of stress related to psychological or behavioural effects might exist but these are difficult to identify and are unlikely where sound exposure is less than 55 dBA L_{dn}. Any such effects, can be significantly confounded by non-acoustical factors, including fear of aircraft crashing, anxiety about loss of business or reduced services if helicopter operations cease or are restricted.

Sleep disturbance

120. Because helicopter operations take place during the day, as distinct from night-time or even the evening, sleep interference is not a primary concern.

Speech interference

121. Interference with speech communications is considered by the World Health Organisation to be an adverse health effect. Speech considered here includes people indoors or outdoors, direct or indirect (using telephones), and speech for personal or business purposes. Noisy events, which increase the ambient sound level, may cause interference to conversation either by disturbance of the speaker (the speaker will have to speak louder), or by masking speech resulting in a decrease in speech intelligibility for the listener.

122. In Franz Josef’s commercial area alongside the highway a number of businesses include outdoor or semi-outdoor areas used by patrons, eg. outdoor tables at restaurants. Business premises are established along the river terrace level which overlooks the helicopter landing area to the West, but the commercial frontages of the business on the Western side of

¹⁶ “Guidelines for Community Noise” (edited by B. Berglund, T. Lindvall, D.H. Schwela, & K.-T. Goh), 2000, Geneva: World Health Organization, (ISBN: 9971-88-770-3)

¹⁷ Noise and Health, Health Council of the Netherlands, September 1994

¹⁸ Finegold, L. S., Job, S., de Jong, R., Griefahn, B. (2004, Oct. 5). The effect of noise on public health: International congress explores global impact. The ASHA Leader, pp. 6-7, 13.

the road are to the East, ie facing the State highway. Business on the Eastern side of the highway have frontages facing West ie towards the helipads.

123. The potential for speech interference was assessed by observation of people in conversation and measurements of road traffic and helicopter noise. The West-side business frontages and adjacent public spaces tend to be more screened acoustically from helicopter noise because of the bulk of the buildings interrupting sound propagation from the helicopter operations to the West. The buildings can be thought of as casting an acoustical “shadow.” The closer to the building, the deeper the “shadow effect” ie reduced helicopter noise, and the further away from the buildings, the less the “shadow effect” ie increased helicopter noise.

124. Observations of conversations between staff and customers inside shops along the Western side of the highway during helicopter noise events did not appear to be affected by the helicopter noise on the basis of the level or conversation or apparent intelligibility even with people for whom English was a second language. Outdoors, beside the road, observations were inconclusive as passing traffic noise was more intrusive than helicopter noise, including some apparent reflection of helicopter noise off the buildings on the Eastern side of the highway.

125. On the Eastern side of the road, under verandas and in outdoor spaces and in public space such as footpath, people were observed to have their conversation interrupted by helicopter noise events and some road traffic pass-by events. Such effects were transient but were experienced personally by this author on more than one occasion and were observed to be similar effects upon other peoples’ conversations.

126. In Fox Glacier township, in the shopping area, effects of road traffic noise are the same as they are for Franz Josef township, but helicopter noise exposure is significantly different. There are no helipads near the commercial area along the highway and helicopter noise in that area is mainly from overflight towards the South as helicopters enter and leave the valley on their way to and from their various landing areas off Cook Flat Road, plus occasional flights passing East of the township to and from Franz Josef and other places to the North, and the flight path to and from the helipad at the Franz Josef airfield.

127. With the exception of the transit of helicopters to the East of the Fox Glacier township, observed no apparent effect on conversations of people in shops or outdoors in the commercial area of the township. While some increased vocal effort appeared necessary during these transits to the East, it was far less than that required while road vehicles passed through the township.

128. The nearest dwelling to the landing area West of the embankment at the Franz Josef helipads, is the house near the Department of Conservation office about 200m from the embankment, which is partially screened by that barrier. Being set back from the road about 120m, road traffic noise is less evident. Flight paths are all at least 200m West of this house and speech interference would be evident outdoors, during helicopter landing and departure manoeuvres.

129. There is a house about 20m from The Helicopter Cook Flat Road helipads near Fox Glacier township which is understood to be owned by persons in a leasehold relationship with the operator. Two motels are 170m to the South-East and outdoor speech communications at these locations is slightly affected during landing and departure manoeuvres at both The Helicopter Line, and Fox and Franz Josef Heliservices landing areas, based on the personal experience of the author and measurement of sound levels for

idling of about 55 dBA and transient noise during arrival and departure events over 70 dB L_{Amax} .

130. For other dwellings West of the township and East of The Helicopter Line landing area, and Fox and Franz Josef Heliservices landing areas, the primary helicopter noise source would be from aircraft during take-off and landing at these sites and the Mountain Helicopter site on the aerodrome. The typical altitude of flights up and down the river bed is about 1000-2000 feet above mean ground level and more than 1km to the South, ie not directly overhead.

131. Helicopters approaching and departing the Franz Josef Heliservices landing area to and from the South are climbing or descending about 600m West of the Fox Glacier Holiday Park and houses in its environs.

132. As explained in Annex A and paragraphs 20-28 above, aircraft in flight are generally exempt from control by local authorities under the Resource Management Act 1991 and in this report such noise effects as may occur for persons on the ground are reported or considered for the sake of completeness, rather than any implication such effects could be controlled by the Westland District Council.

Annoyance as an adverse effect of noise

133. Adverse effects of noise generally can be considered to commence at about 42 dBA L_{dn} as a daily sound exposure level with mild annoyance and effects upon personal perceptions of the acoustical elements of amenity values. Effects increase with 65 dBA L_{dn} being the threshold level generally considered requiring remedial action for the protection of public health from direct adverse effects of noise. Below 65 dBA L_{dn} effects upon health are considered to be indirect effects and include interference with communications and annoyance. However at least 10% of the population would normally be considered “highly annoyed” at 65 dBA L_{dn} . The sustainable management ethos of the Resource Management Act 1991 may in some environments be evaluated to correlate to “slightly annoyed” or “moderately annoyed” which might be represented by sound exposure levels in the order of 50 dBA L_{dn} or 55 dBA L_{dn} .

134. Quantification of noise on an average basis over a time period such as a day cannot fully describe the acoustical effects of noise. The number and frequency of events, the time intervals between events and the maximum level of such events are additional factors which all affect human perceptions of annoyance and potentially affect health and the acoustical component of amenity values. Attitudinal factors can condition the response of people and although these may not be based on sensory perception of sound, they can have a major influence on how sound is perceived, ie whether it is sound or noise.

135. One other effect applicable in the vicinity of all helipads, and an effect known to be present in the commercial area of Franz Josef township, is the smell of AVGAS exhaust fumes while helicopters are operating near or on helipads. In the presence of this smell, aversion to helicopter noise is likely to increase. While the smell may be a transitory nuisance to people working in the area, it is unlikely to be a health hazard, and any detailed consideration is a matter outside the scope of this report.

Findings and recommendations

136. Where noise of aviation activities occurs in airspace and is not associated with an imminent landing or departure manoeuvres, it is outside the jurisdiction of a territorial local authority and subject to a specific statutory exemption from application of the Resource Management Act 1991. Current legal proceedings will probably reaffirm that long-established

interpretation. Much of the aviation noise in the Franz Josef and Fox Glacier environs occurs in airspace away from landing areas and as a matter of law, is outside jurisdiction of the council.

137. The early co-existence of aviation and tourism service infrastructure in South Westland near Franz Josef and Fox Glacier has permitted intensive developments in close proximity despite relatively high sound exposure levels for some residents. Annoyance of people in their homes and around their community is likely to be a common reaction to intrusive noise events from aviation activity, both fixed-wing aircraft and helicopters, unless attitudinal modifiers are present to mitigate the perception of the noise events. The co-dependence of air and ground-side tourism service business will be a strong motivation for many residents and workers to have a positive rather than negative attitude towards helicopter noise and perhaps to a lesser extent, fixed-wing parachute and flightseeing aircraft noise operations from the aerodrome.

138. Interference with communications is the principal adverse effect of helicopter noise in the commercial area of Franz Josef. This is an adverse health effect but is at sound exposure levels in the commercial area which are similar to the sound exposure level of road traffic noise. Such effects are partly mitigated because the number of days suitable for flying is limited. Helicopter noise events near the township have lower sound exposure levels than some noise events due to road traffic in and through the township.

139. Permanent residents of Franz Josef township live with a daily sound exposure level from helicopter noise of 55-60 L_{dn} during normal helicopter operations at the helipads West of the town. This exceeds the 50 dBA L_{dn} minimum acceptable degree of protection for public health and the environment from the recommended daily upper limits in NZS 6807:1994, and its predecessor Department of Health guidelines for new heliports.

140. The standard and the guidelines were developed after most aviation facilities in Westland were established and are not referenced in the past District Schemes or current District Plan. Exposure is not continuous because of weather and seasonal variations in flightseeing and helicopter noise has been a part of the acoustical component of the various amenity values of the locality for many years. There is no night-time exposure to helicopter noise. Residential Zoned areas of Fox Glacier township have a daily average sound exposure level less than 50 dBA L_{dn} .

141. Noise from parachute and sightseeing aircraft based at the aerodrome just North of Fox Glacier township increases the aviation sound exposure for people in the locality. Each overflight is an intrusive event because of the level and character of the sound, but is still less than the noise from road traffic next to roads either in the township or elsewhere, and is significantly less than the noise from atypically noisy road vehicles.

142. Some speech interference with activities due to transient but frequent helicopter and fixed-wing aircraft noise will occur in the locality of the church, school and some motels and other tourist accommodation in Cook Flat Road. The Residential Zoned land at Pekanga Drive is reasonably separated from flight paths and helipads, but the Residential Zone to the North of Fox Glacier township receives cumulative noise effects from highway traffic, aircraft overflights and aerodrome noise from helicopter and fixed-wing aircraft. Any increases in the scale of aviation activities on the aerodrome has the potential to increase adverse noise effects for residents of this area.

143. Law about environmental noise in New Zealand does not provide for absolute levels of protection of people from noise and is based on the sustainable management ethos of the Resource Management Act 1991. Concern for protection of the health of the public on

grounds of adverse noise effects from current aviation noise in the South Westland areas around Franz Josef and Fox Glacier townships in their present states of development are not justified on the basis of current sound exposure levels measured during typical flying activities.

144. Relocation of the helipads from Franz Josef to the site near the oxidations ponds or anywhere else well removed from the township would reduce overall aviation noise in Franz Josef, to less than 50 dBA L_{dn} , but would increase noise near the new site. Relocation to a site near the oxidation ponds would have a minor effect on the school and the holiday park.

145. Aviation planning in South Westland has evolved piecemeal over time and the need for some degree of consolidation became evident in the mid 1990's. Most helicopter landing areas were developed without consideration of the provisions of the helicopter standard, NZS 6807:1994, but in the Fox Glacier township environs most landing areas were located with significant separation distances from the township and neighbours' dwellings.

146. Current sound exposure levels for the present extent of development in the environs of the two main townships is unlikely to adversely affect public health. However, any future consolidation of district plan provisions about aviation planning should have regard to the land use planning recommendations in NZS 6807:1994. It is recommended helicopter landing areas and aerodrome noise be addressed as a specific topic in the next review of the District Plan.

147. Land use planning and local aviation user group protocols must coexist and changes in one regime should consider the potential acoustical implications for the other. It is recommended where any changes are contemplated, substantial consultation should be undertaken between the local aviation industry and ground side-infrastructure interests and the affected communities to ensure noise impacts upon the communities are considered.

List of attachments

Annex A Exemption for overflying

Glossary

Maps

Annex A Exemption for overflying

- A1. This Annex explains the legal issues about the exemption for aircraft in the Resource Management Act 1991 and the relationship with Civil Aviation law. It is based upon review of case law which has mostly arisen in cases where environmental noise has also been an issue. This consideration also includes matters discussed with Counsel and *obiter* comments by Environmental Judges in the course of hearings about airport and helicopter noise.
- A2. An important distinction must be made for resource management purposes between helicopter or fixed wing aircraft noise associated with flight operations on and near the site, and overflight of land or water away from the defined area of the site. This is not a straight-forward matter and arises because aircraft flight operations fall partly within two separate and distinct bodies of statute law – aviation law and resource management law.
- A3. To understand some of the issues involved it is necessary to review s.9(8) of the Resource Management Act 1991. Part 3 of the Act sets out certain duties and restrictions under the Act. Those relating to activities on land are included in sections 9 and 16. The effect of section 9 of the Act is that any person may use their land as they think fit unless that contravenes a rule in a district plan. There is an exception to use of airspace. That provides:
- “9. (8) the application of this section to overflying by aircraft shall be limited to any noise emission controls that may be prescribed by a territorial authority in relation to the use of airports.”
- As a consequence district plans may not include rules, except for airports, controlling the noise of aircraft flying overhead.
- A4. Remarks in *obiter* by the Environment Court in aviation related cases, acknowledge there are potential legal arguments about interpretation of s.9(8) of the Act, however the sub-section has remained un-amended since 7 July 1993. Since that time, the effect of the s.9 (8) exemption has not hindered application of NZS 6805:1992 *Airport noise management and land use planning*, a standard similar to NZS 6807:1994, to nearly all the major airports in New Zealand. Neither has the exemption prevented the Courts making determinations on Appeals, References, and Notices of Requirement in relation to airports, airstrips, helicopter landing areas, or heliports whether or not associated with land subject to designations under Part 8 of the Act. The Court has exercised jurisdiction in a similar manner as its predecessors in relation to airport and helipads under the previous Town and Country Planning Acts in cases dating back more than half a century.
- A5. There is a general recognition that if controls are prescribed, perhaps through conditions of a resource consent, or plan provisions, then some degree of control appears to be *vires*, but there remains uncertainty as to how far the control goes as,
- “...the exact intent of subsection 8 is not evident¹⁹.”
- A6. There does not appear to be any limitation to the use of the s.9(8) words “overflying by aircraft,” in the operative Westland District Plan even in relation to established commercial airports. Those words, “in relation to the use of airports,” have generally been construed by the Courts to included aircraft undertaking approach and departure

¹⁹ Kaikoura District Council, C119/02, 7 NZED 846, [34]

manoeuvres imminent to contact with the land itself including use of airspace beyond the boundary of such land use activities.

- A7. In *Aviation Activities*²⁰ the Court expressed its opinion that short helicopter flights around Tekapo village had potential to be quite disruptive (even if noise limits were adhered to), and it would have liked to add a review condition (to a resource consent), if the flights were causing an undue adverse effect on the amenities of Tekapo village. However the Court considered it had no jurisdiction to do so because of the operation of section 9(8) of the Act. It went on to say,

"The absence from the RMA of such a power to control noise from tourism flights is an issue that, in our view, deserves legislative attention."

- A8. In *Minister of Conservation*²¹ the Court conjectured,

"...accepting for the purposes of this case that we would probably be unable to control the proposed flight paths beyond the approach and landing phase..."²²

recognising its inability to control the flight paths beyond approach and departure manoeuvres, but goes on immediately in the same sentence to state,

"we consider that for planning purposes we are entitled to have regard to the consequences of allowing the landing pad, and indeed the applicant's operation as a whole to become established on the proposed site."²³

- A9. The Court then took into account evidence about noise from helicopter overflight of land and water away from the proposed landing pad and in particular, as a matter of national importance²⁴ in that case, the potential detriment to a significant element of naturalness about the Moeraki boulders area (South Island East Coast). The application was refused largely because of this factor.
- A10. In an appeal to the High Court²⁵, the Dome Valley District Residents Soc Inc challenged the decision of the Environment Court in Decision A099/07 to disallow its appeal against the grant of consent by Rodney District Council to Skywork Helicopters Ltd to relocate a commercial helicopter operation to a rural site near Warkworth. The Society claimed the Environment Court had erred in two matters including its interpretation and application of ss.9(8) and 104(2) of the Resource Management Act 1991.
- A11. The Court reviewed the Environment Court's decision, and noted that the grievance of the society was that the proposed heliport would generate air traffic and noise. The Environment Court had carefully reviewed the statutory provisions and noted that as the application was for a land use activity it had concluded that, reading s.104(1) in its context, the scope of effects which the consent authorities were to have regard to did not include effects generated by helicopters or other aircraft while airborne or in flight, but only the noise effects of landing and departing from the base, or while on the ground. The Environment Court had not considered the adverse effects of airborne helicopter noise on residents.

²⁰ *Aviation Activities Ltd and MacKenzie* DC C072/00, 5 NZED 362 [53]

²¹ *Minister of Conservation et al v Waitaki District Council*, C65/91(a case under s.69, Town and Country Planning Act 1977)

²² *ibid* page 14, paragraph 2.

²³ *idem*

²⁴ In this case "national importance" under the Town and Country Planning Act 1977

²⁵ *Dome Valley District Residents Soc Inc v Rodney DC*, 1 August 2008, Priestley J, High Court Auckland, CIV-2008-404-587

- A12. The High Court addressed, and acknowledged the "clear conceptual difficulties" which arose from provisions relating to overflying aircraft being part of a section of the Resource Management Act 1991 dealing with restrictions on land use. The Court found that the Environment Court had not erred by basing on s.9(8) its decision to ignore the noise effects of overflying aircraft. The Court stated that the field of overflying aircraft was properly the subject of the Civil Aviation Act 1990. Further, once lawfully airborne, the Court considered it wrong to suggest an aircraft was somehow engaged in s.9(1) "use of land" which, by s.9(4) was terrestrially based. It was the clear intention of Parliament that s.9 prohibitions could not extend to overflying aircraft except in the area of noise controls imposed in relation to airport use. The Court found that after take-off or landing, in particular when the aircraft was operating over 500 ft above land, the effects lay outside the ambit of the Resource Management Act 1991.
- A13. The Court then considered the issue of the permitted baseline and ss.104 and 104D, and stated that its conclusions as to s.9(8) meant that the actual and potential effects under s.104(1)(a) of overflying aircraft and the adverse effects of their noise for s.104(2) and baseline purposes had no relevance. The Court found that the Environment Court had not erred in the application of law in these areas.
- A14. As regards the noise generated by aircraft approaching and departing under the 500-foot restriction, however, different considerations applied. Skywork's consent was for a non-complying activity, which could obtain consent only if the adverse effects were minor (s.104D(1)(a)). The Court rejected the submission of the society that the Environment Court erred in using the words "not significant" rather than "minor"; the Court found that in the context they were synonymous. The Environment Court had decided to exercise its discretion to disregard the effects of the heliport on the basis that any differences from other baseline activities were not significant, and that other baseline activities contributed to the neighbourhood's character. The High Court found no basis at law to interfere with this decision.
- A15. An application for leave to appeal the High Court's Skywork decision to the Court of Appeal was heard on 26 November 2008 and the reserved decision is awaited. The notice of application states the relevant matters of law as;
- (a) Are the effects of over flying aircraft operating above 500 feet (in rural areas) or 1,000 feet (over congested areas) and beyond the course of departure or landing, irrelevant to the assessment of resource consent applications seeking to establish or operate an airport?
 - (b) Is the scope of the control of noise effects from over flying aircraft that may be applied by a territorial authority (in relation to the use of an airport under section 9(8) of the Resource Management Act 1991) to be determined by reference to regulations promulgated under the Civil Aviation Act 1990?
- A16. After review of the history of cases where the jurisdiction under s.9(8) has been examined, it is apparent that any uncertainty about the extent of jurisdiction has not constrained the Courts from findings consistent with the position reaffirmed in the Skyworks case by the High Court. The Resource Management Act 1991 exemption under s.9(8) is clearly the law makers' intent to avoid jurisdictional conflict between application of civil aviation and resource management laws.
- A17. These jurisdictional limitations appear to apply to land subject to resource consents, as well as land subject to notices of requirement for designations and to making other provisions in district plans such as rules. Decisions of the Court relating to rules in plans and conditions of designations in District plans for Auckland and Christchurch international airports, for example, consider effects of aircraft noise while on the

ground or while in the air approaching or departing the landing area. These effects extend many nautical miles along flight paths.

- A18. It remains uncertain at what point in airspace the transition between Civil Aviation rules and application of the RMA s.9(8) exemption actually occurs. Based on review of decisions of the Courts, it is not at the airspace boundary of the site containing the land area and not necessarily at the point where the aircraft attains whatever minimum altitude may be applicable according to Civil Aviation Rules, generally 500 feet in non-urban areas.
- A19. This matter is clearly a legal issue and the decision on leave to appeal to the Court of Appeal in the Skyworks case will have significance one way or another.

V.C. Goodwin
Environmental Noise Analysis and Advice Service
Ministry of Health



Direct Dial: +64 3 388 8536



Mobile: 027 435 3269



Virtual Fax: 0832 68899



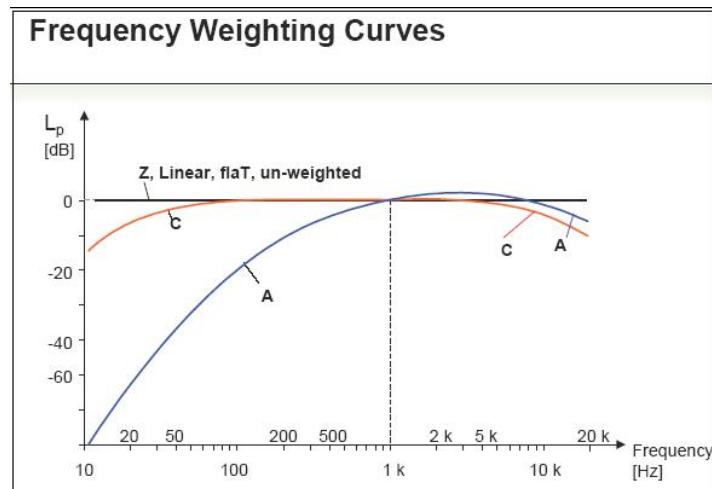
PO Box 18-885, Christchurch, 8641, New Zealand



noise@chch.planet.org.nz

Updated 3 Dec 08

Glossary



A-WEIGHTED SOUND LEVEL The ear does not respond equally to frequencies. It is less efficient at low and high frequencies than it is at medium or speech-range frequencies. To obtain a single number representing the sound level of a noise containing a wide range of frequencies in a manner representative of the ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to the medium frequencies. The resultant sound level is said to be A-weighted, and the units are decibels, (dB), hence the abbreviation dBA.

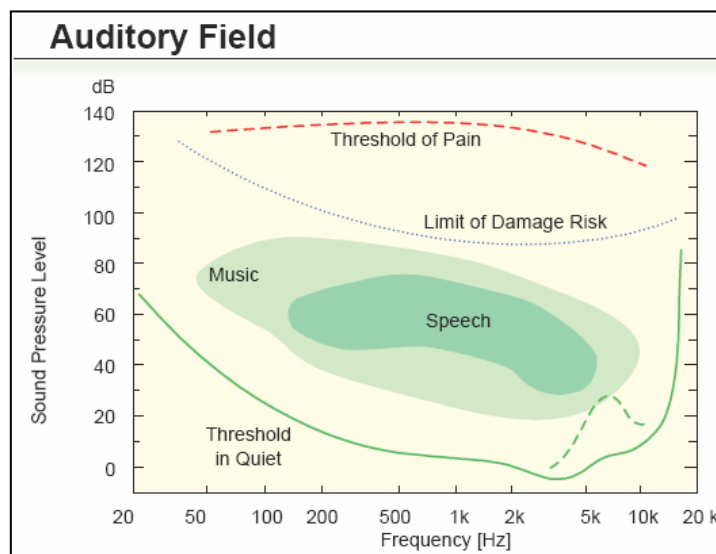
Sound level meters have an electronic A-weighting network for measuring A-weighted sound levels. See graphic for common weightings. Z weighting now defines zero weighting (linear weighting).

AMBIENT SOUND LEVEL Obsolete terminology superseded by Total sound Formerly that sound level that exists at any instant, regardless of source. Not the same as background sound level or Residual Sound.

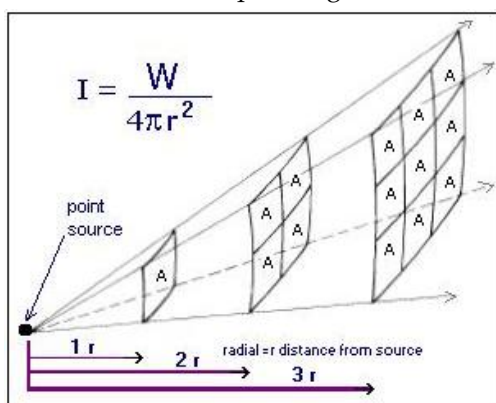
AUDIBLE RANGE Sounds in the frequency range 20-20,000 Hz. See Auditory field graphic.

BROADBAND NOISE Noise with components over a wide range of frequencies.

DECIBEL The decibel, (abbreviated "dB") is a dimensionless value relating one power level to another. For practical acoustics, it is used to relate sound pressure levels to the threshold of hearing. Because the audible range of hearing from silence to painfully loud involves ratios of a million to one, the logarithmic decibel scale provides a convenient scalar range of 0-140. Decibels as logarithmic values cannot be subjected by arithmetic calculations as if they were linear values. e.g. 50 dB plus 50 dB = 53 dB.



DIVERGENCE the spreading of sound waves from a source in a free field, resulting in a diminution of sound pressure level with increasing distance from the source. See graphic.



FREQUENCY The number of times per second that the sine-wave of sound repeats itself or that the sine-wave of a vibrating object repeats itself. Expressed in Hertz (Hz) formerly called cycles per second (cps).

FREQUENCY-WEIGHTING A frequency-dependent correction defined in accordance with an International Electrotechnical Commission (IEC) standard specification that is applied to a measured or calculated sound level. If not stated, assume A-weighting.

HERTZ See frequency. Formerly called “cycles per second.”

IMMISSION Sounds received at a listener’s location. Opposite of “emission”, ie. sound emitted by a noise source.

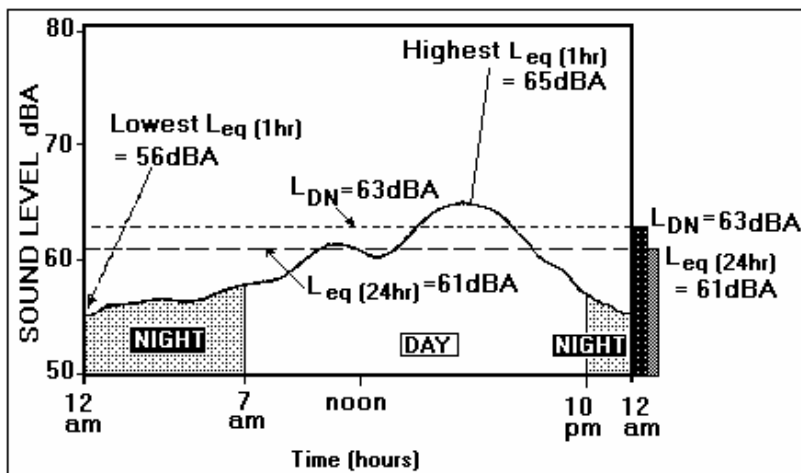
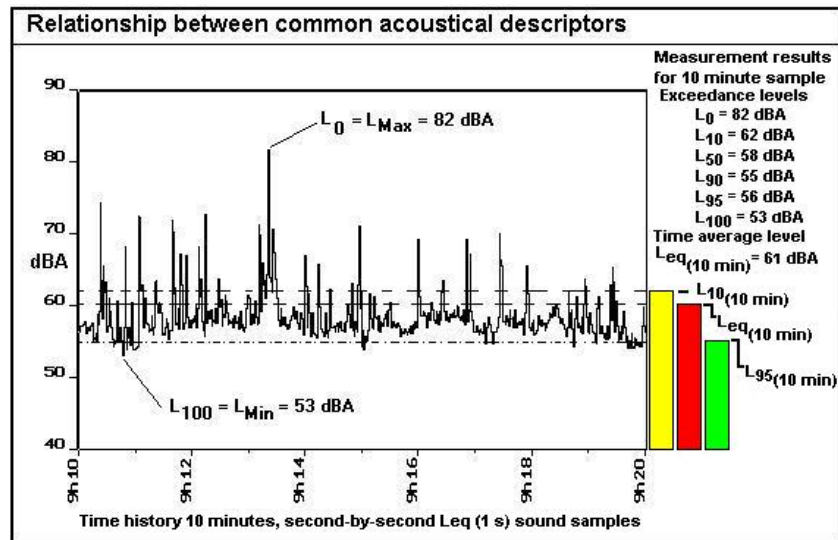
L_n L_{10} L_{90} L_{95}

The percentile exceeded sound level, or centile level L_{10} is the metric used in pre-1999 editions of NZS 6802 to describe intrusive noise and L_{95} the background sound level. L_{95} was superseded by L_{90} in NZS 6802:1999 and 2008 editions but only where the latter standards apply. See graphic.

L_{eq} , L_{eq} , L_{eq} The parameter used in NZS 6801:2008 Acoustics-

Measurement of

environmental sound as the descriptor for intrusive noise. It is the value of the sound pressure level of a continuous steady sound that, within a stated measurement sample time, has the same mean-square sound pressure level as a sound whose level varies with time. Also known as the “time-average level” or, “equivalent continuous sound level”. See graphic.



LDN, L_{dn} DNL, Night-weighted sound exposure level or the day-night average sound level. It describes a receiver’s cumulative noise exposure from all events over a full 24 hours. It may be thought of as a noise dose, totalled after increasing all night-time levels (between 10pm and 7am) by 10 decibels. Every noise event during the 24-hour period increases this dose, louder events more

than quieter events, and events that stretch out in time more than shorter events.

L_{max} or LAF_{max} A metric mostly used as a night-time noise limit to protect sleep. It is the maximum rms sound pressure level during a discrete measurement interval. $L_{AF_{max}}$ indicates fast time weighing and A-frequency weighing. $L_{A_{max}}$ indicates A-frequency weighing based on L_{eq} rather exponential F time weighing. .Not the same as peak level which is a non-rms value.

LOUDNESS The judgement of intensity of a sound by a human being. Loudness depends primarily upon the sound pressure of the stimulus. Over much of the loudness range, it takes about a threefold increase in sound pressure (approximately 10 dB) to produce a doubling of loudness. A subjective perception.

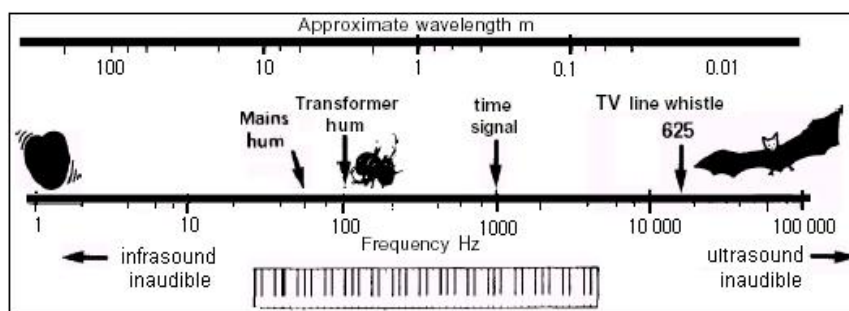
REFERENCE SOUND PRESSURE, (p_0), or REFERENCE VALUE is 20 micropascals and, unless otherwise stated, should be assumed for all acoustical standards.

RESIDUAL SOUND is the total sound remaining at a given location in a given situation when the specific sounds under consideration are suppressed or are an insignificant part of the total sound.

SOUND PRESSURE LEVEL (SPL) A logarithmic dB scale is used, akin to the Richter scale for earthquakes. Usually A-frequency weighted for environmental sound. A 3dB increase means doubling the power. Zero dB SPL is the threshold of hearing; a quiet room has a background SPL of about 30dBA; a loud rock concert can go to 120dBA.

SOUND EXPOSURE LEVEL LE or SEL (dB)- sound pressure or pressure level over a specified period of time. A-frequency weighted sound exposure is written as LAE or ASEL

SPECIFIC SOUND The component of total sound that can be attributed to a specific source.



THRESHOLD OF AUDIBILITY The minimum sound pressure level at which a person can hear a specified sound, about 0 dB for a healthy young adult in laboratory conditions. (20 micro-pascals, 20 μPa , 0.00002 Pa, $2 \times 10^{-5} \text{ N/m}^2$)

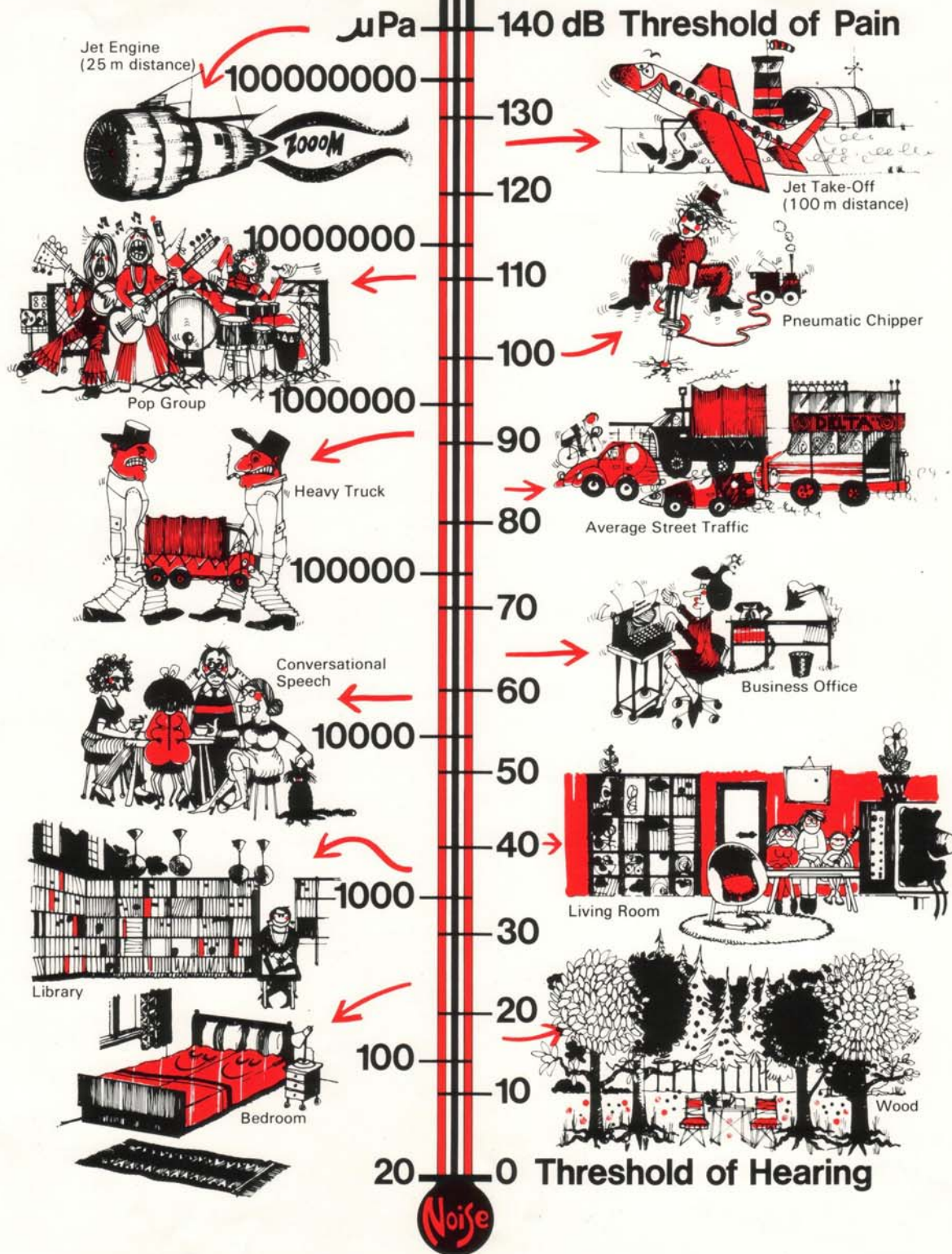
TONE A sound of definite pitch. A pure tone has a sinusoidal wave form.

TOTAL SOUND The totally encompassing sound in a given situation at a given time, from all sources near and far including the specific sound. Formerly called ambient sound.

WAVELENGTH (λ) in metres The product of speed of sound over frequency The distance between two crests (or valleys) of sound wave pressure. Varies from about 7 m for a 50 Hz tone to about 70mm for a 5 kHz tone. **WEIGHTING** Refers to the effect on a signal of electronic circuits that modify the signal in a standardised manner. "Frequency weighting" refers to modifiers of the spectrum such as the A-frequency weighting characteristic and "time-weighting" refers to the time-averaging carried out by networks such as the F (Fast).

Sound Pressure

Sound Pressure Level



Brüel & Kjær

DK-2850 Nærum · Denmark · Telephone: +45 280 0500 · Telex: 37316 bruks dk · Fax: 02 80 1405

15-145

WELCOMES YOU TO FOX GLACIER AND PARINGA 2003/2004

ACCOMMODATION

Backpackers:

Fox Glacier Inn & Backpackers	751 0022
Fox Glacier Holiday Park	751 0821
Ivory Towers Backpackers	751 0838

Bed and Breakfasts:

Pekanga Homestay	751 0016
------------------	----------

Hotels:

Fox Glacier Resort Hotel	751 0839
Glacier Country Hotel	751 0847

Inn and Lodge:

Fox Glacier Inn & Backpackers	751 0022
Fox Glacier Lodge	751 0888
Te Weheka Inn	751 0730

Motels:

A1 - Fox Glacier Motel	751 0804
Alpine View Motel	751 0821
Lake Matheson Motel	751 0830
Lake Paringa Heritage Lodge	751 0894
Mt Cook View Motel	751 0814
Rainforest Motel	751 0140
The Westhaven	751 0084

Motor Park:

Campervan Park	751 0888
Fox Glacier Holiday Park	751 0821

FOOD AND DRINK

Café Lake Matheson	751 0878
Café Nevè	751 0110
Cook Saddle Café/Saloon	751 0700
Fox Glacier Inn Café & Bar	751 0022
Fox Glacier Resort Hotel	751 0839
Glacier Country Hotel	751 0847
High Peaks Bar & Restaurant	751 0804
Hobnail Café	751 0005
Paringa Café	751 0894
The Plateau	751 0058
The Salmon Farm Café	751 0837

SHOPS

Alpine Guides Souvenir Shop	751 0825
Department of Conservation	751 0807
Fox General Store	751 0829
Fox Glacier Holiday Park Store	751 0821
Fox Glacier Information Centre	751 0044
Fox Glacier Motors/Petrol Station	751 0823
Fox Souvenirs	751 0765
Information Bureau	751 0046
South Westland Salmon	751 0837

ACTIVITIES

Glacier Guided Walks & Helihiikes:

Alpine Guides (Westland) Ltd	751 0825
------------------------------	----------

Glow Worms:

Glow Worm Forest Walk	751 0711
-----------------------	----------

Hunting and Fishing:

Alpine Trophies	03 752 0793
-----------------	-------------

Scenic Flights & Skydiving:

Fox and Franz Heliservices	751 0866
Glacier & Southern Lakes Heli.	751 0803
Mountain Helicopters	751 0045
Mount Cook Skiplanes	03 752 0714
The Helicopter Line	751 0767
Skydive NZ	751 0080

Tours:

Fox Glacier Tours & Shuttles	0800 369 287
------------------------------	--------------

SERVICES

Bicycle Hire:

Fox Glacier Holiday Park	751 0821
Fox Glacier Lodge	751 0888
Ivory Towers Backpackers	751 0838

Bus Bookings (North and South):

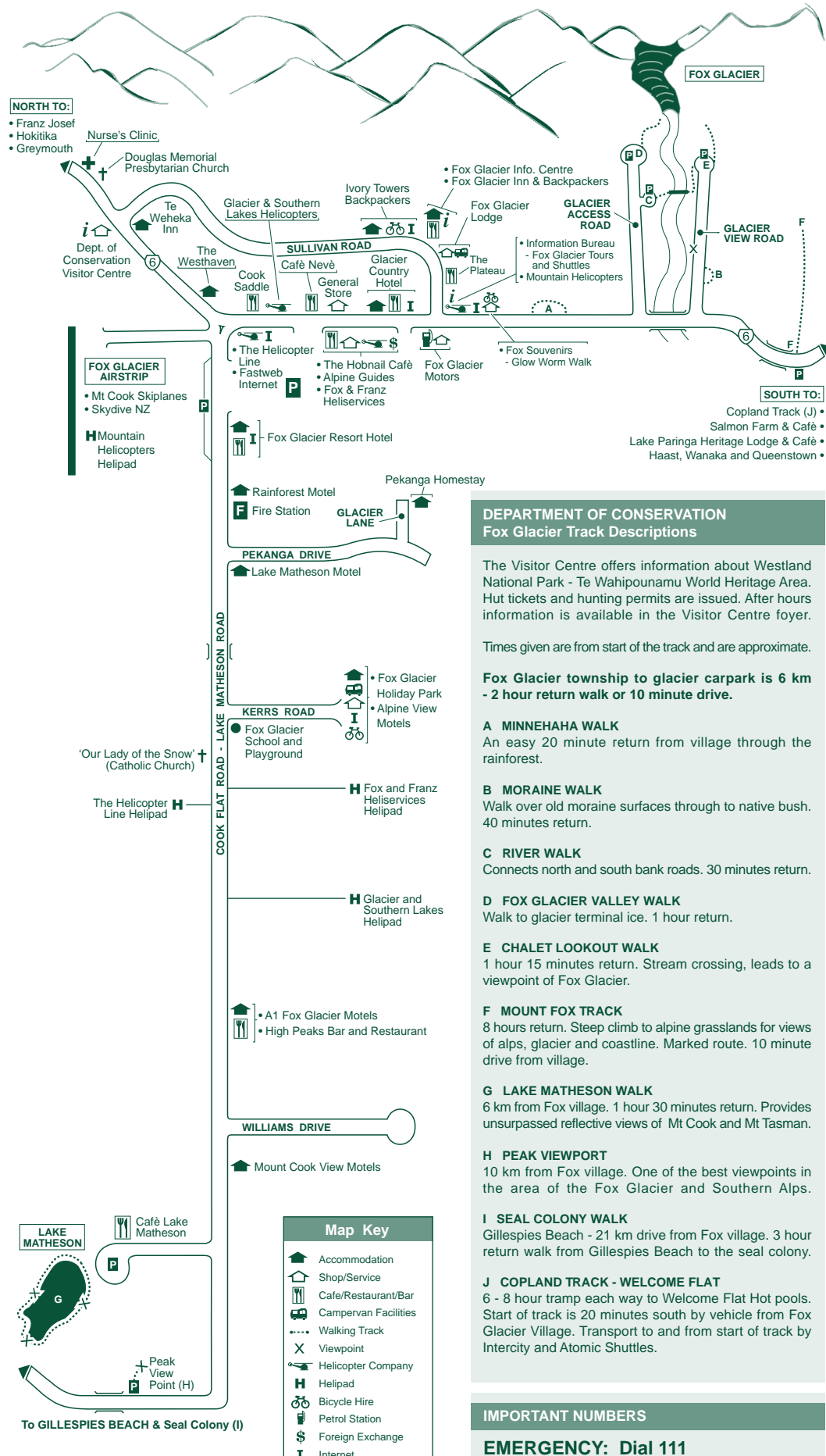
Alpine Guides Building	751 0825
Fox Glacier Information Centre	751 0044
Ivory Towers	751 0838

Foreign Exchange & Postal Agency:

Alpine Guides Building	751 0825
------------------------	----------

Internet:

Fastweb Inte	
Fox Souveni	



DEPARTMENT OF CONSERVATION Fox Glacier Track Descriptions

The Visitor Centre offers information about Westland National Park - Te Wahipounamu World Heritage Area. Hut tickets and hunting permits are issued. After hours information is available in the Visitor Centre foyer.

Times given are from start of the track and are approximate.

Fox Glacier township to glacier carpark is 6 km - 2 hour return walk or 10 minute drive.

A MINNEHAHA WALK

An easy 20 minute return from village through the rainforest.

B MORaine WALK

Walk over old moraine surfaces through to native bush. 40 minutes return.

C RIVER WALK

Connects north and south bank roads. 30 minutes return.

D FOX GLACIER VALLEY WALK

Walk to glacier terminal ice. 1 hour return.

E CHALET LOOKOUT WALK

1 hour 15 minutes return. Stream crossing, leads to a viewpoint of Fox Glacier.

F MOUNT FOX TRACK

8 hours return. Steep climb to alpine grasslands for views of alps, glacier and coastline. Marked route. 10 minute drive from village.

G LAKE MATHESON WALK

6 km from Fox village. 1 hour 30 minutes return. Provides unsurpassed reflective views of Mt Cook and Mt Tasman.

H PEAK VIEWPORT

10 km from Fox village. One of the best viewpoints in the area of the Fox Glacier and Southern Alps.

I SEAL COLONY WALK

Gillespies Beach - 21 km drive from Fox village. 3 hour return walk from Gillespies Beach to the seal colony.

J COPLAND TRACK - WELCOME FLAT

6 - 8 hour tramp each way to Welcome Flat Hot pools. Start of track is 20 minutes south by vehicle from Fox Glacier Village. Transport to and from start of track by Intercity and Atomic Shuttles.

IMPORTANT NUMBERS

EMERGENCY: Dial 111

WELCOMES YOU TO FRANZ JOSEF GLACIER

WHATAROÄ AND OKARITO 2005/2006

ACCOMMODATION

Backpackers

Chateau Franz	752 0738
Franz Josef YHA	752 0754
Glow Worm Cottages	752 0172
Montrose Accommodation	752 0188
Rainforest Backpackers	752 0220

Bed and Breakfasts

Franz Josef Alpine Lodge	752 0688
Glacier Cottages	752 0170
Heritage Gateway (Whataroä)	0800 466 108
Holly Homestead B&B	752 0299
Lake Mapourika B&B	752 0034
Ribbonwood Retreat	752 0072
Westwood Lodge	752 0112

Hotel

Scenic Circle Franz Josef Glacier Hotel	
- Douglas & Graham Wings	752 0729
- Mueller Wing	752 0719

Inn & Lodge

Franz Josef Glacier Country Retreat	752 0012
Mt Adam Lodge (Nth of Whataroä)	0800 675 137

Motels

A1 - Rata Grove Motel	752 0741
Alpine Glacier Motel	752 0226
Bella Vista Motel	752 0008
Glacier Gateway Motel	752 0776
Glacier View Motel	752 0705
Glenfern Villas	752 0054
Mountain View Top 10	752 0735
Punga Grove	752 0001
Rainforest Retreat	752 0220
Terrace Motel	752 0130
White Heron Sanctuary Tour Motel and Cabins (Whataroä)	0800 523 456

Motor Parks

Franz Josef Top 10 Holiday Park	752 0735
Rainforest Holiday Park	752 0220

FOOD AND DRINK

Alice May Bar and Restaurant	752 0740
Beeches Café Restaurant and Bar	752 0721
Blue Ice Restaurant & Bar	752 0707
Cheeky Kea Café	752 0139
Guzzi Al Fresco	
Monsoon Bar & Restaurant	752 0101
Priya Indian Restaurant	752 0062
Scenic Circle Franz Josef Glacier Hotel	
- Douglas & Graham Wings	752 0729
- Canavans Restaurant & Glasshouse Restaurant	
- Mueller Wing	752 0719
- Fern Room Restaurant & Public Bar/Bottle Store	
The Landing Bar Café	752 0229
Westwood Lodge	752 0112

SHOPS

Department of Conservation	752 0796
Fern Grove Food Centre	752 0177
Fern Grove Souvenirs	752 0731
Flights Gallery	752 0242
Glacier Motors Ltd	752 0725
The Glacier Shop	752 0131

ACTIVITIES

Guided Glacier Walks & Helihikes:

Franz Josef Glacier Guides	752 0763
Glacier Valley Eco-Tours	0800 999 739
The Guiding Company	752 0047
The Helicopter Line	752 0767

Guided Tours:

Across Country Quad Bikes	0800 234 288
Franz Josef River Experience	752 0763
Glacier Off-Road Adventures	0800 147 238
Glacier Valley Eco-Tours	0800 999 739
Heli Rafting	0800 147 238
Okarito Wetland Experience	752 0763
White Heron Sanctuary Tours	0800 523 456

Horse Treks:

South Westland Horse Treks	752 0223
----------------------------	----------

Hunting & Fishing: Alpine Trophies

752 0793

Kayaking:

Ferg's Kayaks	752 0230
Okarito Nature Tours	03 753 4014

Movie: Flowing West Helimax

752 0793

Scenic

Air	
Fo	
Gl	
Gl	
Mo	
Mo	
Skyline	
The Helicopter Line	752 0767

SERVICES

ATM: Outside Mount Cook Skiplanes building

Bicycle Hire:

Chateau Franz	752 0738
Glow Worm Cottages	752 0172

Bus Bookings (North & South):

Atomic Shuttles: Glacier Shop	752 0131
Intercity: YHA	752 0754
Scott Base Information Centre	752 0288
	752 0212

Fitness: Gym/Sports Hire

752 0230

Foreign Exchange:

Fern Grove Souvenirs	752 0731
Glacier Shop	752 0131

Internet:

Fastweb @ Scott Base	752 0288
Icebridge Internet (Ferg's Kayaks)	752 0230

Laundromat: Guzzi Laundromat

752 0085

Photos: Franz photos

752 0650

Digital photos: IceBridge Internet

752 0230

Postal Agency:

Glacier Motors Ltd	752 0725
Glacier Motors Ltd	752 0230

Scooter Hire: Ferg's Kayaks

0800 999 739

Shuttle Service to Glacier

0800 337722

Massage Therapy: The Body Business

0800 337722

