VOLUME 2:

APPENDIX A-J

Modification to the approved mining area at the Donaldson Open Cut Coal Mine, Beresfield.

Application under Section 96(2) of the Environmental Planning and Assessment Act 1979

Prepared for

Donaldson Coal Pty Ltd

Mr Doug Gordon

General Manager

PO Box 2275

10th November 2004.

Volume 2: APPENDICES

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Appendix A

Development Consent

DETERMINATION OF A DEVELOPMENT APPLICATION PURSUANT TO SECTION 101(8) OF THE UNAMENDED ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

I, the Minister for Urban Affairs and Planning, pursuant to Section 101(8) of the unamended *Environmental Planning and Assessment Act, 1979* ("the Act") determine the Development Application ("the application") referred to in Schedule 1 by granting consent to the application subject to the Conditions set out in Schedule 2.

The reasons for the imposition of the Conditions are:

1. to minimise the adverse environmental impacts the development may cause; and
2. to provide for environmental monitoring and reporting.

Because of the recognised significance of the locality as an area containing valuable flora and fauna, and because the established vegetation cover provides an extensive and complex fauna habitat, the Approval is specifically conditioned to conserve the ecological features of the area for the long term future.

The Conditions require the Applicant to understand the nature of the existing flora and fauna that prevailed before mining occurred; to pursue a progressive rehabilitation program that attempts to replicate the ecology of the area mined; and to continue to implement a comprehensive rehabilitation strategy for a suitable period after the mine has finished.

Andrew Refshauge
Minister for Urban Affairs and Planning

Sydney, 1999 File No. N97/00147

SCHEDULE 1

Application made by:	Donaldson Pty Ltd ("the Applicant").
To:	The Minister for Urban Affairs and Planning ("the Minister").
In respect of:	Land as shown on the map and table in Schedule 3.
For the following:	Construction and operation of an open cut coal mine, including a Coal Preparation Plant, known as Donaldson Coal Mine ("the Development").
Development Application:	DA 98/01173 dated 13/2/98 lodged with Maitland Council and DA 118/698/22 dated 19/2/98 lodged with Cessnock Council.

NOTES:

1. *To ascertain the date upon which the Consent becomes effective, refer to section 101(9) of the unamended Act. To ascertain the date upon which the Consent is liable to lapse, refer to section 99 of the unamended Act.*
2. *Reference to the unamended EP&A Act 1979 means the Act in force immediately prior to 1 July 1998.*

SCHEDULE 2 - CONDITIONS

ABBREVIATIONS AND DEFINITIONS

AEMR	Annual Environmental Management Report (Conditions 114-116)
construction	Includes any earthworks or roadworks
Councils	Cessnock, Maitland and Newcastle City Councils (as applicable)
DA area	Area to which the DA applies, as described in the table and map in Schedule 3
Director-General	Director-General of the Department of Urban Affairs and Planning or her nominee
DLWC	Department of Land and Water Conservation
DMR	Department of Mineral Resources
DUAP	Department of Urban Affairs and Planning
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
Lower Hunter Region	Local government areas of Newcastle, Greater Cessnock, Maitland, Lake Macquarie and Port Stephens
NPWS	National Parks and Wildlife Service

OPERATION OF DEVELOPMENT

1. (1) The Applicant shall carry out the development of the Donaldson Coal Mine in accordance with the Environmental Impact Statement (EIS) dated February 1998 prepared by PPK Environment and Infrastructure in accordance with Section 77(3) of the *Environmental Planning and Assessment Act, 1979* and certified by Mark Dimmock BE (Civil) MIE (Aust.) as modified by the reports in Schedule 4, submissions to the Commission of Inquiry, and as may be modified by the following Conditions.

   (2) The Applicant shall ensure that all contractors and sub-contractors are aware of, and comply with, the Conditions of this Consent. The Applicant shall be ultimately responsible for compliance.

   (3) Unless otherwise specifically stated, the Conditions of this Consent do not apply to Lot 113 DP 234203 (owned by Steggles Limited at the date of this Consent), provided the Deed of Agreement between Steggles Limited and the Applicant (dated 24 February 1999) is still in effect.

Note: The Applicant is obliged to ensure that all statutory requirements, including all relevant legislation, Regulations, Australian Standards, Codes, Guidelines and Notices, Conditions and Directions of the Councils and relevant government agencies are met and approvals obtained. The approvals obtained by the Applicant shall include, but not be limited to:

- *(i) licences required under the Protection of the Environment Operations Act, prior to the commencement of construction of the development;*
- *(ii) an approval under Part 3A of the Rivers and Foreshores Improvement Act, prior to undertaking any proposed works that are within 40 metres of any creek; and*
- *(iii) approvals under the Water Act for the diversion of creeks.*

2. The development shall be restricted as follows:
   - (i) the mine plan in the EIS shall be reduced such that no mining shall be undertaken in any area identified in accordance with these Conditions as a Conservation Area. This includes the *Tetratheca juncea* Conservation Area (Condition 68); and
   - (ii) the Applicant shall not clear any land or erect any structures within any Conservation Area without approval from the Director-General.

3. (1) Subject to (2) the approved hours of operation are as follows:

Works	Period	Hours
Construction, including construction of any bunds	Monday to Friday	7am to 6pm
	Saturday	8 am to 1pm
Mining operations, including mining, haulage of waste to dumps and coal processing	Monday to Friday	24 hours per day
	Saturday, Sunday	7am to 6pm
Road transportation and stockpiling of coal	7 pays per week	24 hours per day
Rail loading of coal	7 pays per week	7am to 10pm
Maintenance of mobile and fixed plant	7 pays per week	24 hours per day
Blasting, not involving closure of John Renshaw Drive	Monday to Saturday	7am to 5pm
Blasting, involving closure of John Renshaw Drive	Monday to Saturday	10am to 2pm

Notes: Restrictions on Public Holidays are the same as Sundays.

(2) The Applicant shall submit a report to the Director-General's satisfaction demonstrating that the noise limits in Condition 15 can be met while rail loading of coal is occurring during the period from 6pm to 10pm. If that report does not demonstrate that the noise limits can be met to the Director-General's satisfaction, then the hours of operation for rail loading of coal shall be restricted to 7am to 6pm.

4. The Applicant shall comply with any order of the Director-General to cease activities causing serious or irreversible environmental concerns, until those concerns have been addressed to the satisfaction of the Director-General.

COMMENCEMENT AND DURATION

5. (1) To ensure the employment benefits of this development are realised without delay, the Applicant shall commence mining within two years of the date of this Consent. This does not remove the obligation of the Applicant to comply with any other requirement listed in the Conditions of this Consent.

(2) To minimise potential delays to development on adjoining lands, consent for mining shall lapse 11 years from commencement of mining.

Note: Certain Conditions of this Consent will continue to operate after the Consent for mining operations has lapsed.

6. The Applicant shall notify the Director-General and the Councils in writing of the dates of commencement of:
(i) construction works,
(ii) mining, and
(iii) coal processing operations,
14 days prior to the commencement of such works.

7. No construction or mining shall commence until:
(i) the relevant compliance reports in Condition 121 have been completed to the satisfaction of the Director-General; and
(ii) the Applicant provides evidence to the Director-General of an agreement with the adjoining Bloomfield mine for the use of rail loading infrastructure.

ENVIRONMENTAL OFFICER

8. The Applicant shall employ an Environmental Officer, whose qualifications are suitable to the Director-General, throughout the life of the mine. The Environmental Officer shall:
   (i) be responsible for the preparation of the Environmental Management Strategy (Conditions 10-13) and environmental management plans;
   (ii) be responsible for considering and advising on matters specified in the Conditions of this Consent and compliance with such matters;
   (iii) be responsible for receiving and responding to complaints in accordance with Condition 113;
   (iv) facilitate an induction and training program for all persons involved with construction activities, mining and environmental management activities; and
   (v) have the authority and independence to require reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts and failing the effectiveness of such steps, to stop work immediately if an adverse impact on the environment is likely to occur.

9. The Applicant shall notify the Director-General, EPA, DLWC, DMR, NPWS, Councils and the Community Consultative Committee (Conditions 107-110) of the name and contact details of the Environmental Officer upon appointment and upon any changes to that appointment.

ENVIRONMENTAL MANAGEMENT STRATEGY

10. The Applicant shall prepare an Environmental Management Strategy (the Strategy) for the development, providing a strategic context for environmental management. All environmental management plans required by the Conditions of this Consent shall be consistent with the Strategy. The Strategy shall be prepared in consultation with the relevant authorities and the Community Consultative Committee and to the satisfaction of the Director-General, prior to commencement of construction.

11. The Strategy shall cover the area of mining, the haul road and rail loading facility, and the Conservation Areas. The Strategy shall include:
   (i) statutory and other obligations which the Applicant is required to fulfill during construction and mining, including all approvals and consultations and agreements required from authorities and other stakeholders, and key legislation and policies;
   (ii) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to environmental management, including the Environmental Officer;
   (iii) overall environmental management objectives and performance outcomes, during construction, mining and decommissioning of the mine, for each of the key environmental elements for which management plans are required under this Consent;
   (iv) overall ecological and community objectives and a strategy for restoration and management, including habitat areas, creeklines and drainage channels, within the context of those objectives;
   (v) identification of cumulative environmental impacts and procedures for dealing with these at each stage of the development;
   (vi) overall objectives and strategies for minimising the impacts of the development on economic productivity;
   (vii) steps to be taken to ensure that all approvals, plans, and procedures are being complied with;
   (viii) processes for conflict resolution in relation to the environmental management of the project; and
   (ix) documentation of the results of consultations undertaken in the development of the Strategy.

12. The Applicant shall make copies of the Environmental Management Strategy available to Councils, EPA, DLWC, NPWS, DMR and the Community Consultative Committee within 14 days of approval by the Director-General.

ENVIRONMENTAL MONITORING AND REPORTING

13. (1) Except as provided in (2), the Applicant shall provide six-monthly monitoring reports on all environmental monitoring required under this Consent for the first three years of the project and for any further period as may be determined necessary by the Director-General. The reports shall contain interpretations of the monitoring data, and summarise exceedances and action taken. The Applicant shall make copies of the monitoring reports available to the Director-General, DLWC, EPA, DMR, Councils and the Community Consultative Committee, and to NPWS where relevant.

(2) Noise monitoring reports shall be provided six-monthly for the life of the mine, unless the Director-General, on the advice of the independent noise expert (Condition 48) requires more frequent reports.

14. All sampling strategies and protocols undertaken as part of any monitoring program shall include a quality assurance/quality control plan and shall require approval from the relevant regulatory agencies to ensure the effectiveness and quality of the monitoring program. Only accredited laboratories shall be used for laboratory analysis.

NOISE AND VIBRATION

Noise Limits:

15. Unless subject to a negotiated agreement in accordance with Condition 23, the Applicant shall ensure that the noise emission from construction or mining operations, when measured or computed at the boundary of any dwelling not owned by the Applicant (or within 30 metres of the dwelling, if the boundary is more than 30 metres from the dwelling), shall not exceed the following noise limits:

Location	**L_{A10}(15 minute) noise limits (dB(A))**	
	Daytime	**Night-time**
Beresfield area (residential)	45	35
Steggles Poultry Farm	50	40
Ebenezer Park Area	46	41
Black Hill Area	40	38
Buchanan and Louth Park Area	38	36
Ashtonfield Area	41	35
Thornton Area	48	40

Note: Daytime is 7am to 10pm Monday – Saturday, and 8am to 10pm Sundays and Public Holidays. Night-time is 10pm to 7am Monday – Saturday, and 10pm to 8am Sundays and Public Holidays.

The noise limits apply for prevailing meteorological conditions (winds up to 3 m/s), except under conditions of temperature inversions.

Noise Management:

16. The Applicant shall prepare and implement a Noise Management Plan to the satisfaction of the Director-General, prior to the commencement of construction. The Applicant shall make copies of

the Noise Management Plan available to the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee within 14 days of approval by the Director-General.

17. The Noise Management Plan shall:
    (i) identify potential noise sources and their relative contribution to noise impacts from the development, including rail noise impacts;
    (ii) specify appropriate intervals for noise monitoring to evaluate, assess and report the $L_{A10\ (15\ minute)}$ noise emission levels due to construction and normal operations of the mine under prevailing weather conditions, or as otherwise determined by the EPA;
    (iii) outline the methodologies to be used, including justification for monitoring intervals, weather conditions, seasonal variations, selecting locations, periods and times of measurements, the design of any noise modelling or other studies, including the means for determining the noise levels emitted by the development;
    (iv) specify measures to be taken to document any higher level of impacts or patterns of temperature inversions, and detail actions to quantify and ameliorate enhanced impacts if they occur; and
    (v) provide details of noise amelioration measures, including measures to be used to reduce the impact of intermittent, low frequency and tonal noise (including truck reversing alarms) and reactive management responses for particular noise sources.

18. The Applicant shall survey and investigate noise reduction measures from plant and equipment and set targets for noise reduction in each AEMR, taking into consideration valid noise complaints received in the previous year. The Report shall also include remedial measures.

19. The Applicant shall revise the Noise Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert (Condition 48), EPA, Councils and the Community Consultative Committee.

20. In the event that a landowner or occupier considers that noise or vibration from the project at their property is in excess of the relevant criteria set out in this Consent, the Applicant shall, upon receipt of a written request and at its own expense immediately undertake direct discussion with the landowners or occupiers affected to determine their concerns. Independent investigations of the noise complaints shall be carried out if the matter is not resolved within six weeks, in accordance with Conditions 48-53.

Noise Acquisition:

21. If noise monitoring or independent noise investigations indicate that noise from construction or operation of the mine at the boundary of a dwelling, or within 30 metres of the dwelling where the boundary is more than 30 metres from the dwelling, is in excess of the noise limits set out in this Consent under adverse weather conditions and if appropriate noise control measures cannot be achieved on the mine site, the landowner may request the Applicant in writing to acquire the whole of the property or such part of the property requested by the landowner where subdivision is approved.

    Note: Adverse weather conditions means the presence of winds up to 3 metres per second, and/or temperature inversions of up to 4 degrees Celsius per 100 metres.

22. Any such request shall be referred to the Director-General for determination in consultation with the independent expert. If the Director-General determines acquisition is necessary, the Applicant shall acquire the property in accordance with Conditions 54-55.

Negotiated agreements:

23. If monitoring or independent investigations indicate that noise or dust from the mine is in excess of the criteria set out in this Consent and the affected landowner does not wish to be acquired, the Applicant shall, if requested by the affected landowner, enter into a negotiated agreement. Where a negotiated agreement is required, the Applicant shall, within the time period specified by the Director-General:
    (i) appoint an independent facilitator, approved by the Director-General;
    (ii) negotiate a package of benefits for the landowner, which may include undertaking noise reduction measures on the property or at the dwelling(s) or compensation;
    (iii) pay all reasonable costs of the process; and
    (iv) report to the Director-General and the EPA on the agreement reached.

BLASTING

Blasting Criteria:

24. The Applicant shall ensure that air blast overpressure of 115dBL and vibration with a peak particle velocity of 5mm/sec shall not be exceeded on more than 5% of the total number of blasts over a period of 12 months at any residence not owned by the Applicant.

Blasting Design and Management:

25. (1) The Applicant shall not blast within 500 metres of an occupied residence.

(2) The Applicant shall not blast within 500 metres of private lands unless there is a written agreement between the Applicant and the landowner/occupier(s) to the satisfaction of the Director-General which guarantees the safety of persons who might use those lands.

(3) The Applicant shall not blast within 500 metres of public lands unless public access to those areas is prevented at times of blasting.

(4) The Applicant shall not blast within 500 metres of a public road unless the road is closed with the prior written agreement of the Regional Traffic Committee (or in the absence of the Regional Traffic Committee, the Director-General). A copy of any such agreement shall be supplied to the Director-General within 14 days of the agreement.

If determined necessary by the Regional Traffic Committee the Applicant shall prepare a Traffic Study to identify upgrading of the surrounding road system commensurate with the additional traffic volumes. The Study shall be prepared in consultation with Councils and the RTA, and to the satisfaction of the Regional Traffic Committee. All recommended traffic management measures and road infrastructure upgrading are to be undertaken at the Applicant's expense prior to any closure of John Renshaw Drive. If the study identifies the need for acquisition to enable the works to be undertaken, acquisition shall occur in accordance with the acquisition procedures established under this Consent.

(5) The 500 metre distance may be reduced by the Director-General if a risk analysis undertaken by the Applicant to the Director-General's requirements indicates a lesser distance provides an appropriate level of safety.

26. The Applicant shall prepare and implement a Blast Management Plan in consultation with DMR and Councils, prior to the commencement of blasting (including trial blasting). The Applicant shall make copies of the Blast Management Plan available to the independent noise expert (Condition

48), EPA, DMR, Councils and the Community Consultative Committee within 14 days of approval by the Director-General.

27. The Blast Management Plan shall:
    (i) provide details of any proposed trial blasting;
    (ii) identify a monitoring program, including locations and justification for selection of locations such as the Steggles Black Hill poultry operations and areas of old underground mine workings;
    (iii) detail measures to ensure that air blast overpressure and vibration monitoring and control is generally carried out in accordance with the recommendations of Australian Standard AS-2187-1993 (or its latest version) and in terms of ANZECC Guidelines;
    (iv) detail methods to measure weather data as soon as practicable prior to blasting and from that data predict whether noise levels are likely to be increased above the levels expected under prevailing metereological conditions;
    (v) detail measures to be taken to minimise disruptions from blasting, including any road closures agreed in accordance with Condition 25, and management of impacts on local traffic and pedestrian movements;
    (vi) specify procedures for ensuring that the occurrence of concurrent blasts with the adjoining coal mine operators is avoided; and
    (vii) identify procedures for notifying landowners/occupiers within 2 km of the site of the general blasting program and for notifying landowners or occupiers within 500m of blasting events (or any reduced area approved by the Director-General under Condition 25(5)) prior to blasting occurring.

28. The Applicant shall not blast if weather conditions indicate that air blast overpressure levels are likely to be exceeded at residences not owned by the Applicant.

29. The Applicant shall report on blasting practices (including any trial blasting), weather data and the results of blast emissions monitoring in the six-monthly environmental monitoring reports and in the AEMR.

30. The Applicant shall revise the Blast Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, the independent noise expert, EPA, DMR, Councils and the Community Consultative Committee.

Blasting Impacts:

31. Prior to the commencement of blasting, the Applicant shall undertake baseline structural surveys of all buildings and structures within 1.5 kilometres of blasting locations, unless it can be demonstrated to the satisfaction of the Director-General in consultation with DMR that surveys of certain properties are unnecessary because blasting damage is unlikely to occur to those properties. In conducting these structural surveys, the Applicant shall ensure that:
    (i) the surveys are carried out by a technically qualified person, as agreed in consultation with the Director-General and relevant landowners; and
    (ii) a copy of any inspection report (including video or photographs, if requested), certified by the person who undertook the inspection, is supplied to the relevant property owner within 14 days of receipt of same.

32. In the event that a landowner or occupier considers that blast emissions from the development may have affected the material condition of their property, the landowner may make a written request to the Director-General for an independent dilapidation assessment. If the Director-General, in consultation with the DMR, is satisfied that an independent investigation is required, the Applicant shall ensure:

(i) the survey is carried out by a technically qualified person, as agreed in consultation with the Director-General and the relevant landowners or occupiers; and

(ii) a copy of any inspection report (including video or photographs, if requested), certified by the person who undertook the inspection, is supplied to the relevant property owner within 14 days of receipt of same.

33. Where a dilapidation assessment concludes that structural damage has occurred as a result of blast emissions, the Applicant shall undertake immediate preventative and/or remedial measures at its expense.

Newcastle Herald's Printing Facilities at Holmwood Business Park:

34. Prior to commencement of mining, the Applicant shall:

(i) conduct ambient vibration monitoring adjacent to (on the floor) and if required, on the most vibration-sensitive component of the printing facilities in order to establish both the levels of ambient vibration generated by the operation of the Printing Facility itself and that of any other nearby vibration sources;

(ii) provide a detailed report on the monitoring procedures and the monitoring results and findings to the Newcastle Herald upon completion of the survey;

(iii) meet with Herald representatives to discuss the results of the survey and determine whether the initially agreed limit of 0.3 mm/s is appropriate; and

(iv) design initial blasting for compliance with a peak particle velocity vibration criterion of 0.3 mm/s adjacent to or on the Printing Facility, unless a more appropriate limit is mutually agreed.

35. The Applicant shall monitor the impacts of blasting on the Printing Facility throughout the life of the mine, at a mutually agreed location in or adjacent to the Printing Facility during every blast. The Applicant shall provide results of the monitoring to the Newcastle Herald and provide a summary in the AEMR.

Hunter Water Corporation Pipelines:

36. The Applicant shall:

(i) ensure that blasting is not carried out within 100 metres of the pipelines;

(ii) ensure that vibration with a peak particle velocity of 10 mm/sec shall not be exceeded on more than 5% of the total number of blasts over a period of 12 months, measured on the pipelines, unless the Director-General, in consultation with DMR and the Hunter Water Corporation, agrees to revised criteria based on the results of monitoring and inspections prove that damage to the cement lining is unlikely; and

(iii) submit a schedule of blasts to the Hunter Water Corporation to assist in management of the pipelines.

AIR QUALITY

Air Quality Criteria:

37. The Applicant shall take all practical steps to manage the mine's operations so that the ambient air quality goals for total suspended particles (TSP) of 90ug/m3 (annual average) and the dust deposition goal of 4gm/m2 (annual average) are not exceeded as a result of the development when monitored at any monitoring location specified in the Air Quality Management Plan.

Air Quality Management:

38. The Applicant shall prepare and implement an Air Quality Management Plan, containing strategies to manage the mine's contribution to dust deposition, TSP, PM_{10} and $PM_{2.5}$ to the satisfaction of the Director-General, prior to the commencement of construction. The Applicant shall make copies of the Air Quality Management Plan available to the independent expert (Condition 48), EPA, Councils and the Community Consultative Committee within 14 days of approval by the Director-General.

39. The Air Quality Management Plan shall:
    (i) identify potential sources of dust deposition, TSP and fine particulates (PM_{10} and $PM_{2.5}$) and specify appropriate monitoring intervals and locations. The purpose of the monitoring is to evaluate, assess and report on these emissions and the ambient impacts with the objective of understanding the mine's contribution to levels of dust deposition, TSP and fine particulates in ambient air around the mine site;
    (ii) provide the mine's monitoring plan having regard to local meteorology and the relevant Australian Standards, identifying the methodologies to be used, including justification for monitoring intervals, weather conditions, seasonal variations, selecting locations, periods and times of measurements;
    (iii) provide the design of any modelling or other studies, including the means for determining the contribution to dust deposition, TSP and fine particulates from the development;
    (iv) provide details of dust suppression measures for all sources of dust from the development (including the haul road and the rail loading site);
    (v) provide details of actions to ameliorate impacts if they exceed the relevant criteria; and
    (vi) provide the design of the reactive management system intended to reduce the day-to-day impacts of dust and fine particulates due to the mine's operation.

40. The Applicant shall ensure the prompt and effective rehabilitation of all disturbed areas as soon as practicable to minimise the generation of dust.

41. The Applicant shall cease offending work at such times when the hourly average wind speed exceeds 5 metres per second and the operations are resulting in visible dust emissions blowing in a direction so as to cross onto public roads or lands not owned by the Applicant.

42. The Applicant shall revise the Air Quality Management Plan as necessary and provide an updated Plan five years after commencement of mining and to the Director-General, independent air quality expert (Condition 48), EPA, Councils and the Community Consultative Committee.

Air Quality Monitoring:

43. The Applicant shall install, maintain and continuously operate a meteorological station in accordance with the relevant Australian Standards and to the satisfaction of the EPA. The meteorological station shall be installed within six weeks of the date of this consent and remain for the life of the mine. The Applicant shall analyse and report the meteorological data on a monthly basis to adequately characterise the site, and shall use the data collected by the wind monitoring and recording station to determine when and how the mine operation is to be modified in accordance with the Air Quality Management Plan and the Conditions of this Consent.

44. The Applicant shall install, maintain and operate dust deposition gauges in accordance with the relevant Australian Standards and to the satisfaction of the EPA. The dust deposition gauges shall be installed and operational within six weeks of the date of this consent and and the Applicant shall determine the dust deposition rate in grams/m2/month in each calendar month so that any increases in dust deposition rates can be presented in the AEMR.

45. (1) The Applicant shall install, maintain and operate an air quality monitoring network in accordance with the relevant Australian Standards and to the satisfaction of the EPA. The network shall be installed and operational within six weeks of the date of this consent and in each calendar year the Applicant shall determine the concentrations of TSP in :g/m^3 (annual average) and fine particulates (PM_{10} and $PM_{2.5}$) in :g/m^3 (24 hour average and annual average) so that the contribution of the mine to regional ambient air quality can be presented in the AEMR.

(2) The Applicant shall also participate in (and if appropriate contribute reasonable funds to) regional air quality studies conducted by or on behalf of the EPA or the Director-General.

Air Quality Acquisition:

46. If dust monitoring or independent dust investigations indicate that dust from operation of the mine at a dwelling is in excess of the criteria set out in this Consent and if appropriate dust control measures cannot be achieved on the mine site, the landowner may request the Applicant in writing to acquire the whole of the property or such part of the property requested by the landowner where subdivision is approved.

47. Any such request shall be referred to the Director-General for determination. If the Director-General determines acquisition is necessary, the Applicant shall acquire the property in accordance with Conditions 54-55.

INDEPENDENT MONITORING OF NOISE, VIBRATION OR DUST

48. The Applicant shall bear the reasonable costs of the appointment by the Director-General of an independent noise and air quality expert(s) and/or mediator to assist in the implementation of the Conditions of this Consent. The independent expert(s) shall:
    (i) receive and advise the Director-General on the Noise, Blast and Air Quality Management Plans;
    (ii) receive and advise the Director-General on noise and dust monitoring results;
    (iii) be responsible for, or supervise, the independent investigation of complaints; and
    (iv) advise the Director-General on the need for acquisition due to noise, vibration or dust.

    The independent expert(s) shall report directly to the Director-General and provide such advice as agreed by the Director-General to the Applicant and the landowner or occupier.

49. In the event that a landowner or occupier considers that noise, vibration and/or dust from the project at their property is in excess of the relevant criteria set out in this Consent the landowner may make a written request to the Applicant for an investigation. If the Director-General, on the advice of the independent expert, is satisfied that an investigation is required, the independent expert shall ensure that:
    (i) direct discussions are undertaken with the landowners or occupiers affected to determine their concerns and to plan and implement an investigation to quantify the impact and determine the sources of the effect;
    (ii) independent investigations are conducted to quantify the impact and determine the source of the effect; and
    (iii) a report is submitted to the Director-General, the Applicant and the landowner or occupier.

50. If exceedances are identified, within six weeks or as otherwise directed by the Director-General, the Applicant shall modify the mining activity which may be causing the impacts and/or enter into a negotiated agreement (Condition 23) with the affected landowner.

51. The Applicant shall bear the cost of the independent investigations and make available plans, programs and other information necessary for the independent expert(s) to form an appreciation of the past, present and future works and their effects on noise, vibration and/or dust emissions.

52. Investigations shall be carried out in accordance with a documented Plan. The Plan shall be designed and implemented to measure and/or compute (with appropriate calibration by measurement) the relevant noise, vibration and/or dust levels at the complainant's residence/property boundary emitted by the development.

53. Further independent investigations shall cease if the Director-General, in consultation with the independent expert, is satisfied that the relevant approval levels are not being exceeded and are unlikely to be exceeded in the future.

ACQUISITION PROCEDURE

54. Upon determination of the Director-General in relation to the purchase of a property in accordance with any Conditions of this Consent, the Applicant shall negotiate and purchase the whole of the property (unless the request specifically requests acquisition of only part of the property and subdivision has already been approved) within six months of receipt of notification from the Director-General. The Applicant shall pay the landowners an acquisition price resulting from proper consideration of:
    (i) a sum not less than the current market value of the owner's interest in the land, whosoever is the occupier, having regard to:
        (a) the existing use and permissible use of the land in accordance with the applicable planning instruments at the date of the written request;
        (b) the presence of improvements on the land and/or any Council approved building or structure which although substantially commenced at the date of the request is completed subsequent to that date; and
        (c) as if the land was unaffected by the development proposal.
    (ii) the owner's reasonable compensation for disturbance allowance and relocation within the Lower Hunter Region;
    (iii) the owner's reasonable costs for obtaining legal advice and expert witnesses for the purposes of determining the acquisition price for the land and the terms upon which it is to be acquired; and
    (iv) the purchase price determined by reference to points (i), (ii) and (iii) shall be reduced by the amount of any compensation awarded to a landowner pursuant to the *Mining Act*, 1992 or other legislation providing for compensation in relation to coal mining but limited to compensation for dwellings, structures and other fixed improvements on the land, unless otherwise determined by the Director-General in consultation with the DMR.

55. Notwithstanding any other Condition of this Consent, the Applicant may, upon request of the landowner, acquire any property affected by the project during the course of this Consent on terms agreed to between the Applicant and the landowner.

INDEPENDENT VALUATION

56. In the event that the Applicant and the landowner cannot agree within three months upon the acquisition price of the land and/or the terms upon which it is to be acquired under the terms of this Consent, then either party may refer the matter to the Director-General who shall request an independent valuation to determine the acquisition price. The independent valuer shall consider any submissions from the landowner and the Applicant in determining the acquisition price.

57. If the independent valuer requires guidance on any contentious legal, planning or other issues, the independent valuer shall refer the matter to the Director-General, who, if satisfied that there is a need for a qualified panel, shall arrange for the constitution of the panel. The panel shall consist of:
    (i) the appointed independent valuer;
    (ii) the Director-General; and/or
    (iii) the President of the Law Society of NSW or nominee.
    The qualified panel shall, on the advice of the valuer, determine the issue referred to it and advise the valuer.

58. The Applicant shall bear the costs of any independent valuation or survey assessment requested by the Director-General.

59. The Applicant shall, within 14 days of receipt of a valuation by the independent valuer, offer in writing to acquire the relevant land at a price not less than the said valuation.

WATER

Water Management:

60. The Applicant shall prepare and implement a Water Management Plan in consultation with DLWC, Councils, EPA and the Hunter Catchment Management Trust, and to the satisfaction of the Director-General, prior to the commencement of construction. The Applicant shall make copies of the Water Management Plan available to the EPA, DLWC, DMR, Councils, the Hunter Catchment Management Trust and the Community Consultative Committee within 14 days of approval by the Director-General.

61. The Water Management Plan shall include but not be limited to:
    (i) management of the impacts of the development on the quality and quantity of surface and groundwater, including water in dirty water dams and clean water diversion dams;
    (ii) stormwater and general surface runoff diversion to ensure separate effective management of clean and dirty water;
    (iii) stormwater management facilities designed to at least a 1:10 year storm design criteria;
    (iv) identification of any possible adverse effects on water supply sources (both surface and groundwater) of landowners or occupiers from the development, and implementation of mitigation measures as necessary;
    (v) identification of the fresh quality groundwater zones within the DA area and appropriate protection strategies;
    (vi) management of the impacts of the development on the quality and quantity of groundwater within 2 kilometres of the boundary of the DA area, with particular attention to mobilisation of salts and contingency plans for managing any adverse impacts;
    (vii) management of the impacts of the development on the quality and quantity of surface water discharged, including scheduling of mining operations to minimise the area excised from the catchment draining to Woodberry Swamp at any one time;
    (viii) identification of a defined buffer zone between the mine pit and Four Mile Creek and measures to minimise the risk of blast-induced fractures in the buffer zone to prevent saline seepage from the rehabilitated landform toward Four Mile Creek in the post-mining period;
    (ix) procedures for the maintenance of drainage systems and water management structures; and
    (x) development of a strategy for the decommissioning of water management structures, including dirty water dams and clean water diversion dams, and long term management of the final void.

62. The Applicant shall revise the Water Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, EPA, DLWC, DMR, Councils, the Hunter Catchment Managemet Trust and the Community Consultative Committee.

Water monitoring:

63. The Applicant shall prepare and implement a detailed monitoring program for groundwater and surface water in consultation with DLWC, EPA, DMR and the Hunter Catchment Managemet Trust, throughout the life of the mine and for a period of at least five years after the completion of mining, or other such period as determined by the Director-General. The results of the monitoring information shall be included in the six-monthly monitoring reports (Condition 13) and the AEMR (Conditions 114-116).

64. The monitoring program shall contain:
    (i) details of proposed monitoring sites, frequency and parameters to be tested;
    (ii) pre-mining baseline data;
    (iii) monitoring of surface water quality to detect any changes in ambient water quality between the mine site and the wetlands;
    (iv) monitoring of macroinvertebrates and vegetation in accordance with protocols developed for the Hunter SIGNAL biological assessment criteria, with an assessment of inflows to the wetlands;
    (v) monitoring of stream stability, stream bank and bed stability;
    (vi) monitoring of the volume and quality of water transfer between the Donaldson and Bloomfield operations; and
    (vii) a program for replacement of any monitoring bores destroyed by the development.

Water Supply:

65. On request of a landowner whose water supply from licensed bore holes or springs has been determined by DLWC at any time to have been affected by the project, the Applicant shall replace lost water supply with water of an equivalent quality and quantity to meet the landowner's requirements, to the satisfaction of DLWC.

EROSION AND SEDIMENT CONTROL

66. The Applicant shall prepare and implement an Erosion and Sediment Control Plan(s) for the development (including the haul road and the relocation of utilities and services) to the satisfaction of DLWC and submit these Plans to the EPA as part of applications for a licence under the *Protection of the Environment Operations Act*. The Plan(s) shall be prepared prior to the commencement of work in the relevant areas. The Applicant shall make copies of all Erosion and Sediment Control Plan(s) available to the Director-General, Councils and the Community Consultative Committee within 14 days of approval.

67. The Erosion and Sediment Control Plan(s) shall include consideration and management of erosion and sedimentation of watercourses and waterbodies, including Woodberry Swamp.

FLORA AND FAUNA

Tetratheca juncea Conservation Area:

68. Prior to the commencement of construction, the Applicant shall:

(i) undertake a survey of potential *Tetratheca juncea* habitat in the southwest portion of the site. The survey shall:
   (a) be undertaken by a suitably qualified botanist, with the assistance of a suitably qualified surveyor, both approved by the Director-General;
   (b) re-examine the outcomes of previous surveys;
   (c) be undertaken between the months of August and December (inclusive);
   (d) record the location of *Tetratheca juncea* clumps on the ground using suitable tags and by using either theodolite and electronic measuring equipment or differential GPS;
   (e) investigate the occurrence of any native sonicating bee habitat within 500 metres of the Tetratheca juncea population; and

(ii) establish a Conservation Area for the *Tetratheca juncea* based on the findings of the survey. The Conservation Area shall include a 50 metre buffer. The boundaries of the Conservation Area shall be surveyed and marked by a suitably qualified surveyor, with the assistance of a botanist, using either a theodolite and electronic measuring equipment or differential GPS. No clearing, construction or mining shall commence until the boundary of the Conservation Area has been approved by the Director-General.

69. The Applicant shall prepare a Management Plan for the *Tetratheca juncea* Conservation Area in consultation with NPWS and to the satisfaction of the Director-General, prior to commencement of construction. The Plan shall be consistent with the Flora and Fauna Management Plan (Conditions 76-79); and include measures for fire management. The Applicant shall clearly mark the boundary of the Conservation Area and make provision for signage which specify that no dumping, clearing or other works are permitted in the Conservation Area. Such signage shall be replaced as required. The Applicant shall make copies of the *Tetratheca juncea* Management Plan available to NPWS, Councils and the Community Consultative Committee within 14 days of approval by the Director-General.

BUSHLAND AREA

70. Within six months of this Consent, or as otherwise agreed by the Director-General, the Applicant shall identify a bushland area(s) in the region that will adequately compensate for the impact of the mine on biodiversity, provide compensatory habitat and be managed for the primary purposes of conservation. The area shall be identified in consultation with NPWS and Councils and be to the satisfaction of the Director-General. Identification of the bushland area(s) shall include:
   (i) a detailed assessment of the current characteristics and ecological values of existing ecosystems affected by the mine, including the habitat of threatened species identified in the EIS as possibly occurring in the area and the Spotted Gum Ironbark community;
   (ii) identification of conservation objectives to be achieved by the establishment of the bushland area(s), with reference to the Regional Biodiversity Strategy and the principles of Ecologically Sustainable Development;
   (iii) consideration of alternative locations within the region, including, but not limited to, the land proposed as compensatory area in the EIS (ie land adjoining the mine site);
   (iv) a detailed assessment of appropriate boundaries, size and shape of the bushland area(s), in relation to the characteristics, values and objectives;
   (v) consideration of appropriate management options necessary to protect the conservation values; and
   (vi) consideration of opportunities to incorporate cultural heritage conservation into the bushland area(s).

71. In identifying the bushland area(s), the following broad criteria shall be applied:
   (i) a ratio of 2:1 in terms of compensatory area to the area to be directly impacted by mining and associated infrastructure;

(ii) the vegetation communities and habitat values of the bushland area(s) are to be broadly representative of the area which will be subject to mining and contain a similar suite of fauna species;
(iii) the location of the bushland area(s) will aim to consolidate existing reserves in the lower Hunter Area; and
(iv) reserve design criteria, including edge-to-area ratio, size and connectivity shall be taken into account.

72. Upon approval of the identified bushland area(s) by the Director-General, the Applicant shall:
(i) secure care, control and management of the bushland area(s) prior to the commencement of mining;
(ii) retain management and ownership of the land for a minimum of 36 years from the commencement of construction, unless other arrangements are agreed in accordance with Condition 73; and
(iii) prepare and implement a Management Plan for that area in consultation with NPWS and to the satisfaction of the Director-General, during the period in which the Applicant is responsible for management. The Management Plan shall be consistent with the Flora and Fauna Management Plan (Conditions 76-79) and consider the integration of cultural conservation objectives and management. The Applicant shall make copies of the Management Plan available to NPWS and the Community Consultative Committee within 14 days of approval by the Director-General.

For the purposes of the Conditions of this Consent, the bushland area(s) approved by the Director-General shall be known as the Bushland Conservation Area until the completion of the period referred to in Condition 72(ii) and any Conditions relating to Conservation Areas shall apply to that area during that period. The Management Plan referred to in Condition 72(iii) shall be referred to as the Bushland Conservation Area Management Plan.

73. The Applicant shall undertake negotiations with the NPWS and Councils to reach agreement on the long term tenure and management status of the Bushland Conservation Area. These negotiations must commence within six months of commencement of construction.

74. The Applicant shall revise the Bushland Conservation Area Management Plan as considered necessary by the Director-General after review by the independent expert and provide an updated Plan five years after commencement of mining to the Director-General, NPWS, Councils and the Community Consultative Committee.

Flora and Fauna Management:

75. The Applicant shall bear the reasonable costs of the appointment by the Director-General of an independent flora and fauna expert(s) to assist in the implementation of the Conditions of this Consent. The independent expert(s) shall:
(i) be selected in consultation with the applicant;
(ii) assess and advise the Director-General on the Applicant's proposed Conservation Areas and Management Plans for those areas;
(iii) assess and advise the Director-General on the Applicant's proposed bushland area(s);
(iv) assess and advise the Director-General on the Applicant's proposed Flora and Fauna Management Plan and the Rehabilitation Plan; and
(v) assess and advise the Director-General on the Applicant's monitoring of flora and fauna management and rehabilitation.

76. The Applicant shall prepare and implement a Flora and Fauna Management Plan for the mine site (in addition to the management plans for specific Conservation Areas), in consultation with DLWC,

NPWS and Councils, and to the satisfaction of the Director-General, prior to the commencement of construction. The Applicant shall make copies of the Flora and Fauna Management Plan available to DLWC, NPWS, Councils and the Community Consultative Committee within 14 days of approval by the Director-General.

77. The Flora and Fauna Management Plan shall include but not be limited to:
    (i) additional surveys to more precisely identify the distribution of known and potential nest and roost trees for owl species. The surveys shall:
        (a) be undertaken by a person experienced in the identification of owl nest and roost trees, approved by the Director-General; and
        (b) record the location of known and potential nest and roost trees on the ground by marking the tree and by using either theodolite and electronic measuring equipment or differential GPS;
    (ii) a vegetation map delineating major vegetation communities, topographic features and the location of threatened species habitats, including potential and known owl nest and roost trees;
    (iii) details of measures to manage the impacts of the development, including:
        (a) restoration of degraded areas;
        (b) management of invasive weed species and feral animals;
        (c) establishment of an appropriate hazard reduction regime which is in keeping with the ecological values of the area;
        (d) revegetation and the provision of compensatory areas of equivalent ecological and habitat value where necessary; and
        (e) strategies to provide increased security for existing habitats and communities;
    (iv) details of measures to manage the impacts of environmental management on flora and fauna, including the impact of erosion and sediment control measures and hazard reduction burning;
    (v) priorities for action and a timetable for all works outlined in the Plan; and
    (vi) a program to monitor flora and fauna impacts on undisturbed portions of the mining lease area and downstream environments (such as the Woodberry Swamp). The program shall extend for the life of the mine and for a period thereafter as approved by the Director-General, and include:
        (a) justification for monitoring intervals and locations;
        (b) monitoring of the presence and persistence of native flora and fauna species over time, particularly threatened species; and
        (c) monitoring the effectiveness of management measures.

78. The Flora and Fauna Management Plan shall also include a Rehabilitation Plan that details the measures to be undertaken to progressively rehabilitate disturbed areas of the mine to replicate the original vegetation cover that existed before mining occurred. The Applicant shall be responsible for the management and monitoring of the rehabilitated mine site until such time as the Director-General agrees that restoration has been successful.

79. The Applicant shall revise the Flora and Fauna Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, NPWS, Councils and the Community Consultative Committee.

80. The Applicant shall participate in (and if appropriate, contribute such reasonable funds as determined by the Director-General in consultation with NPWS) research into the Powerful Owl and Masked Owl habitat requirements in the region, and the habitat requirements and lifecycle of *Tetratheca juncea*.

HERITAGE

Heritage Statutory Requirements:

81. Prior to commencement of construction, the Applicant shall:
    (i) comply with the statutory requirements of NPWS in relation to works affecting Aboriginal sites; and
    (ii) undertake a targeted archaeological survey of the slopes component within the mining impact area in cooperation with the Aboriginal community. Any Aboriginal sites located will be recorded, the significance of the sites assessed, and management strategies for the sites identified.

82. If, during the course of construction, the Applicant becomes aware of any heritage or archaeological material, all work likely to affect the material shall cease immediately and the relevant authorities consulted about an appropriate course of action prior to recommencement of work. The relevant authorities may include NPWS, the Heritage Office, and the Local Aboriginal Land Councils. Any necessary permits or consents shall be obtained and complied with prior to recommencement of work.

Aboriginal Heritage Management:

83. Prior to commencement of construction, the Applicant shall establish an Aboriginal Conservation Area along Four Mile Creek and tributaries in accordance with a plan approved by the Director-General. The plan shall include:
    (i) identification of an appropriate boundary and the basis on which the boundary has been selected;
    (ii) a map at a scale of 1:1000 or larger which clearly delineates the Conservation Area boundary and specific features; and
    (iii) documentation of consultations with NPWS and Aboriginal community groups in relation to the definition of the Conservation Area.

84. The Applicant shall prepare and implement an Aboriginal Sites Management Plan in consultation with the Aboriginal community, Councils and NPWS, and to the satisfaction of the Director-General, prior to the commencement of construction. The Applicant shall make copies of the Aboriginal Sites Management Plan available to the Director-General, Aboriginal community, Councils and the Community Consultative Committee within 14 days of approval by NPWS.

85. The Management Plan shall include, but not be limited to:
    (i) documentation of consultation with the relevant Aboriginal community groups to identify any outstanding concerns they may have with the project and a clear statement about how these concerns will be addressed, including any action to be taken;
    (ii) identification of conservation objectives for the site as a whole and for the Conservation Area specifically;
    (iii) a program to monitor the impacts of the development on the Conservation Area, including justification for monitoring locations and intervals;
    (iv) strategies to achieve conservation objectives, including an access policy;
    (v) the provision of fencing to permit faunal movement and the removal of fencing within six months of completion of mining;
    (vi) further investigations; and
    (vii) long term management requirements upon completion of mining.

86. The Applicant shall revise the Aboriginal Sites Management Plan as necessary and provide an updated Plan five years after commencement of mining to the Director-General, NPWS, Councils and the Community Consultative Committee.

WASTE

87. The Applicant shall prepare and implement a Waste Management Plan in consultation with EPA, DMR and the Hunter Waste Planning and Management Board, and to the satisfaction of the Director-General, prior to commencement of construction. The Applicant shall make copies of the Waste Management Plan available to Councils and the Community Consultative Committee within 14 days of approval by the Director-General.

88. The Waste Management Plan shall include, but not be limited to the management of the mine site to prevent dumping of waste; and the management and treatment of Potentially Acid Forming waste.

89. The Applicant shall meet the requirements of Councils, EPA and Hunter Water Corporation with respect to water and sewer.

VISUAL AMENITY

Landscaping:

90. The Applicant shall provide a minimum of 50 metres of landscaping between the outer edge of the bund wall and the edge of John Renshaw Drive. The 50 metres may include landscaping within the road verge if agreed by Cessnock Council.

91. The Applicant shall, within three months of the date of this Consent, or within such further period as Councils may require, submit for the Councils' approval a detailed Landscaping Plan covering all land within the proposed mining area (including the haul road and transmission line easements) and road reserve along the frontage to John Renshaw Drive. The Applicant shall engage a suitably qualified person to assist in the landscaping plan.

92. The Landscaping Plan shall be consistent with the Environmental Management Strategy and include:
    (i) provision for the establishment of trees and shrubs and the construction of mounding or bunding along the planned highwall and any other areas identified as necessary by the Councils for the maintenance of satisfactory visual amenity and the re-establishment of flora and fauna habitats and corridors;
    (ii) appropriate erosion control and sediment control practices for earthworks associated with the landscaping;
    (iii) details of the visual appearance of all buildings, structures, facilities or works (including paint colours and specifications). Buildings and structures shall be designed and constructed so as to present a neat and orderly appearance and to blend as far as possible with the surrounding landscape; and
    (iv) details, specifications and staged work programs to be undertaken, including a maintenance program of all landscape works, building materials and cladding.

93. The Applicant shall implement the approved Plan in accordance with Councils' requirements and make copies available to the Community Consultative Committee within 14 days of approval by Councils.

94. The Applicant shall plant screening vegetation on properties at higher elevation and with views across the mine site in the Black Hill area if requested in writing by the landowner, within three months of that request. The species, density and location of the plantings shall be determined in consultation with the landowner.

95. The Applicant shall lodge a landscaping bond with Cessnock Council, to a maximum of $10,000 at any one time, for landscaping during the life of mine. This bond does not affect rehabilitation works covered by the *Mining Act*.

Lighting:

96. The Applicant shall screen or direct all onsite lighting and vehicle lights away from residences and roadways to the satisfaction of Councils. All screening to be completed prior to commissioning of the coal preparation plant and associated facilities.

HAZARDS, RISKS AND SAFETY

97. The Applicant shall:
    (i) provide adequate fire protection works on site. This shall include one fully equipped fire fighting unit on standby and hazard reduction works at a time determined by the relevant Council, with particular attention to boundaries of adjoining land holdings;
    (ii) submit an annual report on fire management activities to the local Bush Fire Management Committee; and
    (iii) ensure that all dangerous goods and materials stored on site are stored in accordance with the relevant Australian standards.

UTILITIES AND SERVICES

98. The Applicant shall consult with affected service authorities and make arrangements satisfactory to those authorities for the protection or relocation of utilities and services (such as transmission lines and pipelines) at the Applicant's expense, prior to any existing utilities or services being affected by mining activity. Relocation of utilities and services shall be conducted in accordance with the relevant Management Plans and the Erosion and Sediment Control Plan(s).

TRANSPORT AND ACCESS

99. Prior to commencement of construction, or as otherwise agreed by the Councils, the Applicant shall design, construct and seal the private haul road and access road to the satisfaction of the Councils, and with consideration of the impact on the fragmentation of fauna habitat and fauna movement.

100. No coal shall be hauled on public roads.

101. The Applicant shall carry out intersection improvements as determined necessary by the Regional Traffic Committee as a result of the development and by such times as directed by the Regional Traffic Committee.

102. If closure of John Renshaw Drive is agreed by the Regional Traffic Committee under Condition 25(4), the Applicant shall:
    (i) pay $20,000 to Cessnock City Council to upgrade the alignment and surface of the unsealed western end of Black Hill Road;

(ii) provide a water cart and apply water to the unsealed western end of Black Hill Road to the requirements of Cessnock City Council prior to each closure of John Renshaw Drive for blasting; and

(iii) prepare a Traffic Management Plan for the approval of the RTA in relating to the closure of John Renshaw Drive during blasting.

103. The Applicant shall provide for signalling of the Bloomfield rail loop to the satisfaction of Freight Corp prior to the commencement of mining.

INITIAL COAL WASHING

104. Upon commencement of coal extraction, the Applicant shall initially make use of the coal preparation plant (CPP) at the adjoining Bloomfield coal mine for up to two years from commencement of mining or such other period as approved by the Director-General. This will allow the Applicant to:

(i) trial the washing of Donaldson coal to assist in the determination of its washing characteristics; and

(ii) commence the earliest possible coal extraction at Donaldson, and hence hasten project completion.

105. The haulage route for raw coal from the Donaldson pit to the Bloomfield CPP shall be the same as that proposed for haulage of product coal from the proposed Donaldson CPP to the existing Bloomfield rail loading facility up to the point of intersection with the Bloomfield Mine access road, and thence westward along the Bloomfield Mine access road to the CPP, unless otherwise agreed to with the owners of Bloomfield. However, any variation to the route shall be considered to determine whether a modification to this Consent is required to enable the variation.

106. The Applicant shall notify the Director-General within eighteen months of the commencement of mining as to the results of the Bloomfield washery trials.

COMMUNITY INVOLVEMENT

Community Consultative Committee:

107. The Applicant shall establish a Community Consultative Committee which shall be chaired by an independent chairperson approved by the Director-General. Selection of representatives shall be agreed by the Director-General and include (unless otherwise agreed by the Director-General) two representatives from the Applicant (including the Environmental Officer), four community representatives (including a representative of the local Aboriginal Community) and representatives of the local Councils. Representatives from relevant government agencies (including DUAP) may be invited to attend meetings of the Committee as required.

108. The Committee may make comments and recommendations about the implementation of the development. The Applicant shall ensure that the Committee has access to the necessary plans and/or studies for such purposes. The Applicant shall consider the recommendations and comments of the Committee and provide a response to the Committee and the Director-General.

109. The Applicant shall, at its own expense:

(i) provide appropriate facilities for meetings of the Committee;

(ii) nominate a representative to attend all meetings of the Committee;

(iii) ensure that the first meeting is held prior to commencement of construction, that meetings are held at least every six months for the first 24 months from the date of the mining lease and at least annually thereafter;
(iv) provide to the Committee regular information on the progress of the work and monitoring results;
(v) promptly provide to the Committee such other information as the Chairperson of the Committee may reasonably request concerning the environmental performance of the development; and
(vi) provide reasonable access for site inspections by the Committee.

110. The Applicant shall establish a trust fund to be managed by the Chairperson of the Committee to facilitate functioning of the Committee, and pay $2000 per annum to the fund for the duration of mining operations. The payment shall be indexed according to the Consumer Price Index (CPI) at the time of payment. The first payment shall be made by the date of the first Committee meeting.

Community Information:

111. The Applicant shall, in consultation with Councils, ensure that the local community is kept informed (by way of local newsletters, leaflets, newspaper advertisements and community notice boards as appropriate) of the progress of the project, including prior notice of:
(i) the nature of works proposed for the forthcoming period;
(ii) hours of construction;
(iii) a 24 hour contact telephone number;
(iv) any traffic disruptions and controls;
(v) proposed blasting program, and any changes to the program;
(vi) work required outside the normal working hours; and
(vii) individuals' rights under the Conditions of this Consent (such as the rights for acquisition or independent monitoring) and mechanisms proposed to be used to safeguard the community and individual properties against adverse impacts from the development.

112. The Applicant shall ensure that the AEMR, minutes from Community Consultative Committee meetings and results and interpretation of monitoring required by this Consent are placed on the Internet for public information within 14 days after they are available. The Internet address is to be made publicly available.

Complaints:

113. (1) The Applicant shall record details of all complaints received in an up to date log book, and ensure that a response is provided to the complainant within 24 hours.

(2) If the Applicant's response does not address the complaint to the satisfaction of the complainant within six weeks, the Applicant shall refer the matter to an independent mediator (approved by the Director-General) and bear the costs of such mediation. The Applicant shall immediately carry out such works as agreed through the mediation process.

(3) The Applicant shall make available a report on complaints received every three months to the Community Consultative Committee and to relevant government agencies and the Councils upon request; and include a summary in the AEMRs. The report shall include the number of complaints that have been resolved with or without mediation.

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

114. The Applicant shall prepare and submit an Annual Environmental Management Report (AEMR) throughout the life of the mine to the satisfaction of the Director-General. The AEMR shall review the performance of the mine against the Environmental Management Strategy and the Conditions of this Consent, and other licences and approvals relating to the mine. To enable ready comparison with the EIS's predictions, diagrams and tables, the report shall include, but not be limited to, the following matters:
    (i) an annual compliance audit of the performance of the project against Conditions of this Consent and statutory approvals;
    (ii) a review of the effectiveness of the environmental management of the mine in terms of EPA, DLWC, DMR, and the Councils' requirements and provide an explanation of any variance;
    (iii) results of all environmental monitoring required under this Consent or other approvals, including interpretations and discussion by a suitably qualified person;
    (iv) identification of trends in monitoring results over the life of the mine;
    (v) a comparison of the actual impacts with predictions made in the EIS and supporting documents;
    (vi) a review of the social impact of the mine, including mitigation works and acquisition;
    (vii) a listing of any variations obtained to approvals applicable to the subject area during the previous year;
    (viii) the outcome of the water budget for the year, the quantity of water used from water storages and details of discharge of any water from the site;
    (ix) rehabilitation report; and
    (x) environmental management targets and strategies for the next year, taking into account identified trends in monitoring results.

115. In preparing the AEMR, the Applicant shall:
    (i) consult with the Director-General during preparation of each report for any additional requirements;
    (ii) comply with any requirements of the Director-General or other relevant government agency and with any guidelines current at the time of reporting; and
    (iii) ensure that the first report is completed and submitted within 12 months of this Consent, or at a date determined by the Director-General in consultation with the DMR and the EPA.

116. The Applicant shall ensure that copies of each AEMR are submitted at the same time to DUAP, EPA, DLWC, NPWS, Councils and the Community Consultative Committee, and made available for public information at Councils within 14 days of submission to these authorities.

Note: The AEMR should be the same document submitted to the DMR as part of its mining lease requirements, and as such should also be prepared in accordance with DMR guidelines.

INDEPENDENT ENVIRONMENTAL AUDIT

117. At two yearly intervals after commencement of mining, at the completion of mining and at any additional time as the Director-General may direct, the Applicant shall arrange for an independent environmental audit of the development. The audit shall be conducted by an auditor approved by the Director-General, and shall be conducted pursuant to ISO 14010 – Guidelines and General Principles for Environmental Auditing, ISO 14011 – Procedures for Environmental Auditing (or the current versions) and any specifications of the Director-General. The Applicant shall submit eight copies of the report to the Director-General, who shall provide a copy to the EPA, DLWC, DMR, the Councils and the Community Consultative Committee.

118. The audit shall:

(i) assess compliance with the requirements of this Consent, licences and approvals;
(ii) review the effectiveness of the environmental management of the mine, including any mitigation works;
(iii) be carried out at the Applicant's expense; and
(iv) be conducted by a duly qualified independent person or team approved by the Director-General in consultation with the Councils.

119. The Director-General may, after assessing compliance in accordance with this Consent and after considering any submission made by the EPA, DLWC, DMR, the Councils or the Community Consultative Committee on the report, notify the Applicant of any reasonable requirements for compliance with this Consent. The Applicant shall comply with those requirements within such time as the Director-General may require.

COMPLIANCE

120. The Applicant shall comply or ensure compliance with all requirements of the Director-General in respect of the implementation of any measures arising from the Conditions of this Consent. The Applicant shall bring to the attention of the Director-General any matter that may require further investigation and the issuing of instructions from the Director-General. The Applicant shall ensure that these instructions are implemented to the satisfaction of the Director-General within such time that the Director-General may specify. If necessary, the Director-General may order the Applicant to cease work until non-compliance has been addressed to her satisfaction.

121. The Applicant shall submit for the approval of the Director-General compliance reports concerning the implementation of Conditions of this Consent as applicable:
(i) before the commencement of construction works; and
(ii) before the commencement of mining.

Y2K COMPLIANCE

122. One month prior to the commencement of operation of any automated system, included embedded systems, used for operation, pollution control, monitoring and safety (including fire safety), the Applicant shall provide the Director-General with a report confirming that the system(s) has been tested in accordance with the most recent edition of BSI/DISC PD2000-1 to confirm continuous time and date functionality of that system.

DISPUTE RESOLUTION

123. In the event that the Applicant and an individual, the Councils or a Government agency, other than DUAP, cannot agree on the specification or requirements applicable under this Consent, the matter shall be referred by either party to the Director-General or if not resolved within six months, to the Minister for Urban Affairs and Planning, whose determination of the disagreement shall be final and binding on the parties.

OTHER ISSUES

124. The Applicant shall participate in (including a financial contribution if appropriate, to a maximum of $10,000) the preparation of a revised Planning Strategy for the Thornton-Beresfield area. Any such financial contribution shall be paid as directed by the Director-General and any amounts not expended in the review upon completion of mining shall be refunded to the Applicant.

125. The Applicant shall provide reasonable funding to Councils for independent counselling services for any landowner within 1.5 kilometres of the mining lease area who may request support on stress-related matters resulting from the development.

126. Within six months of the date of this Consent and in each AEMR thereafter, the Applicant shall report to the Director-General on the number of personnel employed by the mine in construction, mining and environmental management during that reporting period. The report shall compare the employment figures with those predicted in the EIS.

Supplementary Note:
Nothing in these Conditions removes or lessens any obligations by the Applicant under the mining lease or mining legislation in relation to matters covered by these Conditions.

SCHEDULE 4:

Supplementary reports to the EIS:

Title	Author	Date
Amended Mine Plan	Donaldson Projects	August 1998
Air Quality Assessment	Holmes Air Scientists	August 1998
Supplementary Assessment of Flora and Fauna	Gunninah Environmental Consultants	August 1998
Threatened Species Issues - Supplementary Information and Section 5A assessments of significance	Gunninah Environmental Consultants	May 1998
Erosion and Sediment Control Plan	Global Soil Systems	August 1998
Soil and Land Capability Survey Report	Global Soil Systems	August 1998
Supplementary Report on Temporary Closure of John Renshaw Drive During Blasting Operations	Project Planning Associates	August 1998
Supplementary Report on Visual Impacts and Landuse Planning Issues	Mike George Planning	August 1998
Supplementary Noise and Blasting Impact Assessment	Richard Heggie Associates	August 1998
Additional Water Management Studies	Mackie Environmental Research	August 1998

Appendix B

Letter from Hon. Mr Milton Morris re: Community Consultative Committee

COPY

Hon. Milton Morris, A.O.
East Greta Junction,
Maitland. 2320
Phone: (02) 4932 4222
Facsimile: (02) 4932 4544

10th November, 2004

Mr Sam Haddad BE (Chem) M App Sc (Env) MBE
Deputy Director General
Department of Infrastructure, Planning and Natural Resources
GPO Box 3927
SYDNEY NSW 2001

Dear Mr Haddad,

Re: Donaldson Community Consultative Committee – Response to the Proposed Modification to Donaldson Coal Mining Area

As you are aware I have chaired the Donaldson Consultative Committee since the approval was given for the Donaldson Open Cut Coal Mine in October 1999.

At a special briefing meeting of the Consultative Committee on 28th October 2004 held at the Donaldson Mine, Donaldson representatives advised the Committee of the Company's intention to seek approval for a minor extension to the open cut pit.

At the meeting, Company representatives gave a presentation on the proposed change to the mining plan comprising an area of 7.5 ha to the south east of the current operations to extract an extra 644,200 tonnes of coal which otherwise would be sterilised. An aerial map was tabled showing the proposed extension which represents an additional 2-1/2% to the size of the open cut pit.

Following the meeting, a tour of the mine site was undertaken where Company representatives identified the area of the proposed extension.

The community representatives on the Committee who were present (Mrs Maureen Langman, Mr Stephen Wright and Dr Greg Steele) raised no objections to the proposed changes and were supportive of the ongoing operations of the Coal Mine. I have also spoken to members of the Committee who were unable to be at the meeting including the Mayor of Maitland, Councillor Peter Blackmore and Professor Brian English, Deputy Vice Chancellor, University of Newcastle. The proposed extension has their support.

During my time as Chairman of this Committee I have been continually encouraged by the high level of support offered to the project by Committee

COPY

members. I believe this has been as a direct result of the Company's management and environmental performance of the operations and the Company's ongoing commitment to maintain an open and direct communication link not just with the Committee members but with the local community.

I would be happy to discuss the Donaldson project with you or your officers should that be required.

Yours sincerely,

MILTON MORRIS

Mam.gg

Appendix C

Correspondence from Mindaribba LALC

Mindaribba Local Aboriginal Land Council

Gordon Griffths — Telephone №. 4934 8511
Coordinator — Fax №. 4934 8544
ABN 82826020881
E-mail address mlalccdep@yahoo.com.au

Mr. Phillip Brown
Donaldson Coal PTY LTD
P.O.Box 2275
Green hills 2323
N.S.W

Dear Phillip,

This letter is to advise that Mindaribba Local Aboriginal Land Council have perused Aboriginal Sites Management Plan Year3: Donaldson Open Cut Mine, Beresfield N.S.W

We agree with the contents of the report.

M.L.A.L.C would like to endorse the contents of the draft plan in its entirety.

We look forward to developing A.S.M.P Year 4 and the subsequent years of the operation of the mine.

- M.L.A.L.C should be primary contact for Aboriginal cultural, heritage and conservation areas assessment within the mining area.
- Continued communication and consultation to ensure any issues that arise may be dealt with effectively.
- Conservation areas to be adequately fenced to ensure protection.

In previous surface surveys of the area isolated artifacts were identified and recorded. Further field studies with members of M.L.AL.C failed to locate those artifacts. Therefore M.L.A.L.C support your application for a Consent Destroy to N.P.W.S

Yours Sincerely

G Griffiths

Gordon Griffiths
Co-ordinator M.L.A.L.C
14/10/03

1a Chelmsford Drive
Metford NSW 2323
PO Box 398
East Maitland NSW 2323

Appendix D

Soil and Land Capability Survey

F I N A L R E P O R T

Soil & Land Capability Survey

Extension of Existing Mining Strips of the Donaldson Open Cut Coal Mine, Cessnock City and Maitland City Areas, NSW.

Prepared for

Donaldson Coal Pty Ltd

Mr Doug Gordon
General Manager
PO Box 2275
GREENHILLS, NSW, 2320

August 2004.

DON 1- 8

Soil & Land Capability Survey Report

Donaldson Coal Pty Ltd (DCPL)

Extension of Existing Mining Strips Donaldson Open Cut Coal Mine, Cessnock LGA, NSW.

Mining Lease No.1461

Department of Infrastructure, Planning and Natural Resources.

ISSUE AND AMENDMENT CONTROL HISTORY

Issue	Date	Description	Author	QA/QC
# 1 (Draft)		Issued to DCPL.	Rod Masters	A Hutton
#2 (Final)		Issued to DCPL	Rod Masters	A Hutton

Description *Master:* ***GSS Environmental***
Copy 1: Phil Brown (DCPL)

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Appendix 3: **Soil Test Results**

1.0 INTRODUCTION

1.1 Project Overview

The Donaldson open cut coal mine is located about 23 km from the port of Newcastle, north of John Renshaw Drive and west of Weakleys Drive. The mine has been in operation since January 2001 and approximately 6.7 million tones of Run-Of-Mine (ROM) coal has been extracted during that time. The mine is owned and managed by Donaldson Coal Pty Ltd (DCPL) under the Development Consent dated 14 October 1999 and the Mining Lease No. 1461. The development consent allows for the extraction of coal over an eleven (11) year period, with a total of 20.091 million tonnes of ROM coal to be mined under the current mine plan.

DCPL seeks a modification to the existing Development Consent to allow the extraction of an additional 644,200 tonnes of ROM coal. The additional coal would be sourced from within the existing mining lease area by the minor extension of eight mining strips sourced from a 7.2 hectare area. The extension area equates to a 2.5% increase in disturbed surface area of the mine, and would be mined using the same methods, equipment and infrastructure as the existing mine. The per annum extraction rate for the mine would not be increased, and the life of the mine would be extended by four (4) months.

GSS Environmental has been commissioned by DCPL to conduct a soil & land capability survey of the extension area, for inclusion in a "Statement of Environmental Effects" to accompany the application for modification of the development consent under Section 96 of the Environmental Planning and Assessment Act (EPAA), 1979.

1.2 Mine Approvals and Operations

On the 13 February 1998 an application (DA 98/01173) was lodged with Maitland City Council (MCC), and on the 19 February 1998 an application (DA 118/698/22) was lodged with Cessnock City Council (CCC), for the development of the Donaldson Coal Mine on Exploration Licence EL5071.

The Minister for Urban Affairs and Planning granted development consent on the 14 October 1999 for Donaldson Coal Mine.

Amongst other approvals, and in addition to the development consent, DCPL holds Mining Lease No. 1461 under the Mining Act, 1992, granted by the Minister for Mineral Resources on 22 December 1999 for the mining of coal.

Coal is extracted in a truck and shovel in an open cut operation at a rate of up to 2.5 million tones per year with resources for an eleven (11) year mine life. Cooks Construction Pty Ltd conduct mining under a long term contract.

1.3 Proposed Mine Modification

Donaldson Coal mine seek a modification to the approved Development Consent to allow open cut coal extraction in an additional area adjacent to the existing mine end wall. The proposed site is on the south eastern edge of the approved mining area, and is remote from residential areas. Mining in this extension area would allow an additional 644,200 tonnes of ROM coal to be produced by DPCL. The per annum coal and overburden extraction rates for the mine would not be increased, which would result in the life of the mine being extended by an additional four (4) months.

Under this proposal the completion date of mining would occur on the October 2010, which is still within the approved eleven (11) year life of the mine. It is proposed that the coal would be mined from the same four (4) discreet coal seams that are currently being mined. The proposed extension area increases the footprint of the mine by about 7.2 ha, and is contained wholly within the approved mining lease area ML1461.

Under the proposal the approved mining sequence would be unchanged other than the lengthening of the strips by up to 100m, and the area would be mined discontinuously over a two (2) or three (3) year period. The coal would be mined using the same terrace/strip mining methods as for the approved mine, and there would be no additional equipment or infrastructure required to extract the coal. The existing methods of environmental management for Donaldson Coal mine would also be applied to the extension area to manage any potential environmental impacts.

2.0 SITE DESCRIPTION

2.1 Site Features and Locality

Donaldson Coal mine is located near Beresfield in the Lower Hunter Valley. The township of Beresfield is located to the east of Donaldson Coal mine. Avalon Forest (Thornton) is to the northeast, while Ashtonfield and East Maitland are to the north. The Blackhill community is to the southwest of Donaldson Coal mine.

The proposed minor extension area directly adjoins the approved Donaldson active mine area, incorporating strips 16 to 23. The proposed minor extension area is to the south east of the active mine area. To the immediate east of the minor extension area is the Weakleys Flat Creek, with John Renshaw Drive being to the south. The closest residential areas to the proposed minor extension are scattered rural residential farms in the Black Hill area.

The proposed minor extension area is located within the Catchment of Weakleys Flat Creek, which drains to Woodberry Swamp, and eventually to the Hunter River via Greenways Creek. The proposed minor extension area consists largely of previously disturbed natural bushland. The area contains one (1) tributary of Weakleys Flat Creek through it, which has had its catchment largely lost through the construction of the approved mine out of pit emplacement area, a large 500ML mine water storage dam and the workshop and office facilities.

2.2 Status of Land

The proposed minor extension area is contained with the parcel of land known as Lot 13 in DP 755260, which is wholly owned by DCPL. It is fully contained within the Cessnock Local Government Areas (LGA), and is Zoned 1(a) Rural 'A'. The proposed extension area is close to the boundary of both the Newcastle and Maitland LGAs. Mining Lease No 1461 includes the proposed minor extension area.

3.0 METHODOLOGY

3.1 Soil Survey

3.1.1 Introduction

The soil survey was undertaken to fulfill the requirements of the Department of Infrastructure, Planning & Natural Resources (DIPNR) and the Department of Mineral Resources (DMR). Specifically, the soil survey was conducted in a manner which complies with DIPNR's *"Specifications for Soil Surveys to Determine the Stripping Depths of Soil Material to be Removed and Used in Association with the Rehabilitation of Land Disturbed during the Period of the Open Cut Approval"*.

The broad objective of the survey is to qualify the reserves of suitable topdressing material within the proposed mine extension area to assist planning of future rehabilitation operations.

3.1.2 Mapping

An initial soil map was developed using the following resources and techniques:

(i) **Aerial photographs and topographic maps**

Aerial photo and topographic map interpretation was used as a remote sensing technique allowing detailed analysis of the landscape and mapping of features related to the distribution of soils in the extension area.

(ii) **Previous soil surveys**

Matthei (1995) completed a soil survey of all areas contained in the Newcastle 1:100,000 Sheet. The Donaldson site was included in the soil survey.

Global Soil Systems conducted a soil and land capability survey of the Donaldson site at a scale of 1:4,000 in August 1998.

Both surveys were utilized as background information prior to commencement of the field work.

(iii) **Stratified observations**

Upon drafting of mapping units, soil profile exposures were visually assessed to ascertain potential mapping units.

3.1.3 Profiling

On 28 June 2004 GSSE conducted the field survey. A total of five (5) soil profile exposures were assessed at selected sites to enable soil profile descriptions to be made. The exposure locations were chosen to provide representative profiles of the soils encountered within the study area.

The soil layers were generally distinguished on the basis of changes in texture and/or colour. Soil colours were assessed according to the Munsell Soil Colour Charts (Macbeth, 1994).

Soil observations were also conducted in eroded areas and small access track cuttings by GSSE to confirm variation within an individual soil unit.

3.1.4 Field Assessment

Soil layers at each profile site were assessed according to a procedure devised by Elliot & Veness (1981) for the recognition of suitable topdressing materials. The system remains the benchmark for the coal mining industry. The system is described in ***Appendix 1***.

In addition, visual observations relating to Acid Sulfate Soils (ASS) properties were conducted, given that the location area adjoins Weakleys Flat Creek.

3.1.5 Laboratory Testing

Soil samples were taken from exposed soil profiles during the soil survey. The samples were subsequently analysed for the following parameters:

- Particle Size Analysis
- Emerson Aggregate Test
- pH
- Electrical Conductivity

A description of the significance of each test and typical values for each soil characteristic are included in ***Appendix 2***.

The laboratory test results were used in conjunction with the field assessment results to determine the depth of soil material that is suitable for stripping and re-use for the rehabilitation of disturbed areas. The soil test results for the soil survey are provided in ***Appendix 3***.

3.2 Land Capability

The land capability survey was conducted according to the DIPNR rural land capability assessment system. The system consists of eight classes which classifies land on the basis of an increasing soil erosion hazard and decreasing versatility of use. It recognizes the following three types of land uses:

- land suitable for cultivation;
- land suitable for grazing; and
- land not suitable for rural production.

These capability classifications identify the limitations to the use of the land as a result of the interaction between the physical resources and a specific land use. The principal limitation recognized by these capability classifications is the stability of the soil mantle (Soil Conservation Service, 1986).

The method of land capability assessment takes into account a range of factors including climate, soils, geology, geomorphology, soil erosion, topography and the effects of past land uses. The classification does not necessarily reflect the existing land use, rather it indicates the potential of the land for such uses as crop production, pasture improvement and grazing.

4.0 RESULTS

4.1 Soils

4.1.1 General

The entire study area contained a Yellow Duplex Soil Unit. The unit bellows to the "Shamrock Hill" Soil Landscape (Matthei, 1995). No Acid Sulfate Soils were observed within the study area.

4.1.2 Profile Description

A typical profile description of the Yellow Duplex Soil Unit observed within the study area follows.

YELLOW DUPLEX SOIL UNIT		
Layer	**Depth (m)**	**Description**
1	0 – 0.30	Brown (10 YR 4/3) loam exhibiting weak pedality. Primary peds are sub-angular blocky and are 20 – 50 mm in size. Secondary peds are 2 – 5 mm. A rough ped fabric is evident. There are many roots. A clear even boundary to;
2	0.30 – 0.50	Light yellowish brown (10 YR 6/4) sandy loam that is weakly structured. Sub-angular blocky primary peds are 20 – 50 mm in size. The soil has a sandy fabric. Cracks are 2 – 5 mm. There are many roots. A clear, even boundary to;
3	0.50 – 1.10	Yellowish red (5 YR 5/8) light clay exhibiting weak pedality. Primary peds are 100 – 200 mm and sub-angular blocky. Fabric is rough faced. Cracks are 2 - 5 mm. Few roots are evident. A clear, wavy boundary to;
4	1.10 – 1.50+	Yellowish red (5 YR 5/8) light clay exhibiting weak pedality. The layer is has 40% light grey (10 YR 7/2) mottles. Primary peds are 100 – 200 mm and sub-angular blocky. Fabric is rough faced. Cracks are 2 - 5 mm. Few roots are evident.

4.1.3 Laboratory Testing

All soil samples taken during the GSSE survey were analysed by the Department of Land's Soil and Water Testing Laboratory at Scone, NSW. All soil analytical results are provided in ***Appendix 3***.

The Yellow Duplex Soil generally grades from loamy surface horizons to light clay subsoil. The subsoil has limited pedality and is bordering on a pedal massive. All soil throughout the profile is non-saline (EC < 0.17 dS/m), non-sodic (EAT of 5 & 8) but moderately acidic (pH < 5.3).

4.2 Land Capability

The majority of the area has been classified as Class VI land. The area is not suitable for cultivation on a regular basis owing to considerable biophysical limitations such as relatively shallow light textured surface soils. The recommended soil conservation practices for this land classification includes pasture improvement, low stocking rates, fire prevention and vermin control.

All land within and immediately adjacent to Weakleys Flat Creek has been classified as Class VII land and is best protected by the existing vegetation.

5.0 TOPDRESSING SUITABILITY

Details of the soil test results (refer ***Appendix 3***) were used in conjunction with the field assessment (refer ***Appendix 1***) to determine the depth or thickness of soil materials that are suitable for stripping and re-use in the rehabilitation of disturbed areas.

Structural and textural properties of soils within the study area are the most significant limiting factors for determination of topdressing suitability. The sub-surface horizons of the Yellow Duplex Soil have weak pedality and are fine textured (high clay content). The subsoils are considered not suitable for stripping, stockpiling and re-spreading as a topdressing material for reshaped overburden.

The recommended stripping depth range for the study area is 0.3 to 0.5m. In some areas the soil unit's A^2 horizon is absent and should only be stripped at a depth of 0.3m. The combination of moderate (loamy) texture, structural stability and low salinity / sodicity levels of initial surface horizons translates to these materials being suitable as topdressing media on post-mining landforms.

6.0 REFERENCES

- Elliot, G.L. and Veness, R.A., 1981. Selection of Topdressing Material for Rehabilitation of Disturbed Areas in the Hunter Valley, J. Soil Cons. NSW 37 37-40
- Macbeth, 1994. Munsell Soil Colour Charts, Revised Edition.
- Matthei L.E. (1995) Soil Landscapes of the Newcastle 1:100 000 Sheet Map, Department
- of Land and Water Conservation. Sydney.
- Northcote, K.H., 1979. A Factual Key for the Recognition of Australian Soils. Rellim Technical Publications, Adelaide, SA.
- Soil Conservation Service of NSW, 1986. Aerial Photograph Interpretation for Land Resource Mapping. Technical Handbook No.8, Sydney, NSW.

APPENDIX 1

FIELD ASSESSMENT PROCEDURE

FIELD ASSESSMENT PROCEDURE

Elliott and Veness (1981) have described the basic procedure, adopted in this survey, for the recognition of suitable topdressing materials. In this procedure, the following soils factors are analysed. They are listed in decreasing order of importance.

Structure Grade

Good permeability to water and adequate aeration are essential for the germination and establishment of plants. The ability of water to enter soil generally varies with structure grade (Charman, 1978) and depends on the proportion of coarse peds in the soil surface.

Better structured soils have higher infiltration rates and better aeration characteristics. Structureless soils without pores are considered unsuitable as topdressing materials.

Consistence - Shearing Test

The shearing test is used as a measure of the ability of soils to maintain structure grade.

Brittle soils are not considered suitable for revegetation where structure grade is weak or moderate because peds are likely to be destroyed and structure is likely to become massive following mechanical work associated with the extraction, transportation and spreading of topdressing material.

Consequently, surface sealing and reduced infiltration of water may occur which will restrict the establishment of plants.

Consistence - Disruptive Test

The force to disrupt peds, when assessed on soil in a moderately moist state, is an indicator of solidity and the method of ped formation. Deflocculated soils are hard when dry and slake when wet, whereas flocculated soils produce crumbly peds in both the wet and dry state. The deflocculated soils are not suitable for revegetation and may be identified by a strong force required to break aggregates.

Mottling

The presence of mottling within the soil may indicate reducing conditions and poor soil aeration. These factors are common in soil with low permeabilities; however, some soils are mottled due to other reasons, including proximity to high water-tables or inheritance of mottles from previous conditions. Reducing soils and poorly aerated soils are unsuitable for revegetation purposes.

Macrostructure

Refers to the combination or arrangement of the larger aggregates or peds in the soil. Where these peds are larger than 10 cm (smaller dimension) in the subsoil, soils are likely to either slake or be hardsetting and prone to surface sealing. Such soils are undesirable as topdressing materials.

Texture

Sandy soils are poorly suited to plant growth because they are extremely erodible and have low water holding capacities. For these reasons soils with textures equal to or coarser than sandy loams are considered unsuitable as topdressing materials for climates of relatively unreliable rainfall, such as the Hunter Valley.

Root Density and Root Pattern

Root abundance and root branching is a reliable indicator of the capability for propagation and stockpiling.

Field Exposure Indicators

The extent of colonisation of vegetation on exposed materials as well as the surface behavior and condition after exposure is a reliable field indicator for suitability for topdressing purposes. These layers may alternate with other layers which are unsuitable. Unsuitable materials may be included in the topdressing mixture if they are less than 15cm thick and comprise less than 30 per cent of the total volume of soil material to be used for topdressing. Where unsuitable soil materials are more than 15 cm thick they should be selectively discarded.

APPENDIX 2

SOIL INFORMATION

TEST SIGNIFICANCE AND TYPICAL VALUES

Particle Size Analysis

Particle size analysis measures the size of the soil particles in terms of grainsize fractions, and expresses the proportions of these fractions as a percentage of the sample. The grainsize fractions are:

clay	(<0.002 mm)
silt	(0.002 to 0.02 mm)
fine sand	(0.02 to 0.2 mm)
medium and coarse sand	(0.2 to 2 mm)

Particles greater than 2 mm, that is gravel and coarser material, are not included in the analysis.

Emerson Aggregate Test

Emerson aggregate test measures the susceptibility to dispersion of the soil in water. Dispersion describes the tendency for the clay fraction of a soil to go into colloidal suspension in water. The test indicates the credibility and structural stability of the soil and its susceptibility to surface sealing under irrigation and rainfall. Soils are divided into eight classes on the basis of the coherence of soil aggregates in water. The eight classes and their properties are:

Class 1 - very dispersible soils with a high tunnel erosion susceptibility.

Class 2 - moderately dispersible soils with some degree of tunnel erosion susceptibility.

Class 3 - slightly or non-dispersible soils which are generally stable and suitable for soil conservation earthworks.

Class 4-6 - more highly aggregated materials which are less likely to hold water. Special compactive efforts are required in the construction of earthworks.

Class 7-8 - highly aggregated materials exhibiting low dispersion characteristics.

The following subdivisions within Emerson classes may be applied:

(1) slight milkiness, immediately adjacent to the aggregate
(2) obvious milkiness, less than 50% of the aggregate affected
(3) obvious milkiness, more than 50% of the aggregate affected
(4) total dispersion, leaving only sand grains.

Salinity

Salinity is measured as electrical conductivity on a 1:5 soil:water suspension to give EC (1:5). The effects of salinity levels expressed as EC at 25^{o} (dS/cm), on plants are:

0 to 1	very low salinity, effects on plants mostly negligible.
1 to 2	low salinity, only yields of very sensitive crops are restricted.
greater than 2	saline soils, yields of many crops restricted.

pH

The pH is a measure of acidity and alkalinity. For 1:5 soil:water suspensions, soils having pH values less than 4.5 are regarded as strongly acid, 4.5 to 5.0 moderately acidic, and values greater than 7.0 are regarded as alkaline. Most plants grow best in slightly acidic soils.

LABORATORY TEST METHODS

Particle Size Analysis

Determination by sieving and hydrometer of percentage, by weight, of particle size classes: Gravel >2mm, Coarse Sand 0.2-2 mm, Fine Sand 0.02-0.2 mm, Silt 0.002-0.2 mm and Clay <0.002 mm SCS Standard method. Reference - Bond, R, Craze B, Rayment G, and Higginson (in press 1990) **Australia Soil and Land Survey Laboratory Handbook**, Inkata Press, Melbourne.

Emerson Aggregate Test

An eight class classification of soil aggregate coherence (slaking and dispersion) in water. SCS Standard Method closely related to Australian Standard AS1289. The degree of dispersion is included in brackets for class 2 and 3 aggregates. Reference - Bond R., Craze, B., Rayment, G., Higginson, F.R., (in press 1990). **Australian Soil and Land survey Laboratory Handbook**, Inkata Press, Melbourne.

EC

Electrical Conductivity determined on a 1:5 soil:water suspension. Prepared from the fine earth fraction of the sample. Reference - Bond R, Craze B, Rayment G, Higginson FR (in press 1990) **Australian Soil and Land Survey Handbook.** Inkata Press, Melbourne.

pH

Determined on a 1:5 soil:water suspension. Soil refers to the fine earth fraction of the sample. Reference - Bond, R., Craze, B., Rayment, G., Higginson, F.R. (in press 1990). **Australian Soil and Land Survey Handbook.** Inkata Press, Melbourne.

APPENDIX 3

SOIL TEST RESULTS

Department of Lands

Land Administration & Management
Property & Spatial Information

Soil Services Division

SOIL TEST REPORT

Scone Research Service Centre

REPORT NO:	SCO04/156R1
REPORT TO:	Rod Masters GSS Environmental PO Box 3214 Wamberal 2260
REPORT ON:	Six soil samples Donaldson Coal
PRELIMINARY RESULTS ISSUED:	Not issued
REPORT STATUS:	Final
DATE REPORTED:	9 July 2004
METHODS:	Information on test procedures can be obtained from Scone Research Service Centre

TESTING CARRIED OUT ON SAMPLE AS RECEIVED

G Holman
(Technical Officer)

SOIL AND WATER TESTING LABORATORY
Scone Research Service Centre

Report No: SCO04/156R1
Client Reference: Rod Masters
GSS Environmental
PO Box 3214
Wamberal 2260

Lab No	Method	P7B/1 Particle Size Analysis (%)					P9B/2	C1A/4	C2A/3
	Sample Id	clay	silt	f sand	c sand	gravel	EAT	EC (dS/m)	pH
1	Donaldson Coal 1/1	16	18	51	13	2	8/3(1)	0.07	5.2
2	Donaldson Coal 1/2	44	14	28	8	6	5	0.11	5.3
3	Donaldson Coal 1/3	50	17	14	13	6	5	0.17	5.1
4	Donaldson Coal 5/1	11	5	56	28	0	8/3(1)	0.06	5.2
5	Donaldson Coal 5/2	47	2	27	15	9	6	0.09	5.3
6	Donaldson Coal 5/3	45	4	31	20	0	6	0.10	5.3

END OF TEST REPORT

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Appendix E

Flora and Fauna and Threatened Species Assessment

EXECUTIVE SUMMARY

Donaldson Coal Pty Limited (Donaldson) operates an open cut coalmine on its own property in the vicinity of Beresfield in the Lower Hunter Valley of NSW with approval having been granted in 2000 for mining within a designated area. Donaldson wishes to extend the footprint of the mine at the south eastern side of the approved area by approximately 100m deep and 650m long. The proposed extension is about 7.2 hectares in area compared with the approximately 293 hectares for the approved mine. This report has been prepared to assess any impact on threatened species of flora and fauna that could occur as a result of the extension of the mined area.

The NSW *Threatened Species Conservation Act 1995* (Part 6 Div 2) requires that potential for impact on,

'threatened species or populations **known or likely to be present** in the area that is the subject of the action and in any area that is likely to be affected by the action',

be assessed and in order to determine the potential for any impact and this assessment should be conducted by applying the '8-part' test of the NSW *Environmental Planning and Assessment Act 1979* (s5A).

A list of the threatened species potentially occurring in the area was obtained from an extract of records from the NPWS Atlas of NSW Wildlife for a 5 kilometre radius from the proposed work location in accordance with investigation guidelines (Murray *et al* 2002). Threatened species actually occurring in the vicinity of the proposed work location were determined through field investigation. The following table provides a summary of the findings of this threatened species assessment showing the numbers of species involved:

	Potentially present	8-part test applied	Actually present
Flora	1	1	0
Amphibians	1	0	0
Birds	7	6	2
Marsupials	1	1	0
Megachiropteran bats	1	1	0
Microchiropteran bats	8	8	6

The threatened species actually present were 6 species of insectivorous bat and two birds- Powerful Owl and Black-chinned Honeyeater. The conclusion of the 8-part test for these threatened species was that there would be no impact on these species by the work associated with the proposed mine pit extension.

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1.0 INTRODUCTION

Donaldson Coal Pty Limited (Donaldson) operates an open cut coalmine on its own property in the vicinity of Beresfield in the Lower Hunter Valley of NSW with approval having been granted in 2000 for mining within a designated area. Donaldson wishes to extend the footprint of the mine at the south eastern side of the approved area by approximately 100m deep and 650m long. This report has been prepared to assess the potential impact on threatened flora and fauna that would occur as a result of the extension of the mined area.

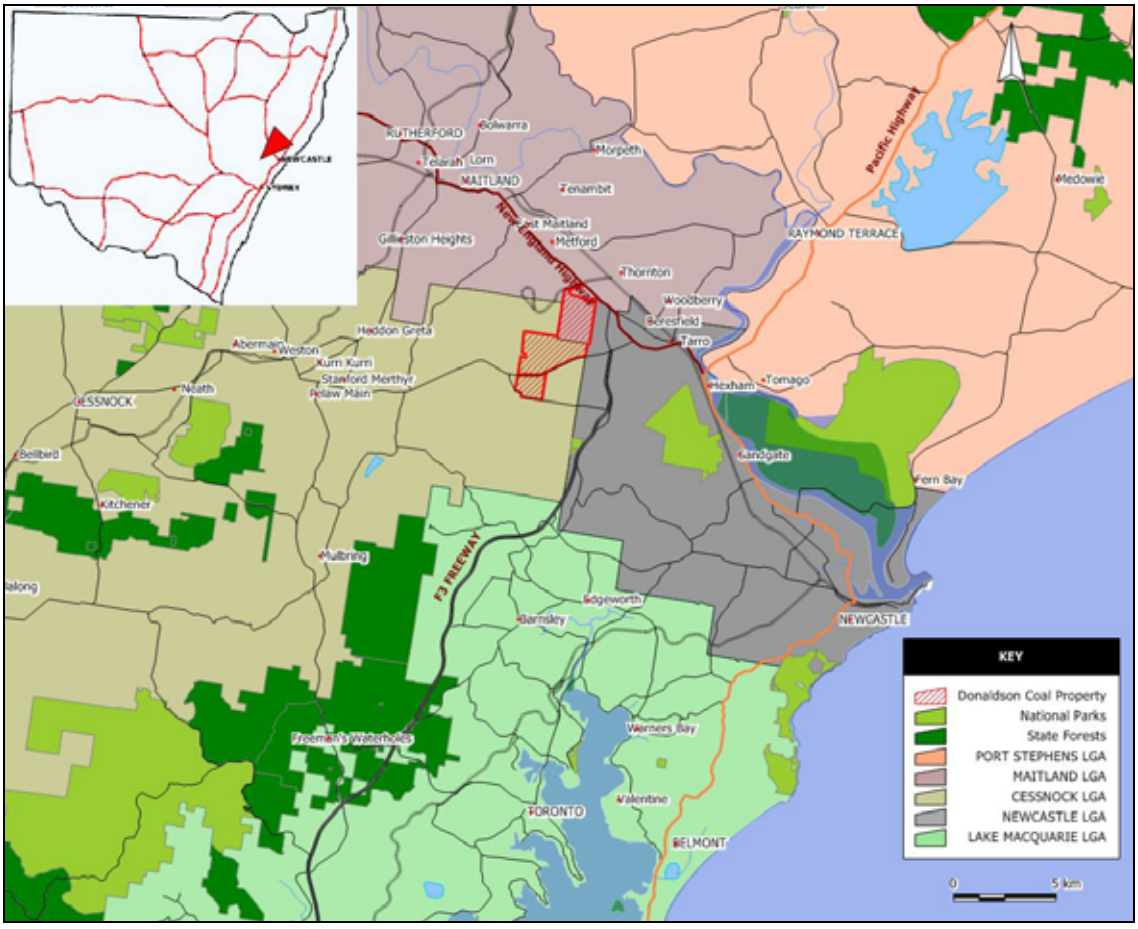

Figure 1: Locality map showing the Donaldson property.

2.0 THE PROPOSAL

Figure 2 shows the proposed mine pit extension in the context of the originally approved mine pit area. The net area of the proposed extension over and above the currently approved mine pit area (293 ha) would be about 7.2 hectares.

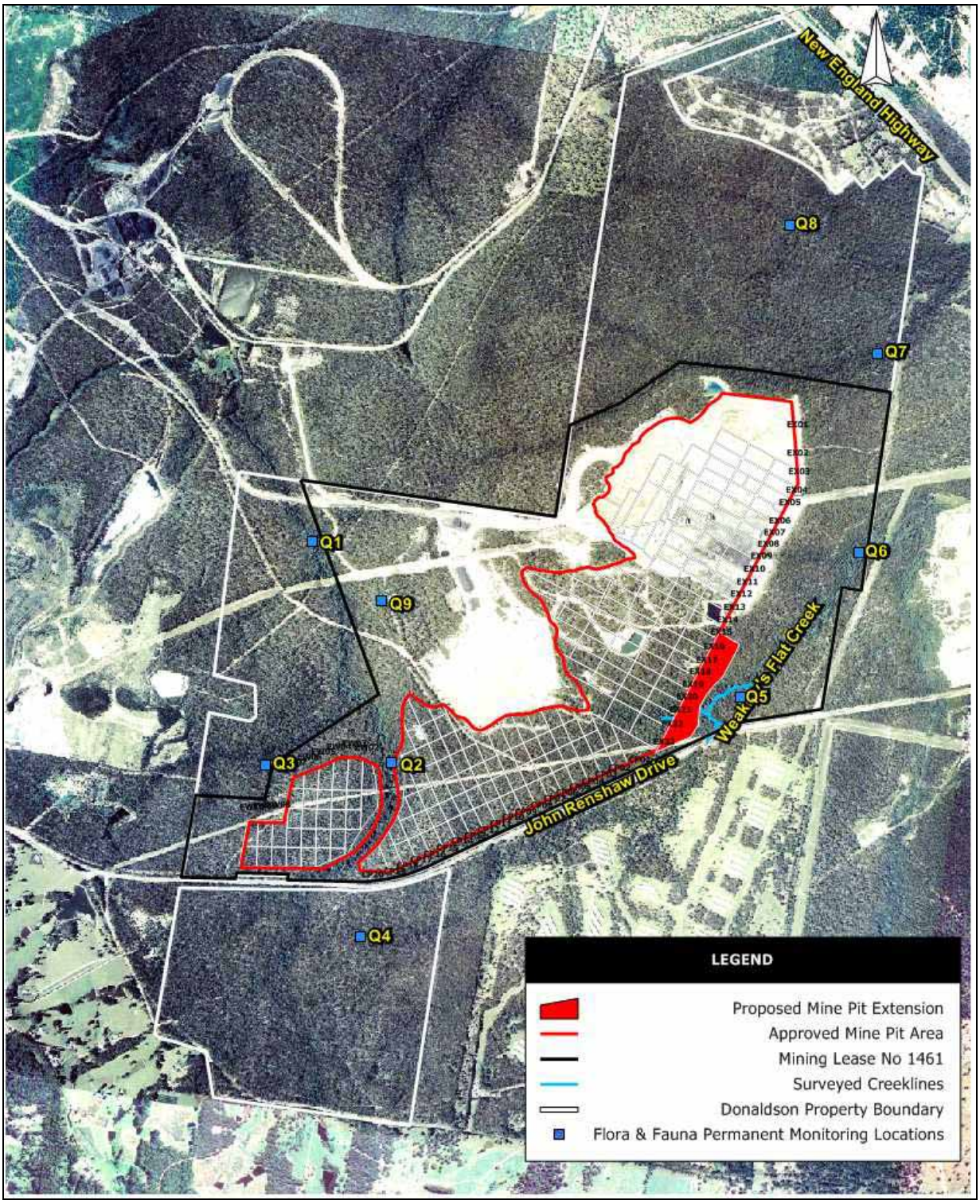

Figure 2: The proposal in context.

3.0 LEGISLATION

In the preparation of this report attention was given to the relevant provisions of the following Acts and Policies:

- Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);

- NSW Threatened Species Conservation Act 1995 (TSC Act);
- National Parks and Wildlife Act 1974 (NP&W Act);
- Environmental Planning and Assessment Act 1979 (EP&A Act);
- SEPP44 Koala Habitat Assessment;
- Flora and Fauna Survey Guidelines, Lower Hunter & Central Coast Region 2002 Volume 1; and,
- Survey Guide to the Threatened Species of the Lower Hunter Central Coast Region 2002 Volume 2.

The TSC Act (1995), Schedules 1 and 2, contain lists of flora and fauna species, populations and communities, which have been determined by the NSW Scientific Committee as being under threat of serious decline that could ultimately lead to extinction. The TSC Act provides for an eight-part test of significance and impact to be applied to any of these listed species or communities that are found, or likely to be found at some time, in an area subject to proposed development. Schedule 3 of the TSC Act contains a list of 'key threatening processes' deemed to be processes that have a negative impact on threatened species, populations or communities.

4.0 METHODS

4.1 Fauna

As part of the Conditions of Consent for the Donaldson Mine a Fauna and Flora Management Plan (Gunninah 2000) was implemented. In part, this plan includes periodic monitoring of fauna around fixed locations in the forested area that surrounds the mine (see Figure 2 above). One of these locations known as Q5 is situated on the eastern side of Weakley's Flat Creek opposite the area of the proposed pit extension. Mammal trapping, spotlighting, Anabat insectivorous bat call recording and owl call playback have been carried out in that area at 6-monthly intervals from September 2001 with the most recent data collected in May 2004. For this report this data is used as the basis for the fauna assessment supported by a bird survey, and general observations.

4.2 Flora and Vegetation Communities

The floristic content of the area of the proposed mine pit extension was recorded during a series of systematic searches conducted through the entire area.

4.3 Threatened Species Assessment

A list of threatened flora and fauna reported from within a 5 kilometre radius of the proposed extension was obtained from the NPWS database of the Atlas of NSW Wildlife. Based on information available concerning habitat requirements of these species, an assessment was made as to the likelihood of any of

the reported threatened species occurring on the property or using the habitat of the property as a essential part of a foraging range (refer to section 4 – Preliminary Assessment).

The list of threatened species was used as a guide to the species possibly occurring on the property. However the survey not limited to the threatened species reported on the database extract with searches being carried out for any species listed on schedules 1 and 2 of the NSW TSC Act 1995 that were considered as possibly occurring in the type of vegetative habitat present on the property. The potential for the involvement of any 'key threatening processes' was also assessed.

5.0 THREATENED SPECIES DETERMINATION

5.1 Flora

Table 1 provides a summary of the threatened flora potentially occurring within the area. The 'Last Date' column in the table refers to the date the species was most recently sighted.

Table 1: Summary of threatened flora species potentially present in the local area

Family Name	Scientific Name	Legal Status	Last Date
Tremandraceae	*Tetratheca juncea*	V	31/12/1998

(Source: NPWS Atlas, April 2004). E = Endangered; V = Vulnerable (NSW TSC Act 1995).

5.2 Fauna

Table 2 provides a summary of the threatened fauna potentially occurring in the area. The 'Last Date' column in the table refers to the date the species was most recently sighted.

Table 2: Summary of threatened fauna species potentially present in the local area.

Scientific Name	Common Name	Legal Status	Last Date
Litoria aurea	Green and Golden Bell Frog	E1	30/05/1984
Hamirostra melanosternon	Black-breasted Buzzard	V	30/09/1990
Lophoictinia isura	Square-tailed Kite	V	3/08/1993
Lathamus discolor	Swift Parrot	E1	24/07/2000
Ninox connivens	Barking Owl	V	11/09/2001
Ninox strenua	Powerful Owl	V	2/11/2001
Tyto novaehollandiae	Masked Owl	V	1/01/1998
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subsp.)	V	1/01/1998
Petaurus norfolcensis	Squirrel Glider	V	28/05/2003
Pteropus poliocephalus	Grey-headed Flying-fox	V	14/08/2000
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	27/09/1995
Mormopterus norfolkensis	Eastern Freetail-bat	V	24/07/2000
Chalinolobus dwyeri	Large-eared Pied Bat	V	28/02/1997
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	1/02/1998

Miniopterus australis	Little Bentwing-bat	V	14/08/2000
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	V	18/03/1998
Myotis adversus	Large-footed Myotis	V	1/02/1998
Scoteanax rueppellii	Greater Broad-nosed Bat	V	1/02/1998

(Source: NPWS Atlas. April 2004). E =Endangered; V = Vulnerable (NSW TSC Act 1995).

5.3 Threatened species profiles

This section provides an outline of all currently available information on the threatened flora and fauna in tables 1 & 2. Tables 3 & 4 assess the likelihood of the species occurring on or around the mine extension area.

Tetratheca juncea

Tetratheca juncea Smith (Tremandraceae) is a terrestrial herbaceous plant endemic to NSW and listed under Schedule 2 of the NSW *Threatened Species Conservation Act* 1995 as Vulnerable and having a ROTAP coding of 3VCa (Briggs and Leigh 1995). It is also listed as Vulnerable in the *Commonwealth Environment Protection and Biodiversity Conservation Act* 1999. Thompson (1976), in a revision of the *Tetratheca* genus, noted that there were records from the late 1800's of the plant occurring in suburbs of Sydney, from Port Jackson and suburbs to the south. *T. juncea* is now known to exist only from the Wyong area to Bulahdelah and inland to the edge of the main ranges with the greatest concentration of records being from the Wyong and Lake Macquarie local government areas (Payne 2000).

Tetratheca juncea propagates through both rhizomal spread and seed development and germination (Thompson 1976, Payne 2000). Propagation by seed appears to be limited by a dispersal mechanism that is most probably by ants collecting the seed for the lipid rich elaiosome (Brew *et al.* 1989, Boeswinkel 1999).

Tetratheca juncea is distinguished from other members of the *Tetratheca* genus by having generally leafless stems that have a distinctly angular, winged structure (Thompson 1976). The flowers of *T. juncea* however share the four-petalled, pink form that is characteristic of the genus. The flowering period for *T. juncea* is generally reported as being from mid to late winter through to late summer (Gardner & Murray 1992). The flowers grow from nodes on the mostly leafless stem and are commonly solitary but occasionally in pairs with each flower facing downward, suspended on a peduncle of about 10mm length. The four petals range in colour from mauve through pink to almost white (Thompson 1976, Payne 2000).

Driscoll (2003) used GIS analysis of 400 records (compiled from Payne 2000, Bartier *et al.* 2001, and S. Bell & C. Driscoll unpub) and showed that *T. juncea* has been reported from 16 separate, and often widely differing, vegetation community types as defined in NPWS (2000) and Eco Logical (2002). However over 60% of records were from within *Coastal Plains Smoothbarked Apple Woodland* (MU30) about 14% from *Coastal Plains Scribbly Gum Woodland* (MU31) and about 11% from *Coastal Foothills Spotted Gum-Ironbark Forest* (MU15). These results indicate that within the range of its occurrence, *T. juncea* should be considered as possibly occurring in most common vegetation communities.

Green and Golden Bell Frog (*Litoria aurea*)

Until the 1970s this frog was widespread from Brunswick Heads through coastal NSW to Victoria. Many areas of previous occurrence are now deserted and this frog is only found in isolated pockets through its former range. The preferred habitat is vegetated edges of dams, marshes and streams with *Typha* spp. and *Eleocharis* ssp. preferred. The introduced

mosquito fish, *Gambusia holbrooki* feeds on small tadpoles and habitat free of these fish is preferred (White & Pike 1996).

Black-breasted Buzzard (*Hamirostra melanosternon*)
The predominant territory of this raptor is across the arid regions from far north western NSW, western Queensland and north Western Australia. There have been a number of sightings recorded in other parts of Australia including eastern NSW and Queensland (Olsen 1995, Simpson & Day 2000). It is most likely that these occasional recordings are of nomadic individuals rather than of birds from established territories. It is a bird of open plains and woodland where it preys on small mammals and also large bird eggs that it breaks by throwing a rock with its bill.

Square-tailed Kite (*Lophoictinia isura*)
The Square-tailed Kite is one of the rarest of the Australian raptors with only sporadic sightings scattered across Australia. The bird has been recorded in most parts of Australia with the exception of the extremely arid centre (Barrett *et al* 2003) although the preferred habitat is coastal and subcoastal tropical and temperate forest and rain forest. The breeding season is from September to October during which the main prey are nestling birds of the Passerines (Olsen 1995).

Swift Parrot (*Lathamus discolor*)
This parrot breeds in Tasmania and migrates to southeastern Australia for the winter months (Barrett *et a*l 2003). It is dependant on Blue Gums in Tasmania for both flower nectar and for nesting hollows and there has been large scale clearing of these trees in Tasmania over many years. A study in Victoria (MacNally & Horrocks 2000) showed that the Swift Parrot is as dependant on invertebrate food sources such as leaf lerps as they are on nectar and in fact no relationship could be established between the occurrence of these birds and eucalypt flowering.

Barking Owl *(Ninox connivens)*
This large Owl is now sparsely distributed through its historic range from Victoria through New South Wales to Cooktown in Queensland. It is also found in the southwest of Western Australia. Large scale clearing of habitat throughout its range has resulted in a 50% decline in numbers since records started. In a study of habitat in Victoria it was found that the habitat occupied by these birds had a higher proportion of large trees and higher densities of trees having suitable hollows for prey and for nest sites than habitat not occupied by the owls (Taylor, Kirsten & Peake 2000). There was also a strong association with proximity of habitat to hydrological features such as large dams or flood plains

Powerful Owl (*Ninox strenua*)
Distribution of this owl is from the coast inland from mid Queensland to western Victoria. The Powerful Owl is the largest of the Australian owls at around 750mm from head to tail. It is almost entirely an arboreal hunter and takes possums, gliders, flying foxes and sleeping diurnal birds from within the tree canopy. In coastal and foothill habitat the primary food source is the Ring-tailed Possum (*Pseudochierus peregrinus*) and in the forests of the ranges the main food source is the Greater Glider (*Petauroides volans*). During the day it roosts in trees or vine thickets and for breeding purposes it uses a large hollow in the side of a tree. The dependence of this bird on hollow dwelling prey and its need for large hollows for breeding means that it requires habitat that contains a good distribution of mature trees in the forest. The home range of this bird is generally around 1000 hectares and the bird systematically 'farms' this territory rather than regularly hunting across the entire home range. The breeding season commences around April and by May most pairs will have settled into

their territory and the female will be commencing egg laying. (Kavanagh 1997, Kavanagh 1998, Kavanagh 2002a&b, Kavanagh & Stanton 2002).

Masked Owl (*Tyto novaehollandiae*)
The Masked Owl can be found around the vegetated coastal area of most of Australia. Its diet consists almost entirely of small terrestrial mammals and some birds and this relates to the type of habitat preferred with the bird generally being found in open woodland and forest with an open understorey and sparse ground cover. (Kavanagh 2002a&b, Kavanagh & Stanton 2002).

Black-chinned Honeyeater (*Melithreptis gularis*)
The New Atlas of Australian Birds (Barrett et al 2003) shows that the Black-chinned Honeyeater has been recorded from northern WA through the NT, QLD, NSW to VIC in coastal and sub-coastal areas. Reports are sporadic throughout the range of the bird however the most records come from the north western parts of Australia. The eastern subspecies Melithreptis gularis gularis is listed as Vulnerable in Schedule 2 of the NSW Threatened Species Conservation Act 1995 and occurs along the east coast of Australia from south eastern QLD to VIC. This honey-eater is easily confused with the more common White-naped Honeyeater and mixed flocks of the two species are often seen. Garnett & Crowley (2002) note that clearing and fragmentation of the favoured woodland and forest habitat are the main threats to the species.

Squirrel Glider *(Petaurus norfolcensis)*
Occurs on the coast and ranges of eastern Australia, from northern Queensland to the Victorian/ South Australian border, and also extends into the western slopes and plains. The Squirrel Glider inhabits dry sclerophyll forest and woodland, and is generally absent from the more densely vegetated coastal ranges. More recently, however, the species has been recorded in a number of coastal locations and confusion with the similar Sugar Glider is attributed as the main reason for the apparent lack of historical coastal records.

One of the reasons that the Squirrel Glider has been considered vulnerable in NSW is that its diet is specialised. It will eat insects and the occasional birds egg, however, the greater part of the diet is nectar, pollen and gum exudates particularly from wattles. The amount of habitat that supports these food resources has been significantly reduced. The Squirrel Glider requires hollows in standing trees for roosting and nesting purposes and home ranges from 2-3ha to 13ha have been reported. (Quinn 1995; SWC 1996; Rowston 1998; Suckling 2000; Holland 2001; Smith 2002).

Grey-headed Flying-fox (*Pteropus poliocephalus*)
Occurs along the eastern seaboard of Australia roosting in communal colony sites which are used permanently, annually or occasionally depending on food availability (Tidemann 1995). Colonies can vary considerably in size from hundreds to many thousands of individuals, and fluctuate according to food resources (Parry-Jones & Augee 1991; Tidemann 1995). Fruits from numerous rainforest trees and other myrtaceous species form a large component of their diet, and consequently mass nomadic movements occur throughout their range in response to fruit availability. Large colonies are very vocal even during the day, and can significantly damage roost trees by their sheer weight of numbers.

“The Grey-headed flying fox must be acknowledged as being highly significant to the health and maintenance of many ecosystems in eastern Australia. The species performs the ecosystem services of pollination and seed dispersal for a wide range of native trees, including commercially important hardwood and rainforest species. It thus contributes directly to reproduction, regeneration and the evolutionary processes of forest ecosystems. Flying-

foxes are unique in the large distances they disperse pollen and seeds. The population of Grey-headed flying fox must be of sufficient size for this to continue. If numbers were reduced to small or localised groups, then rainforest seed dispersal and hardwood pollination processes would be severely curtailed (Eby 2000)".

Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*)
This bat is to be found in a wide range throughout Australia only being absent from the southwest quarter of SA to southern WA and throughout this range it inhabits a similarly wide range of vegetative habitat. They are an adaptive roosting species and have been found under eaves of houses, in animal burrows in the ground and in tree hollows for example. Its reported rarity may be in part due to the fact that it flies high and fast and is not often captured. (Churchill 1998, Richards in Strahan 2000).

Eastern Free-tail Bat (*Mormopterus sp.*)
While this bat is regarded as a separate species, the taxonomy is yet to be resolved. It can be found along the eastern seaboard from central Victoria to north Queensland and can only be found in Australia. The bat can be found in a wide range of forest and woodland habitats where it forages for insects. It prefers tree and limb hollows for denning. (Churchill 1998; Allison & Hoye 2000).

Large-eared Pied Bat (*Chalinobolus dwyeri*)
Dwyer (1983a) has indicated that the Large-eared Pied Bat occurs in scattered localities in central southern Queensland, and on the western slopes of the Great Dividing Range in New South Wales. Parnaby (1992) extends this range to the coast in both states. The species inhabits moderately well wooded habitats, where daytime roosts have been recorded in caves, mine tunnels, and the abandoned mud nests of Fairy Martins (*Cecropis ariel*) (Dwyer 1983a). Hoye (1995) found that this species occupies both moist and dry hardwood forest types within the Morisset Forestry District, but suggests that the species is less prone to habitat disturbance due to its cave-roosting habit.

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
This bat occurs from coastal southeast Queensland to western Victoria and through Tasmania. Very little is known of this bat. Preferred habitat appears to be sclerophyll forests (Churchill 1998). It is a bat that hibernates in the colder winter period of the southern part of its range (Phillips 2000). Preferred roosting sites are large hollow trees and caves.

Little Bent-wing Bat (*Miniopterus australis*)
Occurs along the east coast of Australia from Cape York south to coastal northern NSW. The species also occurs in New Caledonia, New Guinea, the Philippines, and the Indo-Malayan archipelago. The Little Bent-wing Bat generally occupies well-wooded habitats throughout its range, roosting during the day in caves and similar locations. As with other Bent-wing bats, this species depends on specific nursery sites in which to raise its young, and only five of these sites were known of in 1983. In central Queensland one of these nursery colonies numbers 100,000 adult bats. They forage for insects in generally well-wooded habitat of a variety of forms from swamp forest, dry forest to rain forest. (Churchill 1998, Dwyer 2001a).

Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)
Is widely distributed on the coast and ranges of eastern Australia, from Cape York Peninsula, south to Victoria and eastern South Australia. The species is also present in northern Western Australia and the Northern Territory. Within New South Wales, it extends from the coast to the western slopes of the Great Dividing Range. These bats roost in caves and man-made structures such as culverts, mine shafts and farm sheds. They are territorial, moving within a 300 km radius of a maternity cave. They forage for insects in generally well-wooded habitat of a variety of forms from swamp forest, dry forest to rain forest. (Churchill 1998, Dwyer 2001b).

Large-footed Myotis (*Myotis adversus*)
Also known as the Fishing Bat, this bat is the only confirmed Australian representative of the most widely spread genus of Microchiropteran bat worldwide. It can be found within 100 km of the coast from the Kimberly in Western Australia to south eastern South Australia. Foraging is commonly over water with the bats skimming the surface and using their large hind feet to scoop aquatic insects and even small fish. They can be found roosting in a variety of locations that include caves, bridges, tree hollows, and even dense foliage (Churchill 1998, Richards 2000).

Greater Broad-nosed Bat (*Scoteanax rueppellii*)
Occurs along the coast and ranges of eastern Australia, from northern Queensland to the New South Wales/Victorian border. This species appears to be most frequent in the river systems draining the Great Dividing Range. Tree-lined creeks, and the junctions of woodland and cleared paddocks, are favoured hunting areas for the Greater Broad-nosed Bat, although it may also forage in rainforest environments, flying as low as one metre above the surface of a creek. The species normally roosts in tree hollows, but roosting records in the ceilings of old buildings also exist (Churchill 1998;Hoye & Richards 2000).

5.4 Summary of threatened species determination

Table 3: The likelihood of the selected threatened flora species occurring in the area of the proposed mine extension.

Family	Species Name	Likelihood of being found in area	Eight-part test applied
Tremandraceae	*Tetratheca juncea*	Found elsewhere on the mine site	Yes

Table 4: The likelihood of the selected threatened fauna species occurring in the area of the proposed mine extension.

Family	Species Name	Likelihood of being in area	Eight-part test applied
Litoria aurea	Green and Golden Bell Frog	Unsuitable habitat	No
Hamirostra melanosternon	Black-breasted Buzzard	Unlikely	No
Lophoictinia isura	Square-tailed Kite	Possible	Yes
Lathamus discolor	Swift Parrot	Possible	Yes
Ninox connivens	Barking Owl	Suitable habitat	Yes
Ninox strenua	Powerful Owl	Suitable habitat	Yes
Tyto novaehollandiae	Masked Owl	Suitable habitat	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subsp.)	Suitable habitat	Yes
Petaurus norfolcensis	Squirrel Glider	Suitable habitat	Yes
Pteropus poliocephalus	Grey-headed Flying-fox	Suitable habitat	Yes
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Suitable habitat	Yes
Mormopterus norfolkensis	Eastern Freetail-bat	Suitable habitat	Yes
Chalinolobus dwyeri	Large-eared Pied Bat	Suitable habitat	Yes
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Suitable habitat	Yes
Miniopterus australis	Little Bentwing-bat	Suitable habitat	Yes
Miniopterus schreibersii	Eastern Bent-wing Bat	Suitable habitat	Yes

oceanensis			
Myotis adversus	Large-footed Myotis	Suitable habitat	Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	Suitable habitat	Yes

6.0 FIELD SURVEY RESULTS

6.1 Fauna

Fauna data has been collected at seven 6-monthly intervals from September 2001 and table shows a summary of the trapping effort over this period. The combined results can be seen in Appendix 2 with six species of threatened insectivorous bat and two species of threatened bird having been seen or detected in the area (Table 5).

Table 5: Summary of trapping effort.

Trap type	Total trap nights
Elliot A small mammal	400
Elliot B medium mamma (ground)	80
Elliot B medium mammal (tree)	60
Cage large mammal	60
Hair tubes	80

Table 6: Threatened species of fauna recorded in the area.

Scientific Name	Common Name	Status
Insectivorous bats		
*Miniopterus australis**	Little Bent-wing Bat	V
*Miniopterus schreibersii**	Large Bent-wing Bat	V
*Mormopterus norfolkensis**	Eastern Freetail Bat	V
*Myotis adversus**	Fishing Bat	V
*Saccolaimus flaviventris**	Yellow-bellied Sheathtail Bat	V
*Scoteanax rueppellii**	Greater Broad-nosed Bat	V
Birds		
Ninox strenua	Powerful Owl	V
Melithreptis gularis gularis	Black-chinned Honeyeater	V

6.2 Flora

Appendix 1 lists the species of flora found in the area of the proposed mine extension. The search was divided into the three main vegetative habitats in the area: northern side of the Weakley's Flat Creek tributary; southern side of the tributary; and, the riparian vegetation along the tributary. No species of threatened flora were found in these areas and no endangered ecological communities were present.

The vegetation in the northern and southern sides of the Weakley's Flat Creek tributary was similar in overall content even though the southern side appeared to be generally drier than the northern side. The overstorey throughout this area was a co-dominant mix of *Corymbia maculata* (Spotted Gum), *Eucalyptus punctata* (Grey Gum), *Eucalytpus acmenoides* (White mahogany) with scattered *Eucalyptus pilularis* (Blackbutt). The riparian habitat along the tributary to Weakley's Flat Creek had emergent *Eucalyptus pilularis* with a mesic understorey of *Glochidion ferdinandi*, *Melicope micrococca* and *Cryptocaria microneura*. Lantana was dominant in the shrub layer of the edges of the drainage line with large areas totally covered with 2m tall masses of the weed.

6.3 Habitat trees

The approximate location of trees having potential habitat hollows was determined using a hand held GPS and plotted on a plan of the proposed mine pit extension (Figure 3). None of these trees had hollows suitable for large forest owls.

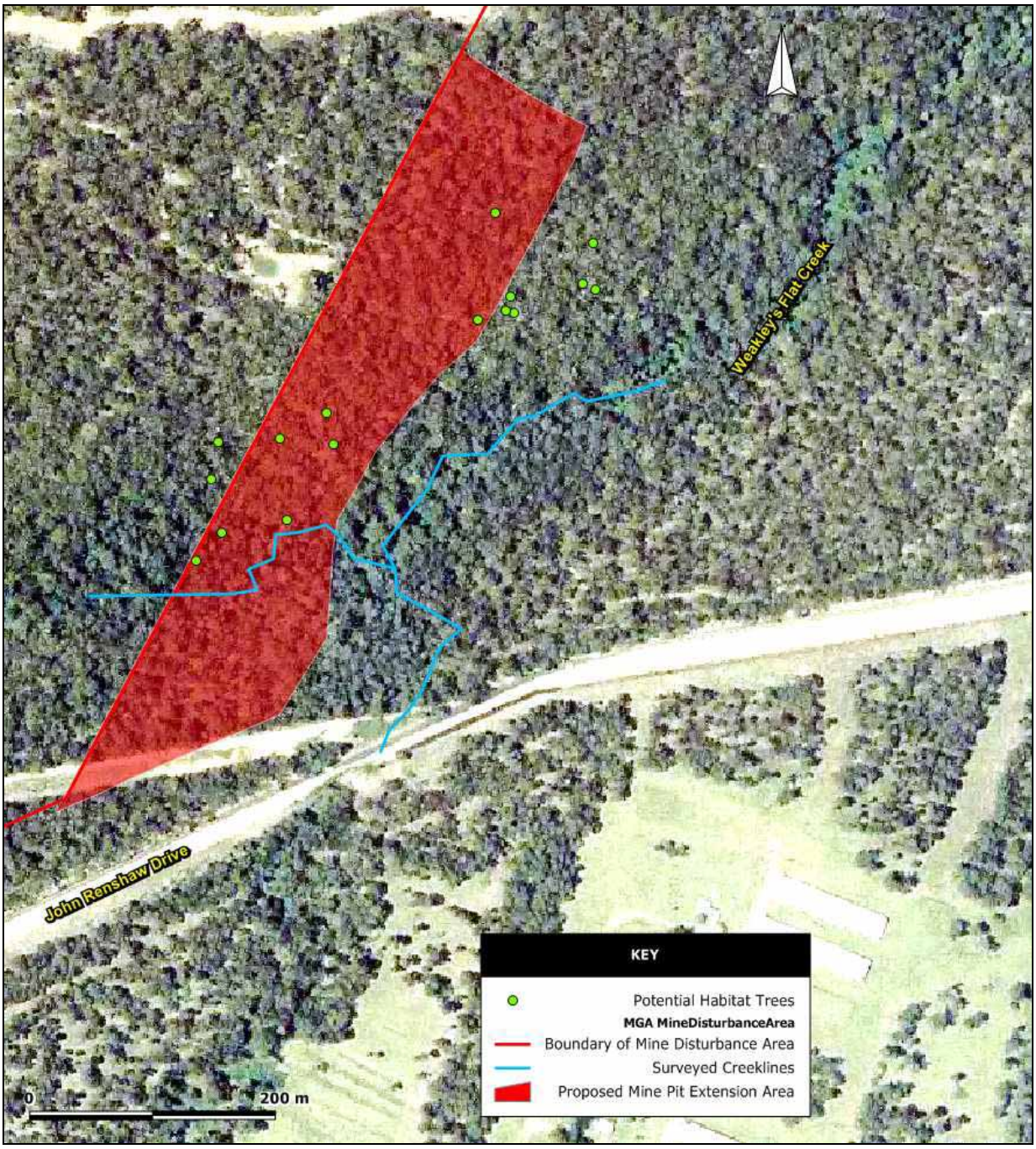

Figure 3: Location of trees having potential habitat hollows.

6.4 SEPP 44 Koala Habitat

SEPP 44 requires that for proposals on properties involving 1 hectare or more, the habitat should be evaluated for potential Koala habitat and core Koala Habitat. Potential Koala habitat is defined as 'areas of native vegetation where the trees listed in Schedule 2 (of SEPP 44) *'constitute at least 15% of the total number of trees in the upper and lower strata of the tree component'*. Should potential Koala habitat be found further investigation for the existence of

core Koala habitat should be undertaken and if this habitat is found to be present then a detailed Plan of Management should be prepared for the Koala colony in the area. A list of Schedule 2 feed trees is provided in Table 7 below.

Table 7: SEPP 44, Schedule 2 - Koala Feed Tree Species

Scientific Name	**Common Name**
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus punctata	Grey Gum
Eucalyptus viminalis	Ribbon or Manna Gum
Eucalyptus camaldensis	River Red Gum
Eucalyptus haemastoma	Broad-leaved Scribbly Gum
Eucalyptus signata	Scribbly Gum
Eucalyptus albens	White Box
Eucalyptus populnea	Bimble Box or Poplar Box
Eucalyptus robusta	Swamp Mahogany

The only feed tree species present, *Eucalyptus punctata* (Grey Gum), was not in sufficient numbers for the are to be classed as potential Koala habitat and no further action was required. No evidence of Koala has been found anywhere on the Donaldson property over the last three years of monitoring.

7.0 THREATENED SPECIES, COMMUNITIES AND THREATENING PROCESSES ASSESSMENT- THE EIGHT-PART TEST

Section 5A of the EP&A Act 1979, as amended by the TSC Act 1995, provides for the application of an "eight-part test" in the consideration of the likely impact of any development on threatened species, populations or habitats. A review of the threatened species profiles shows that there were threatened species that could be found on the property under different conditions to those prevailing at the time of this investigation or could be found in similar habitat in the immediate region. Summary tables are presented at the beginning of the eight-part tests (Tables 8 & 9).

7.1 Flora eight-part test

Table X lists the species of flora that were considered as possibly occurring in the type of habitat represented in the locality of the proposed mine extension.

Table 8: Threatened species of flora considered as possibly occurring in the area.

Species	Common Name
Tetratheca juncea	Black-eyed Susan

Tetratheca juncea

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

No viable local populations were present.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered populations were present.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant area of known habitat was not present.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

Critical habitat was not present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

A significant reserve has been set aside at the western side of the Donaldson Coal property. The *Tetratheca juncea* Conservation Area contains in excess of 600 plants.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however there would be no impact on any *Tetratheca juncea* in the area as a consequence of the clearing associated with the mining of the extended area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

Tetratheca juncea can be found from Buladelah in the north to Wyong in the south.

7.2 Fauna eight-part test

Table 9 lists the species of fauna that were considered as possibly occurring in the type of habitat represented in the locality of the mine extension.

Table 9: Threatened species of fauna considered as possibly occurring in the area.

Family	Species Name	Likelihood of being in area	Eight-part test applied
Lophoictinia isura	Square-tailed Kite	Possible	Yes
Lathamus discolor	Swift Parrot	Possible	Yes
Ninox connivens	Barking Owl	Suitable habitat	Yes
Ninox strenua	Powerful Owl	Suitable habitat	Yes
Tyto novaehollandiae	Masked Owl	Suitable habitat	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subsp.)	Suitable habitat	Yes
Petaurus norfolcensis	Squirrel Glider	Suitable habitat	Yes
Pteropus poliocephalus	Grey-headed Flying-fox	Suitable habitat	Yes
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Suitable habitat	Yes
Mormopterus norfolkensis	Eastern Freetail-bat	Suitable habitat	Yes
Chalinolobus dwyeri	Large-eared Pied Bat	Suitable habitat	Yes
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Suitable habitat	Yes
Miniopterus australis	Little Bentwing-bat	Suitable habitat	Yes
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	Suitable habitat	Yes
Myotis adversus	Large-footed Myotis	Suitable habitat	Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	Suitable habitat	Yes

Square-tailed Kite

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

No sightings have been recorded of this bird in the Donaldson property since monitoring commenced in 2001. No viable local population exists.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

No habitat isolation or fragmentation would occur.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The bird would not be at the limit of its range in this area.

Swift Parrot

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

This bird is an itinerant in the Central Coast and lower Hunter during the winter months and feeds on blossom and lerps generally on eucalypts. The bird has not been recorded on the Donaldson property since monitoring commenced in 2001 and being itinerant no viable local population would be present.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The bird would not be at the limit of its range in this area.

Barking Owl

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

The Barking Owl has not been recorded on the Donaldson property during monitoring since 2001. A viable local population was not present.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The bird would not be at the limit of its range in this area.

Powerful Owl

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

A pair of Powerful Owls has been known to be present on the Donaldson property since 1998. These owls have been monitored closely since 2001 and it has been established that the birds use the length of Weakley's Flat Creek and surrounding forest as a substantial part of their home range. In 2001 the birds raised a male and female pair of young, in 2002 no young were found and the adults were not seen in the usual places for long periods then in 2003 they raised another two young and have since been seen regularly along Weakley's Flat Creek. The nest tree has not yet been located however indications are that it is at the northern end of the property and could possibly be in the property to the east of the Donaldson property. The favoured area for the adults to raise the young after leaving the nest has been in a section of dense rain forest approximately 800m downstream along Weakley's Flat Creek from the area of the mine pit extension. One of the owls has been seen further north on Scotch Dairy Creek in the

property to the east of the Donaldson boundary and other circumstantial evidence suggests that the birds forage into the northern parts of the property. Greater Gliders were seen in the vicinity of Q8 on several occasions during monitoring until May 2004 when they were not found and this suggests that the owls have caught these gliders (Figure 4). A juvenile female from the 2001 brood was seen on the western side of the mine near Q1.

All observations over the last 3 years indicate that the section of riparian forest along Weakley's Flat Creek, adjacent to the proposed mine pit extension, is part of the foraging range for the birds. The more critical locations of daily roost trees and the nest tree are over 800m to the north from this area. The length of Weakley's Flat Creek from John Renshaw Drive downstream to the Donaldson property boundary has been searched several times and the only area where the birds roost has been in the dense rainforest section at the northeastern end.

Experience from two other locations in the region indicate that Powerful Owls are capable of living in disturbed habitat with considerable human activity around them. There has been a resident pair of birds at Green Point Reserve in the Lake Macquarie suburb of Valentine for many years. The nest tree, which is being used as this report is written, is situated less than 50m from suburban housing. There is also a long-established pair in Blackbutt Reserve in the Newcastle suburb of New Lambton. The critical factor for these Owls is the quality of the vegetative habitat for the supply and maintenance of food resources. In a recent study Blundell (2003) analysed owl ejecta pellets from beneath roost trees on the Donaldson property and the diet of these birds was found to be made up of Common Ringtail Possum 67%, Birds 14% and Sugar Gliders 11% with the balance being insect and unidentified material. This is consistent with findings elsewhere in Australia and Kavanagh (2002) reported the primary dietary content of the owls in the Central Coast region of NSW to be Common Ringtail Possum 61.6%, Birds 16.4%, Greater Glider 4.3%, Sugar Glider 5.9%. A small percentage (~0.5%) of the diet can be from terrestrial mammals and bandicoot was found in the Donaldson study. Also during the field investigation for this assessment evidence was found that one of the owls had caught a European Hare.

Given that roosting and nesting areas are well away from the proposed mine pit extension the potential for any impact on this local pair of Powerful Owls can be assessed in relation to the available habitat for the main prey species. The Common Ringtail Possum either builds large ball-shaped nests in dense foliage or will use tree hollows while the Sugar Glider uses tree hollows for denning purposes. Evidence from monitoring of the owls since 2001 suggests that they are using at least 600 hectares of the Donaldson property and an unknown amount outside of the property. The disturbance area for the proposed mine pit extension would remove just over 1.0% of the potential habitat within the Donaldson property.

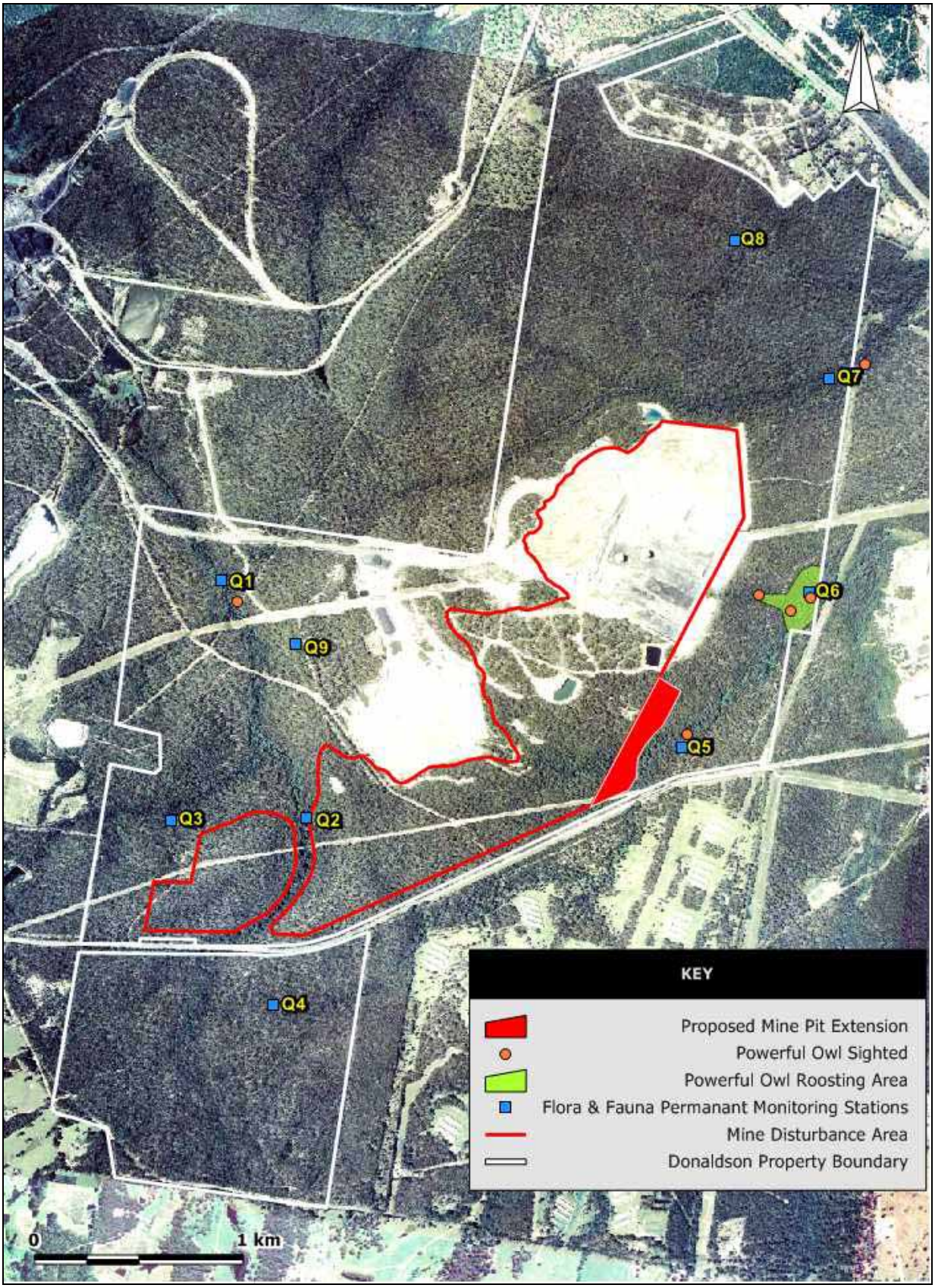

Figure 4: Powerful Owl sightings since 2001

It is debatable as to what constitutes a 'local population' of a species such as the Powerful Owl that has a home range of up to 1000 hectares. With such large home ranges it is likely that the territory of one breeding pair would abut or overlap the territory of neighbouring pairs with the only limitation being the availability of habitat in a fragmented landscape. The most conservative view would be that a single breeding pair would constitute a local population. In view of the information available about the Donaldson Powerful Owls, and assuming that they might be considered a local population, it is concluded that the life cycle of the pair of Powerful Owls on the Donaldson property is **not** likely to be disrupted so that the pair would be placed at the risk of extinction as a result of the clearing and work associated with the proposed mine pit extension.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The bird would not be at the limit of its range in this area.

Masked Owl

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

Masked Owls were reported from the Donaldson property in a 1998 assessment (PPK 1998) however despite numerous targeted searches since that time these owls have not been found. No viable local population is known to exist however were there to be a breeding pair on the Donaldson property it is concluded that the small amount of clearing asscoiated with the mine pit extension would not put that pair at risk of extinction.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The bird would not be at the limit of its range in this area.

Black-chinned Honeyeater

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

The Black-chinned Honeyeater was originally recorded on the property in 1998 (PPK 1998) however listing as a vulnerable species did not occur until November 2001. During this investigation Black-chinned Honeyeaters were seen feeding with White-naped Honeyeaters in the upper foliage of emergent trees in the riparian vegetation along Weakley's Flat Creek about 40m from the edge of the proposed mine pit extension. In late June 2004 a mixed flock of the same two species was observed in the area where Scotch Dairy Creek crosses the Donaldson property boundary to the north and these birds were in similar riparian habitat although they were also feeding through the low shrub layer.

The small amount of vegetation to be removed by the proposed mine pit extension would not significantly reduce the foraging or nesting resources for these birds on the Donaldson Property as a whole and would not place any viable local population at risk of extinction.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area..

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The bird would not be at the limit of its range in this area.

Squirrel Glider

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

No Squirrel Gliders have been seen or detected in the vicinity of the proposed mine pit extension. Squirrel Gliders have been trapped or seen during monitoring at the northern end of the property around Q8 and at the western side of the property near Q3. None have been found near the proposed mine pit extension and no viable local population of the Squirrel Glider would be placed at risk of extinction as a result of the proposed works.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The Squirrel Glider would not be at the limit of its range in this area.

Grey-headed Flying-fox

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

The Grey-headed Flying-fox is an itinerant feeder on blossom of eucalypts and the fruit of rainforest trees. There were no roosting colonies on the Donaldson property and the small amount of clearing associated with the mine pit extension would not place any local population at risk of extinction.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

The Grey-headed Flying-Fox would not be at the limit of its range in this area.

Insectivorous bats

Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat*
Mormopterus norfolkensis	Eastern Freetail-bat*
Chalinolobus dwyeri	Large-eared Pied Bat
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Miniopterus australis	Little Bentwing-bat*
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat*
Myotis adversus	Large-footed Myotis*
Scoteanax rueppellii	Greater Broad-nosed Bat*

*species recorded in the vicinity of the proposed development

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at the risk of extinction.

These insectivorous bats forage through and above the forest and along its edges. During long-term monitoring and spotlighting through the area no denning trees have been found. The small amount of clearing associated with the mine pit extension would not place any local population at risk of extinction.

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered population exists in the area.

c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or destroyed.

A significant amount of potential habitat for this species would not be destroyed.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas for a threatened species, population or ecological community.

Habitat isolation or fragmentation would not occur as a result of the mine pit extension.

e) Whether critical habitat will be affected.

No critical habitat was present.

f) Whether a threatened species, population or ecological community, or their habitats are adequately represented in conservation reserves (or other similar protected areas) in the region.

No information is available concerning any reserved populations of this bird in the region.

g) Whether the development or activity proposed is a class of development or activity that is recognised as a threatening process.

The clearing of native vegetation is a recognised threatening process however this activity would not impact on this bird in the area.

h) Whether any threatened species or ecological community is at the limit of its known distribution.

These bats would not be at the limit of their range in this area.

8.0 CONCLUSION

Table 10 summarises the threatened species found to occur in the vicinity of the Donaldson open cut mine pit extension.

Table 10: Threatened species found in the vicinity of the proposed mine pit extension.

Species	Common Name
Ninox strenua	Powerful Owl
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subsp.)
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat
Mormopterus norfolkensis	Eastern Freetail-bat
Miniopterus australis	Little Bentwing-bat
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat
Myotis adversus	Large-footed Myotis
Scoteanax rueppellii	Greater Broad-nosed Bat

The results of the application of the 8-part test were that there would be no impact on the viability of these threatened species as a consequence of the activities associated with the mine pit extension. No threat was found to any species considered as potentially occurring in the vicinity.

9.0 RECOMMENDATIONS

It is recommended that the protocols embodied in the Donaldson Flora and Fauna Management Plan (Gunninah 2000) be extended to the activities associated with the proposed mine pit extension. In particular the pre-clearing protocols (s4.1) should be followed to ensure that no loss of hollow-dwelling mammals occurs during clearing.

10.0 REFERENCES

Allison F.R. & Hoye G.A. (2000) Eastern Freetail-bat *Mormopterus norfolkensis* (Gray, 1839) **IN** *The Mammals of Australia.* Ronald.Strahan (Ed) Reed New Holland.

Barrett G., Silcocks A., Barry S., Cunningham R. & Poulter R. (2003) *The New Atlas of Australian Birds* Birds Australia RAOU.

Bartier FV, Gross CL, Mulligan DR, Bellairs SM and Bowen D (2001) Understanding the Biology and Ecology of Vulnerable Plant Species – A Case Study With *Tetratheca juncea* Occurring Over Coal Leases, ACARP Project C8012. A report prepared for Australian Coal Research. June 2001.

Blundell A. (2003) *The Powerful Owl* (Ninox strenua) *in Disturbed Environments*. Honours Thesis. Geography & Environmental Science. University of Newcastle.

Boeswinkel F.D. (1999) Ovules and seeds of Tremandraceae. *Australian Journal of Botany* **47**, 769-781.

Brew C.R., O'Dowd D.J. & Rae I.D. (1989) Seed dispersal by ants: behaviour-releasing compounds in elaiosomes. *Oecologia* **80**, 490-497.

Briggs JD and Leigh JH (1995) *Rare or Threatened Australian Plants,* CSIRO.

Churchill Sue (1998) *Australian Bats*. New Holland.

Driscoll C. (2003) The pollination ecology of *Tetratheca juncea* Smith (Tremandraceae): finding the pollinators. *Cunninghamia* 9(1) 133-140.

Dwyer P.D., (2001a) Little Bentwing-bat *Miniopterus australis* (Tomes, 1858) in *The Mammals of Australia.* Ronald.Strahan (Ed) Reed New Holland.

Eby, P. (2000) The results of four synchronous assessments of relative distribution and abundance of Grey-headed Flying-fox *Pteropus poliocephalus*. In *Proceedings of a Workshop to Assess the Status of the Grey-headed Flyingfox in New South Wales*. Richards, G. (ed). http://batcall.csu.edu.au/abs/ghff/ghffproceedings.pdf

Eco Logical (2002) *Vegetation Survey, Classification and Mapping Lower Hunter and Central Coast Region.* Version1.2. A project undertaken for The Lower Hunter and Central Coast Regional Environment Management Strategy CRA Unit Sydney Zone National Parks and Wildlife Service.

Gardner, C. and Murray, L. (1992) Tremandraceae. In: *Flora of New South Wales* Vol 3 (ed. G.J. Harden) pp. 74-78. UNSW Press.

Gunninah (2000), *Donaldson Open-cut Mine Beresfield, Flora and Fauna Management Plan*, Gunninah Environmental Consultants, Crows Nest.

Harden GJ(ed) (1992) *Flora of New South Wales Volume 3*. NSW University Press: Sydney.

Harden G.J(ed) (1993) *Flora of New South Wales Volume 4*. NSW University Press: Sydney.

Harden GJ (ed) (2000) *Flora of New South Wales Volume 1*. NSW University Press: Sydney.

Harden GJ (ed) (2002) *Flora of New South Wales Volume 2*. NSW University Press: Sydney.

Higgins PJ (1999) *Handbook of Australian, New Zealand and Antarctic Birds* Volume 4. Oxford University Press, Melbourne.

Holland GJ (2001) Opportunistic Vertebrate Predation by the Squirrel Glider (Peta*urus norfolcensis*) *The Victorian Naturalist*, 118 (4)

Hoye GA (1995) A bat survey of the Morisset Forestry District. *Morisset Forestry District Environmental Impact Statement Supporting Document No. 5.*

Hoye GA and Richards GC (2000) Greater Broad-nosed Bat *Scoteanax rueppellii* (Peters, 1866). **IN** *The Mammals of Australia*, Ronald Strahan (Ed) Reed New Holland.

Kavanagh R.P., (1997) *Ecology and management of large forest owls in south-eastern Australia*. PhD Thesis. School of Biological Sciences, University of Sydney.

Kavanagh R.P., (1988) The impact of predation by the Powerful Owl, *Ninox strenua*, on a population of the Greater Glider, *Petauroides volans*. *Australian Journal of Ecology* 13: 445-450.

Kavanagh R.P., (2002a) Conservation and management of large forest owls in southeastern Australia. In *Ecology and Conservation of Owls*. Newton I., Kavanagh R., Olsen J., and Taylor I. (Eds) CSIRO.

Kavanagh R.P., (2002b) Comparative diets of the Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebrocosa) and Masked Owl *(Tyto novaehallandiae*) in southeastern Australia. In *Ecology and Conservation of Owls*. Newton I., Kavanagh R., Olsen J., and Taylor I. (Eds) CSIRO.

Kavanagh R.P., & Stanton M.A., (2002) Response to habitat fragmentation by the Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*), Masked Owl (*Tyto novaehollandiae*) and other nocturnal fauna in southeastern Australia.

MacNally R & Horrocks G (2000) Landscape-scale conservation of an endangered migrant: the Swift Parrot (*Lathamus discolor*) in its winter range *Biological Conservation* 92 (2000) 335-343

Murray, M., Bell, S., & Hoye, G. (2002). *Flora and fauna survey Guidelines: Lower Hunter Central Coast Region 2002*. Lower Hunter & Central Coast Regional Environment Management Strategy.

Olsen P (1995) *Australian Birds of Prey*. UNSW Press.

Parry-Jones KA & Augee M (1991) Food selection in Grey-headed flying foxes (*Pteropus poliocephalus*) occupying a summer colony site near Gosford, NSW. *Wildlife Research* 18: 111-124.

Payne, R.J. (2000). Lake Macquarie Tetratheca juncea Conservation Management Plan Final Report November 2000. A report prepared for Lake Macquarie City Council, NSW National Parks and Wildlife Service and BHP Pty Ltd.

Phillips W (2000) Eastern False Pipistrelle *Falsistrellus tasmaniensis* **IN** *The Mammals of Australia*. Ronald Strahan (Ed). Reed New Holland.

PPK (1998) *Proposed Open Cut Mine, Beresfield NSW – Species Impact Statement.* A report prepared

by PPK Evironment & Infrastructure Pty Ltd for Donaldson Projects.

Quinn DG (1995) Population Ecology of the Squirrel Glider (*Petaurus norfolcensis*) and the Sugar Glider (*Petaurus breviceps*) (Marsupiala:Petauridae) at Limeburners Creek on the Central North Coast of New South Wales. *Wildlife Research* 22:471-515.

Richards (2000) *Proceedings of a Workshop to Assess the Status of the Grey-headed Flyingfox in New South Wales*. Richards, G. (ed). http://batcall.csu.edu.au/abs/ghff/ghffproceedings.pdf

Richards GC (2000) Large-footed Myotis, *Myotis adversus* (Morsefield, 1824). **IN** *The Mammals of Australia*. Ronald Strahan (Ed). Reed New Holland.

Rowston C (1998a) '*The Squirrel Glider: An Autecological Study in a Fragmented Landscape*' PhD Thesis, Faculty of Environmental Sciences, Griffith University, QLD.

Rowston C (1998b) Nest- and refuge-tree usage by squirrel gliders, *Petaurus norfolcensis*, in south east Queensland, *Wildlife Research*, **25:** 157-164.

Simpson K & Day N (1999), *The Claremont Field Guide to the Birds of Australia*. Penguin Books Victoria.

Smith A (2002) *Squirrel Glider (Petaurus norfolkensis) Condervation Management Plan: Wyong Shire.* Report to Wyong Shire Council, November 2002.

Suckling, G. C. (2000) Squirrel Glider (*Petaurus norfolcensis*) Kerr, 1792. **IN** *The Mammals of Australia*. Ronald Strahan (Ed) Reed New Holland.

SWC (1996) Eleebana Local Squirrel Glider Study: Report to Lake Macquarie City Council by SWC Wetland and Ecological Management Consultancy.

Taylor I.R., Kirsten I., & Peake P. (2002). Distribution and Habitat of Barking Owls (Ninox connivens) in Central Victoria. In *Ecology and Conservation of Owls*. Newton I., Kavanagh R., Olsen J., and Taylor I. (Eds) CSIRO.

Thompson J (1976), A Revision of the Genus *Tetratheca* (Tremandraceae). *Telopea* 1 (3), 139-215.

Tidemann CR (2000) Grey-headed flying fox, *Pteropus poliocephalus* (Temminck, 1825). **IN** *The Mammals of Australia*. Ronald Strahan (Ed) Reed New Holland.

White AW & Pyke GH (1996). Distribution and conservation status ot the Green and Golden Bell Frog *Litoria aurea* in New South Wales. *Australian Zoologist* 30 (2): 177-189.

11.0 APPENDICES

Species of flora found in area

Northern side of Weakley's Flat Creek tributary

Common Name	Scientific Name	Family Name
Pastel Flower	*Pseuderanthemum variabile*	**Acanthaceae**
Maiden Hair Fern	*Adiantum aethiopicum*	**Adiantaceae**
Mulga Fern	*Cheilanthes sieberi subsp. sieberi*	**Adiantaceae**
Pale Grass-lily	*Caesia parviflora var. parviflora*	**Anthericaceae**
Elderberry Ash	*Polyscias sambucifolia*	**Araliaceae**
	Chrysocephalum semipapposum	**Asteraceae**
Slender Lagenophora	*Lagenifera gracilis*	**Asteraceae**
	Lagenifera stipitata	**Asteraceae**
Fuzzweed	*Vittadinia cuneata*	**Asteraceae**
Wonga Vine	*Pandorea pandorana subsp. pandorana*	**Bignoniaceae**
Forest Oak	*Allocasuarina torulosa*	**Casuarinaceae**
Orange Bark	*Maytenus silvestris*	**Celastraceae**
	Cuscuta australis	**Convolvulaceae**
	Lepidosperma laterale	**Cyperaceae**
Bracken Fern	*Pteridium esculentum*	**Dennstaedtiaceae**
	Hibbertia aspera subsp. aspera	**Dilleniaceae**
Native Yam	*Dioscorea transversa*	**Dioscoreaceae**
	Leucopogon juniperinus	**Epacridaceae**
	Styphelia triflora	**Ericaceae**
Coffee Bush	*Breynia oblongifolia*	**Euphorbiaceae**
Cheese Tree	*Glochidion ferdinandi var. ferdinandi*	**Euphorbiaceae**
	Phyllanthus hirtellus	**Euphorbiaceae**
Gorse Bitter Pea	*Daviesia ulicifolia*	**Fabaceae (Faboideae)**
	Desmodium rhytidophyllum	**Fabaceae (Faboideae)**
	Glycine microphylla	**Fabaceae (Faboideae)**
	Gompholobium latifolium	**Fabaceae (Faboideae)**
False Sarsaparilla	*Hardenbergia violacea*	**Fabaceae (Faboideae)**
	Hovea linearis	**Fabaceae (Faboideae)**
	Jacksonia scoparia	**Fabaceae (Faboideae)**
	Podolobium scandens	**Fabaceae (Faboideae)**
	Acacia elongata	**Fabaceae (Mimosoideae)**
	Acacia falcata	**Fabaceae (Mimosoideae)**
	Acacia parvipinnula	**Fabaceae (Mimosoideae)**
	Acacia ulicifolia	**Fabaceae (Mimosoideae)**
	Goodenia heterophylla subsp. heterophylla	**Goodeniaceae**
	Gonocarpus tetragynus	**Haloragaceae**
	Cassytha glabella f. glabella	**Lauraceae**
Whiteroot	*Pratia purpurascens*	**Lobeliaceae**
	Lomandra cylindrica	**Lomandraceae**

	Lomandra filiformis subsp. coriacea	**Lomandraceae**
	Lomandra filiformis subsp. filiformis	**Lomandraceae**
Spiny-headed Mat-rush	*Lomandra longifolia*	**Lomandraceae**
	Lomandra multiflora subsp. multiflora	**Lomandraceae**
Scrambling Lily	*Geitonoplesium cymosum*	**Luzuriagaceae**
Smooth-barked Apple	*Angophora costata*	**Myrtaceae**
Red Bloodwood	*Corymbia gummifera*	**Myrtaceae**
Spotted Gum	*Corymbia maculata*	**Myrtaceae**
	Eucalyptus acmenoides	**Myrtaceae**
Red Ironbark	*Eucalyptus fibrosa*	**Myrtaceae**
	Eucalyptus globoidea	**Myrtaceae**
Grey Ironbark	*Eucalyptus paniculata subsp. paniculata*	**Myrtaceae**
Blackbutt	*Eucalyptus pilularis*	**Myrtaceae**
	Eucalyptus punctata	**Myrtaceae**
Red Mahagony	*Eucalyptus resinifera subsp. resinifera*	**Myrtaceae**
White Mahogany	*Eucalyptus umbra*	**Myrtaceae**
	Leptospermum polygalifolium subsp. polygalifolium	**Myrtaceae**
Turpentine	*Syncarpia glomulifera subsp. glomulifera*	**Myrtaceae**
Native Olive	*Notelaea longifolia*	**Oleaceae**
	Acianthus fornicatus	**Orchidaceae**
	Caladenia catenata	**Orchidaceae**
	Chiloglottis trapeziformis	**Orchidaceae**
	Pterostylis nutans	**Orchidaceae**
	Dianella caerulea var. caerulea	**Phormiaceae**
	Dianella longifolia var. longifolia	**Phormiaceae**
Apple Dumplings	*Billardiera mutabilis*	**Pittosporaceae**
Apple Dumplings	*Billardiera scandens var. scandens*	**Pittosporaceae**
	Bursaria spinosa subsp. spinosa	**Pittosporaceae**
Hairy Pittosporum	*Pittosporum revolutum*	**Pittosporaceae**
	Pittosporum undulatum	**Pittosporaceae**
Threeawn Speargrass	*Aristida vagans*	**Poaceae**
Hedgehog Grass	*Echinopogon ovatus*	**Poaceae**
Wiry Panic	*Entolasia stricta*	**Poaceae**
Bladey Grass	*Imperata cylindrica var. major*	**Poaceae**
	Joycea pallida	**Poaceae**
	Oplismenus imbecillis	**Poaceae**
	Panicum simile	**Poaceae**
	Poa labillardierei var. labillardierei	**Poaceae**
Kangaroo Grass	*Themeda australis*	**Poaceae**
	Banksia spinulosa var. collina	**Proteaceae**
	Lomatia silaifolia	**Proteaceae**
Narrow-leaved Geebung	*Persoonia linearis*	**Proteaceae**
	Morinda jasminoides	**Rubiaceae**
	Boronia polygalifolia	**Rutaceae**
Lantana	*Lantana camara**	**Verbenaceae**
Slender Grape	*Cayratia clematidea*	**Vitaceae**
Cycad	*Macrozamia reducta*	**Zamiaceae**

Riparian habitat

Common Name	Scientific Name	Family Name
Pastel Flower	*Pseuderanthemum variabile*	**Acanthaceae**
Maiden Hair Fern	*Adiantum aethiopicum*	**Adiantaceae**
Settler's Flax	*Gymnostachys anceps*	**Araceae**
Prickly Rasp Fern	*Doodia aspera*	**Blechnaceae**
Forest Oak	*Allocasuarina torulosa*	**Casuarinaceae**
	Carex longebrachiata	**Cyperaceae**
Swordgrass	*Gahnia clarkei*	**Cyperaceae**
	Hypolepis muelleri	**Dennstaedtiaceae**
	Calochlaena dubia	**Dicksoniaceae**
Native Yam	*Dioscorea transversa*	**Dioscoreaceae**
Cheese Tree	*Glochidion ferdinandi var. ferdinandi*	**Euphorbiaceae**
	Acacia parvipinnula	**Fabaceae (Mimosoideae)**
Murrogun	*Cryptocarya microneura*	**Lauraceae**
Spiny-headed Mat-rush	*Lomandra longifolia*	**Lomandraceae**
Scrambling Lily	*Geitonoplesium cymosum*	**Luzuriagaceae**
Pearl Vine	*Sarcopetalum harveyanum*	**Menispermaceae**
Snake Vine	*Stephania japonica var. discolor*	**Menispermiaceae**
	Hedycarya angustifolia	**Monimiaceae**
	Ficus fraseri	**Moraceae**
Grey Ironbark	*Eucalyptus paniculata subsp. paniculata*	**Myrtaceae**
Blackbutt	*Eucalyptus pilularis*	**Myrtaceae**
	Melaleuca styphelioides	**Myrtaceae**
Turpentine	*Syncarpia glomulifera subsp. glomulifera*	**Myrtaceae**
Native Olive	*Notelaea longifolia*	**Oleaceae**
	Dianella caerulea var. caerulea	**Phormiaceae**
Hairy Pittosporum	*Pittosporum revolutum*	**Pittosporaceae**
	Oplismenus imbecillis	**Poaceae**
Red Ash	*Alphitonia excelsa*	**Rhamnaceae**
	Ripogonum album	**Ripogonaceae**
	Morinda jasminoides	**Rubiaceae**
Hairy-leaved Doughwood	*Melicope micrococca*	**Rutaceae**
Lantana	*Lantana camara**	**Verbenaceae**
Water Vine	*Cissus antarctica*	**Vitaceae**

Southern side of Weakley's Flat creek tributary

Common Name	Scientific Name	Family Name
Mulga Fern	*Cheilanthes sieberi subsp. sieberi*	**Adiantaceae**
Common Silkpod	*Parsonsia straminea*	**Apocynaceae**
Elderberry Ash	*Polyscias sambucifolia*	**Araliaceae**
	Brachyscome multifida var. multifida	**Asteraceae**
Slender Lagenophora	*Lagenifera gracilis*	**Asteraceae**
Fire Weed	*Senecio madagascariensis**	**Asteraceae**
Fuzzweed	*Vittadinia cuneata*	**Asteraceae**
Forest Oak	*Allocasuarina torulosa*	**Casuarinaceae**
Orange Bark	*Maytenus silvestris*	**Celastraceae**
	Cuscuta australis	**Convolvulaceae**
	Dichondra repens	**Convolvulaceae**
	Lepidosperma concavum	**Cyperaceae**
	Lepidosperma laterale	**Cyperaceae**
Bracken Fern	*Pteridium esculentum*	**Dennstaedtiaceae**
	Hibbertia aspera subsp. aspera	**Dilleniaceae**
	Hibbertia pedunculata	**Dilleniaceae**
Twining Guinea Flower	*Hibbertia scandens*	**Dilleniaceae**
	Leucopogon juniperinus	**Epacridaceae**
	Styphelia triflora	**Ericaceae**
Coffee Bush	*Breynia oblongifolia*	**Euphorbiaceae**
Cheese Tree	*Glochidion ferdinandi var. ferdinandi*	**Euphorbiaceae**
Gorse Bitter Pea	*Daviesia ulicifolia*	**Fabaceae (Faboideae)**
	Desmodium rhytidophyllum	**Fabaceae (Faboideae)**
	Glycine clandestina	**Fabaceae (Faboideae)**
False Sarsaparilla	*Hardenbergia violacea*	**Fabaceae (Faboideae)**
	Pultenaea euchila	**Fabaceae (Faboideae)**
	Pultenaea villosa	**Fabaceae (Faboideae)**
	Acacia falcata	**Fabaceae (Mimosoideae)**
	Acacia fimbriata	**Fabaceae (Mimosoideae)**
	Acacia longifolia subsp. longifolia	**Fabaceae (Mimosoideae)**
Maiden's Wattle	*Acacia maidenii*	**Fabaceae (Mimosoideae)**
	Acacia pedina	**Fabaceae (Mimosoideae)**
	Acacia ulicifolia	**Fabaceae (Mimosoideae)**
Whiteroot	*Pratia purpurascens*	**Lobeliaceae**
	Lomandra filiformis subsp. coriacea	**Lomandraceae**
	Lomandra multiflora subsp. multiflora	**Lomandraceae**
Smooth-barked Apple	*Angophora costata*	**Myrtaceae**
	Callistemon rigidus	**Myrtaceae**
White Bottlebrush	*Callistemon salignus*	**Myrtaceae**
Red Bloodwood	*Corymbia gummifera*	**Myrtaceae**
Spotted Gum	*Corymbia maculata*	**Myrtaceae**
	Eucalyptus acmenoides	**Myrtaceae**
Red Ironbark	*Eucalyptus fibrosa*	**Myrtaceae**
Grey Ironbark	*Eucalyptus paniculata subsp. paniculata*	**Myrtaceae**
White Mahogany	*Eucalyptus umbra*	**Myrtaceae**

A Paperbark	*Melaleuca nodosa*	**Myrtaceae**
Turpentine	*Syncarpia glomulifera subsp. glomulifera*	**Myrtaceae**
	Acianthus fornicatus	**Orchidaceae**
	Caladenia catenata	**Orchidaceae**
	Pterostylis nutans	**Orchidaceae**
	Oxalis exilis	**Oxalidaceae**
	Dianella caerulea var. caerulea	**Phormiaceae**
	Dianella longifolia var. longifolia	**Phormiaceae**
Apple Dumplings	*Billardiera scandens var. scandens*	**Pittosporaceae**
	Bursaria spinosa subsp. spinosa	**Pittosporaceae**
Hairy Pittosporum	*Pittosporum revolutum*	**Pittosporaceae**
Threeawn Speargrass	*Aristida vagans*	**Poaceae**
	Digitaria aequiglumis	**Poaceae**
Hedgehog Grass	*Echinopogon caespitosus var. caespitosus*	**Poaceae**
Wiry Panic	*Entolasia stricta*	**Poaceae**
Bladey Grass	*Imperata cylindrica var. major*	**Poaceae**
	Paspalidium albovillosum	**Poaceae**
Kangaroo Grass	*Themeda australis*	**Poaceae**
	Banksia spinulosa var. collina	**Proteaceae**
	Hakea teretifolia subsp. teretifolia	**Proteaceae**
	Lomatia silaifolia	**Proteaceae**
Narrow-leaved Geebung	*Persoonia linearis*	**Proteaceae**
Headache Vine	*Clematis glycinoides var. glycinoides*	**Ranunculaceae**
	Morinda jasminoides	**Rubiaceae**
	Boronia polygalifolia	**Rutaceae**
Native Cherry	*Exocarpos cupressiformis*	**Santalaceae**
	Clerodendrum tomentosum	**Verbenaceae**
Lantana	*Lantana camara**	**Verbenaceae**
Ivy-leaved Violet	*Viola hederacea*	**Violaceae**
	Cayratia clematidea	**Vitaceae**
Grass Tree	*Xanthorrhoea resinifera*	**Xanthorrhoeaceae**

Species of fauna found in area

Scientific Name	Common Name	Status	Sep-01	Mar-02	Nov-02	Apr-03	Dec-03	May-04
Mammal Trapping								
Antechinus stuartii	Brown Antechinus		1	20	9	11	9	8
Perameles nasuta	Long-nosed Bandicoot				1			
Rattus fuscipes	Bush Rat			4		4		1
Rattus rattus	Introduced Rat			1				
Trichosurus vulpecula	Common Brushtail possum			1	2		3	4
Bats Anabat recording								
Chalinolobus gouldii	Goulds Wattled Bat		+	+	+		+	
Chalinolobus morio	Chocolate Wattled Bat		+	+	+			
Miniopterus australis	Little Bent-wing Bat	V	+				+	
Miniopterus schreibersii	Large Bent-wing Bat	V			+			
Mormopterus norfolkensis	Eastern Freetail Bat	V	+		+		+	
Mormopterus sp. 1	Little Freetail Bat		+	+	+			
Myotis adversus	Fishing Bat	V	+		+		+	
Nyctophilus sp.	Unidentified Long-eared Bat		+		+			
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	+		+			
Scoteanax rueppellii	Greater Broad-nosed Bat	V			+			
Scotorepens orion	Eastern Broad-nosed Bat			+	+		+	
Tadarida australis	White-striped Mastff Bat		+					
Vespadelus vulturnus	Little Forest Bat		+	+	+			+
Rhinolopus megaphyllus	Eastern Horseshoe-bat							+
	Total Bat Species		10	5	11	0	5	2
Spotlighting								
Birds								
Aegotheles cristatus	Owlet Nightjar		+					
Ninox strenua	Powerful Owl	V	+					+
Mammals								
Acrobates pygmaeus	Feathertail Glider				+			
Petaurus breviceps	Sugar Glider							+

Bird Species identified in the area

Family	Sub-family	Scientific name	Common Name
CAPRIMULGIFORMES	**Aegothelidae**	*Aegotheles cristatus*	Australian Owlet-nightjar
FALCONIORMES	**Accipitridae**	*Accipiter novaehollandiae*	Grey Goshawk
PASSERIFORMES	**Campephagidae**	*Coracina tenuirostris*	Cicadabird
PASSERIFORMES	**Cinclosomatidae**	*Psophodes olivaceus*	Eastern Whipbird
PASSERIFORMES	**Climacteridae**	*Cormobates leucophaeus*	White-throated Treecreeper
PASSERIFORMES	**Dicruridae**	*Myiagra rubecula*	Leaden Flycatcher
PASSERIFORMES	**Dicruridae**	*Rhipidura fuliginosa*	Grey Fantail
PASSERIFORMES	**Maluridae**	*Malurus cyaneus*	Superb Fairy-wren
PASSERIFORMES	**Maluridae**	*Malurus lamberti*	Variegated Fairy-wren
PASSERIFORMES	**Meliphagidae**	*Lichenostomus chrysops*	Yellow-faced Honeyeater
PASSERIFORMES	**Meliphagidae**	*Meliphaga lewinii*	Lewin's Honeyeater
PASSERIFORMES	**Meliphagidae**	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)[V-TSCAct]
PASSERIFORMES	**Meliphagidae**	*Melithreptus lunatus*	White-naped Honeyeater
PASSERIFORMES	**Meliphagidae**	*Myzomela sanguinolenta*	Scarlet Honeyeater
PASSERIFORMES	**Meliphagidae**	*Phylidonyris nigra*	White-cheeked Honeyeater
PASSERIFORMES	**Muscicapidae**	*Zoothera lunulata*	Bassian Thrush
PASSERIFORMES	**Neosittidae**	*Daphoenositta chrysoptera*	Varied Sittella
PASSERIFORMES	**Oriolidae**	*Oriolus sagittatus*	Olive-backed Oriole
PASSERIFORMES	**Pachycephalidae**	*Colluricincla harmonica*	Grey Shrike-thrush
PASSERIFORMES	**Pachycephalidae**	*Pachycephala pectoralis*	Golden Whistler
PASSERIFORMES	**Pachycephalidae**	*Pachycephala rufiventris*	Rufous Whistler
PASSERIFORMES	**Pardalotidae**	*Acanthiza lineata*	Striated Thornbill
PASSERIFORMES	**Pardalotidae**	*Pardalotus punctatus*	Spotted Pardalote
PASSERIFORMES	**Pardalotidae**	*Sericornis frontalis*	White-browed Scrubwren
STRIGIFORMES	**Strigidae**	*Ninox novaeseelandiae*	Southern Boobook
STRIGIFORMES	**Strigidae**	*Ninox strenua*	Powerful Owl[V-TSCAct]

Appendix F

Noise and Blasting Impact Assessment

REPORT 30-1343R2
Revision 0

Donaldson Mine Extension
Noise & Blasting Impact Assessment

Prepared for

Donaldson Coal Pty Ltd
PO Box 2275
Four Mile Creek Rd
GREENHILLS NSW 2323

12 November 2004

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DOCUMENT CONTROL

Donaldson Mine Extension
Noise & Blasting Impact Assessment

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Richard Heggie Associates Pty Ltd operates under a Quality System which has been certified by Quality Assurance Services Pty Limited to comply with all the requirements of ISO 9001:2000 "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing" (Licence No 3236).

This document has been prepared in accordance with the requirements of that System.

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Richard Heggie Associates Pty Ltd is a Member Firm of the Association of Australian Acoustical Consultants.

Reference	Status	Date	Prepared	Checked	Authorised
30-1343R2	Revision 0	12 November 2004	Rod Linnett	Rod Linnett	Rod Linnett

EXECUTIVE SUMMARY

Richard Heggie Associates Pty Ltd (Heggies) has been commissioned by Donaldson Coal Pty Ltd to determine the noise impact of an extension of the existing open cut coal mine at Beresfield, NSW.

Noise Impact

Noise emissions from mining operations, within the proposed hours of operation, for the proposed mine extension under calm weather conditions, are predicted to comply with project specific noise levels at all residential locations for all operating periods, except at the occupied residences on the Bartter site (Locations K1, K2 & K3) which will meet marginal compliance (< 2 dBA above the goal). This minor exceedance of 1 dBA that may occur during the evening and night-time periods is unlikely to be noticeable by most people.

Blasting

The impacts of blasting will not change as a result of this proposal. The frequency of blasting will remain the same at two (2) to three (3) blasts per week. It is intended for blasting at Donaldson Mine to be carried out between 9.00 am and 5.00 pm Mondays to Saturdays in accordance with the DEC guidelines and in line with current practice.

Blast emissions site laws were developed from ground vibration and airblast levels recorded during recent blasting operations at the mine site. These site laws were used to predict the levels of blast emissions (ground vibration and airblast) at the receivers surrounding Donaldson Mine. The maximum instantaneous charge (MIC) will vary, and be limited, depending on the location of the area being mined and its relation to the nearest affected receiver to maintain ground vibration and airblast levels to within the ANZECC Guidelines.

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1 INTRODUCTION

Richard Heggie Associates Pty Ltd (Heggies) has been commissioned by Donaldson Coal Pty Ltd to determine the noise impact of an extension to the existing open cut coal mine.

Donaldson Coal Pty Ltd has been operating the mine at Beresfield, NSW since February 2001. Consent was granted for this project by the Minister for Urban Affairs and Planning in October 1999.

This Noise Impact Assessment will be submitted to the Department of Environment and Conservation (DEC, formerly the EPA) in order to obtain approval for the development.

The Noise Impact Assessment has been prepared in general accordance with Australian Standard 1055-1997 "*Description and Measurement of Environmental Noise*" Parts 1, 2 and 3 and with reference to the DEC's Industrial Noise Policy and the Environmental Noise Control Manual (ENCM).

2 PROJECT DESCRIPTION

Donaldson Coal Pty Ltd proposes to extend the mine to the south east to extract resource that was previously regarded as unsuitable for mining.

The subject proposal is for an extension of the pit ("push back" of the highwall) along approximately 670 metres of strike, to a maximum of 100 metres east towards Weakley's Flat Creek.

The extension contains approximately 1.8 million bcm of burden and 644,000 tonnes of coal. It will be mined in conjunction with the adjacent existing strips, and will be completely mined out by July 2007. No changes to the current extraction rate are proposed. The impact on the project lifetime will be minimal, and will not require any extension of the approved project life.

The area will be mined with existing equipment and methods, and within existing hours of operations.

The extension area would be an extension of mining strips 16 to 23 by up to 100 metres in an easterly direction toward Weakleys Flat Creek. The extension area would not encroach within 40 metres to the creek. Details of the proposed extension are shown in **Figure 1**.

Figure 1 Mine Extension

2.1 Plant and Equipment

The plant and equipment used for the site includes the following:

- Off - Road Haul Trucks
  - 7 x Caterpillar 785 rear dump truck
  - 3 x Caterpillar 777A rear dump truck
  - 3 x Komatsu HD 785 rear dump truck
- Excavators
  - 2 x Komatsu PC 1000/1
  - 1 x Komatsu PC 3000/5
  - 2 x Komatsu PC 1600
  - 1 x Hitachi 2500
- Bulldozers
  - 1 x Caterpillar IT28B Dozer
  - 1 x Caterpillar 824C Dozer
  - 1 x Caterpillar D7H Dozer
  - 2 x Caterpillar D9R Dozer
  - 1 x Caterpillar D9N Dozer
  - 1 x Caterpillar D10N Dozer
  - 1 x Komatsu D375A/1 Dozer
  - 1 x Komatsu D475/2 Dozer
- Front end loaders
  - 1 x Komatsu WA 600 front end loader
  - 1 x Komatsu WA 800 front end loader
- 1 x Caterpillar 16G Grader
- 2 x Leibherr Drills

2.2 Plant and Equipment Noise Levels

A noise survey of acoustically significant plant and equipment used on site was conducted by Heggies on 1 July 2004. A summary of the sound power levels determined from these measurements are contained in **Table 1**. Details of the sound power levels and octave band levels used in the modelling process are given in **Appendix A**.

Table 1 Acoustically Significant Equipment Sound Power Levels

Equipment	Sound Power Levels
Caterpillar 785 rear dump truck	122 dBA
Caterpillar 777A rear dump truck	117 dBA
Komatsu HD 785 rear dump truck	119 dBA
Komatsu PC 1000/1 Excavator	111 dBA
Komatsu PC 300/5 Excavator	109 dBA
Komatsu PC 1600 Excavator	120 dBA
Hitachi 2500 Excavator	115 dBA
Komatsu WA 600 front end loader	114 dBA
Komatsu WA 800 front end loader	116 dBA
Caterpillar 16G Grader	109 dBA
Caterpillar IT28B Dozer	112 dBA
Caterpillar 824C Dozer	112 dBA
Caterpillar D7H Dozer	112 dBA
Caterpillar D9R Dozer	113 dBA
Caterpillar D9N Dozer	113 dBA
Caterpillar D10N Dozer	113 dBA
Komatsu D375A/1 Dozer	112 dBA
Komatsu D475/2 Dozer	112 dBA
Coal Truck	108 dBA
Leibherr Small Drill	120 dBA
Leibherr Large Drill	117 dBA

2.3 Hours of Operation

The mine has approval to operate seven (7) days a week, 24 hours a day. A summary of all relevant mining activity and operating hours are shown in **Table 2**.

Table 2 Operating Hours

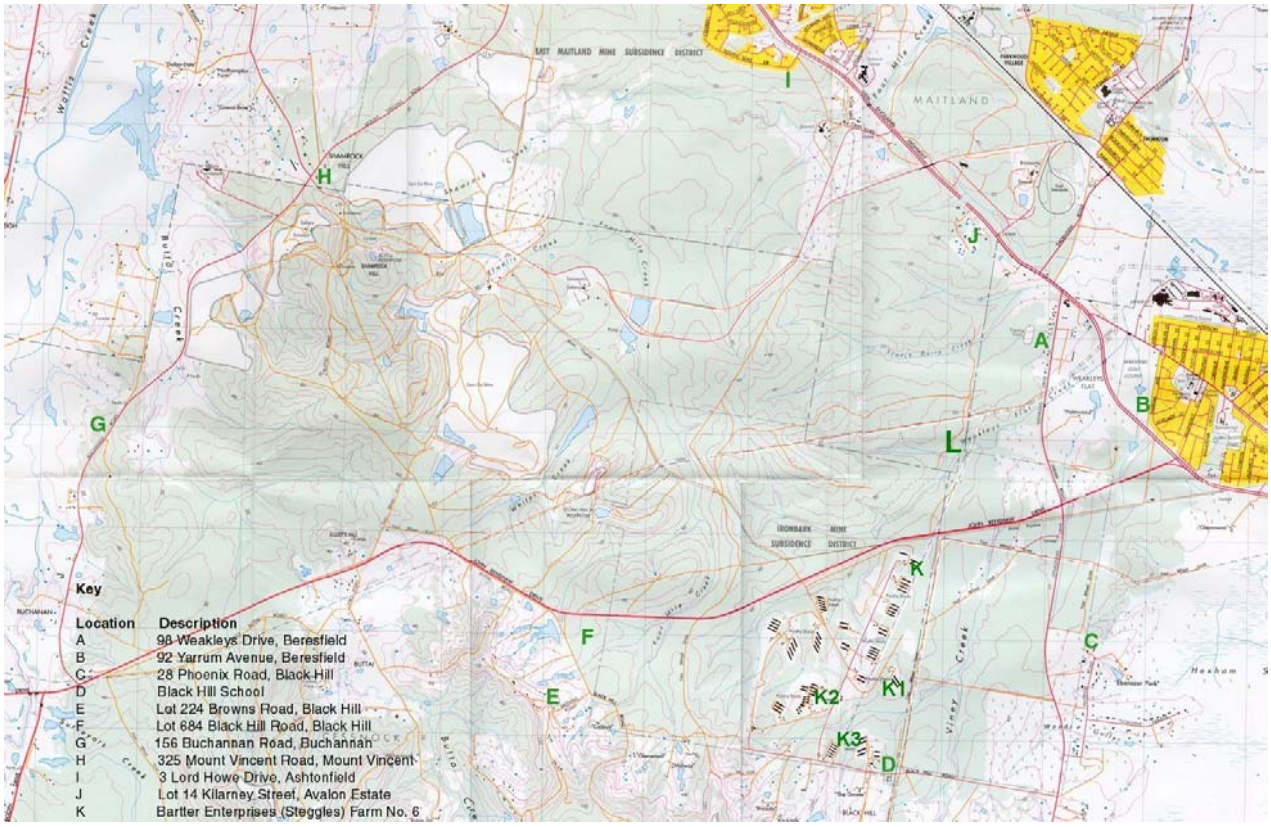
Activity	Period	Operating Hours
Vegetation Removal	7 days per week	24 hours per day
Topsoil Stripping	7 days per week	24 hours per day
Overburden Removal	7 days per week	24 hours per day
Coal Extraction & Removal	7 days per week	24 hours per day
Overburden Emplacement	7 days per week	24 hours per day
Construction, including construction of any bunds	Monday to Friday Saturday	7.00 am to 6.00 pm 8.00 am to 1.00 pm
Mining operations, including mining, haulage of waste to dumps and coal processing	Monday to Friday Saturday, Sunday	24 hours per day 7.00 am to 6.00 pm
Road transportation and stockpiling of coal	7 days per week	24 hours per day
Rail loading of coal	7 days per week	7.00 am to 10.00 pm
Maintenance of mobile and fixed plant	7 days per week	24 hours per day
Blasting, not involving the closure of John Renshaw Drive	Monday to Saturday	7.00 am to 5.00 pm
Blasting, involving the closure of John Renshaw Drive	Monday to Saturday	10.00 am to 2.00 pm

Note: Restrictions on public holidays are the same as for Sundays

3 SITE DETAILS

Donaldson open cut coal mine is located at Beresfield, NSW. The nearest effected receivers to the mine site, Locations A to L, are shown in **Figure 2**.

Figure 2 Location Map



There are restrictions of the use of land within 500 metres from the edge of Donaldson mine. Hence, noise and blasting criteria do not apply within the 500 metre buffer zone from the mine, this includes a portion of the Bartter site (Location K). The land use restrictions are attached to the land, regardless of the ownership, and apply for the life of the Donaldson Mine.

There are currently three occupied residences, shown as K1, K2 and K3 in **Figure 2** on the Bartter site. The nearest residence, K1 is approximately 1.5 km south of the mine extension area, and 1 km south of Location K.

4 IMPACT ASSESSMENT PROCEDURES

Currently, the Donaldson Mine noise consent conditions are in accordance with the guidelines set out in the ENCM. The proposed extension of the mining area will trigger the application of the NSW Industrial Noise Policy (INP) to the operation. INP based criteria used in this assessment have been derived from baseline monitoring data compiled in October 2000, prior to the operation of the mine.

The project specific noise design goals for the Donaldson Mine were established and determined using the methodology prescribed in the NSW Department of Environment and Conservation (DEC, formerly the EPA) Environmental Noise Control Manual (ENCM). The DEC introduced the INP in December 1999. This policy was designed to provide an equitable framework for undertaking noise surveys, and for deriving noise criteria for consents and licenses.

4.1 General Objectives

Residential Receiver

Responsibility for the control of noise emission in New South Wales is vested in Local Government and the DEC. The DEC released an Industrial Noise Policy in December 1999 that provides a framework and process for deriving noise criteria for consents and licences that will enable the DEC to regulate premises that are scheduled under the Protection of the Environment Operations Act 1997.

The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.

- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.

Assessing Intrusiveness

For assessing intrusiveness, the background noise needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than 5 dBA above the measured background level (L_{A90}).

Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. For high-traffic areas there is a separate amenity criterion. The cumulative effect of noise from industrial sources needs to be considered in assessing impact.

Assessing Sleep Disturbance

To avoid sleep disturbance the DEC recommends that the L_{A1} of the noise source under consideration should not exceed the background noise level (L_{A90}) by more than 15 dBA when measured outside the bedroom window of the receiver during the night-time hours (10.00 pm to 7.00 am).

5 EXISTING ACOUSTICAL AND METEOROLOGICAL ENVIRONMENT

5.1 Ambient Background Noise Monitoring

Ambient noise surveys were conducted to characterise and quantify the existing acoustical environment in the area surrounding the approved Donaldson Coal Mine and existing Bloomfield Coal Mine were conducted by Heggies in October 2000 prior to the commencement of the Donaldson Mine operation.

Monitoring was conducted at eleven locations to represent the areas potentially affected by noise from the proposed Donaldson Mine. The details of the monitoring locations are contained within **Table 3**.

Eleven unattended noise loggers were positioned at the nearest potentially affected residential areas.

Table 3 Monitoring Locations

Noise Monitoring Location	Description
A	98 Weakleys Drive, Beresfield
B	92 Yarrum Ave, Beresfield
C	28 Phoenix Rd, Black Hill
D	Black Hill School
E	Lot 224 Browns Road, Black Hill
F	Lot 684 Black Hill Road, Black Hill
G	156 Buchanan Road, Buchanan
H	325 Mount Vincent Road, Louth Park
I	3 Lord Howe Drive, Ashtonfield
J	Lot 14 Killarney Street, Avalon Estate
K K1*, K2*, K3*	Bartter Enterprises (Steggles) Farm No 6 Occupied Residences on Bartter Site
L*	Industrial Estate – Beresfield

* *monitoring not conducted at this location*

5.2 Results of Unattended Continuous Monitoring

The unattended ambient noise logger data from each monitoring location, together with the prevailing weather are presented graphically on a daily basis and are attached in **Appendix B**. The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

Precautions can be taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses etc), however not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Removal of Weather-Affected Data

The ambient noise level data from each monitoring location which correlated with periods of unstable weather (ie rainfall greater than 0.5 mm or ground level wind speed greater than 5 m/s) were discarded. Weather data was obtained from the Donaldson Mine on-site weather station and used in conjunction with that acquired from the Bureau of Meteorology site at Cessnock.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the INP. The day, evening and night periods replace the day and night periods defined under the ENCM. A summary of the ambient noise levels recorded in the unattended monitoring survey are presented in **Table 4**.

Table 4 Unattended Continuous Monitoring Ambient Noise Levels (dBA re 20 µPa)

Location	Description	Background LA90 Noise Level	Measured Existing LAeq Noise Level	Estimated Existing Industrial LAeq Contribution
		Rating Background Level		
A Weakleys Drive Beresfield	Daytime	45 dBA	54 dBA	< 54 dBA
	Evening	48 dBA	57 dBA	< 44 dBA
	Night	39 dBA	52 dBA	< 39 dBA
B Yarrum Road Beresfield	Daytime	50 dBA	64 dBA	< 54 dBA
	Evening	43 dBA	60 dBA	< 44 dBA
	Night	36 dBA	58 dBA	< 39 dBA
C Phoenix Road Black Hill	Daytime	38 dBA	58 dBA	< 49 dBA
	Evening	39 dBA	51 dBA	< 39 dBA
	Night	35 dBA	48 dBA	36 dBA
D Black Hill School	Daytime	39 dBA	59 dBA	43 dBA
	Evening	36 dBA	55 dBA	< 39 dBA
	Night	32 dBA	54 dBA	< 34 dBA
E Browns Road Black Hill	Daytime	36 dBA	50 dBA	< 49 dBA
	Evening	37 dBA	50 dBA	< 39 dBA
	Night	31 dBA	43 dBA	34 dBA
F Black Hill Road Black Hill	Daytime	39 dBA	55 dBA	< 49 dBA
	Evening	35 dBA	47 dBA	< 39 dBA
	Night	31 dBA	46 dBA	< 34 dBA
G Buchanan Road Buchanan	Daytime	39 dBA	55 dBA	41 dBA
	Evening	37 dBA	50 dBA	< 39 dBA
	Night	34 dBA	50 dBA	< 34 dBA
H Mt Vincent Rd Louth Park	Daytime	38 dBA	55 dBA	40 dBA
	Evening	36 dBA	55 dBA	< 39 dBA
	Night	31 dBA	52 dBA	33 dBA
I Lord Howe Dr. Ashtonfield	Daytime	39 dBA	54 dBA	44 dBA
	Evening	41 dBA	55 dBA	< 39 dBA
	Night	33 dBA	52 dBA	< 34 dBA
J Kilarney Street Avalon Estate	Daytime	44 dBA	53 dBA	< 54 dBA
	Evening	42 dBA	57 dBA	< 44 dBA
	Night	35 dBA	47 dBA	< 39 dBA
K Bartter Farm No.6	Daytime	41 dBA	53 dBA	< 49 dBA
	Evening	40 dBA	49 dBA	< 39 dBA
	Night	35 dBA	48 dBA	< 34 dBA

Notes: For Monday to Saturday, Daytime 7.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 8.00 am.
The LA90 represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.
The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

5.3 Prevailing Weather Conditions

Wind Velocity

An assessment of existing wind velocities has been prepared from local meteorological data recorded at the Donaldson Site Office for the period June 2003 to July 2004. The prevailing wind speeds and direction throughout the year are summarised in **Table 5** for daytime, **Table 6** for evening and **Table 7** for night.

Table 5 Annual and Seasonal Frequency of Occurrence Wind Speed Intervals – Daytime

Period	Calm (< 0.5 m/s)	Wind Direction	0.5 m/s to 2 m/s	2 m/s to 3 m/s	0.5 m/s to 3 m/s
Annual	8%	W (±45^0)	27%	7%	34%
Summer	5%	SE (±45^o)	30%	18%	48%
Autumn	12%	W (±45^o)	33%	5%	38%
Winter	13%	W (±45^o)	42%	11%	53%
Spring	3%	SE (±45^o)	24%	13%	37%

Table 6 Annual and Seasonal Frequency of Occurrence Wind Speed Intervals – Evening

Period	Calm (< 0.5 m/s)	Wind Direction	0.5 m/s to 2 m/s	2 m/s to 3 m/s	0.5 m/s to 3 m/s
Annual	34%	SE (±45^o)	34%	2%	36%
Summer	19%	SE (±45^o)	55%	8%	63%
Autumn	46%	SE (±45^o)	33%	1%	34%
Winter	45%	W (±45^o)	28%	5%	33%
Spring	24%	SE (±45^o)	39%	1%	40%

Table 7 Annual and Seasonal Frequency of Occurrence Wind Speed Intervals – Night-time

Period	Calm (< 0.5 m/s)	Wind Direction	0.5 m/s to 2 m/s	2 m/s to 3 m/s	0.5 m/s to 3 m/s
Annual	42%	W (±45^o)	35%	3%	38%
Summer	44%	SE (±45^o)	30%	3%	31%
Autumn	51%	W (±45^o)	34%	3%	35%
Winter	33%	W (±45^o)	52%	6%	58%
Spring	40%	W (±45^o)	36%	4%	40%

In accordance with the NSW INP, the seasonal frequency of occurrence of westerly and south easterly winds up to 3 m/s is greater than 30% during all seasons and all periods. Therefore prevailing south easterly and westerly winds, predominantly with wind strength of 2 m/s will form part of this assessment.

Atmospheric Stability and Temperature Inversion

Insufficient local meteorological data was available to conduct an assessment of atmospheric stability for the area surrounding the mine site. The Donaldson Site metrological station has recorded the sigma-theta parameter, used in the determination of atmospheric stability class, from October 2003. This sigma-theta data will enable the calculation of the stability class, at the site, during the winter period, but at this stage is only available for June 2004.

In the absence of this on-site data, and in order to assess the likely occurrence of temperature inversions, the INP Appendix F was used. Appendix F was developed in conjunction with the DEC and gives the percentage occurrence of F Class stability in the Hunter Valley region. Appendix F of the INP shows that the occurrence of F Class temperature inversions for the Donaldson Mine location occurs for less than 30% of winter nights.

In accordance with the NSW INP the seasonal frequency of occurrence of temperature inversions is less than 30% during the combined evening and night-time period and need not be considered in the noise impact assessment.

6 PROJECT SPECIFIC NOISE EMISSION DESIGN GOALS

6.1 Noise Emission Design Goals

The Donaldson Mine noise emission design goals have been set with reference to the NSW Industrial Noise Policy outlined in **Section 4**. The intrusiveness and amenity criteria have been set from measurements at the nearest affected residences listed in **Table 3**.

An extract from the DEC Industrial Noise Policy that relates to the amenity criteria is given in **Table 8**.

Table 8 Amenity Criteria – Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms – internal	All	Noisiest 1-hour period when in use	35	40
Commercial premises	All	When in use	65	70

Notes: For Monday to Saturday, Daytime 7.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am – 6.00 pm; Evening 6.00pm – 10.00 pm; Night-time 10.00 pm – 8.00 am.
The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.
The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Table 9 Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing L_{Aeq} noise level from Industrial Noise Sources	Maximum L_{Aeq} Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is *likely to decrease* in future acceptable noise level minus 10 dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

*ANL = recommended acceptable LAeq noise level for the specific receiver, area and time of day from **Table 8**.*

The amenity criteria have been set from **Table 8**, with adjustments to account for existing industrial noise contributions from **Table 9** as necessary.

The acoustical environment typifies that of urban and suburban environments. The residences in the general area have been assessed under the relevant receiver type as shown in **Table 10**.

The RBL's calculated for the Black Hill area were adopted as representative of the background levels at the occupied residential receivers on the Bartter site (K1, K2 and K3). The RBL's chosen are more restrictive than those at Location K where noise levels are influenced more by traffic noise along John Renshaw Drive.

The intrusive and amenity noise assessment criteria based on the INP for the eleven assessment localities are presented in **Table 10**.

Table 10 Donaldson Coal Mine Project Specific Noise Design Goals

Location No	Locality (Noise Amenity Area)	Period	Ambient Noise Level (dBA)		Project Specific Assessment Criteria (dBA)	
			RBL	Industrial $L_{Aeq(Period)}$[1]	Intrusive $L_{Aeq(15minute)}$	Amenity $L_{Aeq(Period)}$[1]
A	Beresfield (Urban)	Day	45	< 54	50	60
		Evening	43	< 44	48	50
B		Night	36	< 39	41	45
C	Ebenezer Park (Suburban)	Day	38	< 49	43	55
		Evening	39	< 39	44	45
		Night	35	36	40	38
D	Black Hill (Suburban)	Day	36	43	41	55
E		Evening	35	< 39	40	45
F		Night	31	< 34	36	40
G	Buchanan & Louth Park (Suburban)	Day	38	< 44	43	55
		Evening	36	< 39	41	45
H		Night	31	< 34	36	40
I	Ashtonfield (Suburban)	Day	39	< 44	44	55
		Evening	41	< 39	46	45
		Night	33	< 34	38	40
J	Thornton (Urban)	Day	44	< 54	49	60
		Evening	42	< 44	47	50
		Night	35	< 39	40	45
K1, K2, K3	Bartter Residences	Day	36	43	41	55
		Evening	35	< 39	40	45
		Night	31	< 34	36	40
L	Beresfield Industrial Estate	When in Use	n/a	n/a	n/a	70

Notes: For Monday to Saturday, Daytime 7.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am – 6.00 pm; Evening 6.00 pm – 10.00 pm; Night-time 10.00 pm – 8.00 am.
The LA90 represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.
The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

In those cases where the INP project specific assessment criteria are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the INP project specific assessment criteria can be generally described as follows:

- Negligible noise level increase < 1 dBA
  (Not noticeable by all people)
- Marginal noise level increase 1 dBA to 2 dBA
  (Not noticeable by most people)
- Moderate noise level increase 3 dBA to 5 dBA
  (Not noticeable by some people but may be noticeable by others)
- Appreciable noise level increase > 5 dBA
  (Noticeable by most people)

6.2 Sleep Disturbance Noise Emission Design Goals

The sleep disturbance noise emission design goals for the night-time period have been set with reference to the ENCM as outlined in **Section 4** and are detailed in **Table 11**.

Table 11 Sleep Disturbance Design Goals

Location No	Locality (Noise Amenity Area)	Period	Sleep Disturbance Criterion $L_{A1(1minute)}$
A, B	Beresfield (Urban)	Night (10.00 pm to 7.00 am)	51 dBA
C	Ebenezer Park (Suburban)	Night (10.00 pm to 7.00 am)	50 dBA
D, E, F	Black Hill (Suburban)	Night (10.00 pm to 7.00 am)	46 dBA
G, H	Buchanan & Louth Park (Suburban)	Night (10.00 pm to 7.00 am)	46 dBA
I	Ashtonfield (Suburban)	Night (10.00 pm to 7.00 am)	48 dBA
J	Thornton (Urban)	Night (10.00 pm to 7.00 am)	50 dBA
K1, K2, K3	Bartter Enterprises (Occupied Residences)	Night (10.00 pm to 7.00 am)	46 dBA
L	Beresfield Industrial Estate (Industrial)	Night (10.00 pm to 7.00 am)	N/A

7 ASSESSMENT OF NOISE IMPACTS

7.1 Noise Modelling

A computer model was used to predict the noise emissions from the project site. The Environmental Noise Model (ENM) used has been produced in conjunction with the DEC. A map giving all relevant topographic information was used to generate cross sections from source to receiver locations. The model used these cross sections, together with the noise source data, ground cover, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels. Noise levels under calm atmospheric conditions and prevailing weather conditions were modelled and are shown in **Table 12**.

The model was used to predict noise emissions from mining operations in the proposed extension up to Strip 23, with all the equipment operating simultaneously and assuming peak production. Equipment was situated in locations considered to be representative of a worst case scenario. Mobile noise sources (such as haul trucks and product trucks) were modelled at worst case locations on each respective haulage route and assumed to operate in repetitive cycles.

Predicted noise levels at the residential receivers for the daytime and evening periods are the sum of the worst case noise emissions from mining operations and the worst case noise emissions from stripping and vegetation removal operations.

Table 12 Modelling Parameters

Assessment Condition	Temperature (^{o}C)	Wind Speed & Direction (m/s)	Relative Humidity (%)	Temperature Gradient °C/100 m
Calm	20	Calm	65	N/A
Prevailing Wind (W)	10	West 2 m/s	90	N/A
Prevailing Wind (SE)	20	South East 2 m/s	65	N/A

7.2 Noise Mitigation and Management

Donaldson Mine has a Noise Management Plan in place to address noise issues that arise from the mine operation. The following noise mitigation which forms part of the Noise Management Plan was assumed in the modelling process for all operating conditions.

The following noise mitigation was assumed for all conditions:

- The stripping and vegetation removal fleet operate between the hours of 7.00 am and 10.00 pm.
- Overburden removal fleet operate between the hours of 7.00 am to 11.00 pm.
- Coaling fleet operate 24 hours a day.
- Drills operate between the hours of 7.00 am and 6.00 pm (daytime period).

7.3 Noise Level Predictions for Mine Operation

Noise levels are predicted to account for the land use restrictions within 500 metres from the Donaldson mine and at the occupied residential receivers on the Bartter site. The RBL's for the Black Hill area were adopted, as they are more restrictive than those at Location K where noise levels are influenced more by traffic noise along John Renshaw Drive.

Predicted noise emission levels at the residential areas surrounding the site for mining operations under calm and adverse conditions are presented in **Table 13**.

Table 13 Predicted Noise Levels – Mining Operations, Calm & Prevailing Conditions

Receiver Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)			Noise Design Goal $L_{Aeq(15minute)}$
		Calm Conditions	Prevailing W Wind	Prevailing SE	
A, B Weakleys Drive Beresfield	Day	34 dBA	41 dBA	< 30 dBA	50 dBA
	Evening	34 dBA	41 dBA	< 30 dBA	48 dBA
	Night	< 30 dBA	35 dBA	< 30 dBA	41 dBA
C Ebenezer Park (west)	Day	33 dBA	40 dBA	< 30 dBA	43 dBA
	Evening	33 dBA	40 dBA	< 30 dBA	44 dBA
	Night	31 dBA	40 dBA	< 30 dBA	41 dBA
D Black Hill School	Day	34 dBA	37 dBA	< 30 dBA	41 dBA
	Evening	34 dBA	36 dBA	< 30 dBA	40 dBA
	Night	32 dBA	36 dBA	< 30 dBA	36 dBA
E, F Black Hill Browns Rd	Day	< 30 dBA	< 30 dBA	31 dBA	41 dBA
	Evening	< 30 dBA	< 30 dBA	31 dBA	40 dBA
	Night	< 30 dBA	< 30 dBA	31 dBA	36 dBA
G, H Buchanan, Louth Park	Day	< 30 dBA	< 30 dBA	< 30 dBA	43 dBA
	Evening	< 30 dBA	< 30 dBA	< 30 dBA	41 dBA
	Night	< 30 dBA	< 30 dBA	< 30 dBA	36 dBA
I Ashtonfield	Day	< 30 dBA	< 30 dBA	< 30 dBA	44 dBA
	Evening	< 30 dBA	< 30 dBA	< 30 dBA	46 dBA
	Night	< 30 dBA	< 30 dBA	< 30 dBA	38 dBA
J Avalon Estate	Day	< 30 dBA	34 dBA	< 30 dBA	49 dBA
	Evening	< 30 dBA	34 dBA	< 30 dBA	47 dBA
	Night	< 30 dBA	33 dBA	< 30 dBA	40 dBA
Bartter Residences K1, K2, K3	Day	41 dBA	40 dBA	37 dBA	41 dBA
	Evening	41 dBA	41 dBA	37 dBA	40 dBA
	Night	36 dBA	37 dBA	33 dBA	36 dBA
L Beresfield Industrial Estate	Day	46 dBA	54 dBA	35 dBA	70 dBA (When in Use)
	Evening	46 dBA	54 dBA	35 dBA	
	Night	37 dBA	46 dBA	32 dBA	

Notes: For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00am.
The LA90 represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.
The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Predicted noise levels from mining operations for calm and adverse weather conditions given in **Table 13** meet the noise design goals at all residential receiver locations during all operating periods except at Locations K1, K2 & K3 which will meet marginal compliance (< 2 dBA above the goal) during the evening and night-time period. This minor exceedance of 1 dBA during the evening and night-time periods is unlikely to be noticeable by most people.

7.4 Noise Management Strategy for Evening Operation

As part of the Donaldson Mine Noise Management Plan and in order to further reduce the impact of operation during periods of adverse weather conditions (wind from the west) in the evening period, it is recommended that the following management strategies be employed**.**

Prevailing Wind Trigger

Wind speed and direction is to be monitored using a weather station located at the Donaldson Mine site office. The weather station has a sensor height of 10 m.

During periods when prevailing conditions are likely or when westerly winds of between 2 m/s and 3 m/s are measured, the mine operation should:

- Move overburden removal and emplacement activities to lower levels in the mine including the utilisation of low dumps to maximise topographic shielding during prevailing westerly winds.

7.5 Noise Management Strategy for Night-time Operation

As part of the Donaldson Mine Noise Management Plan and in order to further reduce the impact of operation during periods of adverse weather conditions (wind from the west) in the night-time, it is recommended that the following management strategies be employed.

Prevailing Wind Trigger

During periods when prevailing conditions are likely or when westerly winds of between 2 m/s and 3 m/s are measured, the mine operation should:

- Cease all operations except coaling extraction and removal.

Coaling Operations

At night during periods when prevailing conditions are likely or when westerly winds of between 2 m/s and 3 m/s are measured, the mine operation, in order to further reduce the impact, should cease all operations except coaling extraction and removal.

Predicted noise levels from coaling operations during the night-time under a prevailing westerly wind are shown in **Table 14**.

Table 14 Noise Emissions from Coaling Operations

Receiver Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)	Noise Design Goal $L_{Aeq(15minute)}$ (dBA)
		Prevailing W Wind	
A, B Weakleys Drive Beresfield	Night	< 30 dBA	41 dBA
C Ebenezer Park (west)	Night	30 dBA	41 dBA
D Black Hill School	Night	< 30 dBA	36 dBA
E, F Black Hill Browns Rd	Night	< 30 dBA	36 dBA
G, H Buchanan, Louth Park	Night	< 30 dBA	36 dBA
I Ashtonfield	Night	< 30 dBA	38 dBA
J Avalon Estate	Night	< 30 dBA	40 dBA
K1, K2, K3 Bartter Residences	Night	< 30 dBA	36 dBA
L Beresfield Industrial Estate	Night	36 dBA	70 dBA (When in Use)

Predicted noise levels for coaling operations under adverse conditions comply with the noise design goals at all residential receiver locations.

7.6 Noise Level Predictions for Sleep Disturbance

The $L_{A1(1minute)}$ noise emission levels from the overburden fleet predicted at the residential areas surrounding the site under calm and prevailing conditions are presented in **Table 15**.

Table 15 Predicted Sleep Disturbance Noise Levels, Calm & Prevailing Conditions

Receiver Location	Period	Predicted Noise Level $L_{A1(1minute)}$ (dBA)			Noise Design Goal $L_{A1(1minute)}$ dBA
		Calm Conditions	Prevailing W Wind	Prevailing SE Wind	
A, B Weakleys Drive Beresfield	Night	< 45 dBA	< 45 dBA	< 45 dBA	51 dBA
C Ebenezer Park (west)	Night	< 45 dBA	< 45 dBA	< 45 dBA	50 dBA
D Black Hill School	Night	< 45 dBA	< 45 dBA	< 45 dBA	46 dBA
E Black Hill Browns Rd	Night	< 45 dBA	< 45 dBA	< 45 dBA	46 dBA
G. H Buchanan, Louth Park	Night	< 45 dBA	< 45 dBA	< 45 dBA	46 dBA
I Ashtonfield	Night	< 45 dBA	< 45 dBA	< 45 dBA	48 dBA
J Avalon Estate	Night	< 45 dBA	< 45 dBA	< 45 dBA	50 dBA
Bartter Residences K1, K2, K3	Night	< 45 dBA	< 45 dBA	< 45 dBA	46 dBA
L Beresfield Industrial Estate	Night	N/A	N/A	N/A	N/A

Predicted L_{A1} noise levels from the operation do not exceed the recommended sleep disturbance goals.

7.7 Cumulative Impact Assessment

As discussed in **Section 4**, the NSW Industrial Noise Policy (INP) prescribes detailed calculation routines for establishing "project specific" $L_{Aeq(15minute)}$ intrusive criteria and $L_{Aeq(Period)}$ amenity criteria at potentially affected receivers for a development (in isolation).

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise *amenity* levels for residences. Therefore, the cumulative impact of the site with existing industrial noise sources including Bloomfield Coal Mine has been assessed in the determination of the amenity levels.

8 BLASTING

Explosives are used in open cut mining in order to dislodge overburden to enable the extraction of the resource. To achieve this end, holes are drilled in a designed pattern giving strict attention to their angle, depth and spacing. These holes are then filled with an explosive charge consisting of an emulsion type explosive. The charge is initiated with the aid of primers and detonators. The detonation of each hole is delayed in a pre-designed sequence to ensure that each hole is fired individually in close succession. This delayed firing technique improves the efficiency of the blast and also reduces its environmental impacts.

8.1 Blasting Practice

The preliminary production blast designs for both overburden blasting and if required, coal blasting have been based on the maximum thickness of the respective materials encountered throughout the life of the mine. This has resulted in the preliminary overburden blast designs being based on a maximum bench height of 11.4 m (assuming the maximum overburden thickness will be excavated in two lifts), the corresponding seam thickness for coal blasting is approximately 4 m.

A summary of the indicative blast design for overburden and coal blasting are presented in **Table 16**.

Table 16 Typical Blast Design Details

Blast Design Parameter	Typical Dimension
Number of holes/ rows	200 / 8
Hole diameter / Hole inclination	152 mm / Vertical
Bench height	11.4 m
Burden	7.0 m
Spacing	7.5 m
Subdrill	1.0 m
Stemming length	2.5 m
Delay timing	None (single hole per delay)
Column explosive	Emulsion
Powder factor	0.35 kg/bcm
Maximum Instantaneous Charge (MIC)	207 kg

8.2 Blasting Emissions Criteria

The DEC has set down guidelines for blasting based on human comfort levels. The guidelines have been adapted from the ANZECC Guidelines "*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration"* and are as follows:

Airblast

The recommended maximum level for airblast is 115 dB Linear Peak.

The level of 115 dB may be exceeded on up to 5% of the total number of blasts over a period of 12 months. However, the level should not exceed 120 dB Linear Peak at any time.

Ground Vibration

The recommended maximum level for ground vibration is 5 mm/s (peak particle velocity, ppv). It is recommended that a level of 2 mm/s be considered as a long term regulatory goal.

The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

Times and Frequency of Blasting

Blasting should only generally be permitted during the hours of 9.00 am to 5.00 pm Monday to Saturday. Blasting should not take place on Sundays or Public Holidays. Blasting should generally take place no more than once per day.

8.3 Ground Vibration and Airblast Site Laws

The current measured blast emission data was measured by Donaldson Coal at several locations surrounding the mine site. This data was used to develop prediction site laws for Donaldson Mine. Airblast levels recorded due to high wind events were not used in the analysis.

For each site law plot, the lower of each pair of lines (labelled 50%) is based on the median of the measured data. However, the ground vibration and airblast criteria advocated by the DEC and ANZECC, cater for the inherent variation in emission levels from a given blast design by allowing a five percent exceedance of a general criterion up to a (never to be exceeded) maximum. Correspondingly, the "5% exceedance" lines have also been included in the blast emission site laws.

The 5% site laws for ground vibration and airblast are:

Ground Vibration

$$PVS\ (mm/sec)\ (5\%) = 28154\ (SD)^{-1.84}$$

Airblast

$$SPL\ (dBL)\ (5\%) = -11.8 \log (SD) + 140$$

where PVS (5%) and SPL (5%) are the levels of ground vibration (Peak Vector Sum - mm/s) and airblast (dB Linear) respectively, above which 5% of the total population (of data points) will lie, assuming that the population has the same statistical distribution as the underlying measured sample.

SD_1 and SD_2 are the ground vibration and airblast scaled distances, where:

$$SD_1 = \frac{\text{Distance}}{\sqrt{\text{MIC}}} \qquad (m.kg^{-0.5})$$

and,

$$SD_2 = \frac{\text{Distance}}{\sqrt[3]{\text{MIC}}} \qquad (m.kg^{-0.33})$$

These site laws for ground vibration and airblast are presented graphically in **Figure 3** and **Figure 4** as follows.

Figure 3 Donaldson Mine Ground Vibration Site Law

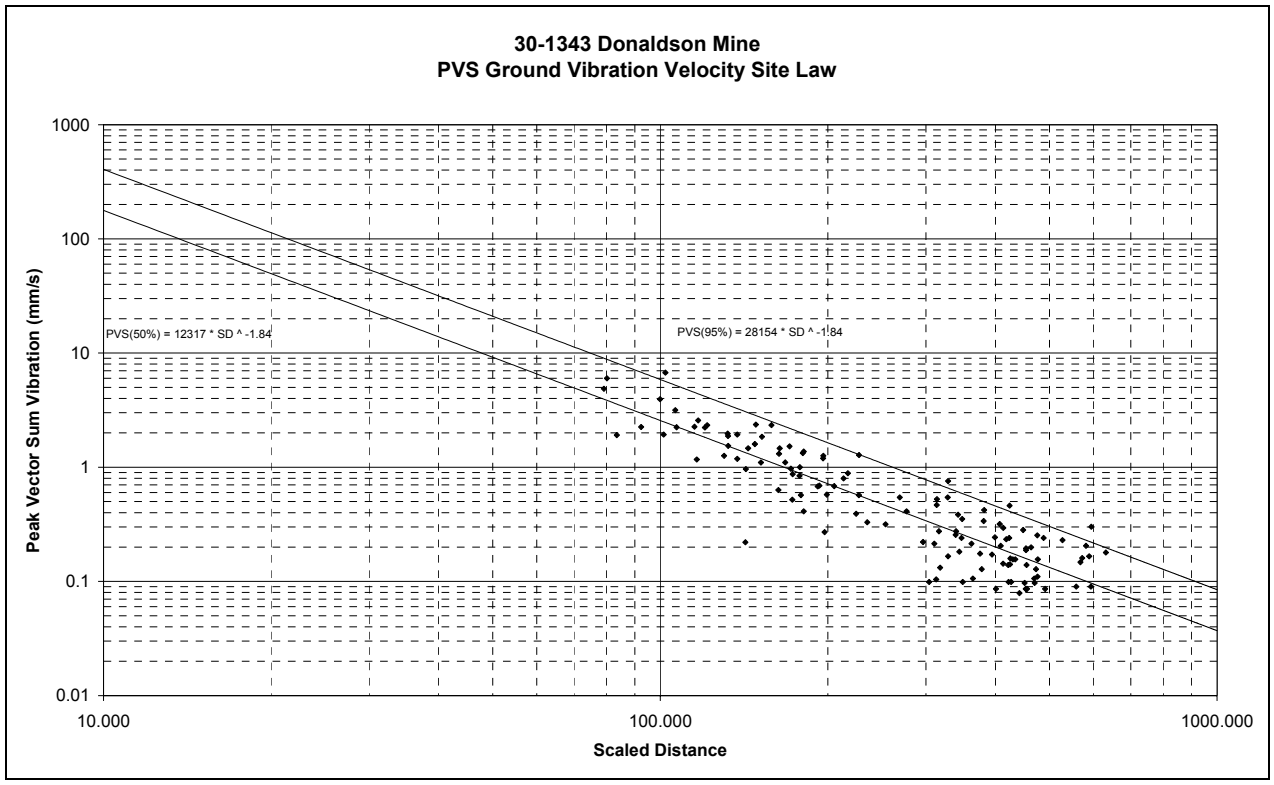
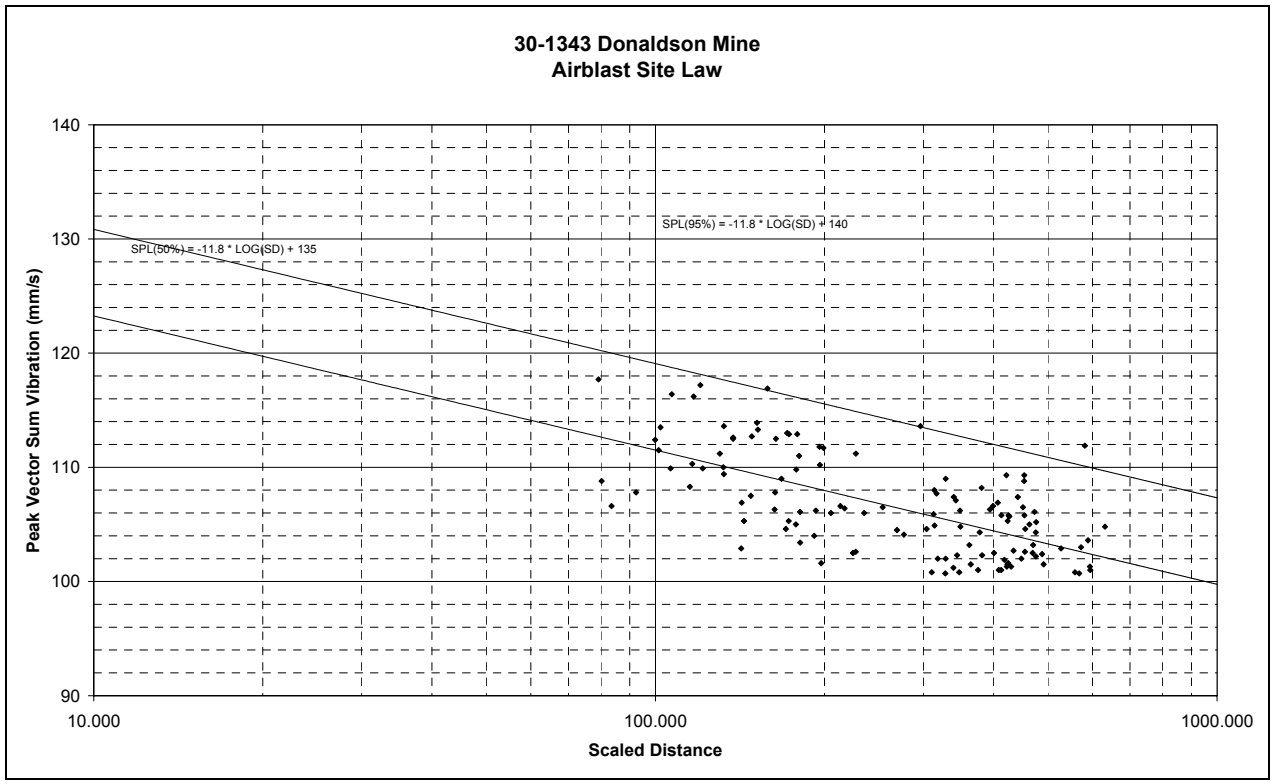


Figure 4 Donaldson Mine Airblast Site Law



8.4 Predicted Levels of Blast Emission

The level of airblast and ground vibration has been predicted using the developed site laws for Donaldson Mine assuming current blasting practice. A summary of the predicted levels for future blasting within the proposed extension area is contained within **Table 17**. The blasting predictions contained within the tables reflect the levels that would be experienced when within the mine extension.

Blasting emission levels are predicted to account for the land use restrictions within 500 metres from the Donaldson mine.

Table 17 Predicted Blasting Levels at Bartter Enterprises – Mine Extension

Blasting Location	MIC (kg)	Receiver Location	Predicted Blasting Level	
			Airblast (dB Linear)	Ground Vibration (mm/s)
Strip 16	160	A – Weakleys Drive	109.9	0.6
		C – Ebenezer Park	108.7	0.4
		D - Black Hill	108.1	0.3
		E – Browns Rd	107.2	0.2
		I - Ashtonfield	106.0	0.1
		J – Avalon	108.4	0.3
		K – Bartter	115.0	3.6
		L – Beresfield	115.0	3.6
Strip 17	130	A – Weakleys Drive	109.4	0.5
		C – Ebenezer Park	108.4	0.3
		D - Black Hill	107.9	0.3
		E – Browns Rd	106.9	0.2
		I - Ashtonfield	105.6	0.1
		J – Avalon	107.9	0.3
		K – Bartter	115.0	3.6
		L – Beresfield	114.2	2.7
Strip 18	90	A – Weakleys Drive	108.6	0.4
		C – Ebenezer Park	107.8	0.3
		D - Black Hill	107.4	0.2
		E – Browns Rd	106.4	0.2
		I - Ashtonfield	104.9	0.1
		J – Avalon	107.2	0.2
		K – Bartter	115.0	3.5
		L – Beresfield	113.2	1.9
Strip 19	75	A – Weakleys Drive	108.0	0.3
		C – Ebenezer Park	107.5	0.2
		D - Black Hill	107.2	0.2
		E – Browns Rd	106.1	0.1
		I - Ashtonfield	104.5	0.1
		J – Avalon	106.7	0.2
		K – Bartter	115.0	3.6
		L – Beresfield	112.4	1.4
Strips 20 - 23	70	A – Weakleys Drive	107.9	0.3
		C – Ebenezer Park	107.6	0.3
		D - Black Hill	107.4	0.2
		E – Browns Rd	106.3	0.2
		I - Ashtonfield	104.4	0.1
		J – Avalon	106.6	0.2
		K – Bartter	115.3	4.0
		L – Beresfield	112.1	1.3

The maximum instantaneous charge (MIC) will vary, and be limited, depending on the location of the area being mined and its relation to the nearest affected receiver. It is intended that the site laws for Donaldson Mine will continually be refined and be used to design the MIC for each individual blast based on the environmental constraints at the nearest affected receiver. This will continue to be the practice for future mine development.

The predicted blast results presented in **Table 17** show that airblast and ground vibration levels will meet the DEC guidelines for proposed blasting at all residential locations surrounding the development.

9 SUMMARY OF FINDINGS AND RECOMMENDATIONS

9.1 Operational Noise Issues

Predicted noise levels from mining operations for calm and adverse weather conditions meet the noise design goals at all residential receiver locations during all operating periods except at Locations K1, K2 & K3 which will meet marginal compliance (< 2 dBA above the goal) during the evening and night-time period. This minor exceedance of 1 dBA during the evening and night-time periods is unlikely to be noticeable by most people.

Predicted noise levels for coaling operations during the night-time period from comply with the noise design goals at all residential receiver locations for calm and adverse weather conditions.

Predicted noise levels for the operation of Donaldson Mine during the night-time under calm and prevailing conditions will comply with the project specific noise goals for sleep disturbance.

9.2 Blasting

The impacts of blasting will not change as a result of this proposal. The frequency of blasting will remain the same at two (2) to three (3) blasts per week. It is intended for blasting at Donaldson Mine to be carried out between 9.00 am and 5.00 pm Mondays to Saturdays in accordance with the DEC guidelines and in line with current practice.

In order to predict the levels of blast emissions (ground vibration and airblast) at the surrounding receivers from the blasting operations at Donaldson Mine, the measured ground vibration and airblast levels from recent blasting operations were used to develop blast emissions site laws.

These site laws were then used to predict the impacts from blasting in the proposed extension of the mine. A maximum allowable MIC of 70 kg is required to meet the ANZECC Guidelines when blasting at the closest location to a receiver location.

10 NOISE AND BLASTING MANAGEMENT PLAN AND MONITORING PROGRAMME

Donaldson Coal have implemented an operational Noise Management Plan (RHA Report 10-1149R1 *Revision 1*) in order to meet the requirements of Conditions 3(2), 13(2), 15, 16, 17, 111, 113, 120 and 121 in the Donaldson Coal Mine Conditions of Consent. The noise management plan will be applied to the mine extension in order to monitor potential impacts from the extension of the current development.

As part of the Noise Management Plan, operator attended and unattended, continuous noise measurements are conducted on a quarterly basis in order to check compliance with current licensing conditions. The first survey for the March 2001 quarter was conducted in February 2001 and has been conducted every operating quarter.

Donaldson Coal has implemented a Blast Management Plan (RHA Report 10-1149R3) in order to meet the requirements of Conditions 24, 25 Parts (1), (2), (3), (4) and (5), 26, 27, 28 and 35 in the Donaldson Coal Mine Conditions of Consent. The blast management plan will be applied to the mine extension in order to monitor potential impacts from the extension of the current development.

A series of blast monitors have been installed at six (6) locations surrounding the mine to measure ground vibration and airblast overpressure. These monitors report any exceedence of blasting criteria via SMS to the Environmental Co-ordinator.

EQUIPMENT SOUND POWER LEVELS

Equipment Description	Octave Band Centre Frequency (Hz) - dBL re 1pW										dBA Overall
	31.5	63	125	250	500	1k	2k	4k	8k	16K	
CAT 777 Haul Truck	104.2	113.9	114.9	119.3	111.6	109.8	109.1	107.0	101.5	97.8	117
Komatsu HD 785Haul Truck	105.8	111.9	121.3	119.8	114.9	113.6	111.8	106.5	101.9	98.0	119
CAT 785 Haul Truck	102.0	111.9	123.7	122.6	120.4	116.1	110.7	107.7	103.6	98.1	122
CAT 777 Watercart	97.4	105.8	103.5	108.1	106.5	104.4	103.0	98.7	93.3	87.8	110
CAT D9 Dozer	100.4	108.0	114.2	116.6	107.9	106.5	106.3	103.0	108.6	99.2	115
CAT D10 Dozer	100.4	108.0	114.2	116.6	107.9	106.5	106.3	103.0	108.6	99.2	115
CAT D7 Dozer	98.2	99.3	107.9	115.0	106.4	103.8	106.0	101.0	93.9	88.0	112
Komatsu D375/ 475 Dozer	98.2	99.3	107.9	115.0	106.4	103.8	106.0	101.0	93.9	88.0	112
CAT IT28/ 824C Dozer	98.2	99.3	107.9	115.0	106.4	103.8	106.0	101.0	93.9	88.0	112
Komatsu WA600 front end loader	101.3	106.3	111.0	112.6	107.6	106.9	108.2	103.9	100.1	94.5	114
Komatsu WA800 front end loader	103	111	114	115	107	108	109	105	102	95	116
Komatsu PC1000 Excavator	96.5	108.6	108.0	111.1	106.1	104.7	104.8	100.1	93.3	89.1	111
Komatsu PC1600 Excavator	105.8	114.0	119.4	121.4	118.2	114.0	110.7	107.0	101.7	95.7	120
Hitachi 2500 Excavato	117	119	118	114	111	109	107	103	99	99	115
Coal Truck Passby	101.0	102.9	111.0	111.5	103.6	102.0	98.3	94.7	87.8	85.3	108
Leibherr Large Drill	107.3	102.9	109.6	118.2	109.8	112.3	108.1	105.1	103.2	98.2	117
Leibherr Small Drill	88	99	108	110	108	111	109	114	116	112	120
CAT 16G Grader	96.5	98.2	101.6	107.9	103.3	101.7	103.7	101.9	96.1	88.9	109

Statistical Ambient Noise Levels
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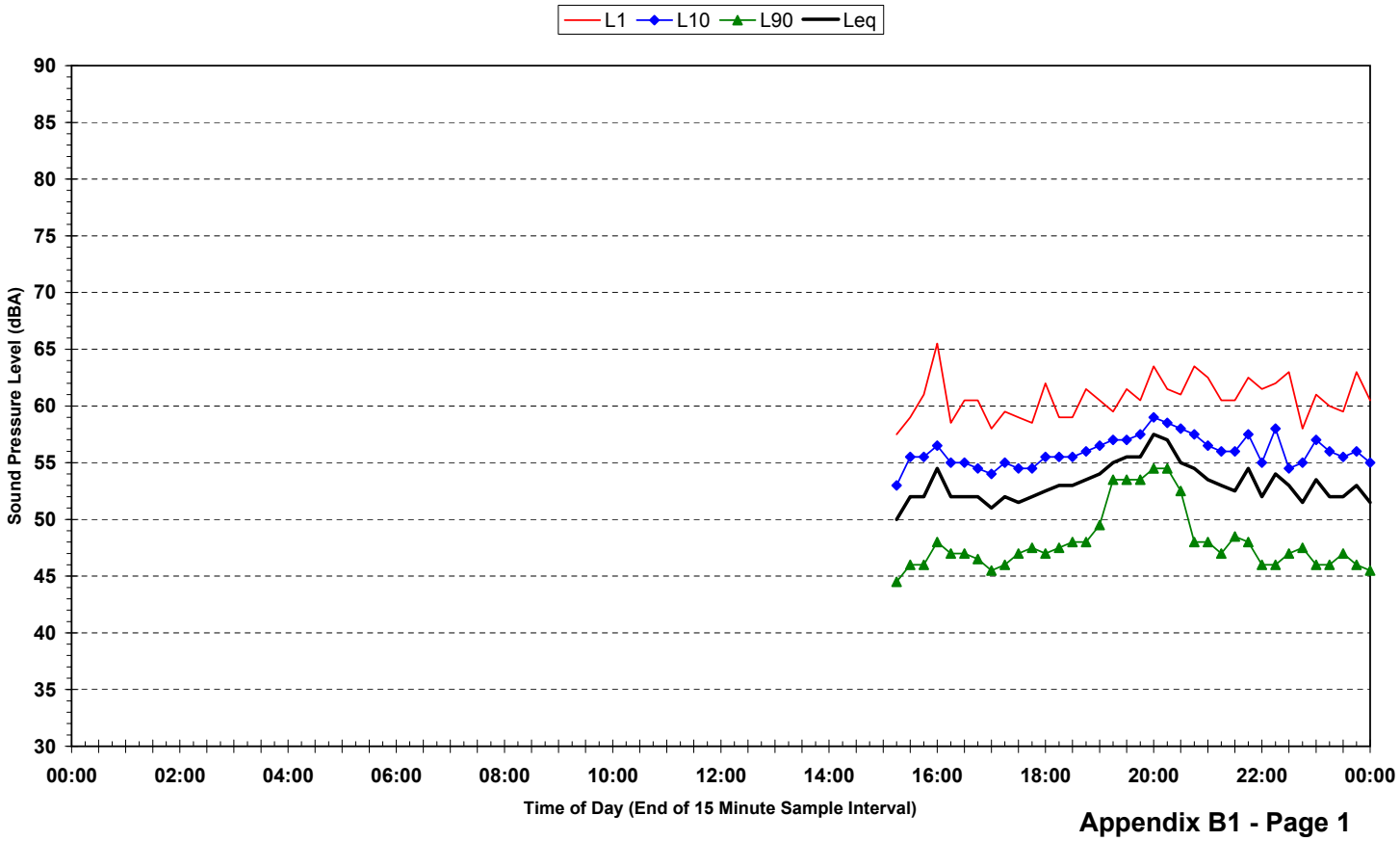

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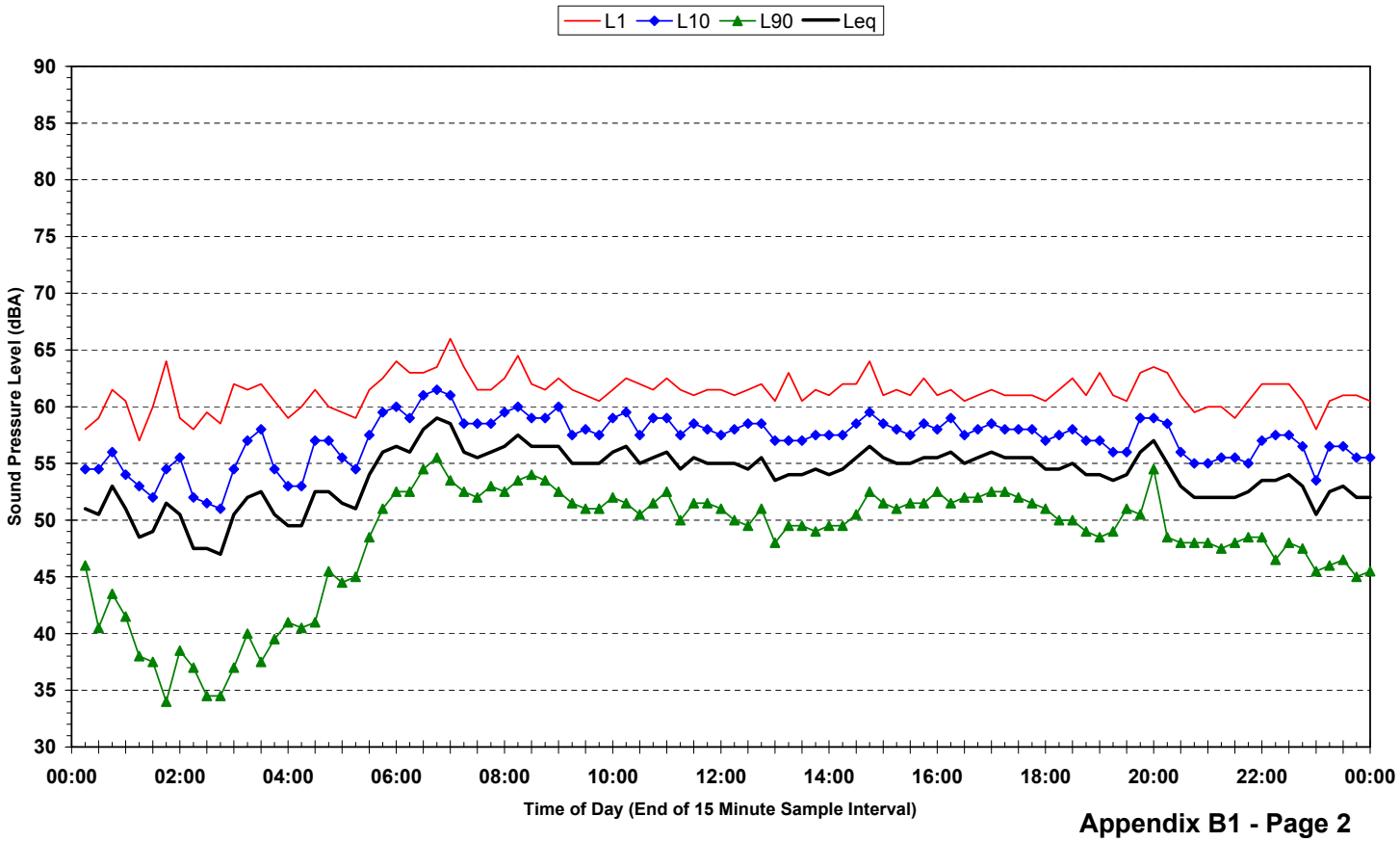
Statistical Ambient Noise Levels
Location A - Weakleys Drive, Beresfield - Wednesday 11 October 2000



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Statistical Ambient Noise Levels
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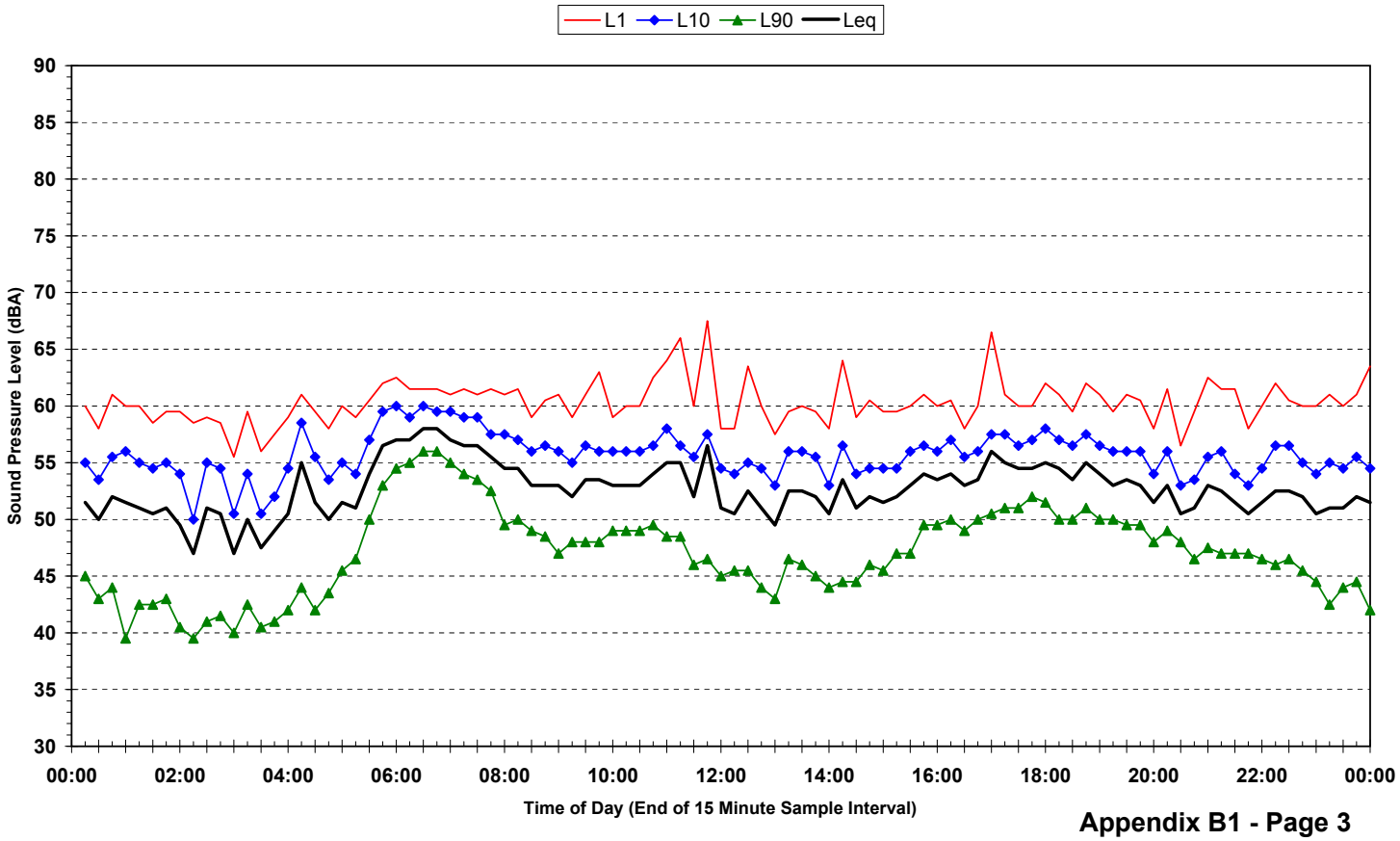

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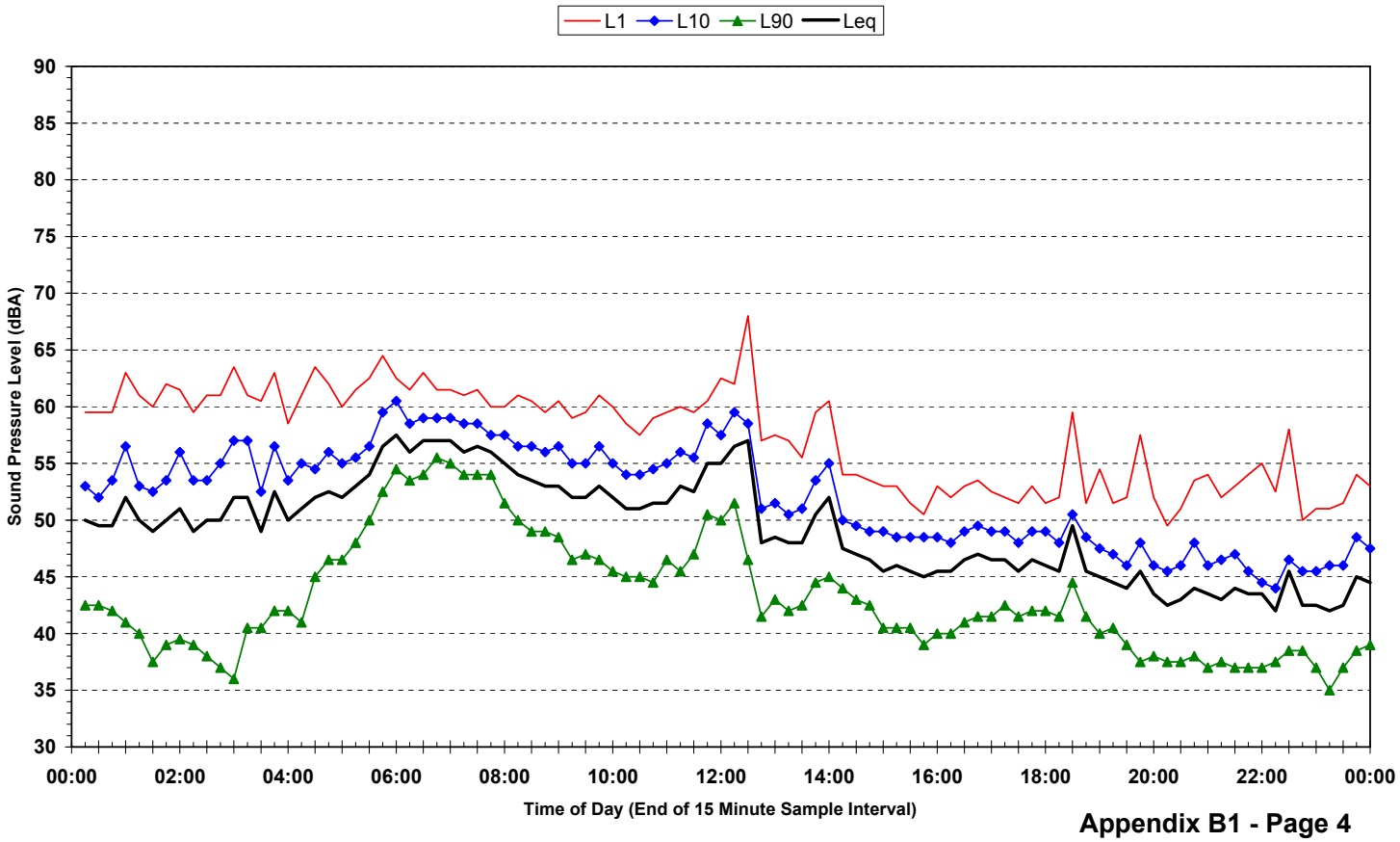
Statistical Ambient Noise Levels
Location A - Weakleys Drive, Beresfield - Friday 13 October 2000



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Statistical Ambient Noise Levels
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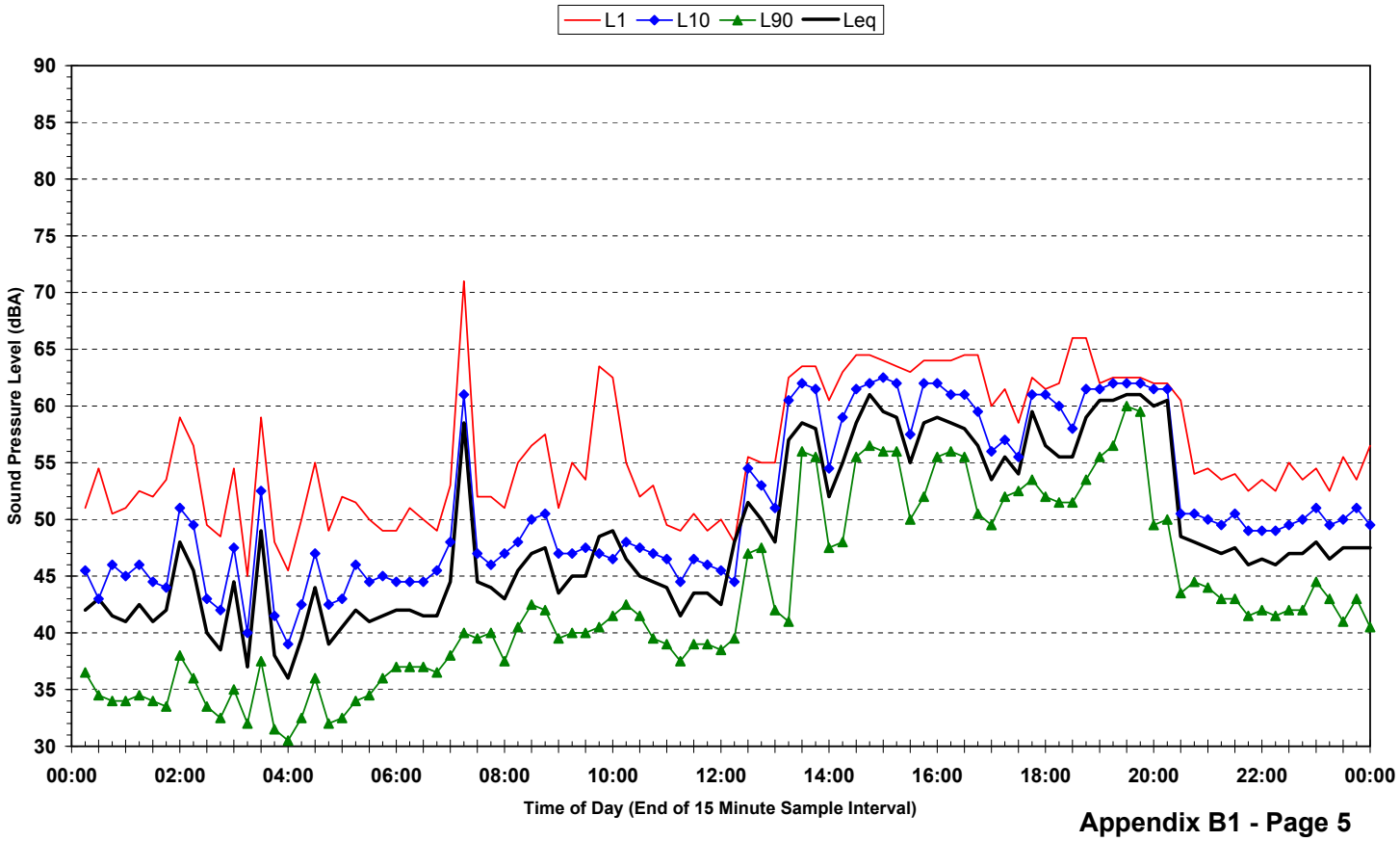

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Statistical Ambient Noise Levels
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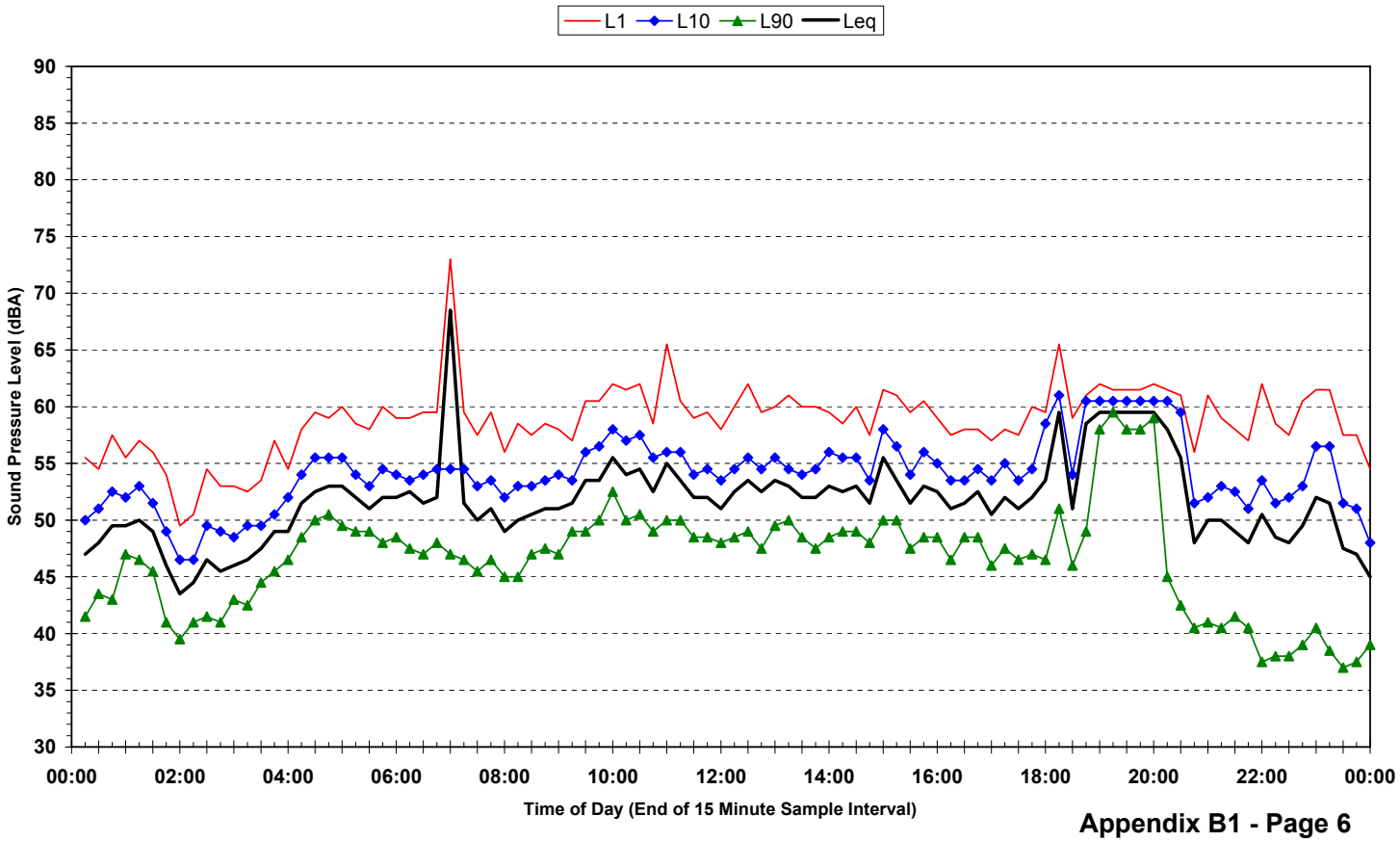

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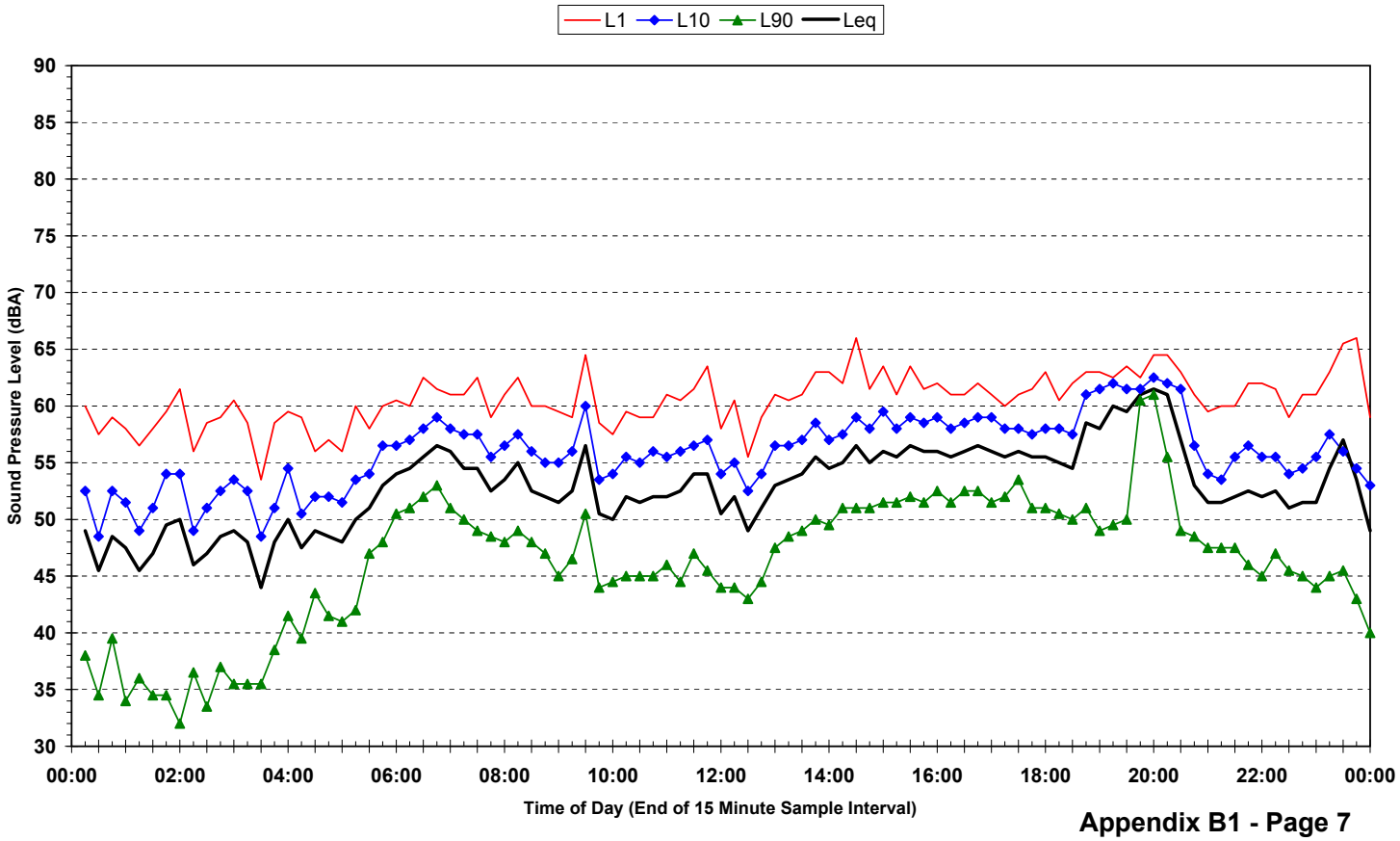

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Statistical Ambient Noise Levels
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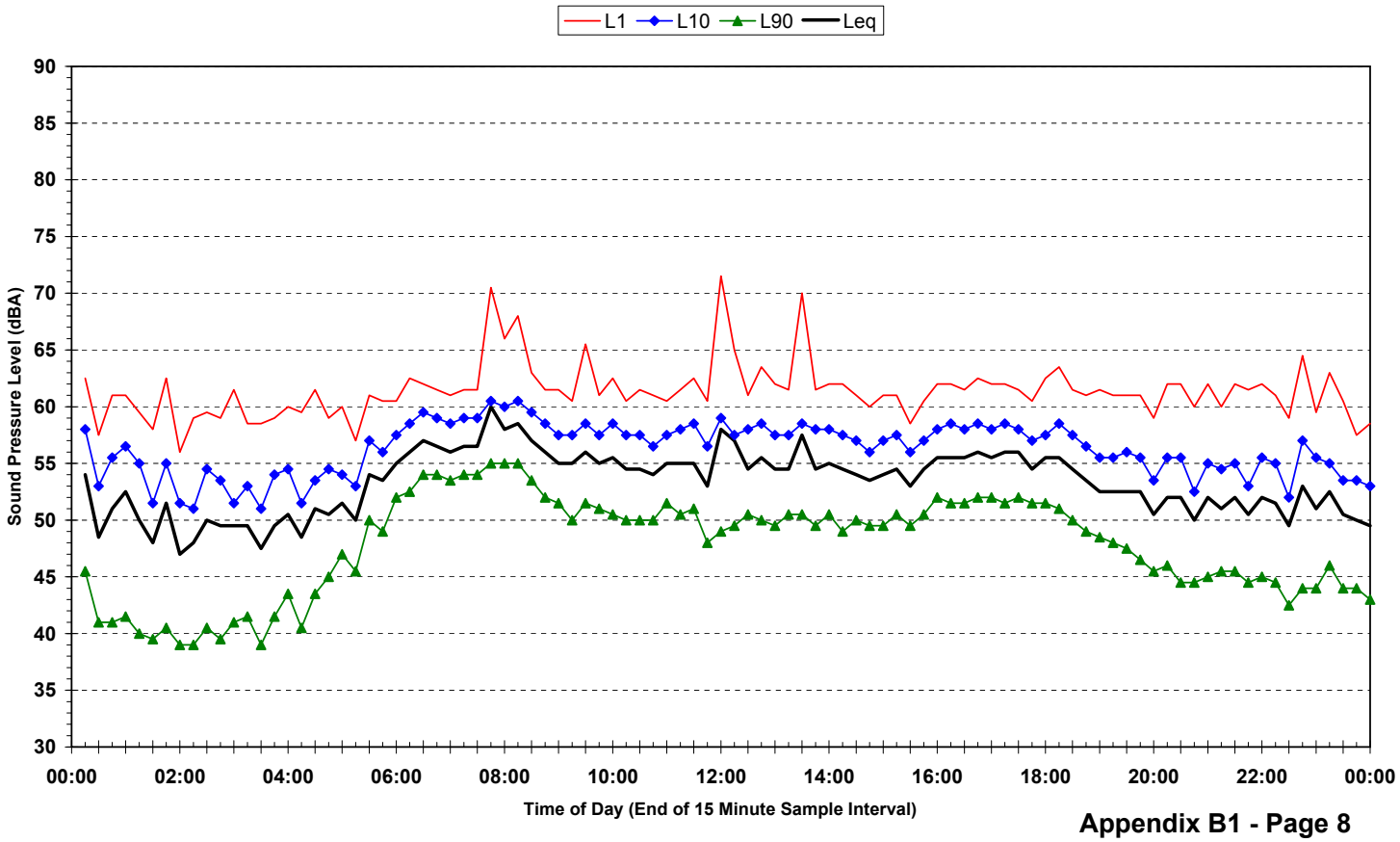

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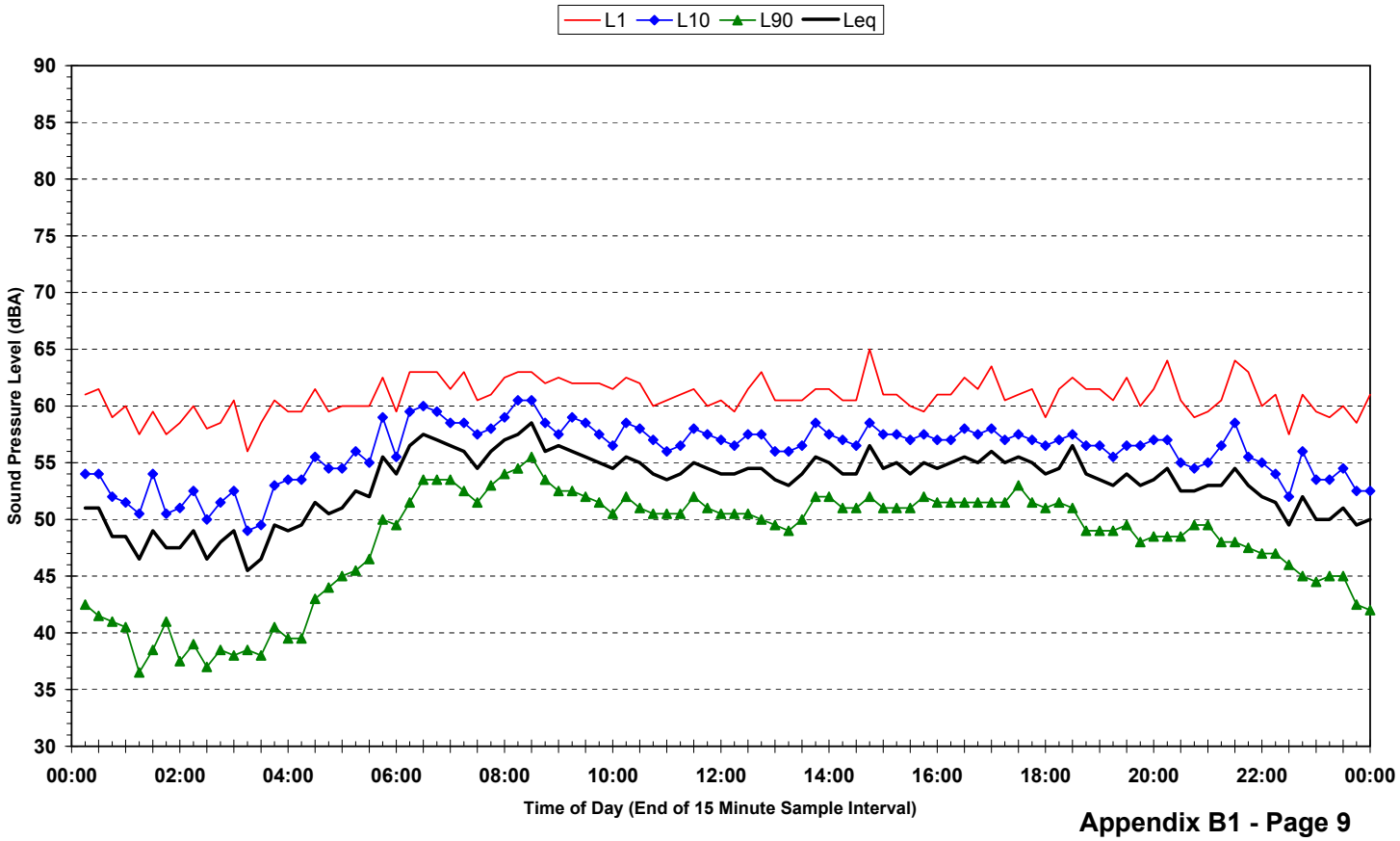

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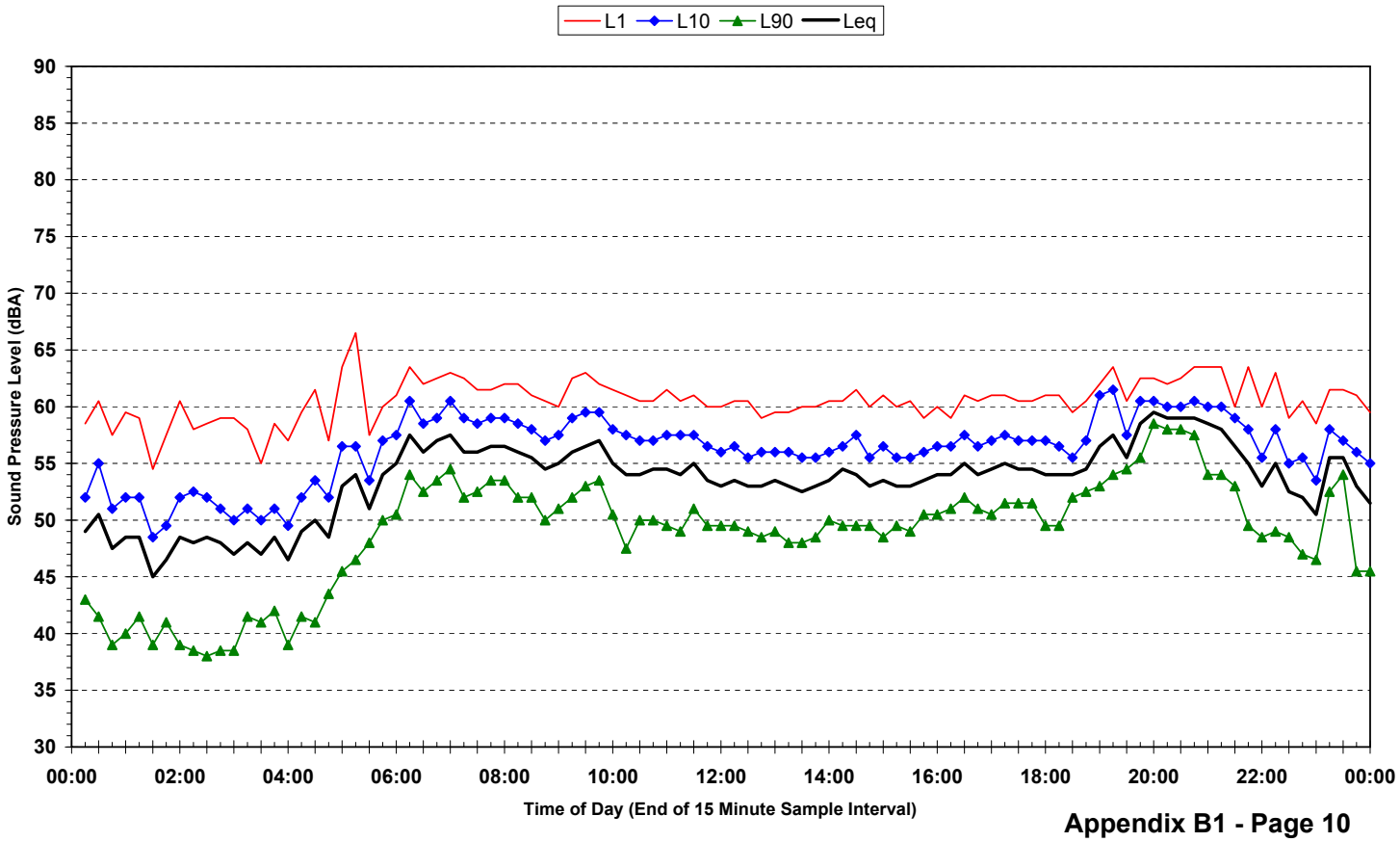
Location A - Weakleys Drive, Beresfield - Thursday 19 October 2000



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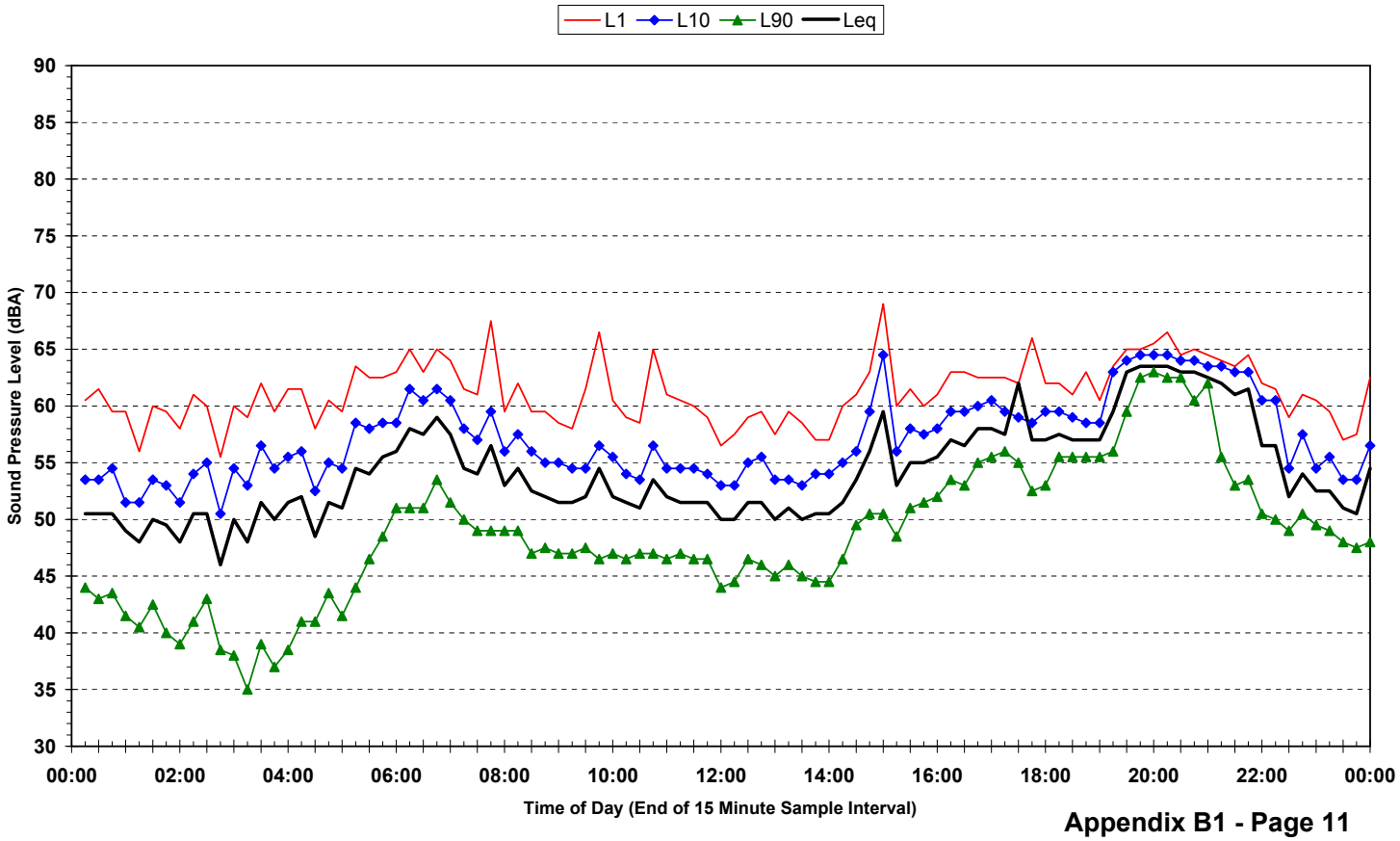
Statistical Ambient Noise Levels
Location A - Weakleys Drive, Beresfield - Friday 20 October 2000



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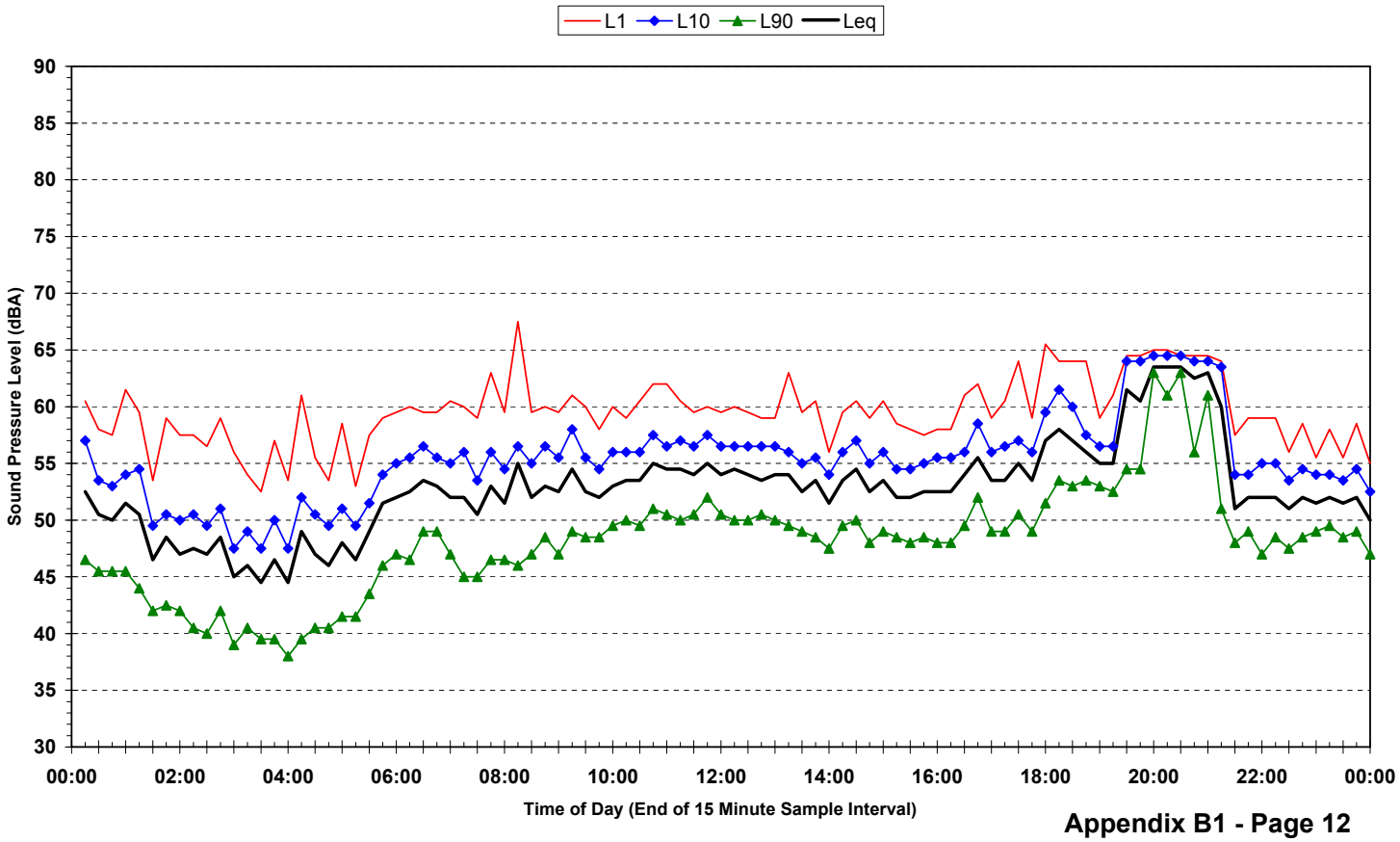
Statistical Ambient Noise Levels
Location A - Weakleys Drive, Beresfield - Saturday 21 October 2000



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Statistical Ambient Noise Levels
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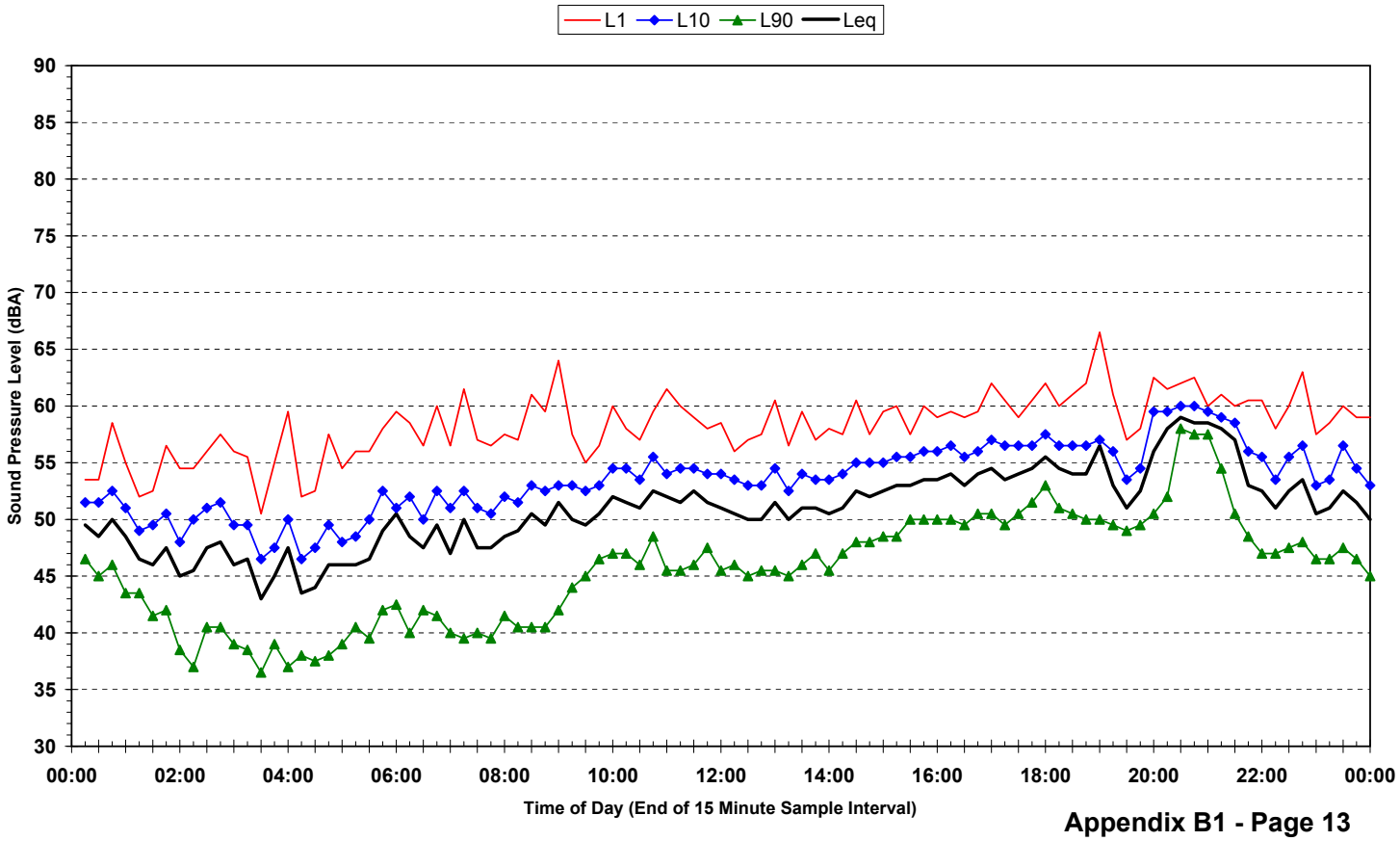

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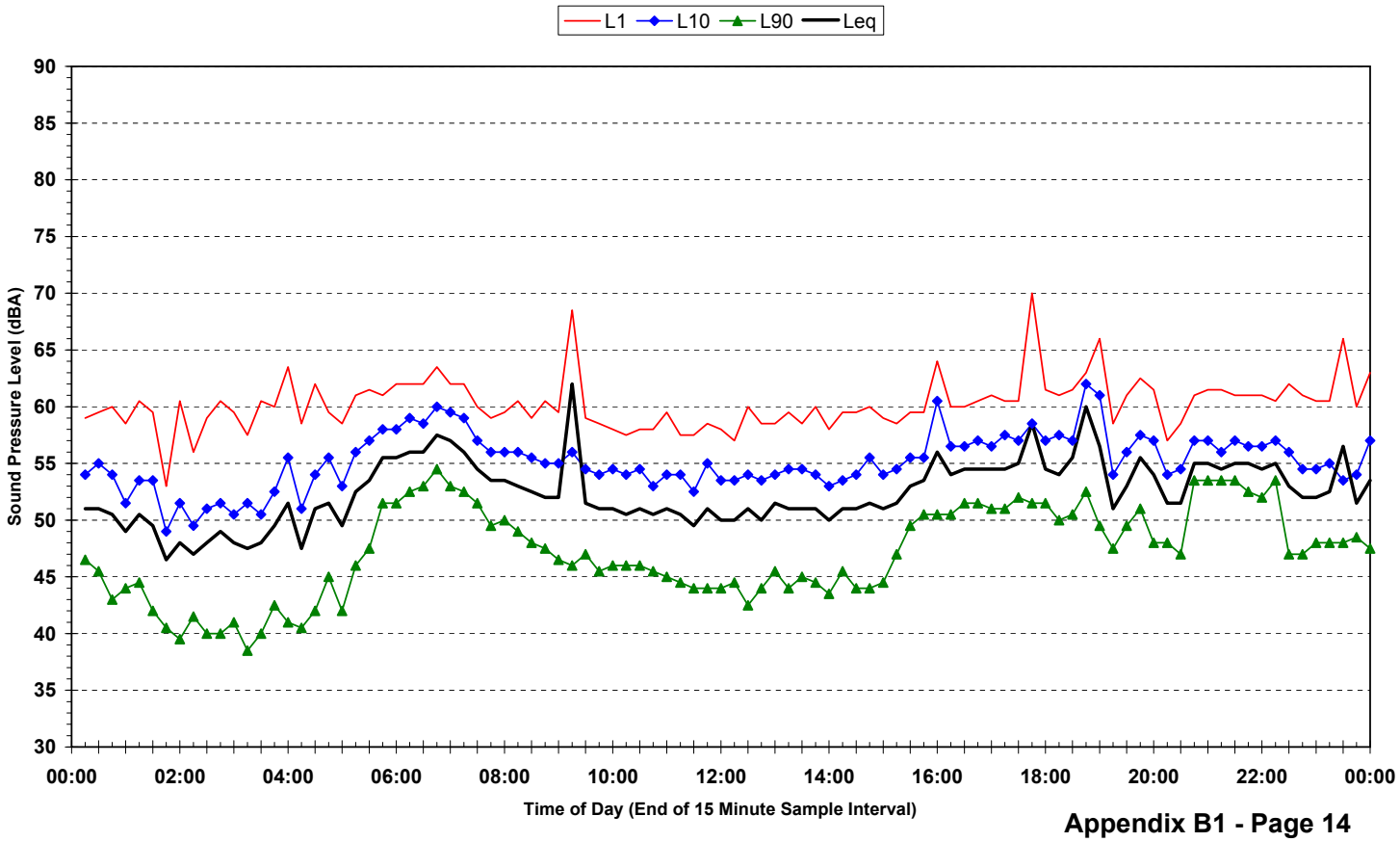
Statistical Ambient Noise Levels
Location A - Weakleys Drive, Beresfield - Monday 23 October 2000



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Statistical Ambient Noise Levels
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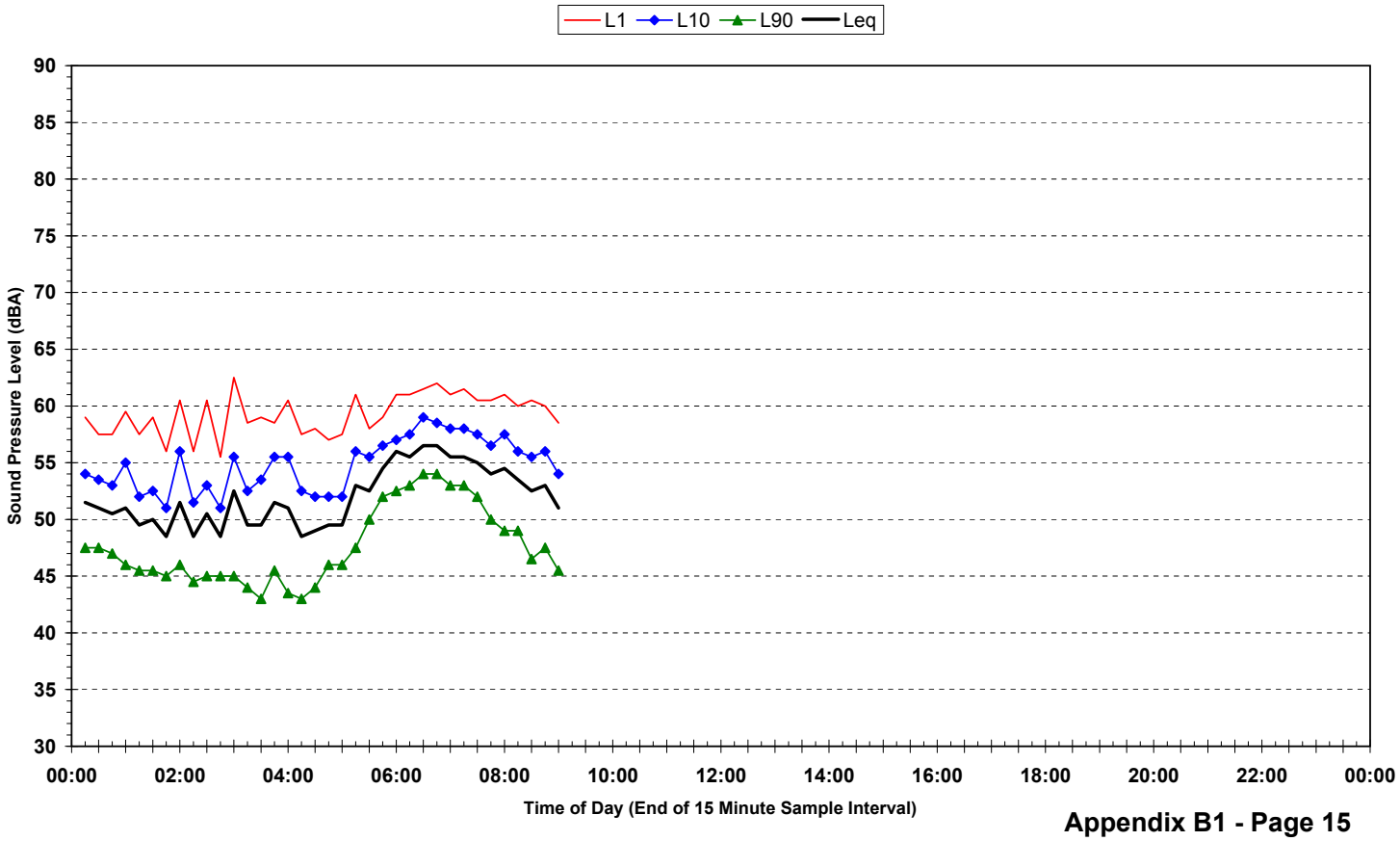

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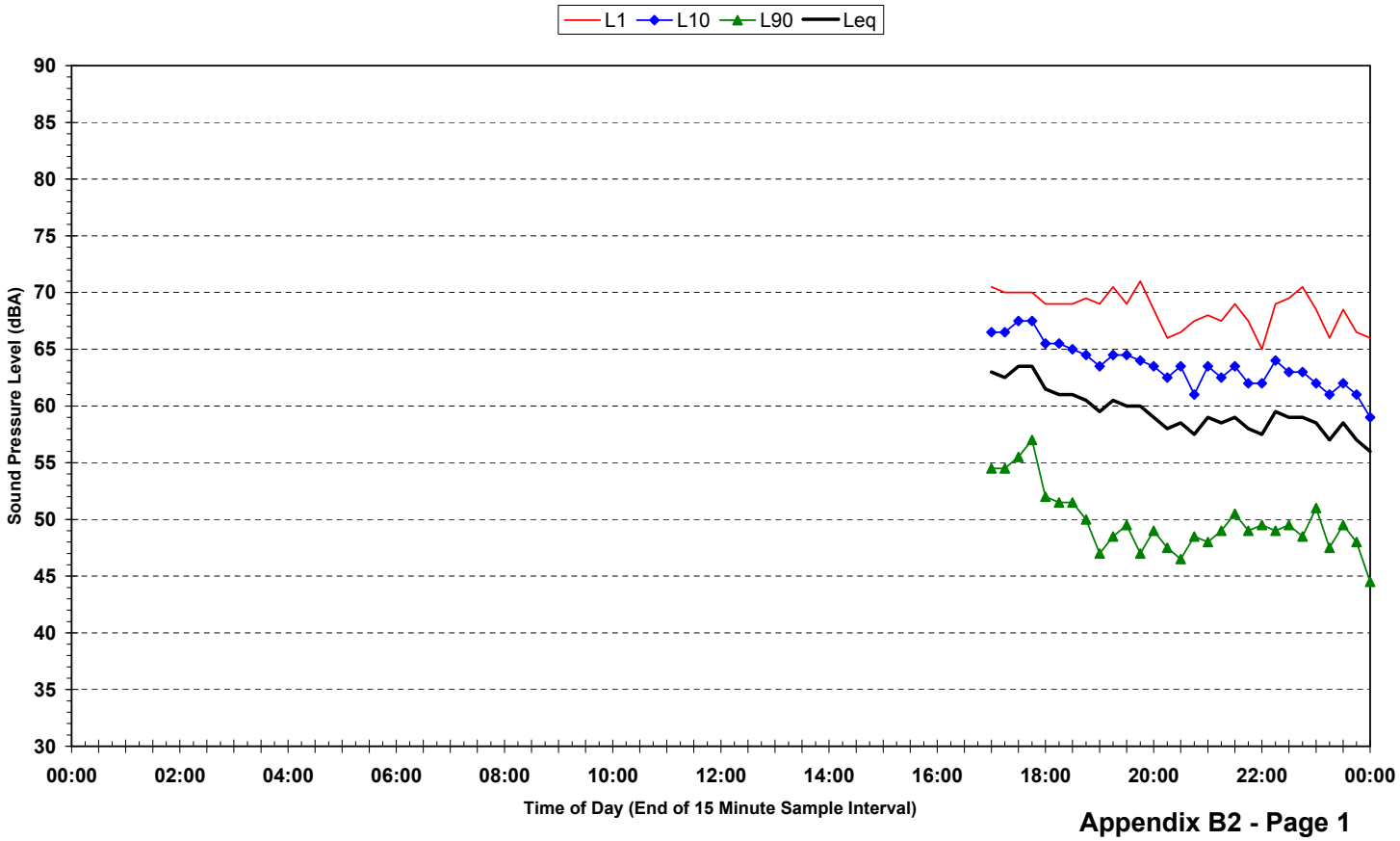
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Tuesday 10 October 2000



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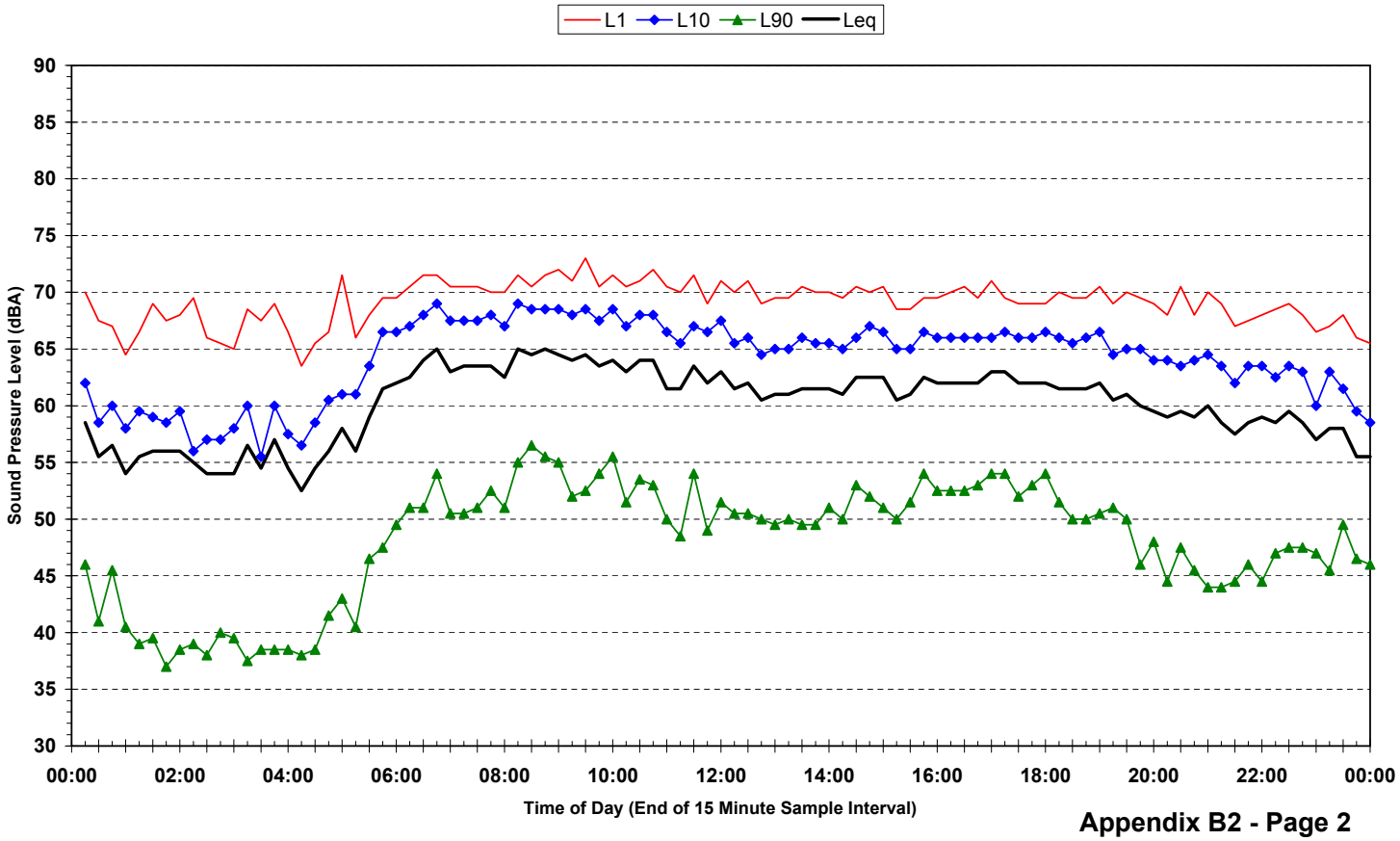
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Wednesday 11 October 2000



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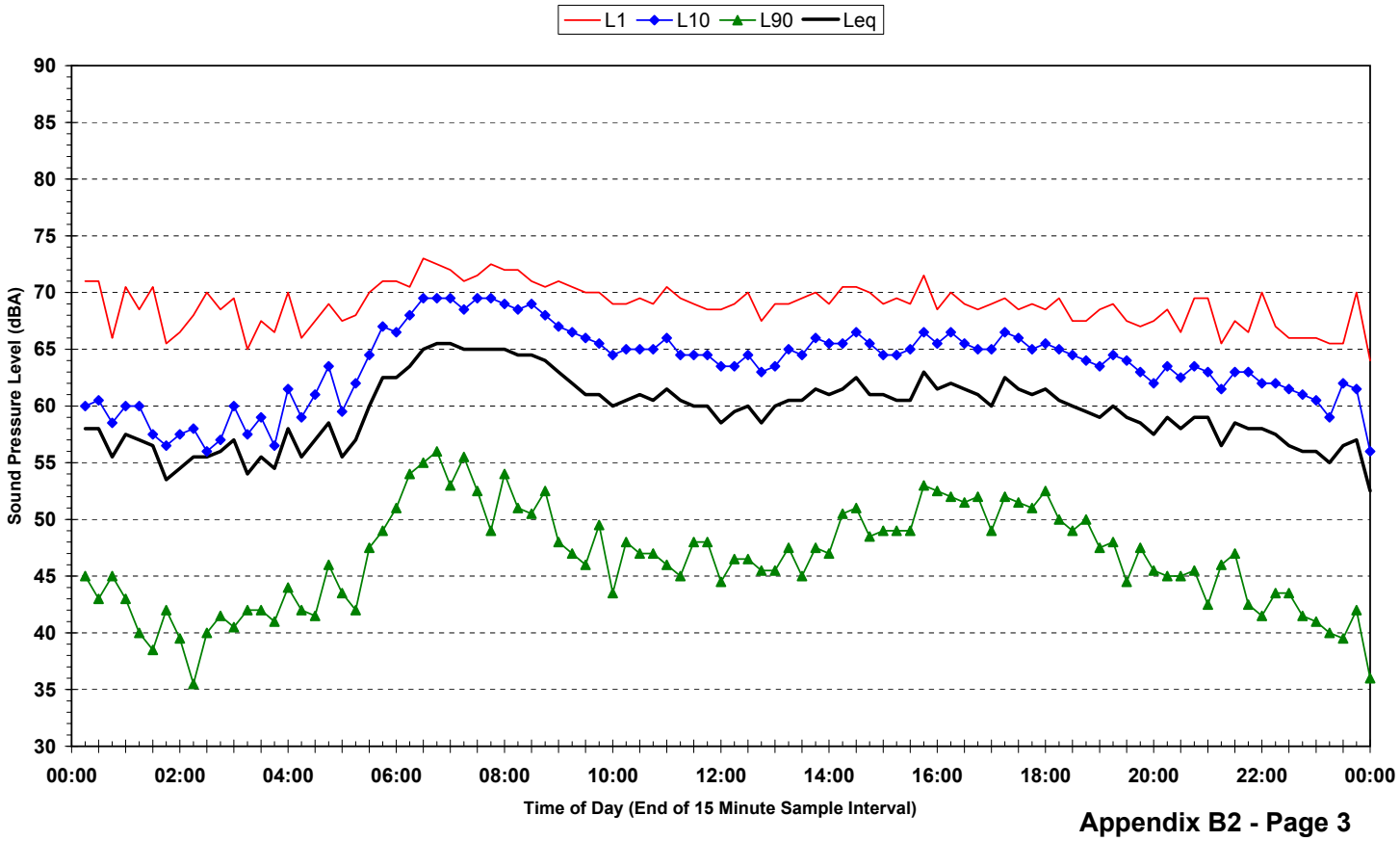
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Thursday 12 October 2000



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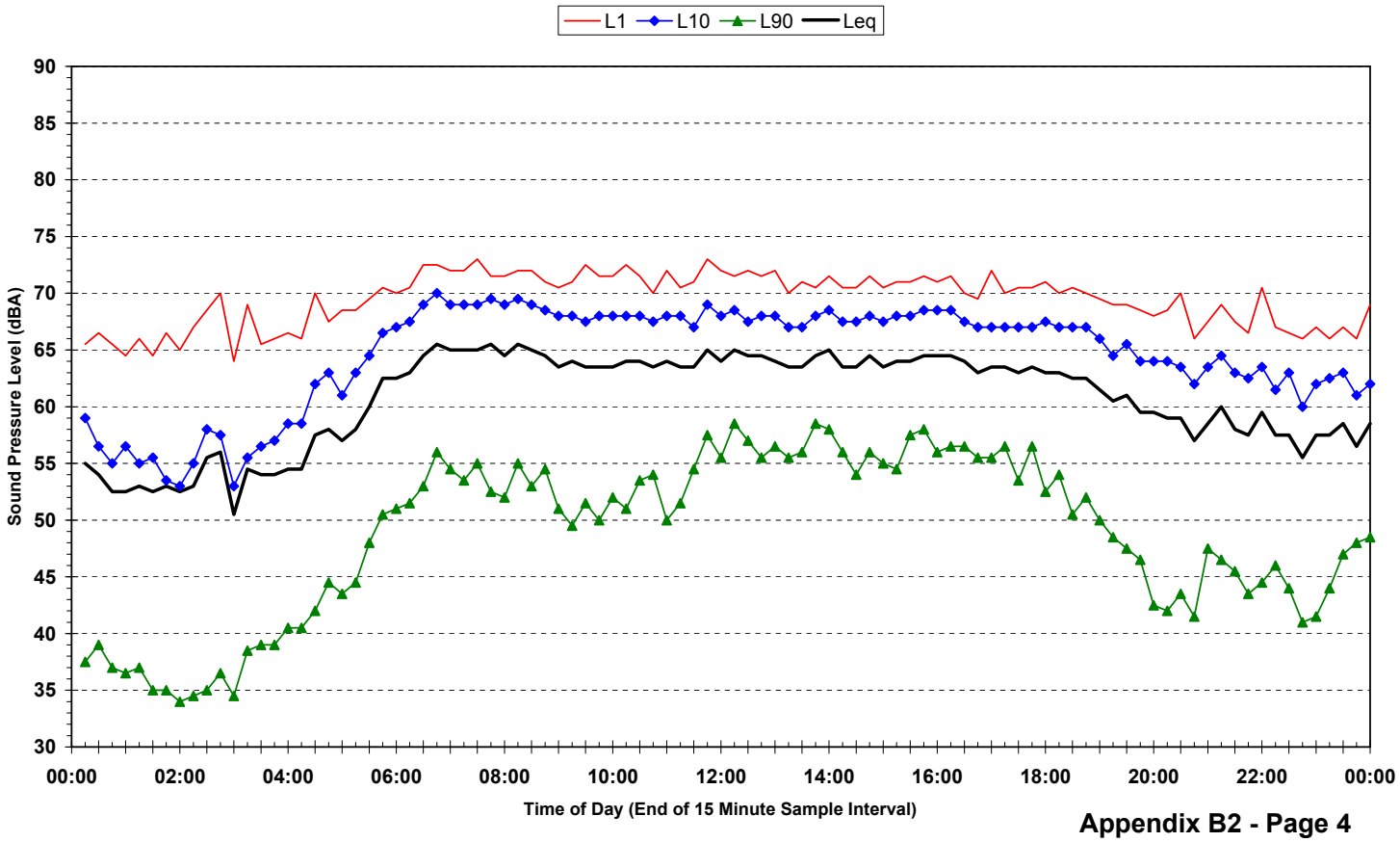
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Friday 13 October 2000



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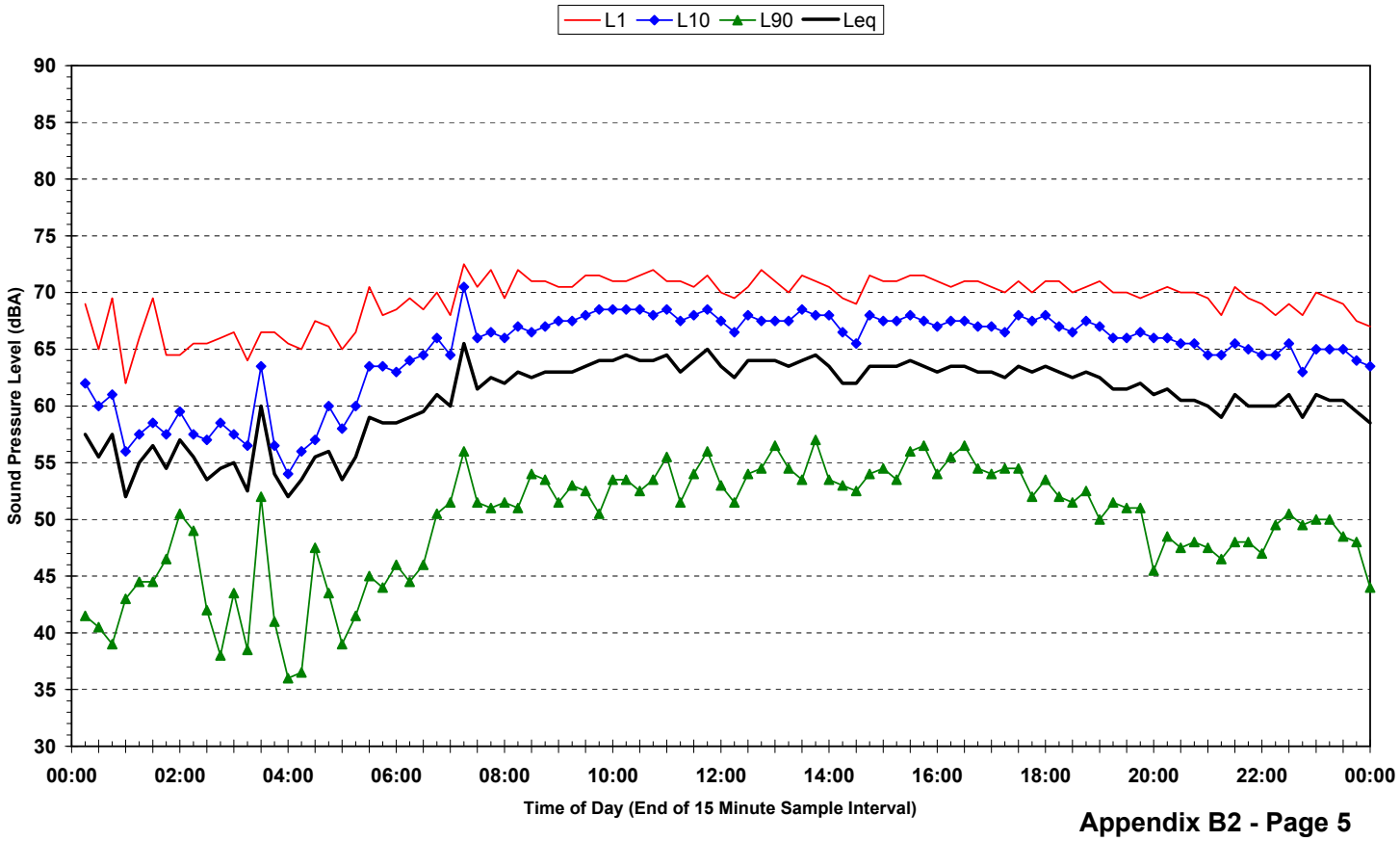
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Saturday 14 October 2000



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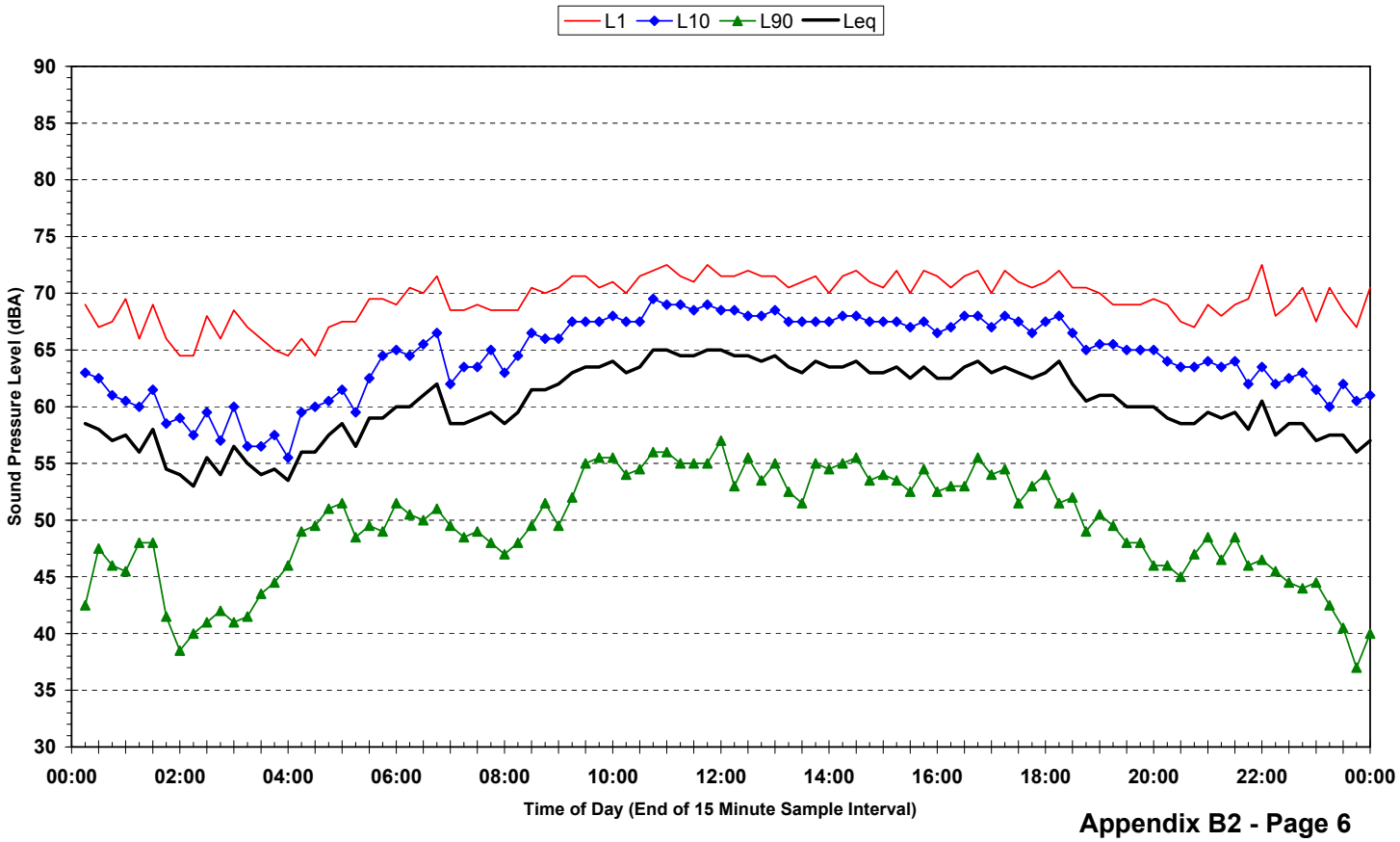
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Sunday 15 October 2000



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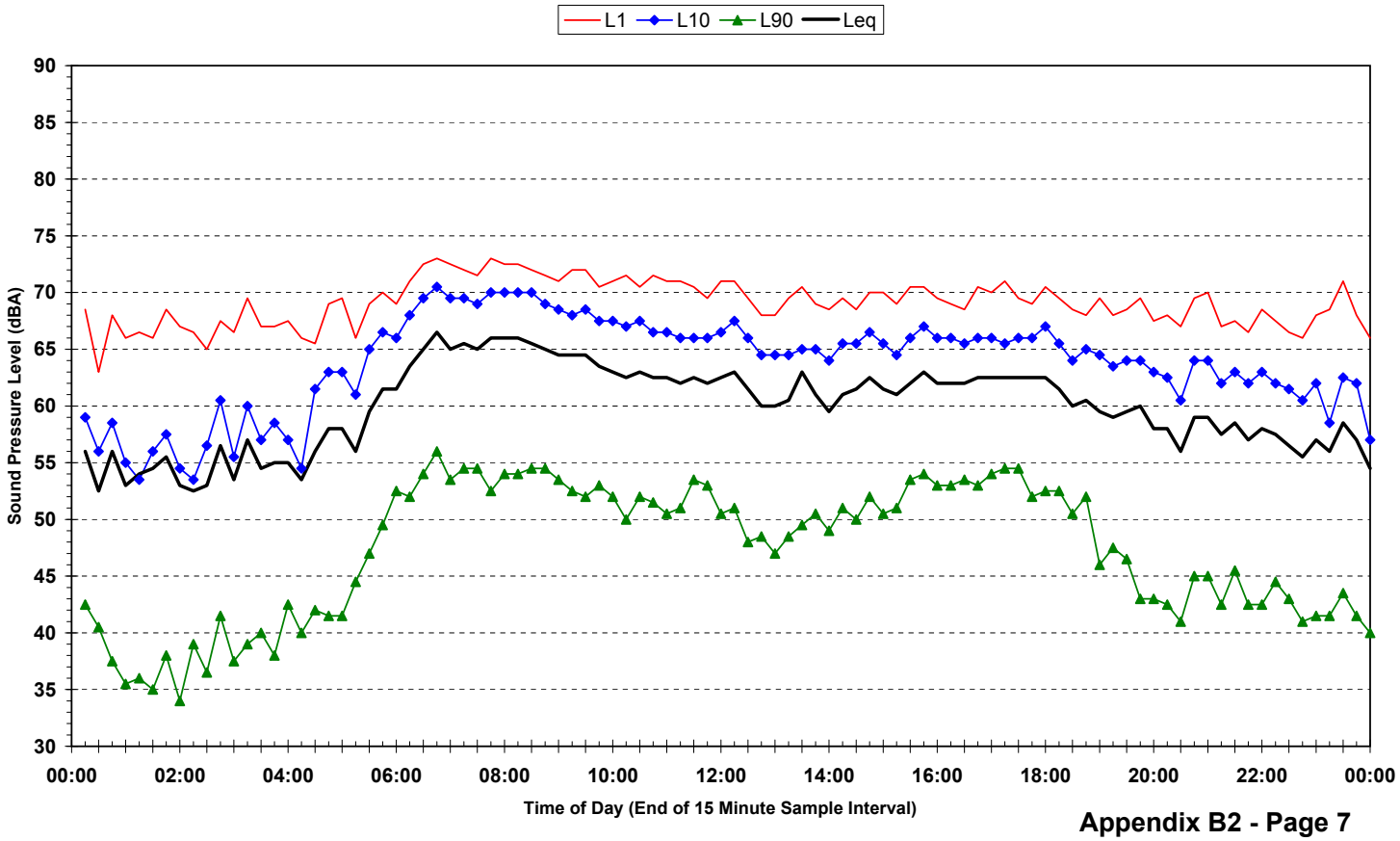
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Monday 16 October 2000



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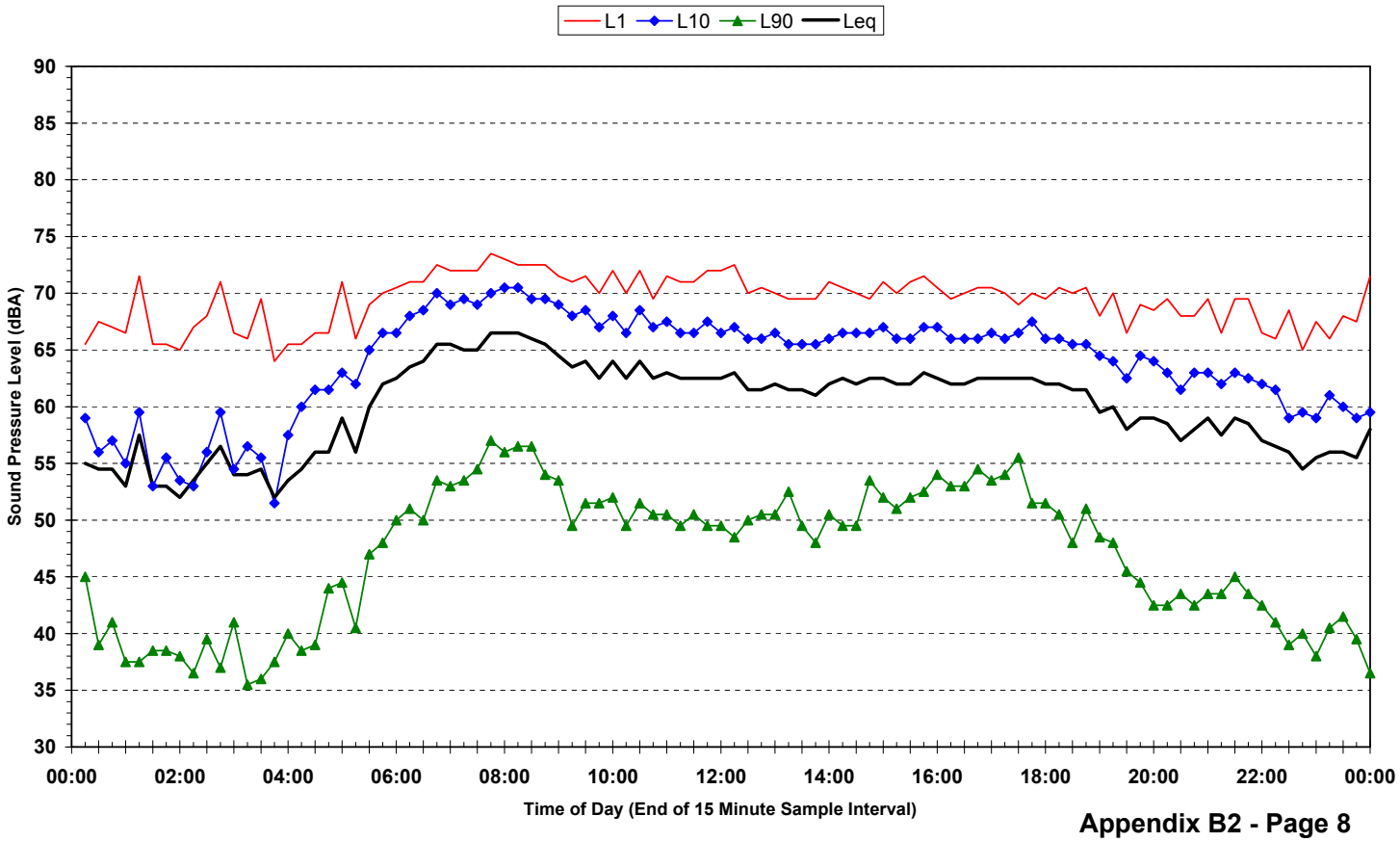
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Tuesday 17 October 2000



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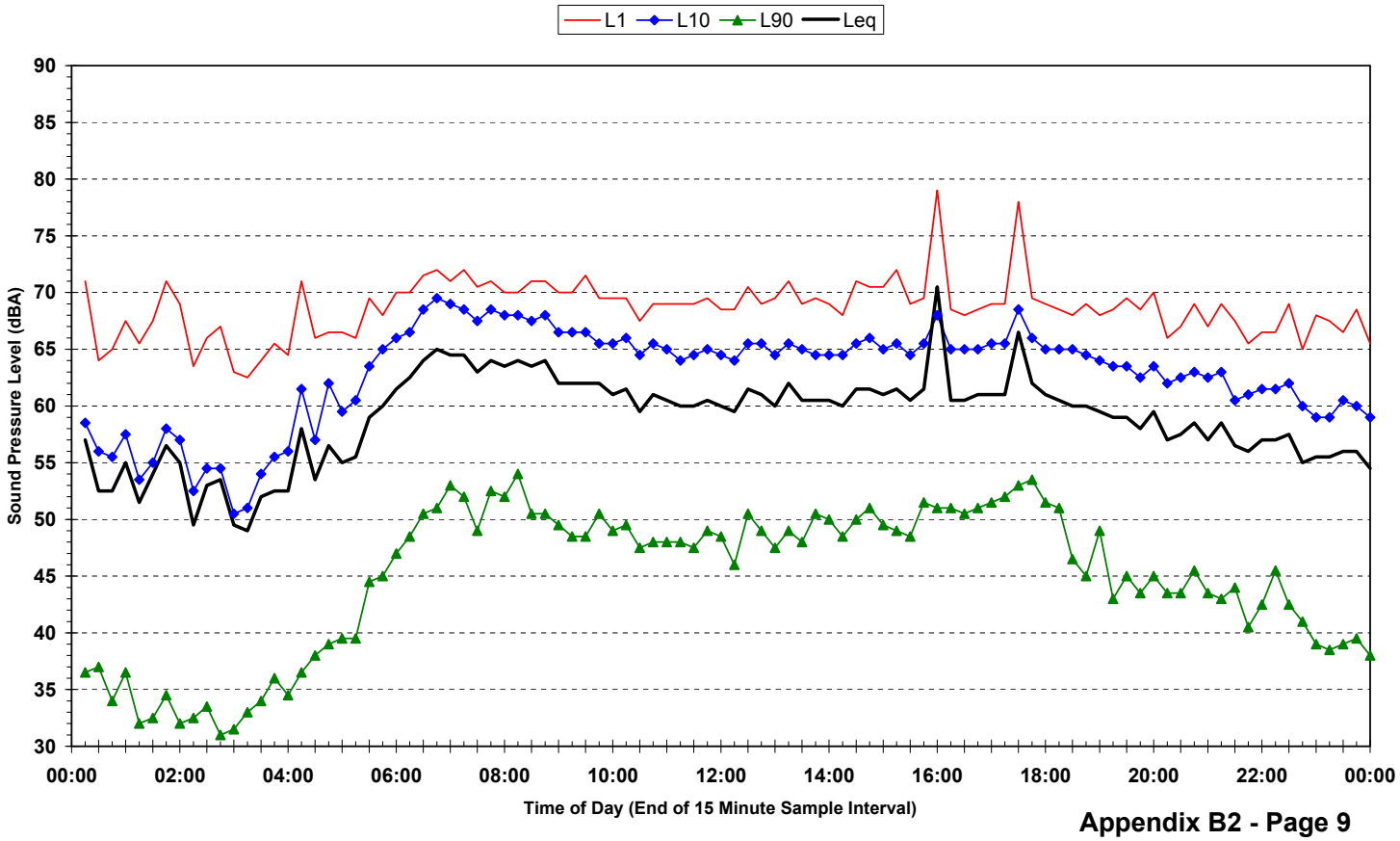
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Wednesday 18 October 2000



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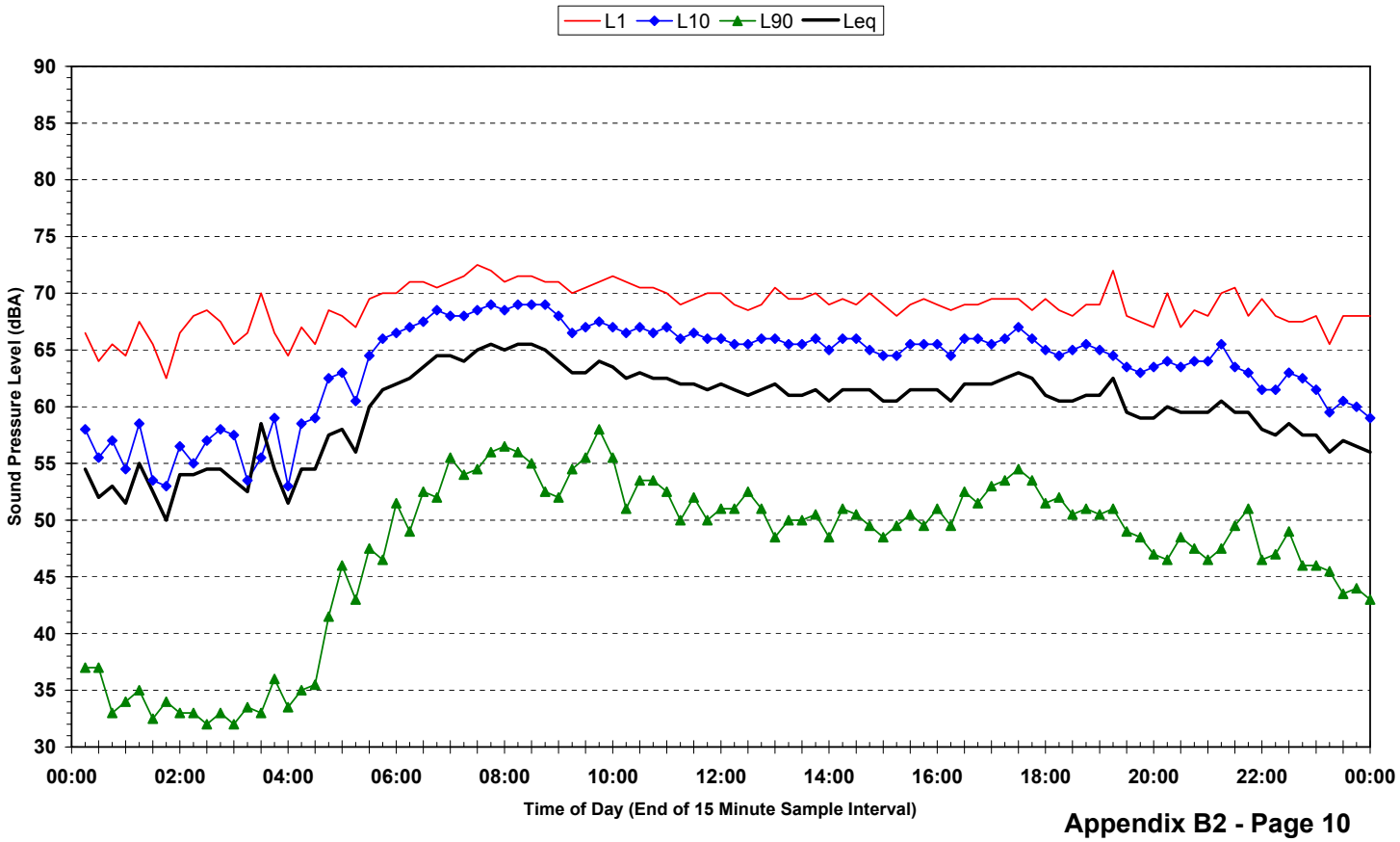
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Thursday 19 October 2000



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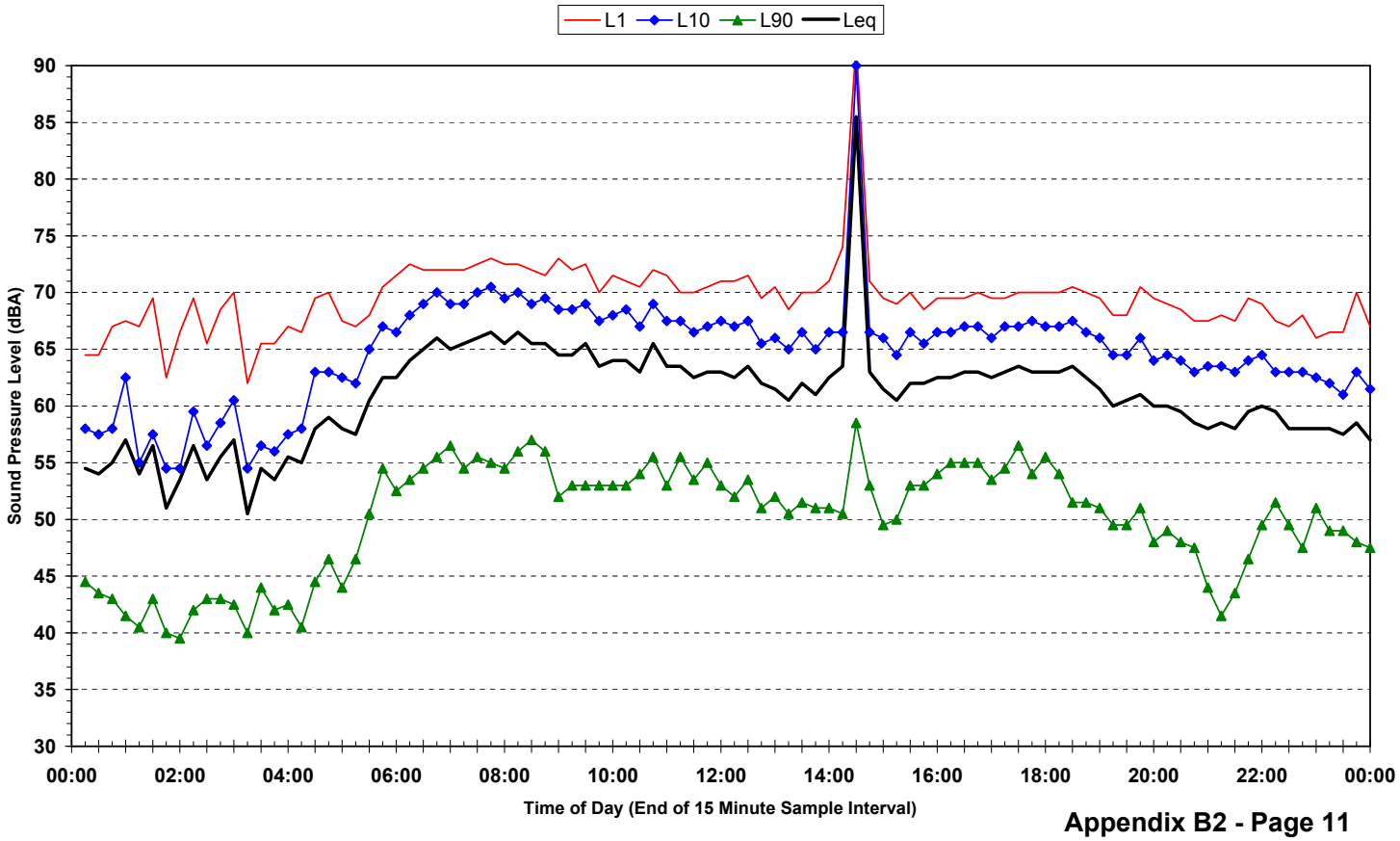
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Friday 20 October 2000



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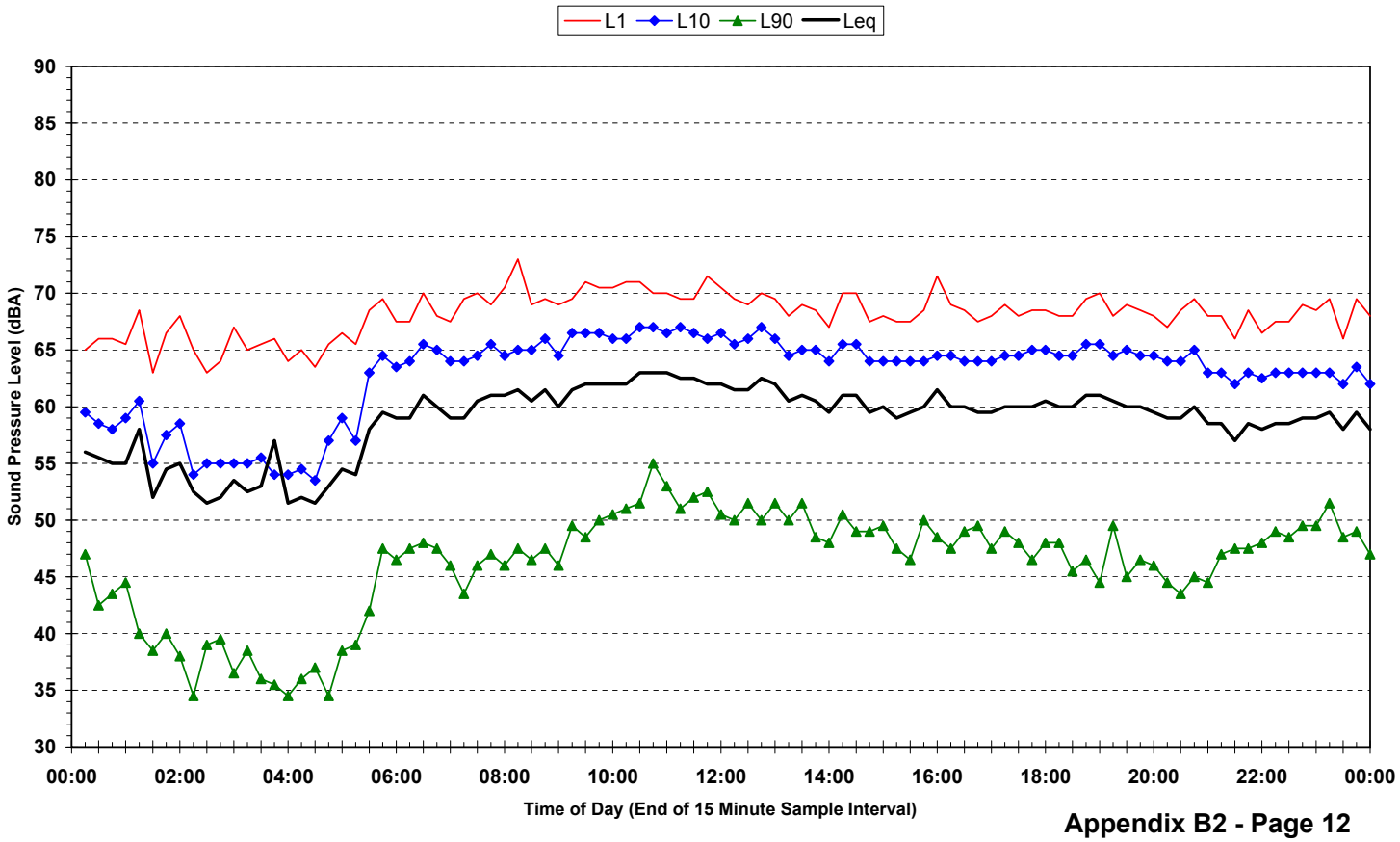
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Saturday 21 October 2000



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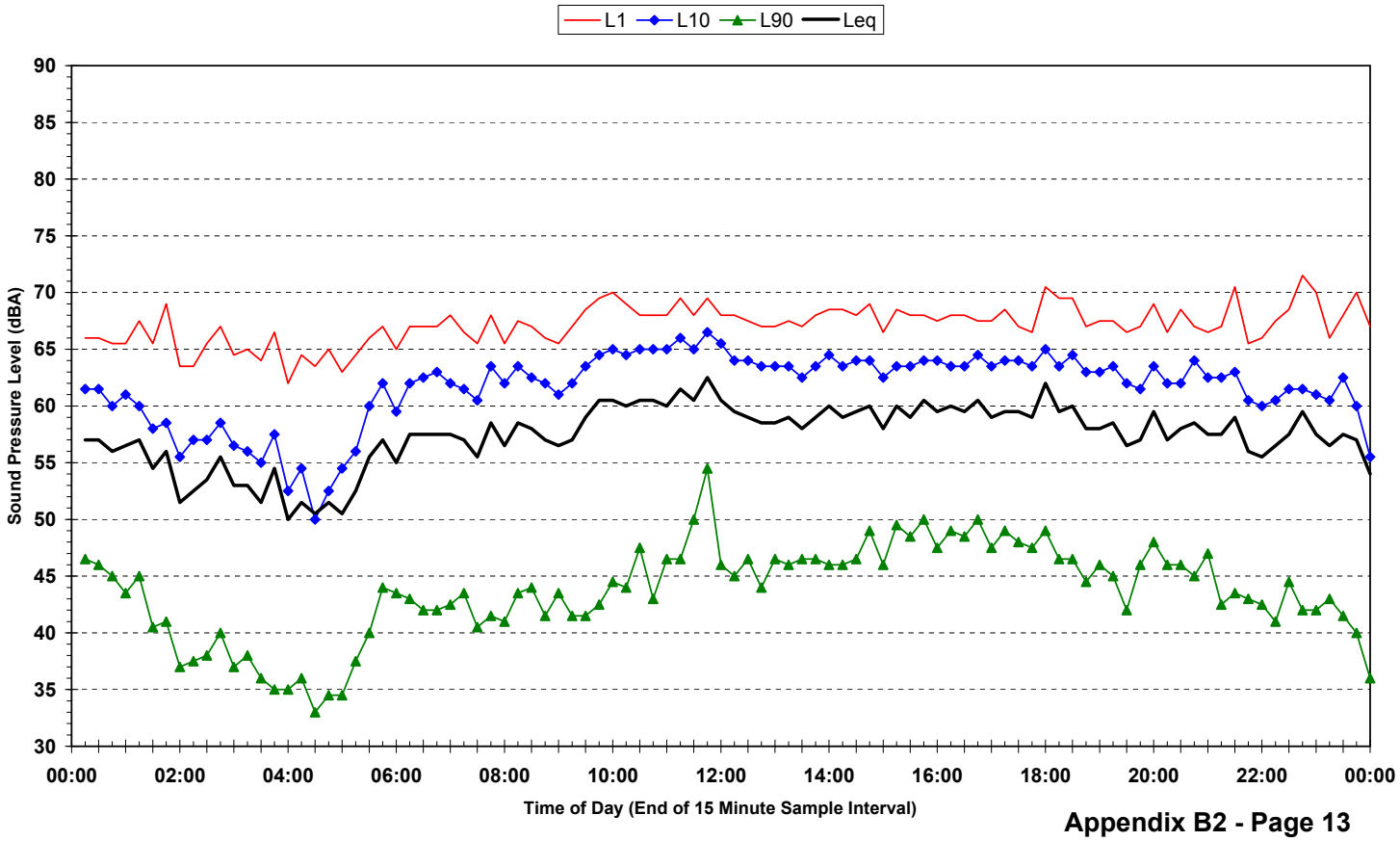
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Sunday 22 October 2000



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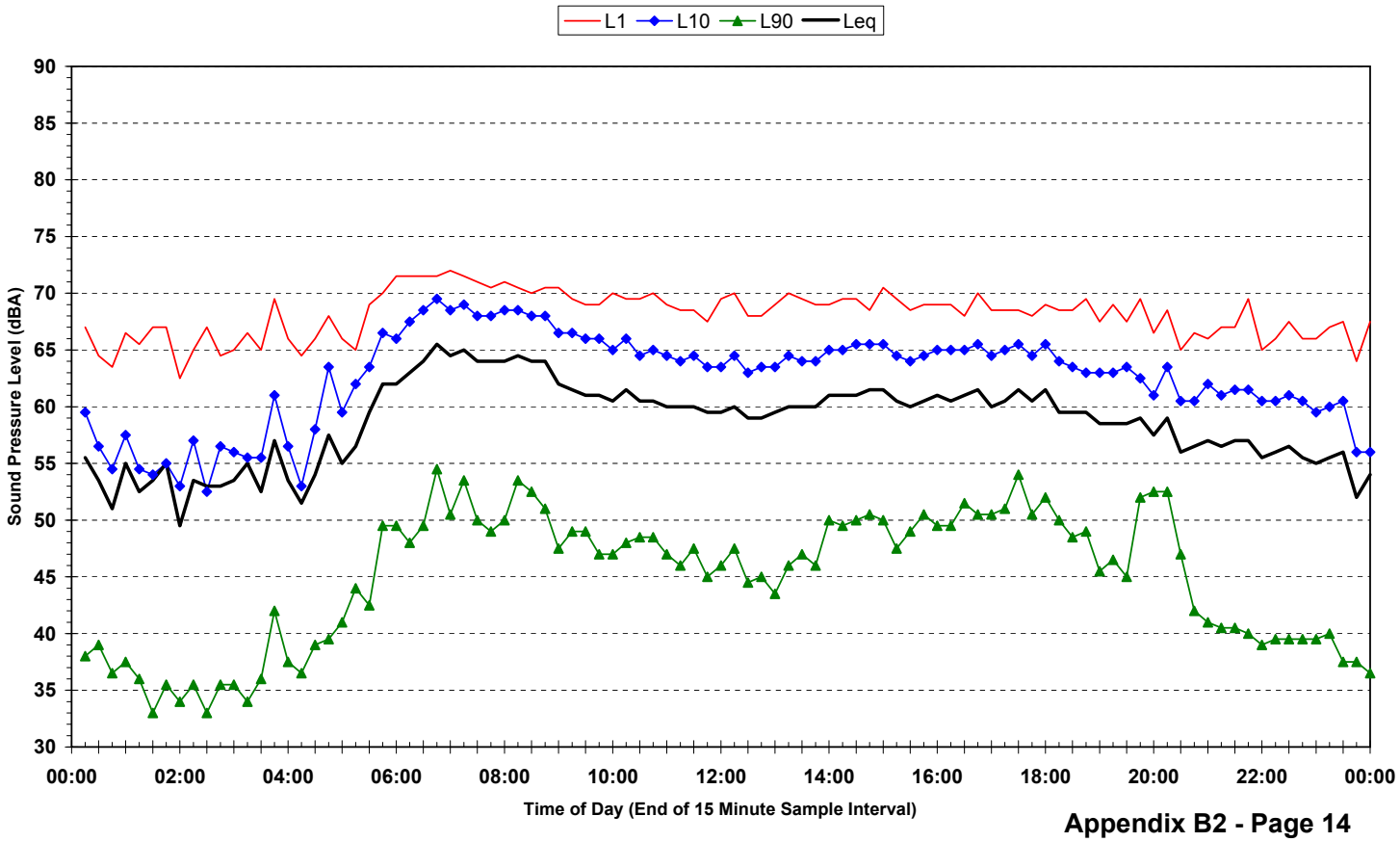
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Monday 23 October 2000



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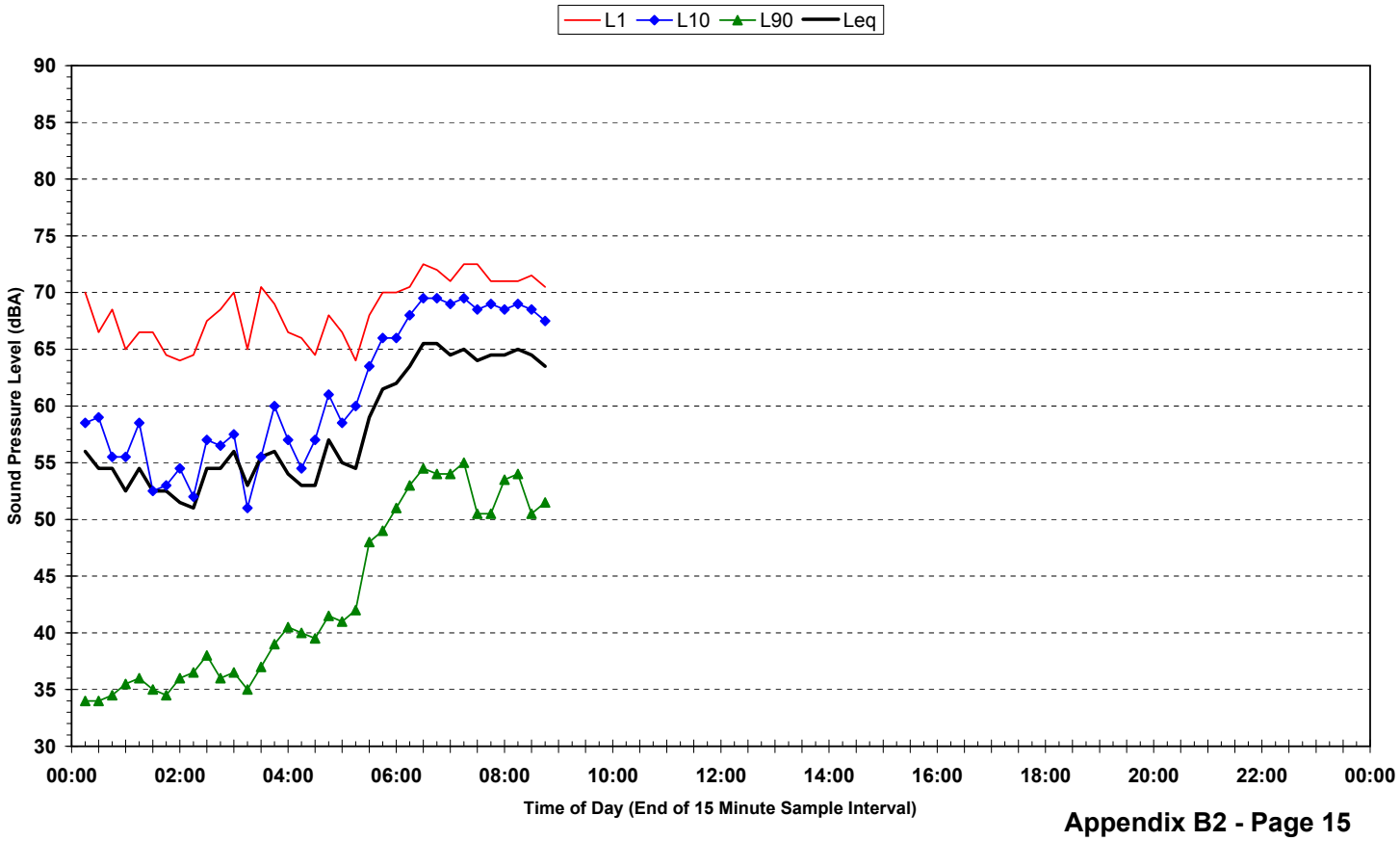
Statistical Ambient Noise Levels
Location B - 92 Yarrum Ave, Beresfield - Tuesday 24 October 2000



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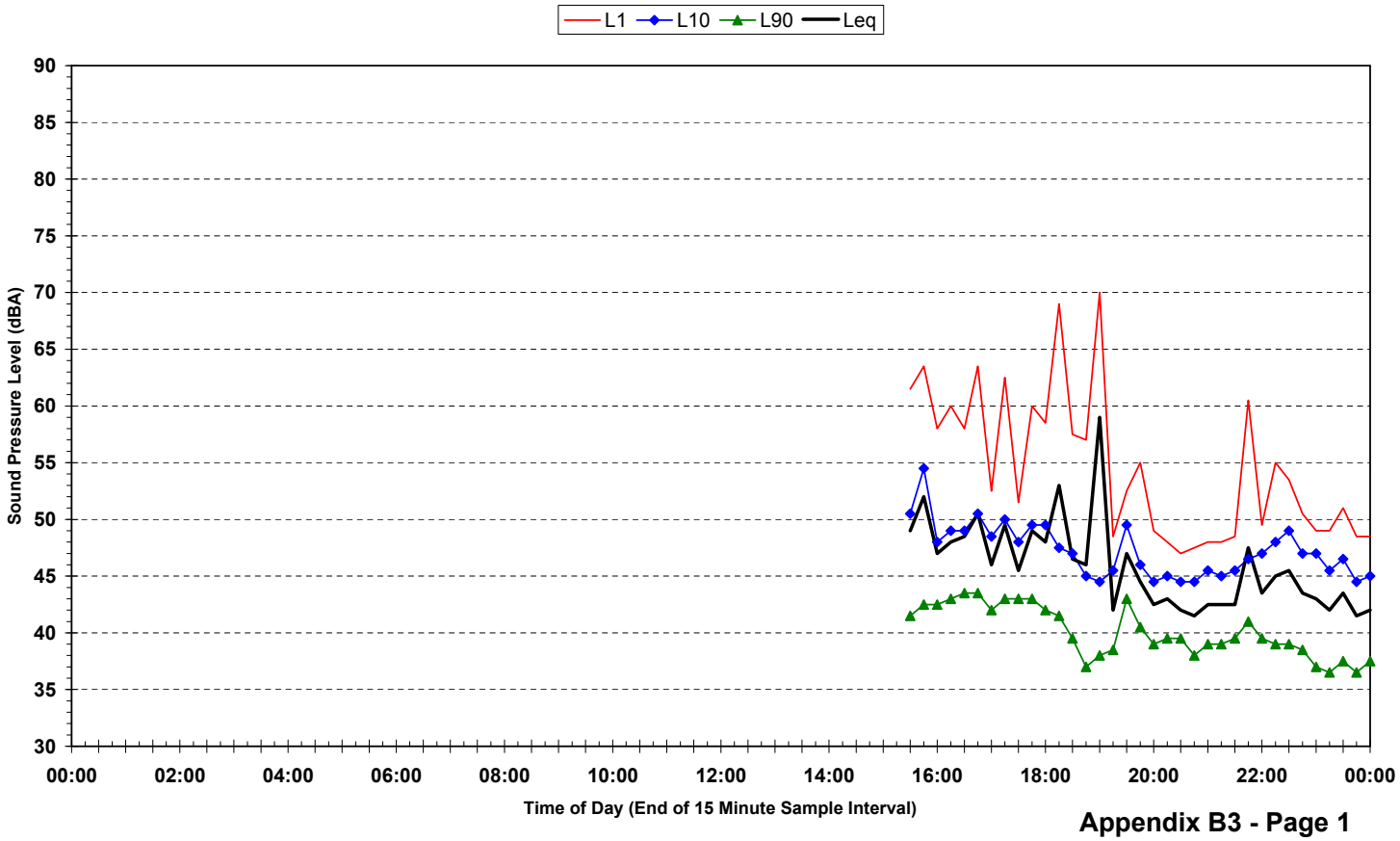
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Tuesday 10 October 2000



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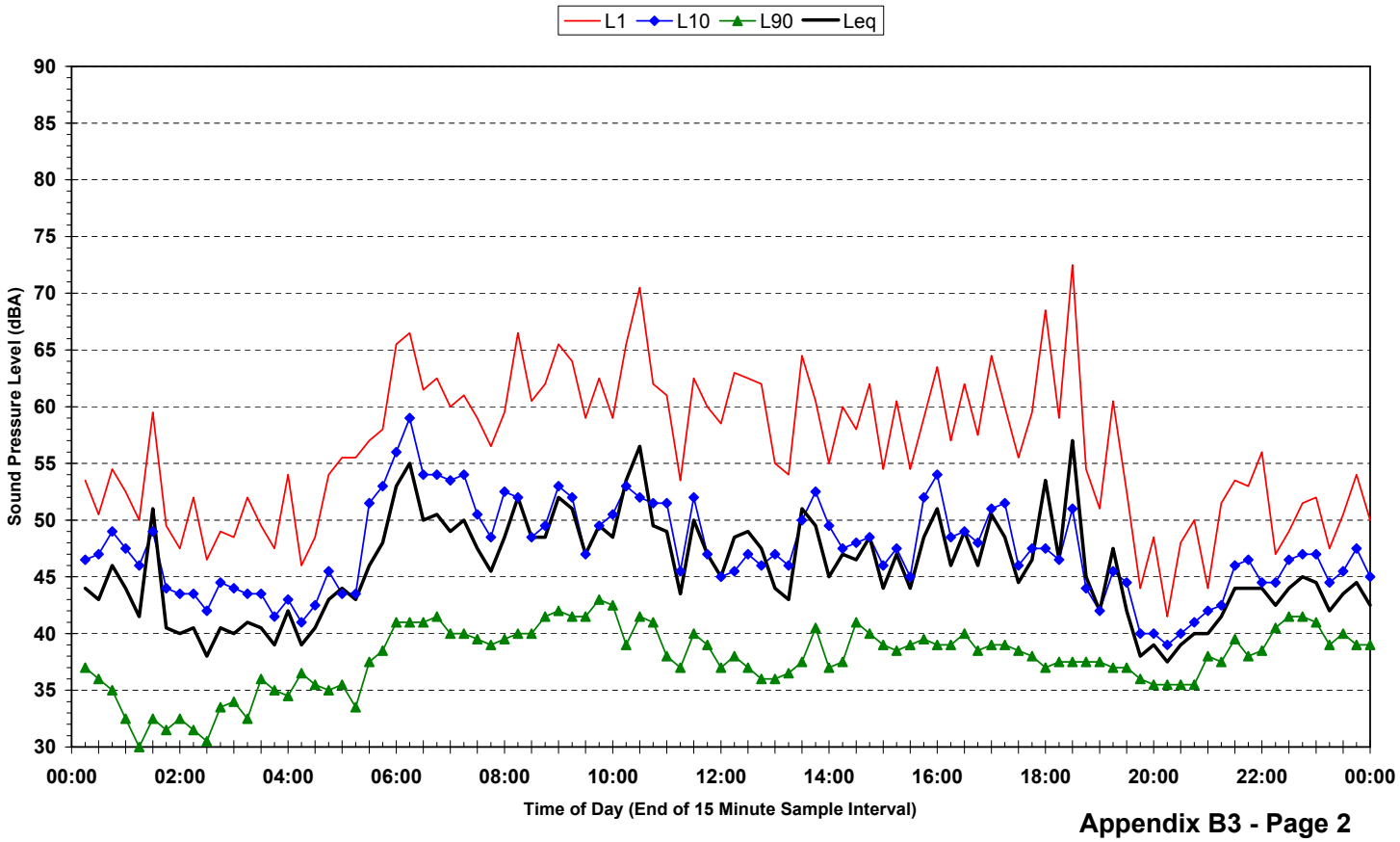
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Wednesday 11 October 2000



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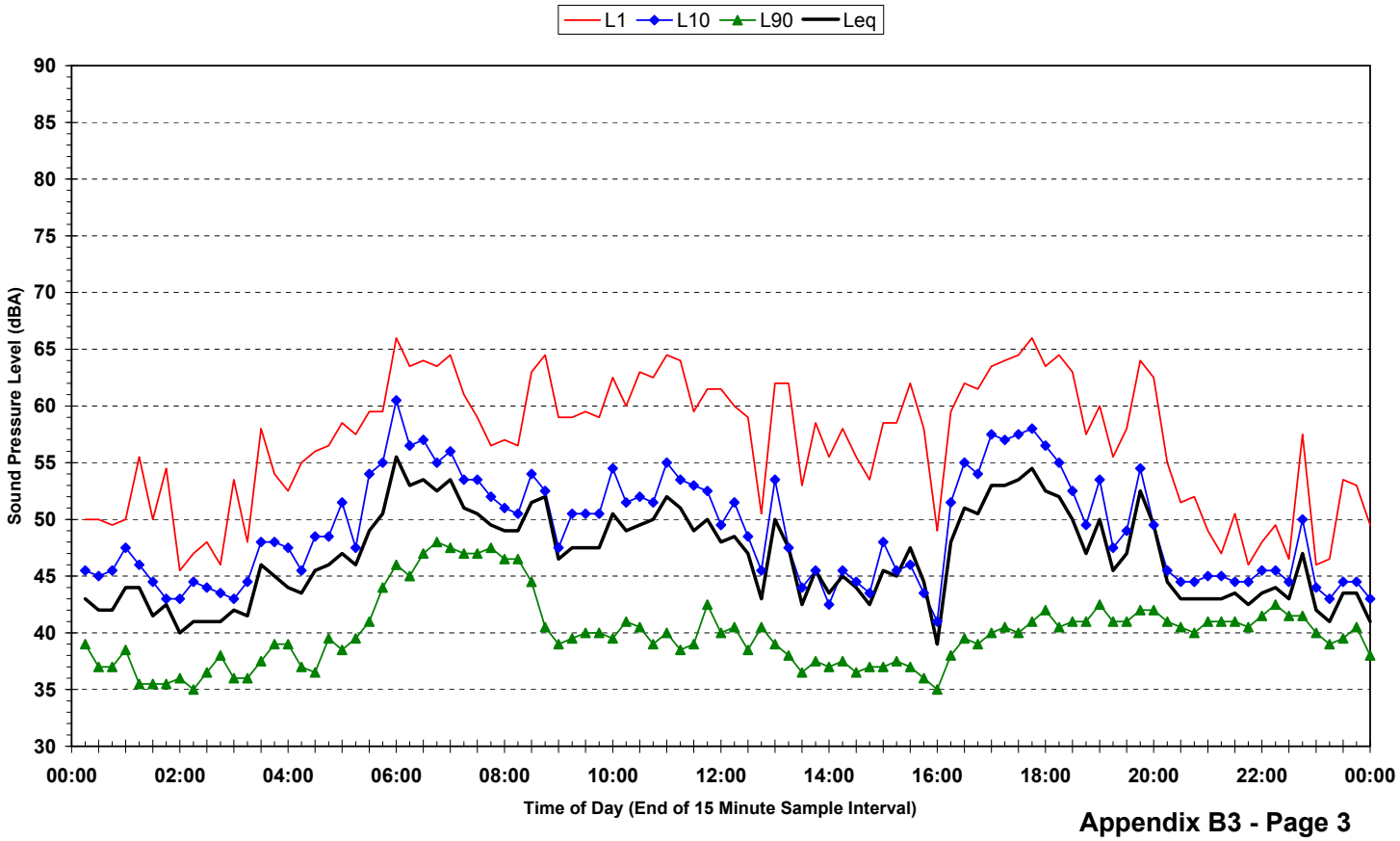
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Thursday 12 October 2000



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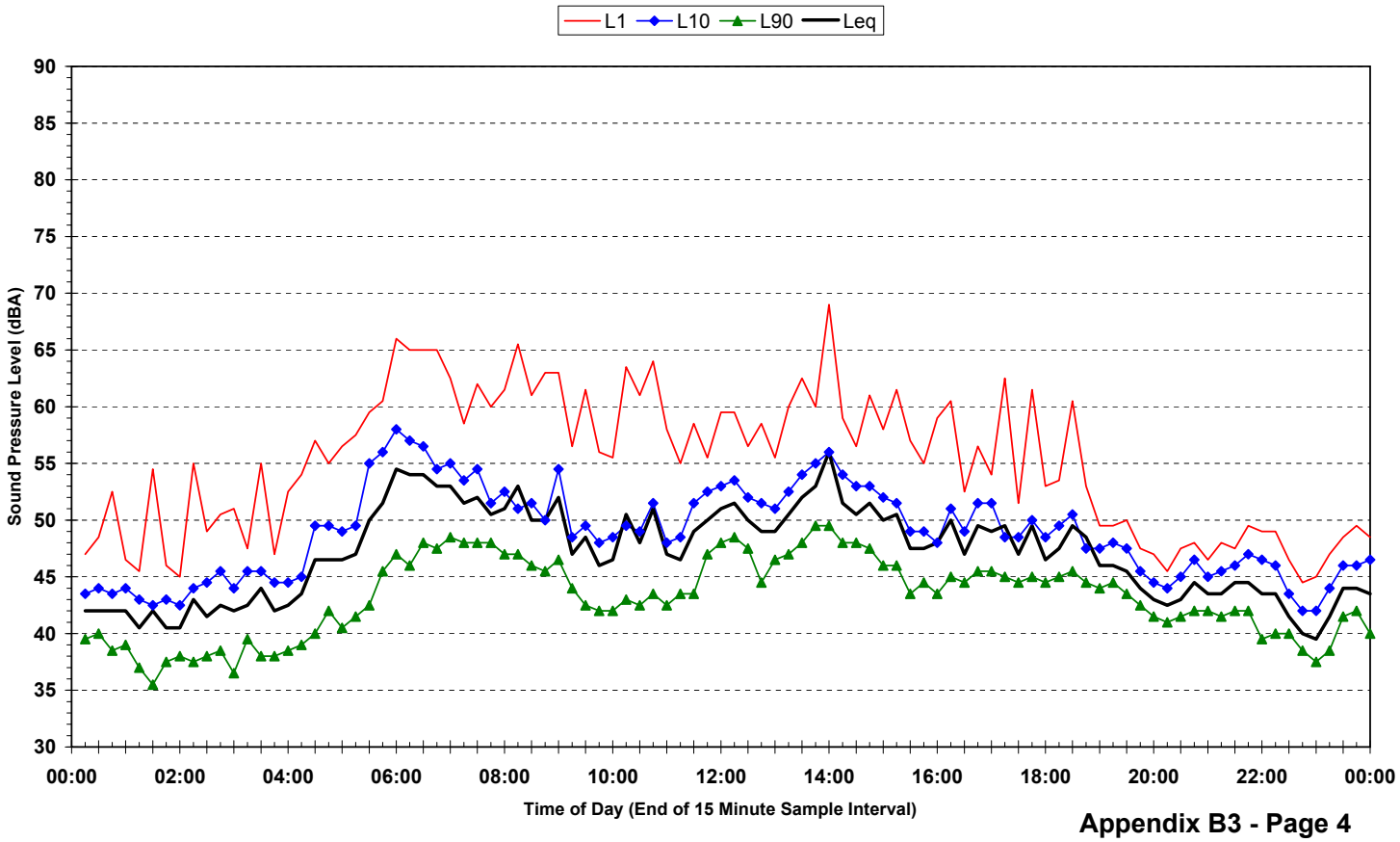
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Friday 13 October 2000



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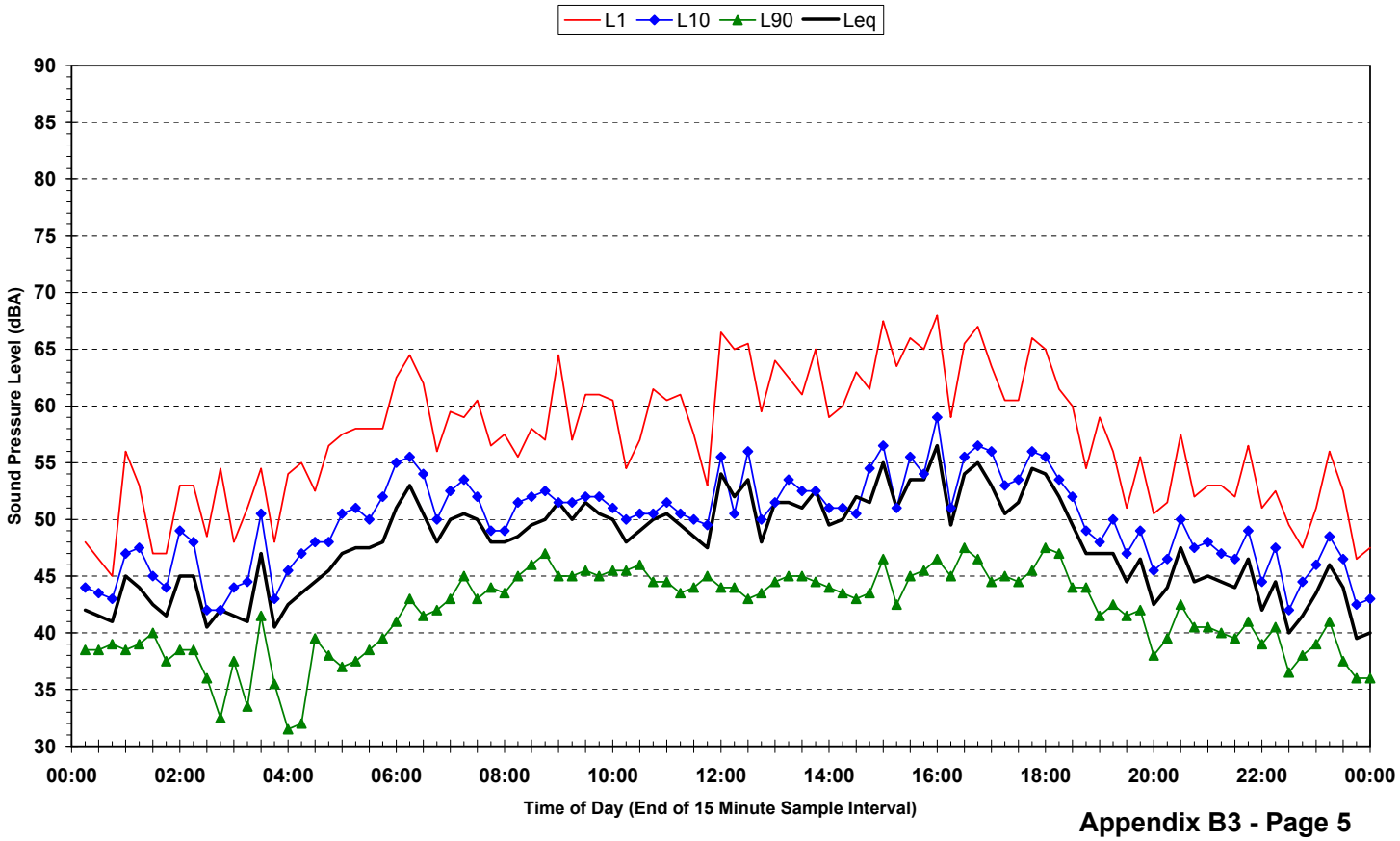
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Saturday 14 October 2000



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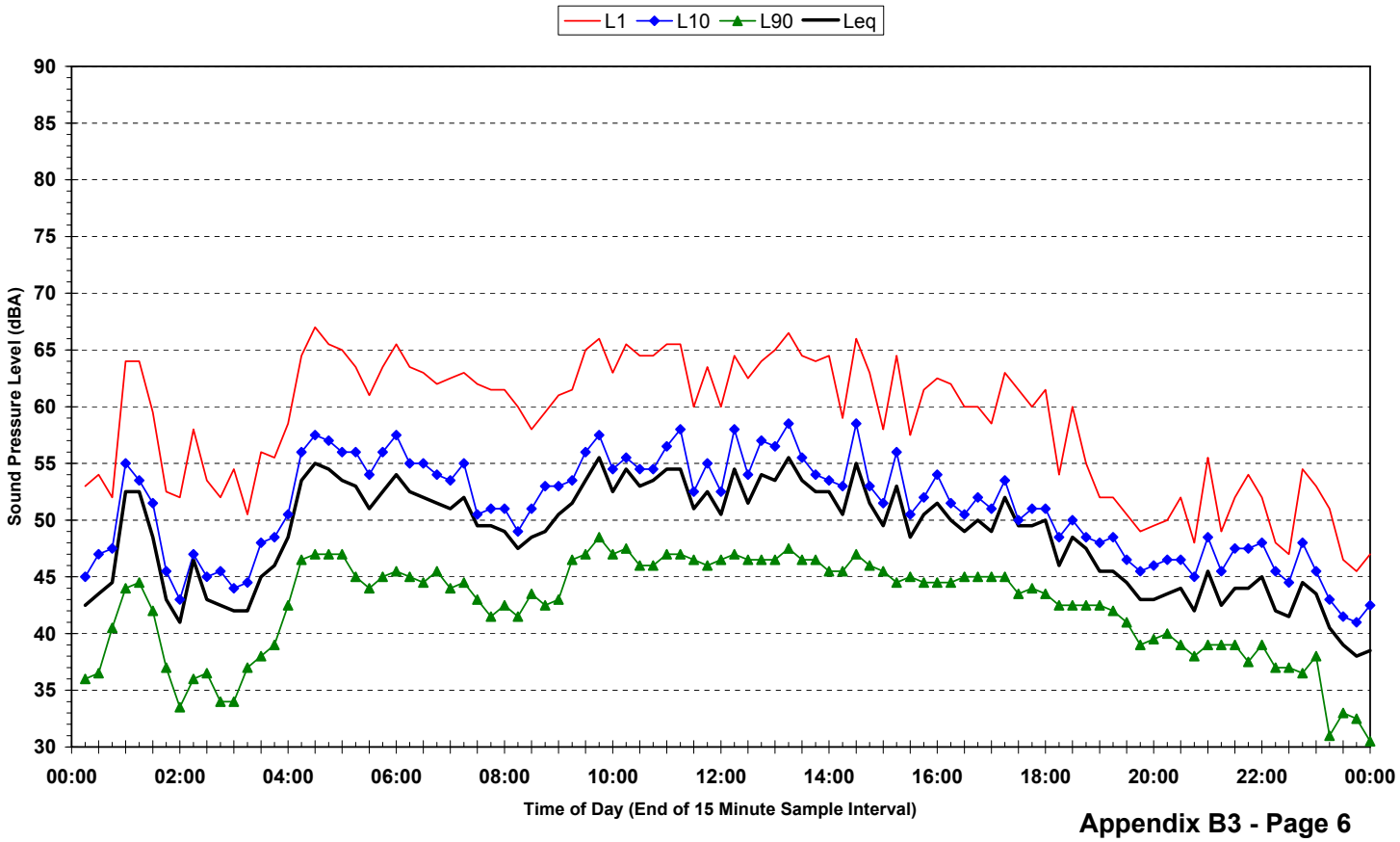
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Sunday 15 October 2000



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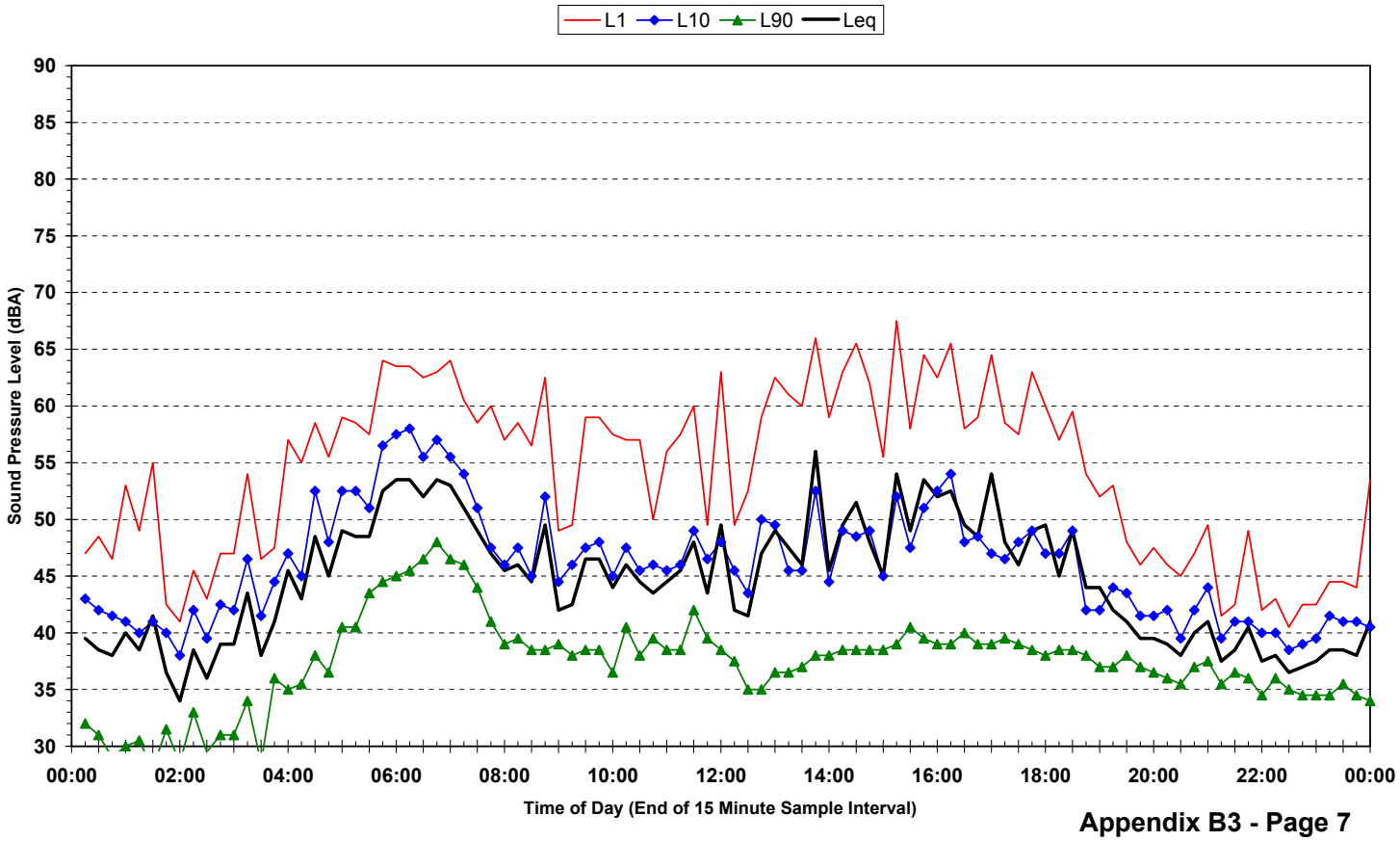
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Monday 16 October 2000



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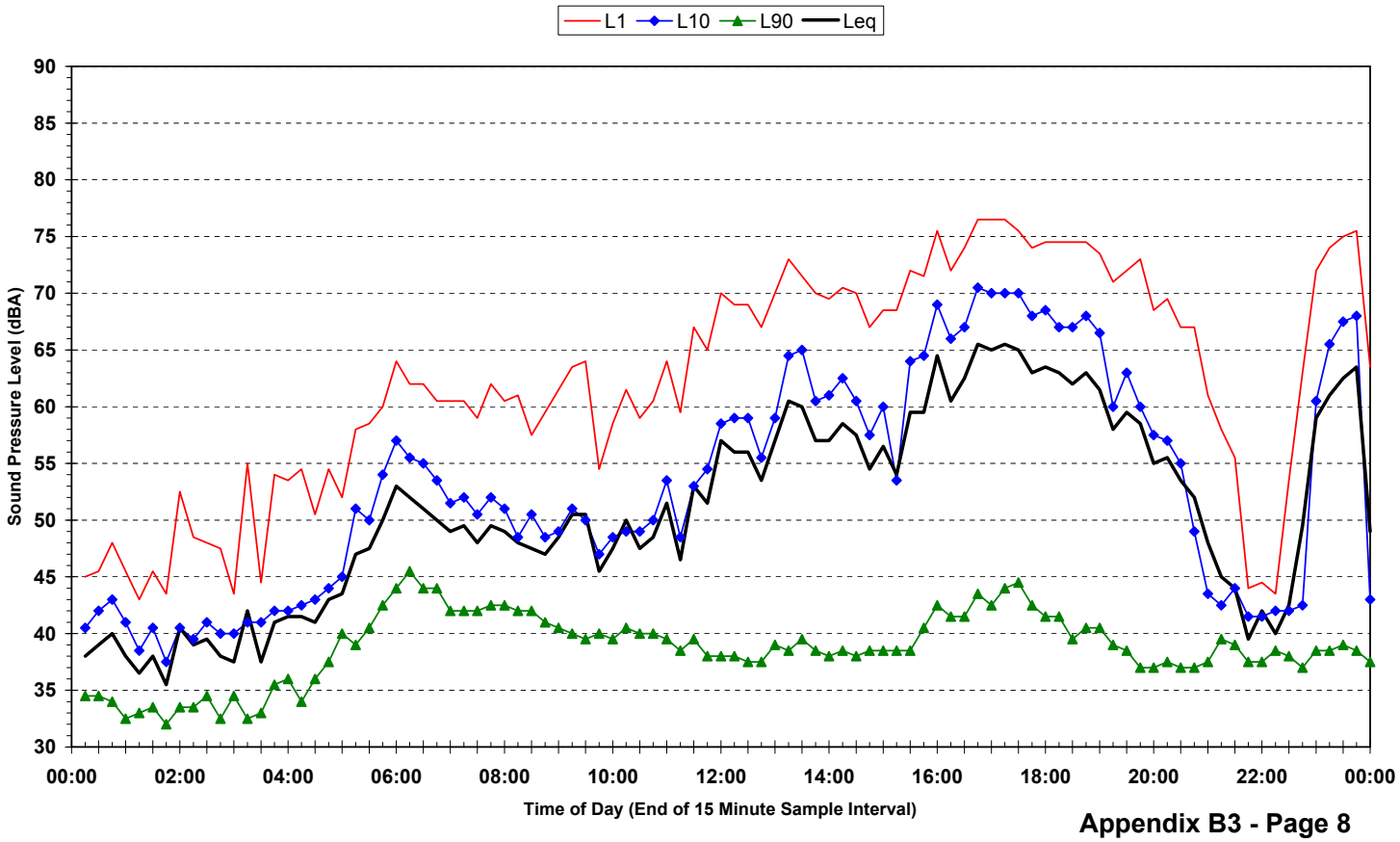
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Tuesday 17 October 2000



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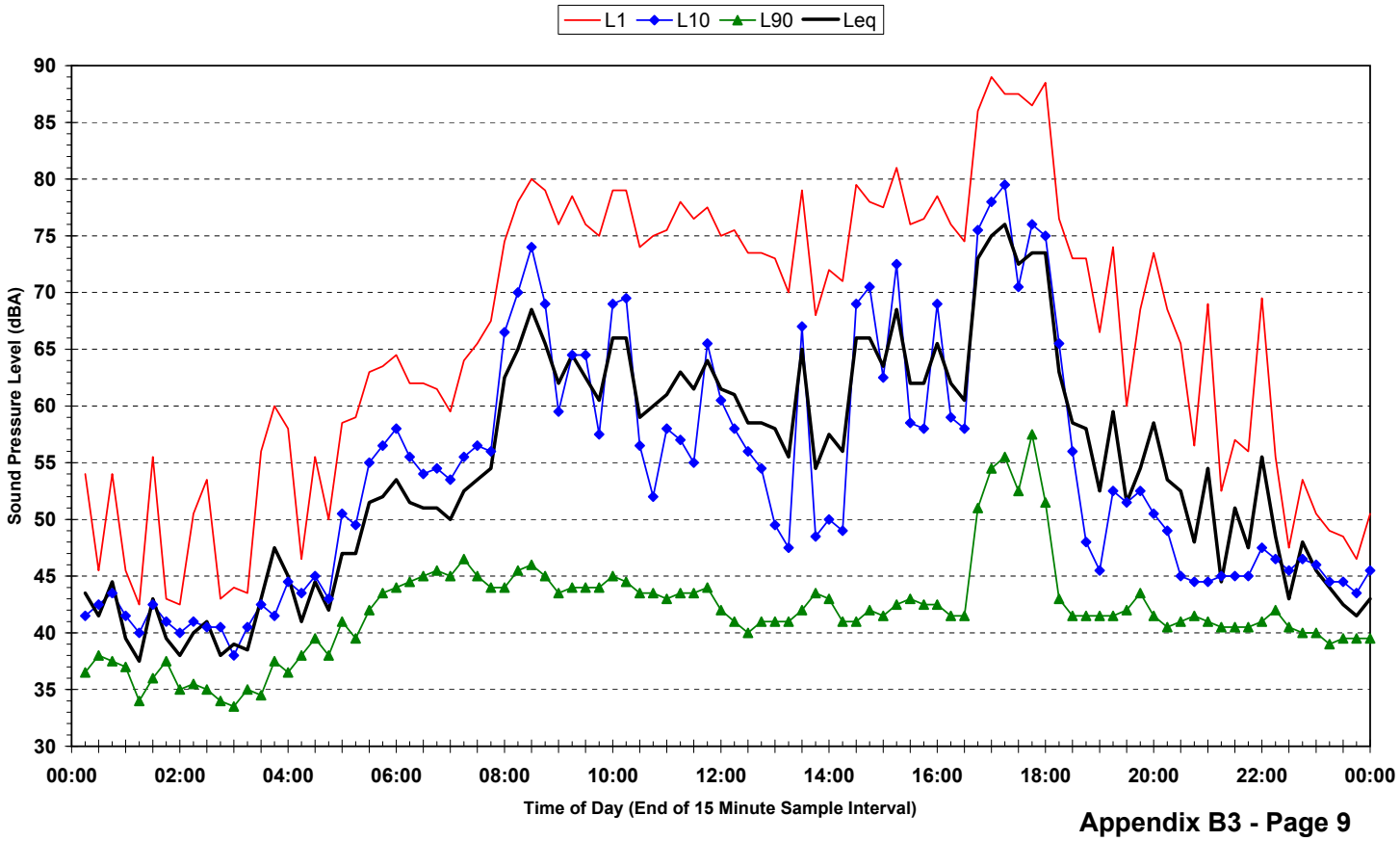
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Wednesday 18 October 2000



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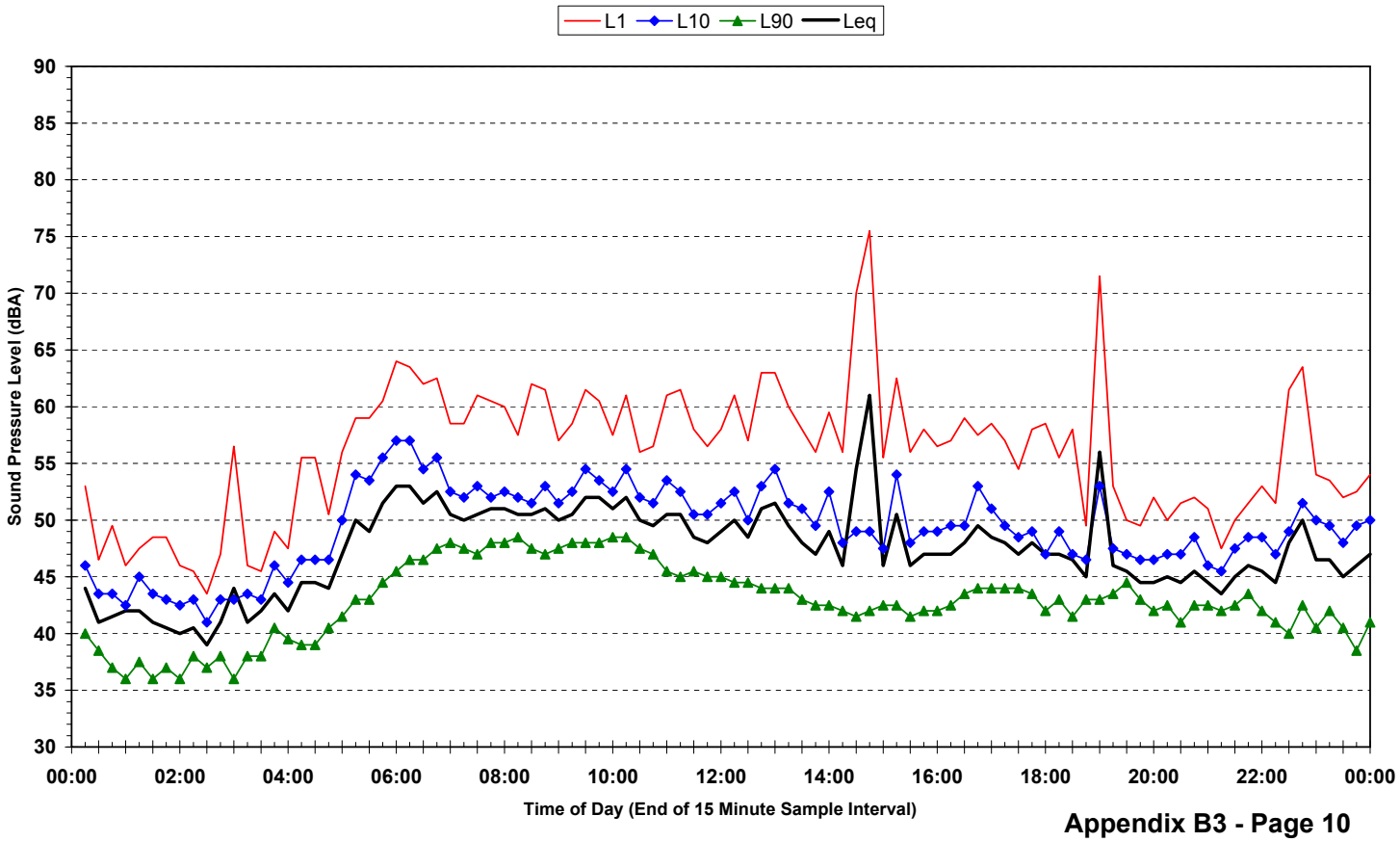
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Thursday 19 October 2000



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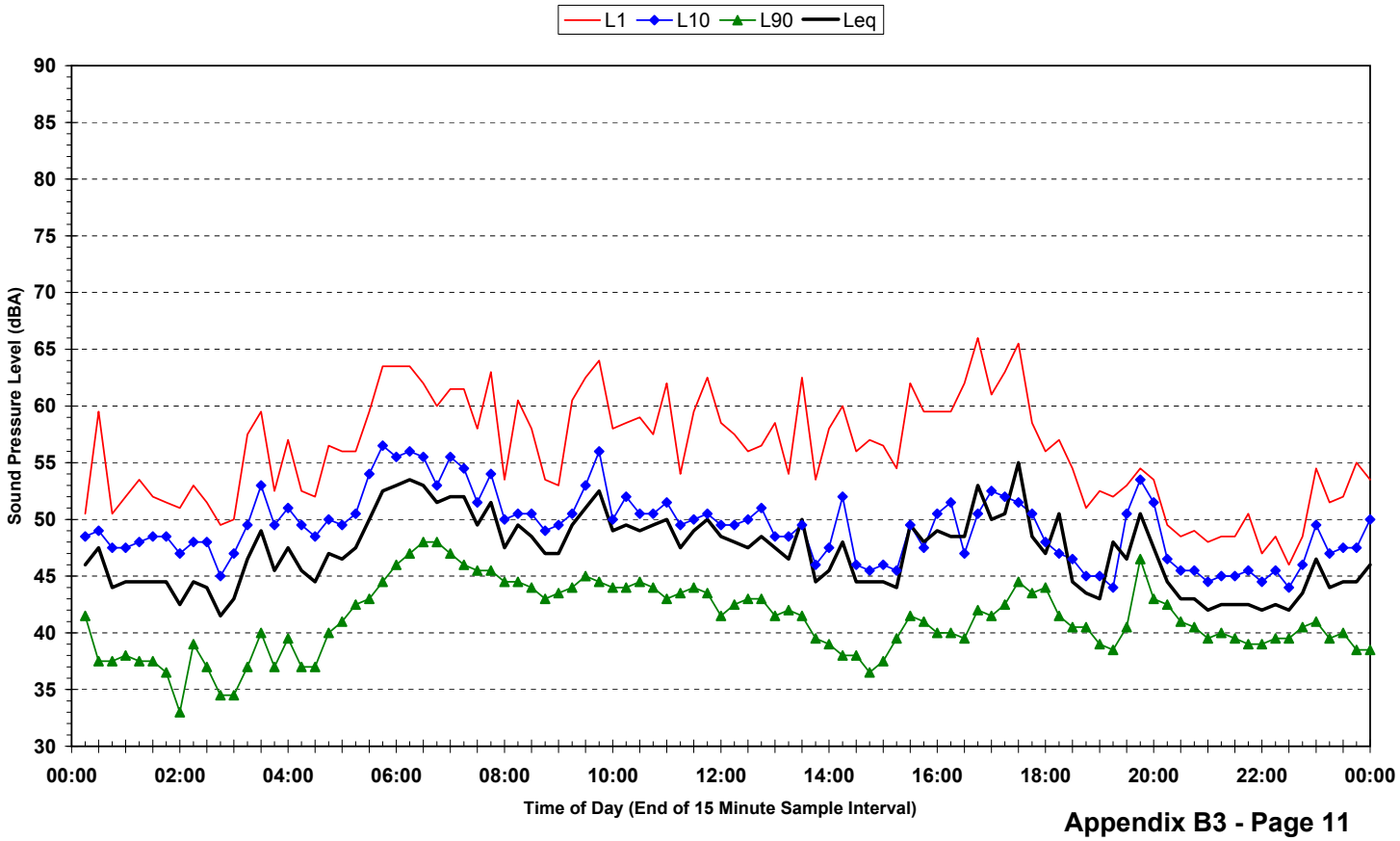
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Friday 20 October 2000



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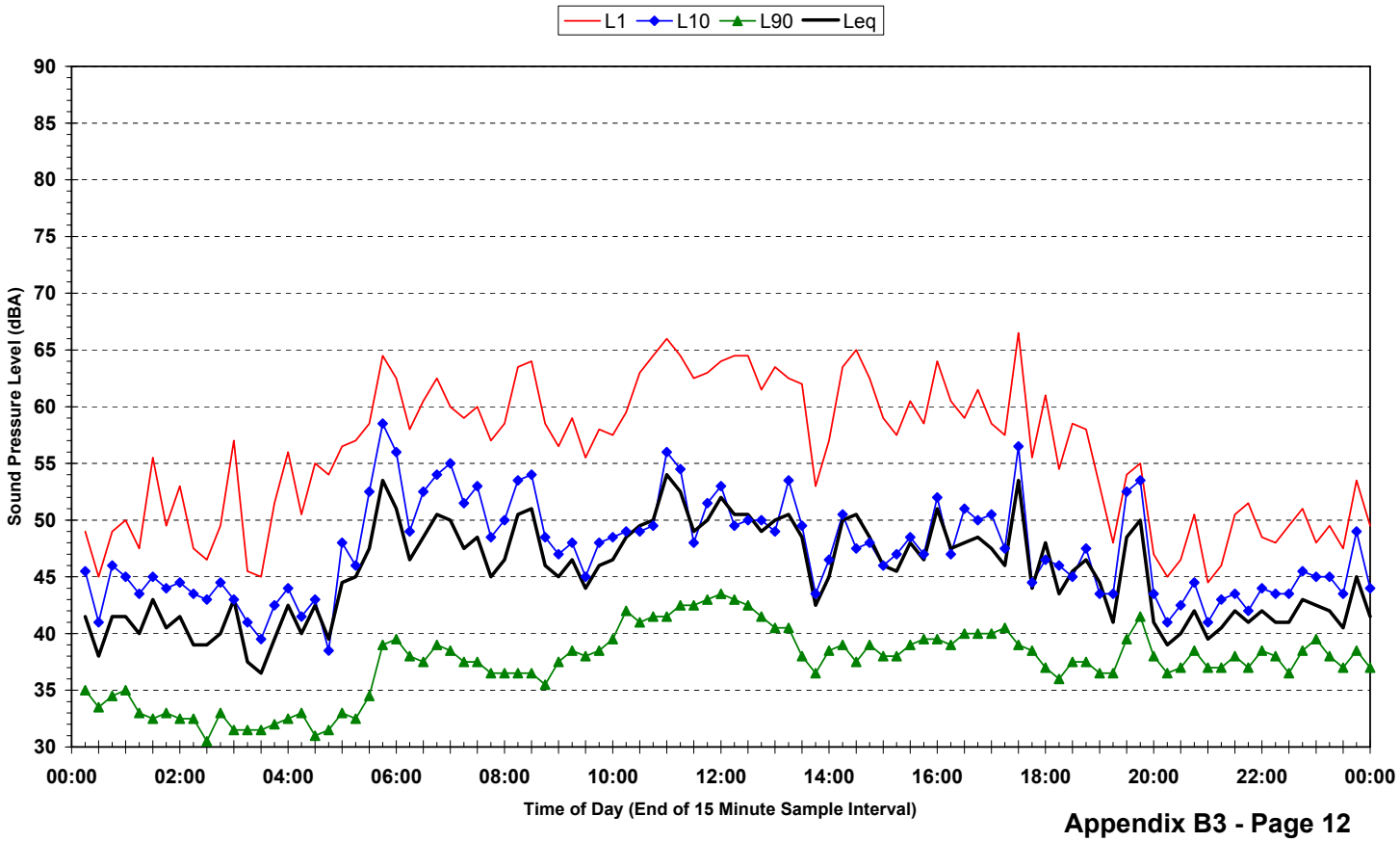
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Saturday 21 October 2000



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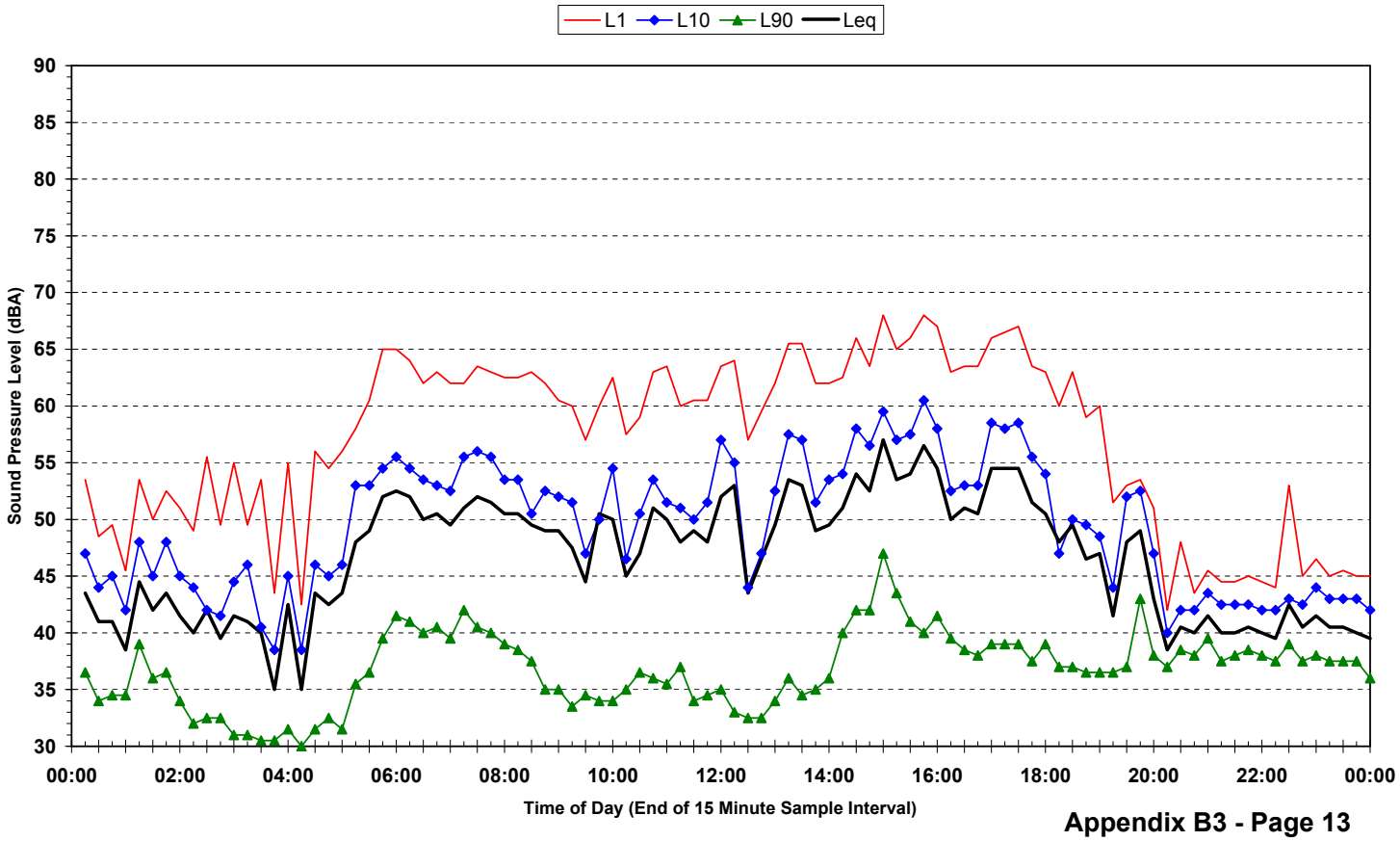
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Sunday 22 October 2000



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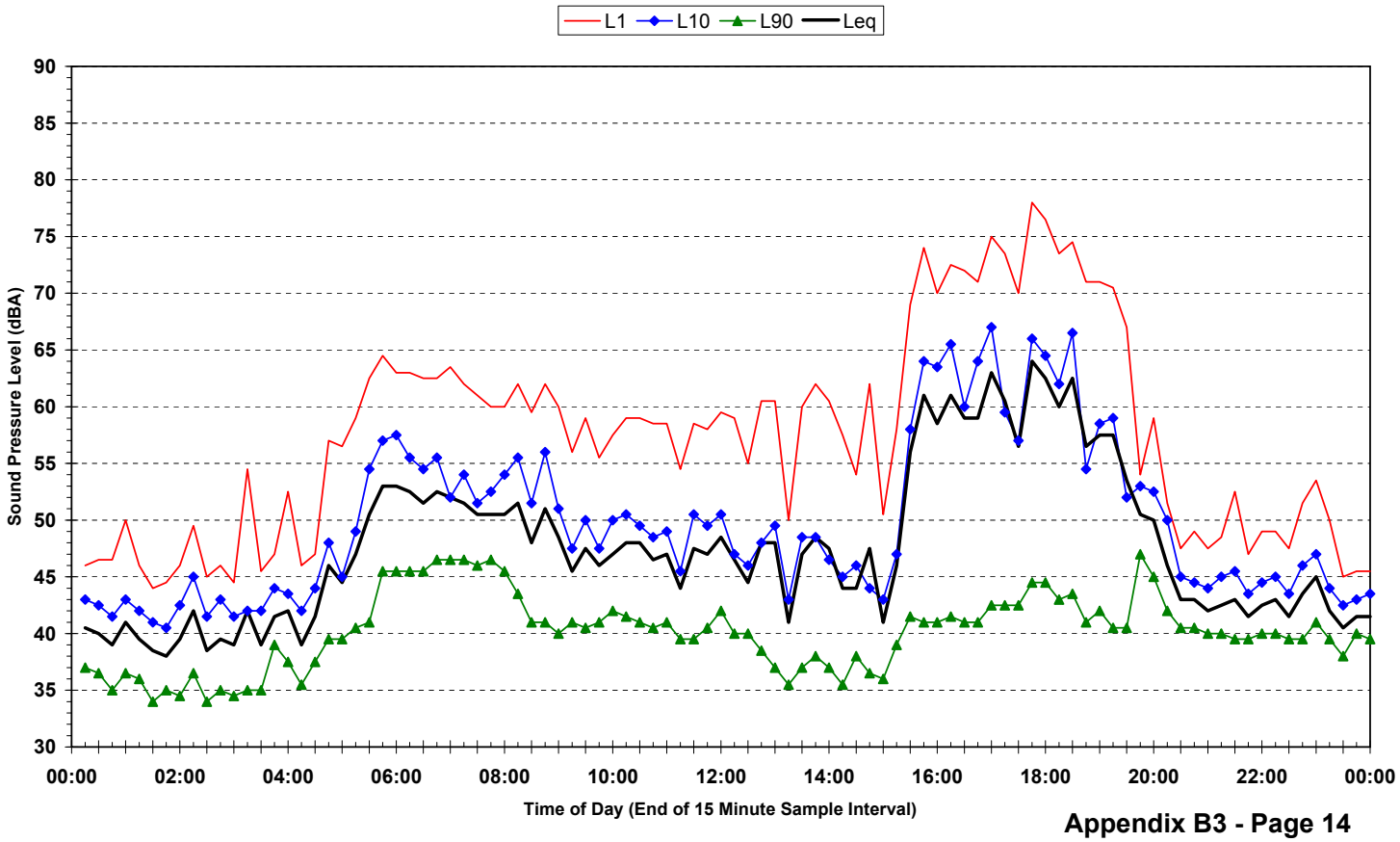
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Monday 23 October 2000



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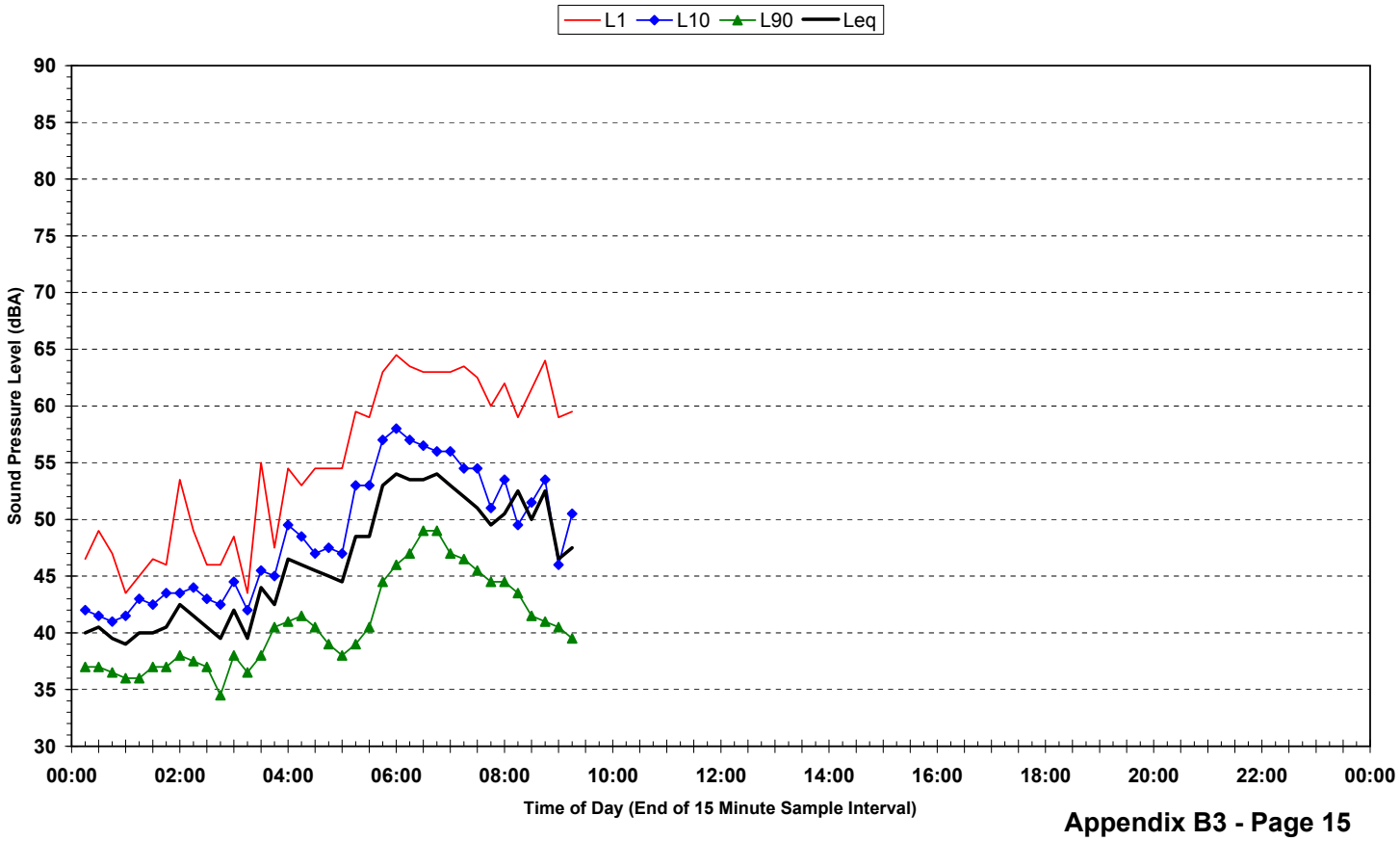
Statistical Ambient Noise Levels
Location C - 28 Phoenix Rd, Black Hill - Tuesday 24 October 2000



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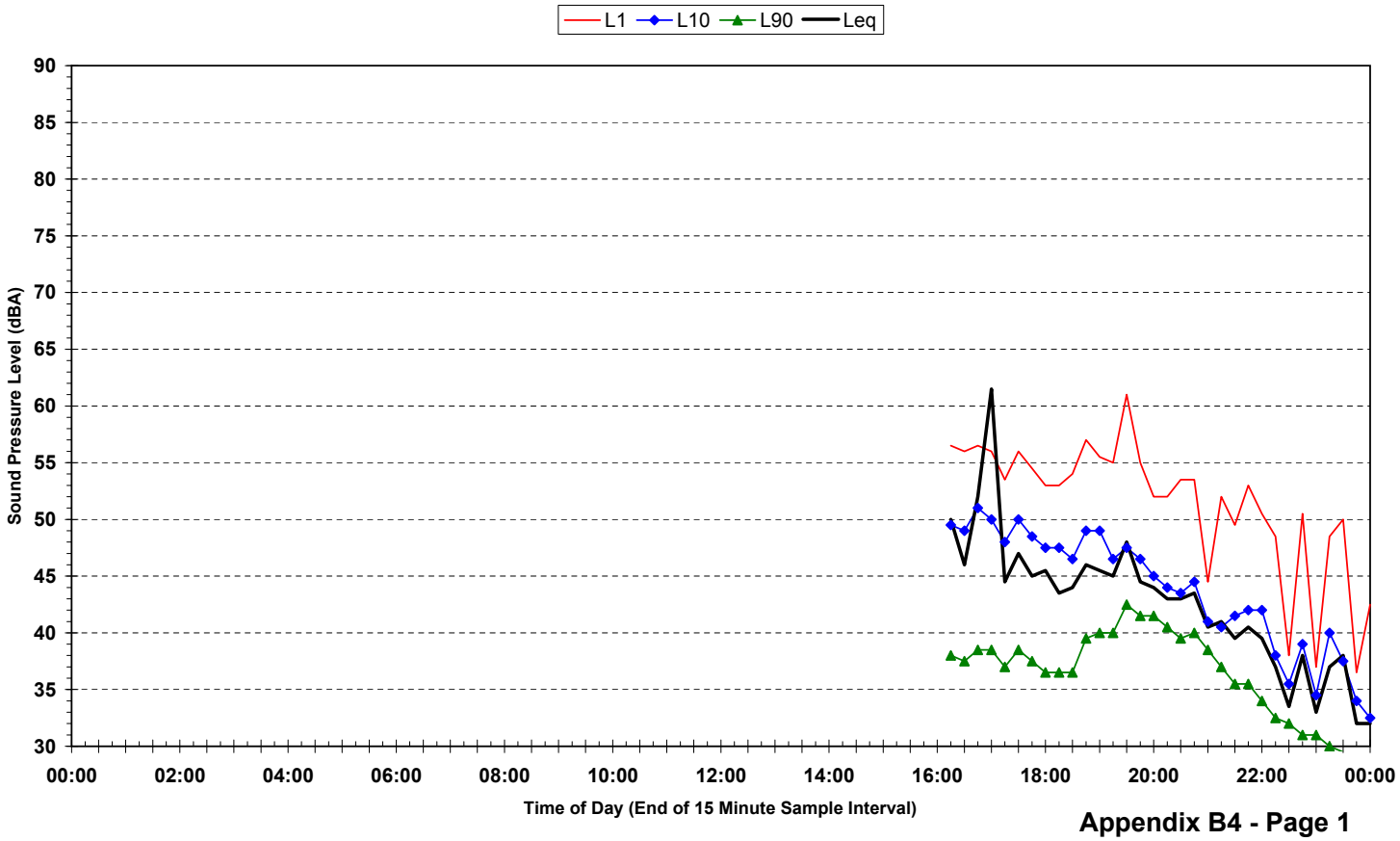
Statistical Ambient Noise Levels
Location D - Black Hill School - Tuesday 10 October 2000



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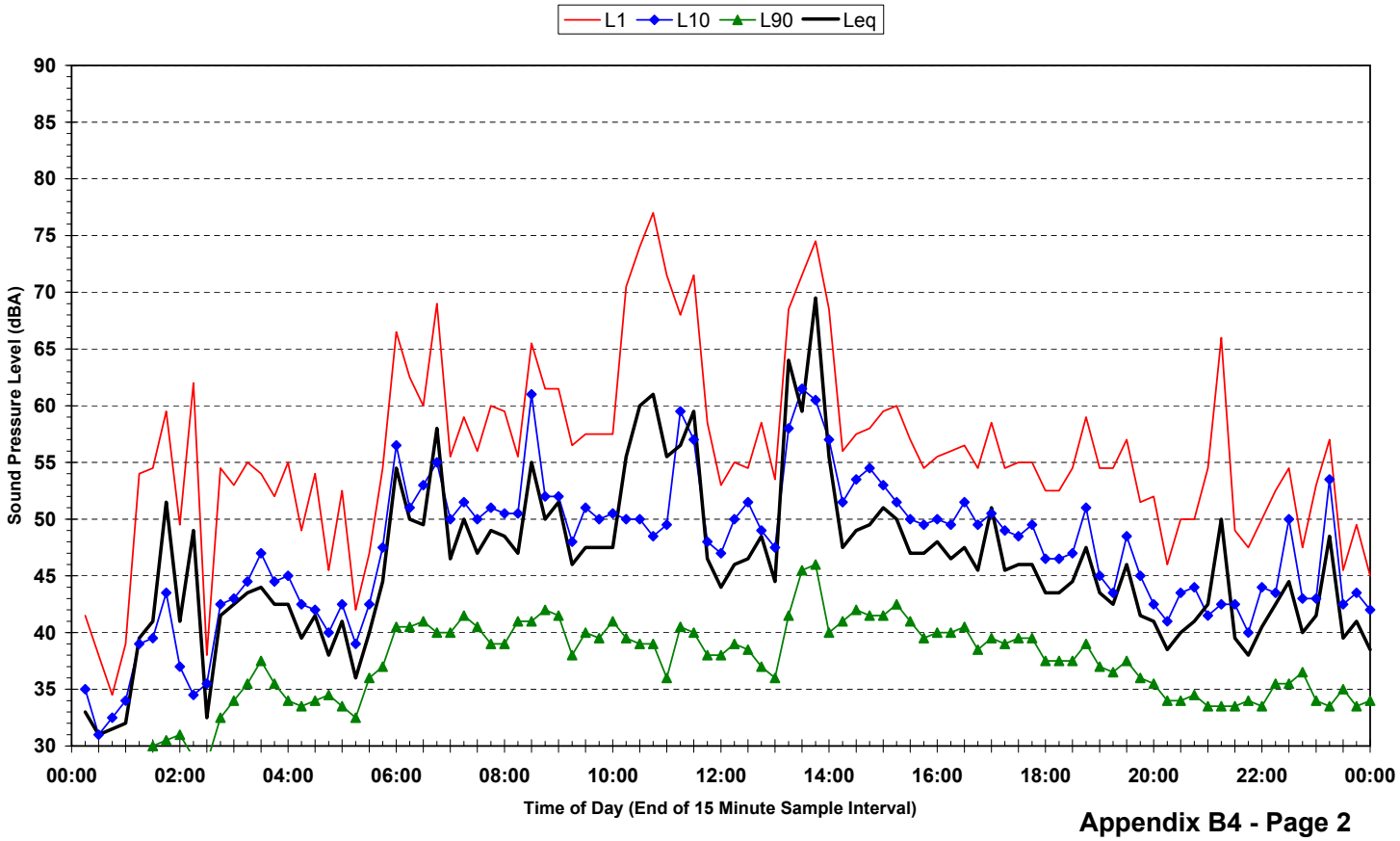
Appendix B4 - Page 1
Statistical Noise Levels
RHA Report 30-1343

Statistical Ambient Noise Levels
Location D - Black Hill School - Wednesday 11 October 2000



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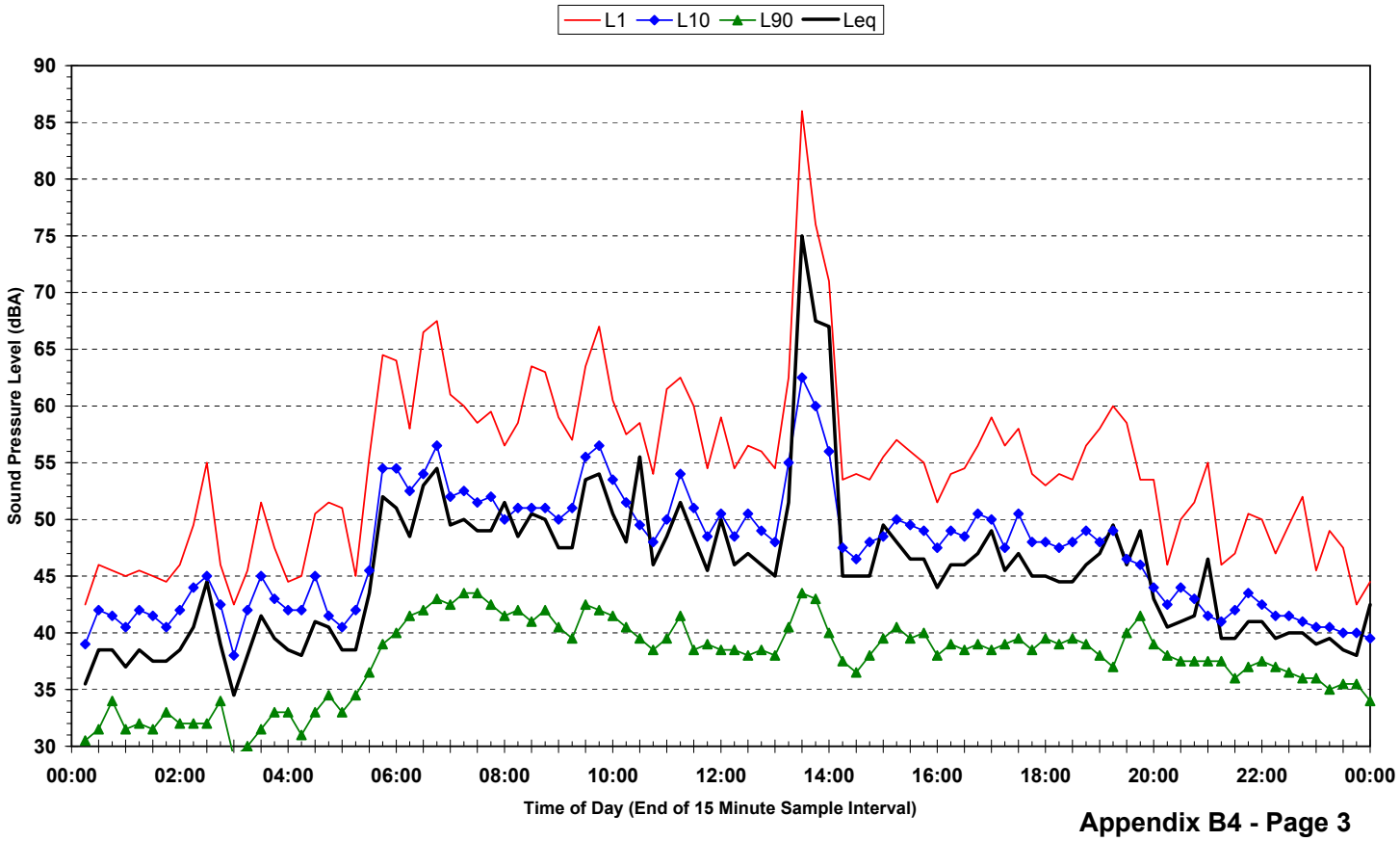
Appendix B4 - Page 2
Statistical Noise Levels
RHA Report 30-1343

Statistical Ambient Noise Levels
Location D - Black Hill School - Thursday 12 October 2000



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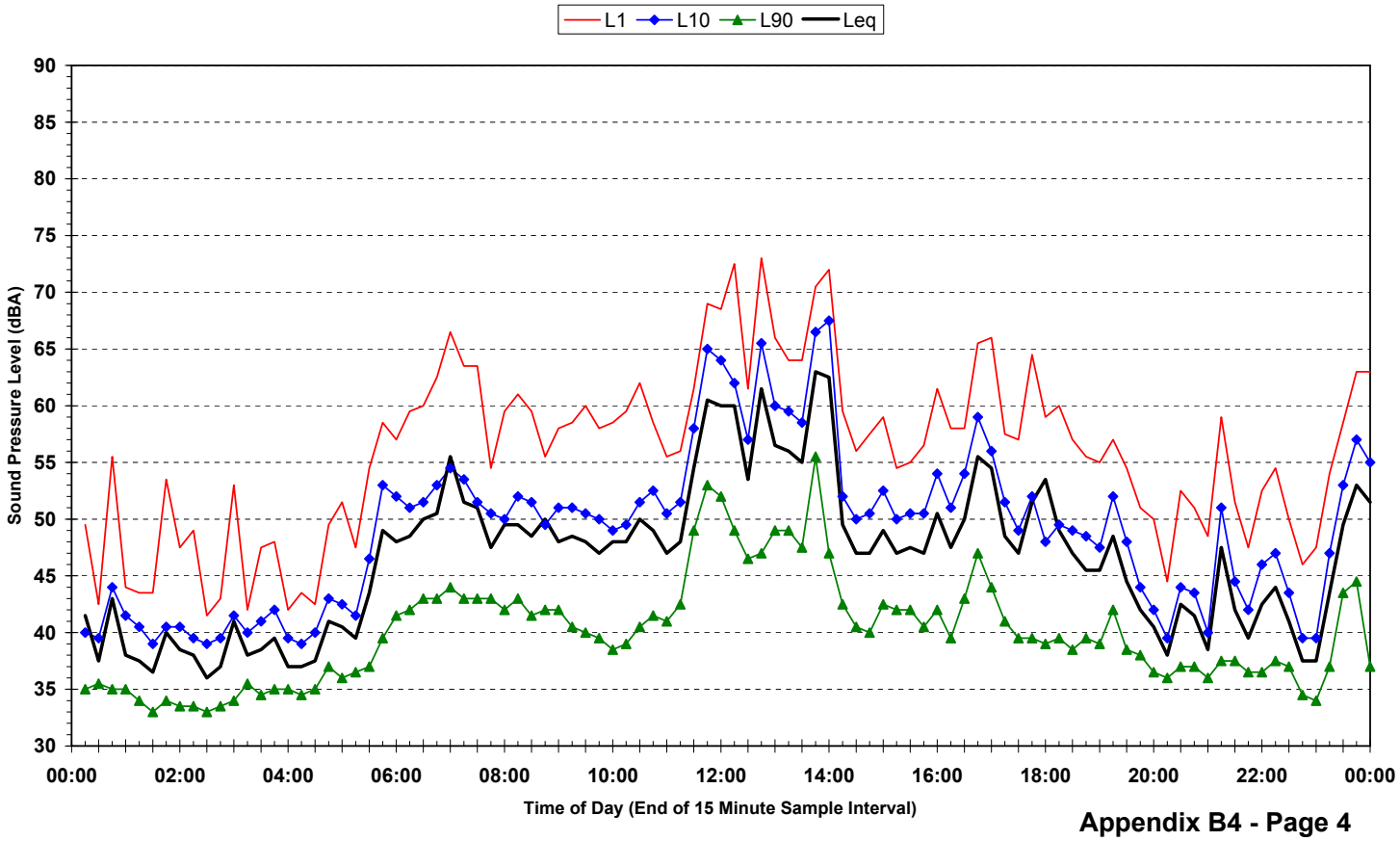
Statistical Ambient Noise Levels
Location D - Black Hill School - Friday 13 October 2000



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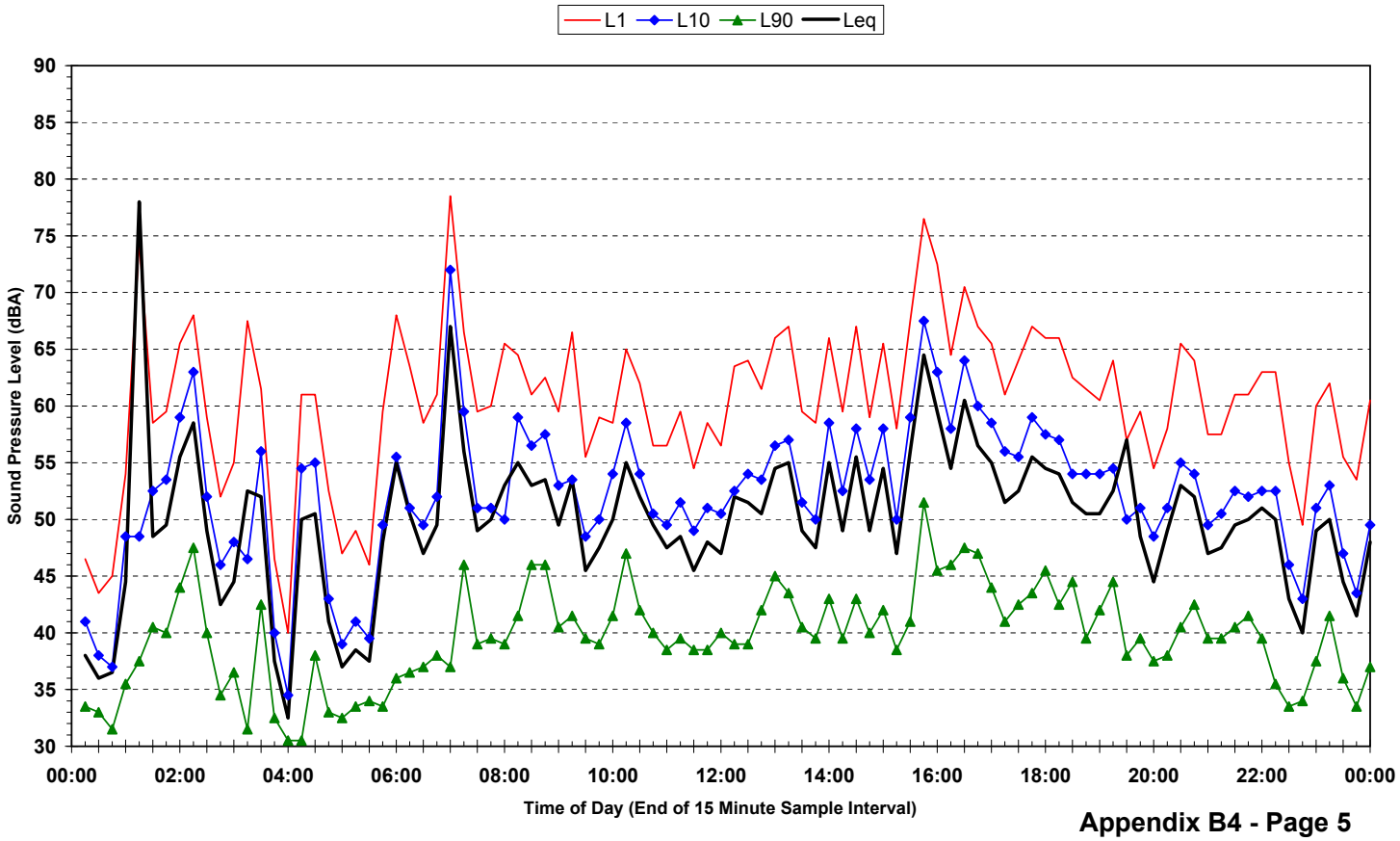
Statistical Ambient Noise Levels
Location D - Black Hill School - Saturday 14 October 2000



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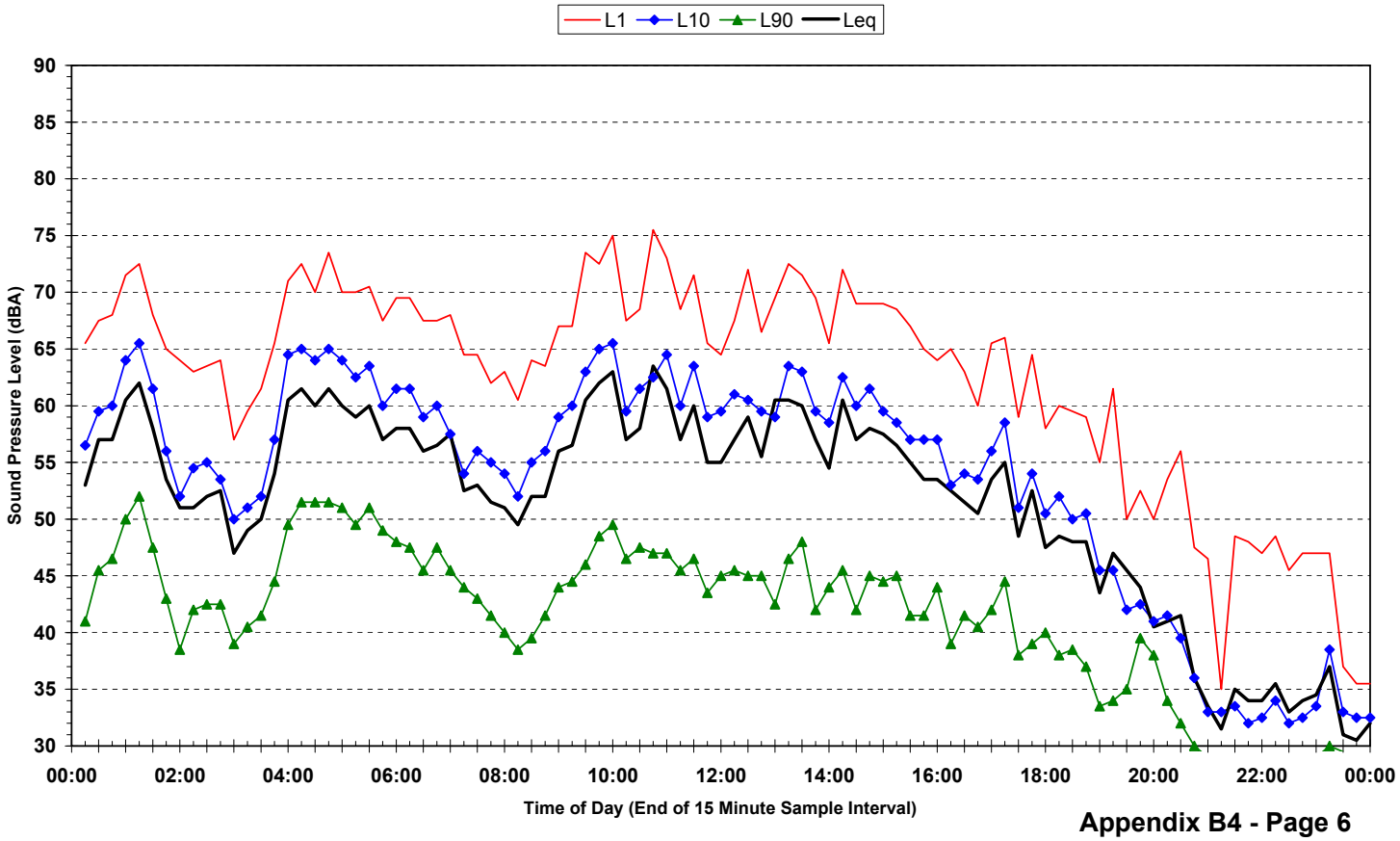
Statistical Ambient Noise Levels
Location D - Black Hill School - Sunday 15 October 2000



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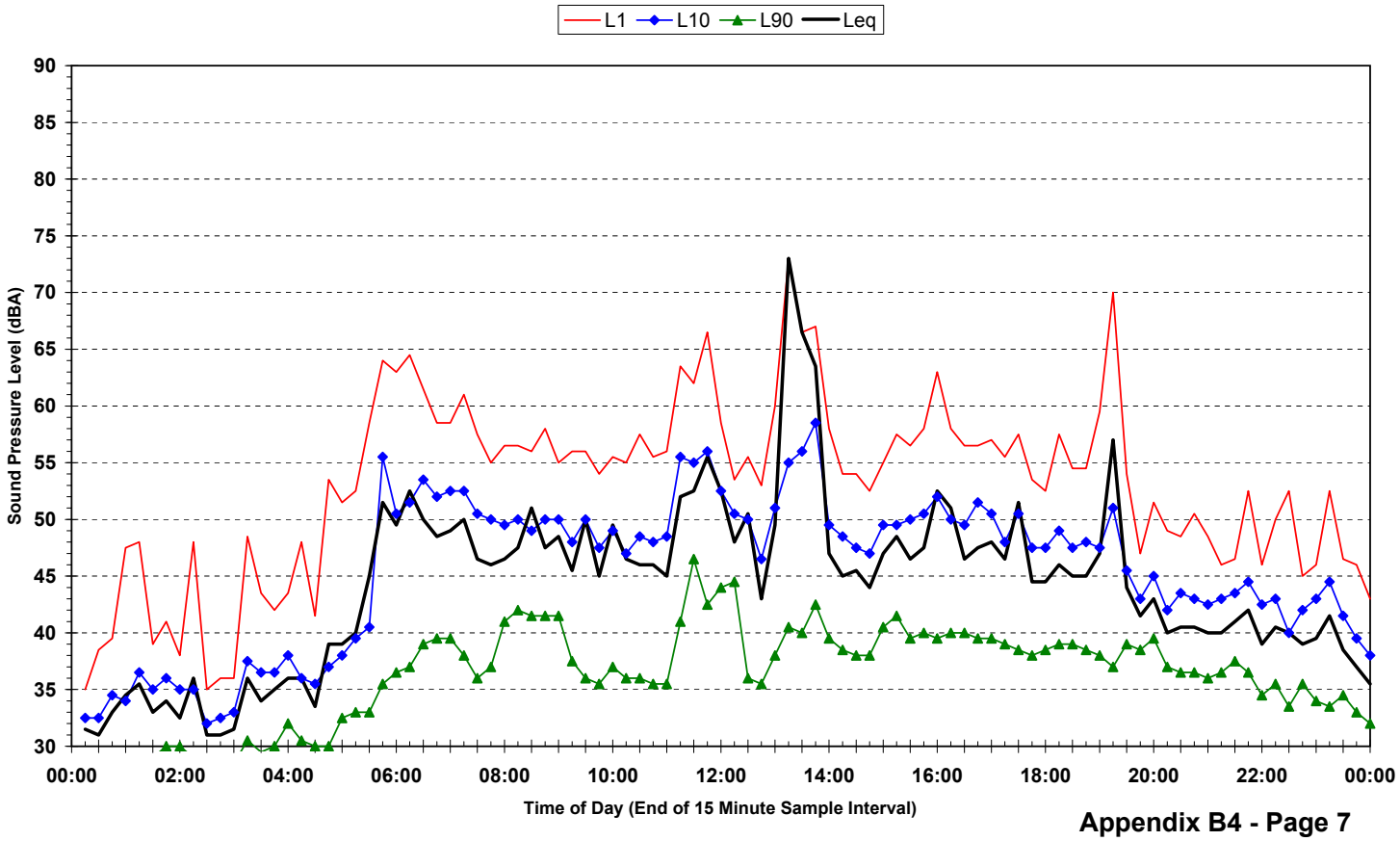
Sun 15-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Monday 16 October 2000



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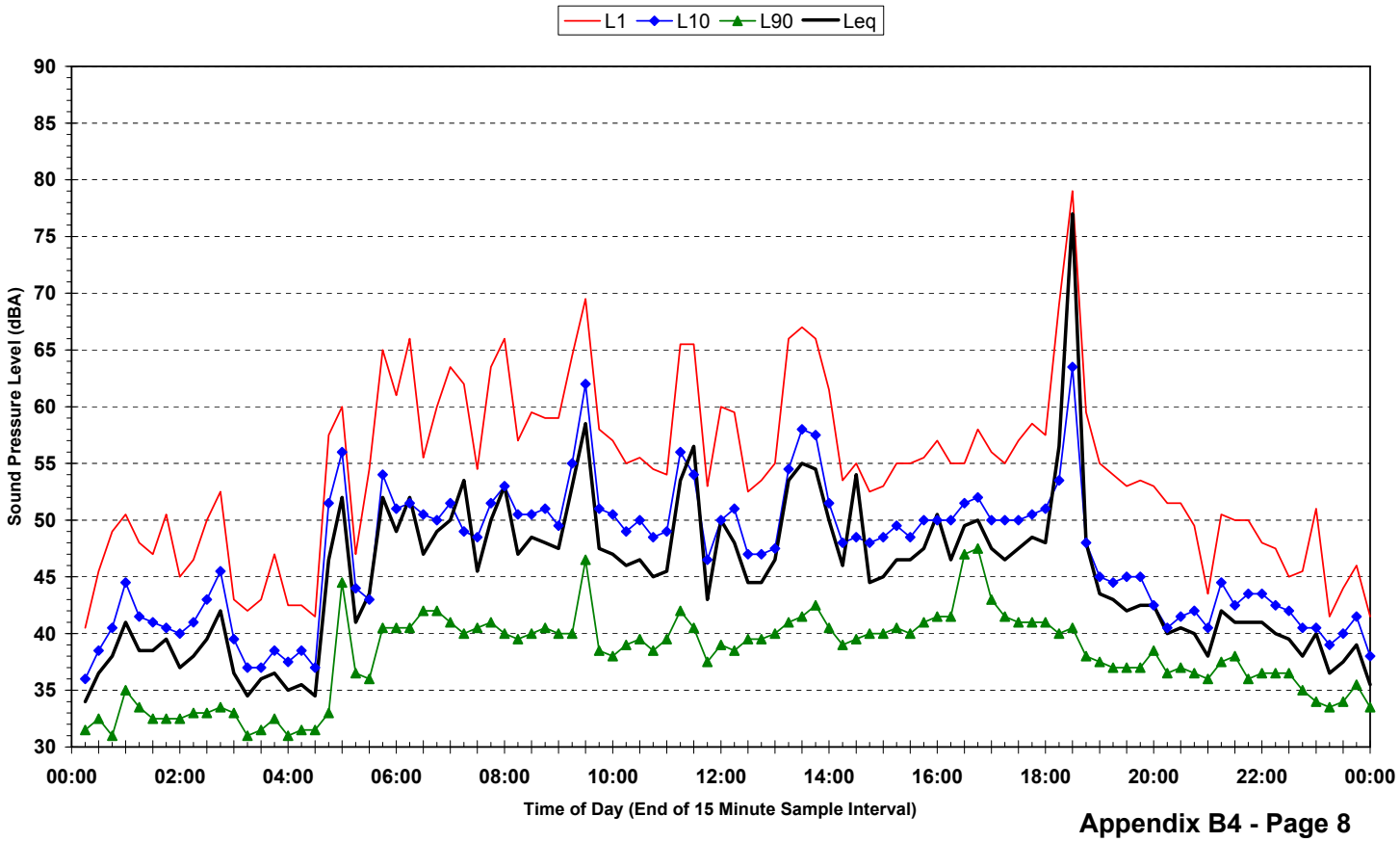
Mon 16-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Tuesday 17 October 2000



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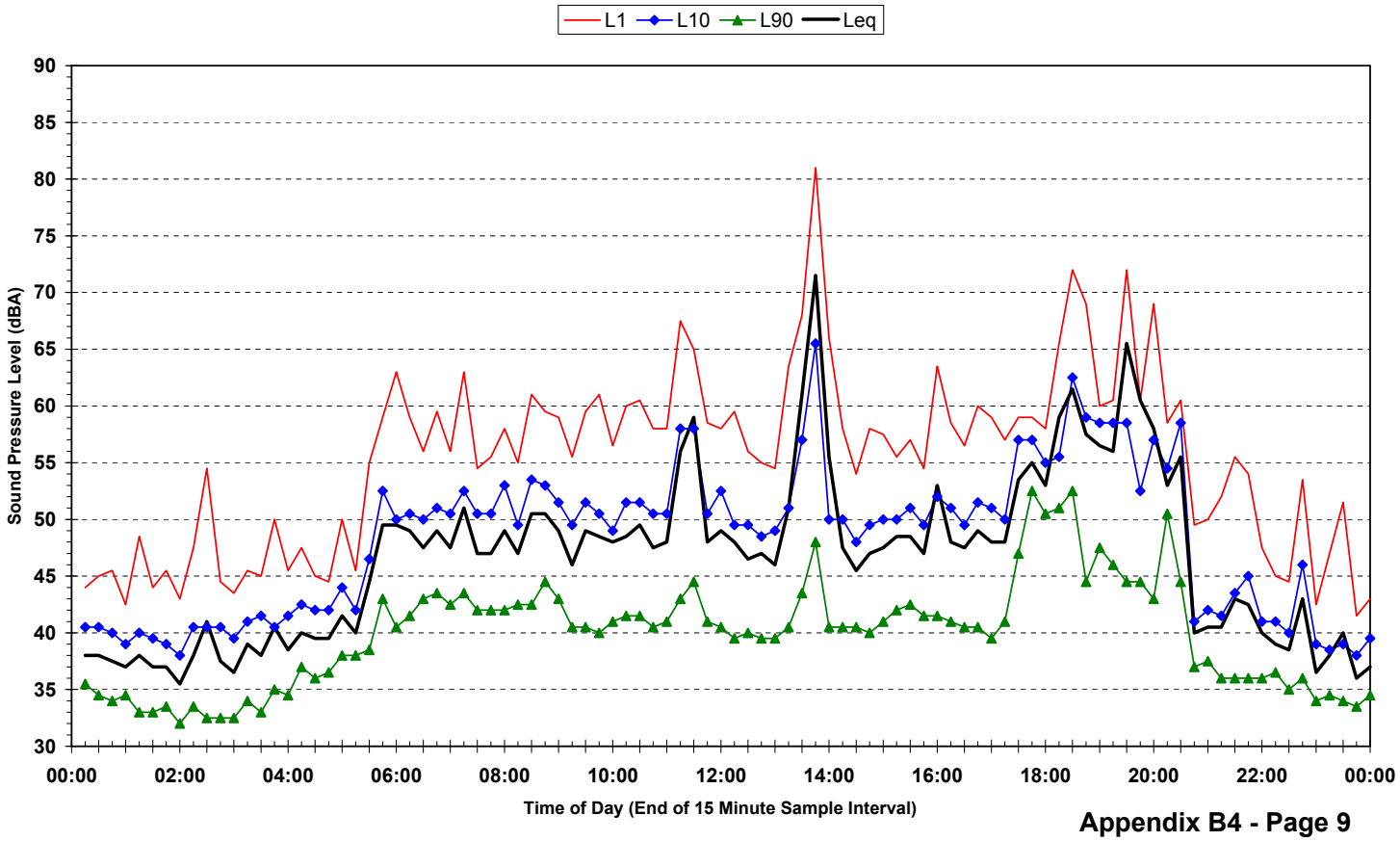
Tue 17-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Wednesday 18 October 2000



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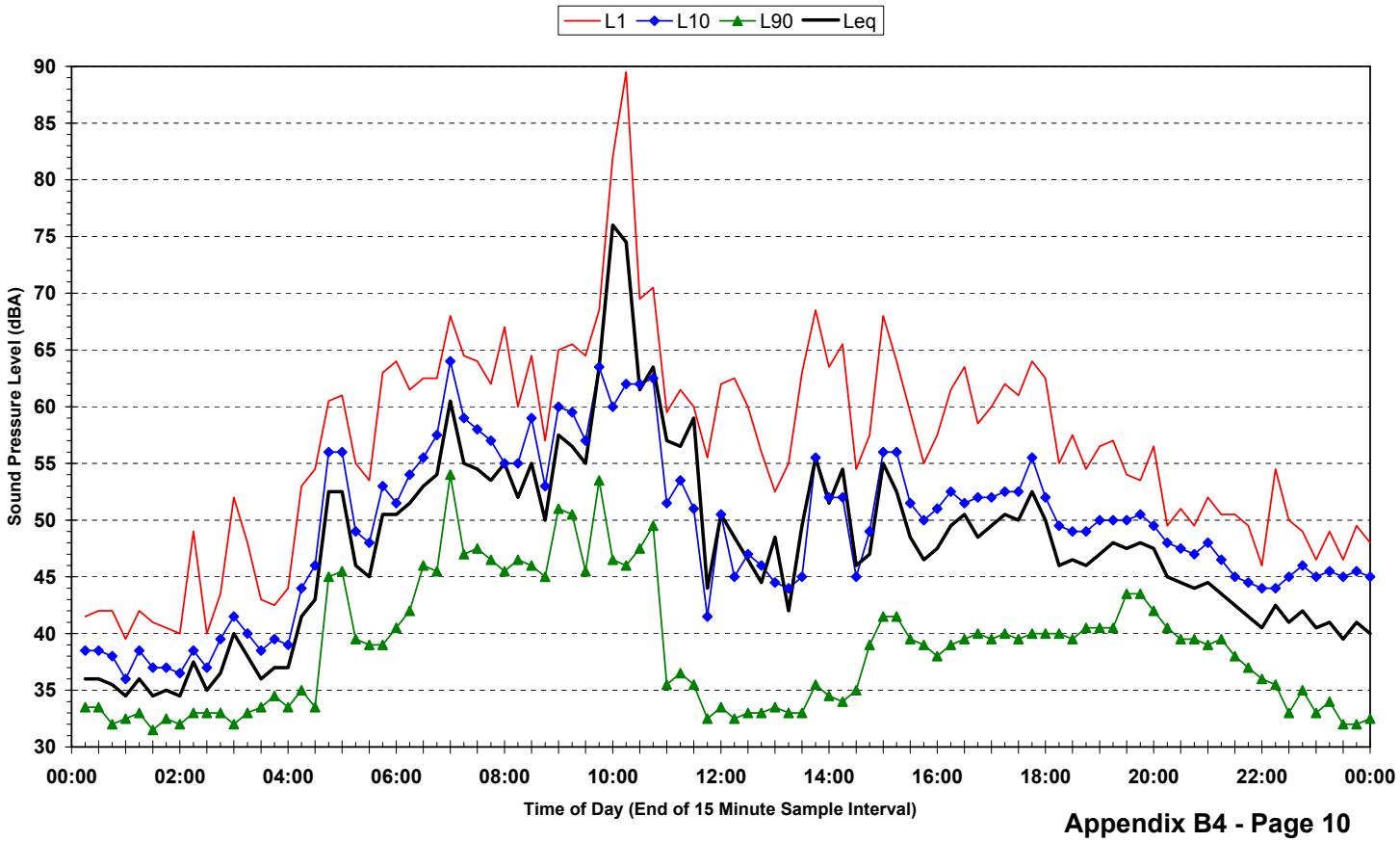
Wed 18-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Thursday 19 October 2000



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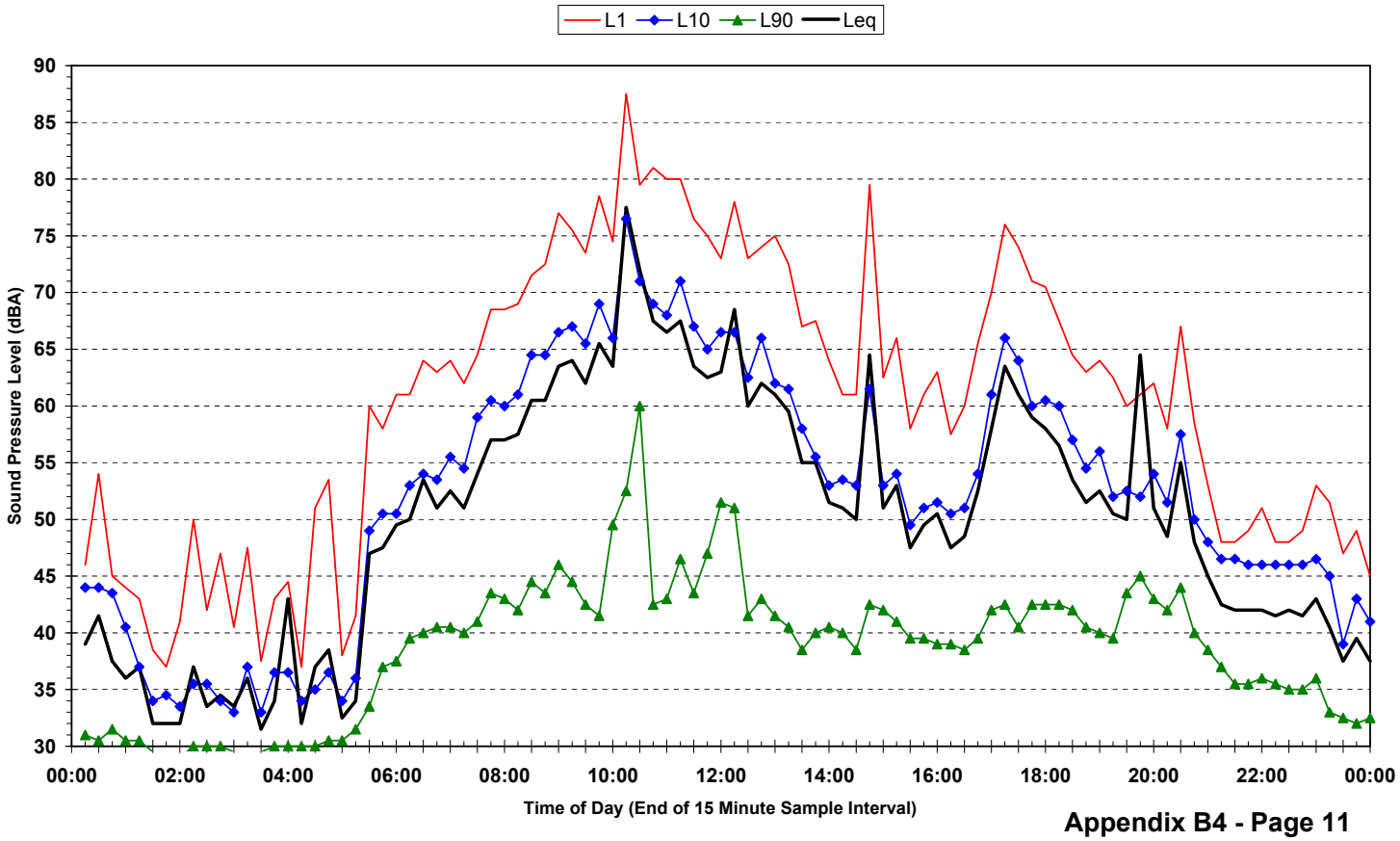
Thu 19-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Friday 20 October 2000



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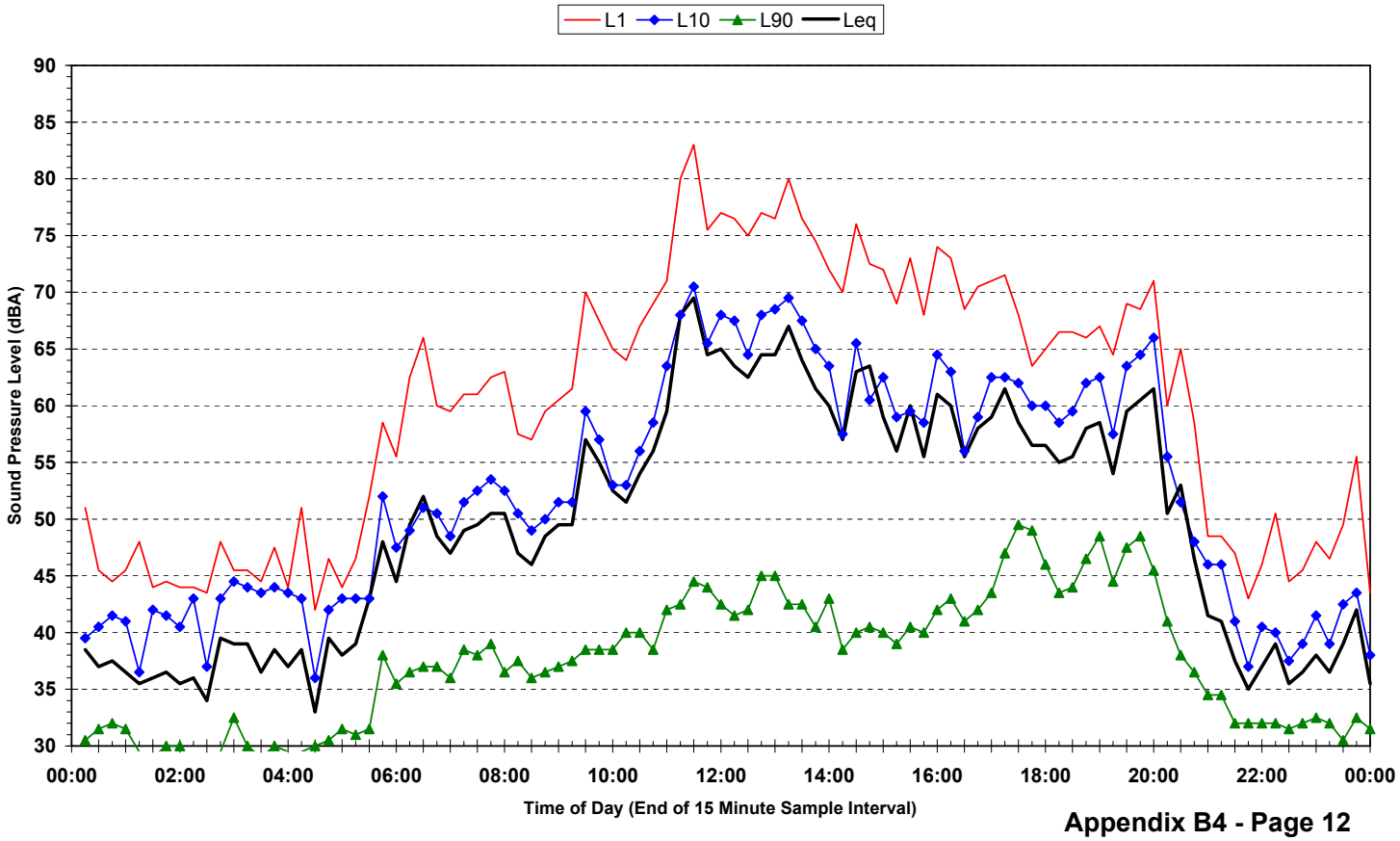
Fri 20-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Saturday 21 October 2000



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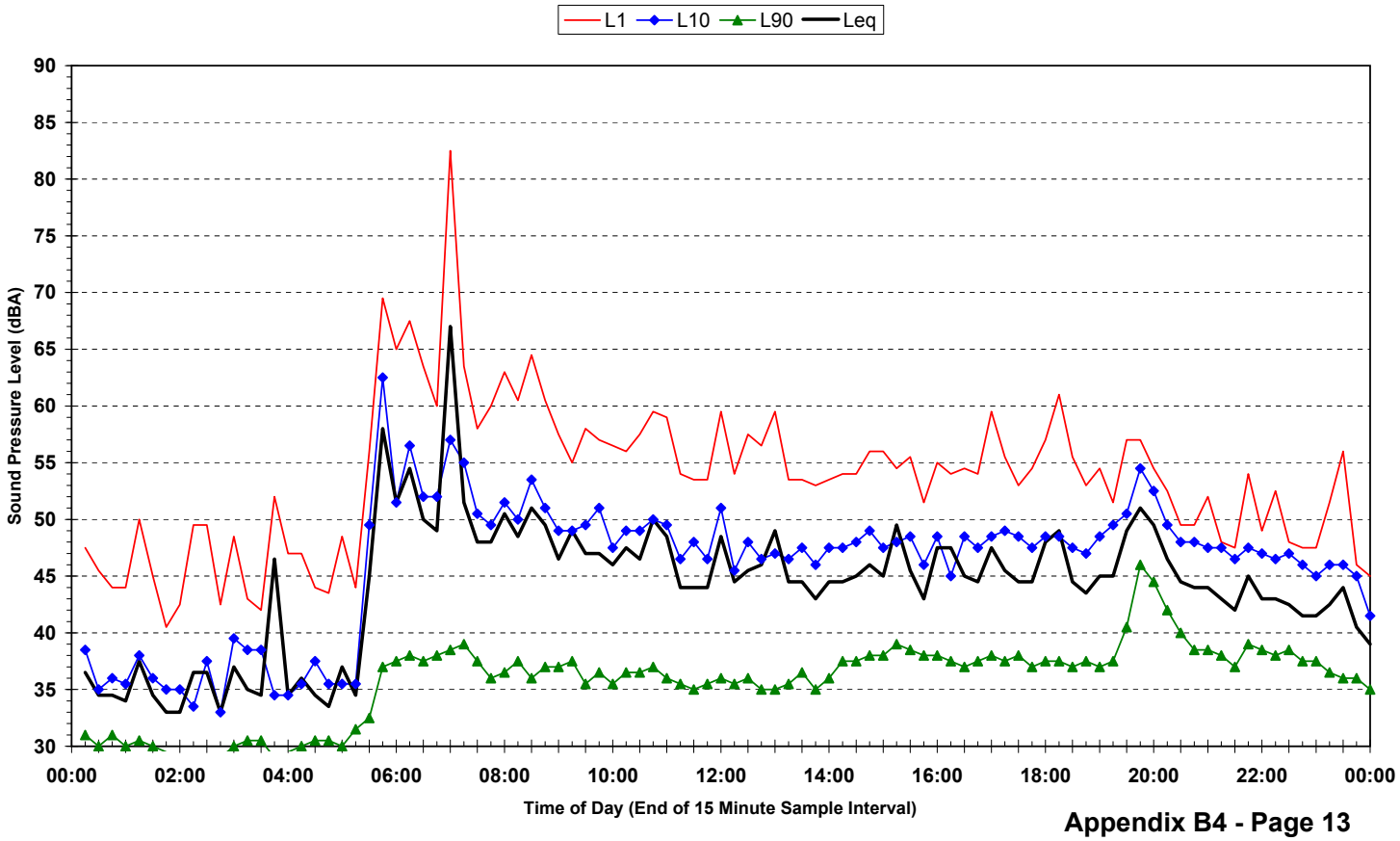
Sat 21-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Sunday 22 October 2000



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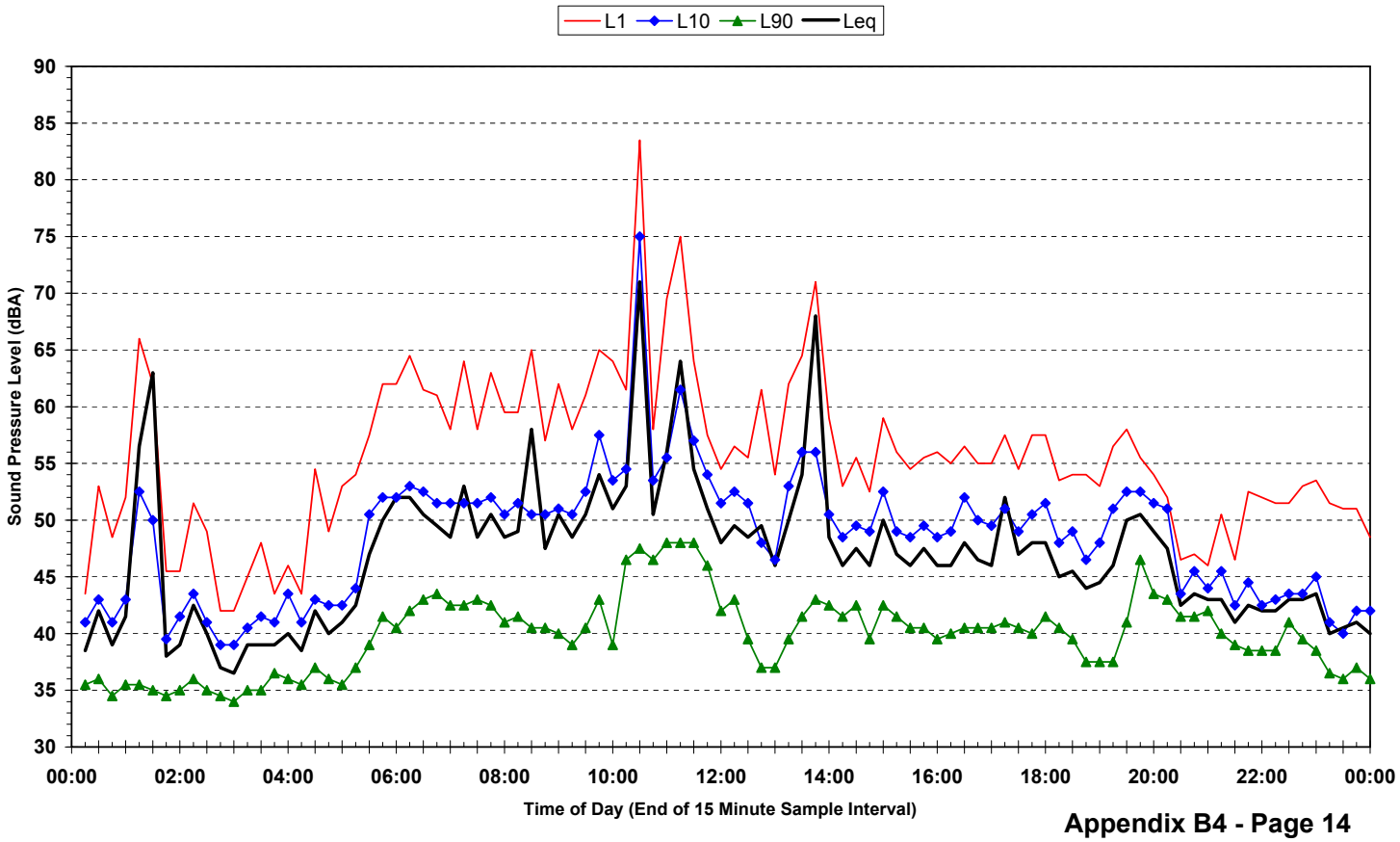
Sun 22-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Monday 23 October 2000



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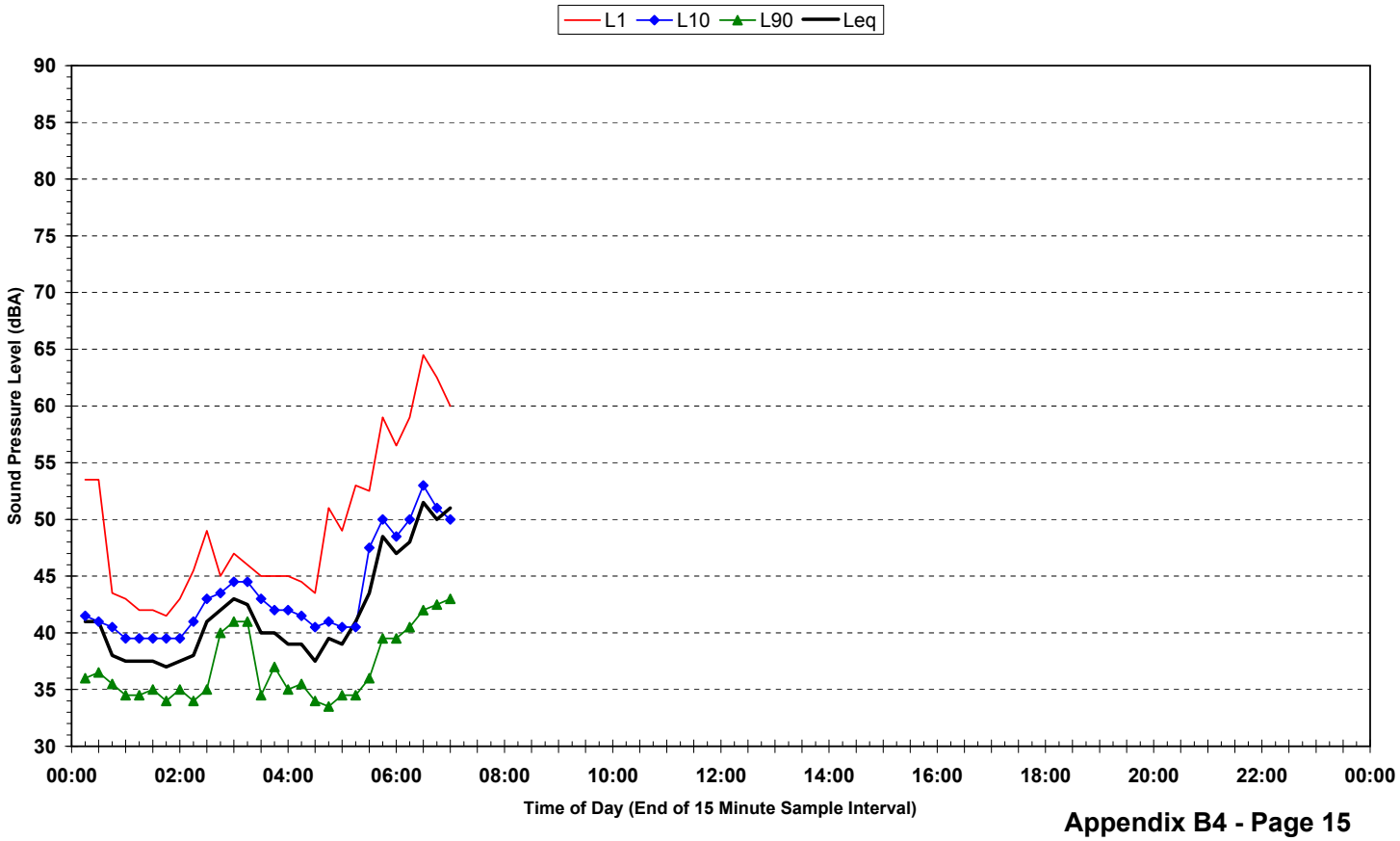
Mon 23-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location D - Black Hill School - Tuesday 24 October 2000



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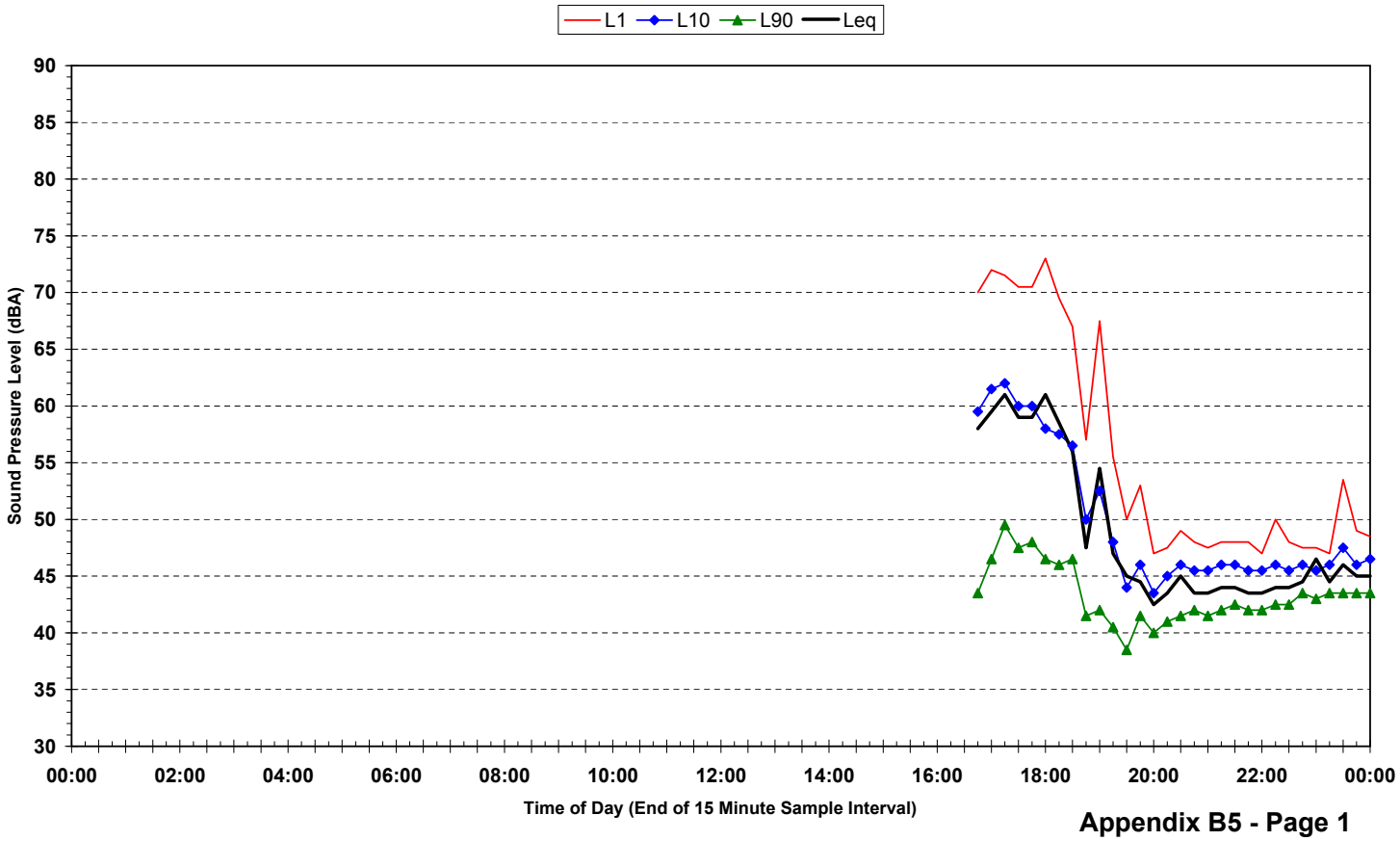
Tue 24-Oct-00 Printed 8/09/2004 09:39

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Wednesday 25 October 2000



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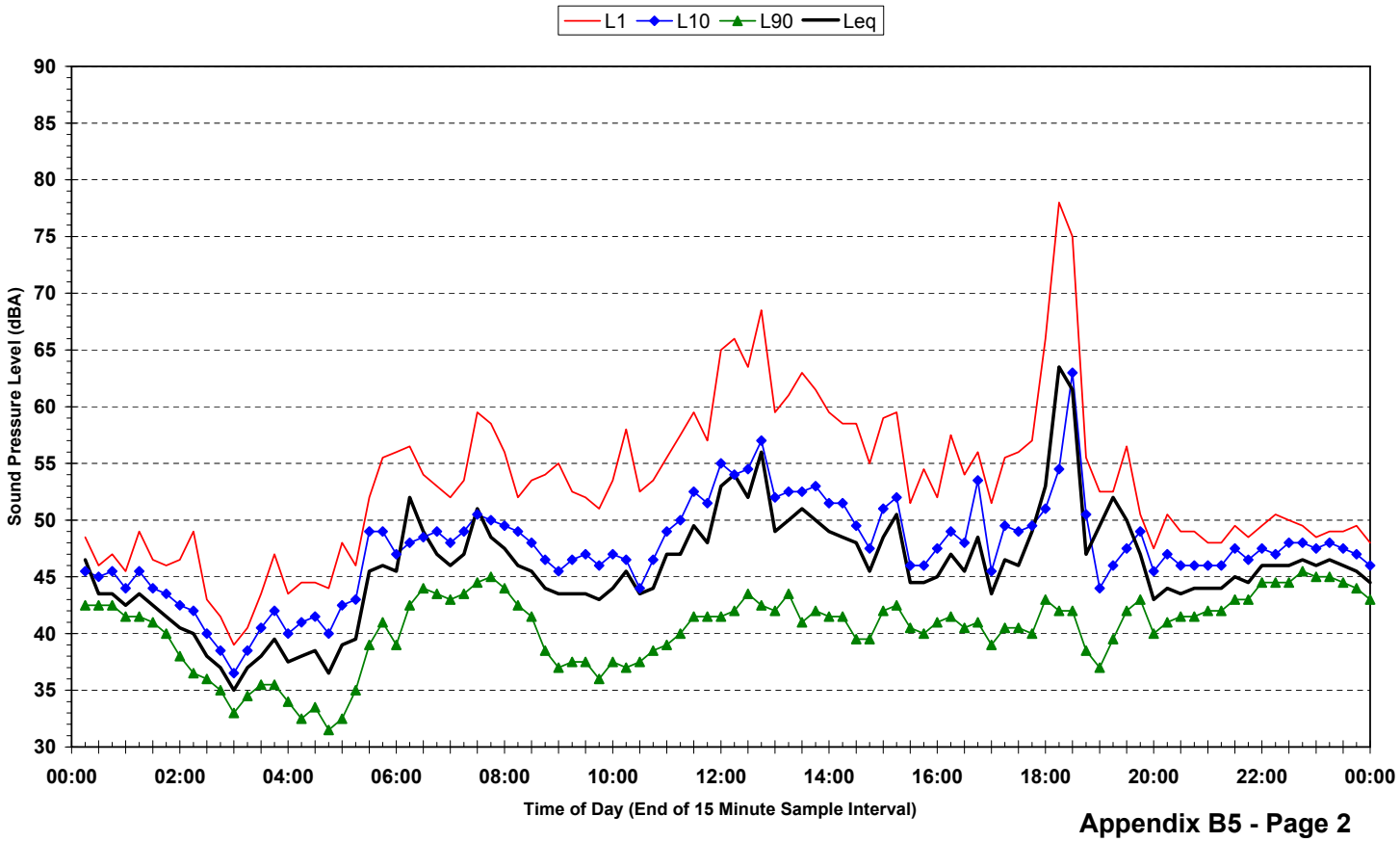
Wed 25-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Thursday 26 October 2000



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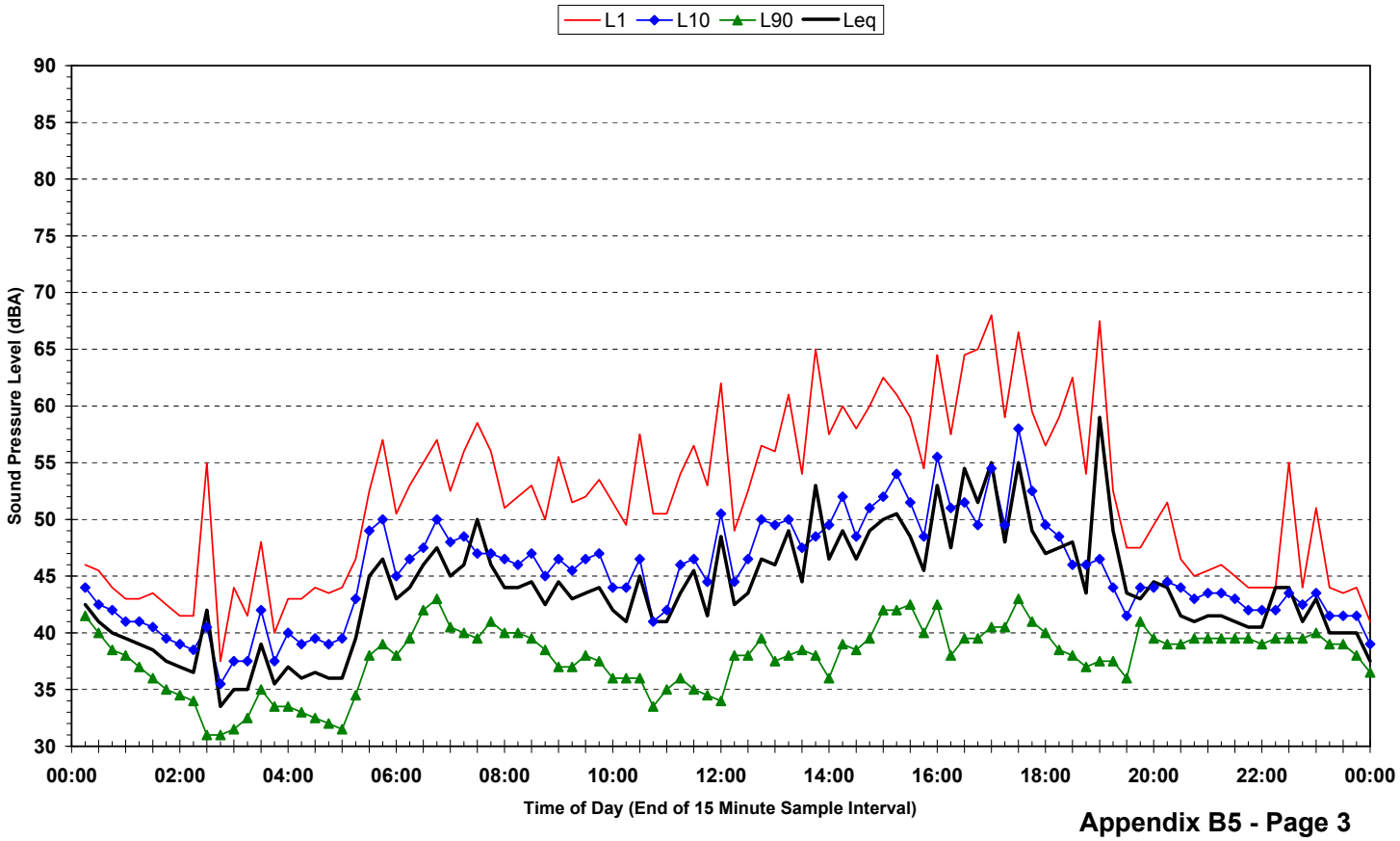
Thu 26-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Friday 27 October 2000



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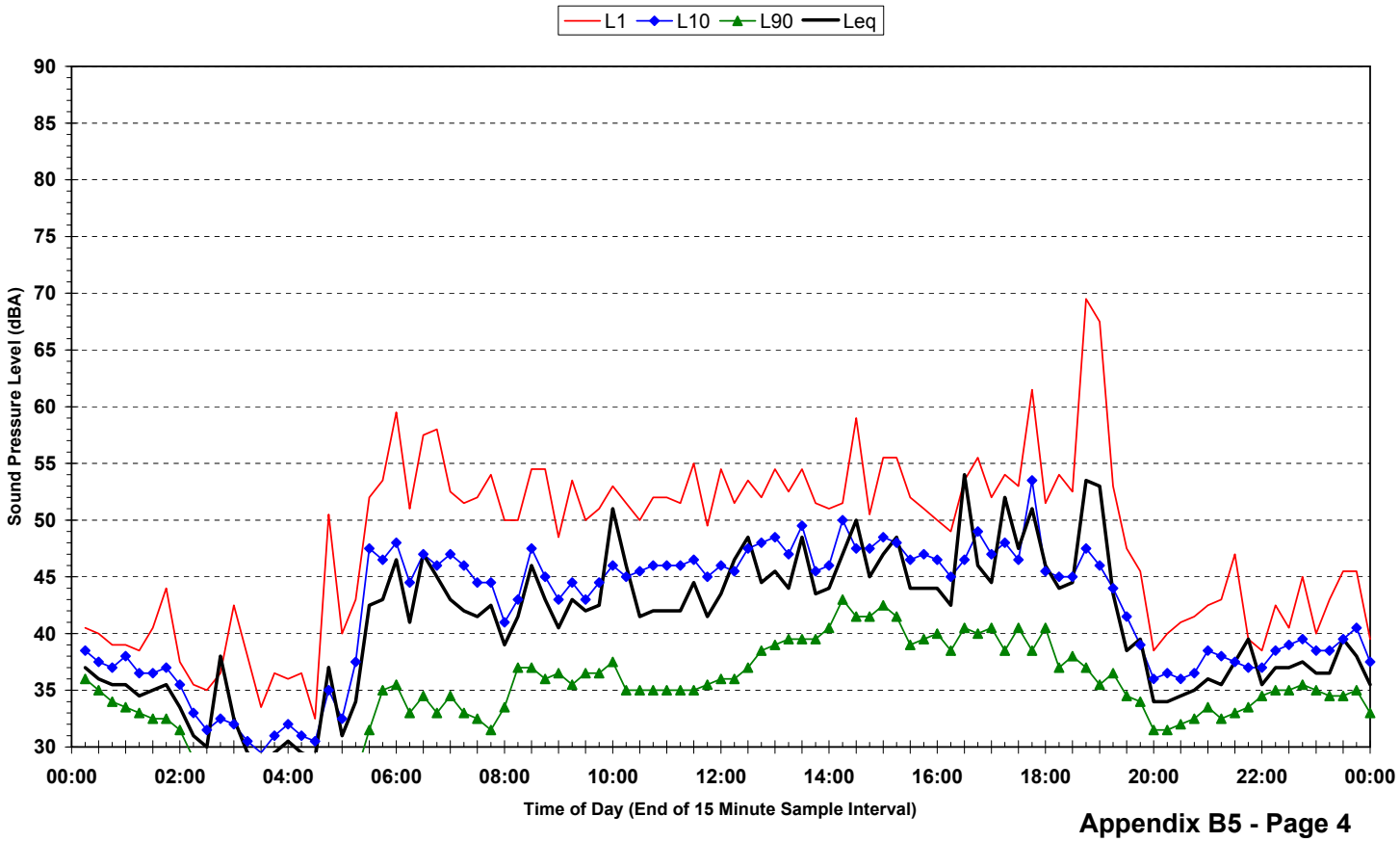
Fri 27-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Saturday 28 October 2000



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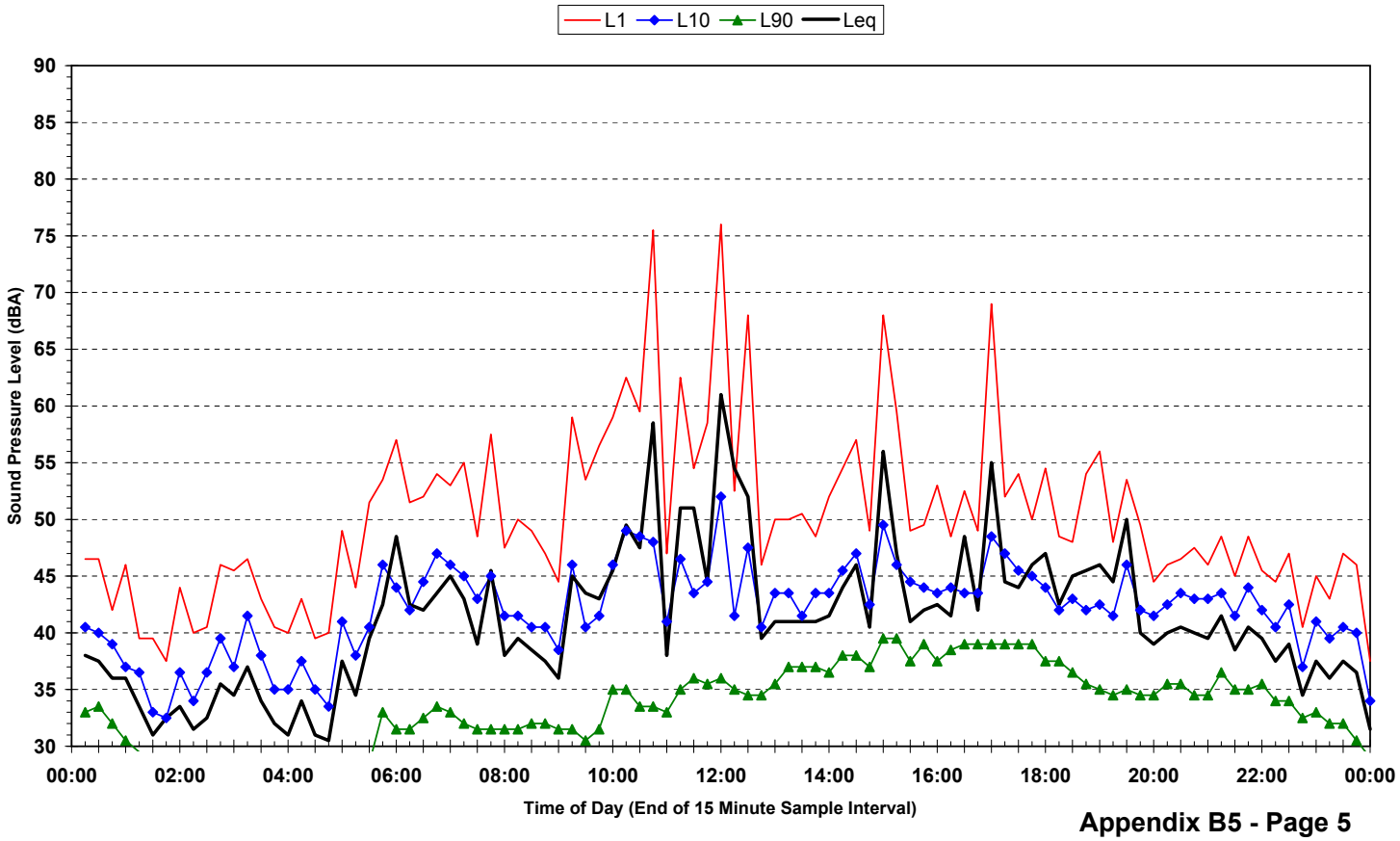
Sat 28-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Sunday 29 October 2000



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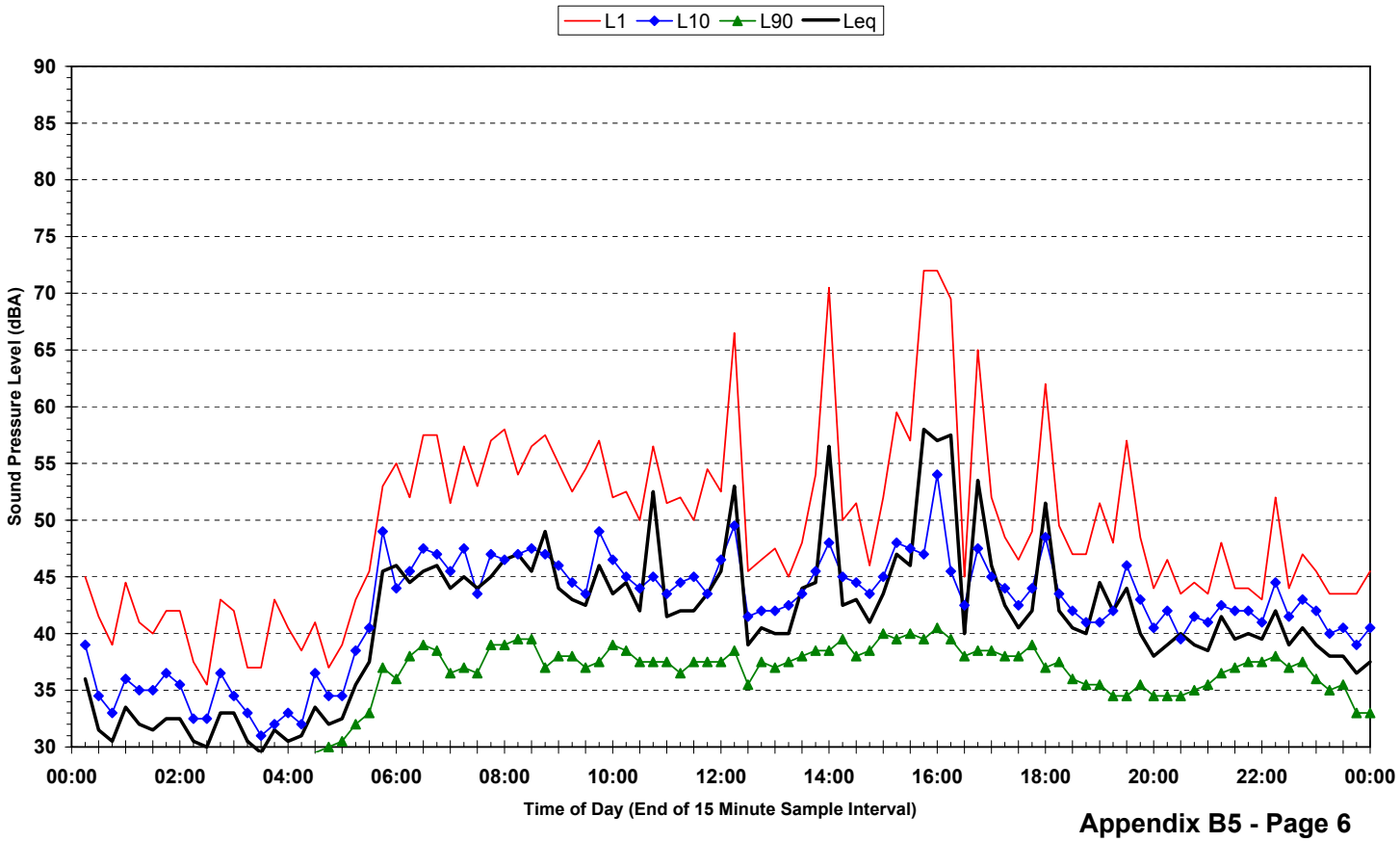
Sun 29-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Monday 30 October 2000



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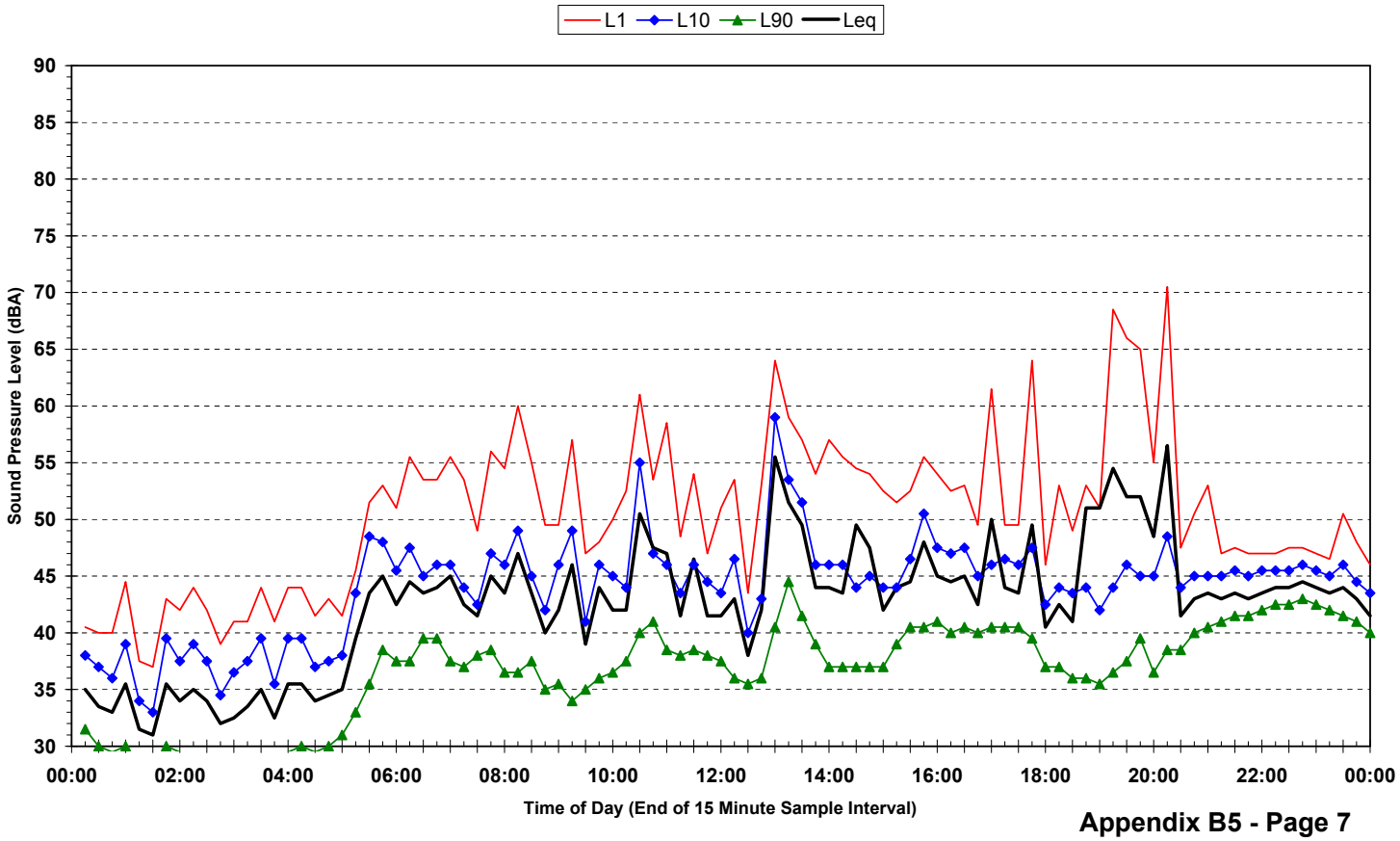
Mon 30-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Tuesday 31 October 2000



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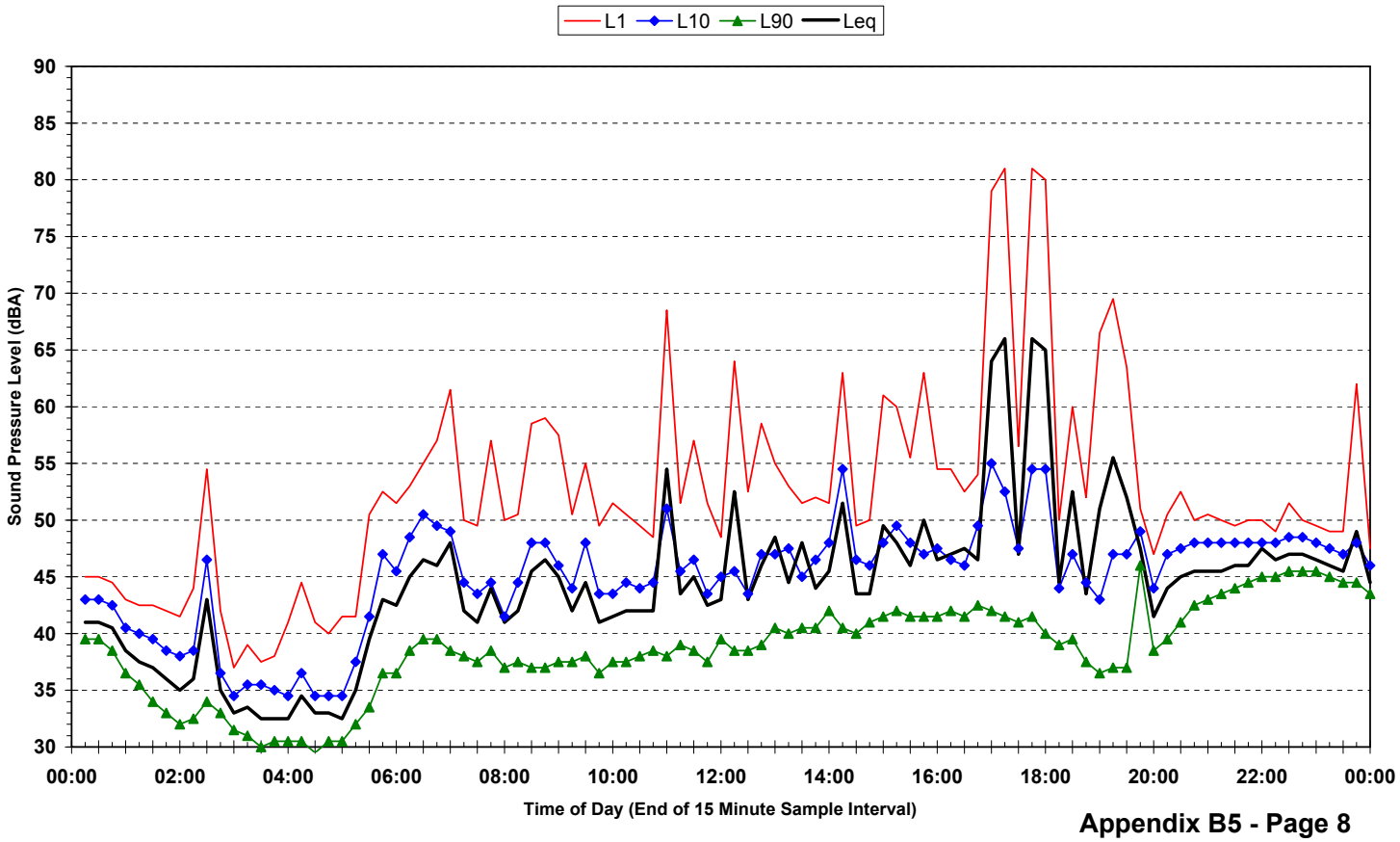
Tue 31-Oct-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Wednesday 1 November 2000



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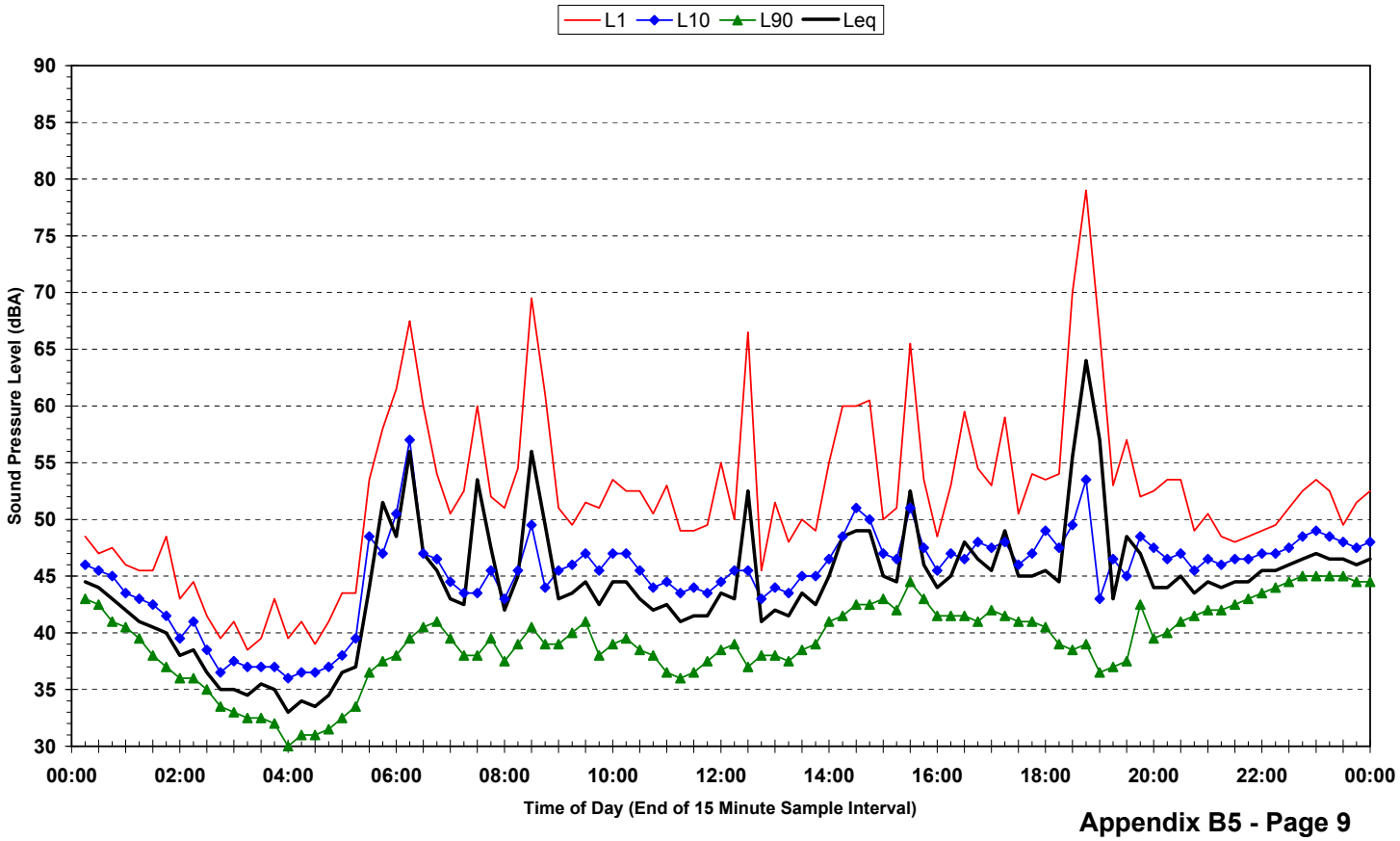
Wed 01-Nov-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Thursday 2 November 2000



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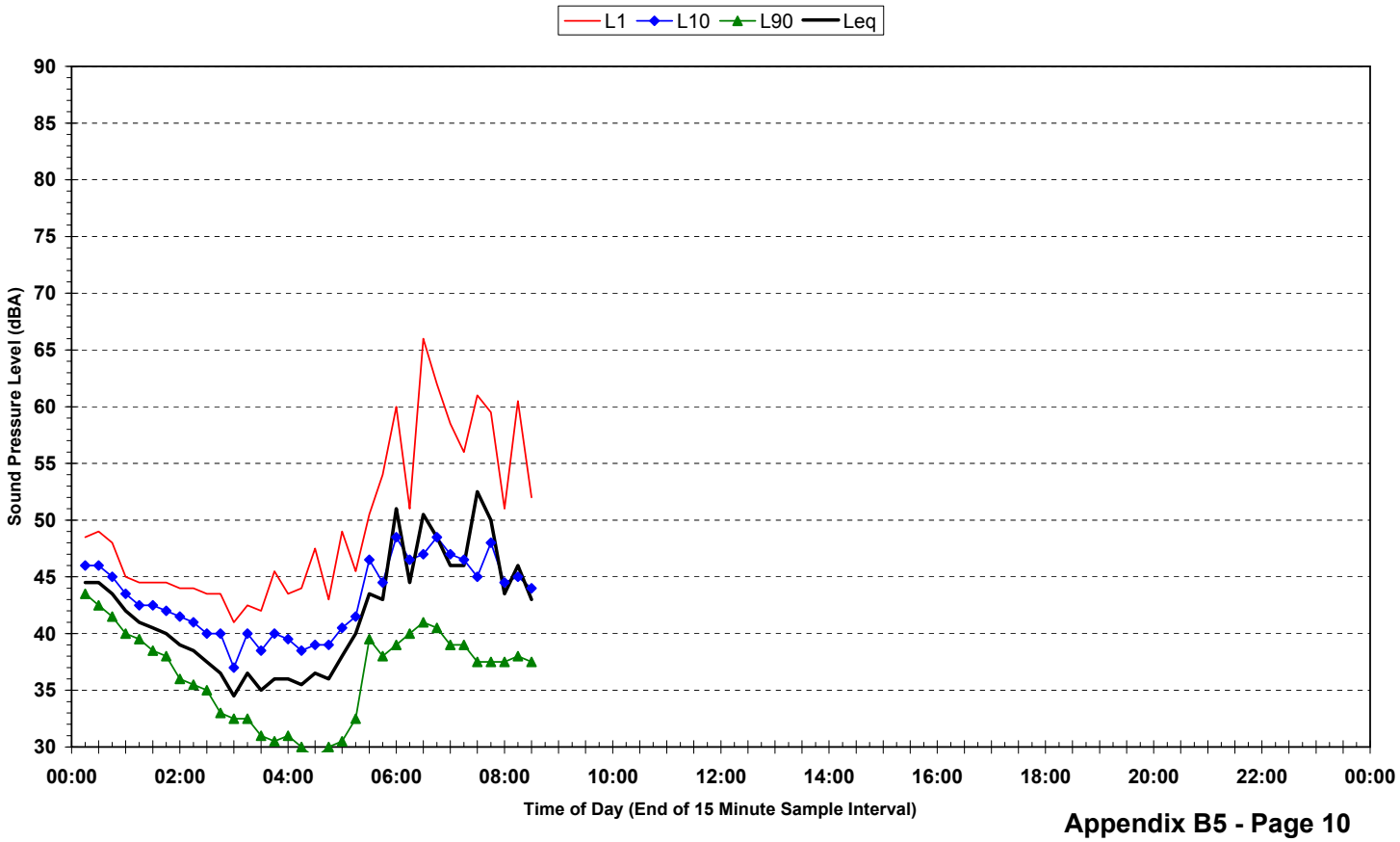
Thu 02-Nov-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location E - Lot 224 Browns Road, Black Hill - Friday 3 November 2000



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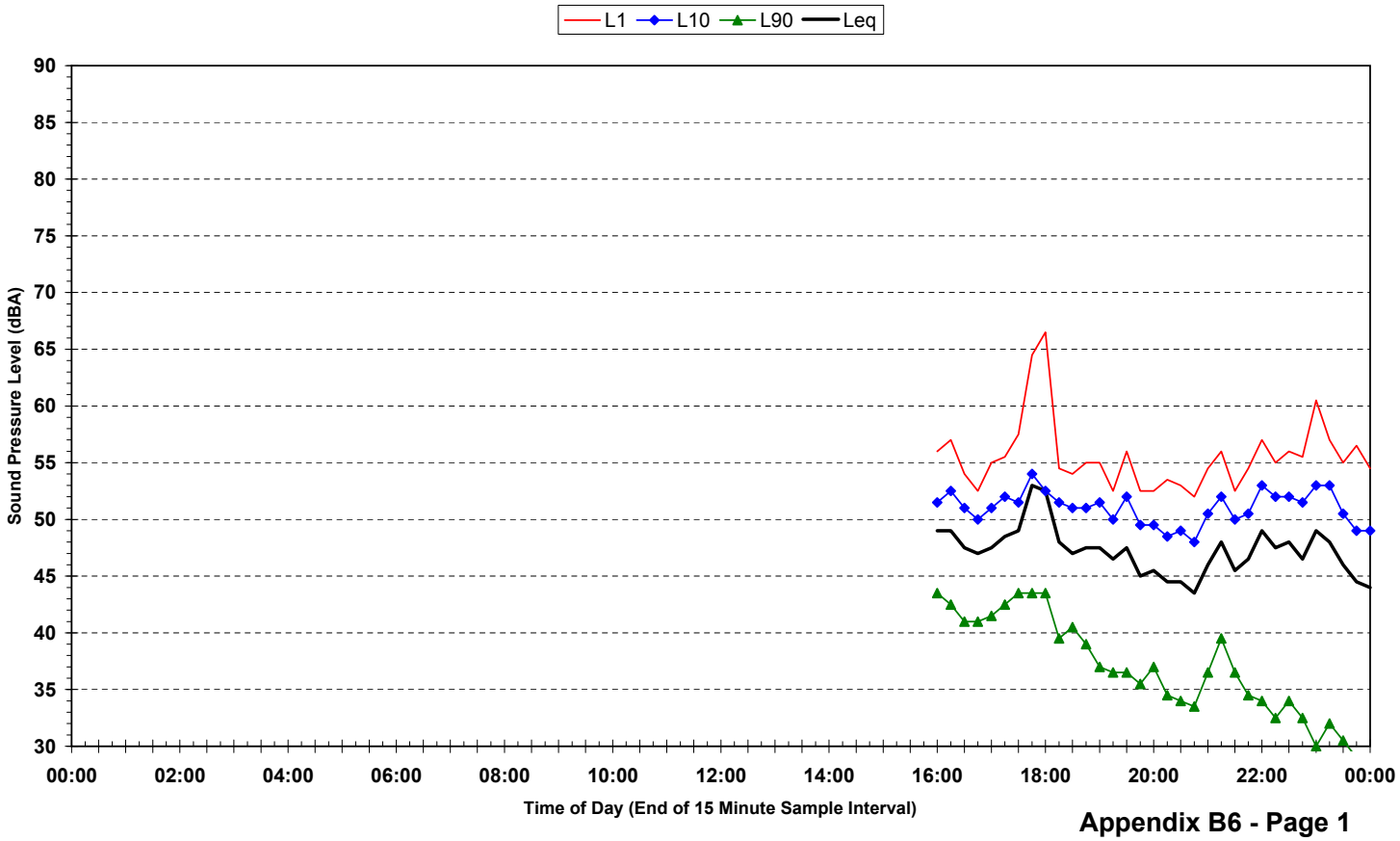
Fri 03-Nov-00 Printed 8/09/2004 09:40

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Tuesday 10 October 2000



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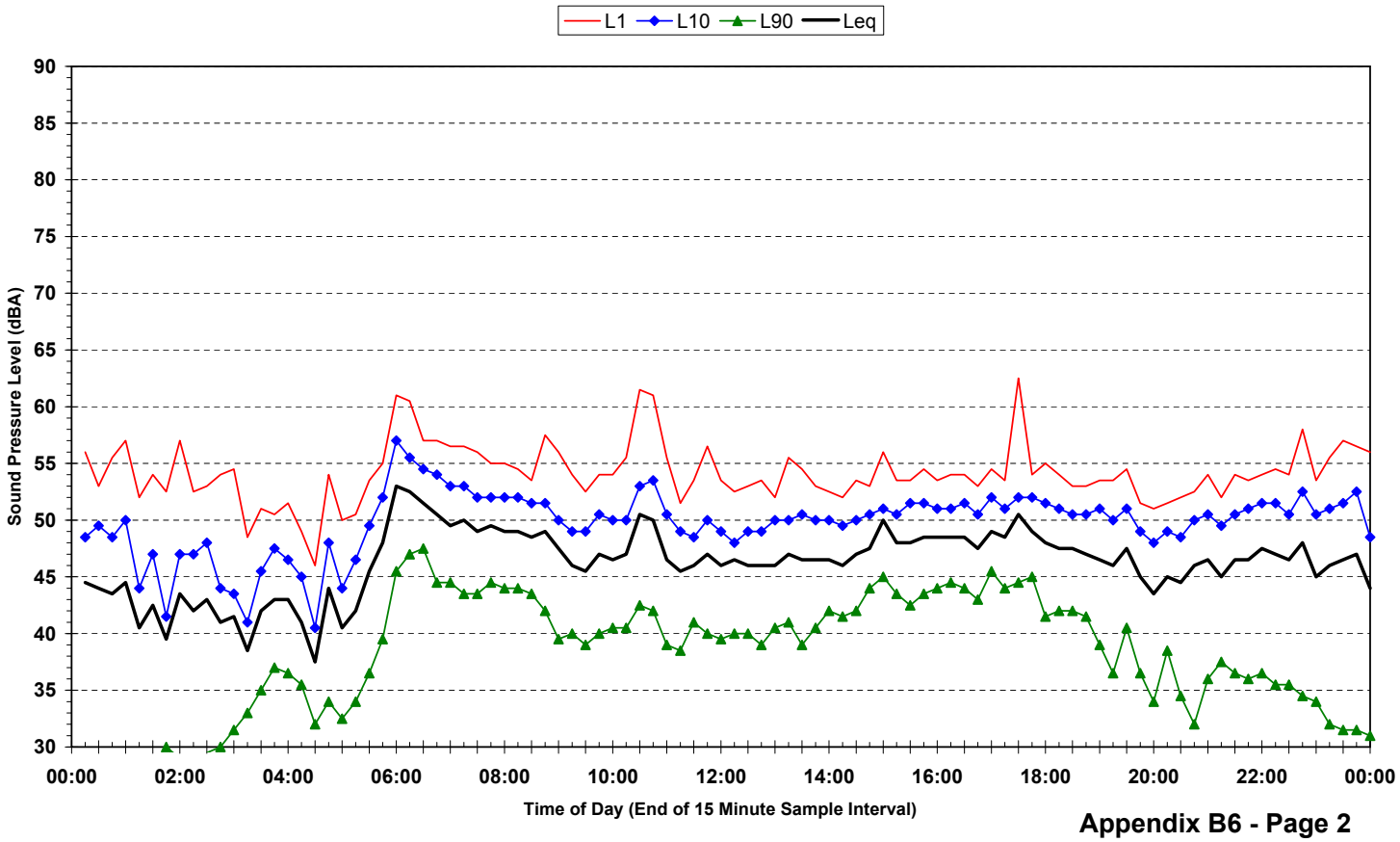
Tue 10-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Wednesday 11 October 2000



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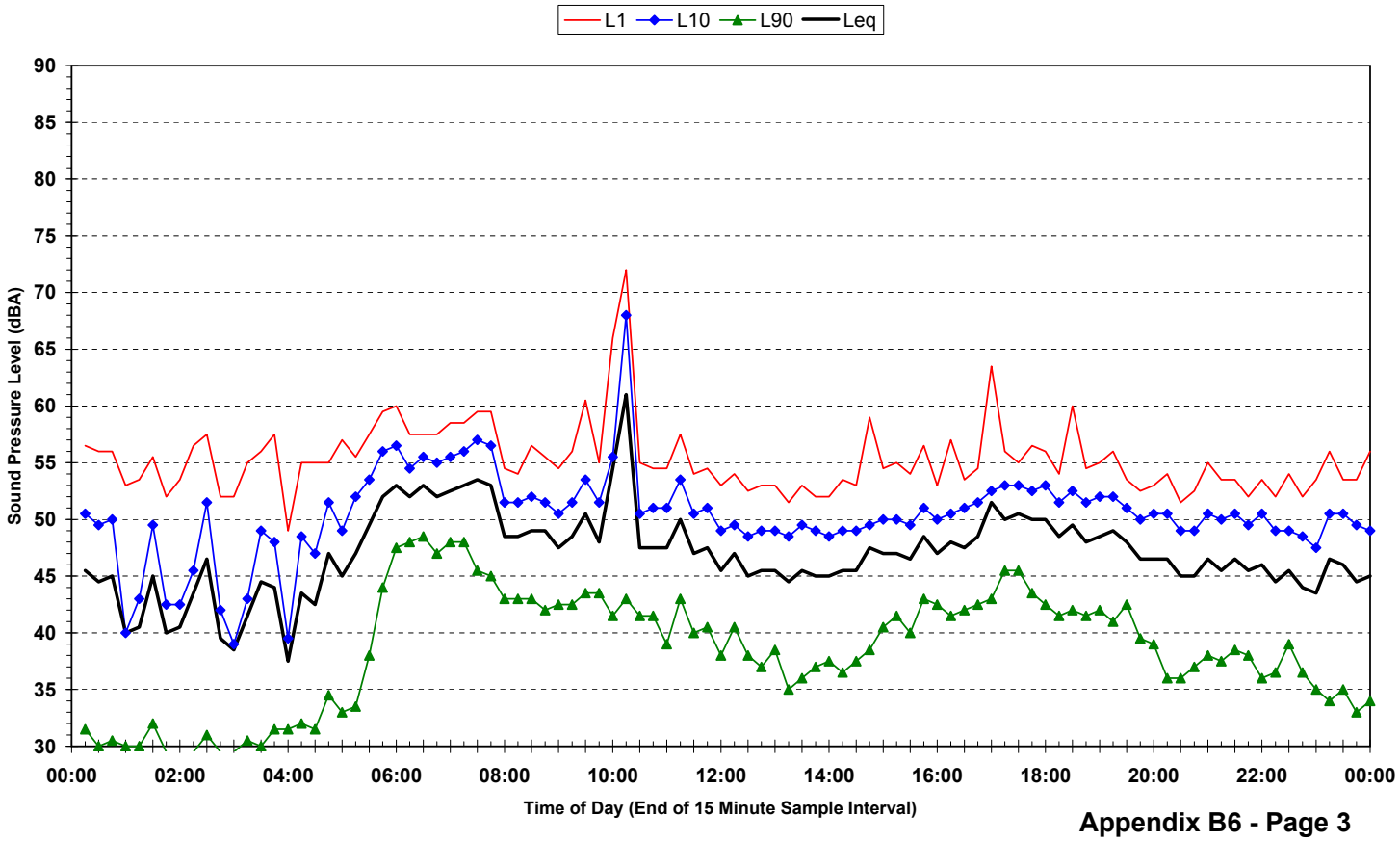
Wed 11-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Thursday 12 October 2000



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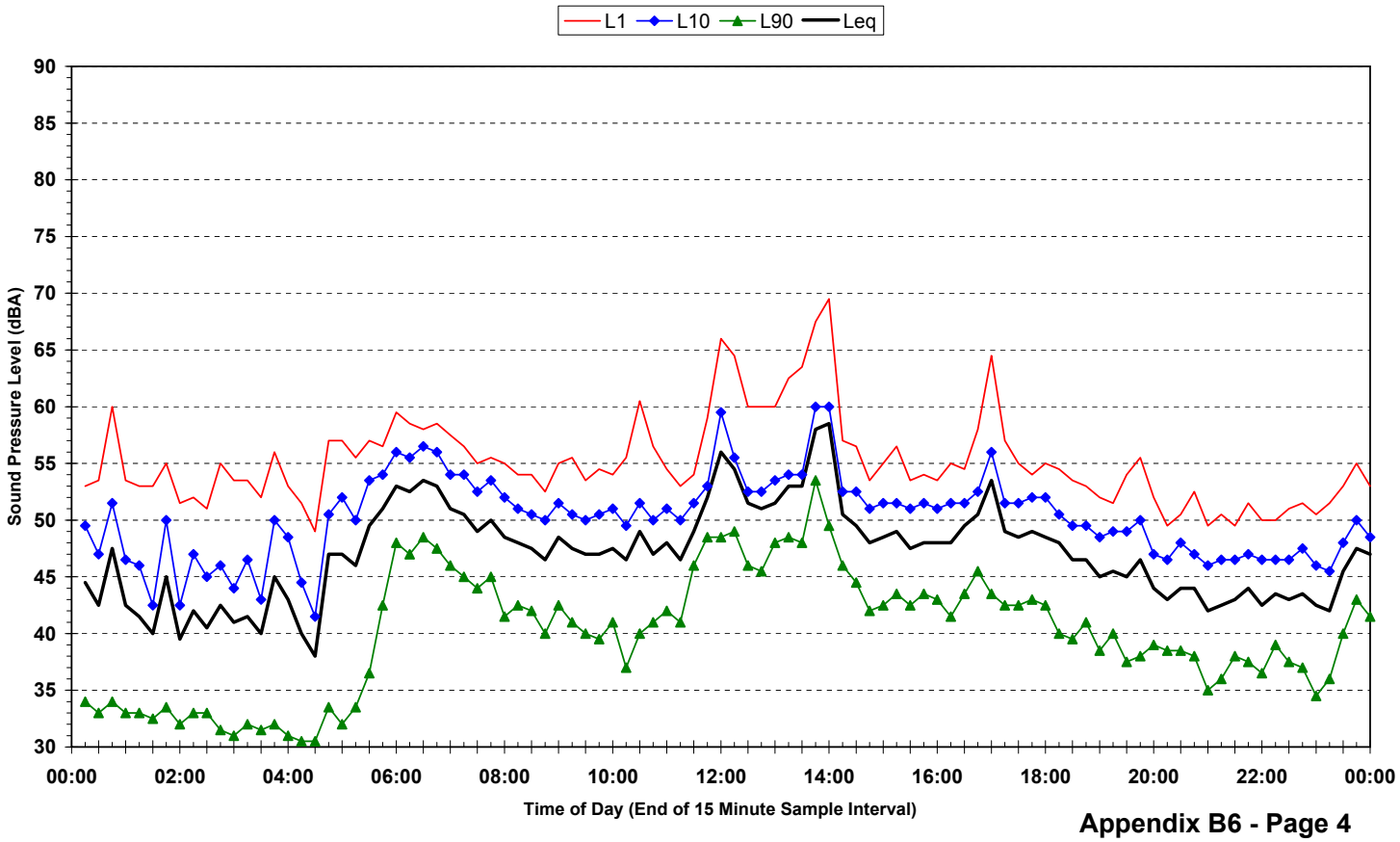
Thu 12-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Friday 13 October 2000



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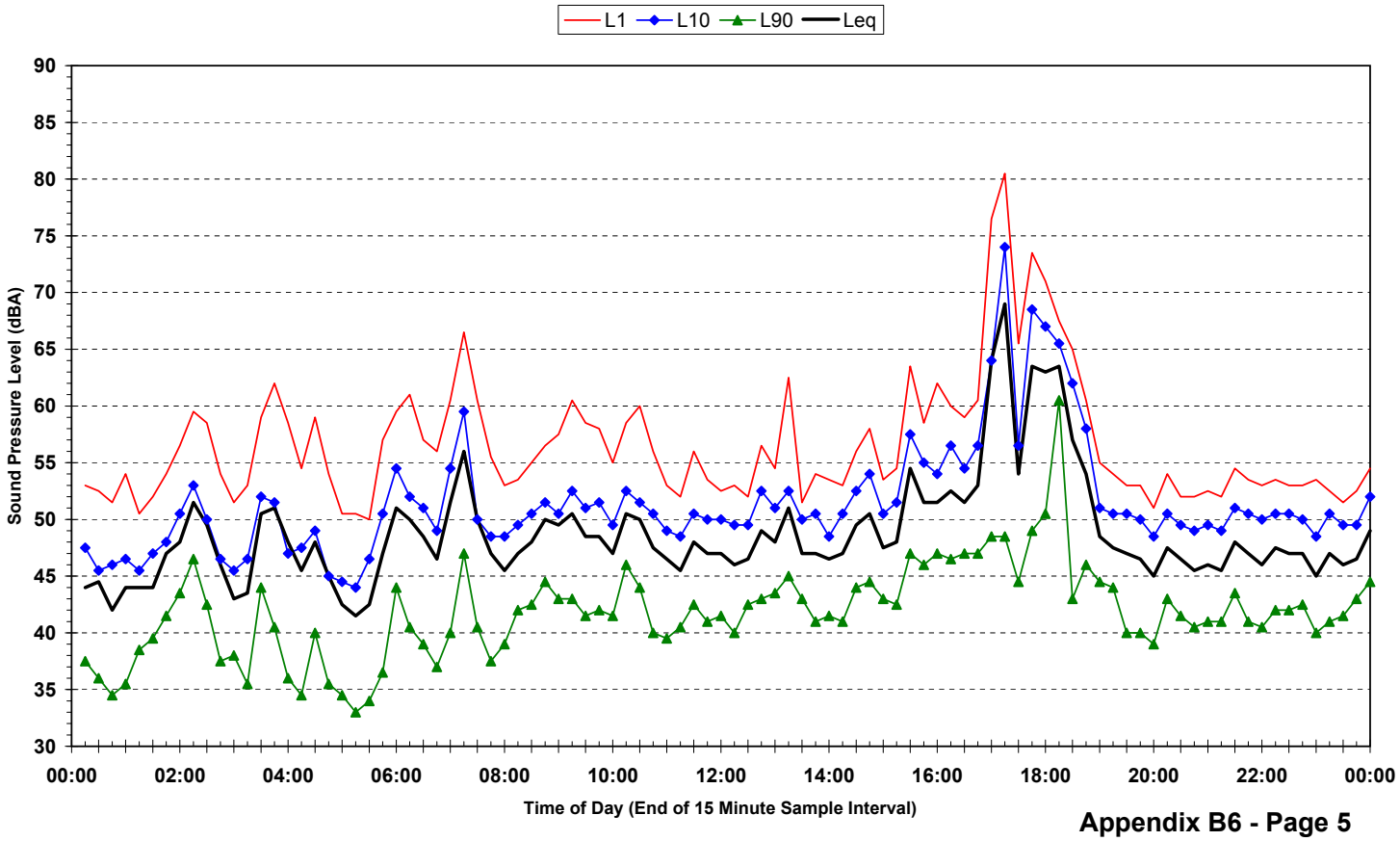
Fri 13-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Saturday 14 October 2000



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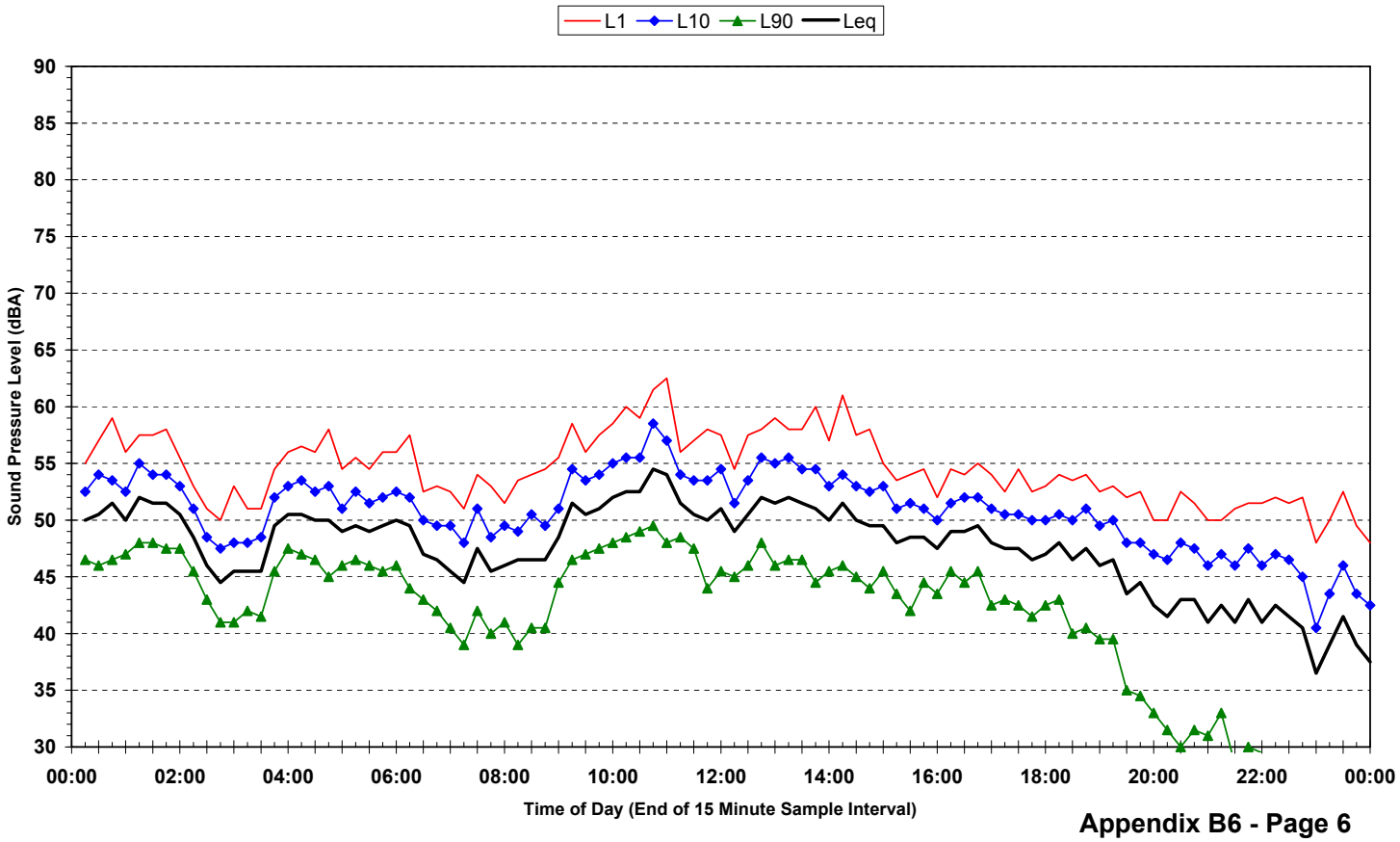
Sat 14-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Sunday 15 October 2000



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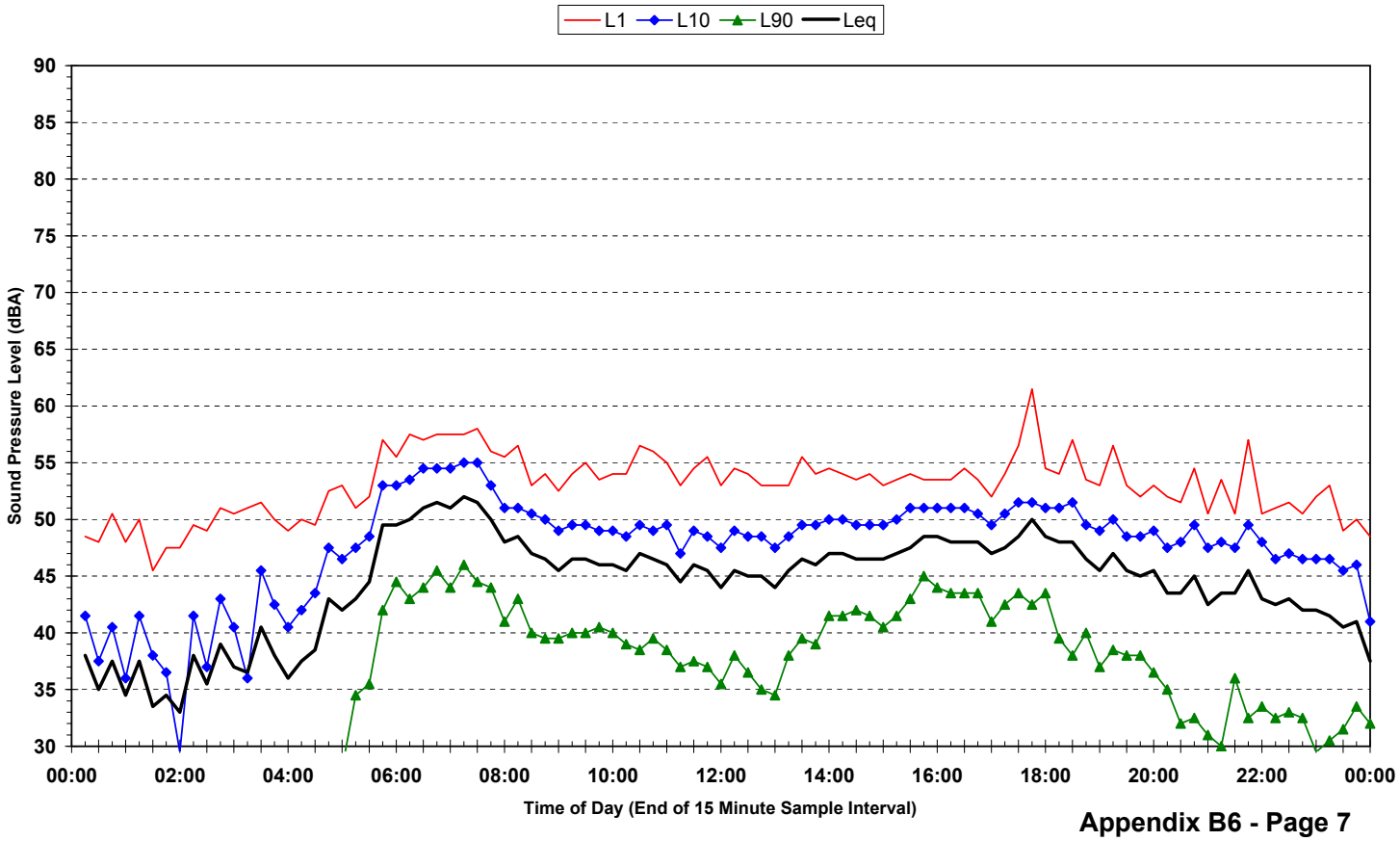
Sun 15-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Monday 16 October 2000



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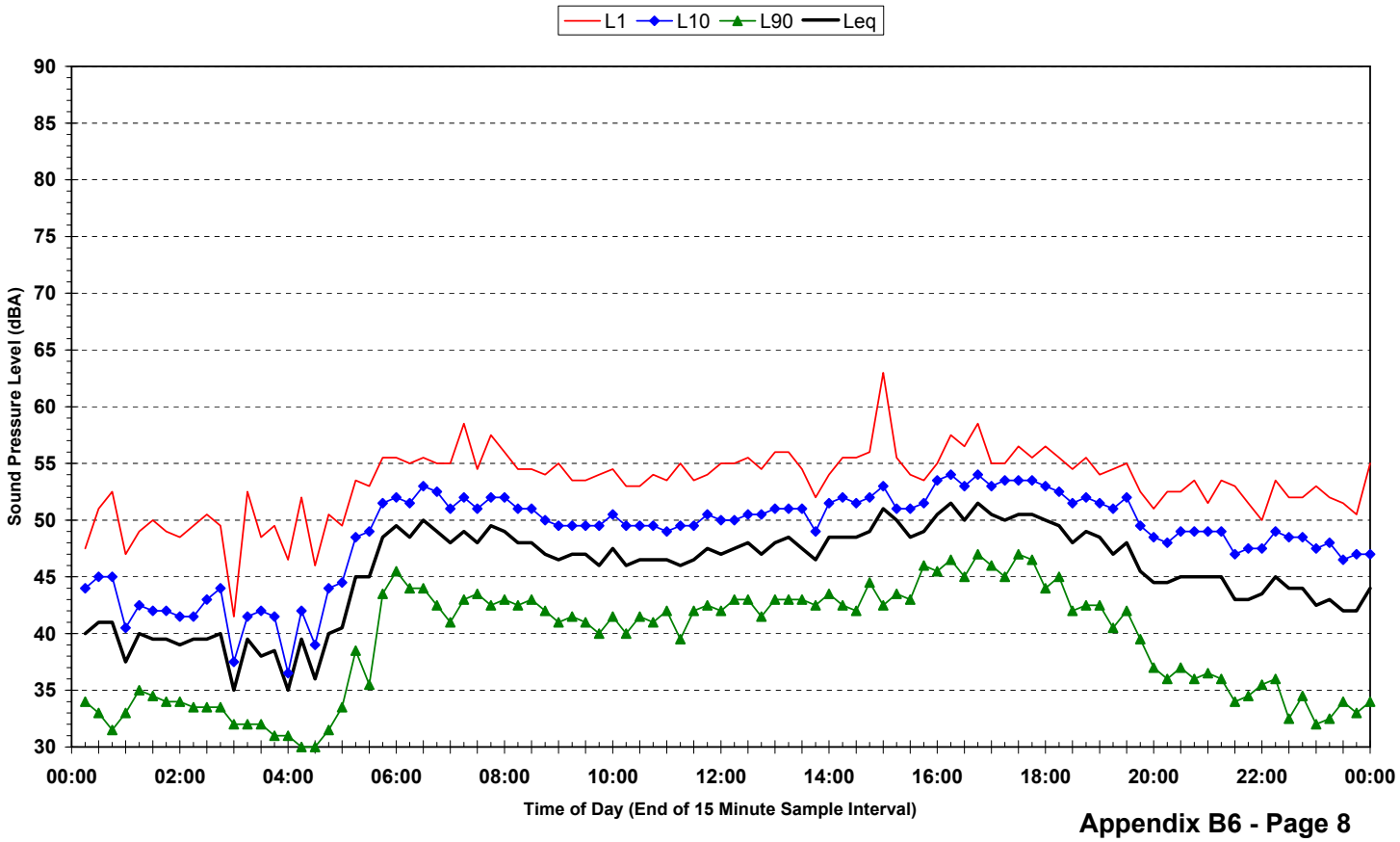
Mon 16-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Tuesday 17 October 2000



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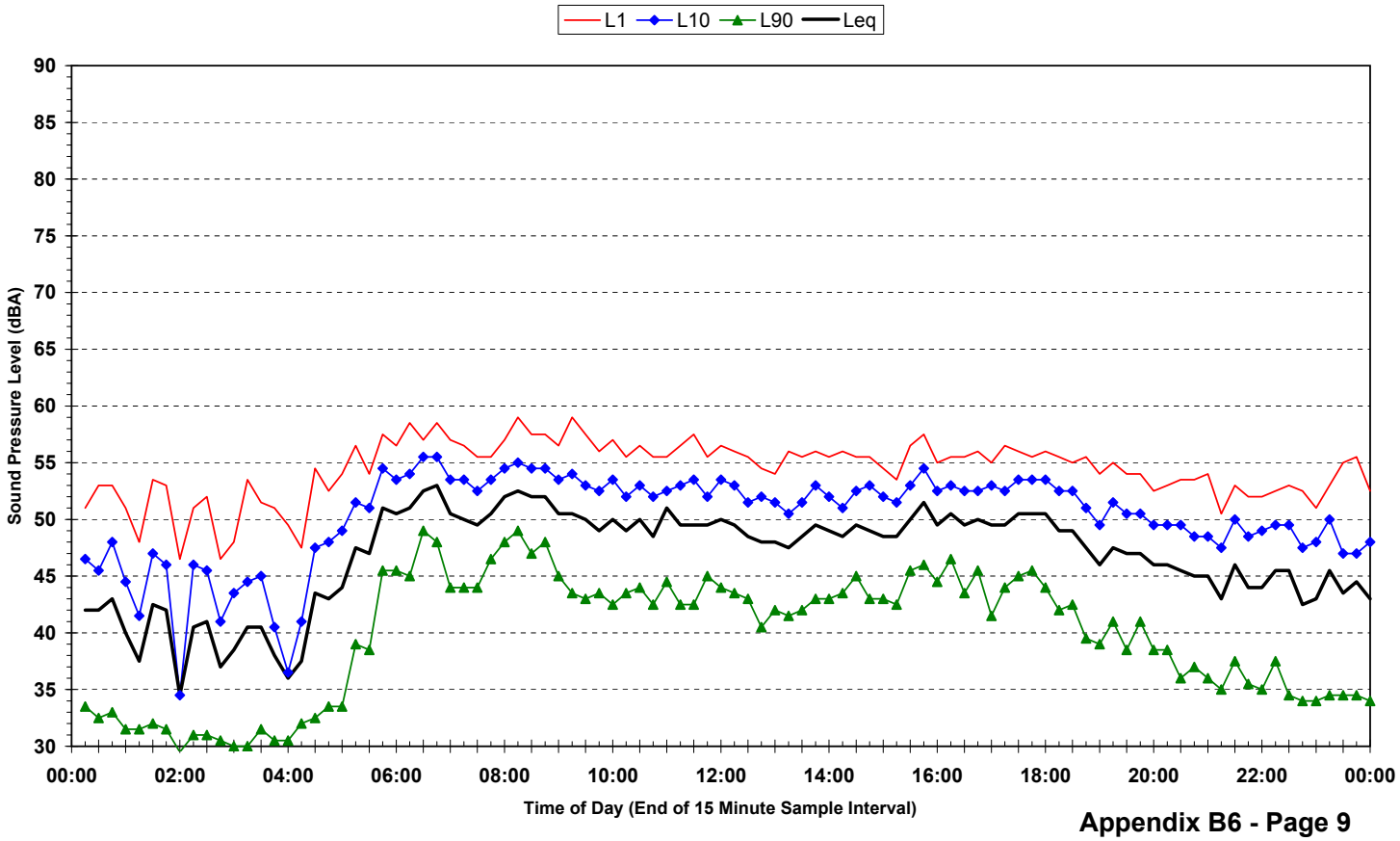
Tue 17-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Wednesday 18 October 2000



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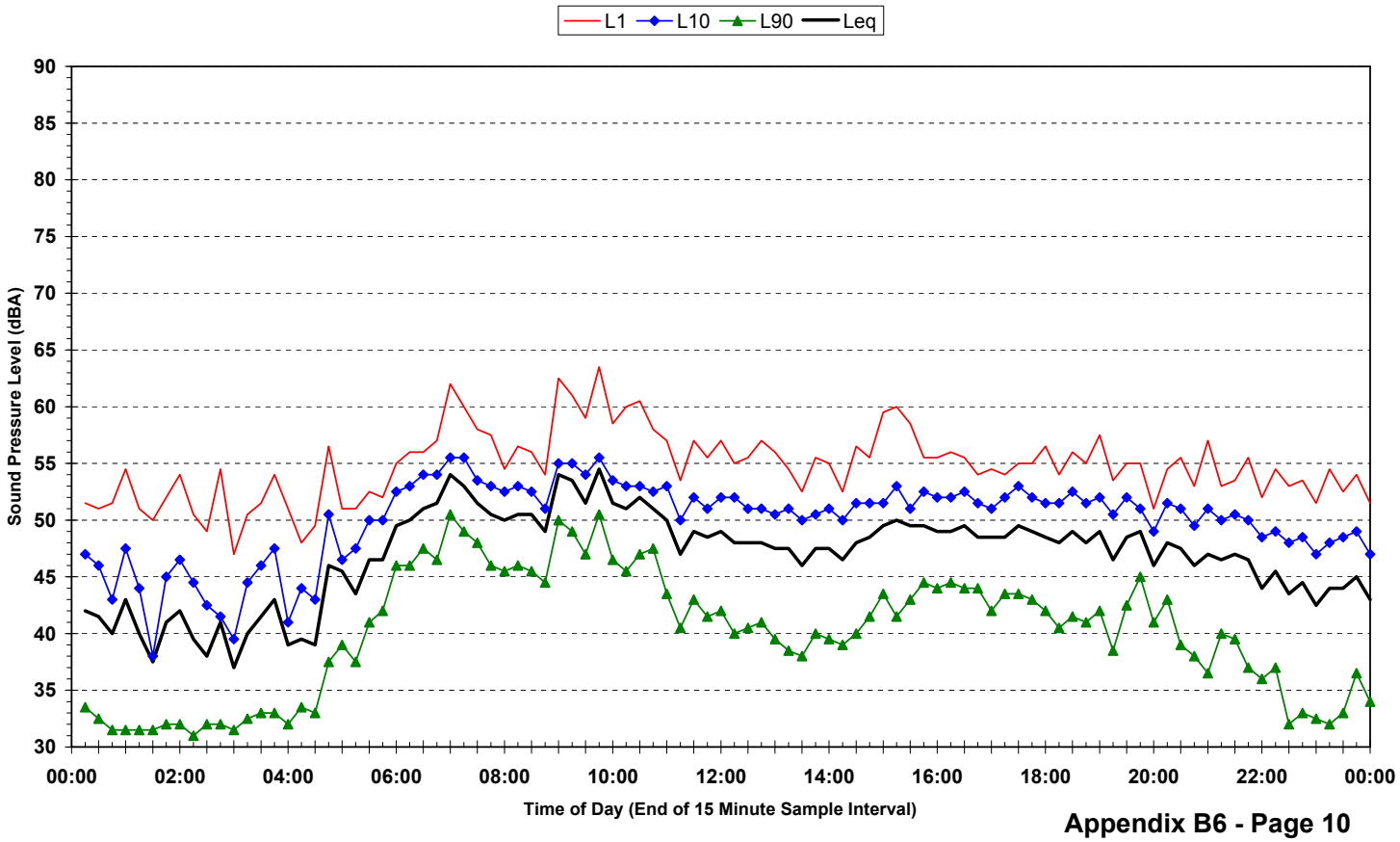
Wed 18-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Thursday 19 October 2000



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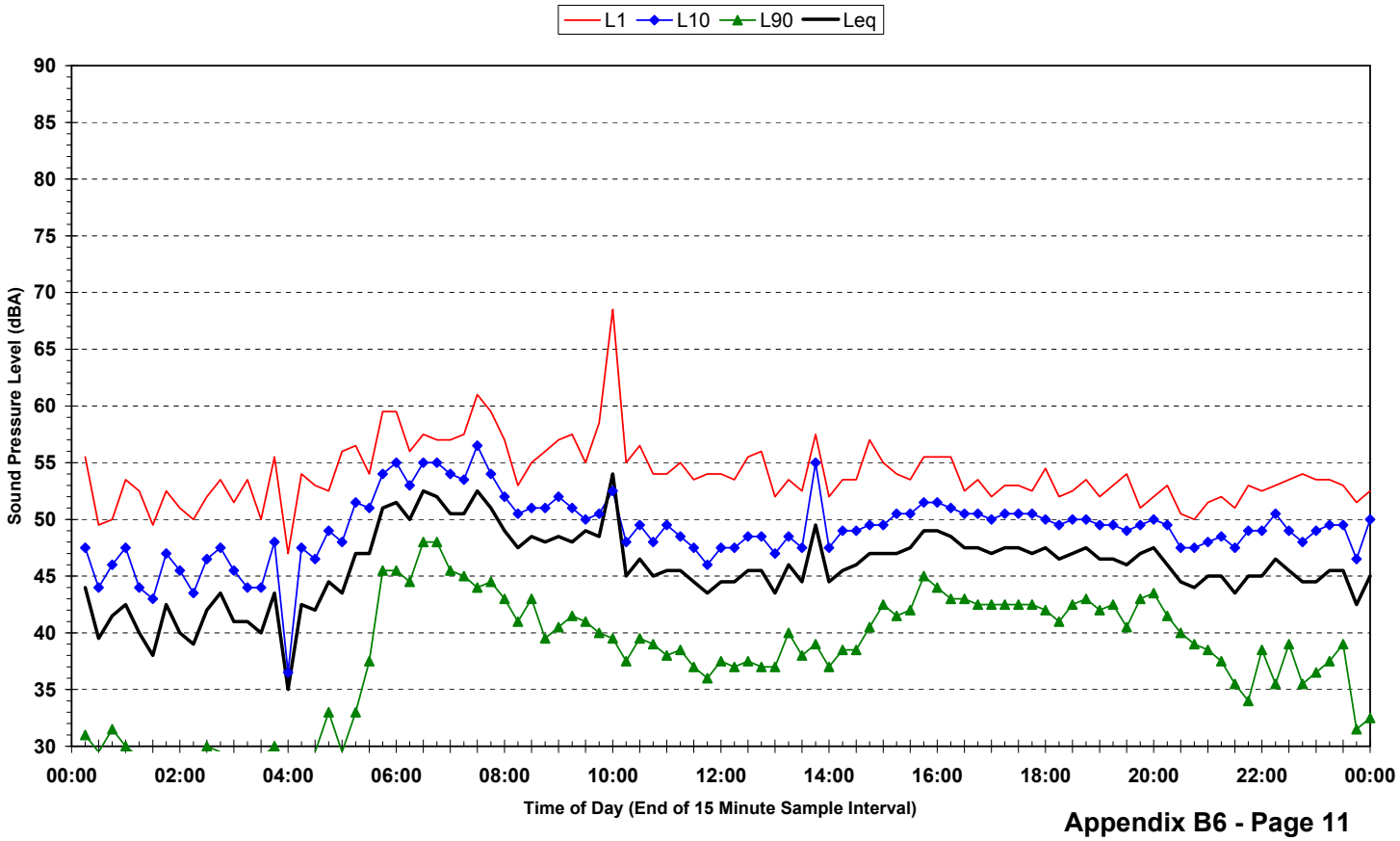
Thu 19-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Friday 20 October 2000



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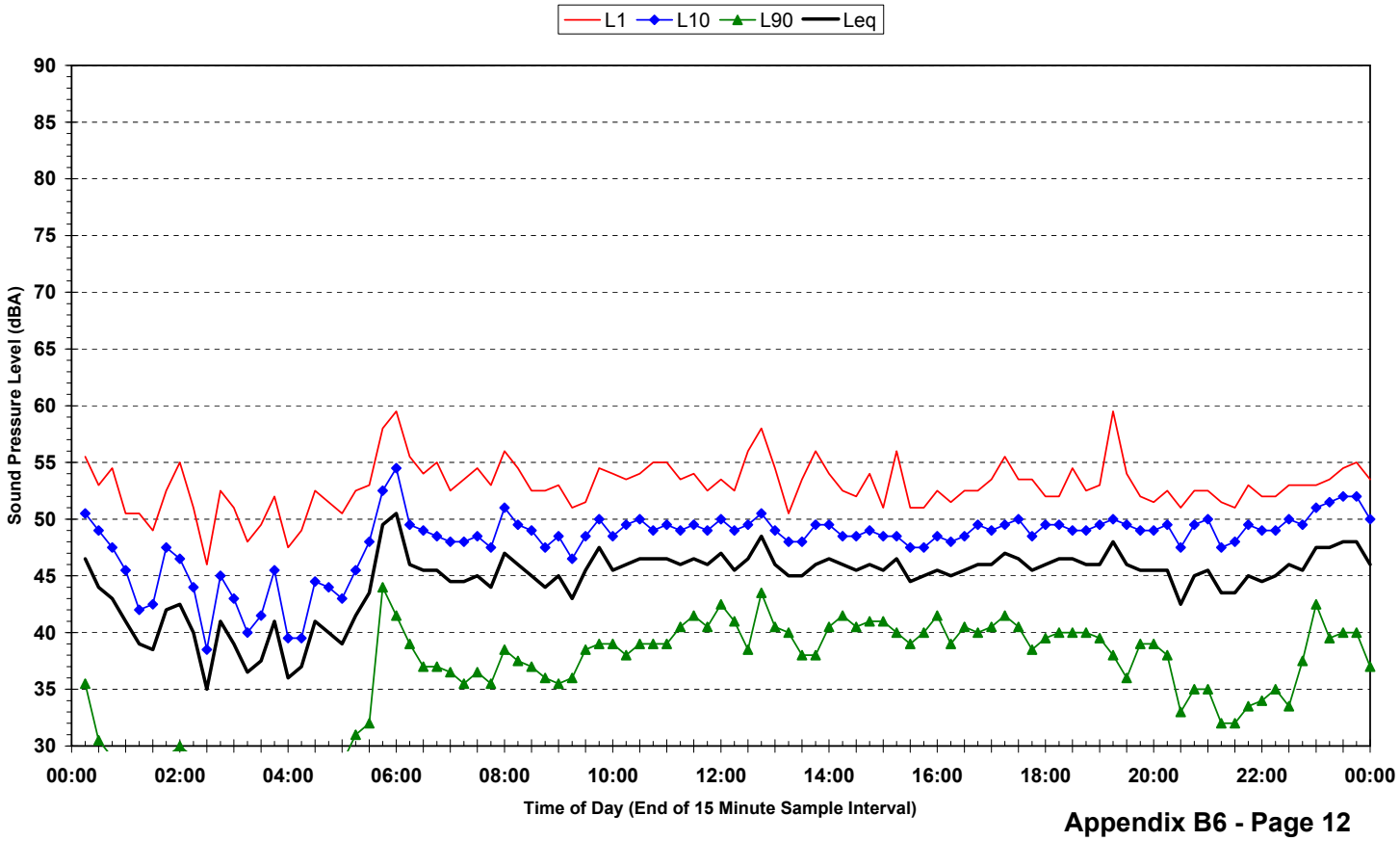
Fri 20-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Saturday 21 October 2000



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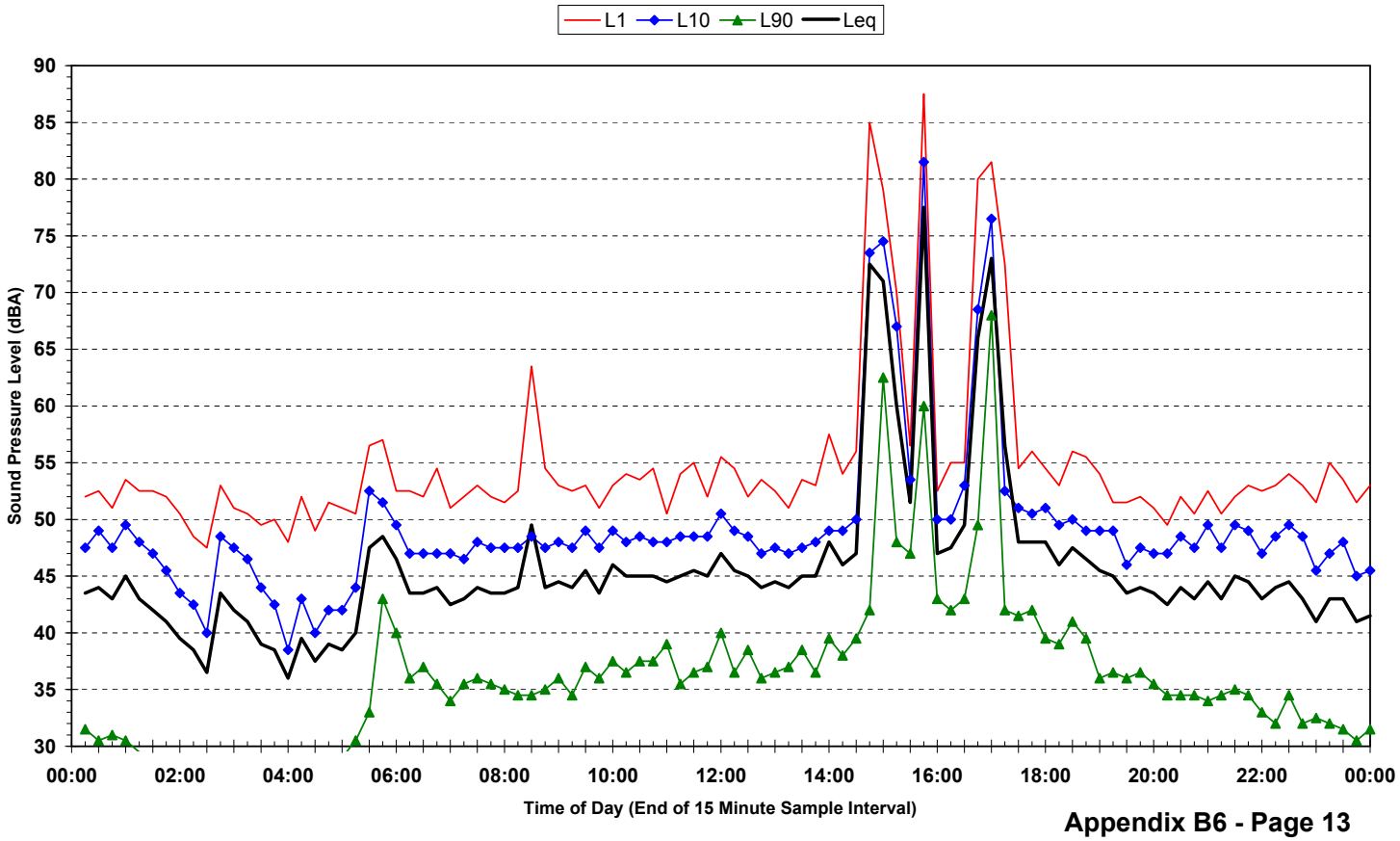
Sat 21-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Sunday 22 October 2000



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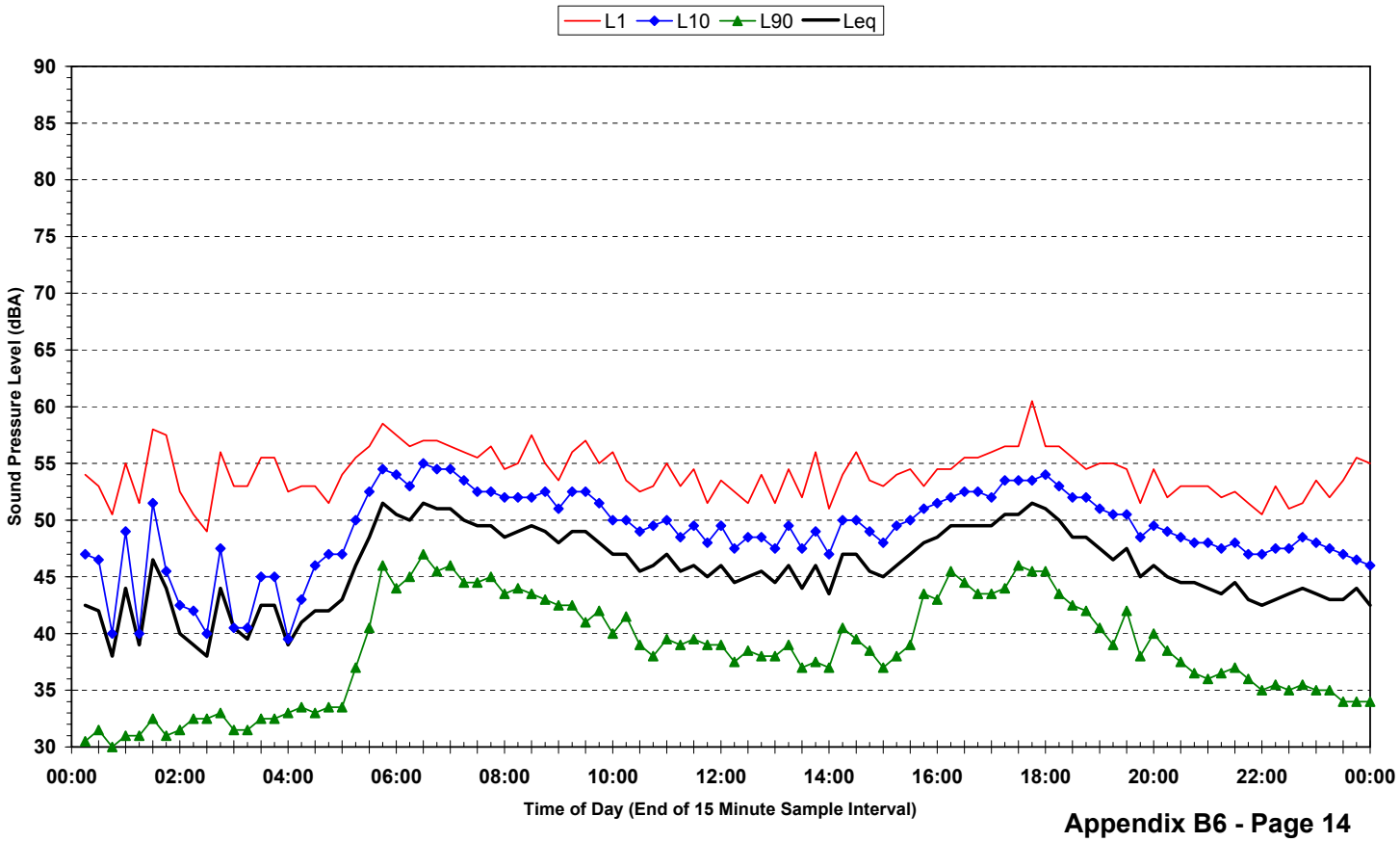
Sun 22-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Monday 23 October 2000



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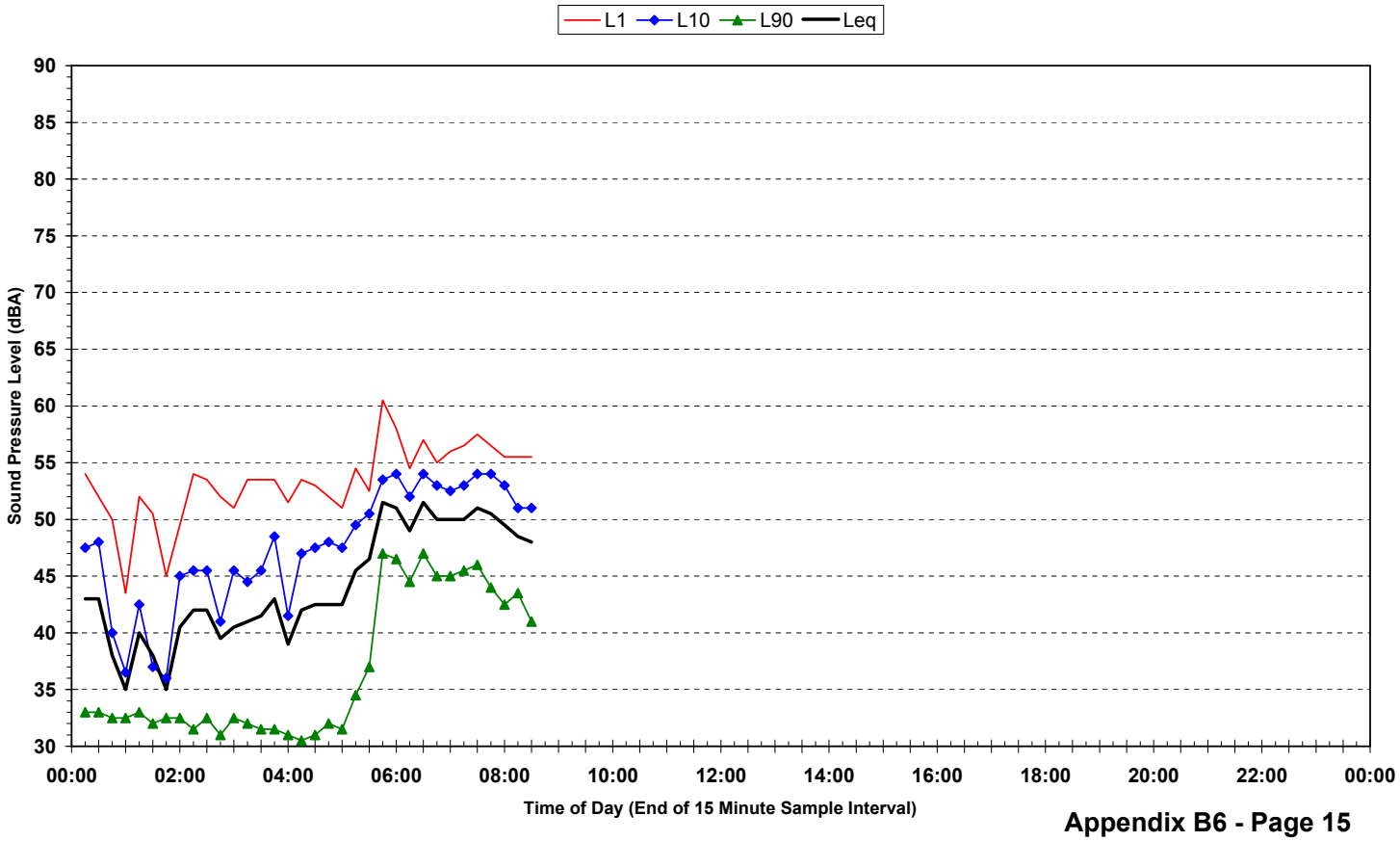
Mon 23-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location F - Lot 684 Black Hill Road, Black Hill - Tuesday 24 October 2000



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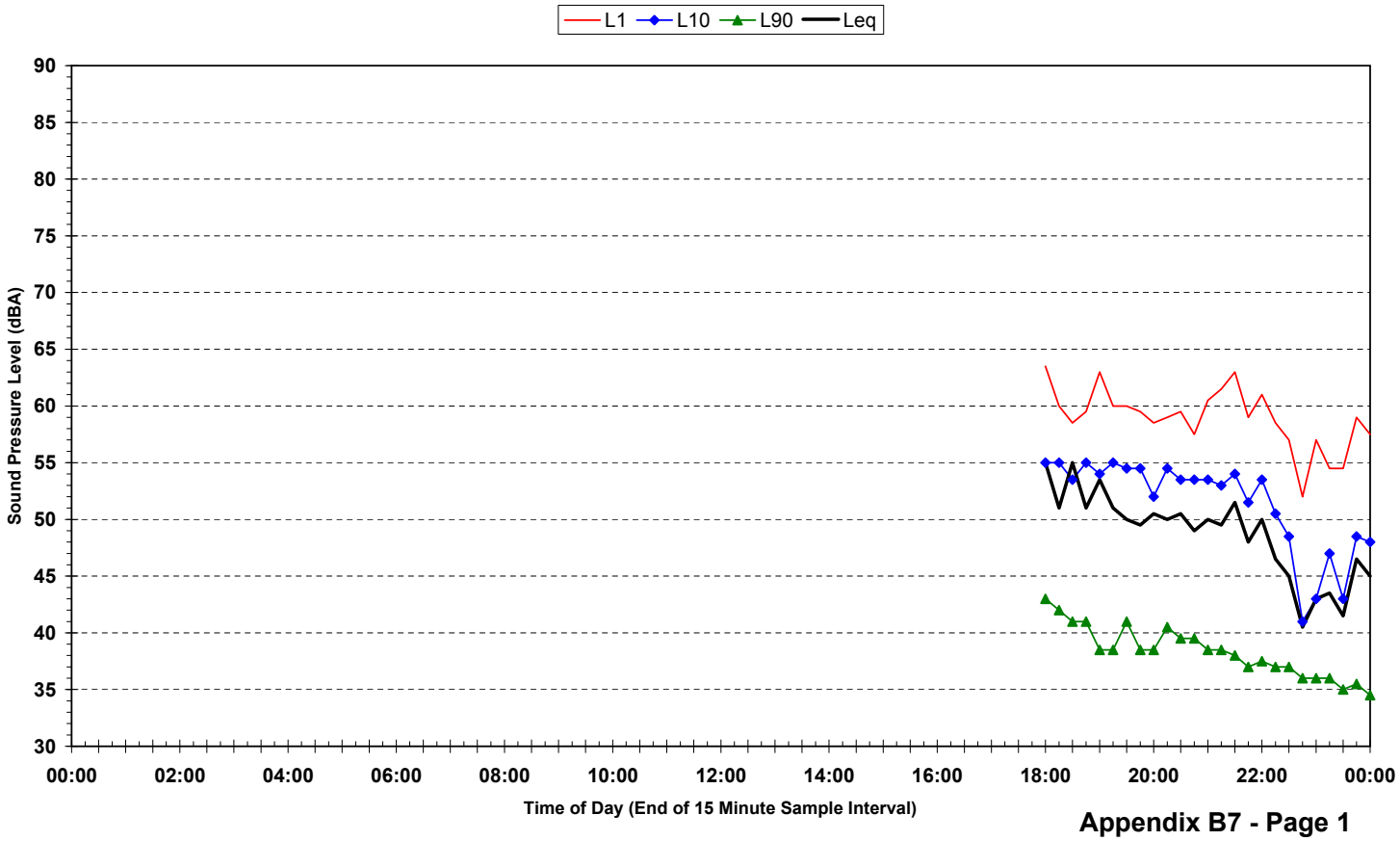
Tue 24-Oct-00 Printed 8/09/2004 09:41

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Tuesday 10 October 2000



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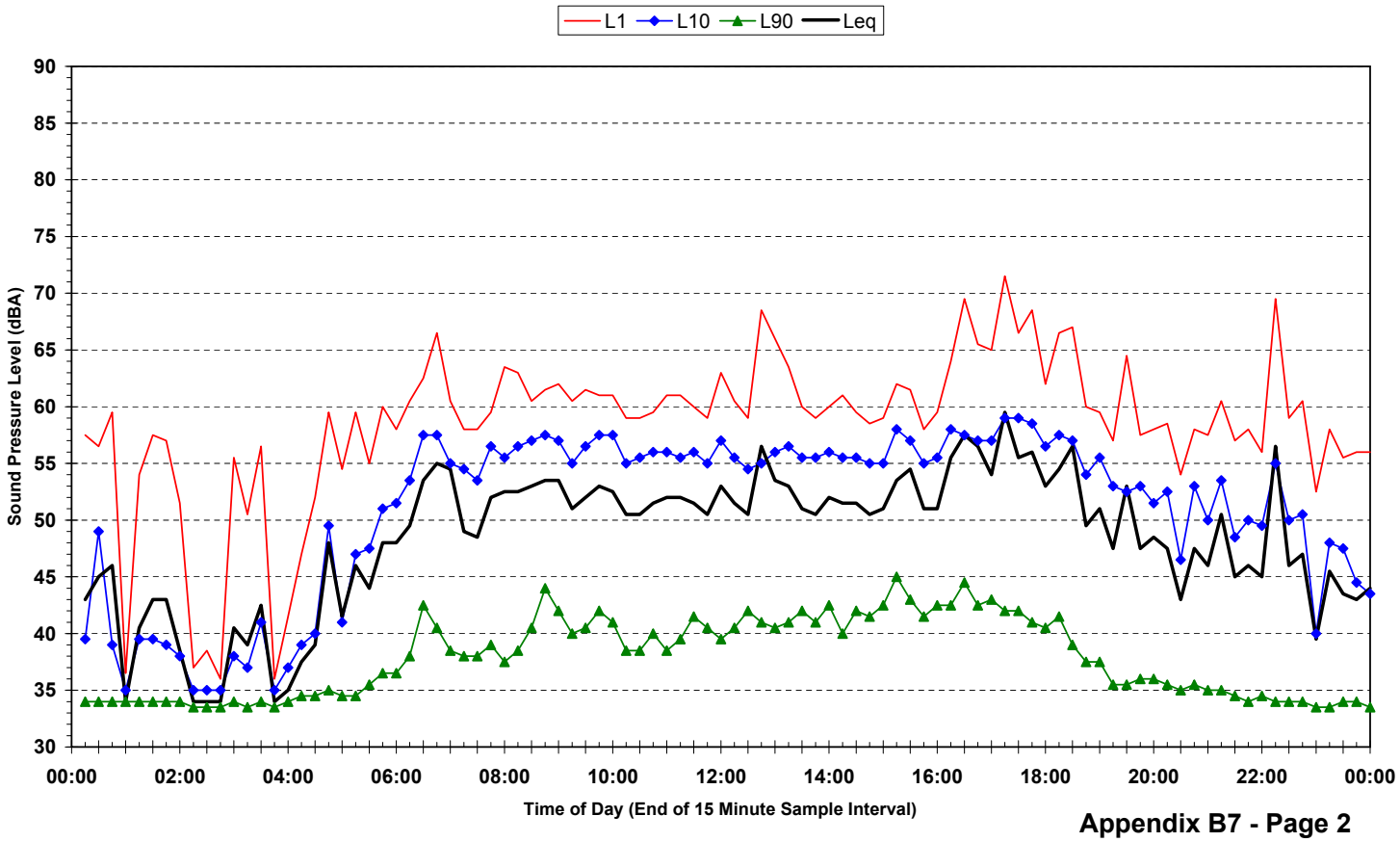
Tue 10-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Wednesday 11 October 2000



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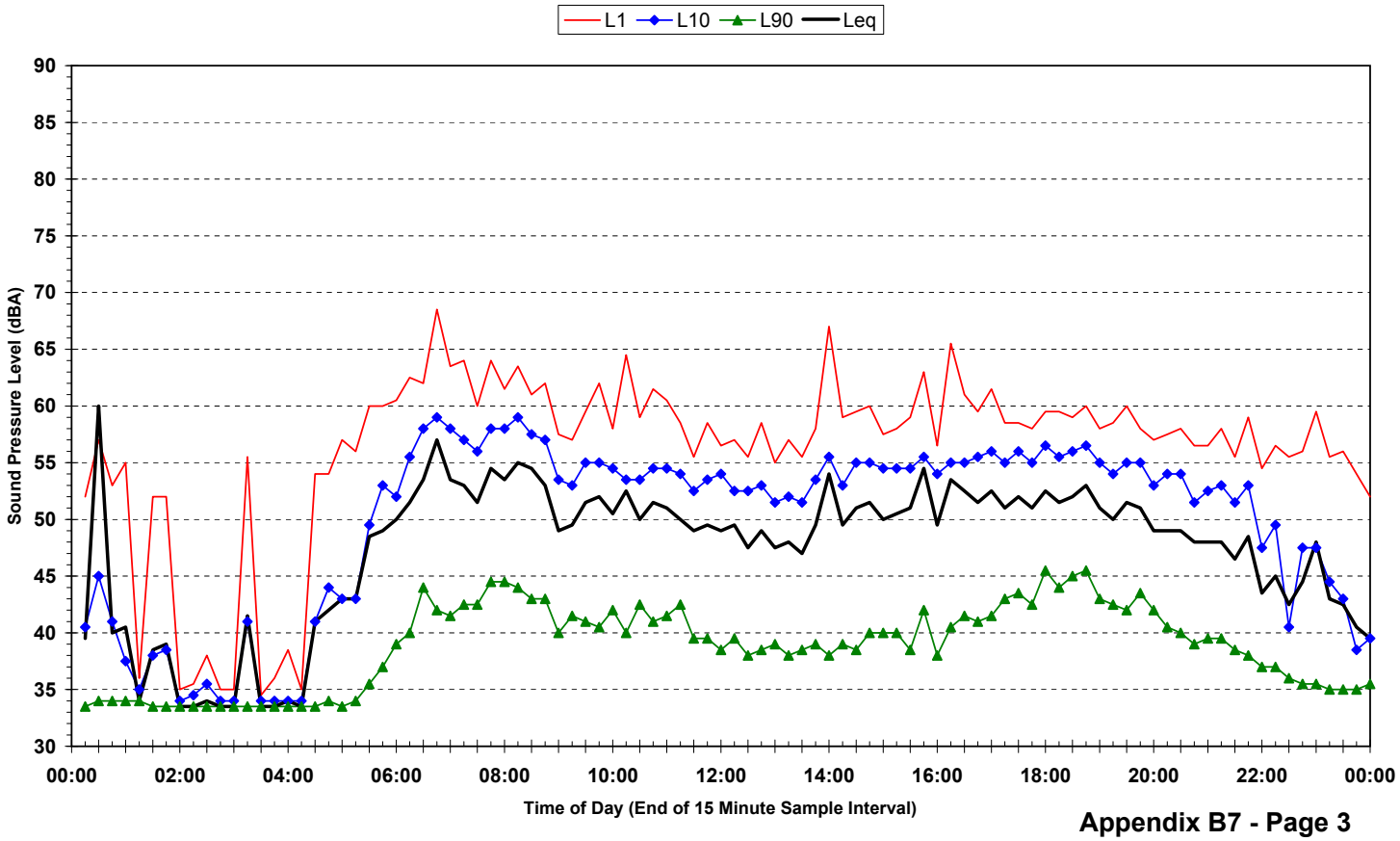
Wed 11-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Thursday 12 October 2000



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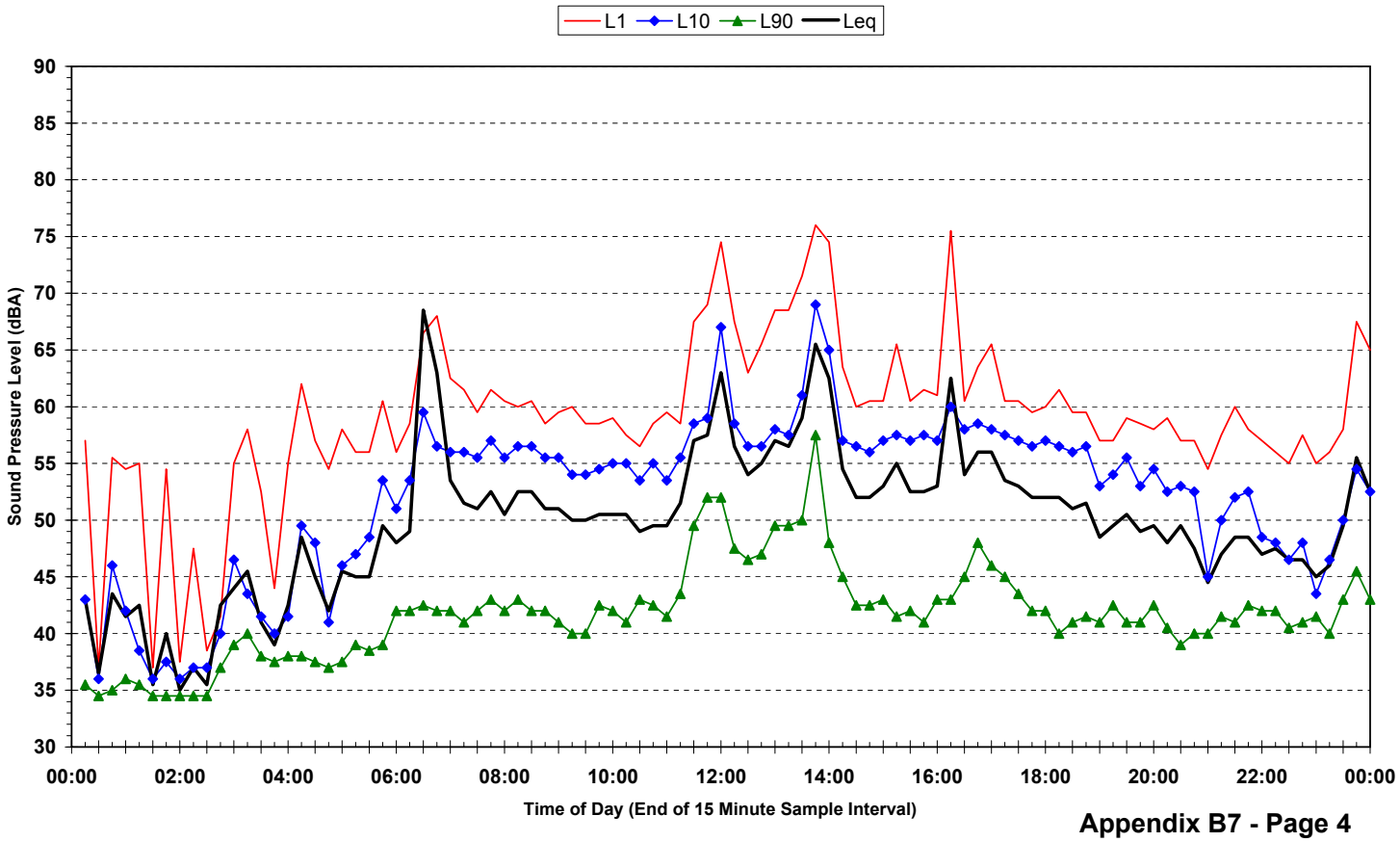
Thu 12-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Friday 13 October 2000



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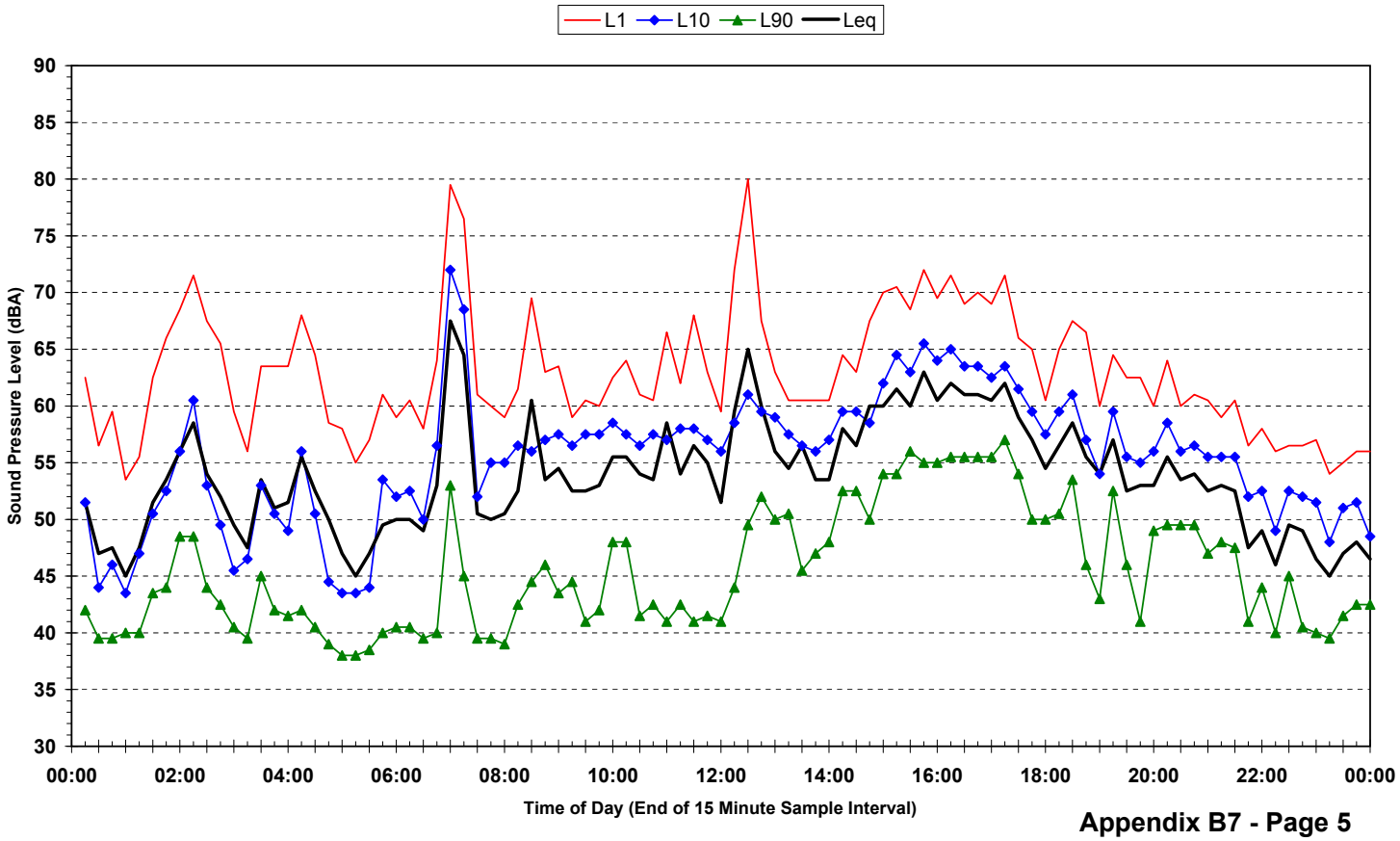
Fri 13-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Saturday 14 October 2000



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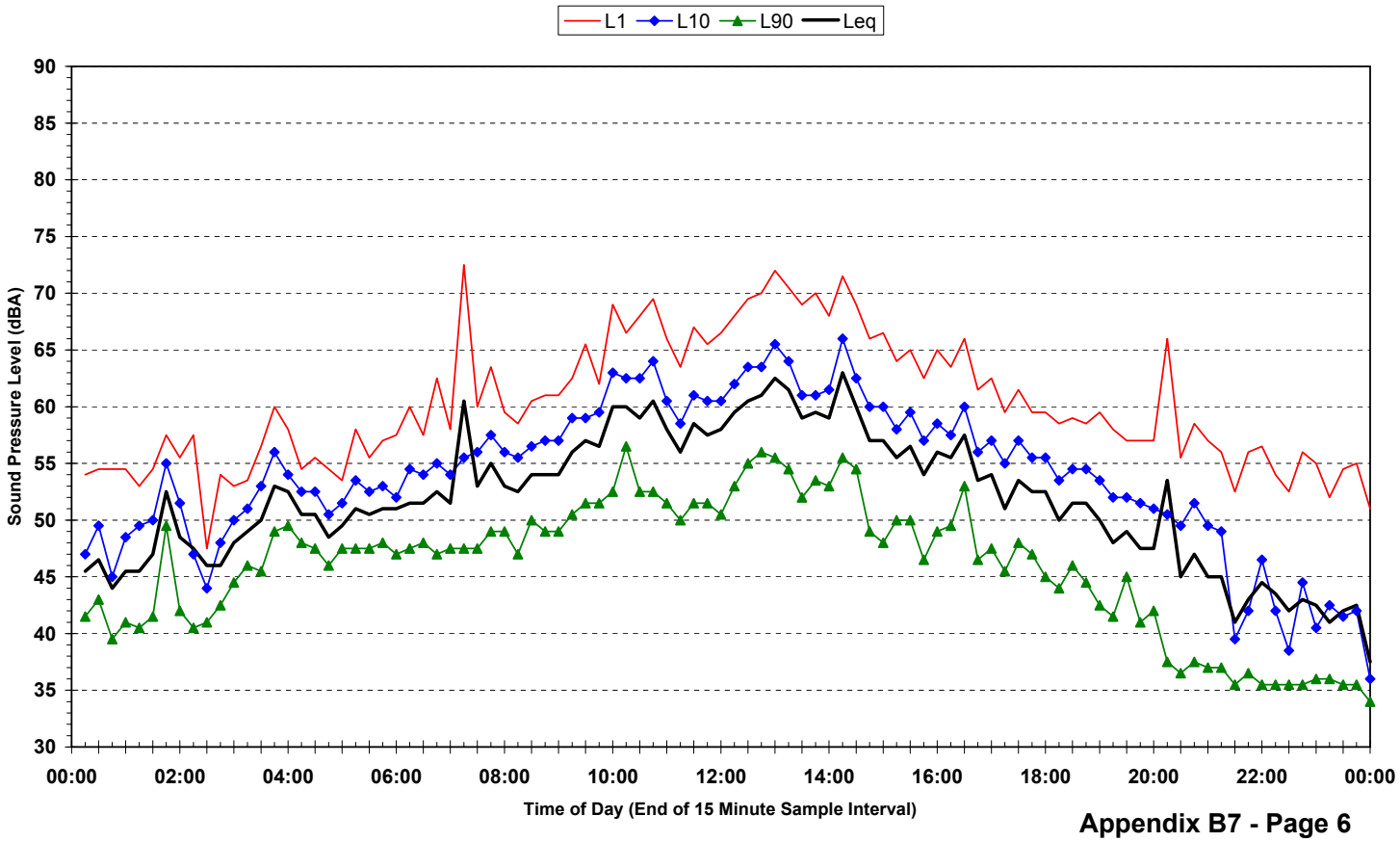
Sat 14-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Sunday 15 October 2000



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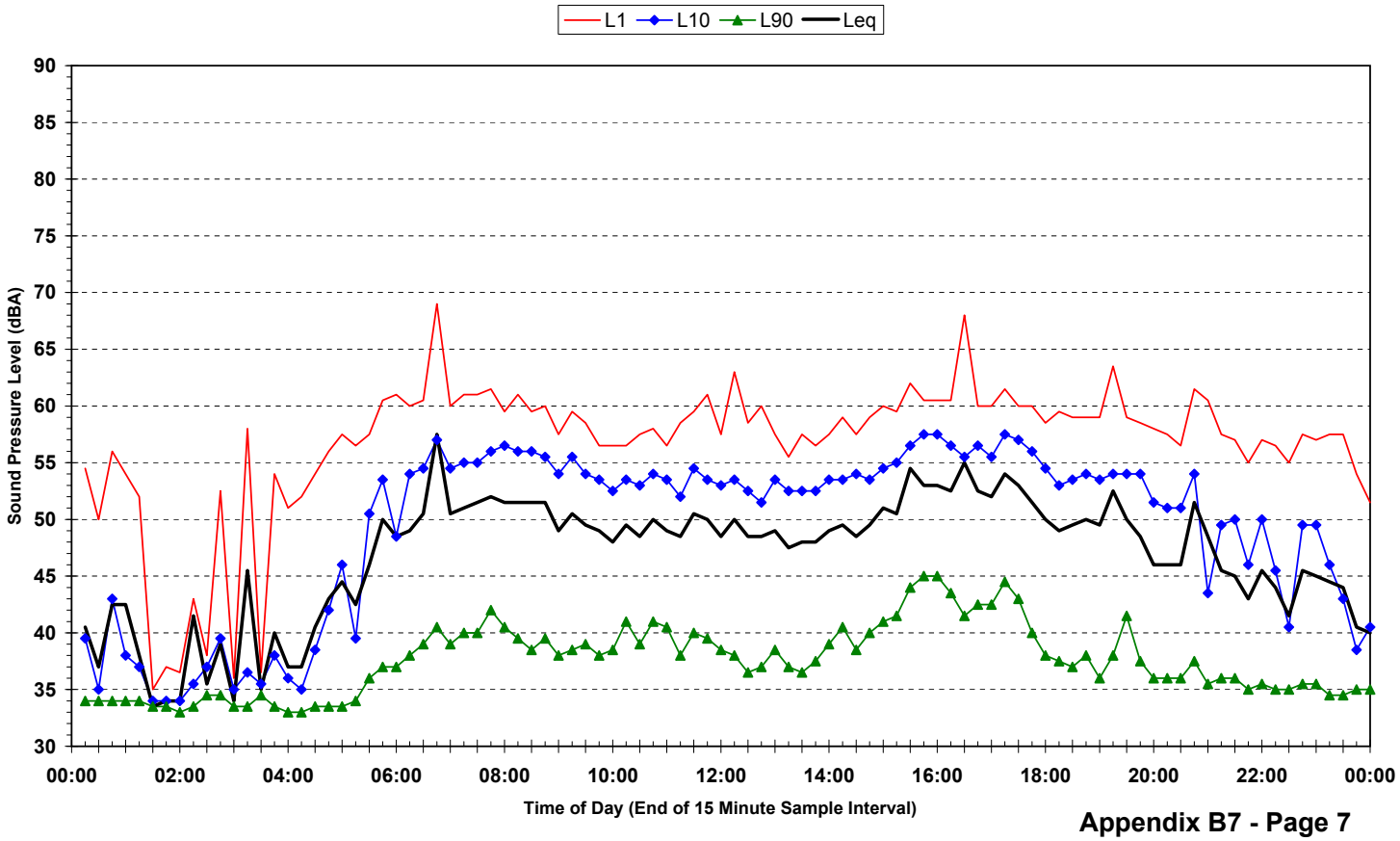
Sun 15-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Monday 16 October 2000



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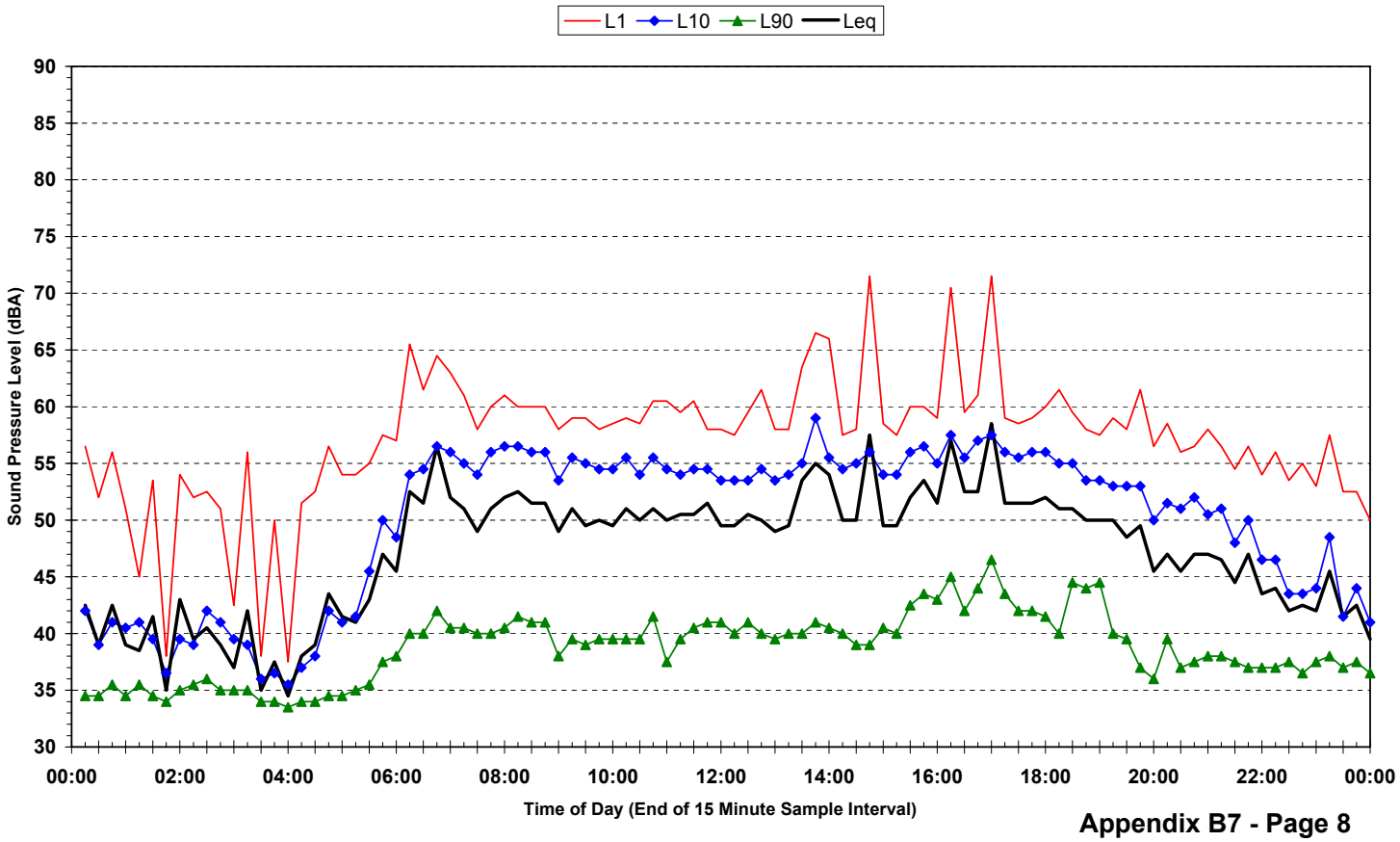
Mon 16-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Tuesday 17 October 2000



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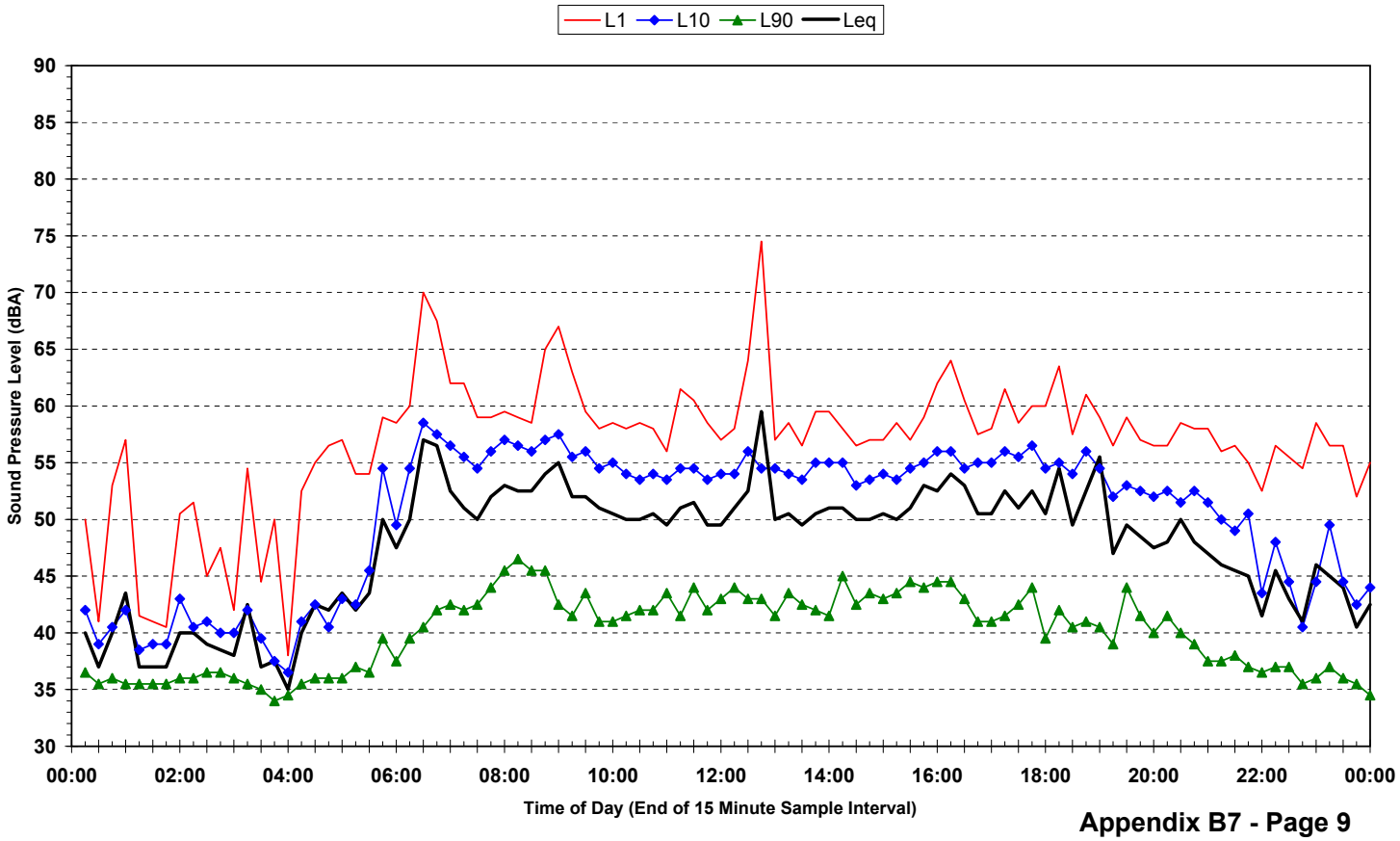
Tue 17-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Wednesday 18 October 2000



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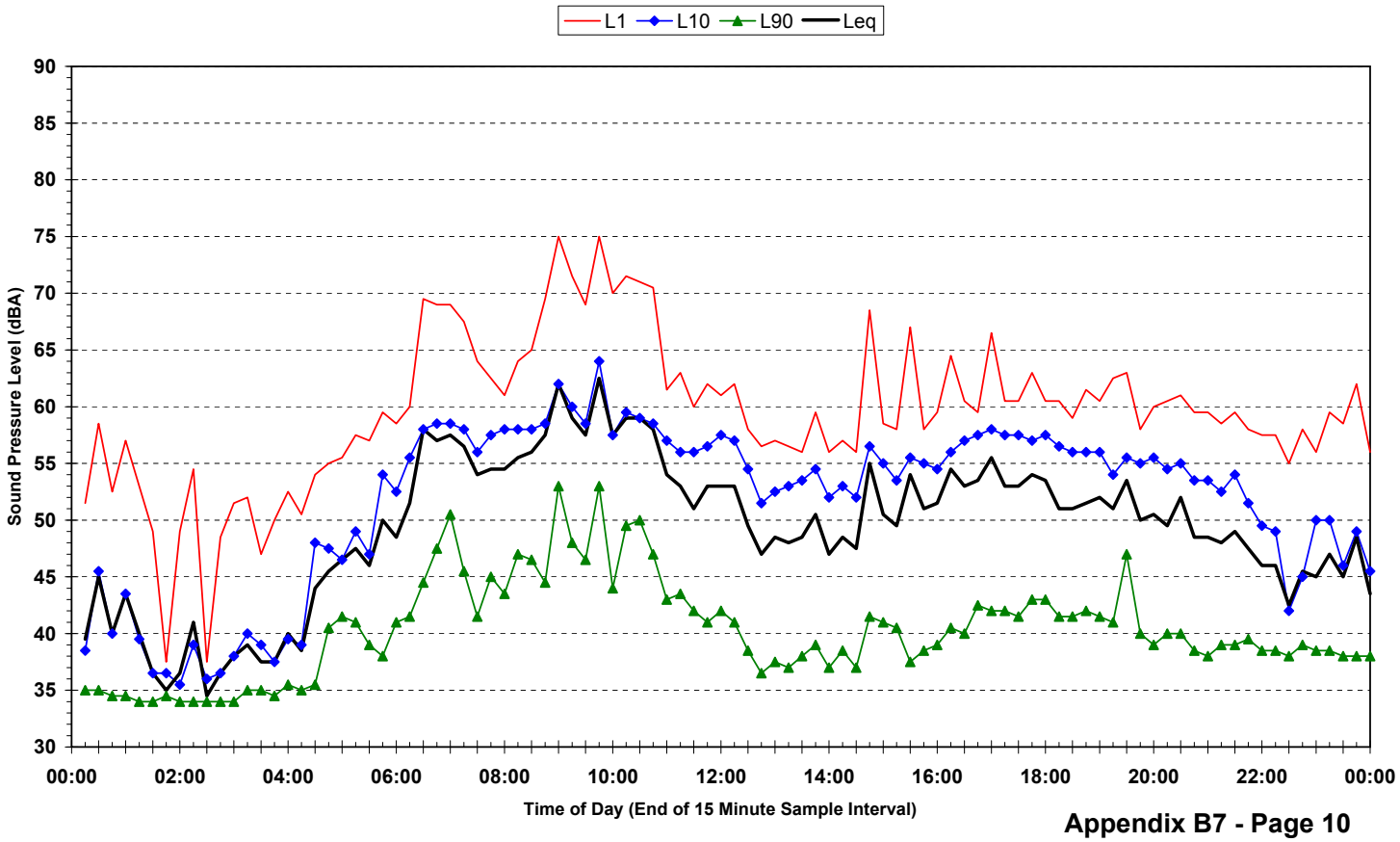
Wed 18-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Thursday 19 October 2000



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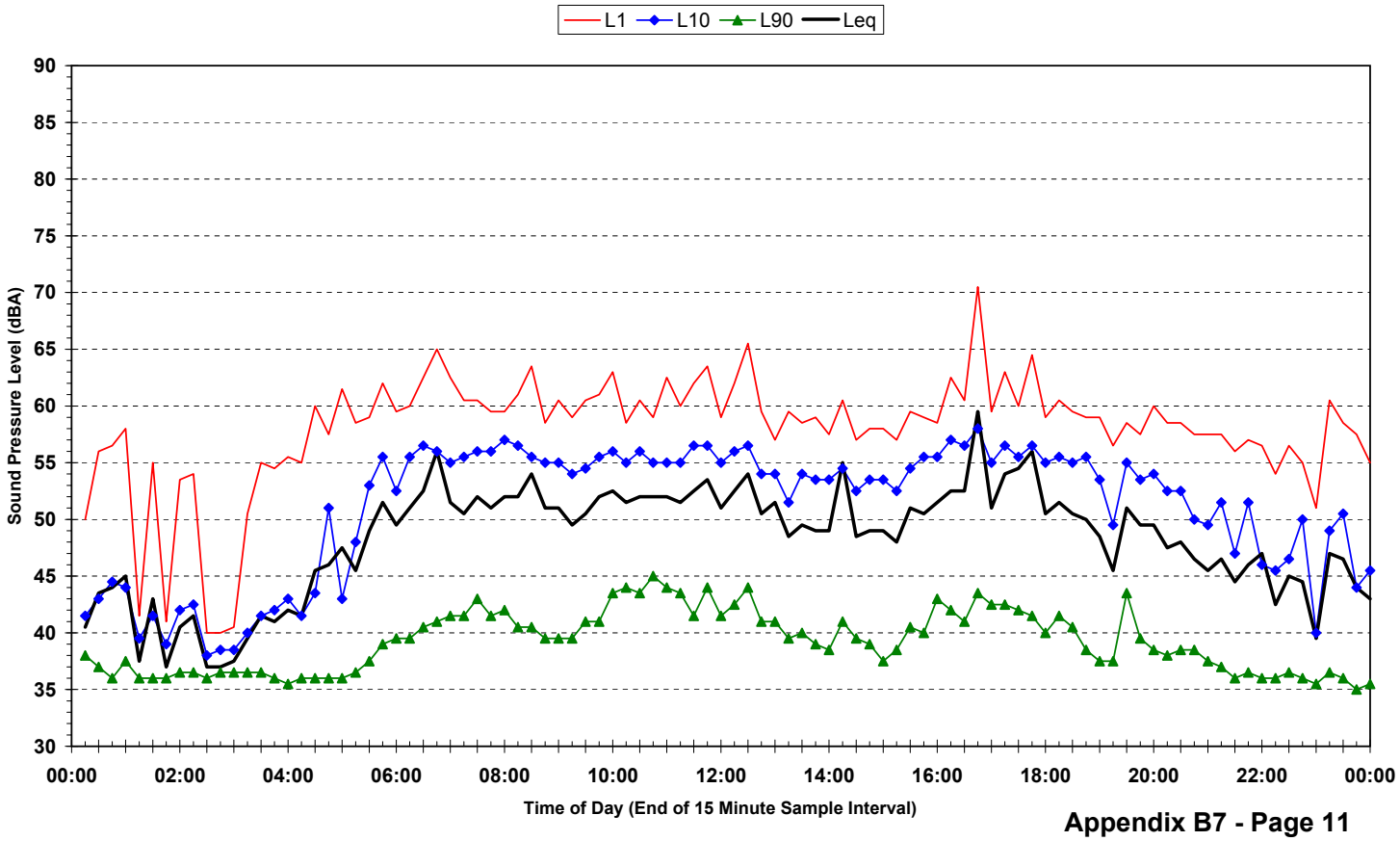
Thu 19-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Friday 20 October 2000



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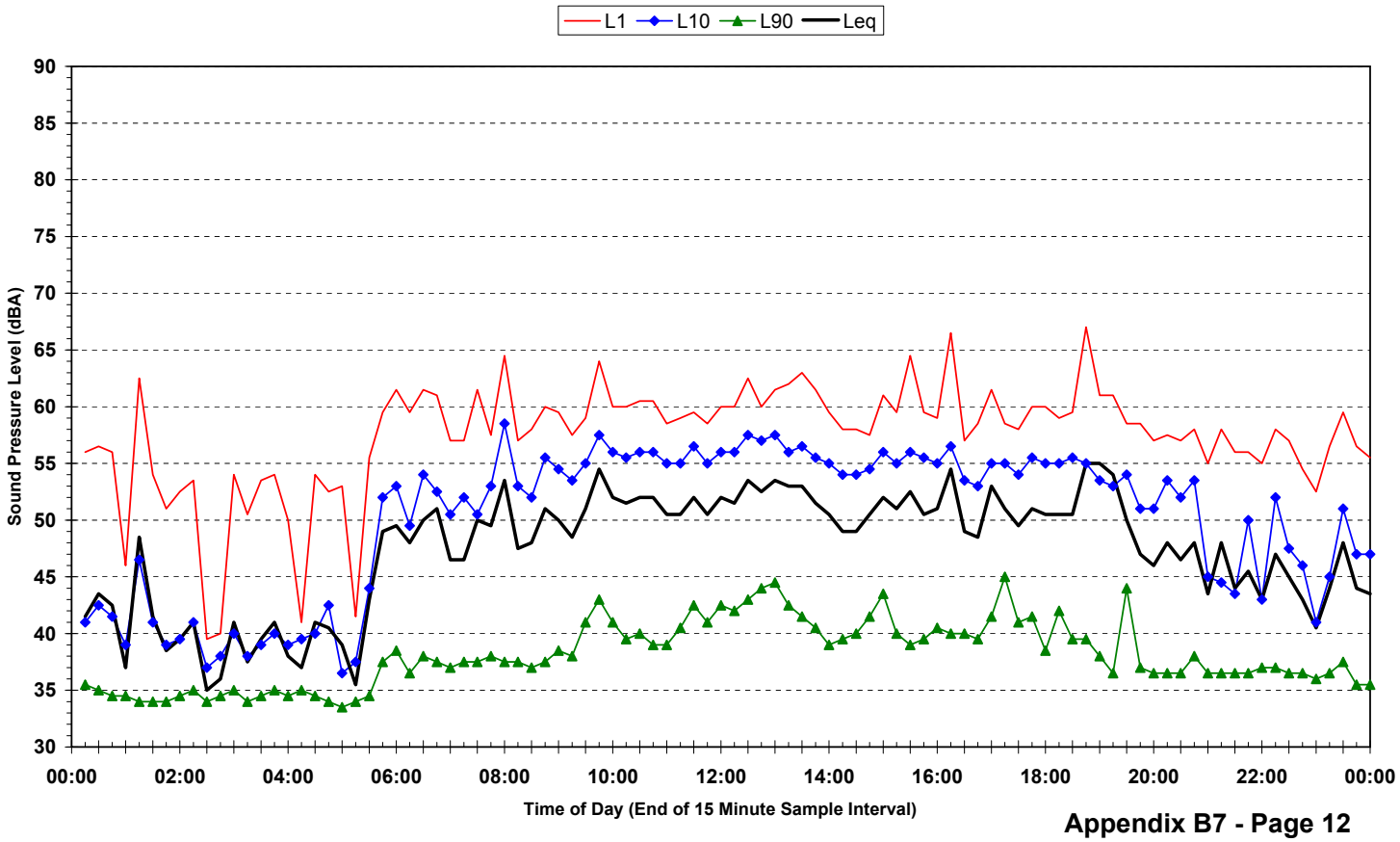
Fri 20-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Saturday 21 October 2000



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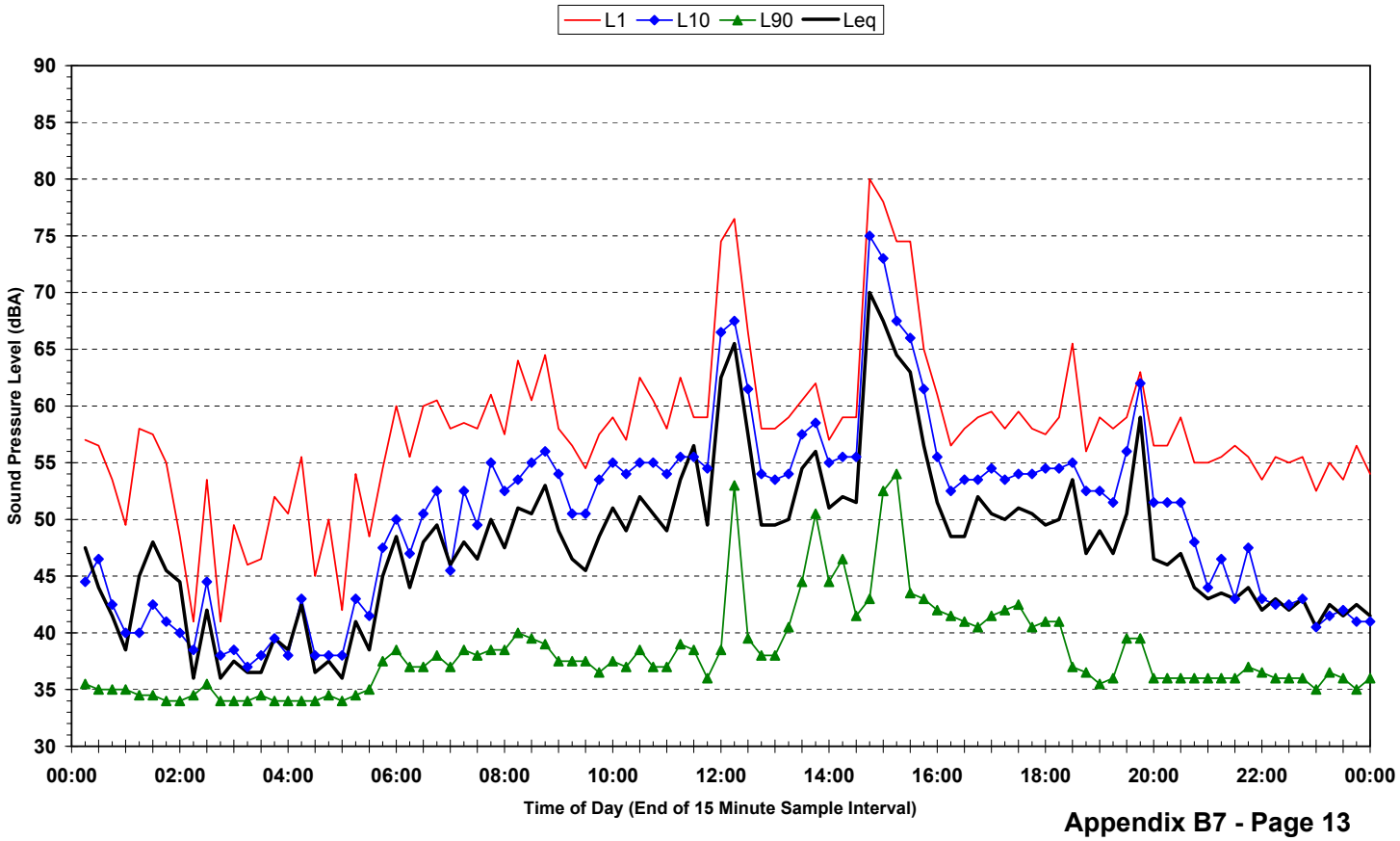
Sat 21-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Sunday 22 October 2000



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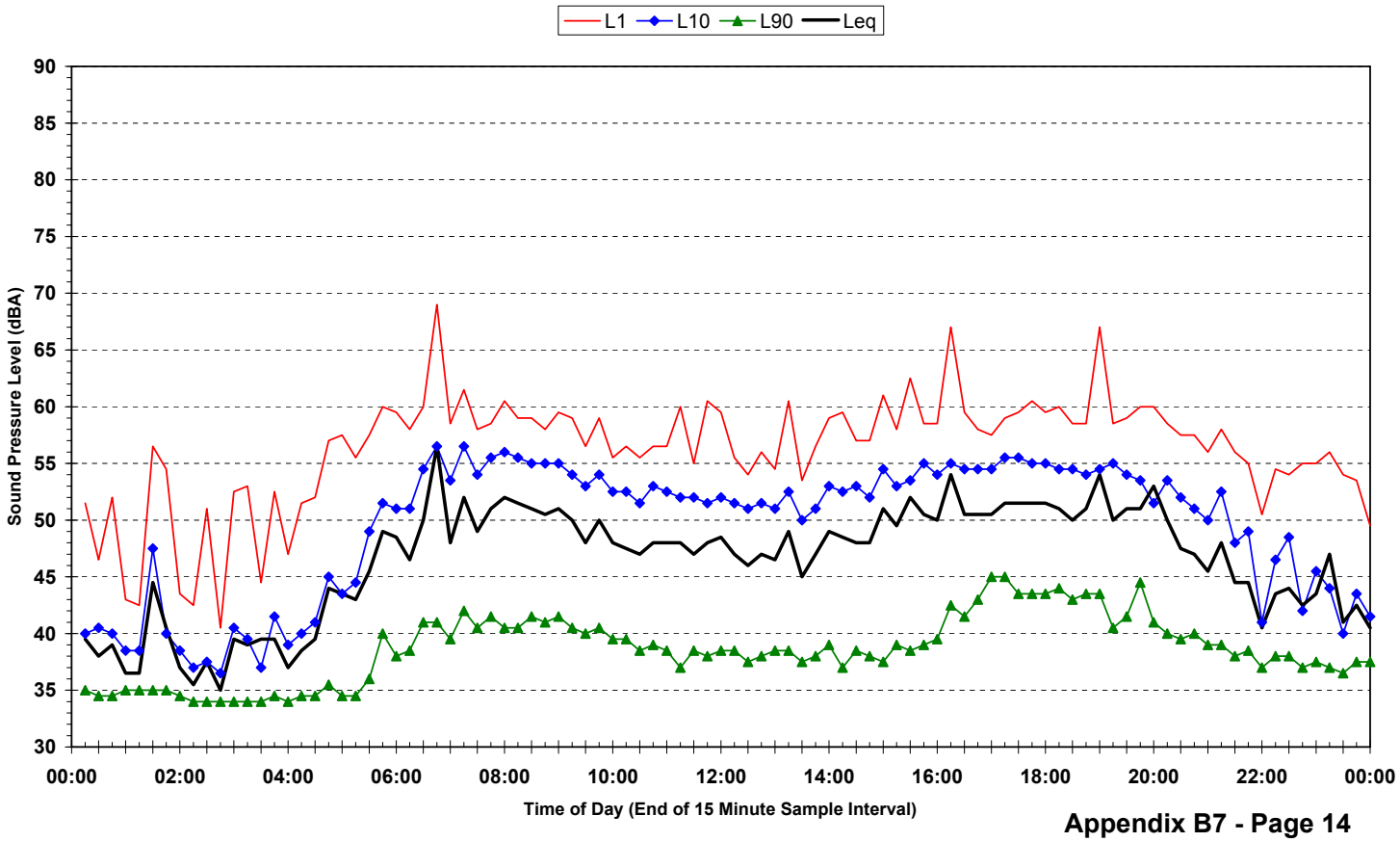
Sun 22-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Monday 23 October 2000



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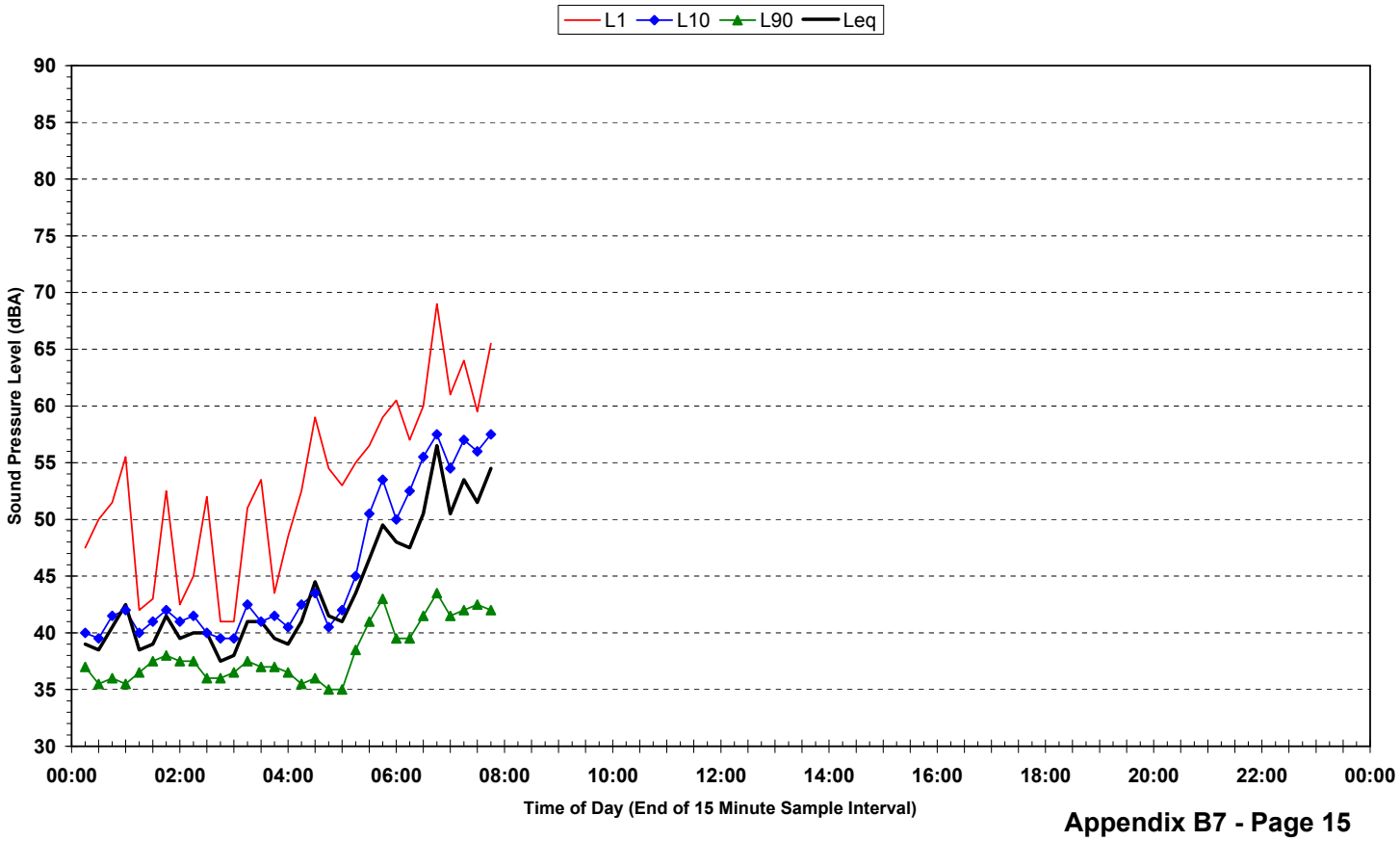
Mon 23-Oct-00 Printed 8/09/2004 09:42

Statistical Ambient Noise Levels
Location G - 156 Buchanan Road, Buchanan - Tuesday 24 October 2000



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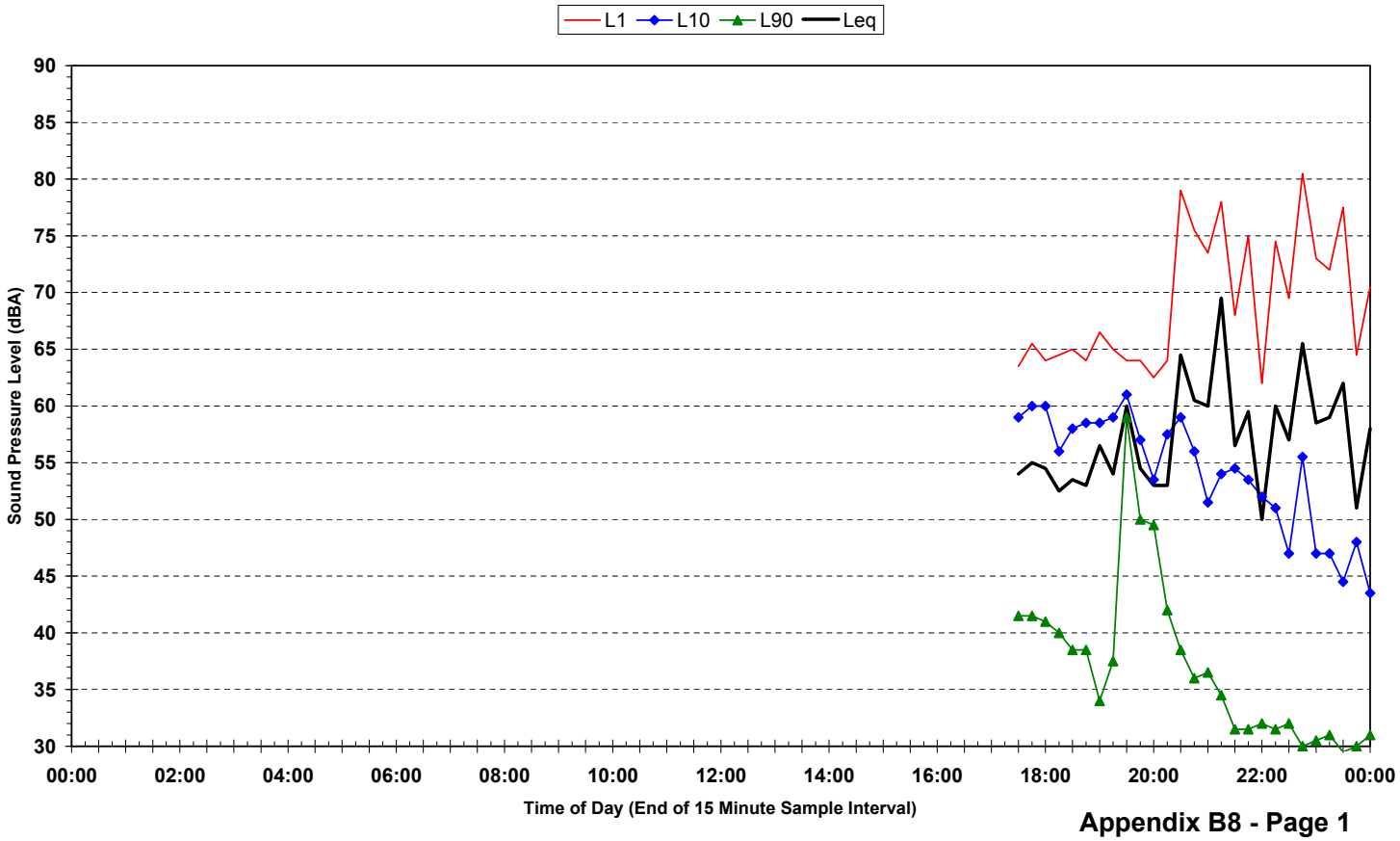
Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Tuesday 10 October 2000



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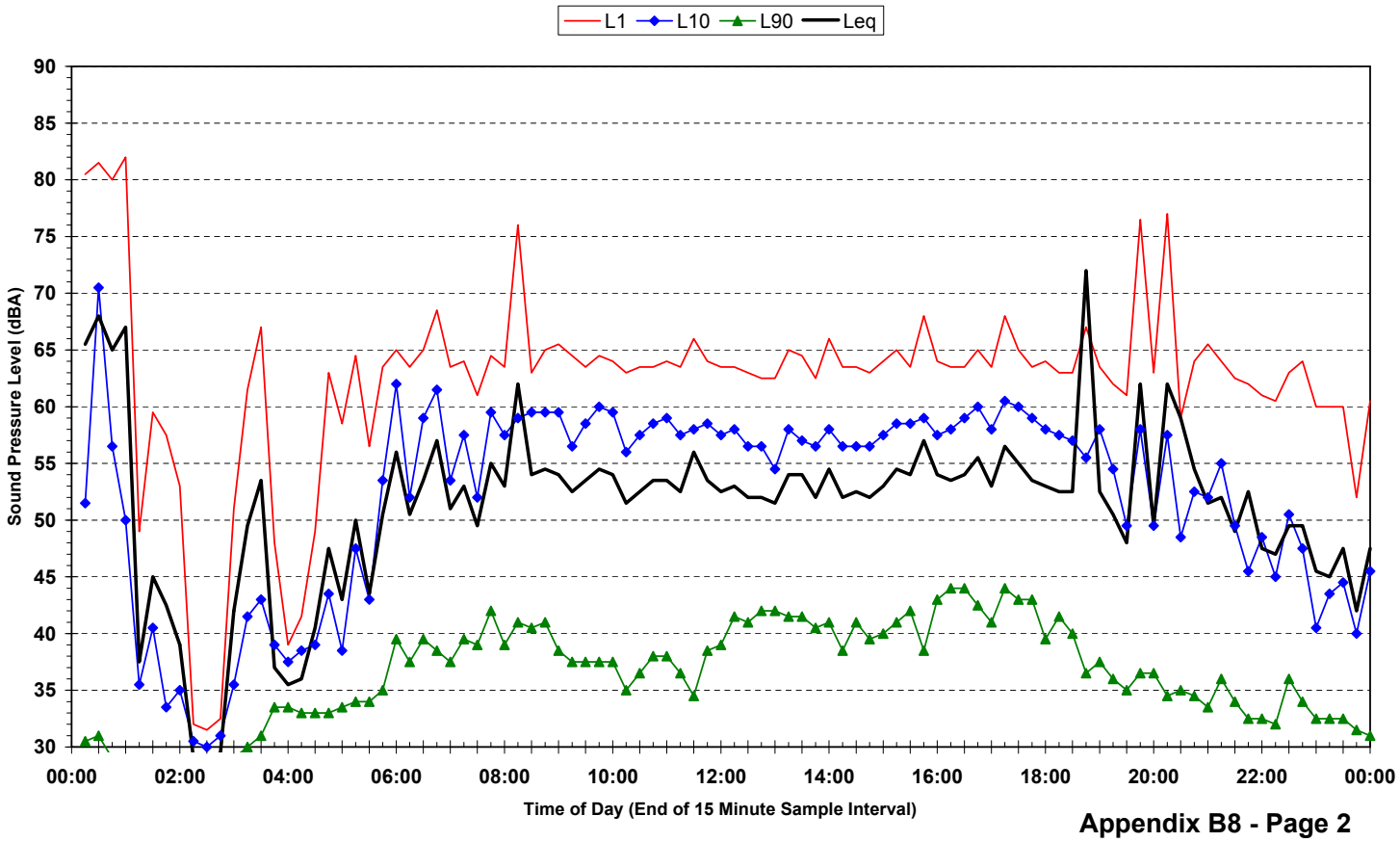
Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Wednesday 11 October 2000



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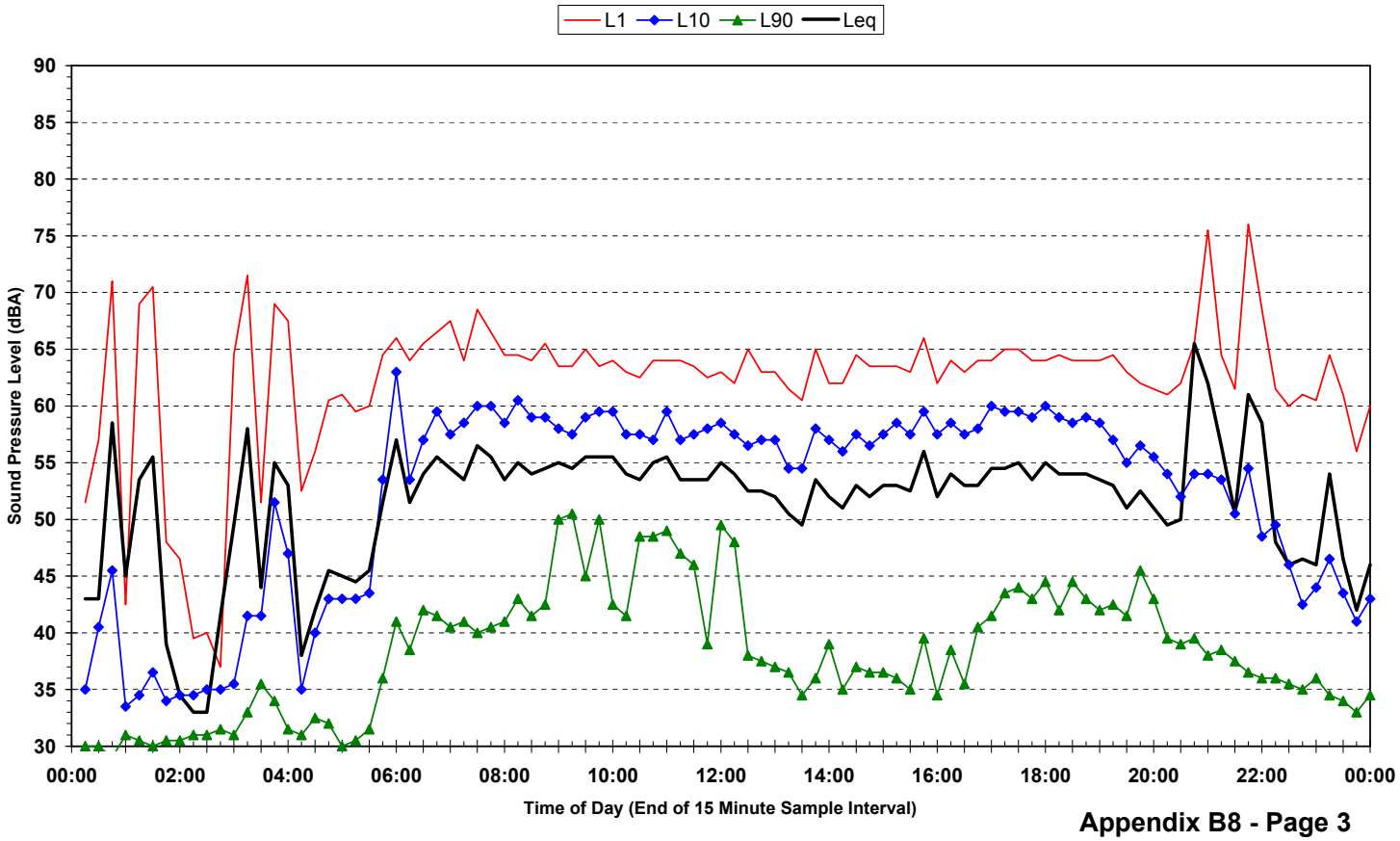
Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Thursday 12 October 2000



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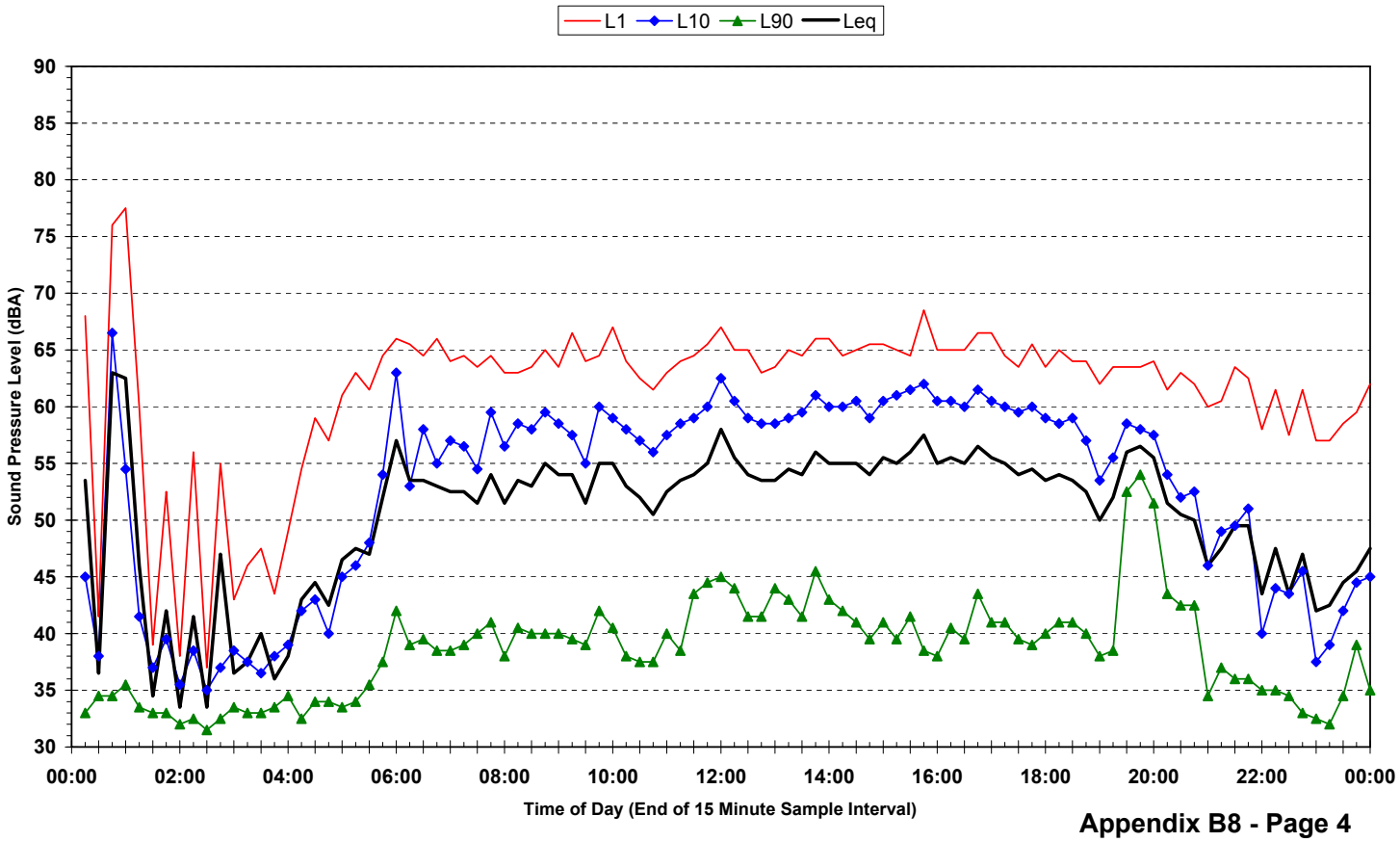
Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Friday 13 October 2000



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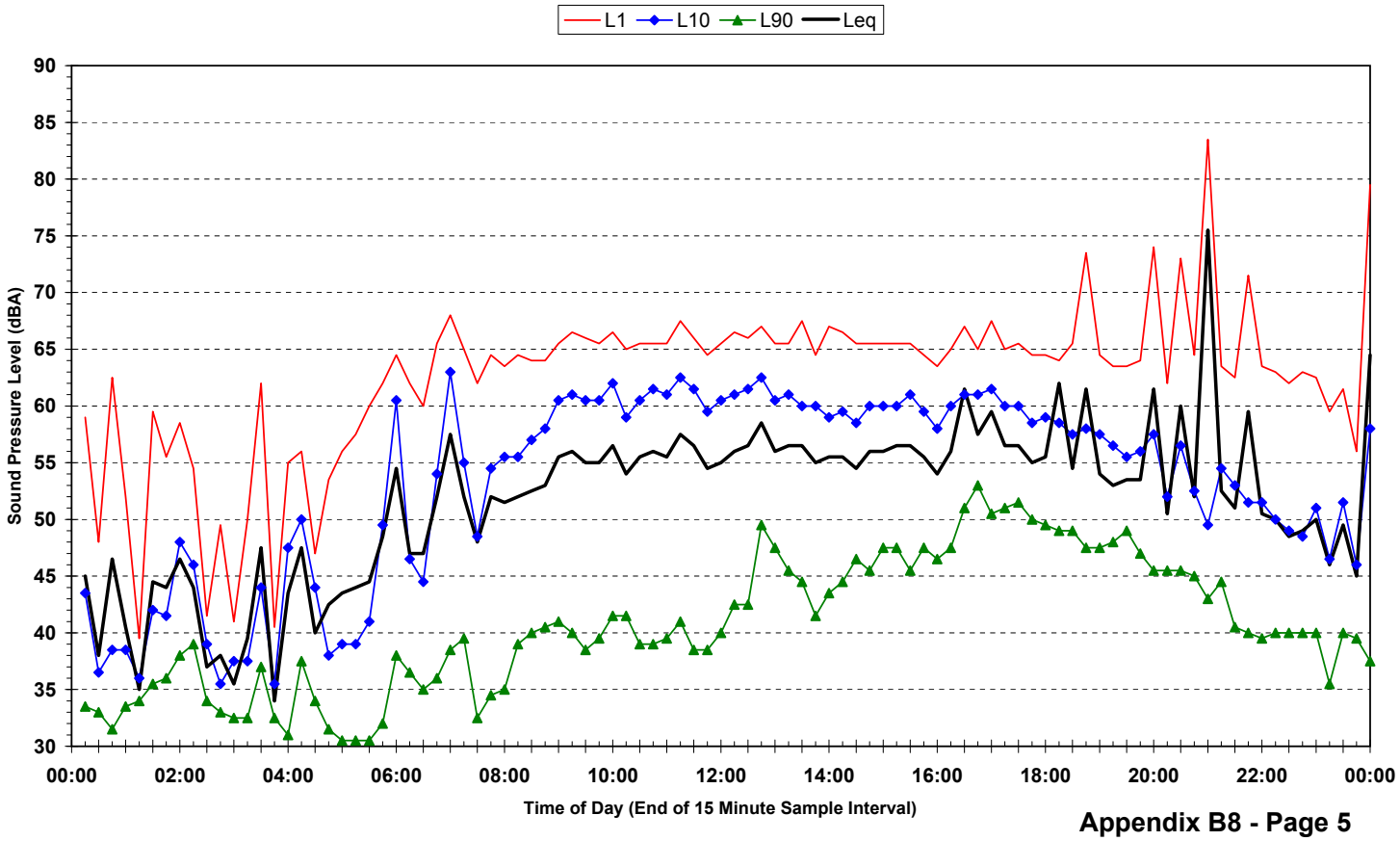
Fri 13-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Saturday 14 October 2000



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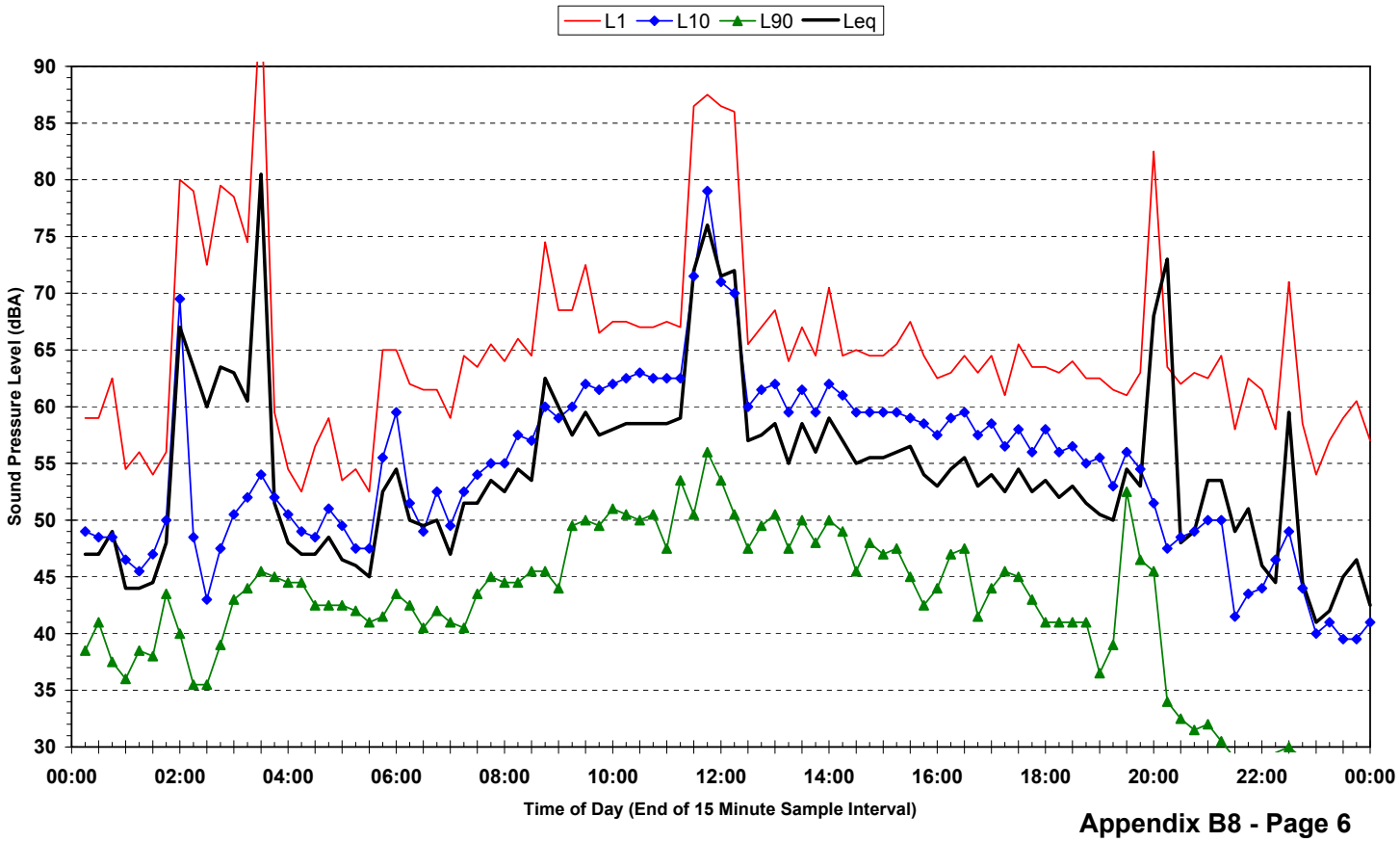
Sat 14-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Sunday 15 October 2000



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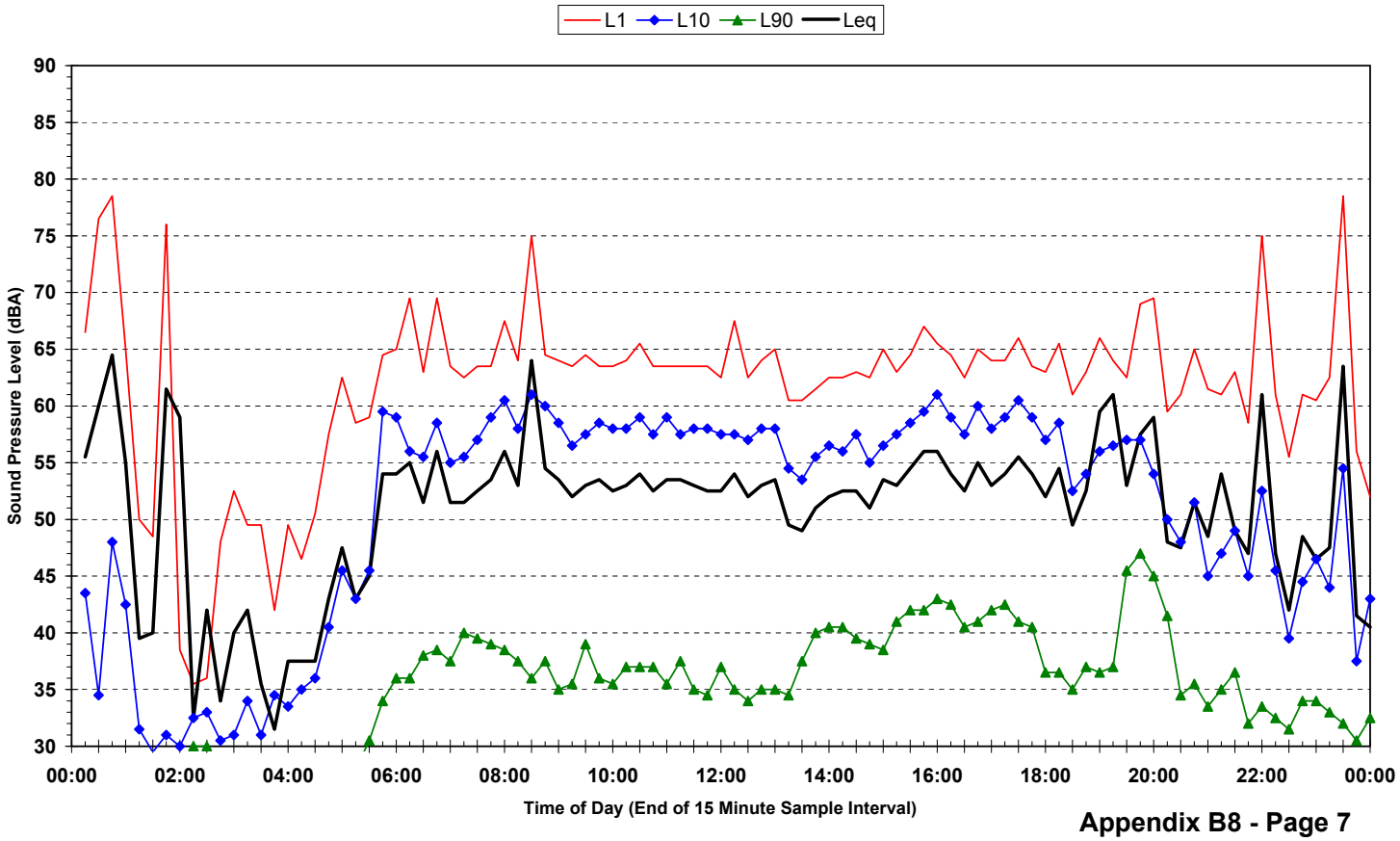
Sun 15-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Monday 16 October 2000



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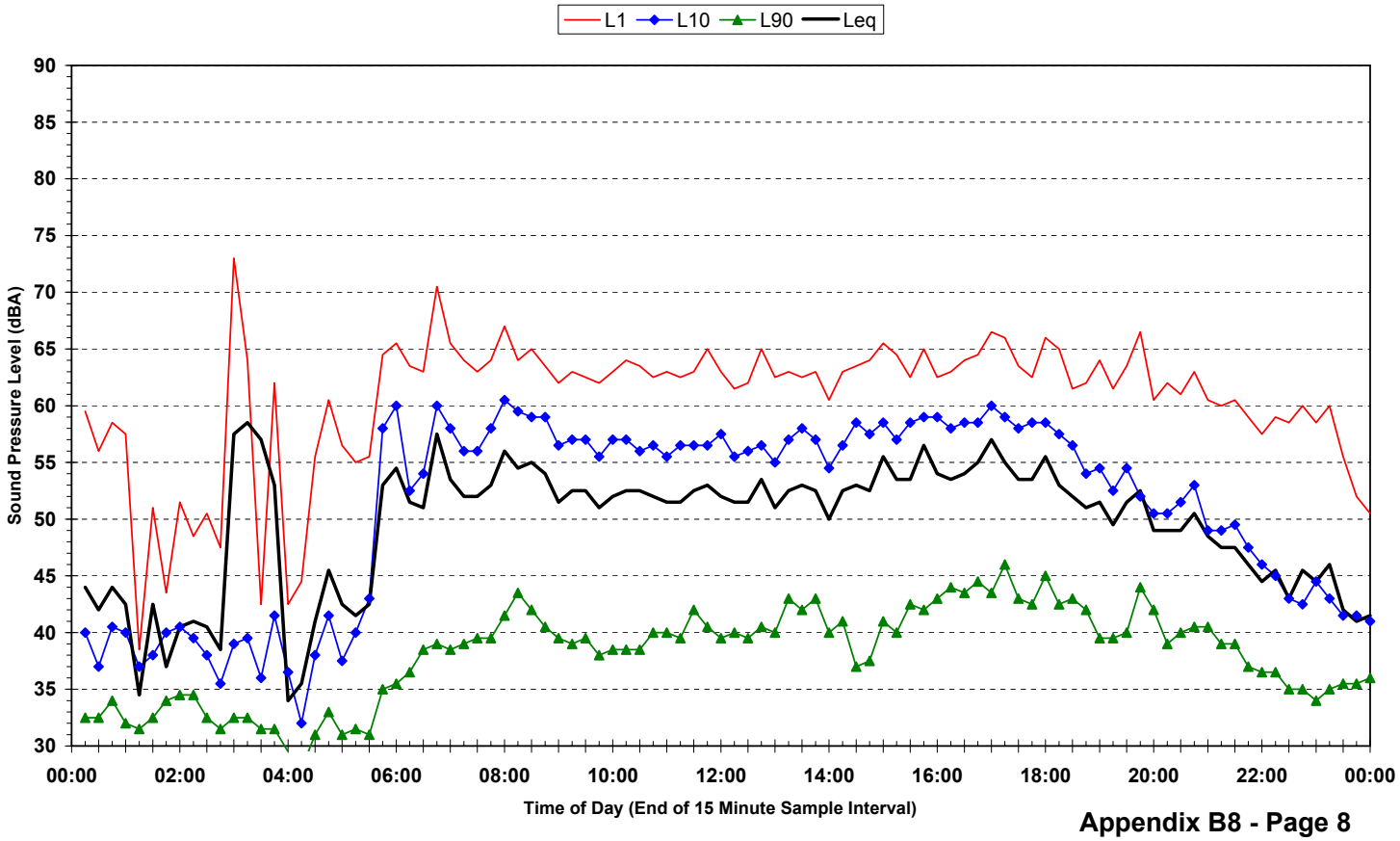
Mon 16-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Tuesday 17 October 2000



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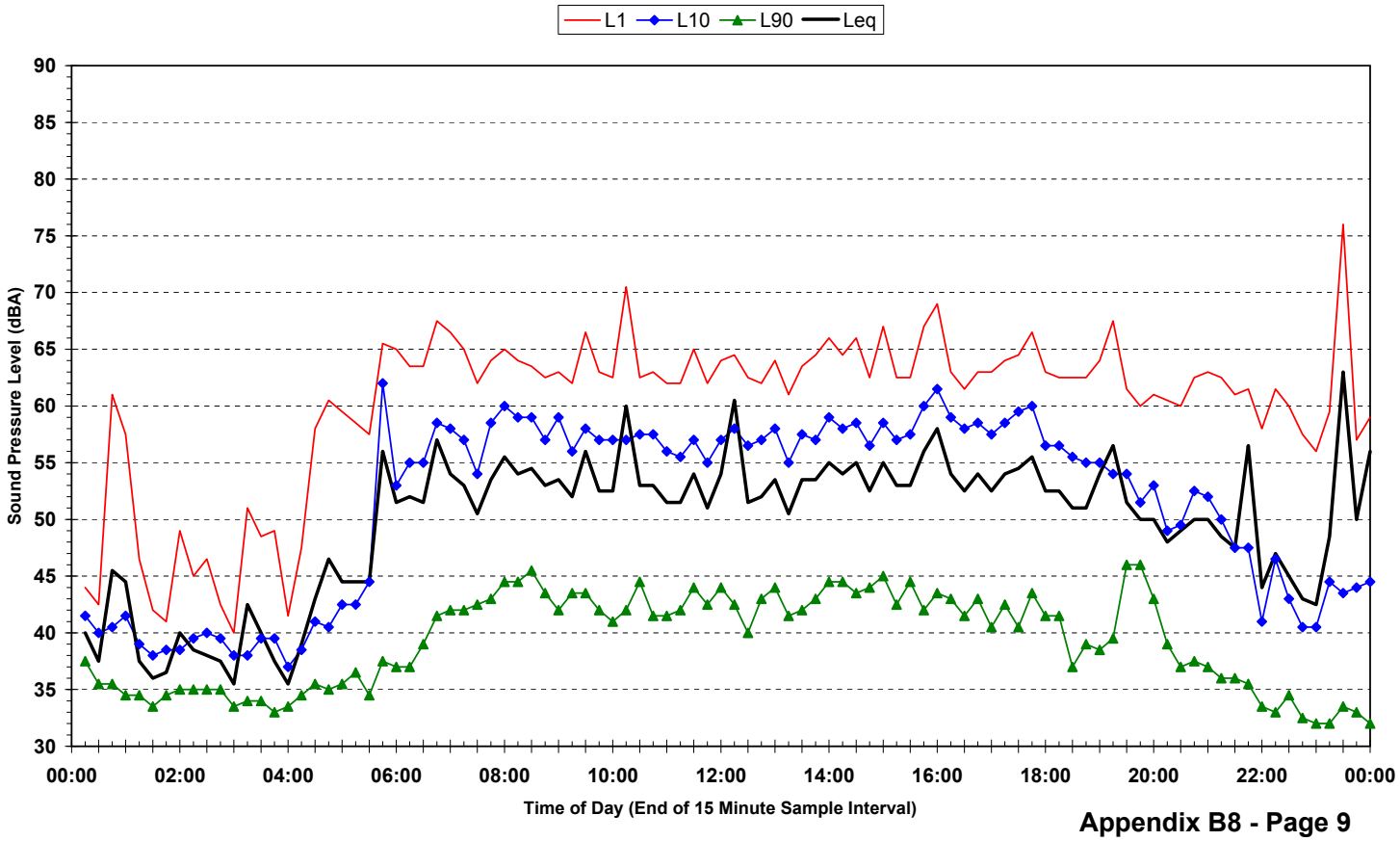
Tue 17-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Wednesday 18 October 2000



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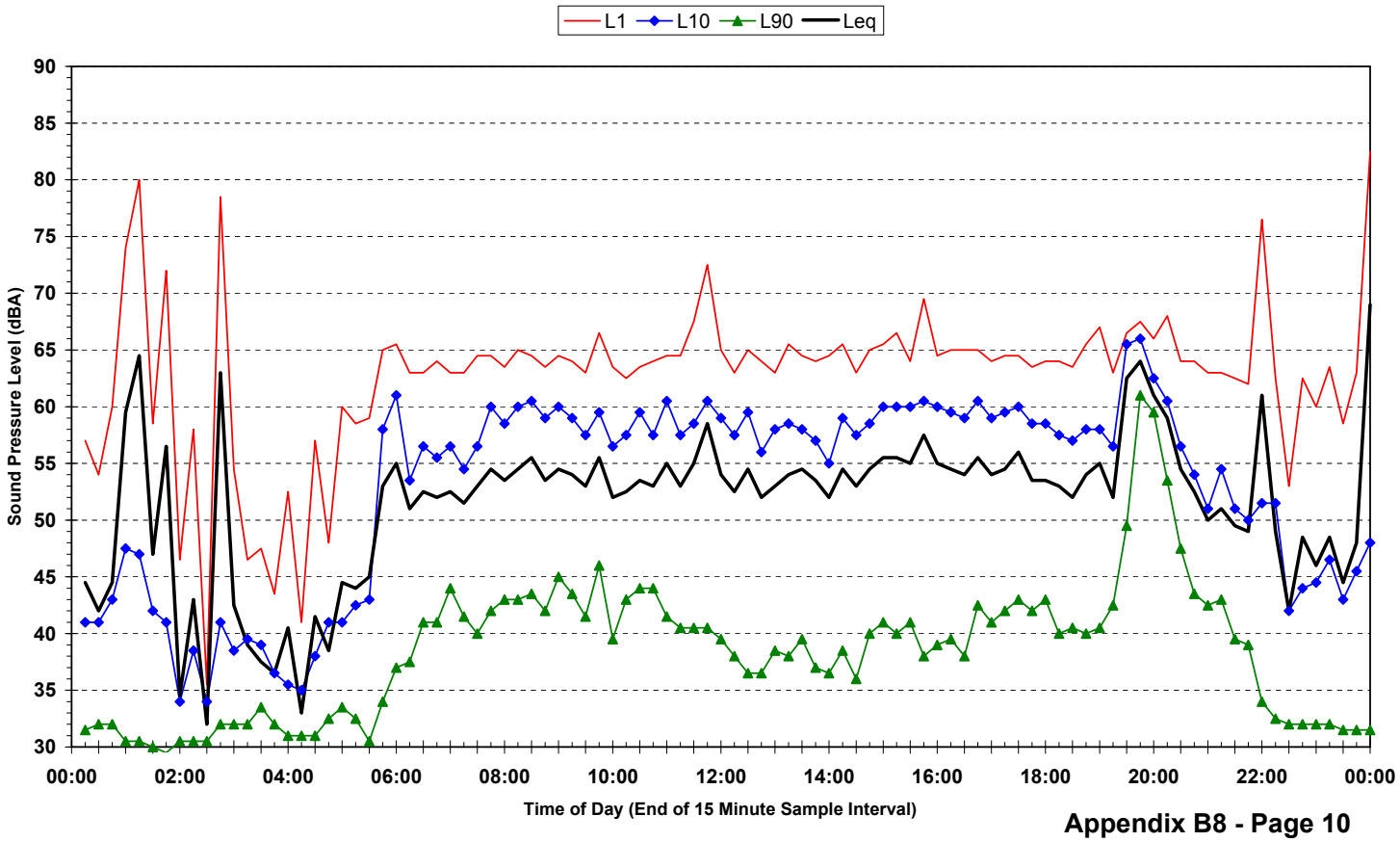
Wed 18-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Thursday 19 October 2000



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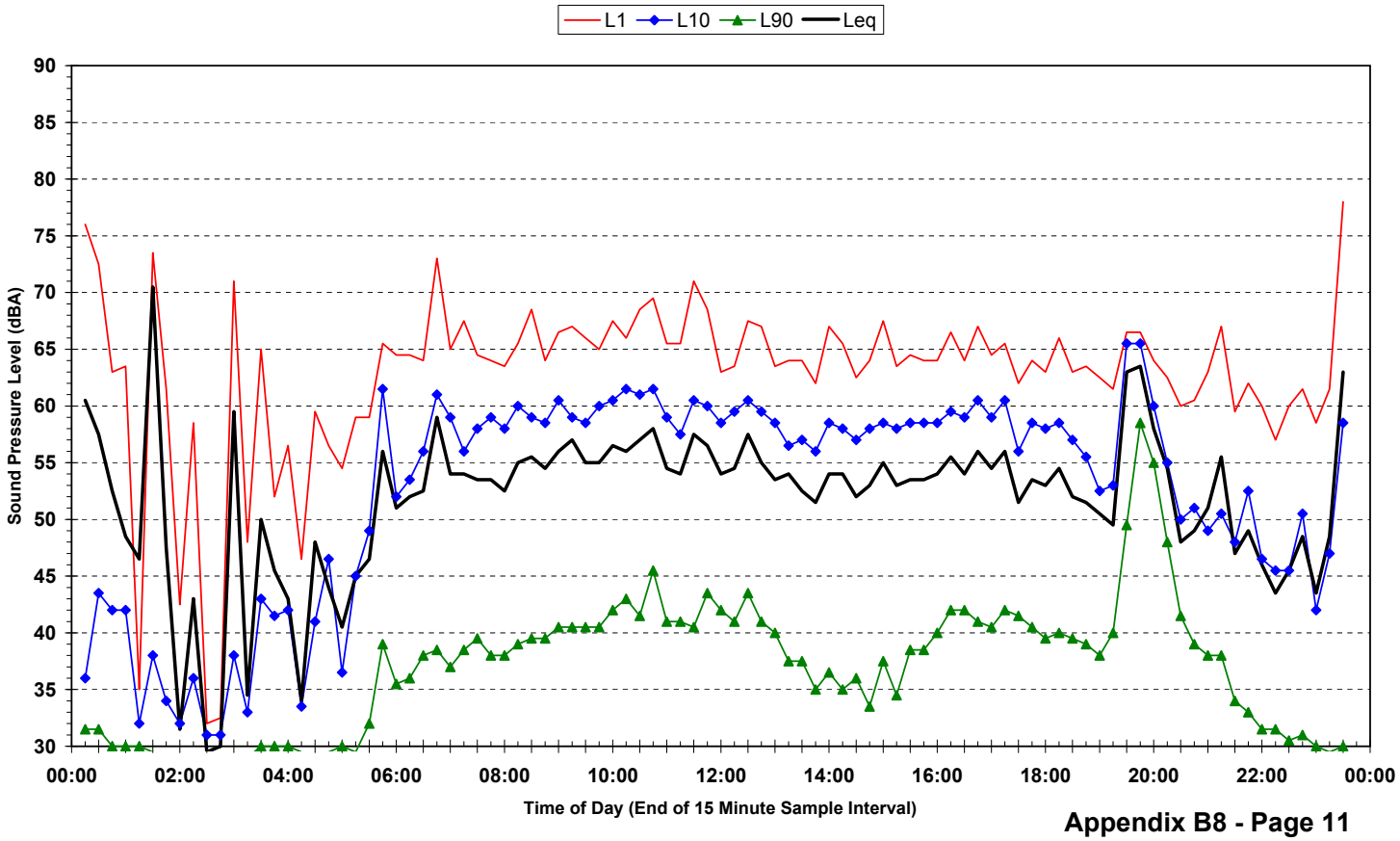
Thu 19-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location H - 325 Mount Vincent Road, Louth Park - Friday 20 October 2000



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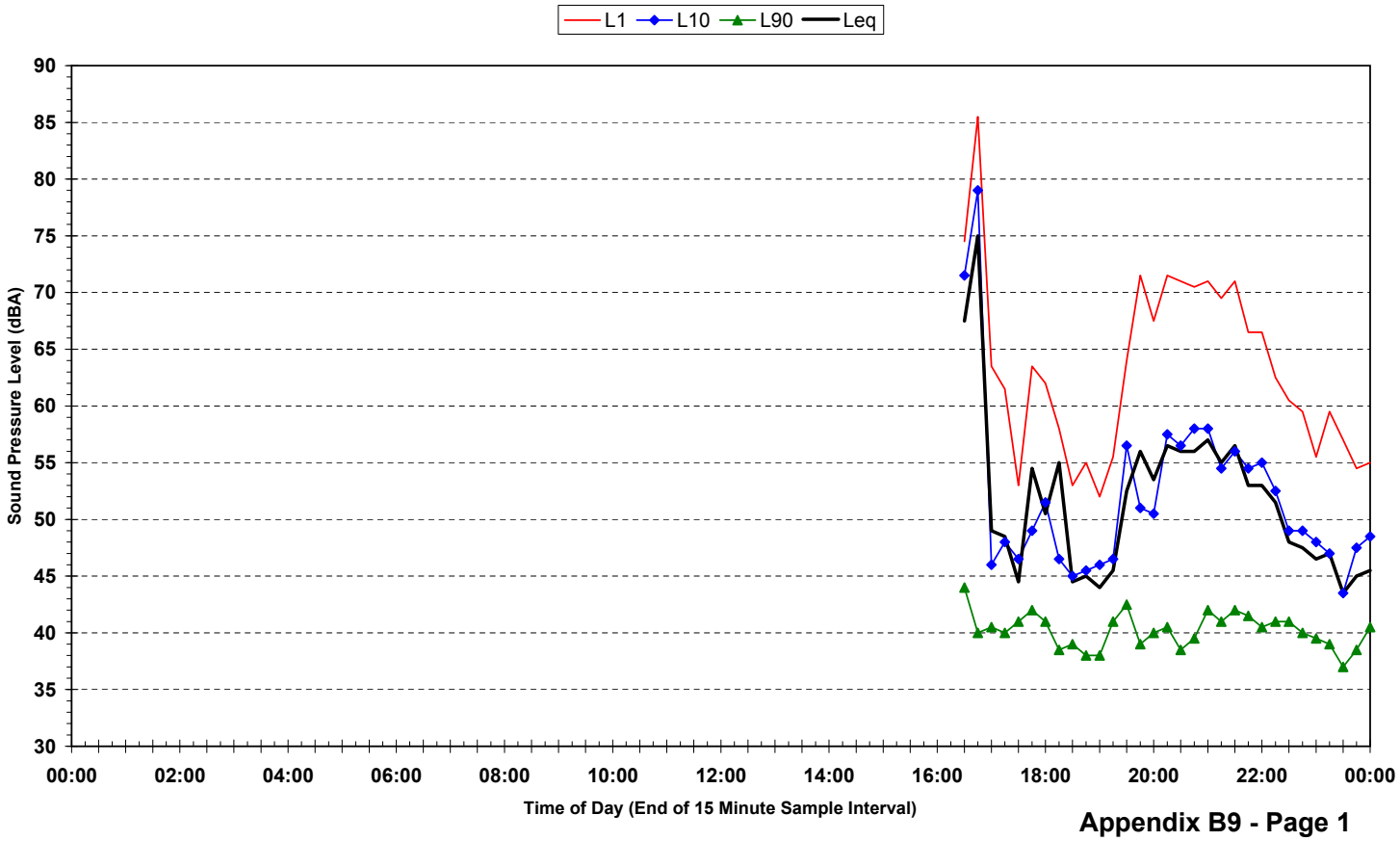
Fri 20-Oct-00 Printed 8/09/2004 09:43

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Tuesday 10 October 2000



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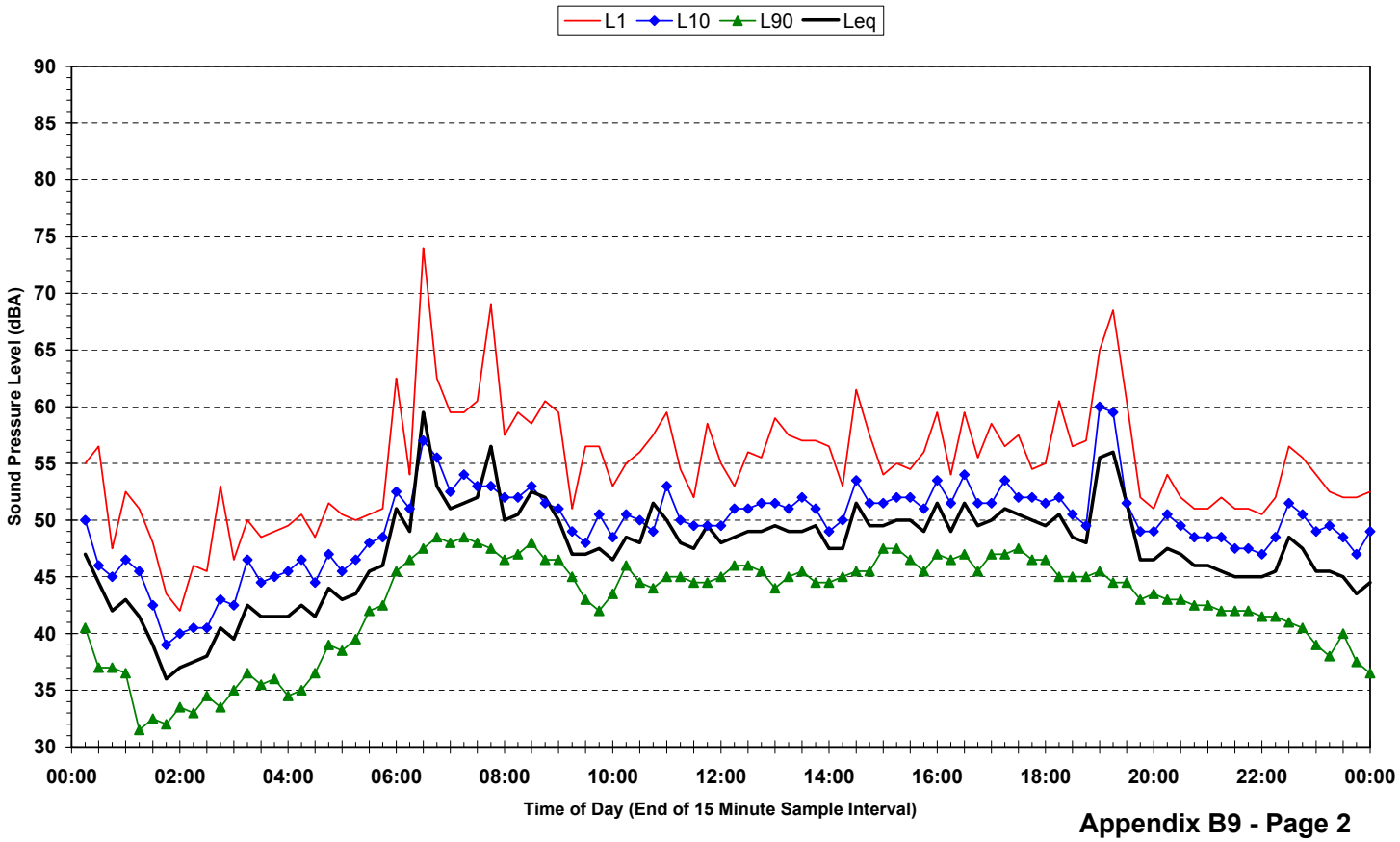
Tue 10-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Wednesday 11 October 2000



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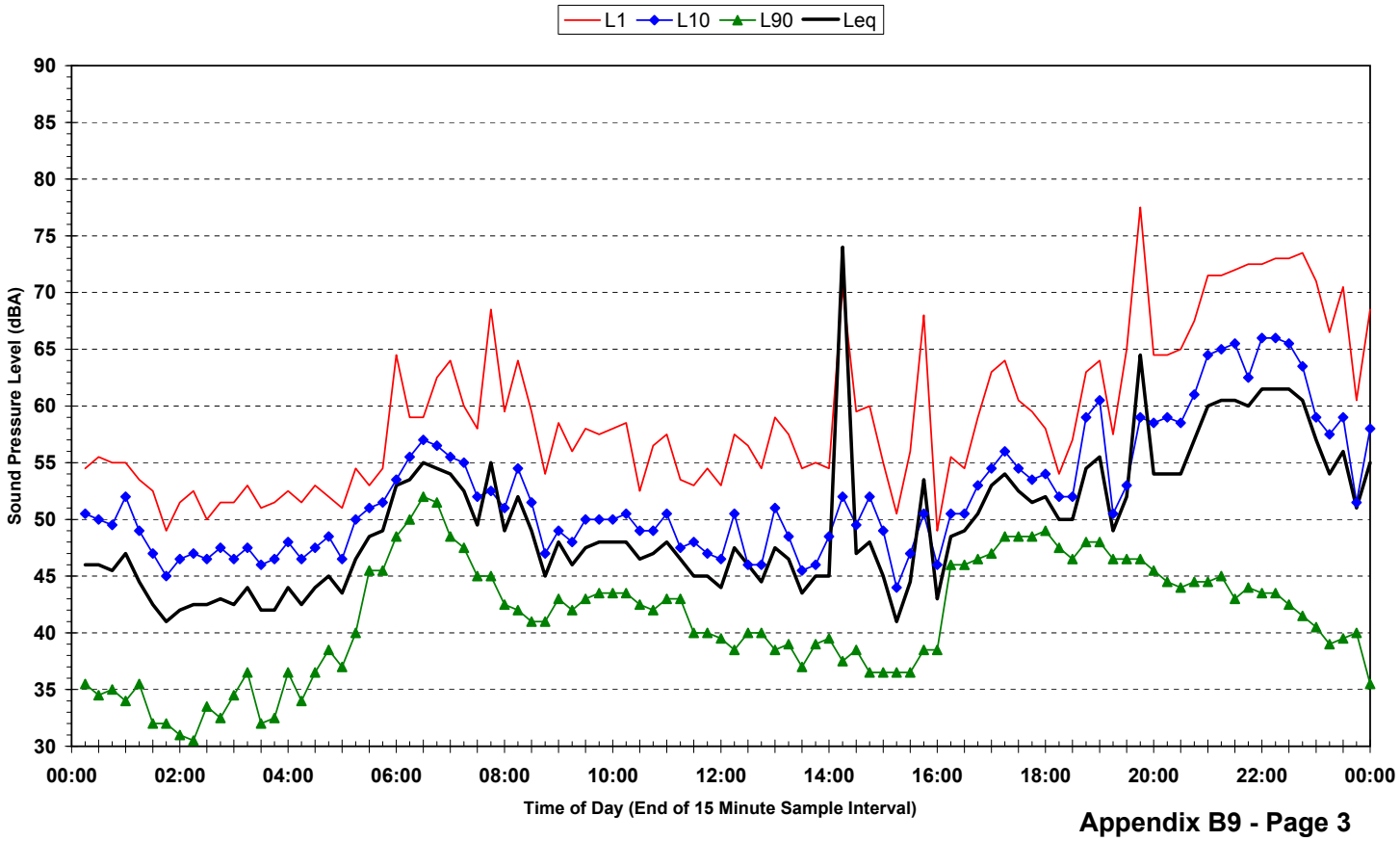
Wed 11-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Thursday 12 October 2000



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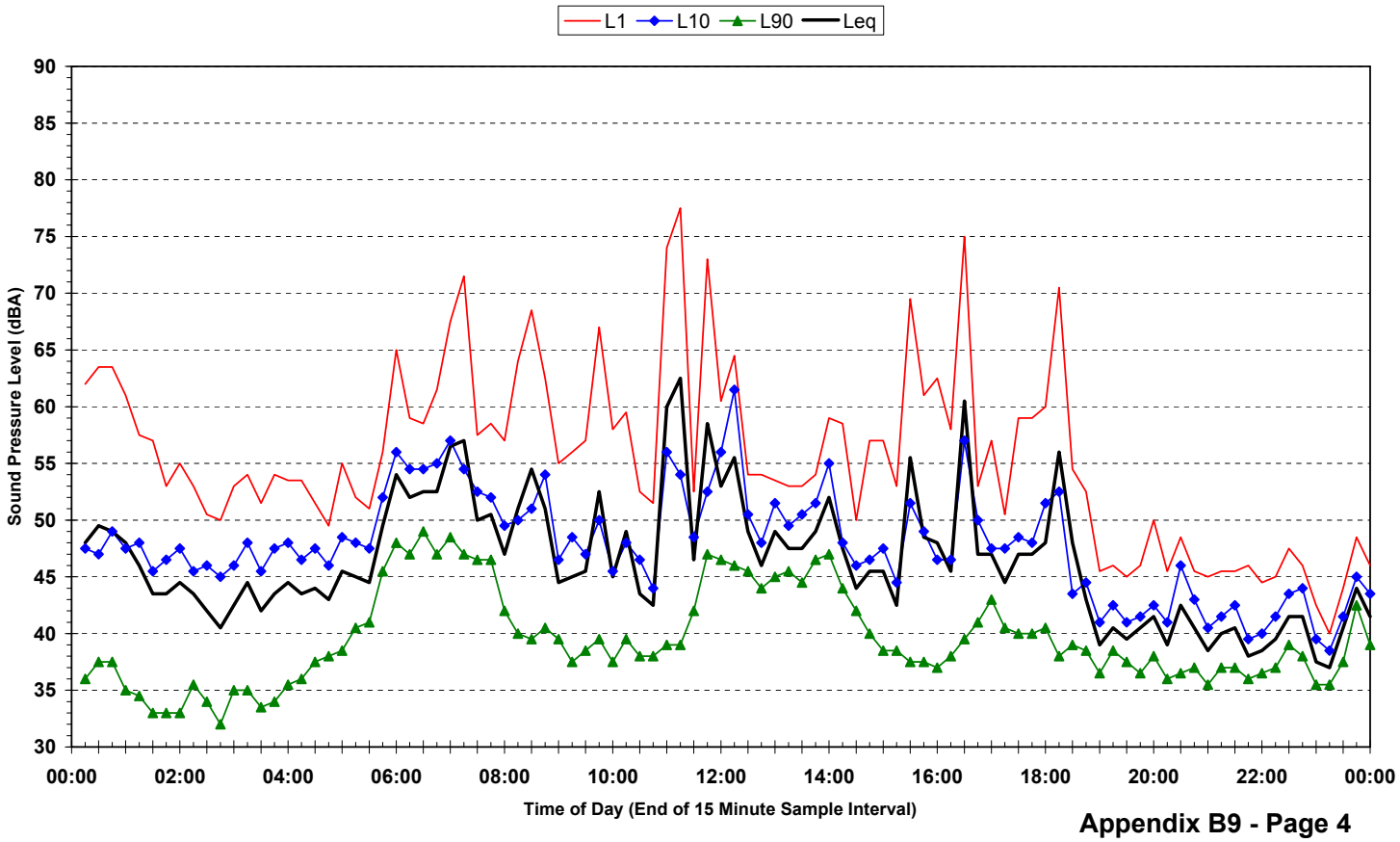
Thu 12-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Friday 13 October 2000



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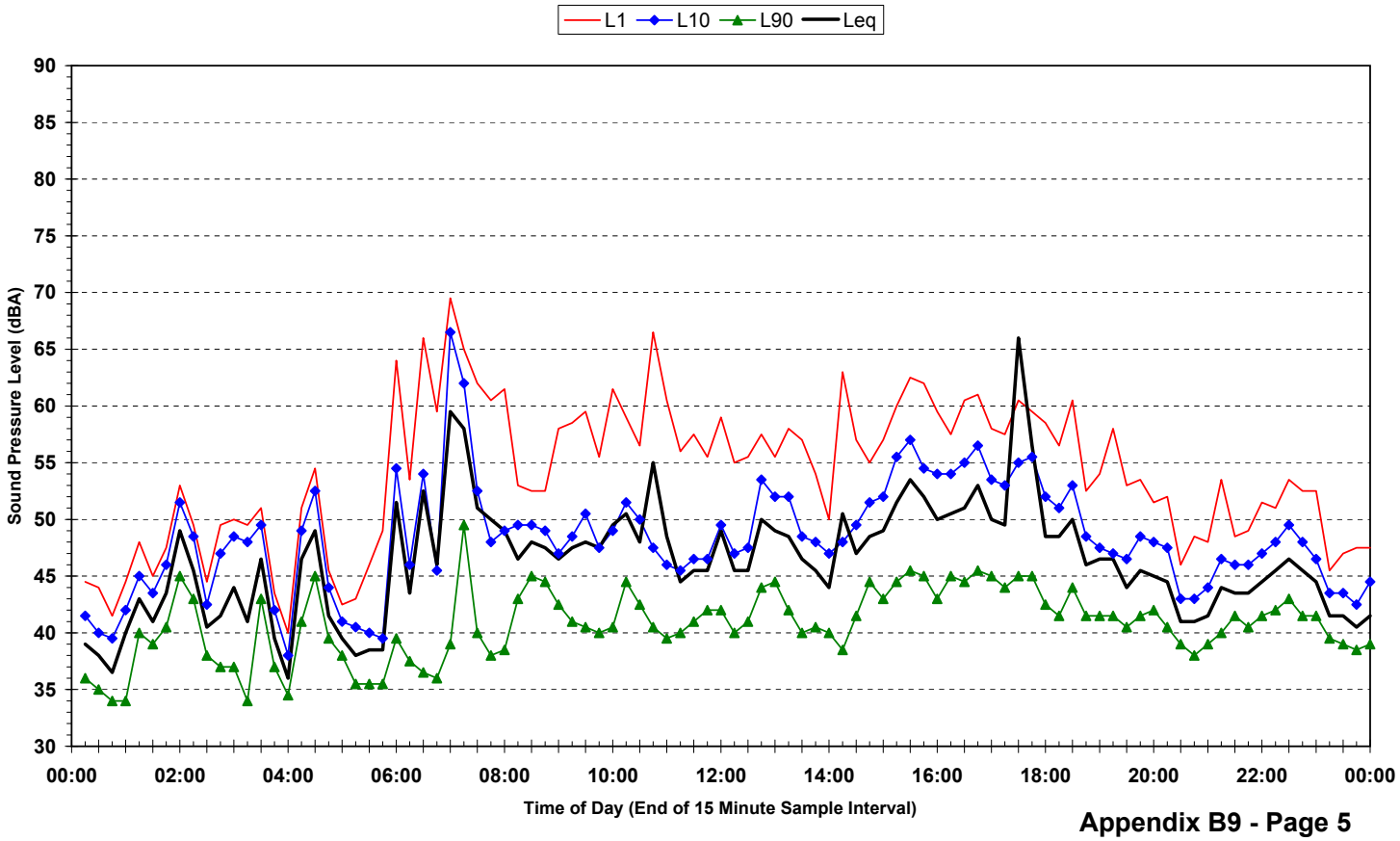
Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Saturday 14 October 2000



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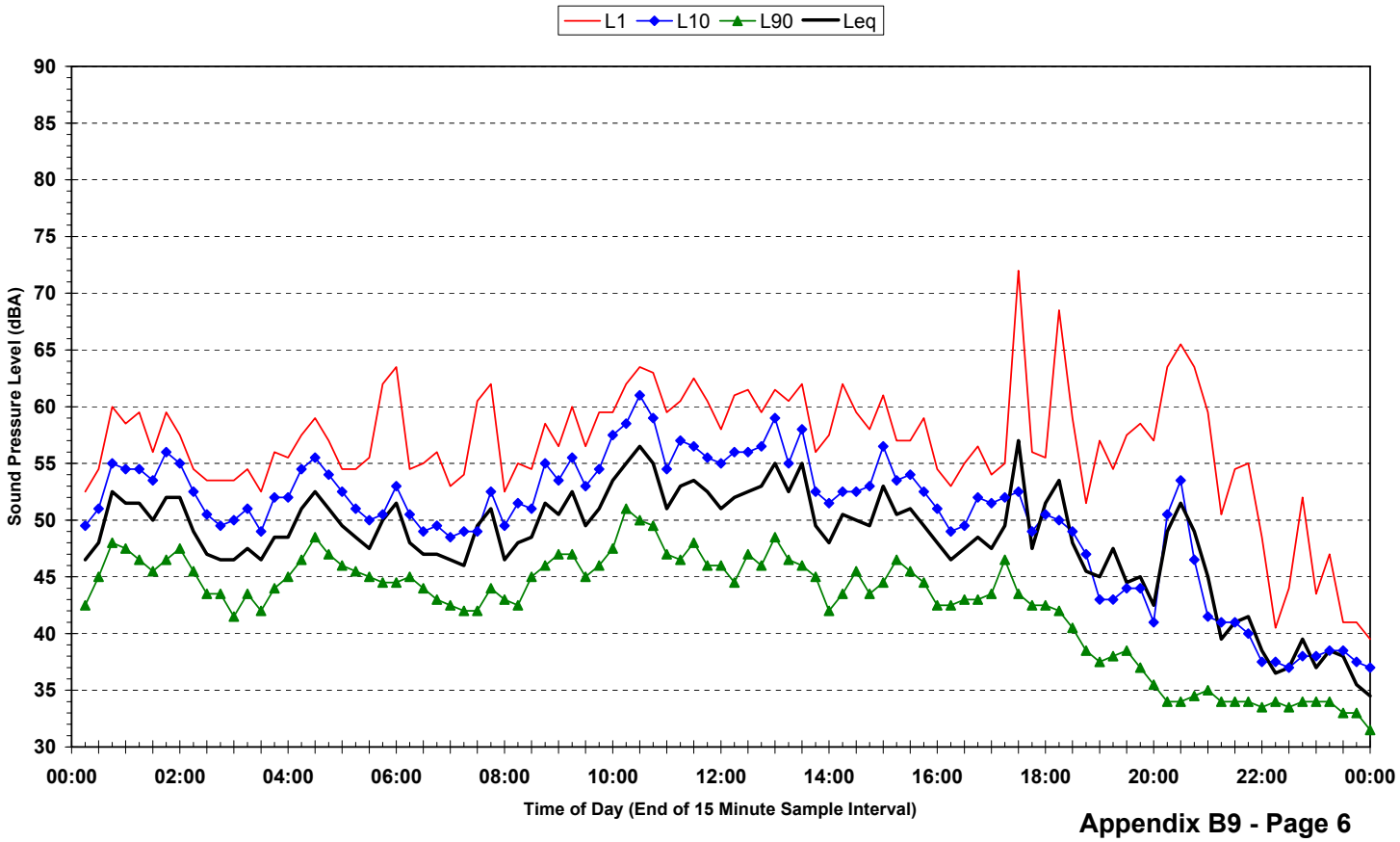
Sat 14-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Sunday 15 October 2000



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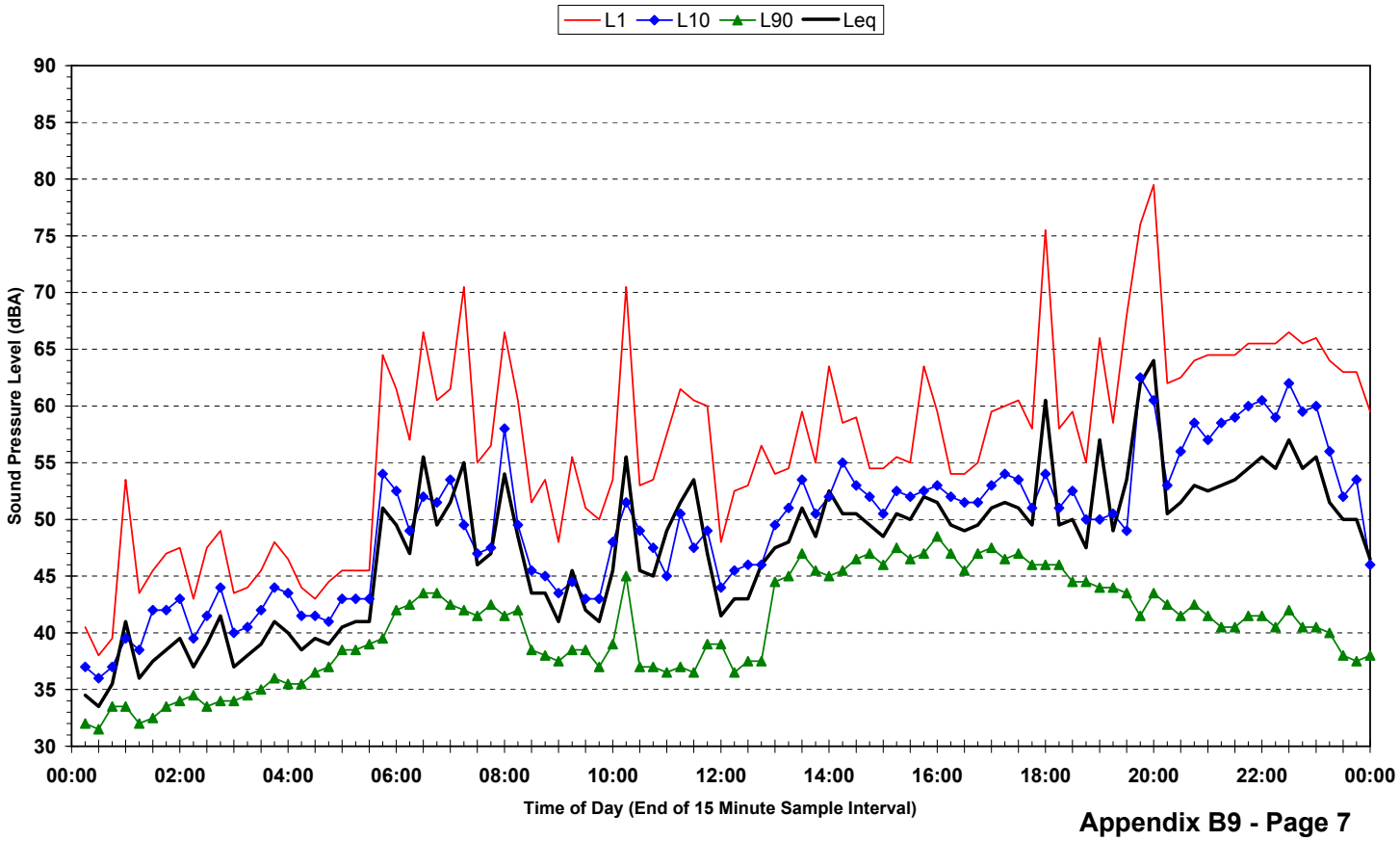
Sun 15-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Monday 16 October 2000



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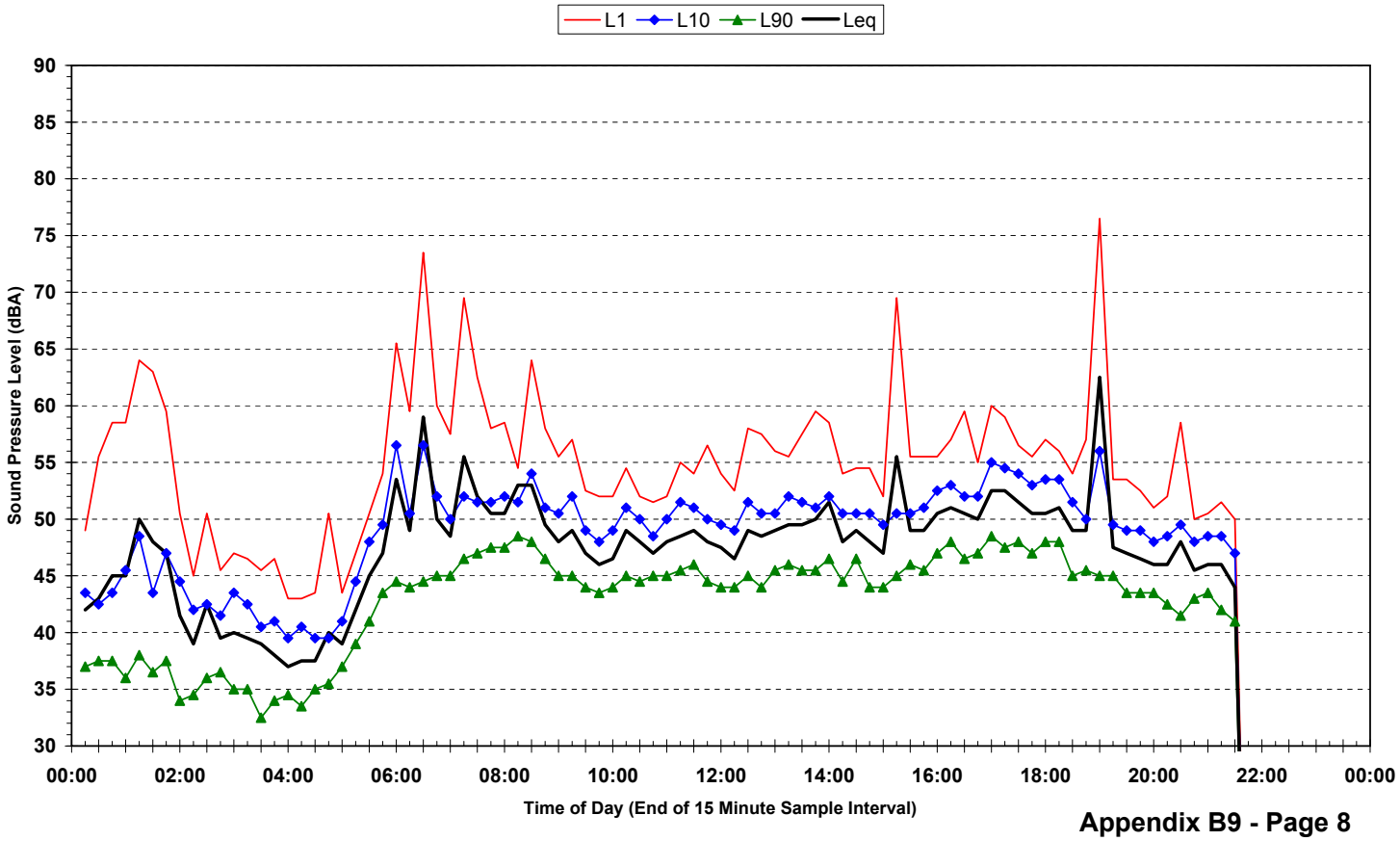
Mon 16-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Tuesday 17 October 2000



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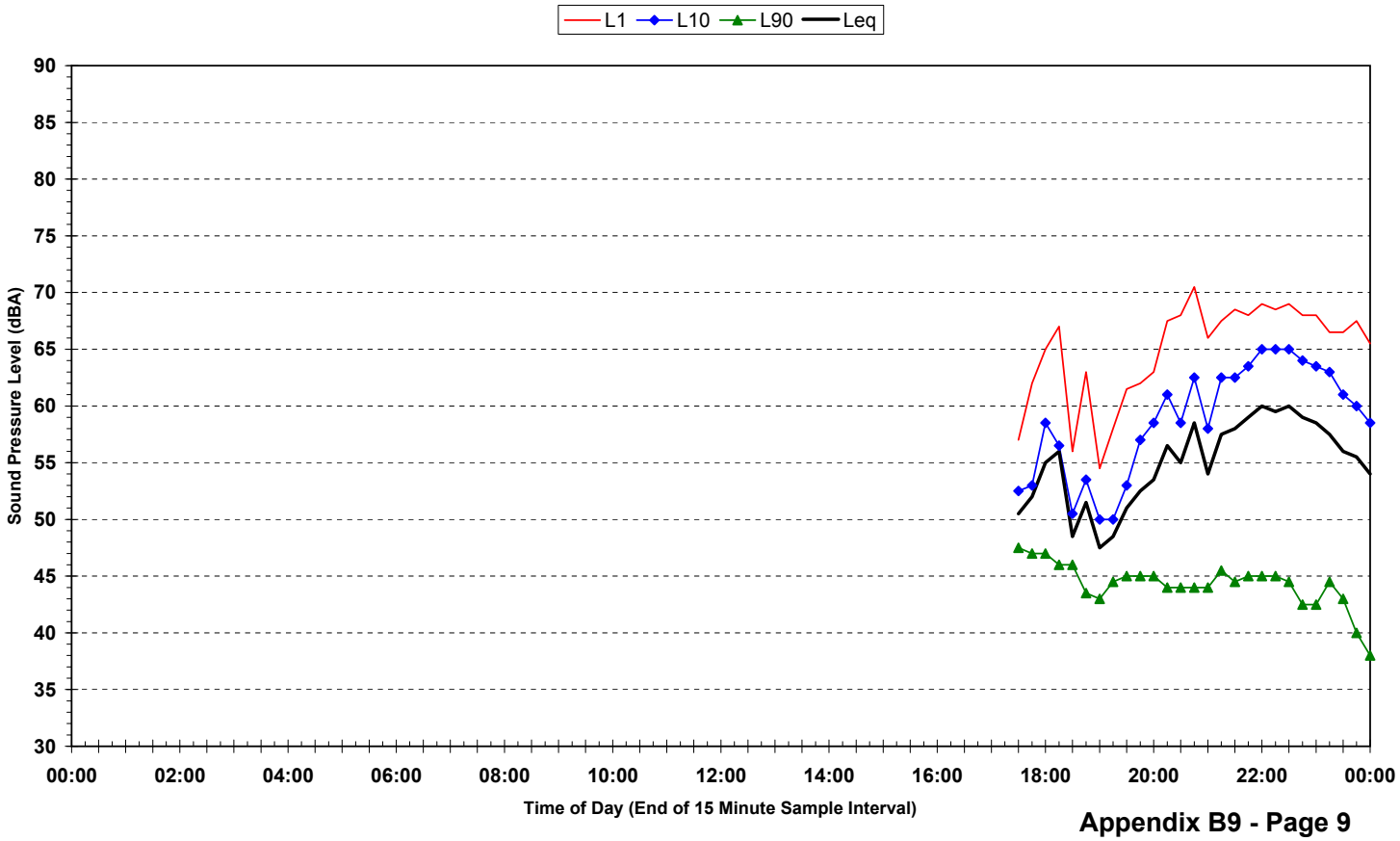
Tue 17-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Wednesday 18 October 2000



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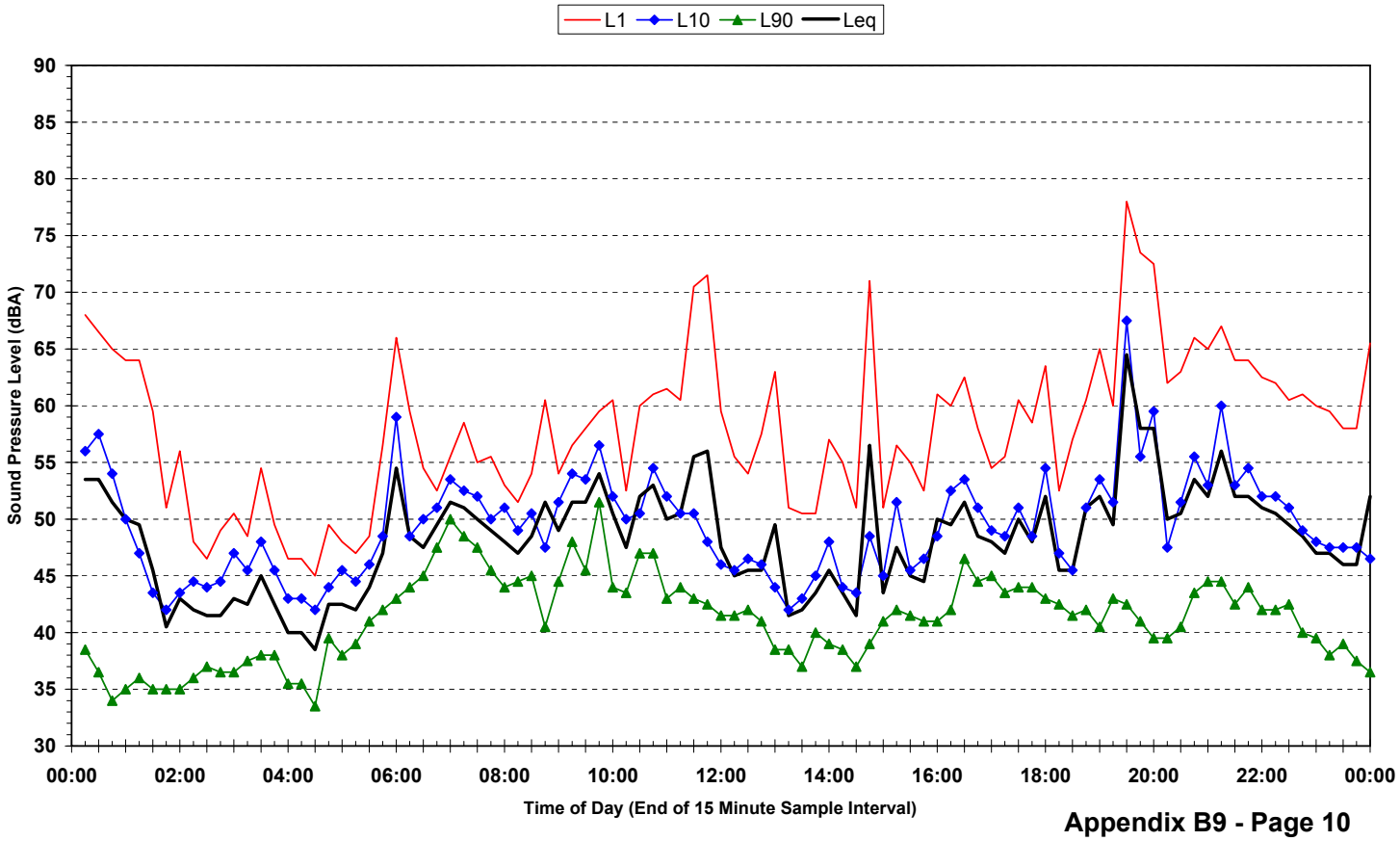
Wed 18-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Thursday 19 October 2000



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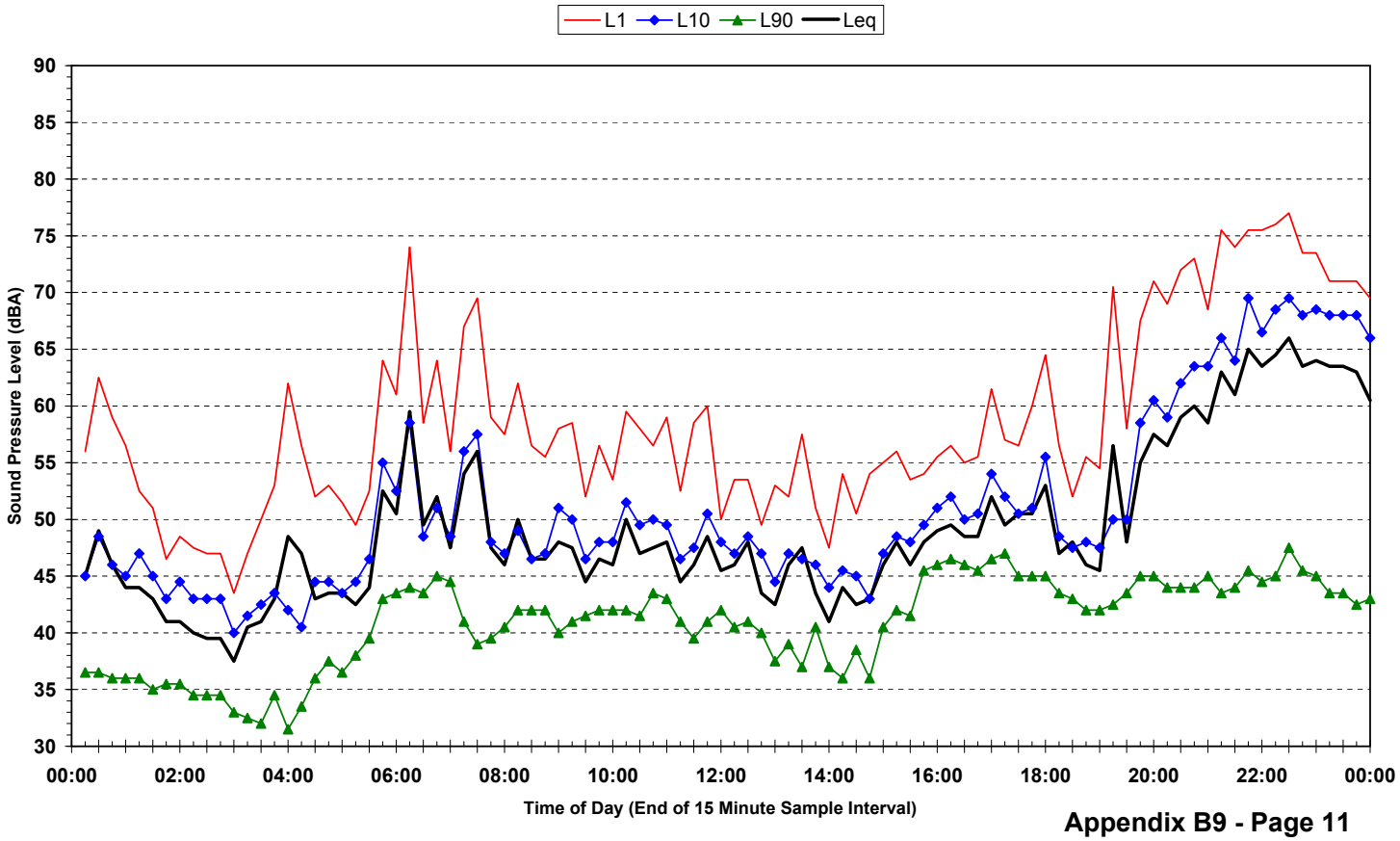
Thu 19-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Friday 20 October 2000



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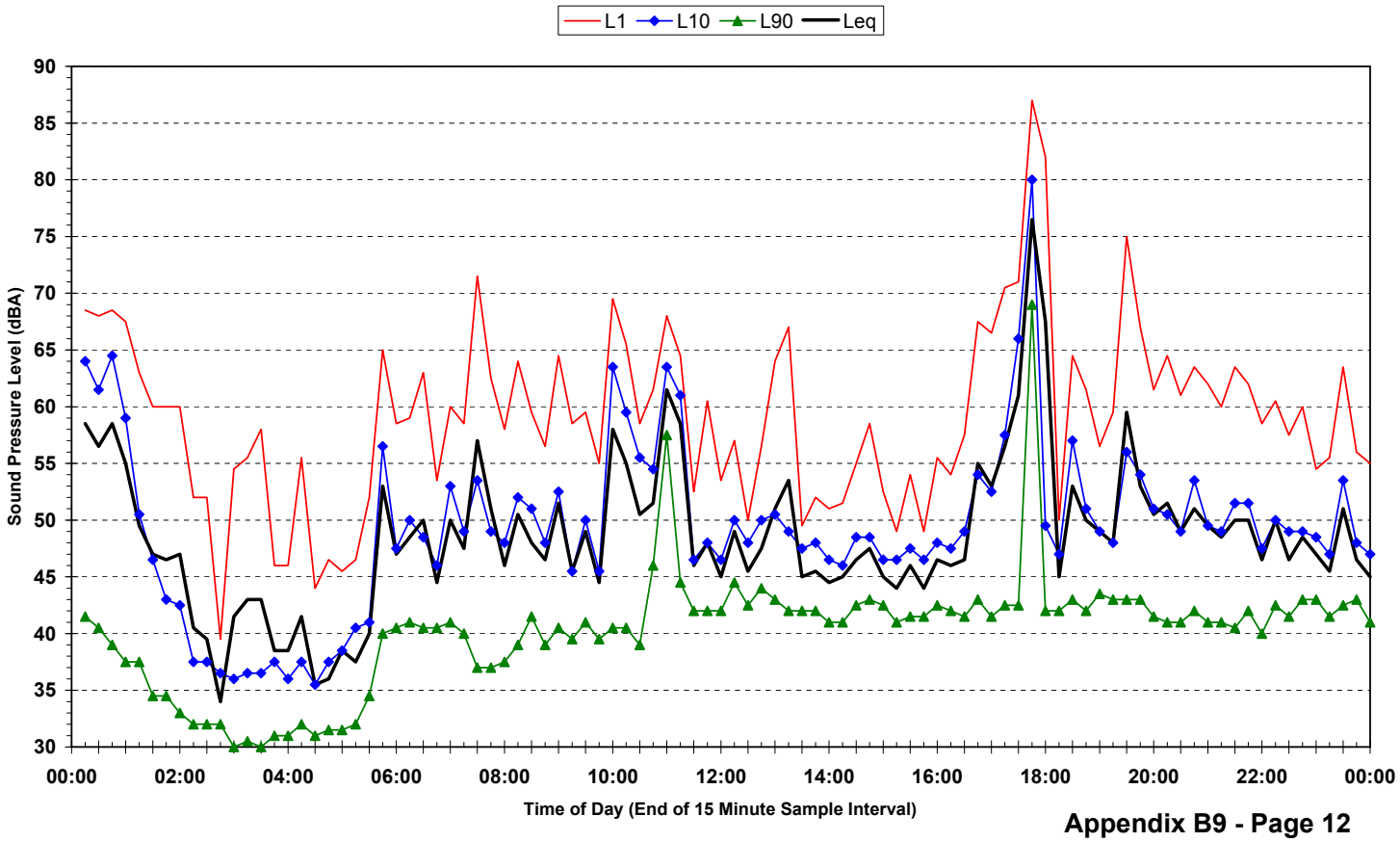
Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Saturday 21 October 2000



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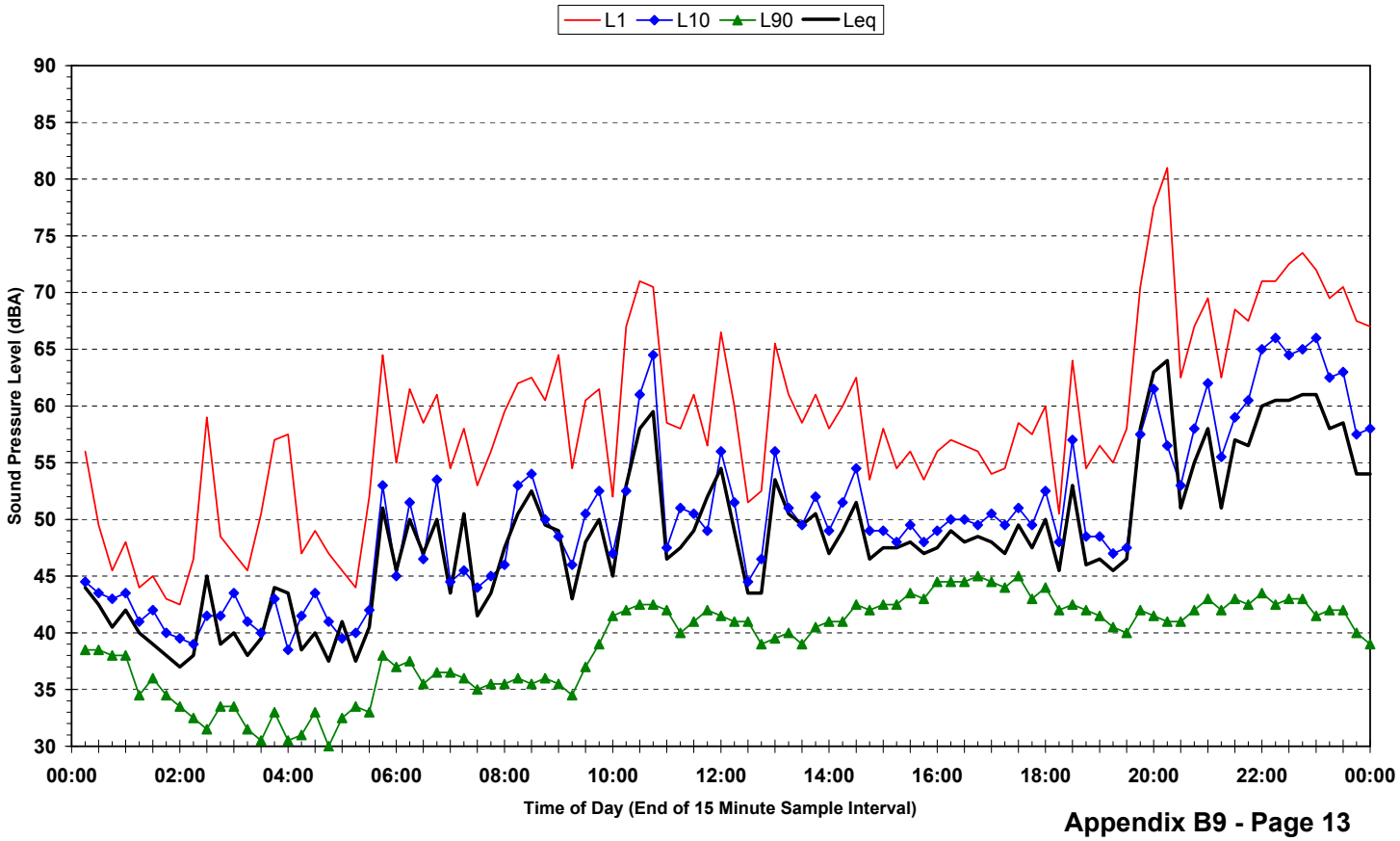
Sat 21-Oct-00 Printed 8/09/2004 09:44

Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Sunday 22 October 2000



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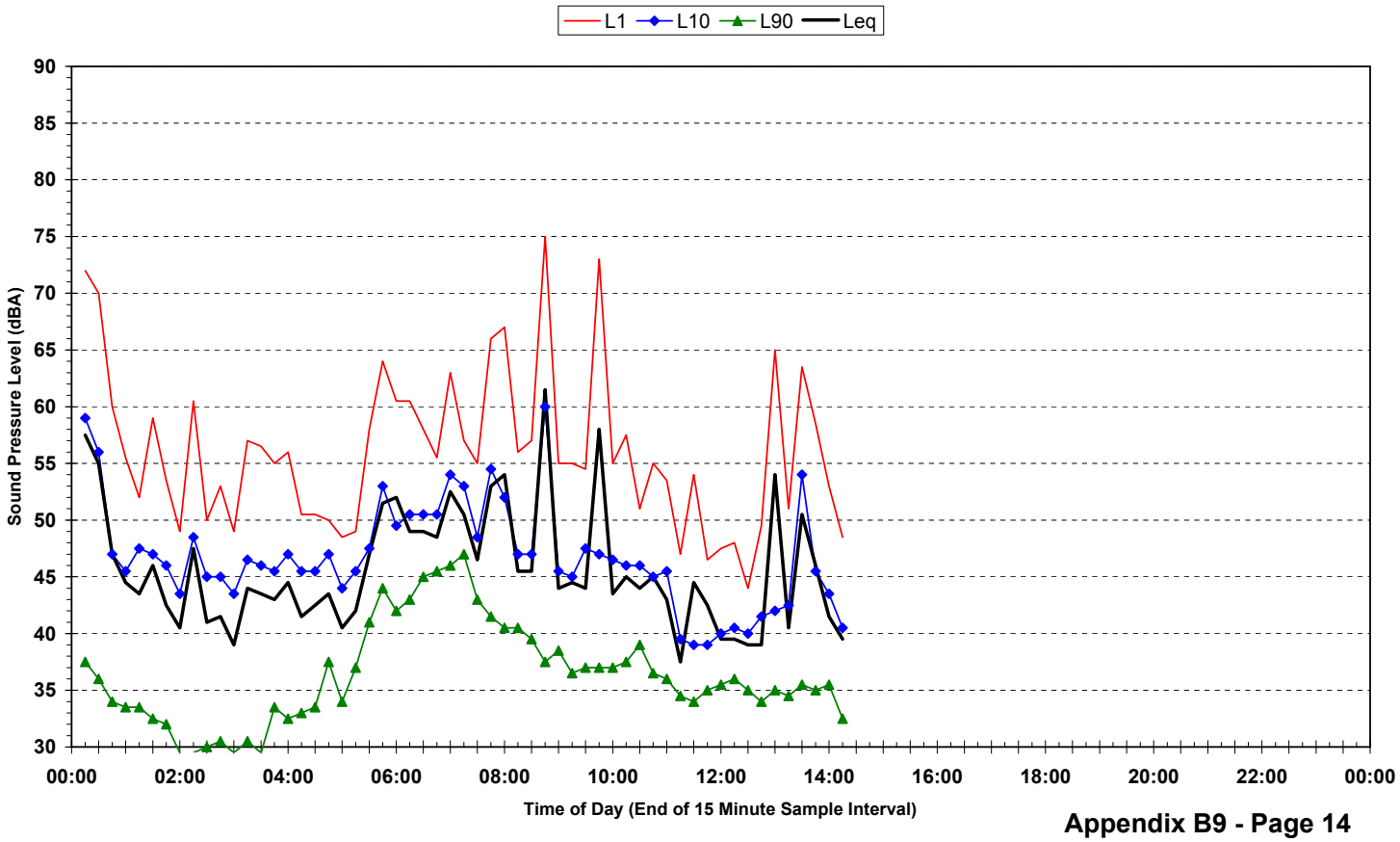
Statistical Ambient Noise Levels
Location I - 3 Lord Howe Drive, Ashtonfield - Monday 23 October 2000



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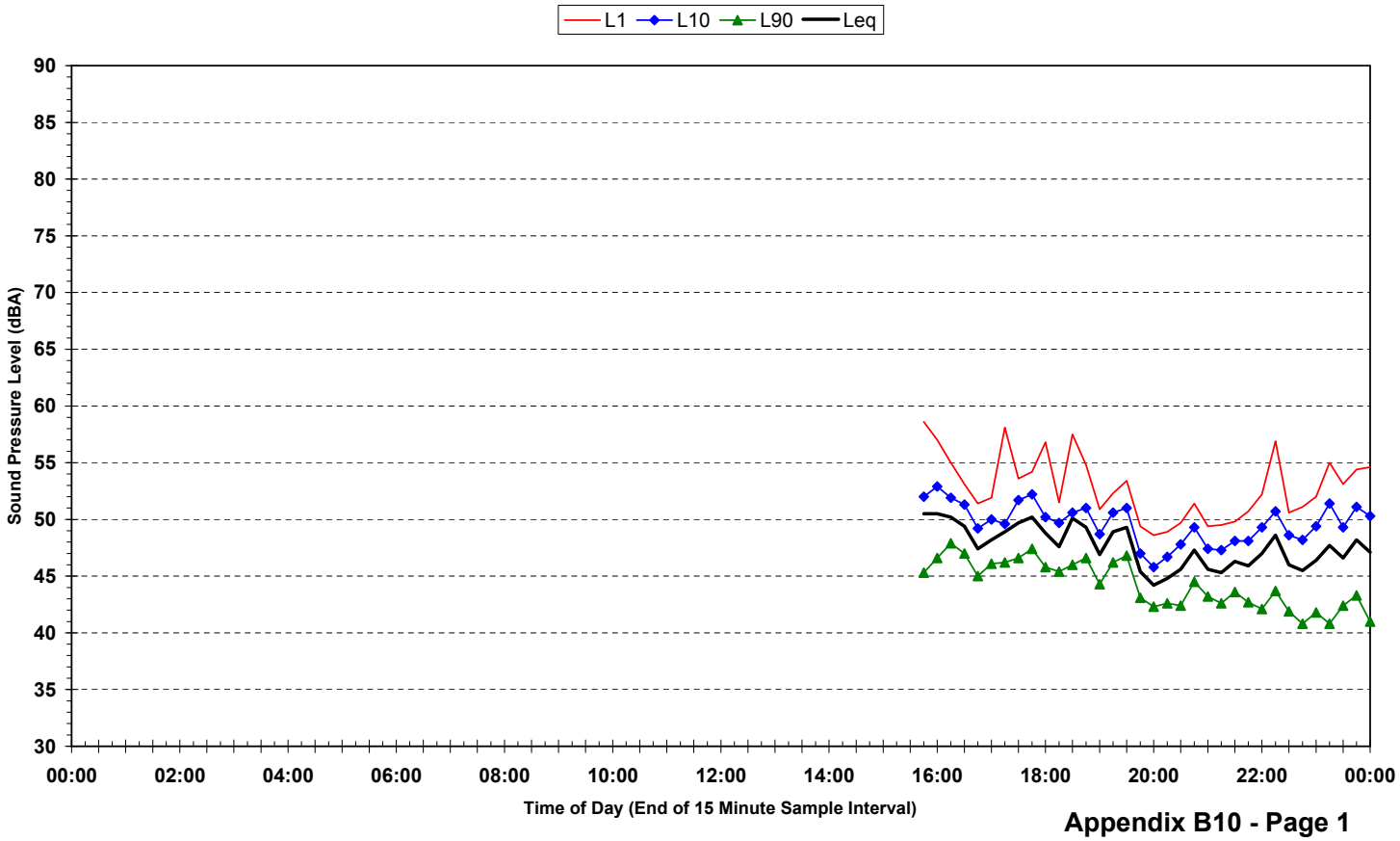

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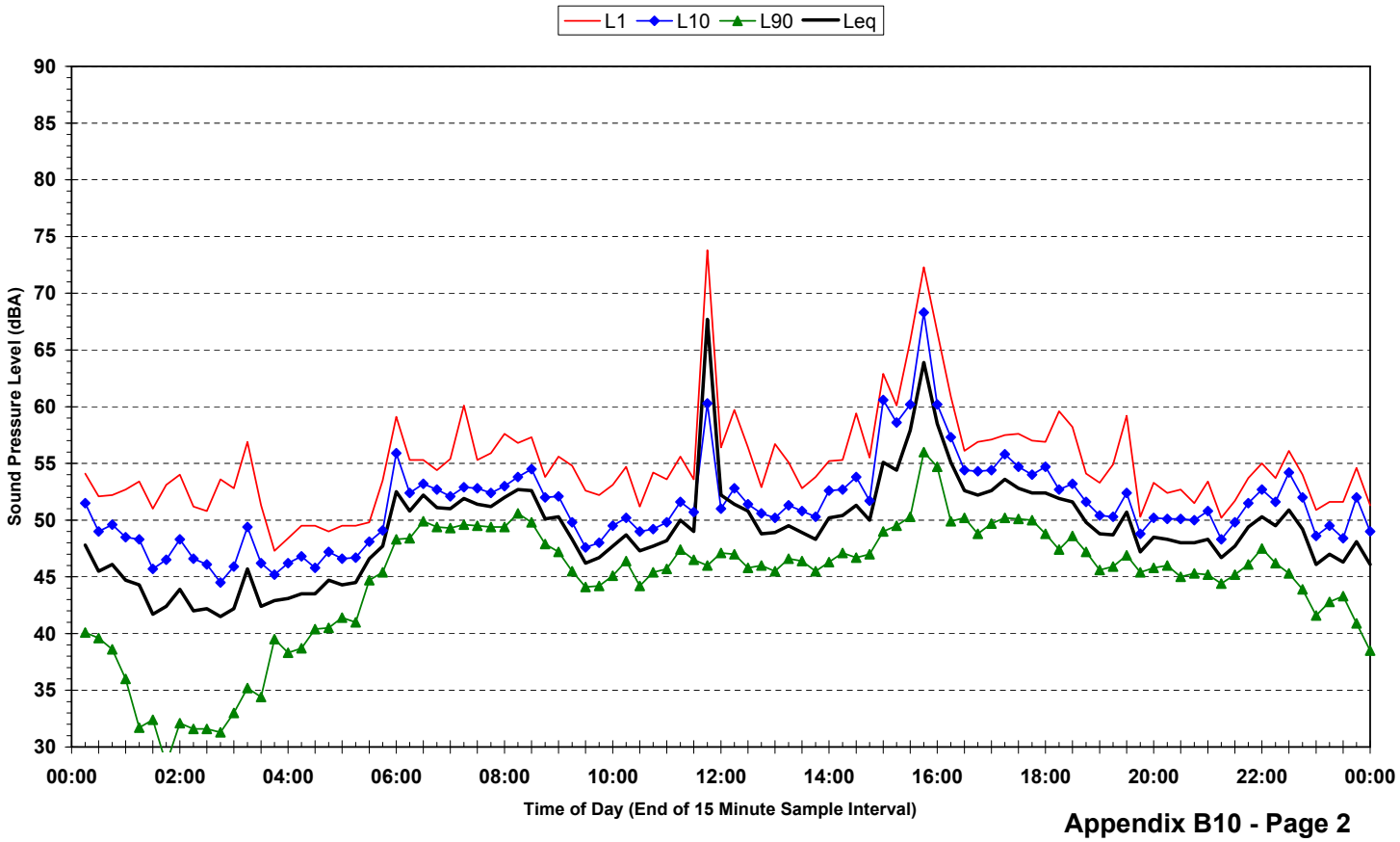

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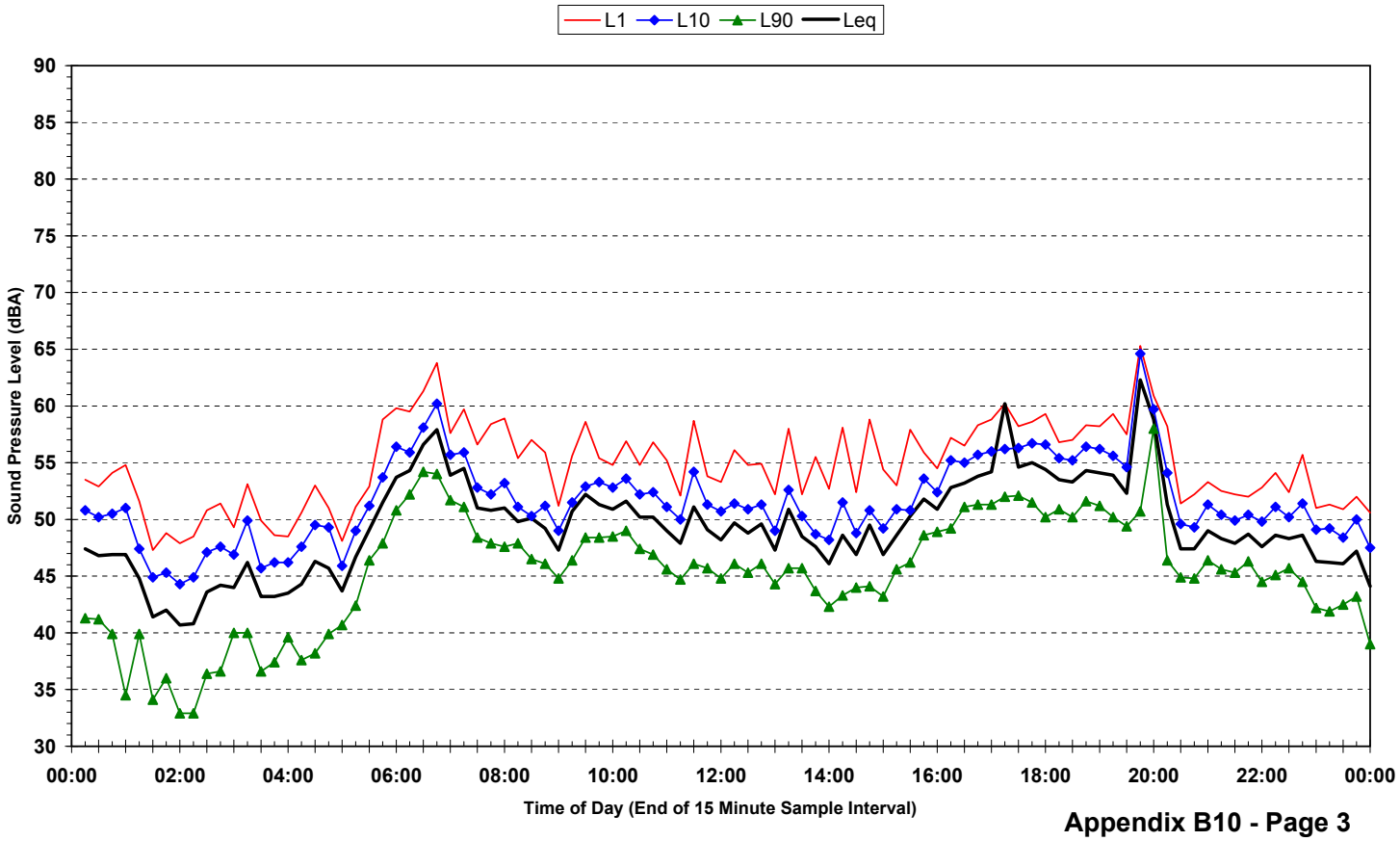

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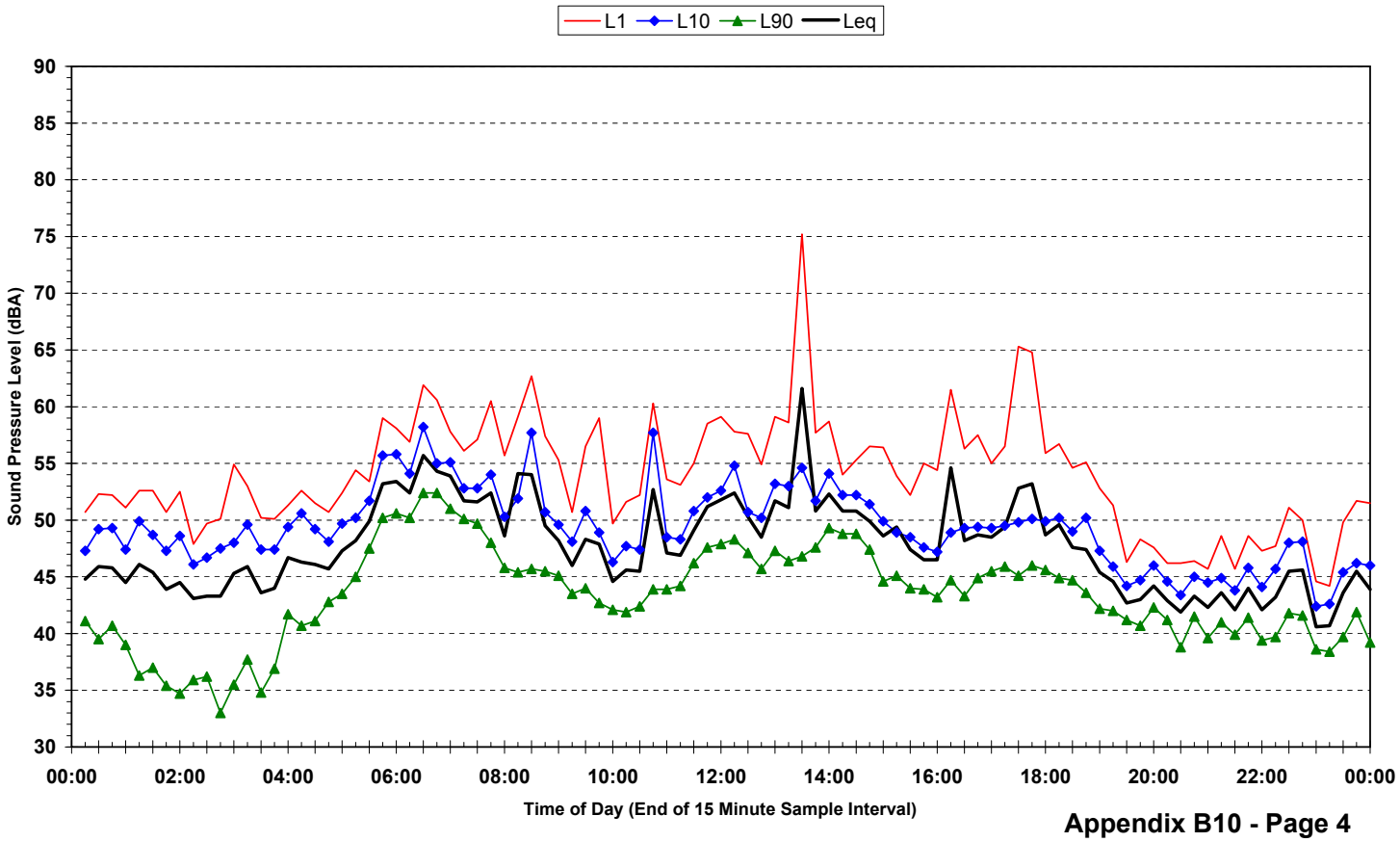

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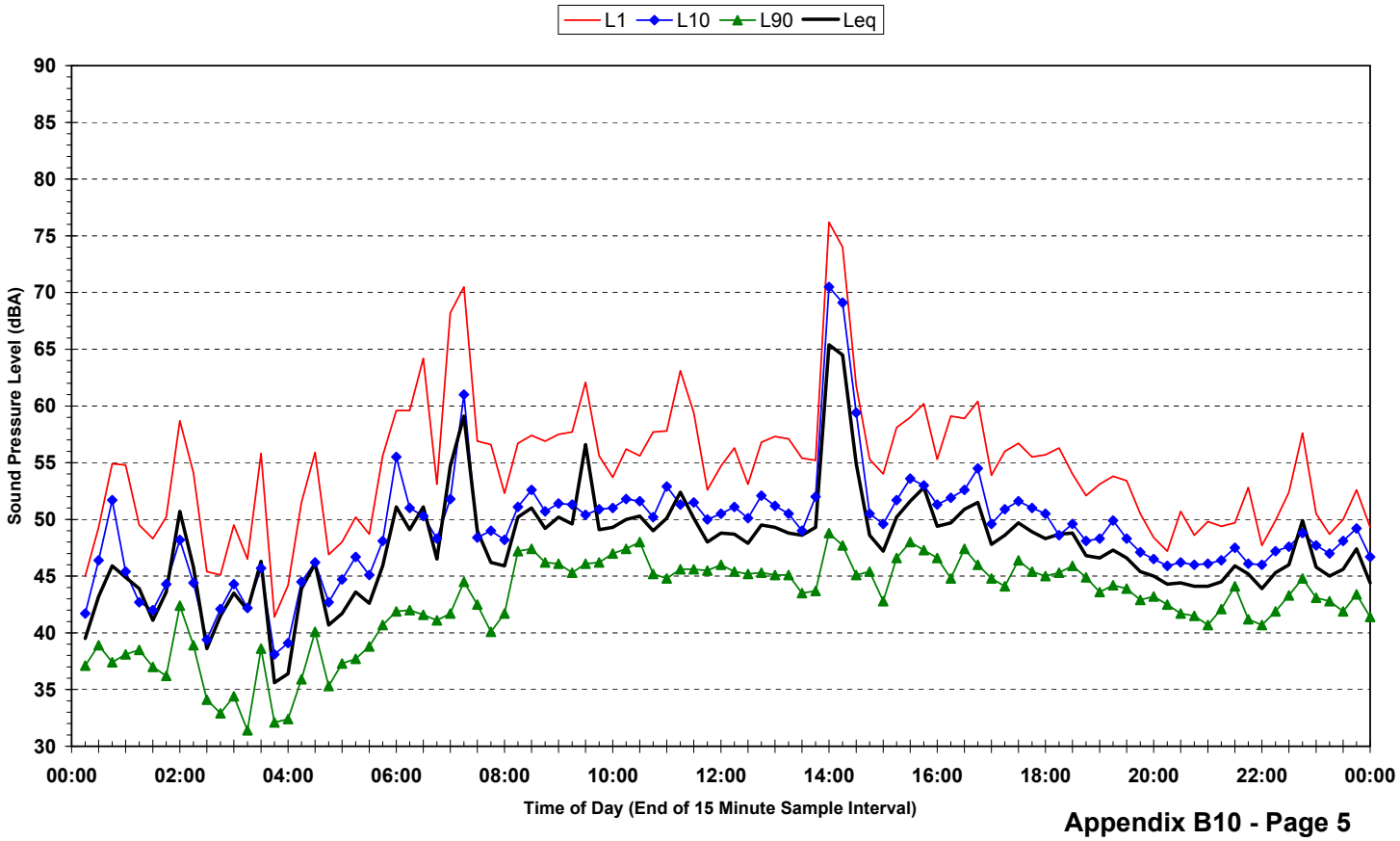

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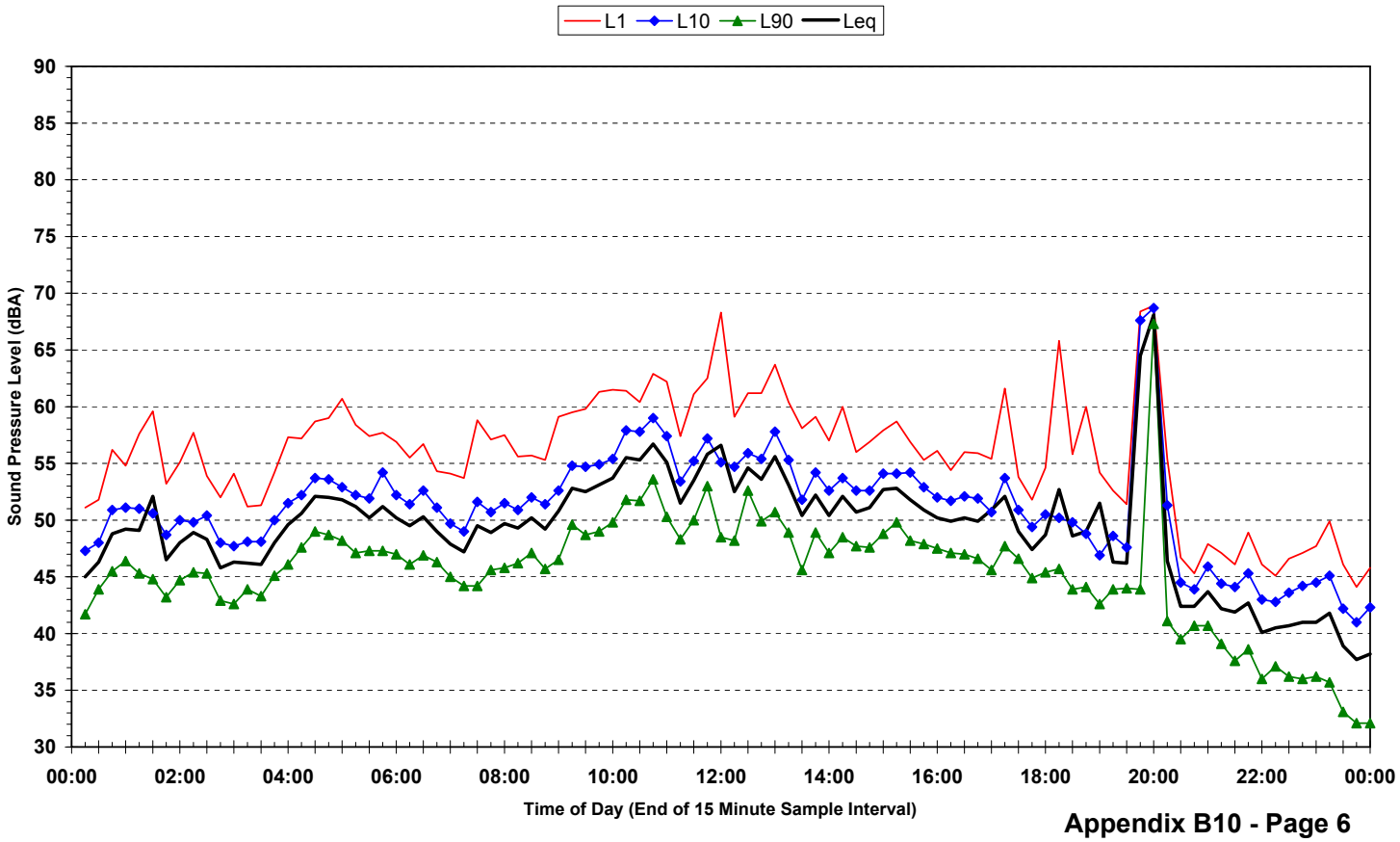

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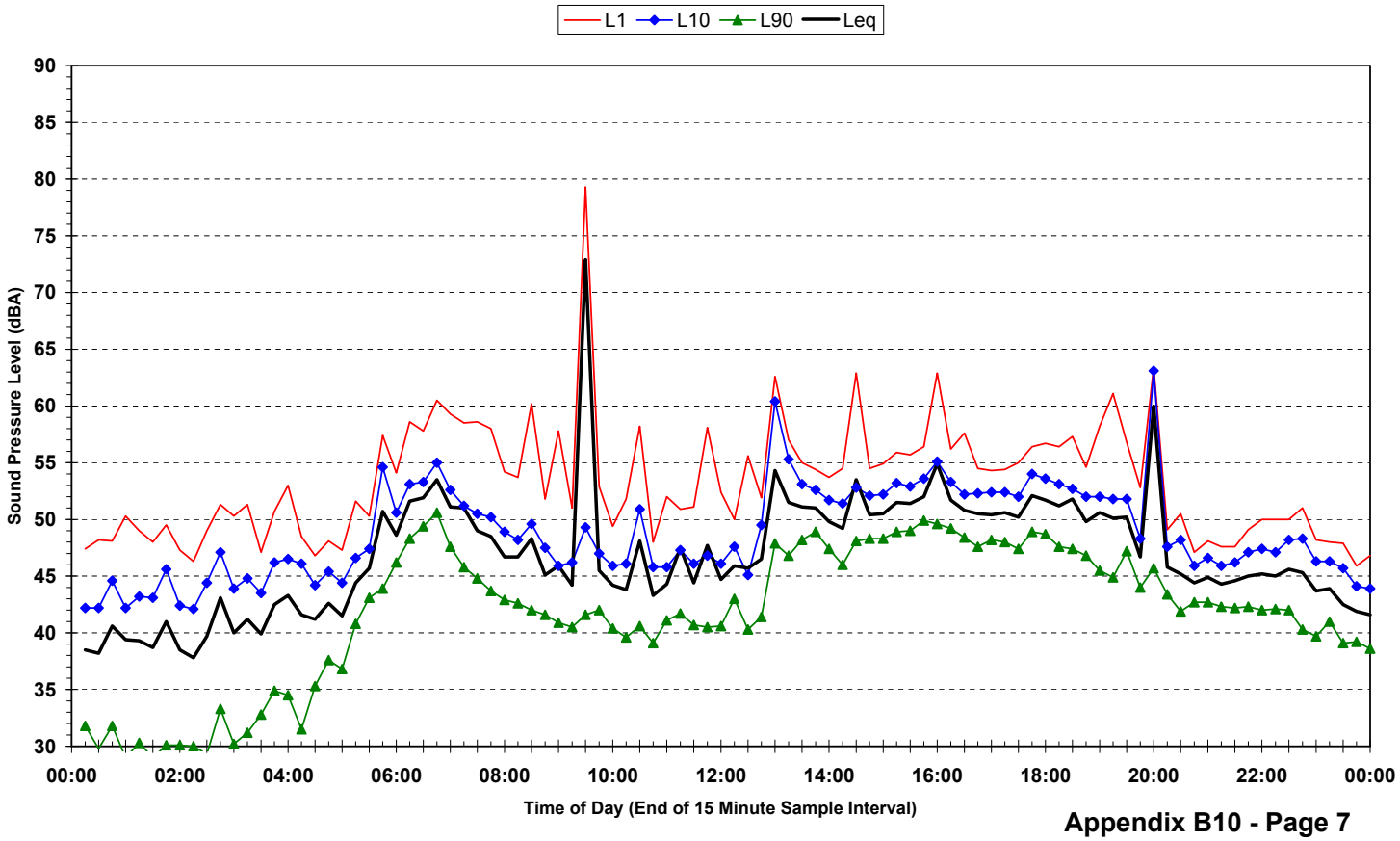

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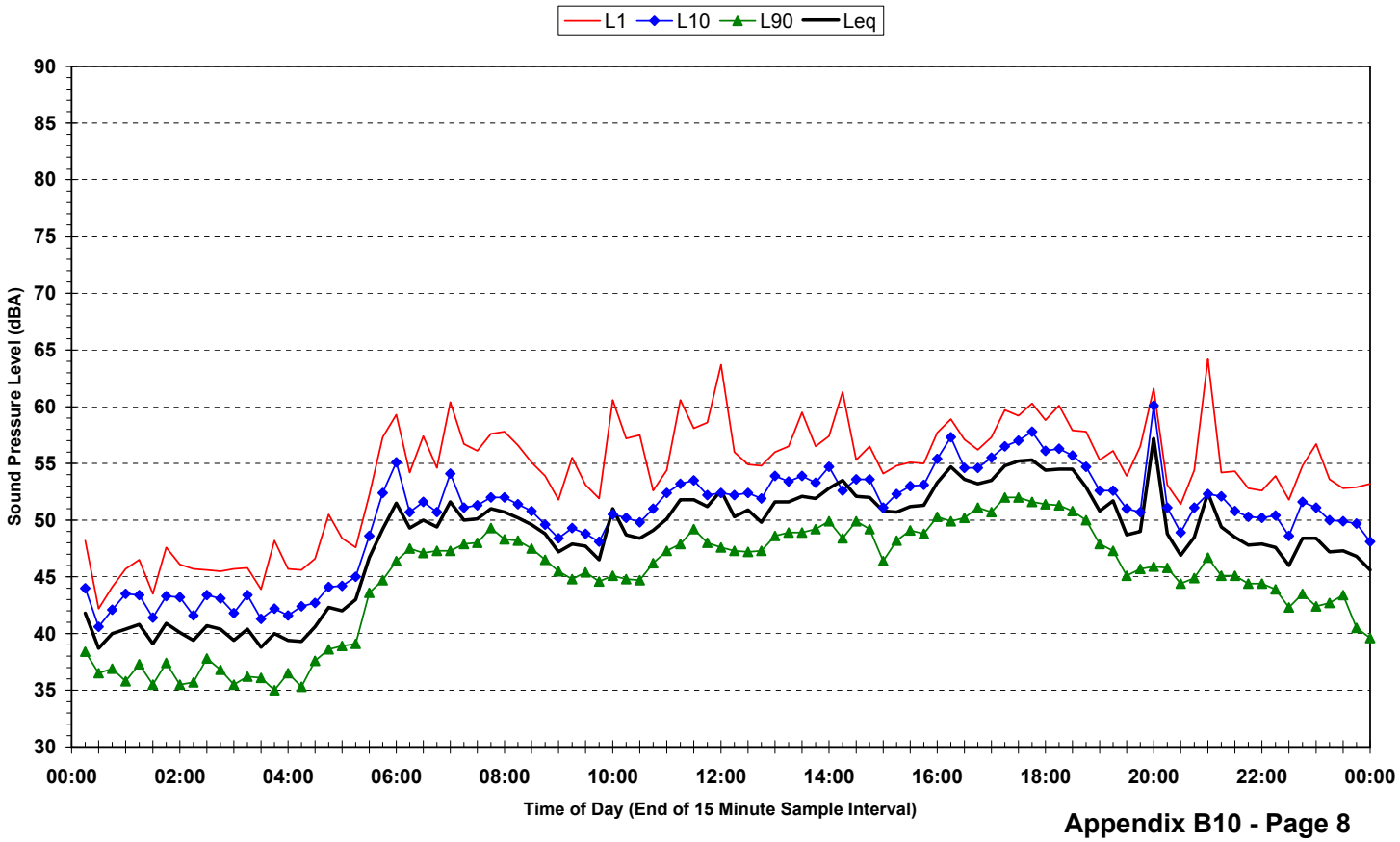

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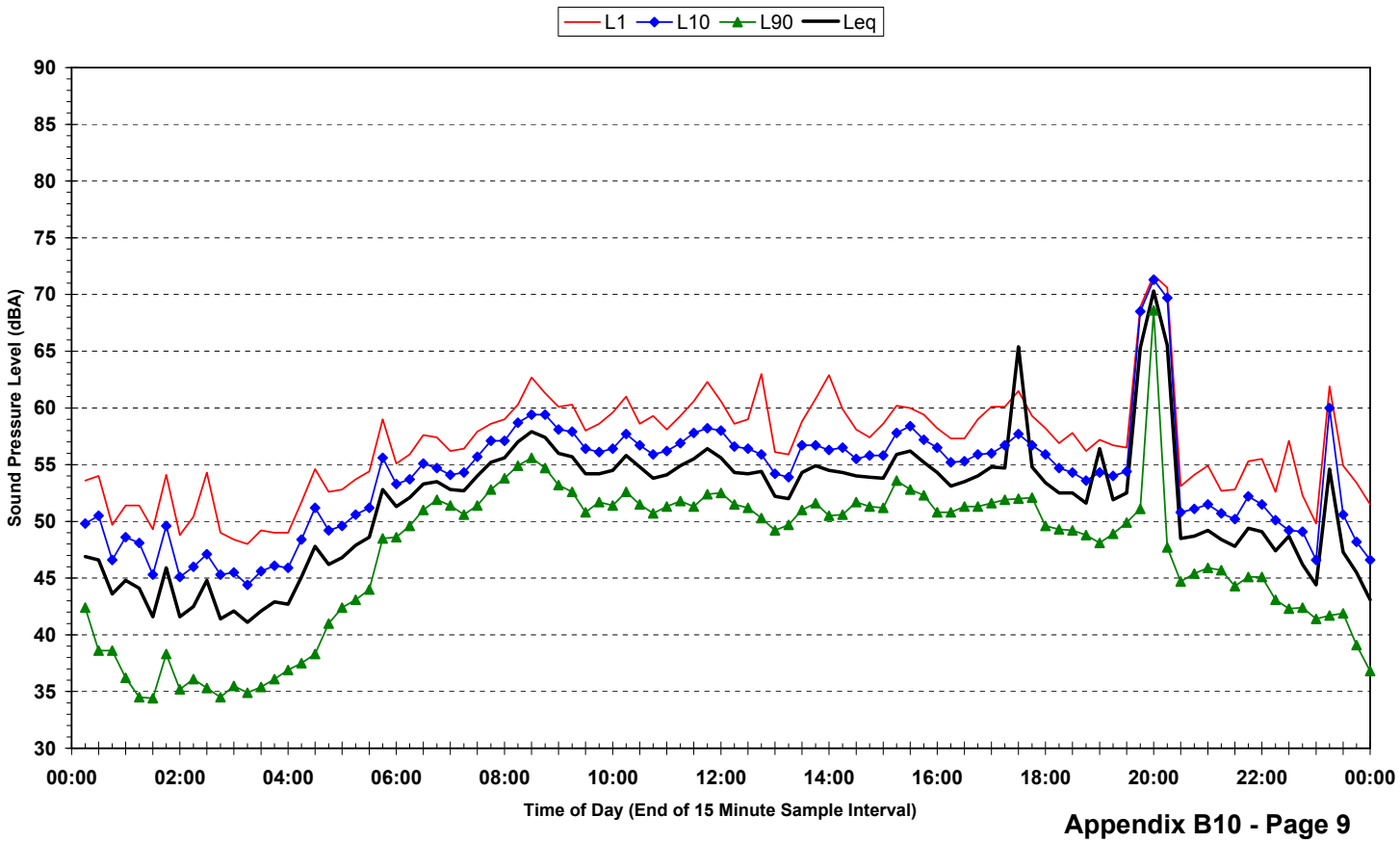

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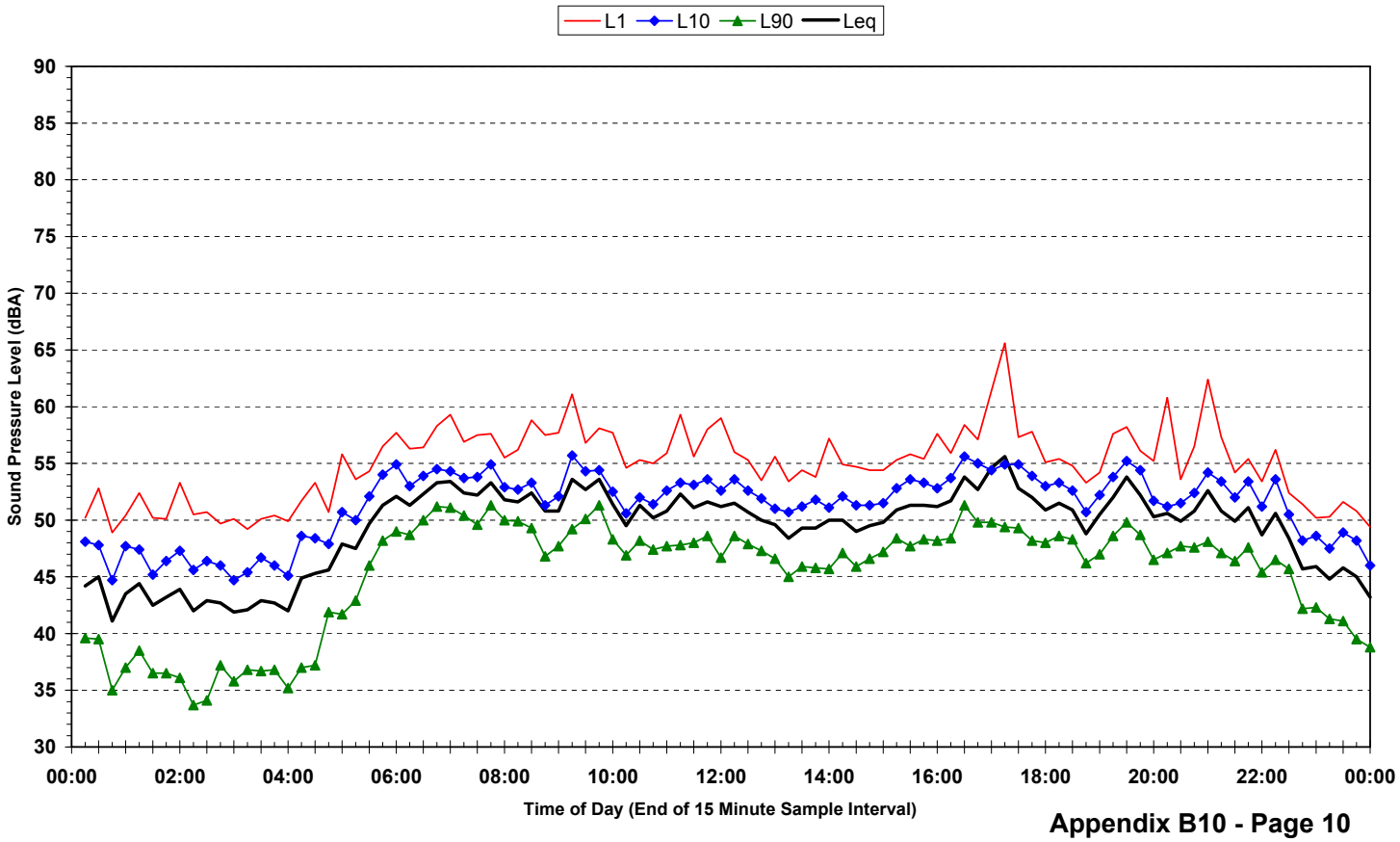

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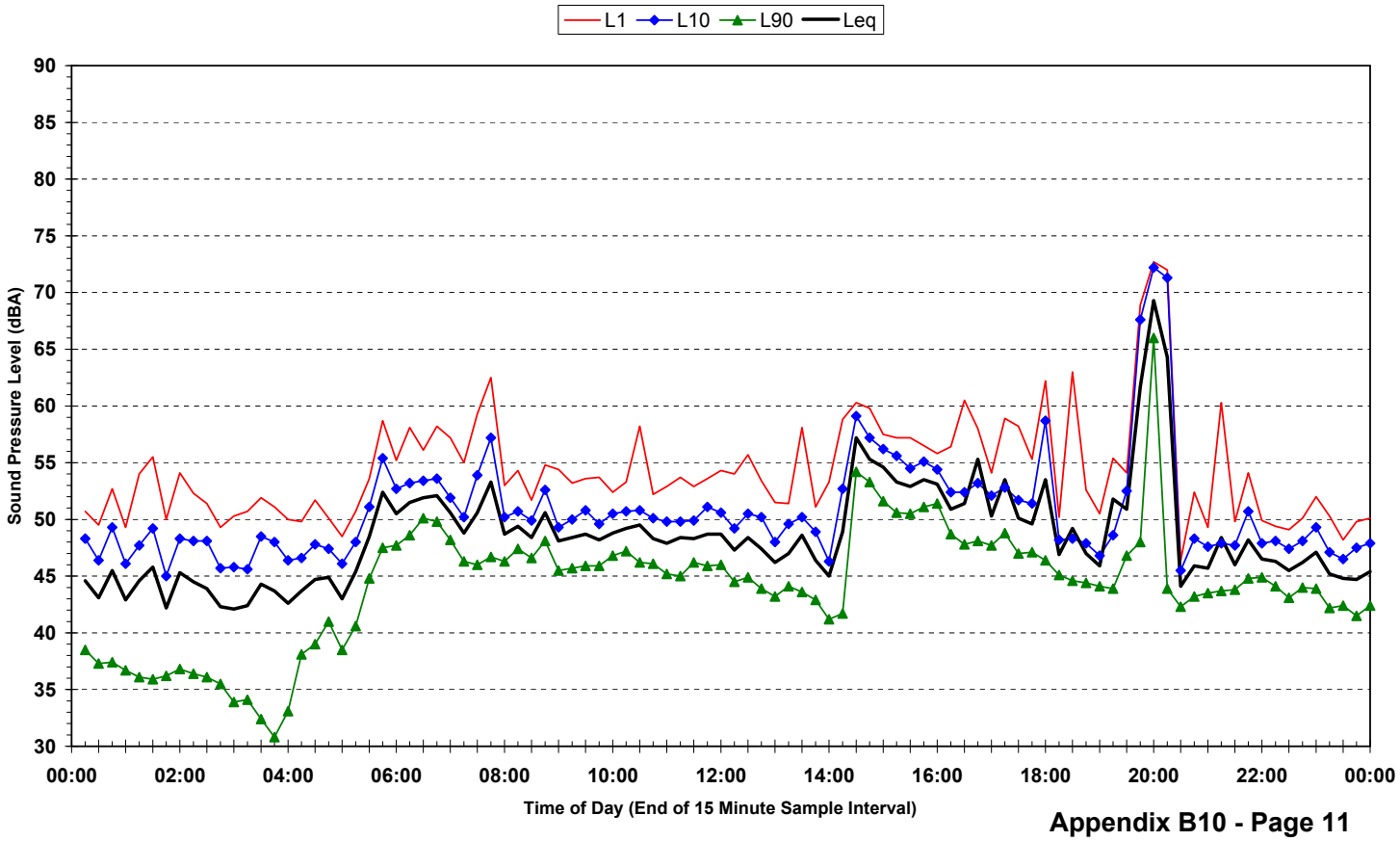

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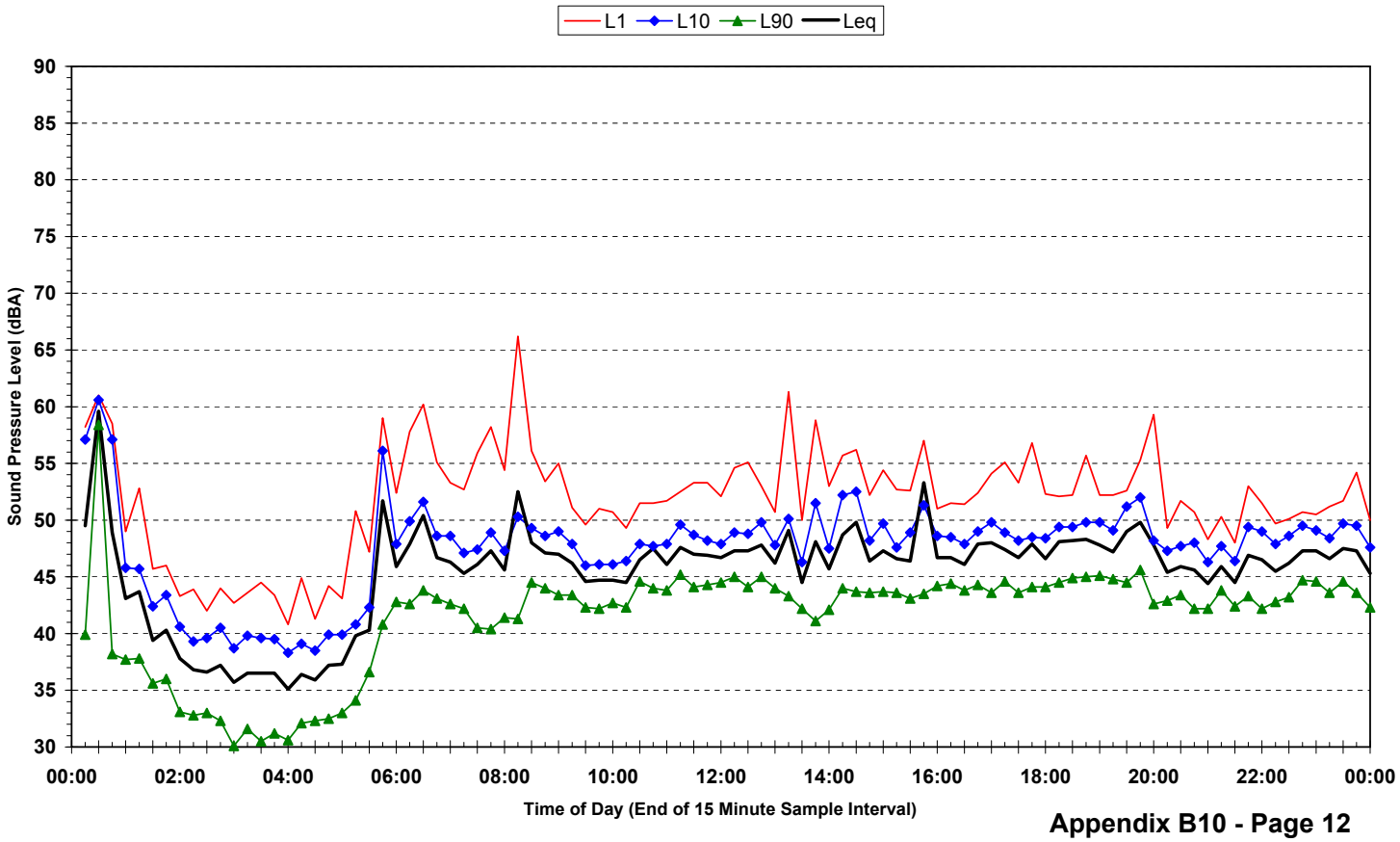

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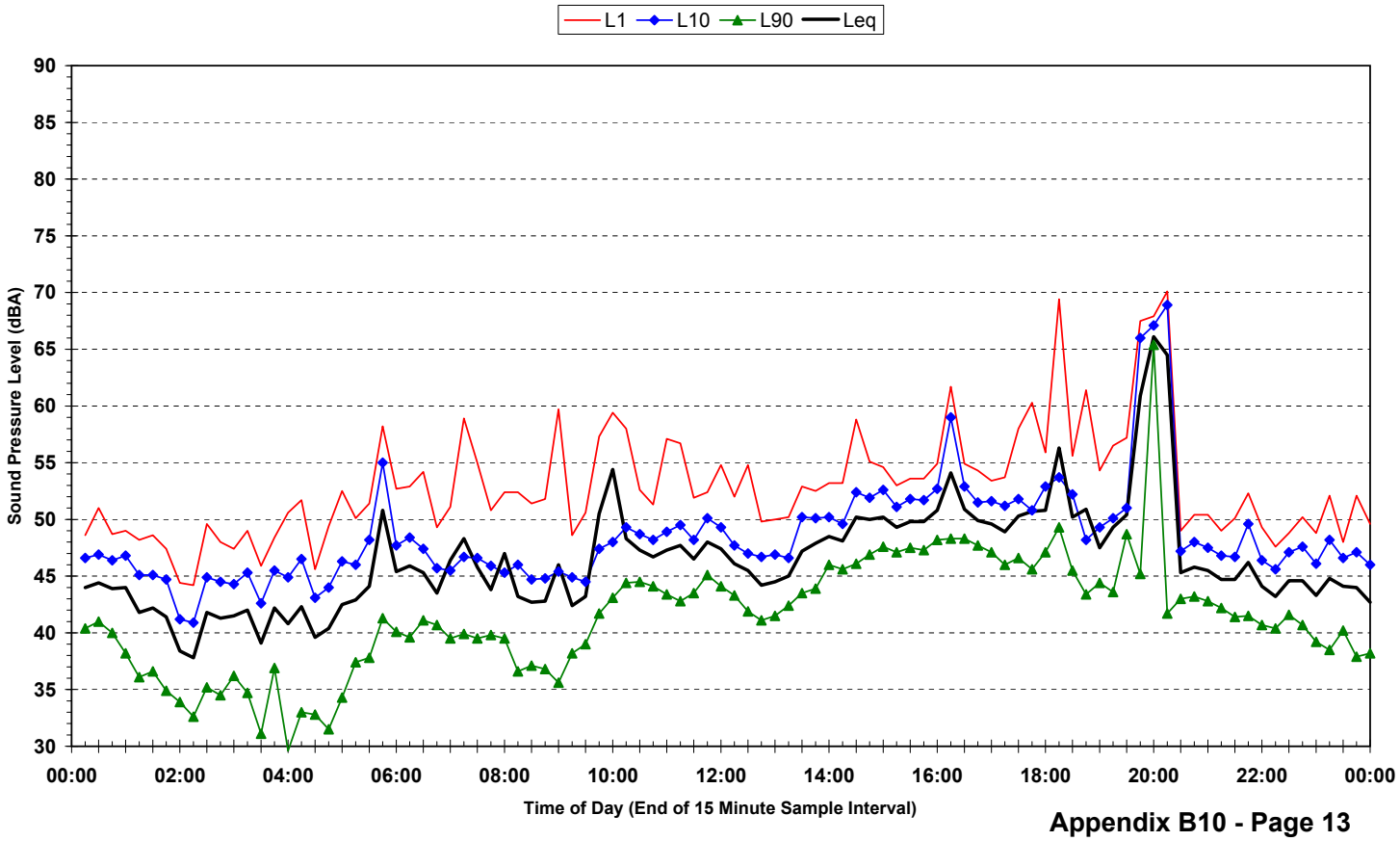

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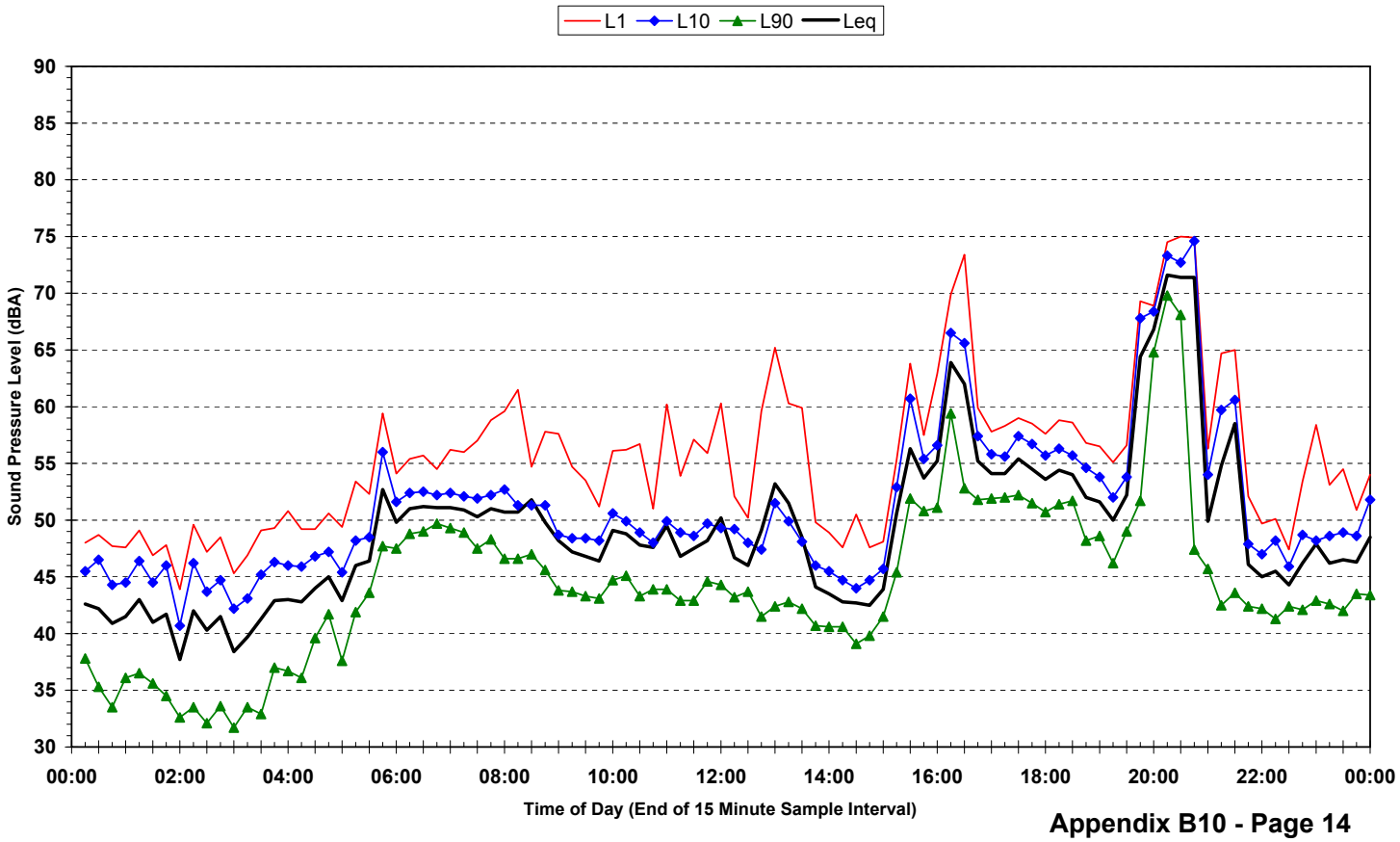

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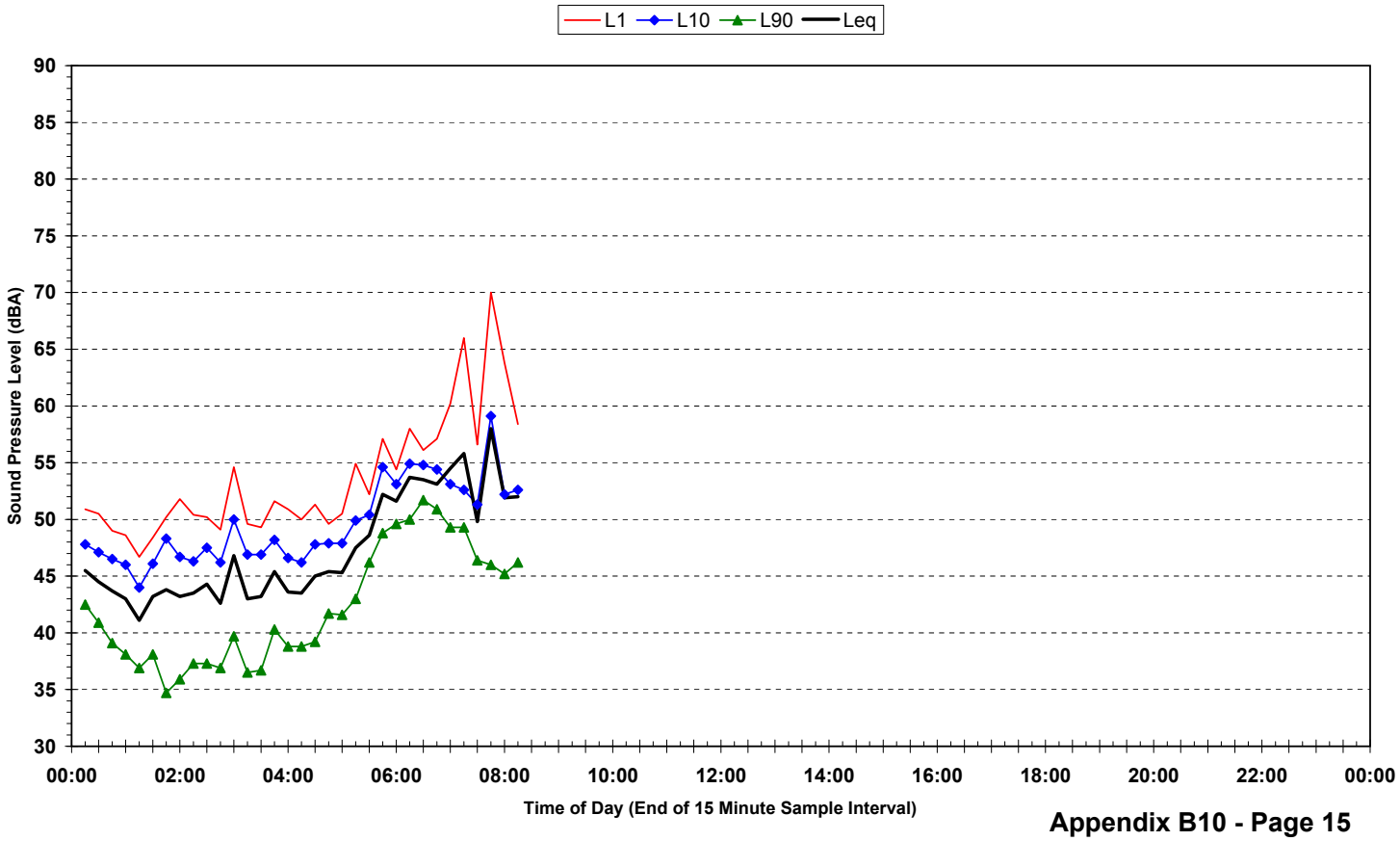

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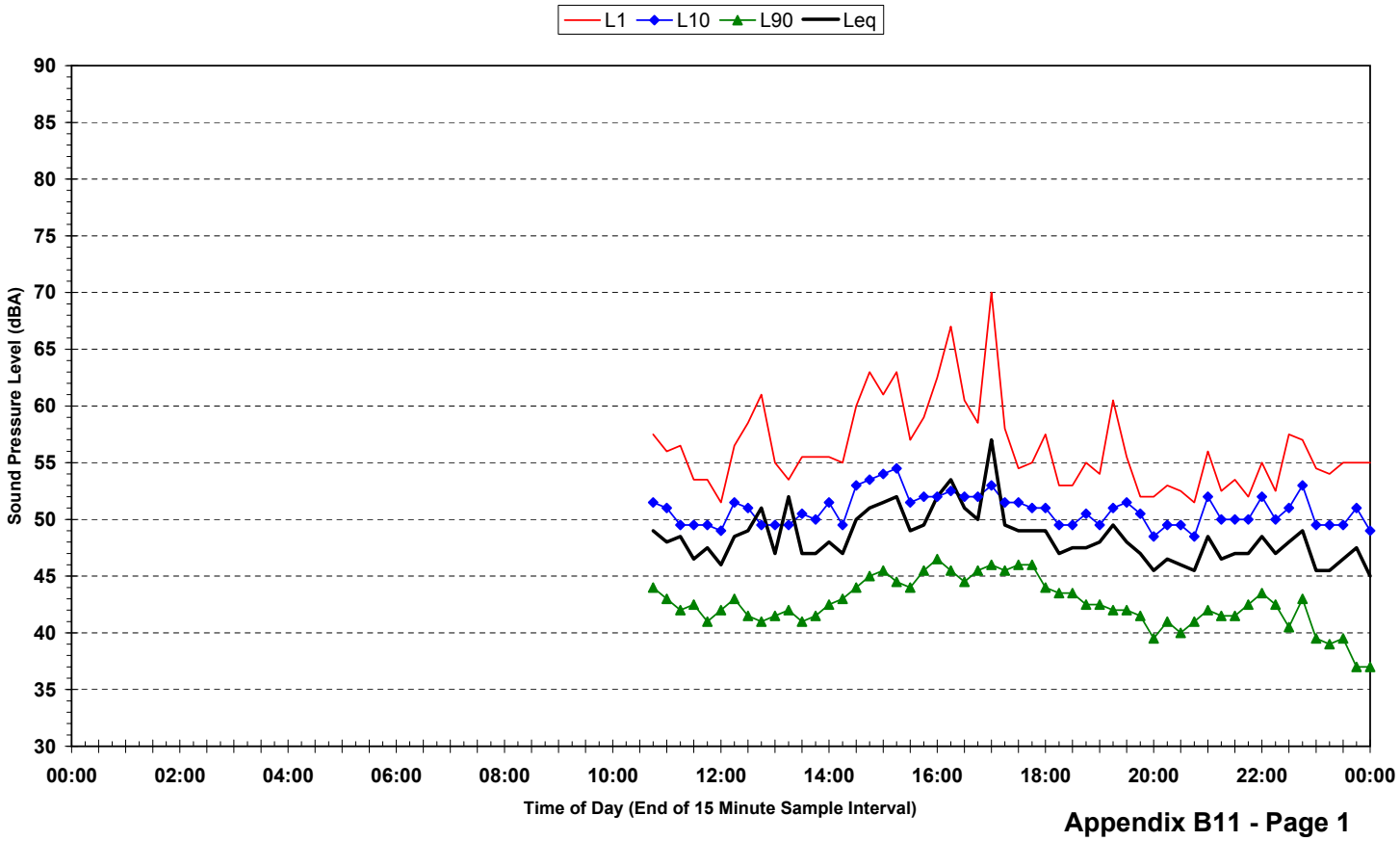

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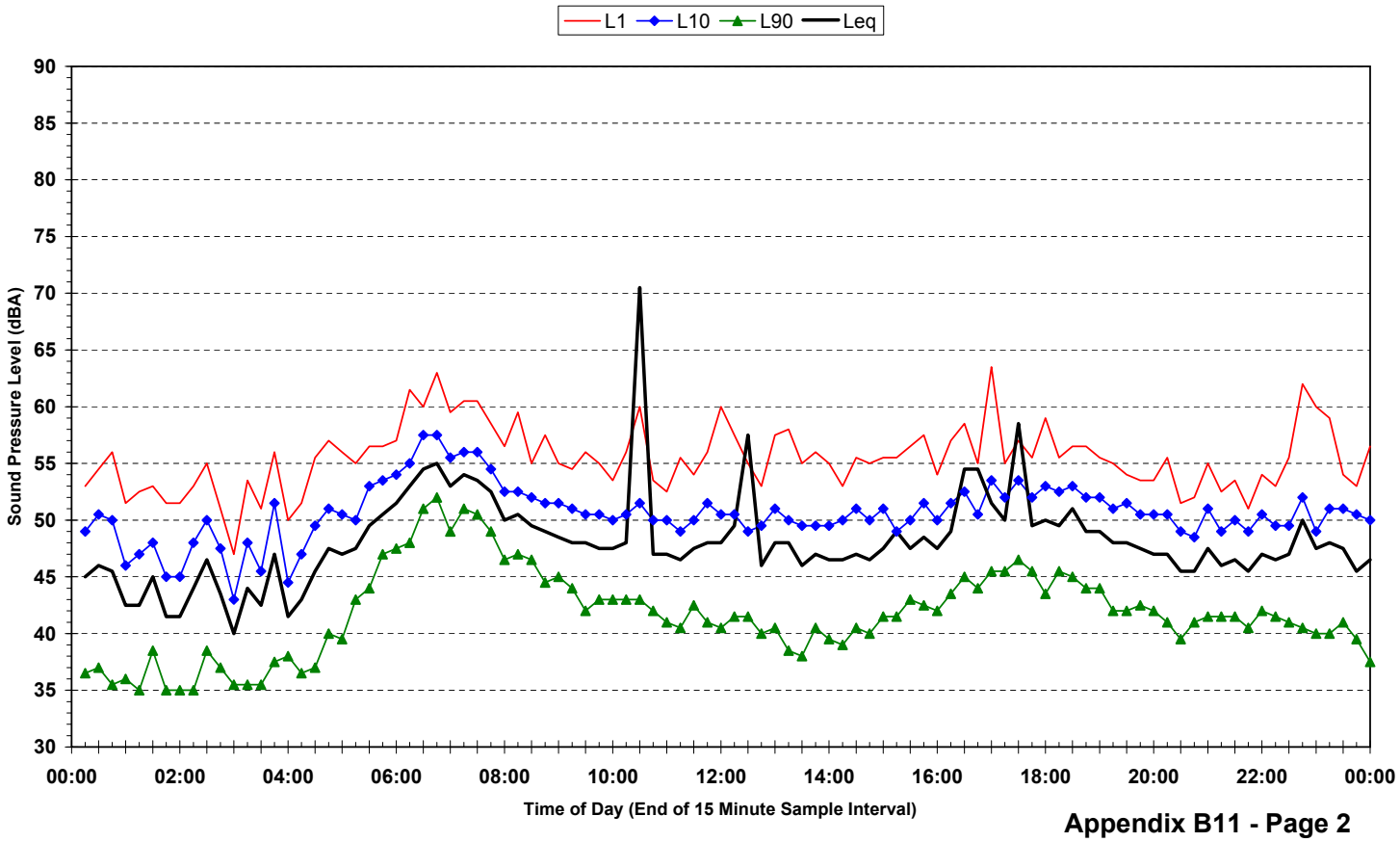

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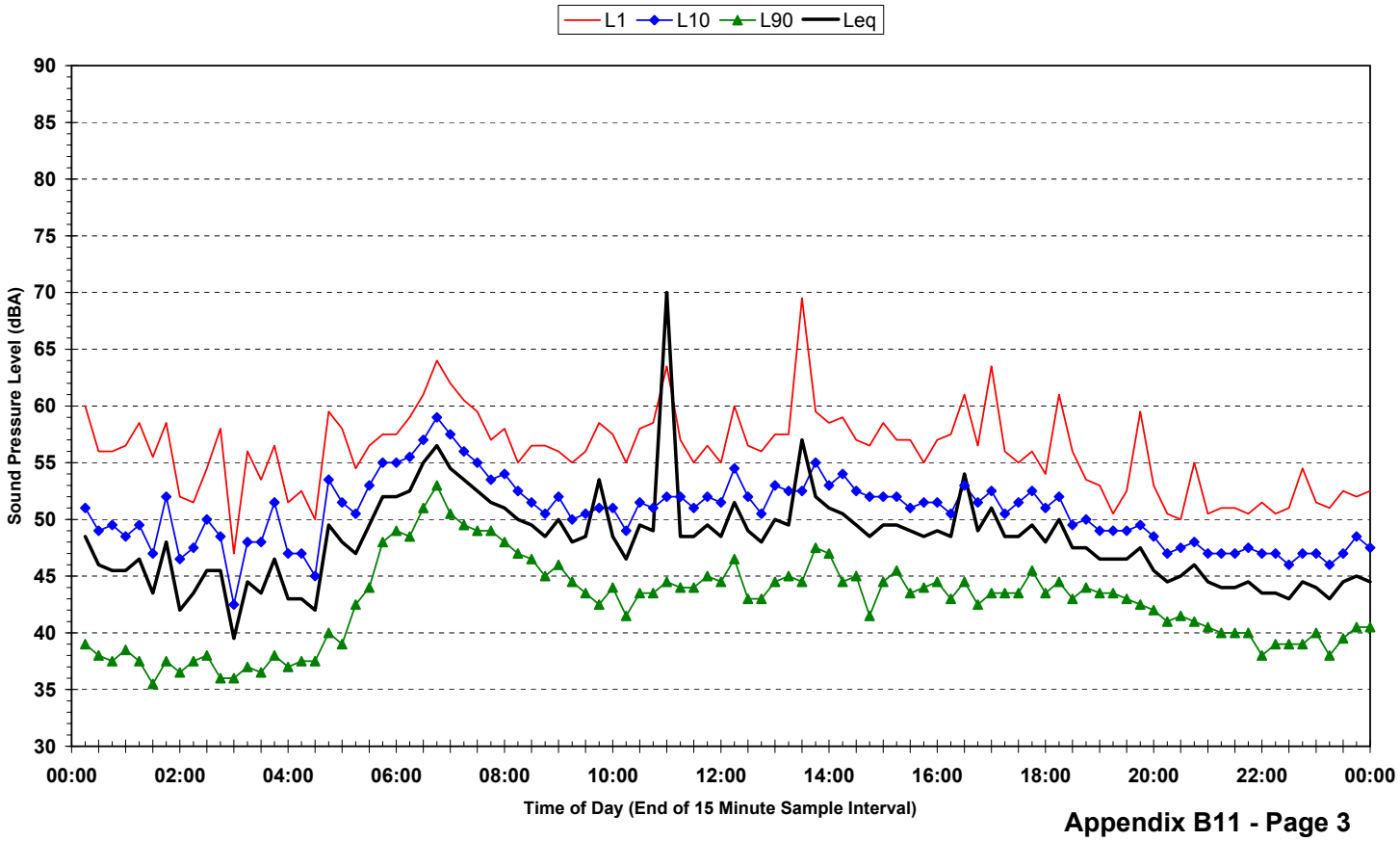

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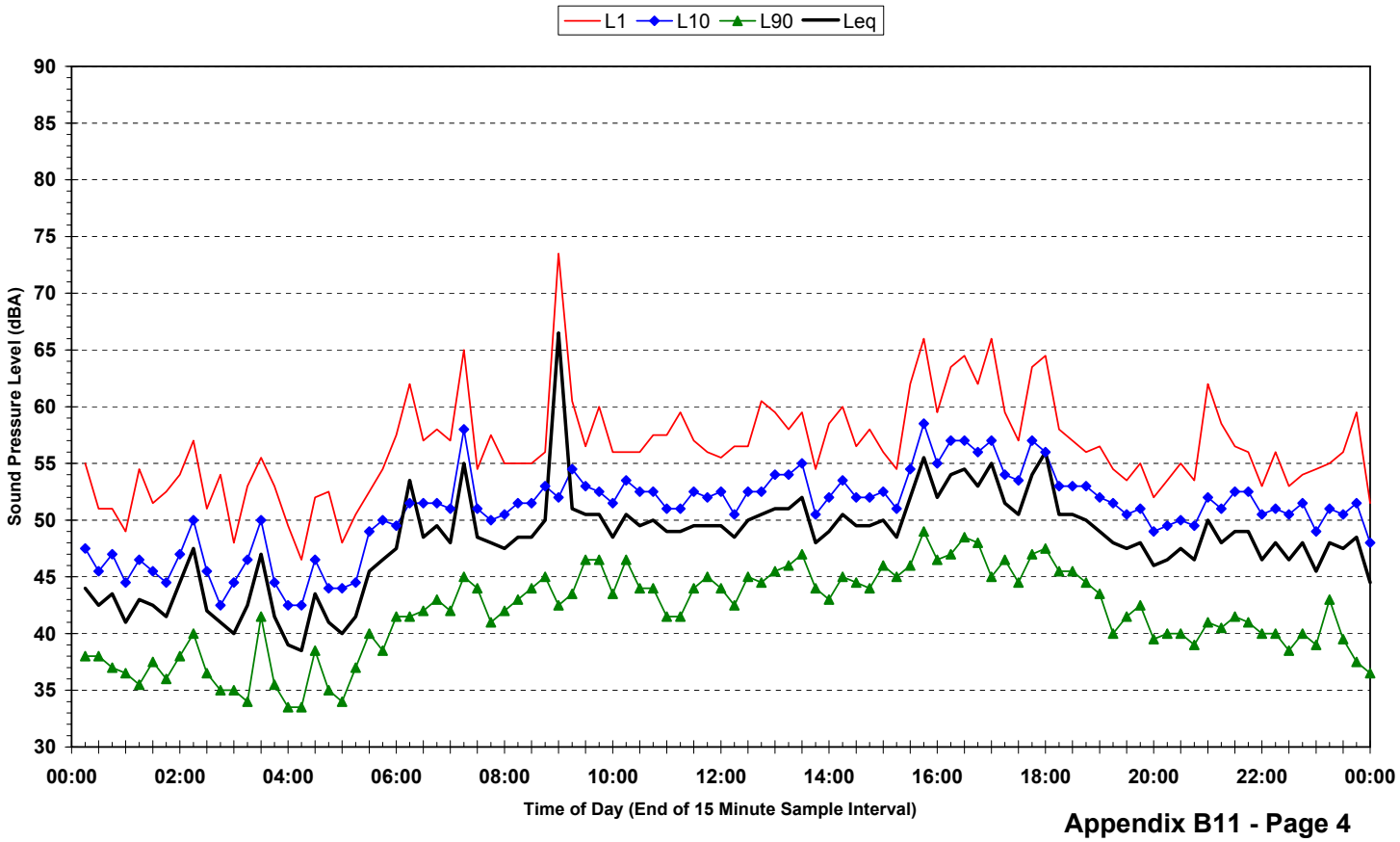

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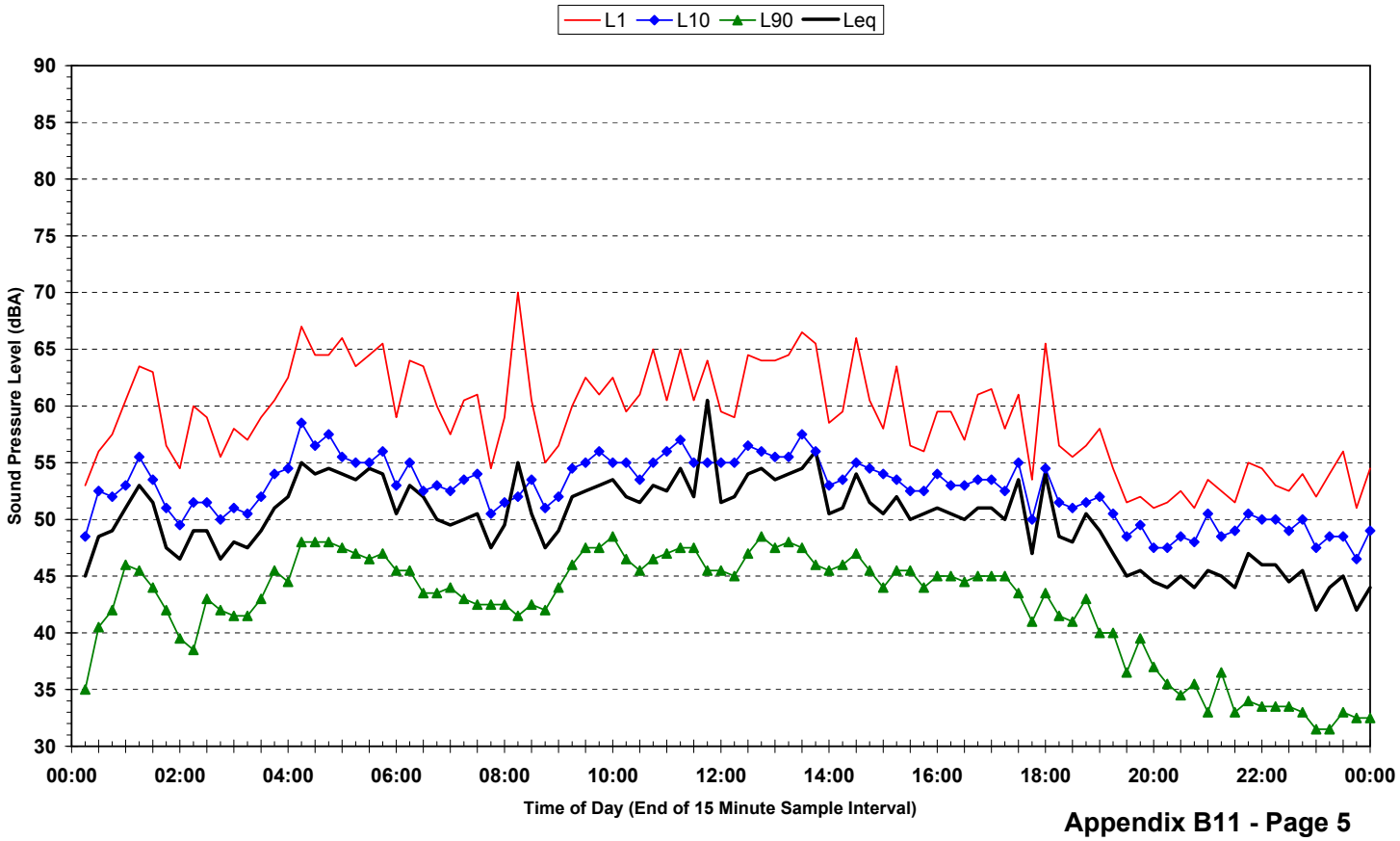

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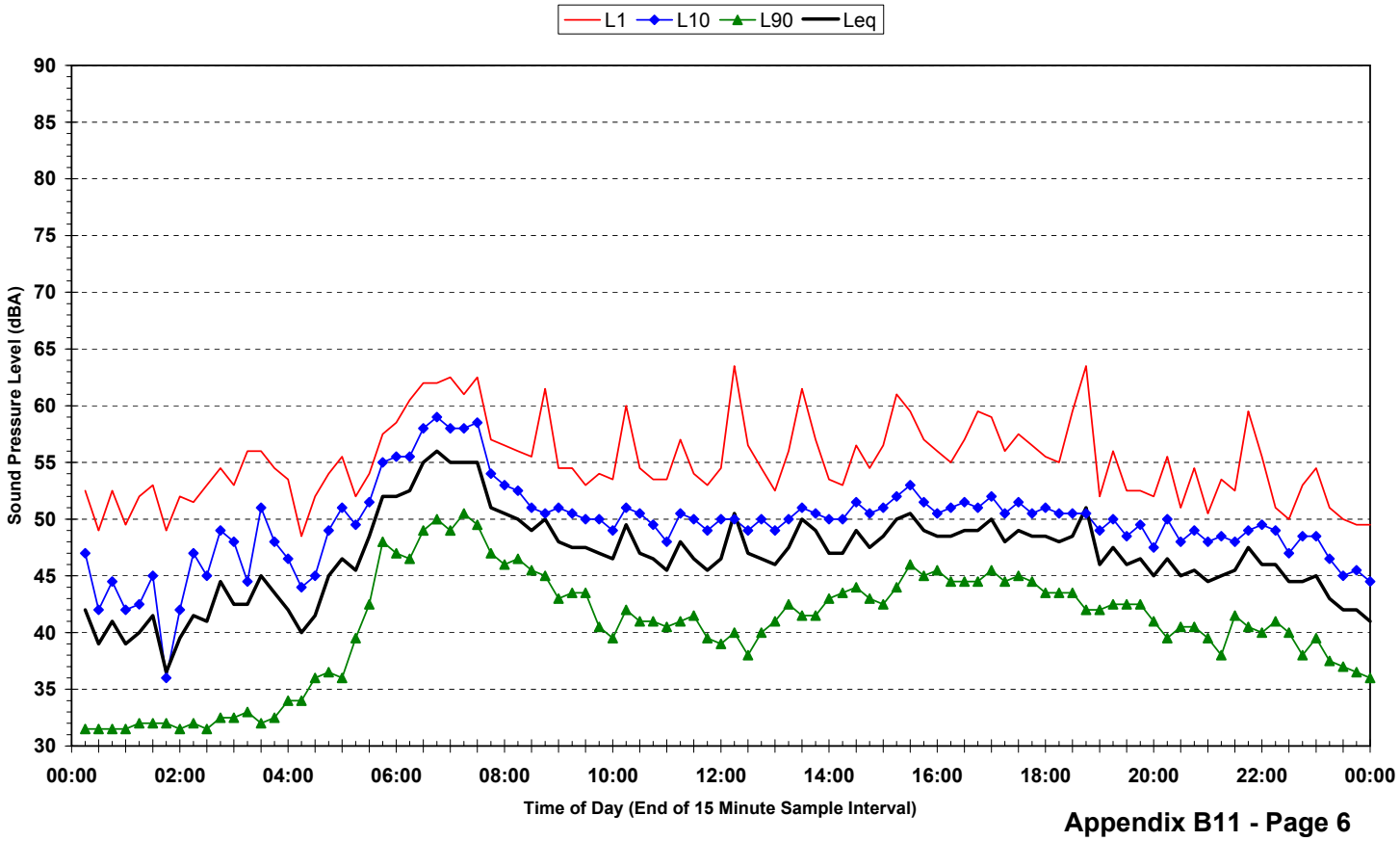

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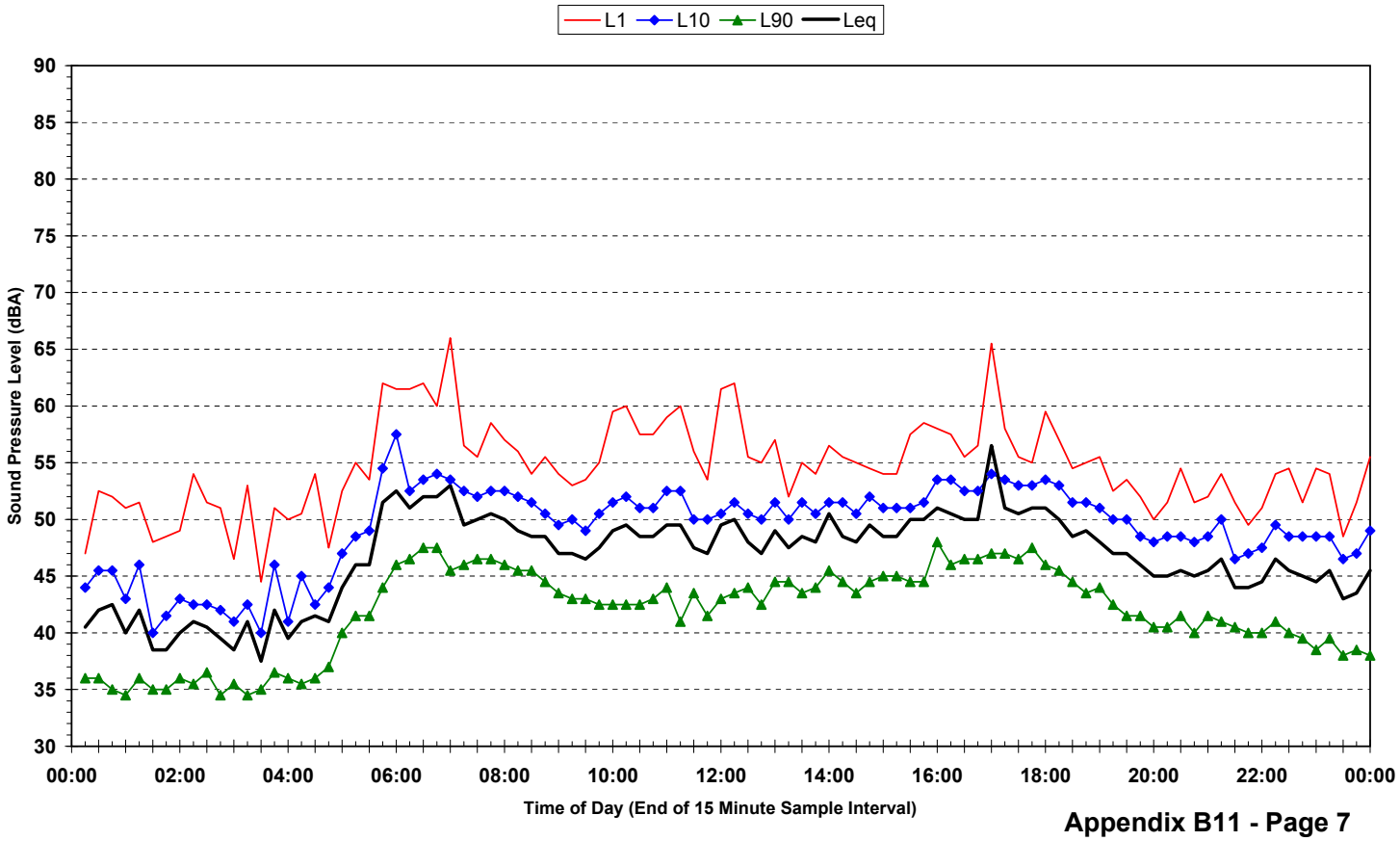

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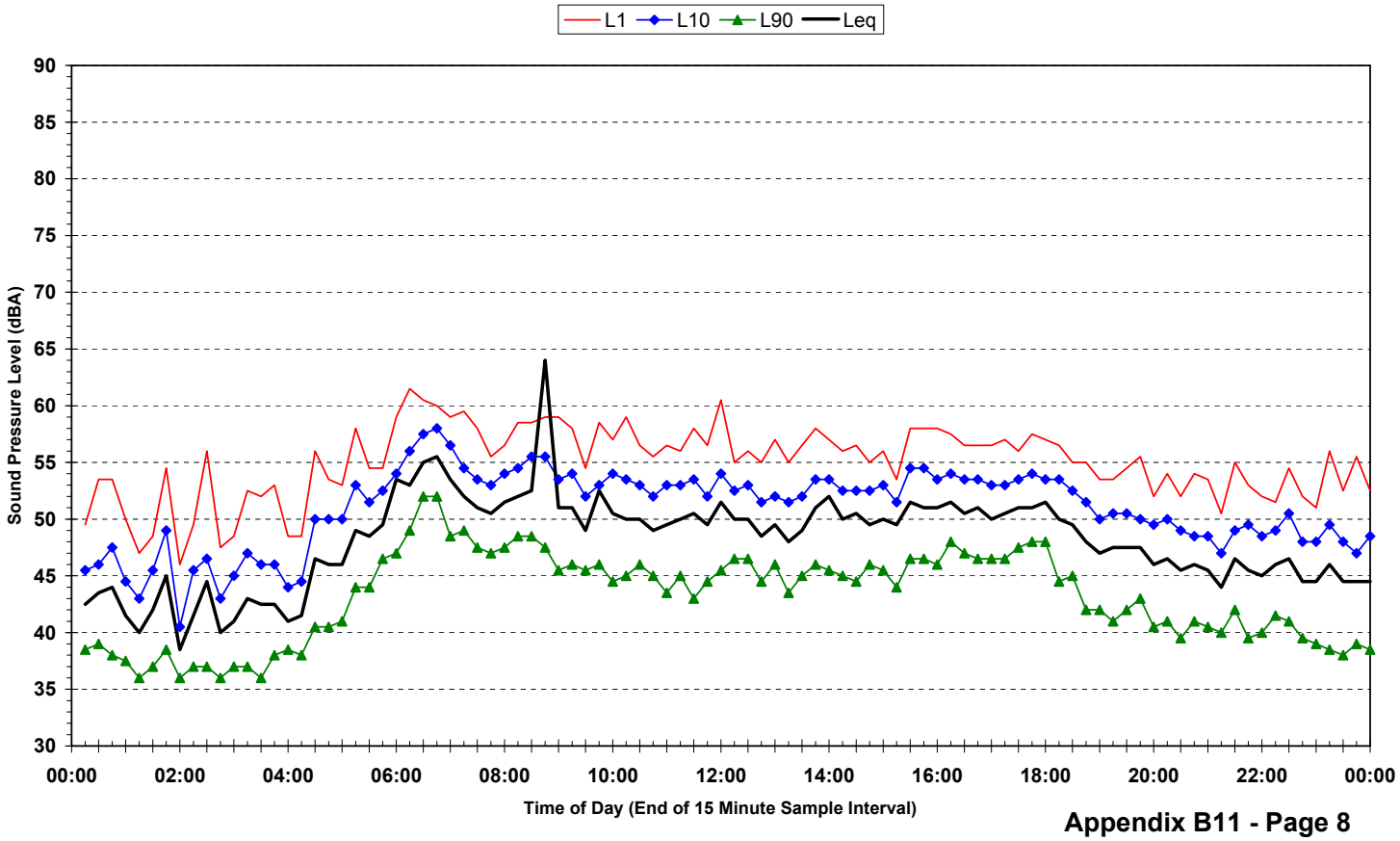

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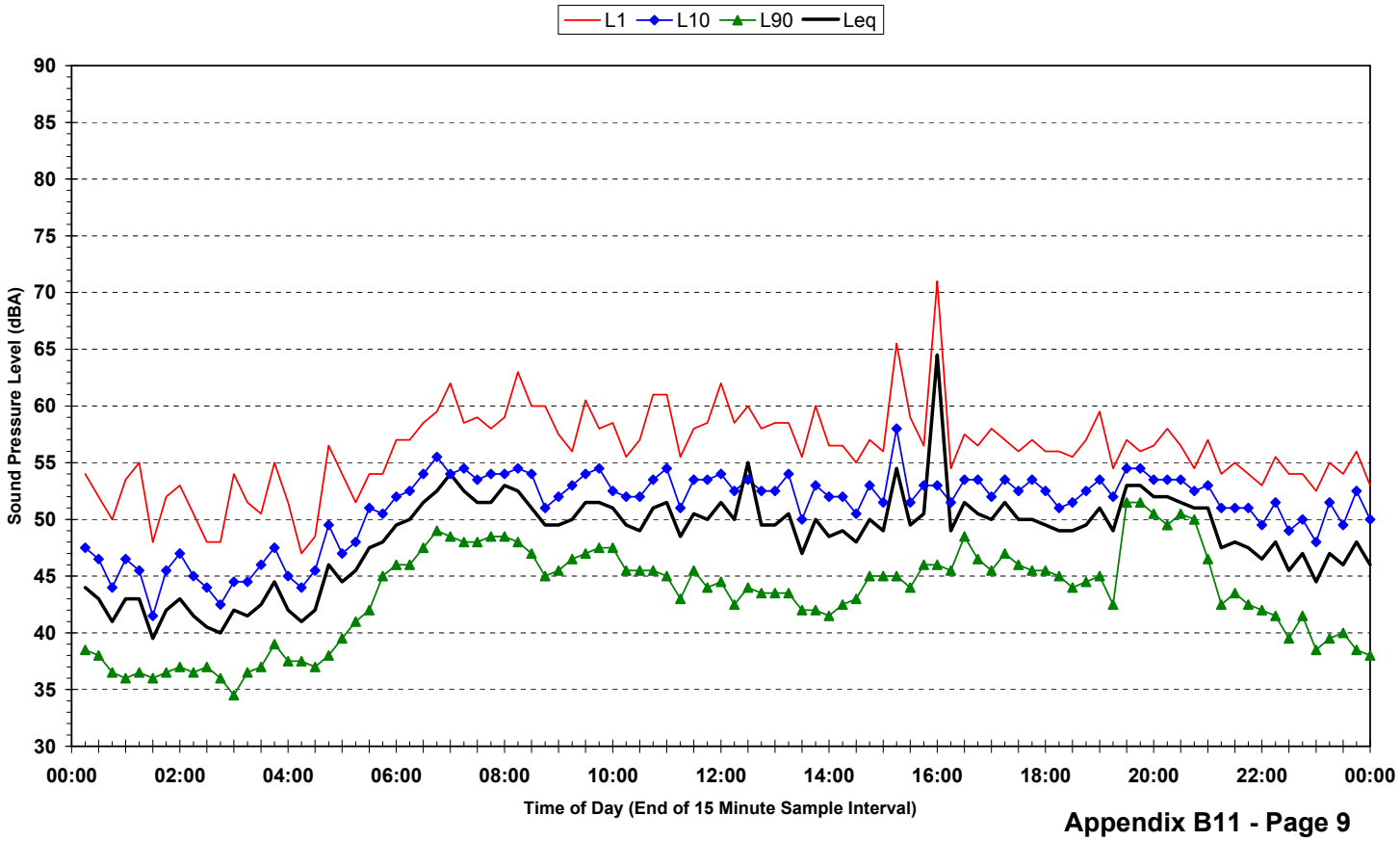

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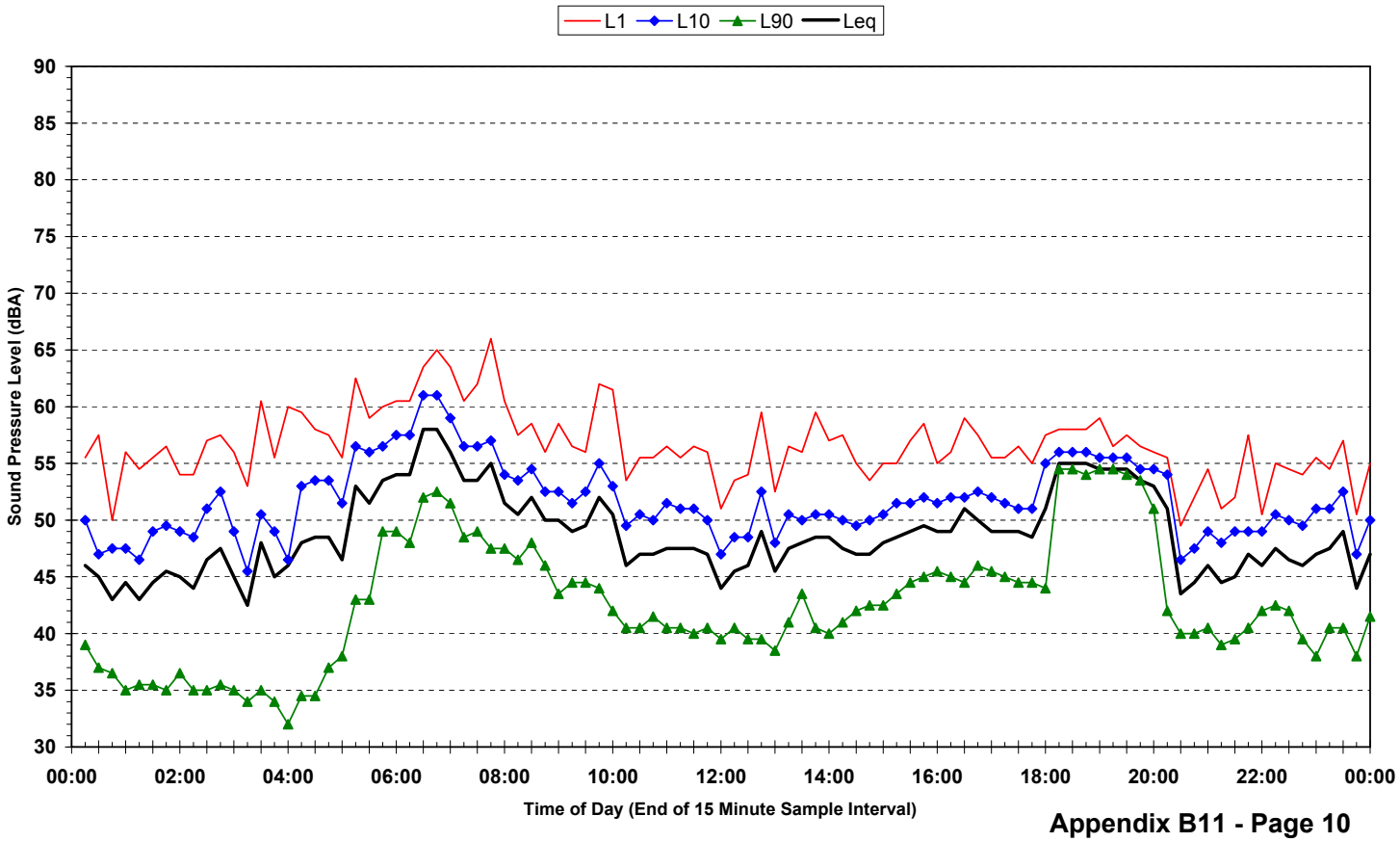

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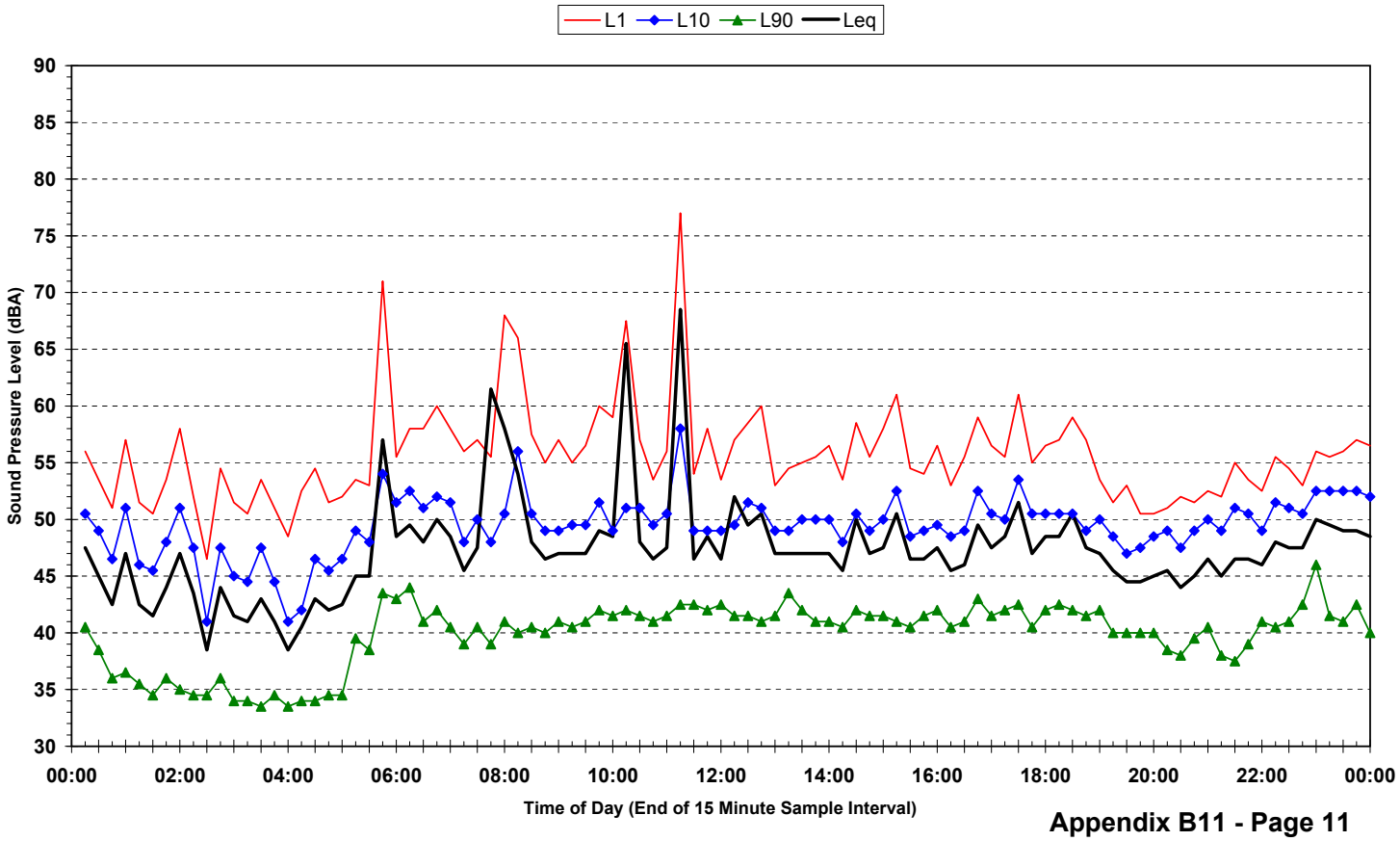

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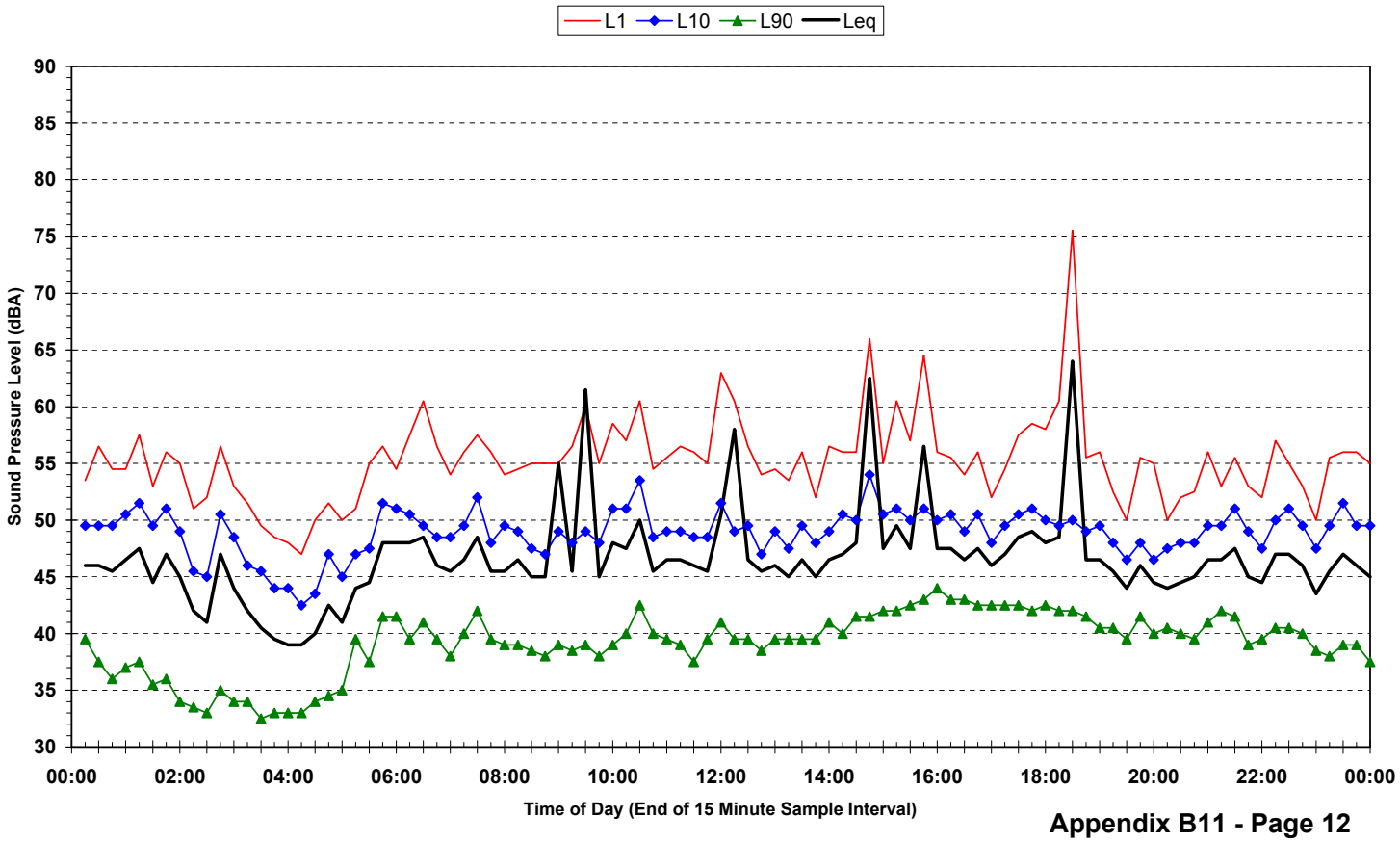

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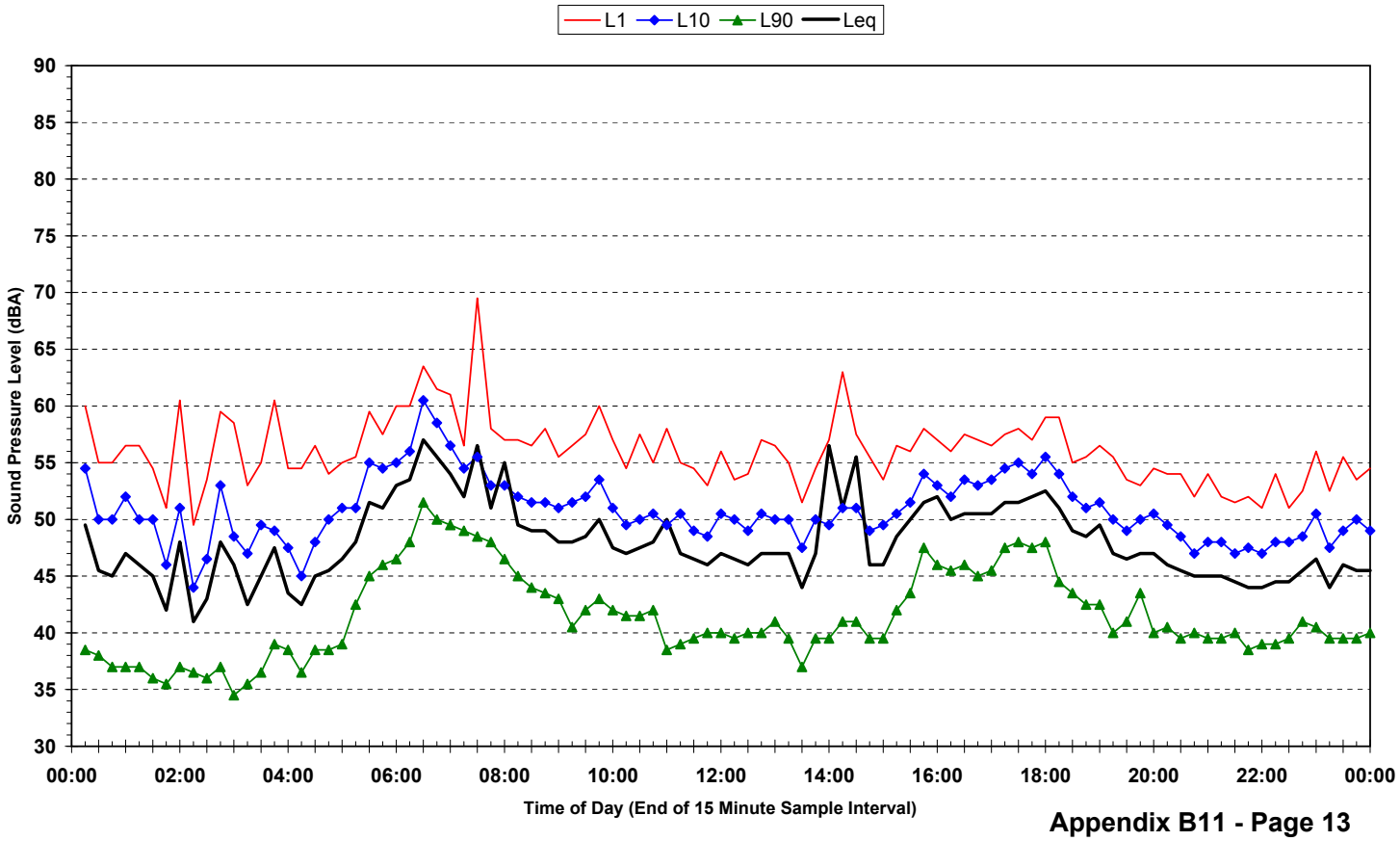

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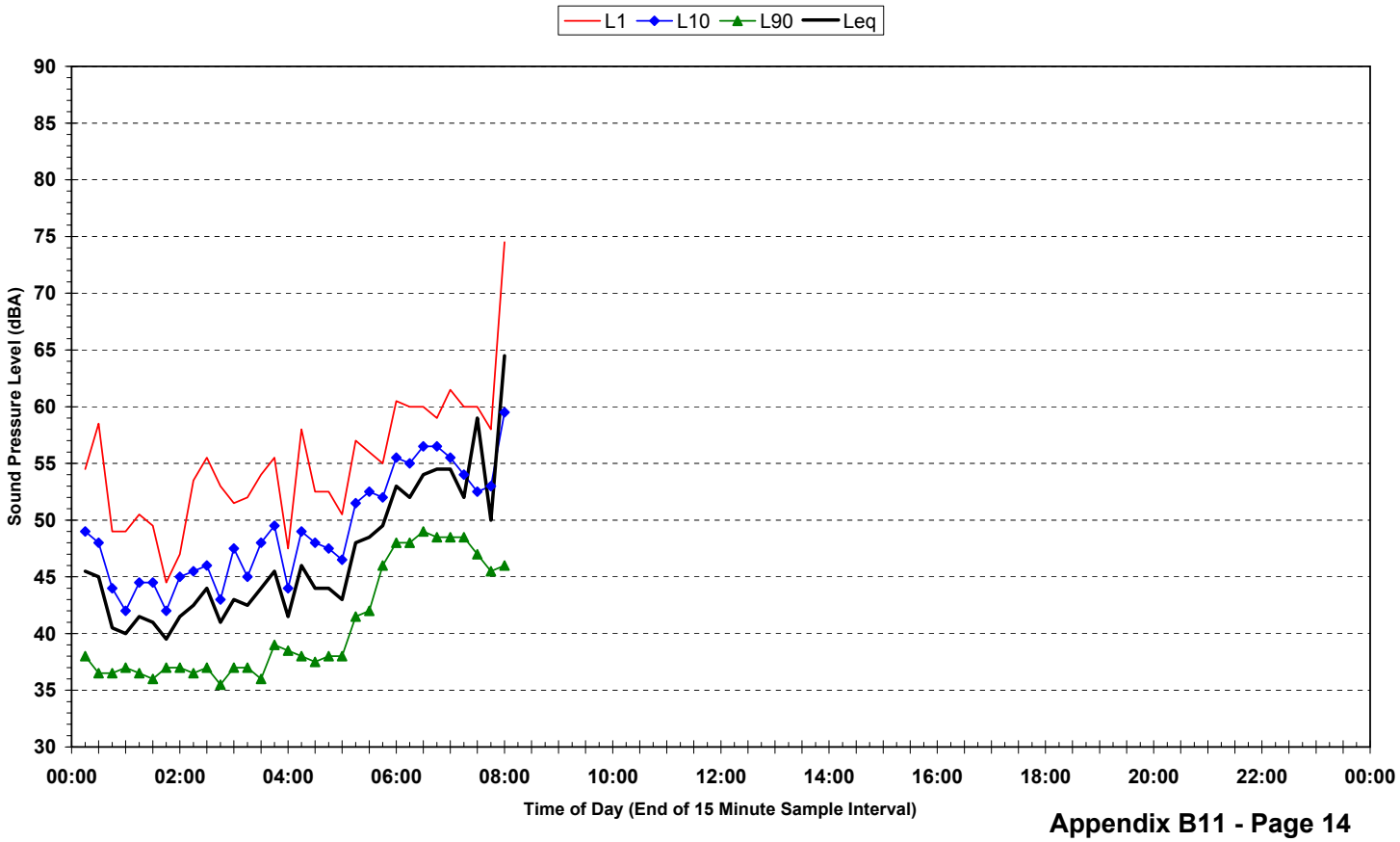

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Appendix G

Air Quality Assessment

AIR QUALITY ASSESSMENT:
MINE PLAN REVISIONS FOR DONALDSON COAL

9 September 2004

Prepared for
GSS Environmental

by
Holmes Air Sciences

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1. INTRODUCTION AND BACKGROUND

This report has been prepared by Holmes Air Sciences for GSS Environmental who are in turn acting on behalf of Donaldson Coal. Donaldson Coal have recently (July 2004) proposed minor revisions to the way in which their open cut coal mine at Beresfield will be developed. The purpose of this report is to assess the air quality impacts that may arise from the proposed revisions.

The Donaldson coal mine is located between Newcastle and Maitland in the lower Hunter Valley. PPK Environment and Infrastructure prepared an Environmental Impact Statement (EIS) for the Donaldson Coal Mine proposal in 1998. This EIS included an air quality assessment undertaken by Holmes Air Sciences (**Holmes Air Sciences, 1998**). The project was granted approval and mining commenced in January 2001.

GSS Environmental are now preparing a Statement of Environmental Effects (SEE) for proposed revisions to the original EIS mining schedule. The revisions include an extension to the existing mining areas. One of the objectives of this assessment is to determine whether there would be changes to air quality impacts as a result of the proposed mine plan revisions.

Computer-based dispersion modelling has been used to predict dust concentration and deposition levels in the study area due to emissions from mining activities. The approach to the assessment follows the approach adopted for the EIS however some changes to the dispersion modelling have been included in this study. These changes include the use of on-site meteorological data and more recent dispersion modelling techniques. The approach to the assessment has been to compare dispersion model predictions with the current mining operations with predictions for operations with the proposed mine plan revisions.

2. PROPOSED MINE PLAN REVISIONS

Figure 1 shows the location of the Donaldson Coal mine and surrounds. Also shown in this figure is the location of the mine extension area and the on-site meteorological station.

Donaldson Coal is proposing to extend mining operations up to 100 m closer to Weakleys Flat Creek than was the case in the original proposal (see **Figure 2**). The extension area contains approximately 1.8 million bank cubic metres of burden and 644,200 tonnes of coal. It would be mined in conjunction with the existing operations, and would be completely mined out by July 2007. There would be no changes to the current extraction rate and implementation of the proposal would not require any extension to the approved project life.

The extension area would be mined with existing equipment and methods, and within existing hours of operations. Mining in the proposed extension area would involve approximately three months of activities in short stages over a period of approximately two years. The second year of mining in the extension area would coincide with Year 5 operations as defined in the EIS.

Table 1 provides information on the estimated annual quantities of overburden and coal mined during Year 5. Under the proposed mine plan revisions, the quantities of overburden and coal from the main pit area (as defined in the EIS) would be reduced by an amount equal to the annual material quantities expected from the proposed extension area. The total material excavated from the mine on an annual basis would therefore remain unchanged.

Table 1 : Annual overburden and coal quantities from active pits during Year 5

Activity	EIS	With mine plan revisions
Overburden from main pit (bcm)	5,652,000	4,752,000
Coal from main pit (tpa)	2,769,000	2,446,900
Overburden from proposed extension area (bcm)	-	900,000*
Coal from proposed extension area (tpa)	-	322,100*

** Assumes mining in extension area will take two years to complete*

3. AIR QUALITY MONITORING

This section examines the existing air quality in the vicinity of the Donaldson mine.

Air quality standards and goals refer to pollutant levels which will include all dust sources in the study area, including the contribution of dust emissions from the Donaldson mine. To fully assess impacts against all the relevant air quality standards and goals it is necessary to have information or estimates on existing dust concentration and deposition levels in the area.

As part of their Air Quality Management Plan Donaldson Coal operate a dust monitoring network in the vicinity of the mining lease. The network includes high volume air sampling, continuous monitoring and dust deposition monitoring. Monitoring commenced in early 2000.

There are two locations which use high volume air samplers to determine concentrations of PM_{10} and TSP. The high volume air samplers operate on a six-day cycle in line with similar measurements made by the NSW Department of Environment and Conservation (DEC, formerly EPA) at other locations. Donaldson Coal's continuous monitoring network consists of two DustTrak monitors measuring PM_{10} at two sites and a GRIMM monitor which is used for one week each quarter to measure $PM_{2.5}$ and PM_{10} simultaneously. In addition to concentration measurements, monthly levels of dust deposition are also measured using eleven gauges placed at various locations in the area of the mine. The monitoring locations are shown in **Figure 1**. **Table 2** lists the instrumentation at each monitoring location.

Table 2 : Air quality monitoring conducted for Donaldson Coal

Monitoring Location	Instrumentation
Beresfield	HVAS (PM_{10})
Blackhill	HVAS (PM_{10}) HVAS (TSP) DustTrak (PM_{10}) Grimm (1 week per quarter) (PM_{10}, $PM_{2.5}$)
Weakleys Drive	DustTrak (PM_{10})
DG1 – DG11	Deposition Gauges

An objective of the air quality monitoring program is to monitor changes to the local air quality environment resulting from dust emissions at the Donaldson mine. For this study an analysis of the monitoring data is useful so that predicted changes in air quality arising from the revised mine plan can be assessed. The most recent year of air quality monitoring data

has been reviewed. These data cover the period from June 2003 to May 2004 and also coincide with the meteorological data period used for the dispersion modelling.

3.1 Dust Concentration

Dust concentration measurements for June 2003 to May 2004 from the high volume air samplers are shown below in **Table 3**. Relevant air quality goals noted by the DEC for comparison with the measurement data include:

- The 24-hour PM_{10} goal of 50 $\mu g/m^3$
- The annual PM_{10} goal of 30 $\mu g/m^3$
- The annual TSP goal of 90 $\mu g/m^3$

Figure 3 shows the measurement data graphically.

Table 3 : High volume air sampling in the study area

Date	Measured 24-hour average concentration ($\mu g/m^3$)		
	PM_{10} at Beresfield	PM_{10} at Blackhill	TSP at Blackhill
01-Jun-03	14	10	15
07-Jun-03	21	13	30
13-Jun-03	24	10	26
19-Jun-03	31	19	-
25-Jun-03	36	10	18
01-Jul-03	11	8	13
07-Jul-03	24	12	26
13-Jul-03	11	9	14
19-Jul-03	17	13	19
25-Jul-03	18	8	29
31-Jul-03	20	8	29
06-Aug-03	44	20	56
12-Aug-03	29	15	37
18-Aug-03	8	9	65
24-Aug-03	20	11	27
30-Aug-03	30	20	45
05-Sep-03	63	23	59
11-Sep-03	48	23	51
17-Sep-03	33	20	52
23-Sep-03	63	44	110
29-Sep-03	44	23	58
05-Oct-03	9	7	13
11-Oct-03	16	12	-
17-Oct-03	17	11	24
23-Oct-03	18	13	31
29-Oct-03	130*	90*	215*
04-Nov-03	38	28	57
10-Nov-03	14	9	20
16-Nov-03	52	39	70

Date	Measured 24-hour average concentration (µg/m^3)		
	PM_{10} at Beresfield	PM_{10} at Blackhill	TSP at Blackhill
22-Nov-03	12	10	18
28-Nov-03	19	10	18
04-Dec-03	21	20	35
10-Dec-03	18	13	24
16-Dec-03	19	16	29
22-Dec-03	39	18	43
28-Dec-03	14	11	21
03-Jan-04	24	18	34
09-Jan-04	41	24	48
15-Jan-04	24	20	34
21-Jan-04	37	24	46
27-Jan-04	-	18	30
02-Feb-04	30	24	57
08-Feb-04	37	37	53
14-Feb-04	28	16	33
20-Feb-04	48	43	88
26-Feb-04	16	15	24
03-Mar-04	78	8	17
09-Mar-04	41	29	48
15-Mar-04	18	17	27
21-Mar-04	19	17	29
27-Mar-04	27	25	39
02-Apr-04	37	26	46
08-Apr-04	19	18	28
14-Apr-04	24	15	24
20-Apr-04	31	20	45
26-Apr-04	27	19	53
02-May-04	11	7	24
08-May-04	41	34	57
14-May-04	41	33	64
20-May-04	38	25	54
26-May-04	14	9	18
Average	29.9	19.3	41.0

** widespread dust storm reported*
Source: Metford Laboratories

Analysis of the data in **Table 3** and **Figure 3** reveal the spatial variability of PM_{10} in the area and that concentrations were generally higher at the Beresfield site than at the Blackhill site. Wind patterns at the Beresfield site (see **Figure 4**) indicate that there are few winds from the west which would transport dust emissions from the mine towards the Beresfield site. Meteorological data collected on the mine site for the June 2003 to May 2004 period (**Figure 5**) show that westerly winds were common. The Blackhill monitoring site may be subjected to dust emissions from the mine when winds are from the north however the windroses (**Figure 4** and **5**) show that northerly winds are uncommon.

Given the prevailing wind patterns of the area, the air quality at the Blackhill site may be less likely to be influenced by dust emissions from the Donaldson mine than the Beresfield site.

Data from the Blackhill site may therefore be more indicative of non-Donaldson mine related dust sources.

The annual average PM_{10} concentrations at both the Beresfield and Blackhill sites were below the 30 $\mu g/m^3$ goal. There were five occasions when the 24-hour average PM_{10} concentration exceeded the 50 $\mu g/m^3$ goal at Beresfield site and one occasion at the Blackhill site. To investigate these events further **Table 4** has been created which shows the wind directions on the days when an exceedance of the 24-hour average PM_{10} goal was recorded.

Table 4 : Daily wind directions when PM_{10} concentrations were above air quality goal

Date	Predominant wind directions during day (number of hours)	Concentrations potentially influenced by dust emissions from Donaldson mine?	
		At Beresfield site	At Blackhill site
05-Sep-03	W (13), WNW (4), NW (1)	Yes (63 $\mu g/m^3$)	No (23 $\mu g/m^3$)
23-Sep-03	WSW (1), W (9), WNW (7), NW (4), NNW (1)	Yes (63 $\mu g/m^3$)	No (44 $\mu g/m^3$)
29-Oct-03	WSW (5), W (15), WNW (4)	Yes (130 $\mu g/m^3$)*	No (90 $\mu g/m^3$)*
16-Nov-03	SE (2), SSE (7), S (2), SSW (1), W (4), WNW (6)	Yes (52 $\mu g/m^3$)	No (39 $\mu g/m^3$)
03-Mar-04	E (1), ESE (10), SE (3), SSW (1)	No (78 $\mu g/m^3$)	No (8 $\mu g/m^3$)

** widespread dust storm reported*

As noted in **Table 3**, there was a widespread dust storm reported for the area on 29 October 2003. The information in **Table 4** therefore shows that exceedances of the 50 $\mu g/m^3$ 24-hour PM_{10} goal may have been influenced by the Donaldson mine activities on three occasions; 5-Sep-03, 23-Sep-03 and 16-Nov-03. On 23-Sep-03 and 16-Nov-03 the measurements at the Blackhill site also approached 50 $\mu g/m^3$ (44 $\mu g/m^3$ and 39 $\mu g/m^3$ respectively) suggesting some widespread elevated levels on these days.

DustTrak instruments have been used for continuous monitoring of PM_{10}. The purpose of the continuous monitoring is to measure short-term fluctuations and variability in dust concentrations and to understand events corresponding with high dust concentrations. Monthly air quality monitoring reports are provided to Donaldson Coal by Holmes Air Sciences. The reports include the data recorded by the DustTrak instruments at the Blackhill and Weakleys Drive sites.

There has been poor correlation between 24-hour average PM_{10} concentrations as measured by the DustTrak monitors and the 24-hour average PM_{10} concentrations from the high volume air samplers. The DustTrak monitors occasionally exhibit readings both higher and lower than those measured by TSP monitors and in some cases the differences are significant and difficult to explain. These anomalous readings occurred on several occasions during the June 2003 to May 2004 period. Annually, however, the DustTraks have reported PM_{10} concentrations similar to those measured by the high volume air samplers. **Table 5** summarises the data collected by the DustTrak monitors.

Table 5 : Continuous monitoring data by DustTrak

Site	Percentage of valid data in June 2003 and May 2004 period (%)	Average from valid data between June 2003 and May 2004 ($\mu g/m^3$)
PM_{10} at Blackhill	53	24.8
PM_{10} at Weakleys Drive	75	25.6

The high volume air sampler data are considered to be the most appropriate dataset for quantifying existing dust concentrations in the area. For the purposes of this assessment the following values have been used as existing concentrations that currently exist in the area:

- Maximum 24-hour average PM_{10} concentration of 44 $\mu g/m^3$
- Annual average PM_{10} concentration of 19 $\mu g/m^3$
- Annual average TSP concentration of 41 $\mu g/m^3$

The above readings of course include the effect of emissions from current mining at Donaldson.

3.2 Dust Deposition

Data from the dust deposition monitoring are shown below in **Table 6**. Annual average measurements for the June 2003 to May 2004 period ranged from 0.7 g/m^2/month to 1.6 g/m^2/month. An annual average dust deposition of 2.4 g/m^2/month was reported from DG8 however this average included a contaminated sample. All of the gauges reported annual average dust deposition levels less than the 4 g/m^2/month goal noted by the DEC.

An existing dust deposition level of 1.2 g/m^2/month (average of the eleven gauges) is considered appropriate for the purposes of this study.

Table 6 : Dust deposition monitoring in the study area

Month	(g/m^2/month)										
	DG1	DG2	DG3	DG4	DG5A	DG6	DG7	DG8	DG9	DG10	DG11
Jun-03	0.5	0.6	0.8	0.8	0.4	0.6	0.8	0.7	0.9	0.7	0.7
Jul-03	0.3	0.4	0.4	0.6	0.4	0.5	0.7	0.5	0.5	0.5	0.7
Aug-03	0.8	0.2	0.7	1.1	0.5	1.3	1.8	2.1	1.3	0.7	0.9
Sep-03	0.6	0.7	1.1	0.7	0.8	1.7	1.4	1.3	2.5	0.9	1.3
Oct-03	*	0.9	1.4	0.9	0.7	1.9	1	1.4	0.6	0.8	1.3
Nov-03	2.6	0.8	1	1.1	0.4	1.3	1.5	1.5	*	0.8	1.3
Dec-03	1	1	1.4	1.3	1.1	1.5	1.6	2	1.8	0.9	1.4
Jan-04	8.5	1.5	2.1	1.5	1.3	2.6	1.4	2.2	1.7	1.5	1.7
Feb-04	1.2	1	1.7	1.4	0.7	3.1	1.6	2.2	*	1.5	2.3
Mar-04	0.4	0.6	6.6*	1.2	0.7	1.9	1.1	12.1*	4.8*	1.5	1.1
Apr-04	0.6	1.0	0.8	0.8	0.6	1.9	0.8	1.4	0.9	1.2	1.1
May-04	0.2	0.9	2.2	0.9	0.8	0.7	0.9	1.4	1.2	0.9	1.5
Annual Average	**1.5**	**0.8**	**1.7**	**1.0**	**0.7**	**1.6**	**1.2**	**2.4 (1.5)**	**1.6 (1.3)**	**1.0**	**1.3**

** contaminated or invalid sample*
Source: Metford Laboratories

4. ESTIMATED DUST EMISSIONS FROM THE PROJECT

Dust emissions arise from various activities at coal mines. Total annual dust emissions at the Donaldson mine have been estimated by analysing all dust generating activities taking place on the mine. The operations and rate of activities have been combined with emission factors developed, both locally and by the US EPA, to estimate the amount of dust produced by each activity. For this study dust emissions have been estimated for both the original Year 5 operations (reproduced from the EIS) and the proposed mine plan revisions. Emission factors used to estimate dust emissions for the proposed mine plan revisions have been taken from the EIS.

To assess the impacts of dust emissions from the revised mine plan, the dust emission inventories have been calculated for the mine during Year 5. **Table 7** summarises the estimated annual dust emissions from the mine including the additional activities that would be associated with the extension area. Details of the calculations of the dust emissions are presented in **Appendix A**.

Table 7 : Summary of estimated dust emissions from Donaldson Mine in Year 5

Activity	Estimated TSP emission per year (kg)	
	EIS	With mine plan revision
O/B drilling (main pit)	1,174	987
O/B blasting (main pit)	31,882	26,805
Loading O/B (all pits)	249,489	249,489
Transport O/B (from main pit)	201,532	169,441
Dump O/B (from all pits)	128,477	128,477
Shape O/B	133,883	133,883
Wind erosion from mine (main pit)	50,855	50,855
Wind erosion from waste dump	296,104	296,104
Wind erosion from pre-strip (main pit)	7,050	7,050
Graders on roads	1,742	1,742
Loading coal to trucks (all pits)	57,121	57,121
Transport coal to hopper (from main pit)	59,455	52,539
Transport rejects	17,535	17,535
Dumping ROM to hopper	27,690	27,690
Loading clean coal to stockpile	54	54
Wind erosion from ROM stockpile	476	476
Loading coal to trucks	178	178
Emissions from conveyer transfer points	3,824	3,824
O/B drilling (extension area)	-	187
O/B blasting (extension area)	-	5,077
Transport O/B (from extension area)	-	19,288
Wind erosion from mine (extension area)	-	35,250
Wind erosion from pre-strip (extension area)	-	7,050
Transport coal to hopper (from extension area)	-	16,218
TOTAL	**1,268,521**	**1,307,320**

Notes:
O/B: Overburden
ROM: Run-Of-Mine coal

The additional activities associated with the proposed extension area have been included in **Table 7**. For the purposes of the emission calculations, activity rates have been apportioned between the main Year 5 pit and extension area pits according to the ratio of overburden and coal quantities mined.

A slight increase (approximately 3%) in annual dust emissions has been calculated with the mine plan revisions over EIS estimates. The increase in the estimated annual total TSP

emission is primarily a result of an increased haul distance from the extension area to stockpiles.

5. APPROACH TO THE ASSESSMENT

In August 2001, the NSW DEC published guidelines for the assessment of air pollution sources using dispersion models (**NSW EPA, 2001**). The guidelines specify how assessments based on the use of air dispersion models should be undertaken. They include guidelines for the preparation of meteorological data to be used in dispersion models, the way in which emissions should be estimated and the relevant air quality criteria for assessing the significance of predicted concentration and deposition rates from proposals. The approach taken in this assessment has been to update the EIS and proposed mine plan revision scenarios during Year 5 so that they follow as closely as possible the approaches suggested by the guidelines.

In order to determine whether there would be any changes to air quality impacts as a result of the revised mine plan, two operational scenarios have been modelled. These scenarios are:

1. Year 5 as per EIS, and
2. Year 5 with proposed mine extension

In both the scenarios above the approach to the dispersion modelling differs from the EIS modelling as follows:

- On-site meteorological data has been used
- The AUSPLUME dispersion model has been chosen instead of ISCST3
- All drilling and blasting activities have been confined only to day-time hours
- Emissions from material transfer and wind erosion have been made to vary with wind speed

Meteorological data has been collected on the Donaldson mine site since December 1999. The meteorological station has been relocated a number of times (in February 2001 and March 2002) since its initial installation in order to have the instrumentation as free as possible from the sheltering effect of trees on the site. The present position (see **Figure 1**) is on a mast attached to the top of the site administration building. This site is much more exposed than the previous two sites.

The data collected from the on-site weather station include 10-minute records of temperature, wind speed, wind direction, solar radiation and rainfall. The most recent year of data (June 2003 to May 2004) has been used for the dispersion modelling. These data have been prepared into a form suitable for use in the AUSPLUME dispersion model which requires hourly records of temperature, wind speed, wind direction, atmospheric stability class[1] and mixing height[2]. Atmospheric stability has been determined for each hour in the

[1] In dispersion modelling stability class is used to categorise the rate at which a plume will disperse. In the Pasquill-Gifford stability class assignment scheme, as used in this study, there are six stability classes A through to F. Class A relates to unstable conditions such as might be found on a sunny day with light winds. In such conditions plumes will spread rapidly. Class F relates to stable conditions, such as occur when the sky is clear, the winds are light and an inversion is present. Plume spreading is slow in these circumstances. The intermediate classes B, C, D and E relate to intermediate dispersion conditions.

meteorological dataset by the US EPA method using sigma-theta (**US EPA, 1986**). Mixing height was determined using a scheme defined by **Powell** (**1976**) for day-time conditions and an approach described by **Venkatram**, (**1980**) for night-time conditions. These two methods provide a good estimate of mixing height in the absence of upper air data.

Figures 4 and **5** show annual and seasonal wind roses prepared from the wind data at Beresfield (as used in the EIS) and from the mine site. **Appendix B** presents joint wind speed, wind direction and stability class frequency tables for mine site data. The main difference between the two datasets is the proportion of calm periods, where the wind speed is 0.5 m/s or less, measured at each site. The Beresfield weather station site is much more exposed than the mine site weather station which explains the higher proportion of calms measured on the mine site. Winds in the Hunter Valley are typically aligned along a northwest-southeast axis and this pattern is evident to some degree in both datasets. The siting of the mine-site weather station would make it representative of wind patterns in the study area (defined by **Figure 1**) given that the land is well vegetated over most of the area.

The mining operations were represented by a series of volume sources located according to the Year 5 mine plan. **Figure 6** shows the location of the dust emission sources used for both the EIS and this assessment. The proposed extension area is represented by sources 18, 19 and 20. Estimates of emissions for each source were developed on an hourly time step taking into account the activities that would take place at that location. Thus, for each source, for each hour, an emission rate was determined depending on the level of activity and the wind speed.

Dust concentrations and deposition rates have been predicted over an area 8 km by 8 km. Local terrain has been included in the modelling. Receptor locations in the dispersion model are the same as in the EIS and have been have been chosen to provide finer resolution closer to the dust sources and nearby residences.

As an example of the model configuration the AUSPLUME model output file is provided in **Appendix C**.

6. ASSESSMENT OF AIR QUALITY IMPACTS

The results from the dispersion modelling are presented as contour plots shown in **Figures 7** to **10**. The contour plots show the predicted ground-level dust concentration and deposition levels for the updated EIS scenario and the mine plan revision scenario. All contour plots relate to Year 5 mine plans and extraction rates. The four figures show the following information:

- **Figure 7**: Predicted maximum 24-hour average PM_{10} concentrations due to Donaldson mining operations in Year 5
- **Figure 8**: Predicted annual average PM_{10} concentrations due to Donaldson mining operations in Year 5
- **Figure 9**: Predicted annual average TSP concentrations due to Donaldson mining operations in Year 5

[2] The term mixing height refers to the height of the turbulent layer of air near the earth's surface into which ground-level emissions will be rapidly mixed. A plume emitted above the mixed-layer will remain isolated from the ground until such time as the mixed-layer reaches the height of the plume. The height of the mixed-layer is controlled mainly by convection (resulting from solar heating of the ground) and by mechanically generated turbulence as the wind blows over the rough ground.

- **Figure 10**: Predicted annual average dust deposition due to Donaldson mining operations in Year 5

For each figure, the updated EIS scenario and the mine plan revision scenario have been presented together to allow easier analysis of any differences resulting from the proposed mine plan revisions. By comparing the model predictions for the updated EIS and mine plan revision scenarios it can be seen that there is very little change to off-site dust concentrations and deposition levels as a result of the proposed mine plan revisions.

In addition to the dispersion model plots, the model predictions have been assessed for selected residences in the vicinity of the mine. **Figure 11** shows the residences selected for further assessment of the model results. The existing air quality has been reasonably well established from the air quality monitoring data discussed in **Section 3**. The objective of assessment at selected residences is to determine the change in air quality that may be expected due to the mine operating with the proposed mine plan revisions.

Table 8 presents the analysis of the model predictions for the four residences. This information includes the established existing air quality levels, the model predictions for the EIS mine plan and the model predictions for the revised mine plan.

Table 8 : Analysis of dispersion model results at selected residences

Resident ID	Maximum 24-hour PM_{10} ($\mu g/m^3$)	Annual PM_{10} ($\mu g/m^3$)	Annual TSP ($\mu g/m^3$)	Annual dust deposition (g/m^2/month)
Relevant air quality goals				
-	50	30	90	4.0
Existing levels (see Section 3)				
-	44	19	41	1.2
Updated EIS predictions				
R1	33.5	1.2	1.4	0.02
R2	53.4	1.3	1.3	0.01
R3	36.7	2.3	2.7	0.06
R4	49.3	8.1	8.9	0.13
Revised mine plan predictions				
R1	31.5	1.2	1.3	0.02
R2	46.7	1.2	1.3	0.01
R3	34.1	2.1	2.3	0.05
R4	48.1	8.1	8.9	0.13
Predicted change at residence				
R1	-2.0	0.0	-0.1	0.00
R2	-6.7	-0.1	0.0	0.00
R3	-2.6	-0.2	-0.4	-0.01
R4	-1.2	0.0	0.0	0.01
Resulting predicted levels at residences during Donaldson Year 5 revised mine plan operations				
R1	42.0	19.0	40.9	1.2
R2	37.3	18.9	41.0	1.2
R3	41.4	18.8	40.6	1.2
R4	42.8	19.0	41.0	1.2

The analysis above compares the EIS mine plan predictions with the revised mine plan predictions at each residences. The resultant change in dust concentration and deposition levels is shown for each residence and the change is added to the existing air quality level.

It can be seen that, at all the selected residences, the change to dust concentrations and deposition levels is small. Also, there are no instances where the predicted resulting levels are above air quality goals noted by the DEC.

7. CONCLUSIONS

This study has assessed the difference to air quality impacts predicted to arise from the proposed extension to mining operations at the Donaldson Coal mine in the lower Hunter Valley. Dispersion modelling has been used to compare scenarios with and without the proposed mine extension area to evaluate changes to air quality impacts. Some changes to the modelling approach since the Donaldson Coal mine EIS have been adopted for this assessment. Most notably, on-site meteorological data have been used instead of data from Beresfield which are considered to be more representative of the wind patterns in the study area, given the nature of the landuse.

It can be concluded from the assessment that there would be very little difference to off-site air quality impacts with the proposed extension to mining operations.

8. REFERENCES

Holmes Air Sciences (1998)

"Air quality assessment: Donaldson Project", Prepared by Holmes Air Sciences for Wootmac, 19 August 1998.

NSW EPA (2001)

"Approved methods and guidance for the modelling and assessment of air pollutants in New South Wales", Prepared by NSW Environment Protection Authority, ISBN 0 7313 2782 9, August 2001.

Powell D C (1976)

"A Formulation of Time-varying Depths of Daytime Mixed Layer and Night-time Stable Layer for use in Air Pollution Assessment Models", Annual Report for 1976 Part 3, Battelle PNL Atmospheric Sciences, 185-189.

US EPA (1986)

"Guideline on air quality models (revised)", Prepared by the United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711, EPA-450/2-78-027R.

Venkatram (1980)

"Estimating the Monin-Obukhov Length in the Stable Boundary Layer for Dispersion Calculations", Boundary-Layer Meteorology, Volume 19, 481-485.

APPENDIX A
ESTIMATED DUST EMISSIONS FROM EXTENSION AREA IN YEAR 5

ESTIMATED DUST EMISSIONS FROM EXTENSION AREA IN YEAR 5

A summary of the TSP emissions estimated during Year 5 are reproduced from the EIS in the table below.

Activity	Estimated TSP emission for Year 5 in the EIS (kg)
O/B drilling	1,174
O/B blasting	31,882
Loading O/B	249,489
Transport O/B	201,532
Dump O/B	128,477
Shape O/B	133,883
Wind erosion from mine	50,855
Wind erosion from waste dump	296,104
Wind erosion from pre-strip	7,050
Graders on roads	1,742
Loading coal to trucks	57,121
Transport coal to hopper	59,455
Transport rejects	17,535
Dumping ROM to hopper	27,690
Loading clean coal to stockpile	54
Wind erosion from ROM stockpile	476
Loading coal to trucks	178
Emissions from conveyer transfer points	3,824

OVERBURDEN OPERATIONS ASSOCIATED WITH THE EXTENSION AREA

Drilling overburden

The proposed extension contains approximately 1,800,000 bcm of overburden that will be mined over two years. This equates to approximately 900,000 bcm per year. In Year 5 a total of 5,652,000 bcm of waste overburden will be blasted from both the main pit and extension area. The total TSP due to overburden drilling in the extension area has been estimated by the ratio of overburden blasted in the extension area to the overburden blasted in the main pit. Therefore the total TSP emission from the extension area due to drilling overburden is 187 kg [1174 kg/y x 900,000 / 5,652,000].

Blasting overburden

The total TSP due to blasting overburden in the extension area has been estimated by the ratio of overburden blasted in the extension area to the overburden blasted in the main pit. Therefore the total TSP emission from the extension area due to blasting overburden is 5,077 kg [31,882 kg/y x 900,000 / 5,652,000].

Transporting overburden for dumping

In Year 5 approximately 2,160,000 t [900,000 bcm x 2.4 t/bcm] of overburden will be transported from the extension area by 140 t rear dump trucks to the overburden dump. Assuming a return travel distance of 1.5 km and dust generation rate of 1.0 kg/VKT (50% control of dust by watering of the haul road) the total dust generated taking into account approximately 21% pit retention, will be 19,288 kg [(2,160,000 t/140 t) x 1.5 km x 1.055 kg/km x 0.79].

Wind erosion from mine

The EPA emission factor for TSP emissions due to wind erosion is 7,050 kg/ha/y. Assuming that the extension area has a disturbed area of 4 ha in Year 5 the annual dust emission will be 35,250 kg/year (assuming approximately 28% pit retention).

Wind erosion from pre-strip

The EPA emission factor for TSP emissions due to wind erosion is 7,050 kg/ha/y. Assuming that the area disturbed by pre-strip is 1 ha in Year 5 the annual dust emission will be 7,050 kg/year.

COALING OPERATIONS IN THE EXTENSION AREA

Transporting ROM coal to stockpile /hopper

It is estimated that the extension area contains approximately 644,200 t of coal which will be mined over two years. This equates to 322,100 t of coal per year which will be transported by 55 t rear dump trucks from the extension area to the ROM stockpile at the CHPP. Assuming a return travel distance of 3.5 km, dust generation rate of 1.055 kg/VKT (50% control of dust by watering of the haul road) the total dust generated (assuming approximately 75% of dust escapes the pit), will be 16,218 kg [(322,100 t/55 t) x 3.5 km x 1.055 kg/km x 0.75].

The information below summarises the emissions from each activity associated with the revised mining operations during Year 5. Also included are the location of sources (refer to **Figure 6**) and the hours of operation for each activity.

```
  -------------------------------      09-Sep-2004 08:30
  DUST EMISSION CALCULATIONS V2
 -------------------------------

 Output emissions file  : C:\Jobs\Donald04\ausplume\Revision\emiss.src
 Meteorological file    : C:\Jobs\Donald04\metdata\don0304.isc
 Number of dust sources : 20
 Number of activities   : 24

  -----ACTIVITY SUMMARY-----
 ACTIVITY NAME : O/B Drilling
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 987 kg/y
 FROM SOURCES  : 3
15 16 17
 HOURS OF DAY  :
0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

 ACTIVITY NAME : O/B blasting
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 26805 kg/y
 FROM SOURCES  : 3
15 16 17
 HOURS OF DAY  :
0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

 ACTIVITY NAME : Loading O/B
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 249489 kg/y
 FROM SOURCES  : 6
15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Transport O/B
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 169441 kg/y
 FROM SOURCES  : 5
6 7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dump O/B
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 128477 kg/y
 FROM SOURCES  : 4
11 12 13 14
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Shape O/B
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 133883 kg/y
 FROM SOURCES  : 4
11 12 13 14
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from mine
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 50855 kg/y
 FROM SOURCES  : 3
15 16 17
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
 ACTIVITY NAME : Wind erosion from waste dump
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 296104 kg/y
 FROM SOURCES  : 4
11 12 13 14
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from pre-strip
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 7050 kg/y
 FROM SOURCES  : 1
17
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Graders on roads
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 1742 kg/y
 FROM SOURCES  : 8
3 4 5 6 7 8 9 10
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading coal to trucks
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 57121 kg/y
 FROM SOURCES  : 6
15 16 17 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Transport coal to hopper
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 52539 kg/y
 FROM SOURCES  : 6
3 4 5 6 7 8
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Transport rejects
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 17535 kg/y
 FROM SOURCES  : 6
3 4 5 6 7 8
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Dumping ROM to hopper
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 27690 kg/y
 FROM SOURCES  : 1
2
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading clean coal to stockpile
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 54 kg/y
 FROM SOURCES  : 1
1
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Wind erosion from ROM stockpile
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 476 kg/y
 FROM SOURCES  : 1
2
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Loading coal to trucks
 ACTIVITY TYPE : Wind sensitive
 DUST EMISSION : 178 kg/y
 FROM SOURCES  : 1
1
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
 ACTIVITY NAME : Emissions from conveyer transfer points
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 3824 kg/y
 FROM SOURCES  : 2
1 2
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Ext-O/B Drilling
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 187 kg/y
 FROM SOURCES  : 3
18 19 20
 HOURS OF DAY  :
0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Ext-O/B blasting
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 5077 kg/y
 FROM SOURCES  : 3
18 19 20
 HOURS OF DAY  :
0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0

 ACTIVITY NAME : Ext-Transport O/B
 ACTIVITY TYPE : Wind insensitive
 DUST EMISSION : 19288 kg/y
 FROM SOURCES  : 5
10 14 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Ext-Wind erosion from mine
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 35250 kg/y
 FROM SOURCES  : 3
18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Ext-Wind erosion from pre-strip
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 7050 kg/y
 FROM SOURCES  : 1
18
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

 ACTIVITY NAME : Ext-Transport coal to hopper
 ACTIVITY TYPE : Wind erosion
 DUST EMISSION : 16218 kg/y
 FROM SOURCES  : 9
3 4 5 9 10 14 18 19 20
 HOURS OF DAY  :
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

APPENDIX B
JOINT WIND SPEED, WIND DIRECTION AND STABILITY CLASS FREQUENCY TABLES

STATISTICS FOR FILE: Donaldson Mine site, June 2003 to May 2004 "don0304.aus"
MONTHS: All
HOURS : All
OPTION: Frequency

PASQUILL STABILITY CLASS 'A'

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.003415	0.000569	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003985
NE	0.002618	0.000683	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003301
ENE	0.003529	0.001366	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004895
E	0.004668	0.002277	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006944
ESE	0.003301	0.001252	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004554
SE	0.004440	0.003643	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008083
SSE	0.006489	0.005920	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012409
S	0.008424	0.003985	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012409
SSW	0.004212	0.001708	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005920
SW	0.004098	0.001480	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005578
WSW	0.005578	0.002277	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007855
W	0.010018	0.013434	0.001025	0.000000	0.000000	0.000000	0.000000	0.000000	0.024476
WNW	0.011043	0.013206	0.000569	0.000000	0.000000	0.000000	0.000000	0.000000	0.024818
NW	0.006944	0.005806	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012750
NNW	0.003415	0.001480	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.005009
N	0.004781	0.000455	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005237
CALM									0.006261
TOTAL	0.086976	0.059540	0.001708	0.000000	0.000000	0.000000	0.000000	0.000000	0.154485

MEAN WIND SPEED (m/s) = 1.47
NUMBER OF OBSERVATIONS = 1357

PASQUILL STABILITY CLASS 'B'

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000228	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000342
NE	0.000342	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000569
ENE	0.000569	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000797
E	0.002505	0.001594	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004098
ESE	0.001594	0.002391	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003985
SE	0.003871	0.009904	0.000569	0.000000	0.000000	0.000000	0.000000	0.000000	0.014344
SSE	0.004098	0.003529	0.000342	0.000114	0.000000	0.000000	0.000000	0.000000	0.008083
S	0.000797	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000911
SSW	0.000455	0.000455	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000911
SW	0.000911	0.001594	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.002618
WSW	0.002960	0.003074	0.000455	0.000228	0.000000	0.000000	0.000000	0.000000	0.006717
W	0.008652	0.015027	0.007058	0.000342	0.000000	0.000000	0.000000	0.000000	0.031079
WNW	0.004668	0.010360	0.010246	0.001708	0.000000	0.000000	0.000000	0.000000	0.026981
NW	0.001138	0.001025	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.002277
NNW	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000228
N	0.000455	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000683
CALM									0.003415
TOTAL	0.033470	0.049863	0.018898	0.002391	0.000000	0.000000	0.000000	0.000000	0.108037

MEAN WIND SPEED (m/s) = 2.12
NUMBER OF OBSERVATIONS = 949

PASQUILL STABILITY CLASS 'C'

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000114
NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ENE	0.000569	0.000455	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001025
E	0.002049	0.006375	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.008538
ESE	0.003643	0.013889	0.001025	0.000000	0.000000	0.000000	0.000000	0.000000	0.018556
SE	0.004212	0.009791	0.001708	0.000000	0.000000	0.000000	0.000000	0.000000	0.015710
SSE	0.001138	0.000797	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001935
S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SW	0.000455	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000569
WSW	0.004326	0.001138	0.000114	0.000342	0.000000	0.000000	0.000000	0.000000	0.005920
W	0.010360	0.005692	0.002505	0.000797	0.000000	0.000000	0.000000	0.000000	0.019353
WNW	0.004781	0.001935	0.001252	0.002391	0.000000	0.000000	0.000000	0.000000	0.010360
NW	0.000342	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000569
NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
N	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
CALM									0.002960
TOTAL	0.031990	0.040414	0.006717	0.003529	0.000000	0.000000	0.000000	0.000000	0.085610

MEAN WIND SPEED (m/s) = 1.96
NUMBER OF OBSERVATIONS = 752

PASQUILL STABILITY CLASS 'D'

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000114
NE	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000228
ENE	0.001025	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001252
E	0.008083	0.008424	0.000455	0.000000	0.000000	0.000000	0.000000	0.000000	0.016963
ESE	0.015255	0.024476	0.001138	0.000000	0.000000	0.000000	0.000000	0.000000	0.040870
SE	0.013775	0.014230	0.001594	0.000000	0.000000	0.000000	0.000000	0.000000	0.029599
SSE	0.001480	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001480
S	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000114
SSW	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000342
SW	0.003529	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003529
WSW	0.029713	0.003529	0.000569	0.000000	0.000000	0.000000	0.000000	0.000000	0.033811
W	0.042122	0.013547	0.003188	0.000228	0.000228	0.000228	0.000000	0.000000	0.059540
WNW	0.011726	0.003757	0.004895	0.000455	0.000114	0.000000	0.000000	0.000000	0.020947
NW	0.003301	0.000228	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.003757
NNW	0.000228	0.000000	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000342
N	0.000455	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000455
CALM									0.040528
TOTAL	0.131489	0.068420	0.012181	0.000683	0.000342	0.000228	0.000000	0.000000	0.253871

MEAN WIND SPEED (m/s) = 1.38
NUMBER OF OBSERVATIONS = 2230

PASQUILL STABILITY CLASS 'E'

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000342	0.000114	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000569
NE	0.000455	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000683
ENE	0.001366	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001594
E	0.004212	0.000569	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.004781
ESE	0.023907	0.002846	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.026753
SE	0.022769	0.005578	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.028347
SSE	0.004098	0.001366	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005464
S	0.000683	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000683
SSW	0.001025	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001252
SW	0.004440	0.001480	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005920
WSW	0.023907	0.003415	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.027322
W	0.033470	0.010701	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.044171
WNW	0.010360	0.009677	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.020036
NW	0.001480	0.000911	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002391
NNW	0.000569	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000683
N	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000228
CALM									0.055328
TOTAL	0.133311	0.037454	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.226207

MEAN WIND SPEED (m/s) = 1.02
NUMBER OF OBSERVATIONS = 1987

PASQUILL STABILITY CLASS 'F'

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000569	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000911
NE	0.000797	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001025
ENE	0.000569	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000683
E	0.000683	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000683
ESE	0.006944	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007172
SE	0.015141	0.002163	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.017304
SSE	0.009335	0.003871	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.013206
S	0.005806	0.001594	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007400
SSW	0.007058	0.001366	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008424
SW	0.004668	0.002732	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007400
WSW	0.005806	0.000455	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006261
W	0.006261	0.001935	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008197
WNW	0.003757	0.003415	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007172
NW	0.001821	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001821
NNW	0.001366	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001480
N	0.000911	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001025
CALM									0.081626
TOTAL	0.071494	0.018670	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.171790

MEAN WIND SPEED (m/s) = 0.83
NUMBER OF OBSERVATIONS = 1509

ALL PASQUILL STABILITY CLASSES

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.004781	0.001138	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.006034
NE	0.004440	0.001366	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005806
ENE	0.007628	0.002618	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.010246
E	0.022199	0.019240	0.000569	0.000000	0.000000	0.000000	0.000000	0.000000	0.042008
ESE	0.054645	0.045082	0.002163	0.000000	0.000000	0.000000	0.000000	0.000000	0.101890
SE	0.064208	0.045310	0.003871	0.000000	0.000000	0.000000	0.000000	0.000000	0.113388
SSE	0.026639	0.015483	0.000342	0.000114	0.000000	0.000000	0.000000	0.000000	0.042577
S	0.015824	0.005692	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.021516
SSW	0.013092	0.003757	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.016849
SW	0.018101	0.007400	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.025615
WSW	0.072291	0.013889	0.001138	0.000569	0.000000	0.000000	0.000000	0.000000	0.087887
W	0.110883	0.060337	0.013775	0.001366	0.000228	0.000228	0.000000	0.000000	0.186817
WNW	0.046334	0.042350	0.016963	0.004554	0.000114	0.000000	0.000000	0.000000	0.110314
NW	0.015027	0.008197	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.023566
NNW	0.005806	0.001708	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.007741
N	0.006831	0.000797	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.007628
CALM									0.190118
TOTAL	0.488730	0.274362	0.039617	0.006603	0.000342	0.000228	0.000000	0.000000	1.000000

MEAN WIND SPEED (m/s) = 1.35
NUMBER OF OBSERVATIONS = 8784

FREQUENCY OF OCCURENCE OF STABILITY CLASSES

A : 15.4%
B : 10.8%
C : 8.6%
D : 25.4%
E : 22.6%
F : 17.2%

APPENDIX C
AUSPLUME MODEL OUTPUT FILE

Donaldson - Mine plan revisions Year 5 - concentration run

Concentration or deposition	Concentration
Emission rate units	grams/second
Concentration units	microgram/m3
Units conversion factor	1.00E+06
Constant background concentration	0.00E+00
Terrain effects	Egan method
Plume depletion due to dry removal mechanisms included.	
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	Yes
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Roughness height at the wind vane site	0.500 m

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Pasquill-Gifford
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.500m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients
given by the hourly met. file, a value from the following table
(in K/m) is used:

Wind Speed Category	Stability Class A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIMES
24 hours
average over all hours

Donaldson

SOURCE GROUPS

Group No.	Members						
1	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	
2	21	22	23	24	25	26	27
	28	29	30	31	32	33	34
	35	36	37	38	39	40	
3	41	42	43	44	45	46	47
	48	49	50	51	52	53	54
	55	56	57	58	59	60	

Donaldson

SOURCE CHARACTERISTICS

VOLUME SOURCE: 1

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356232	1368092	59m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 2

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356406	1367792	53m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 3

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356514	1367834	53m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 4

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356697	1367775	47m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 5

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356864	1367684	37m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 6

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357021	1367571	26m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 7

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356798	1367515	30m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 8

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356588	1367484	37m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 9

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357042	1367755	40m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 10

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357149	1367951	51m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 11

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356948	1368083	57m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with

this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 12

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357291	1368103	50m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 13

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356953	1367768	42m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 14

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357339	1367785	36m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 15

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357225	1367491	20m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 16

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356887	1367463	25m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 17

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356544	1367439	40m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 18

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357407	1367472	16m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 19

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357511	1367666	23m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 20

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357633	1367852	28m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	1.0	2.50

VOLUME SOURCE: 21

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356232	1368092	59m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 22

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356406	1367792	53m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 23

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356514	1367834	53m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 24

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356697	1367775	47m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 25

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356864	1367684	37m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 26

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357021	1367571	26m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 27

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356798	1367515	30m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 28

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356588	1367484	37m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 29

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357042	1367755	40m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 30

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357149	1367951	51m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 31

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356948	1368083	57m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 32

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357291	1368103	50m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 33

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356953	1367768	42m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 34

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357339	1367785	36m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 35

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357225	1367491	20m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 36

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356887	1367463	25m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 37

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356544	1367439	40m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 38

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357407	1367472	16m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)

1.0000	5.0	2.50

VOLUME SOURCE: 39

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357511	1367666	23m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 40

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357633	1367852	28m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	5.0	2.50

VOLUME SOURCE: 41

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356232	1368092	59m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 42

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356406	1367792	53m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 43

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356514	1367834	53m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 44

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356697	1367775	47m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 45

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356864	1367684	37m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 46

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357021	1367571	26m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 47

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356798	1367515	30m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 48

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356588	1367484	37m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 49

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357042	1367755	40m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)

1.0000	17.3	2.50

VOLUME SOURCE: 50

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357149	1367951	51m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 51

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356948	1368083	57m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 52

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357291	1368103	50m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 53

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356953	1367768	42m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 54

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357339	1367785	36m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 55

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357225	1367491	20m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 56

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356887	1367463	25m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 57

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
356544	1367439	40m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 58

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357407	1367472	16m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 59

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357511	1367666	23m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass fraction	Particle Size (micron)	Particle Density (g/cm3)
1.0000	17.3	2.50

VOLUME SOURCE: 60

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
357633	1367852	28m	2m	20m	2m

(Constant) emission rate = 1.00E+00 grams/second

Hourly multiplicative factors will be used with
this emission factor.

Particle Mass	Particle Size	Particle Density

fraction	(micron)	(g/cm3)
1.0000	17.3	2.50

1

Donaldson

RECEPTOR LOCATIONS

DISCRETE RECEPTOR LOCATIONS (in metres)

No.	X	Y	ELEVN	HEIGHT	No.	X	Y	ELEVN	HEIGHT
1	356170	1368208	59.8	0.0	126	358449	1370634	27.2	0.0
2	356301	1368225	55.3	0.0	127	358433	1370276	28.2	0.0
3	356398	1368143	56.0	0.0	128	358677	1370357	22.7	0.0
4	356447	1368029	55.8	0.0	129	359019	1370113	12.5	0.0
5	356594	1367964	56.0	0.0	130	359377	1369690	13.4	0.0
6	356724	1367948	56.6	0.0	131	359182	1369071	16.4	0.0
7	356773	1368046	51.0	0.0	132	359735	1369576	11.0	0.0
8	356870	1368176	59.9	0.0	133	357766	1371285	23.6	0.0
9	357082	1368208	45.6	0.0	134	357326	1371236	19.5	0.0
10	357294	1368225	32.9	0.0	135	357001	1371415	8.2	0.0
11	357505	1368176	30.9	0.0	136	356887	1371789	21.2	0.0
12	357684	1368062	34.2	0.0	137	357277	1371594	10.9	0.0
13	357766	1367948	26.7	0.0	138	351987	1371090	39.6	0.0
14	357782	1367736	14.8	0.0	139	352101	1371415	30.7	0.0
15	357668	1367622	11.4	0.0	140	351776	1371269	34.4	0.0
16	357619	1367460	16.3	0.0	141	351955	1371806	24.2	0.0
17	357554	1367313	21.1	0.0	142	351515	1371724	25.9	0.0
18	357375	1367297	25.4	0.0	143	352264	1371952	20.7	0.0
19	357245	1367313	33.6	0.0	144	355161	1372196	31.3	0.0
20	357049	1367346	31.4	0.0	145	356057	1372066	29.5	0.0
21	356936	1367297	31.2	0.0	146	359182	1372001	24.7	0.0
22	356822	1367313	39.7	0.0	147	359686	1371513	19.1	0.0
23	356740	1367362	42.7	0.0	148	360093	1371024	12.9	0.0
24	356577	1367264	58.1	0.0	149	360337	1369543	10.0	0.0
25	356415	1367330	45.8	0.0	150	360370	1368925	10.3	0.0
26	356431	1367460	41.4	0.0	151	360370	1368485	10.9	0.0
27	356545	1367622	59.1	0.0	152	355519	1367199	66.3	0.0
28	356317	1367622	56.0	0.0	153	355243	1367736	72.7	0.0
29	356219	1367704	53.3	0.0	154	355178	1368306	58.4	0.0
30	356252	1367883	56.1	0.0	155	355536	1368827	44.9	0.0
31	356105	1367932	56.7	0.0	156	356040	1369104	62.4	0.0
32	356024	1368095	55.7	0.0	157	356854	1369087	38.9	0.0
33	356008	1368241	60.4	0.0	158	357798	1369104	25.3	0.0
34	356252	1368290	56.0	0.0	159	358433	1368941	29.8	0.0
35	356545	1368192	55.9	0.0	160	358954	1368339	12.9	0.0
36	356708	1368241	66.6	0.0	161	359084	1367362	20.4	0.0
37	356919	1368290	42.7	0.0	162	358938	1366532	29.2	0.0
38	357277	1368322	27.5	0.0	163	358270	1365995	29.6	0.0
39	357489	1368339	30.1	0.0	164	357538	1365588	37.3	0.0
40	357782	1368208	25.6	0.0	165	356480	1365897	43.4	0.0
41	357880	1367997	25.0	0.0	166	355926	1366239	48.6	0.0
42	357977	1367753	11.8	0.0	167	355373	1366727	56.9	0.0
43	357945	1367574	21.4	0.0	168	354901	1367264	56.4	0.0
44	357847	1367378	25.0	0.0	169	354738	1367948	82.5	0.0
45	357814	1367216	30.1	0.0	170	354673	1368860	44.3	0.0
46	357652	1367167	24.4	0.0	171	355487	1369397	45.0	0.0
47	357473	1367102	21.1	0.0	172	356447	1369592	58.6	0.0
48	357245	1367053	21.2	0.0	173	357261	1369722	41.9	0.0
49	357017	1367102	30.2	0.0	174	358173	1369608	31.0	0.0
50	356773	1367085	40.4	0.0	175	358954	1369266	19.6	0.0
51	356463	1367069	55.0	0.0	176	359361	1368388	10.6	0.0
52	356301	1367167	64.8	0.0	177	359735	1367167	19.6	0.0
53	356122	1367460	57.6	0.0	178	359703	1366304	24.2	0.0
54	355926	1367736	50.3	0.0	179	359654	1365295	14.7	0.0
55	355845	1367948	45.0	0.0	180	359556	1364676	14.8	0.0
56	355812	1368192	51.8	0.0	181	358628	1364172	17.7	0.0
57	355959	1368404	60.0	0.0	182	358482	1365376	38.8	0.0
58	356301	1368453	50.2	0.0	183	358010	1364660	50.5	0.0
59	356675	1368404	51.1	0.0	184	357798	1364042	68.7	0.0
60	357082	1368453	44.8	0.0	185	357163	1364465	68.0	0.0
61	357375	1368501	39.4	0.0	186	356529	1363976	113.3	0.0
62	357717	1368501	30.5	0.0	187	355715	1364253	144.9	0.0
63	357945	1368339	19.3	0.0	188	355015	1364628	146.0	0.0
64	358059	1368046	15.8	0.0	189	355422	1365913	63.6	0.0
65	358140	1367769	15.0	0.0	190	355243	1366320	59.4	0.0
66	358156	1367443	20.5	0.0	191	354282	1367037	65.5	0.0
67	358107	1367216	21.0	0.0	192	354299	1366239	81.3	0.0
68	357880	1366939	32.9	0.0	193	353859	1366857	72.3	0.0
69	357587	1366809	34.4	0.0	194	354185	1367655	62.3	0.0
70	357228	1366809	21.1	0.0	195	354054	1368322	54.9	0.0
71	356936	1366776	23.1	0.0	196	354234	1369494	54.3	0.0
72	356626	1366760	29.9	0.0	197	355112	1369852	30.2	0.0
73	356219	1366825	51.6	0.0	198	356008	1370129	29.2	0.0
74	355943	1367037	49.6	0.0	199	356789	1370324	44.5	0.0
75	355829	1367378	44.7	0.0	200	357863	1370162	30.0	0.0

76	355585	1367671	52.6	0.0	201	358645	1369934	24.0	0.0
77	355568	1367997	49.4	0.0	202	359751	1368746	9.2	0.0
78	355585	1368355	37.6	0.0	203	360256	1367981	13.9	0.0
79	355796	1368599	42.0	0.0	204	360435	1366971	11.1	0.0
80	356415	1368762	43.5	0.0	205	360468	1365865	10.4	0.0
81	357033	1368746	52.1	0.0	206	360516	1364448	6.8	0.0
82	357570	1368762	42.9	0.0	207	359979	1363635	6.0	0.0
83	358075	1368713	30.3	0.0	208	358889	1363390	6.5	0.0
84	358368	1368322	11.1	0.0	209	357294	1363309	14.7	0.0
85	358547	1367769	10.9	0.0	210	355780	1363309	65.7	0.0
86	358531	1367167	18.2	0.0	211	354494	1363635	149.9	0.0
87	358221	1366711	27.2	0.0	212	353534	1364107	71.9	0.0
88	357717	1366516	31.9	0.0	213	352883	1364741	77.4	0.0
89	357505	1366548	28.4	0.0	214	352655	1366255	38.4	0.0
90	357326	1366532	27.9	0.0	215	353159	1367574	63.3	0.0
91	357489	1366206	35.7	0.0	216	353224	1368876	70.8	0.0
92	357701	1366141	35.0	0.0	217	353843	1370211	44.3	0.0
93	357277	1366255	34.1	0.0	218	354819	1370764	28.7	0.0
94	356952	1366532	29.4	0.0	219	356073	1370943	29.6	0.0
95	356643	1366402	31.5	0.0	220	357375	1370764	36.3	0.0
96	356463	1366467	31.7	0.0	221	358677	1371106	27.0	0.0
97	359149	1365816	29.9	0.0	222	359800	1370536	10.1	0.0
98	359100	1364969	27.9	0.0	223	360598	1370324	6.4	0.0
99	358645	1364562	30.3	0.0	224	353338	1363260	121.4	0.0
100	357538	1365132	50.2	0.0	225	352166	1363830	130.3	0.0
101	357359	1364872	59.6	0.0	226	351548	1364807	92.7	0.0
102	357049	1365230	47.2	0.0	227	351239	1366272	34.2	0.0
103	356626	1365669	44.4	0.0	228	351450	1367867	44.1	0.0
104	356968	1365718	36.8	0.0	229	352004	1368990	71.0	0.0
105	356724	1365295	48.0	0.0	230	352687	1370048	61.6	0.0
106	356496	1365409	51.0	0.0	231	353729	1371220	32.7	0.0
107	356577	1364709	65.3	0.0	232	355161	1371708	20.4	0.0
108	356170	1364790	91.0	0.0	233	356398	1371627	17.0	0.0
109	355666	1365376	73.3	0.0	234	358173	1371968	20.7	0.0
110	355471	1365083	81.4	0.0	235	354266	1372245	44.7	0.0
111	355080	1365311	84.1	0.0	236	352736	1371301	35.0	0.0
112	354852	1365832	75.2	0.0	237	351662	1370064	61.3	0.0
113	354657	1366418	68.9	0.0	238	351239	1369039	66.3	0.0
114	354478	1365767	81.0	0.0	239	351401	1372554	16.8	0.0
115	353420	1366776	72.9	0.0	240	353322	1372082	20.5	0.0
116	353729	1366451	79.8	0.0	241	352541	1372652	11.0	0.0
117	354103	1365848	93.6	0.0	242	354722	1372782	36.3	0.0
118	354510	1365344	101.9	0.0	243	356024	1372701	41.2	0.0
119	353908	1364855	87.5	0.0	244	357163	1372733	18.6	0.0
120	353517	1365181	59.3	0.0	245	358693	1372717	23.7	0.0
121	352655	1365669	52.1	0.0	246	359930	1372685	16.9	0.0
122	353355	1366060	64.0	0.0	247	360663	1371643	18.7	0.0
123	352459	1366695	30.8	0.0	248	351000	1363000	64.9	0.0
124	352166	1367004	30.6	0.0	249	361000	1373000	11.0	0.0
125	352427	1367525	55.4	0.0					

METEOROLOGICAL DATA : AUS to AUS Extended records (Met MANAGER)

HOURLY VARIABLE EMISSION FACTOR INFORMATION

The input emission rates specfied above will be multiplied by hourly varying factors entered via the input file:
C:\Jobs\Donald04\ausplume\Revision\emiss.src
For each stack source, hourly values within this file will be added to each declared exit velocity (m/sec) and temperature (K).

Title of input hourly emission factor file is:
AUSPLUME Variable emissions file (Met MANAGER)

HOURLY EMISSION FACTOR SOURCE TYPE ALLOCATION

Prefix 1 allocated: 1
Prefix 2 allocated: 2
Prefix 3 allocated: 3
Prefix 4 allocated: 4
Prefix 5 allocated: 5
Prefix 6 allocated: 6
Prefix 7 allocated: 7
Prefix 8 allocated: 8
Prefix 9 allocated: 9
Prefix 10 allocated: 10
Prefix 11 allocated: 11
Prefix 12 allocated: 12
Prefix 13 allocated: 13
Prefix 14 allocated: 14
Prefix 15 allocated: 15
Prefix 16 allocated: 16
Prefix 17 allocated: 17
Prefix 18 allocated: 18
Prefix 19 allocated: 19
Prefix 20 allocated: 20
Prefix 21 allocated: 21

```
Prefix 22     allocated: 22
Prefix 23     allocated: 23
Prefix 24     allocated: 24
Prefix 25     allocated: 25
Prefix 26     allocated: 26
Prefix 27     allocated: 27
Prefix 28     allocated: 28
Prefix 29     allocated: 29
Prefix 30     allocated: 30
Prefix 31     allocated: 31
Prefix 32     allocated: 32
Prefix 33     allocated: 33
Prefix 34     allocated: 34
Prefix 35     allocated: 35
Prefix 36     allocated: 36
Prefix 37     allocated: 37
Prefix 38     allocated: 38
Prefix 39     allocated: 39
Prefix 40     allocated: 40
Prefix 41     allocated: 41
Prefix 42     allocated: 42
Prefix 43     allocated: 43
Prefix 44     allocated: 44
Prefix 45     allocated: 45
Prefix 46     allocated: 46
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Prefix 50     allocated: 50
Prefix 51     allocated: 51
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Prefix 54     allocated: 54
Prefix 55     allocated: 55
Prefix 56     allocated: 56
Prefix 57     allocated: 57
Prefix 58     allocated: 58
Prefix 59     allocated: 59
Prefix 60     allocated: 60
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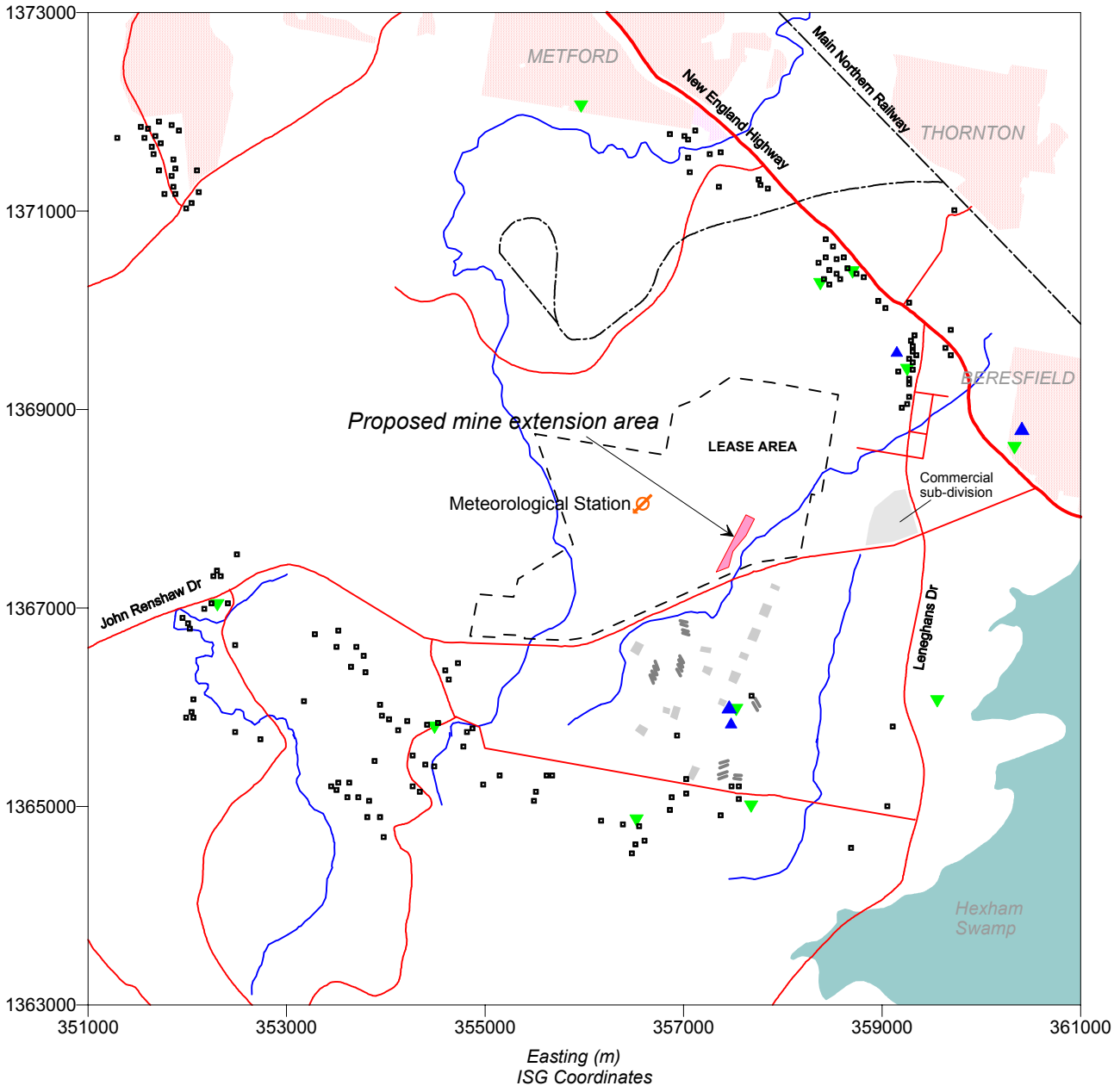
FIGURES



Location of project area and proposed mine extension area

FIGURE 1

Mine plan with proposed extension area

FIGURE 2

High volume air sampling for Donaldson Coal (2003/2004)

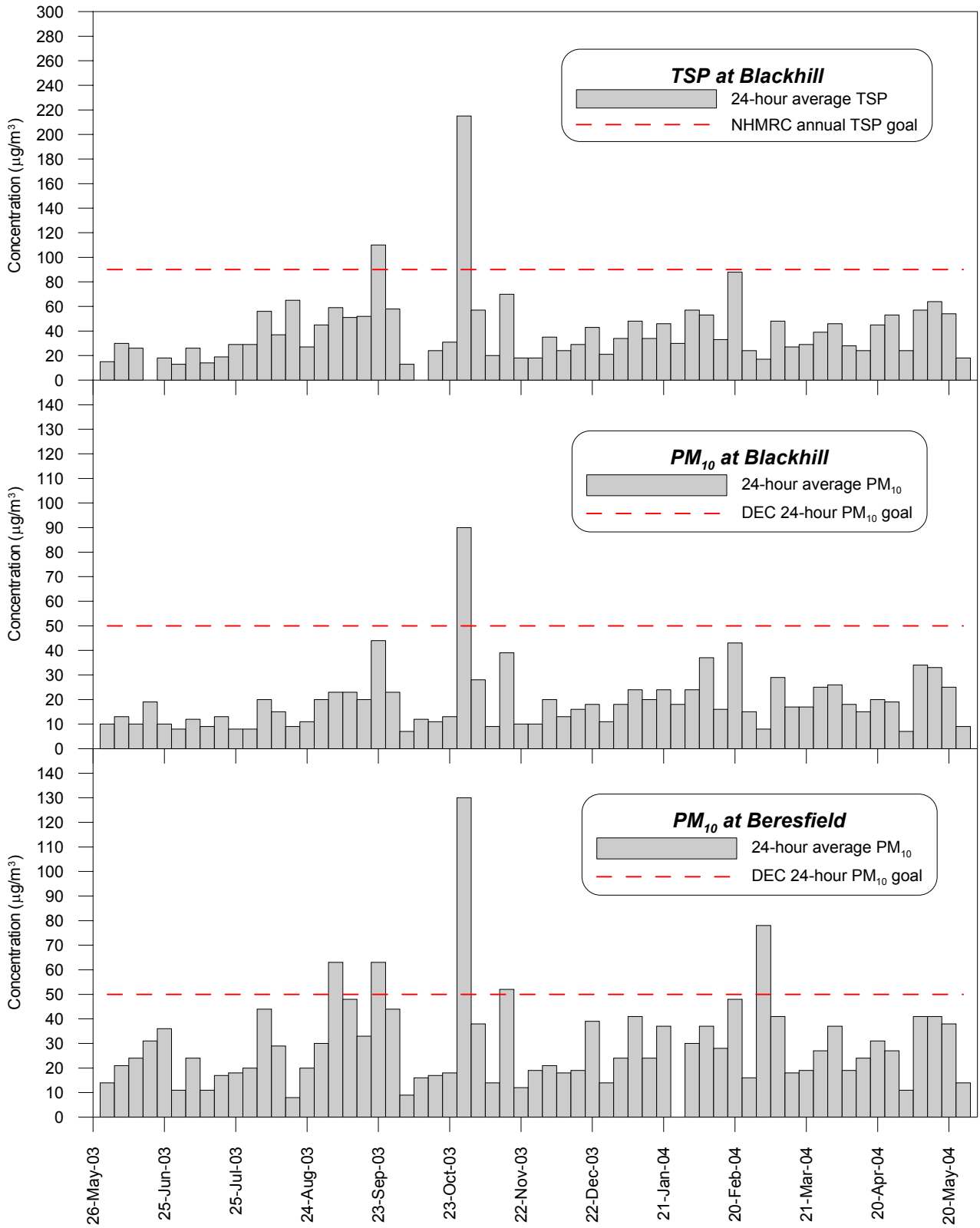
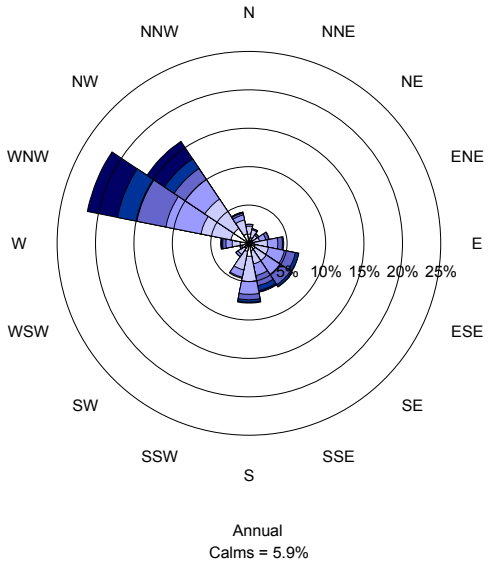
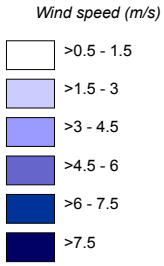


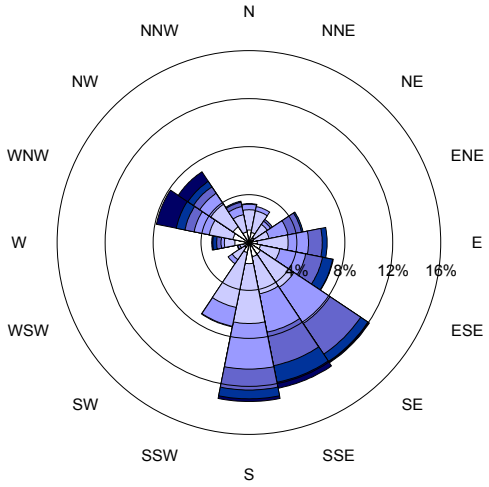
FIGURE 3

Annual and Seasonal Windroses for Beresfield (1996)

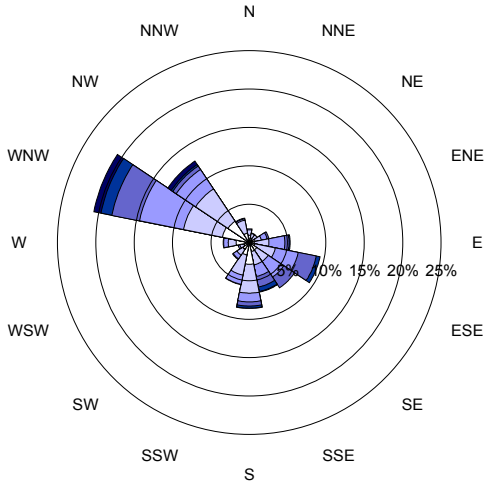


Annual
Calms = 5.9%

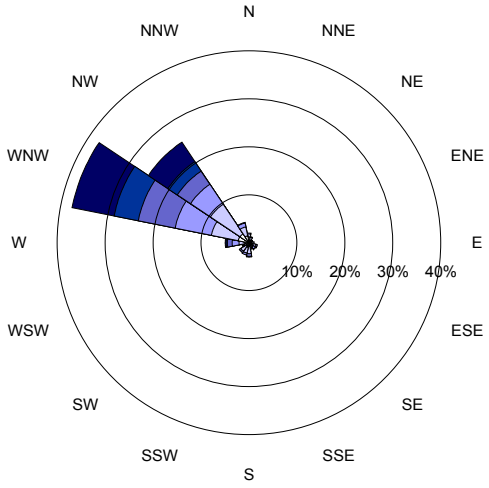




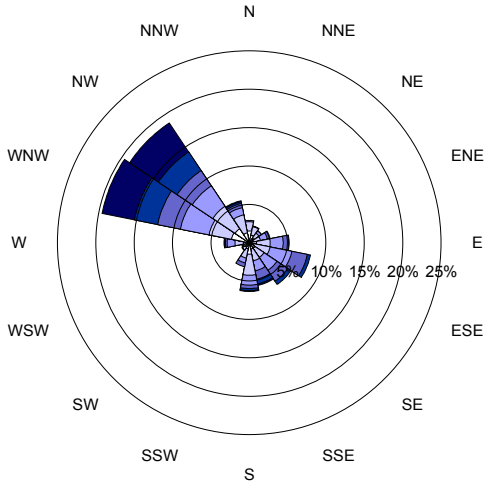
Summer
Calms = 3.6%



Autumn
Calms = 6.5%



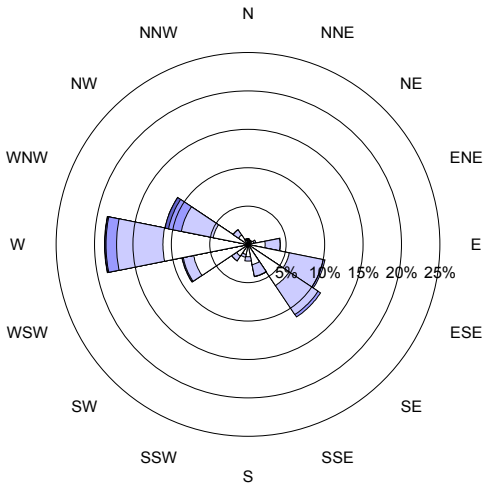
Winter
Calms = 7.7%



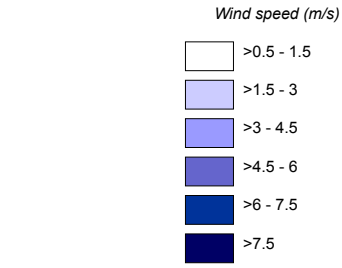
Spring
Calms = 5.9%

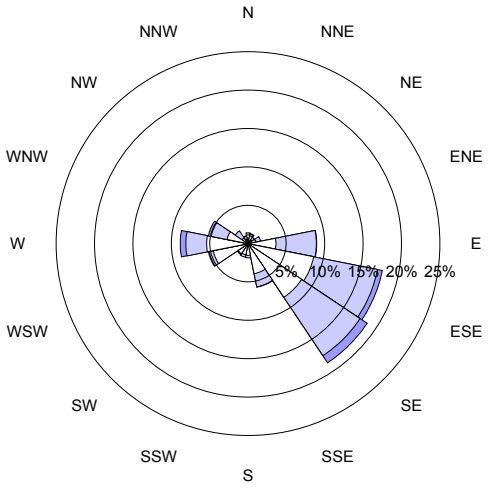
FIGURE 4

Annual and Seasonal Windroses for Donaldson Mine Site (2003/2004)

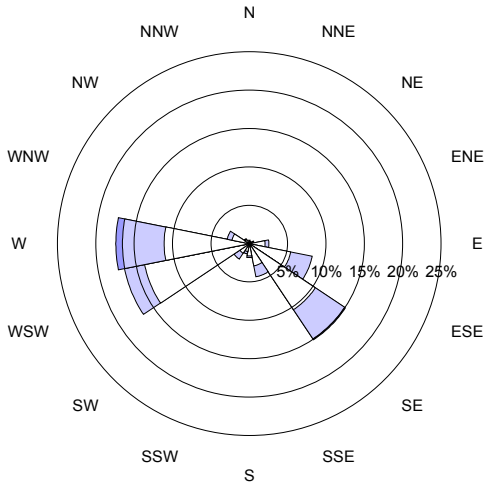


Annual
Calms = 19.0%

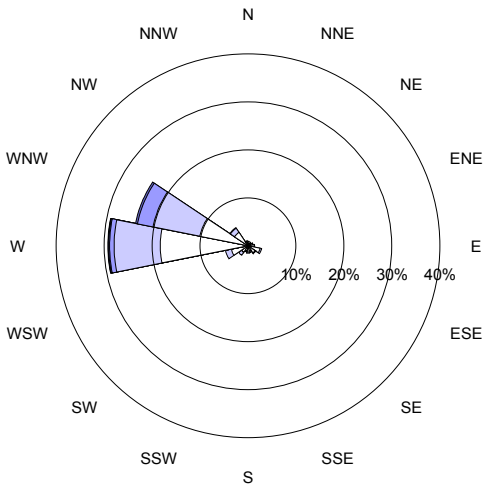




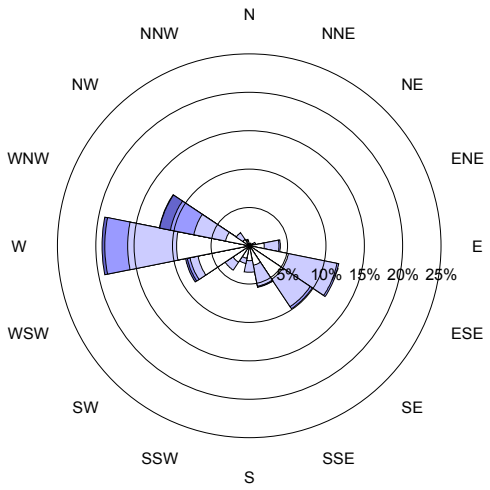
Summer
Calms = 15.7%



Autumn
Calms = 24.7%

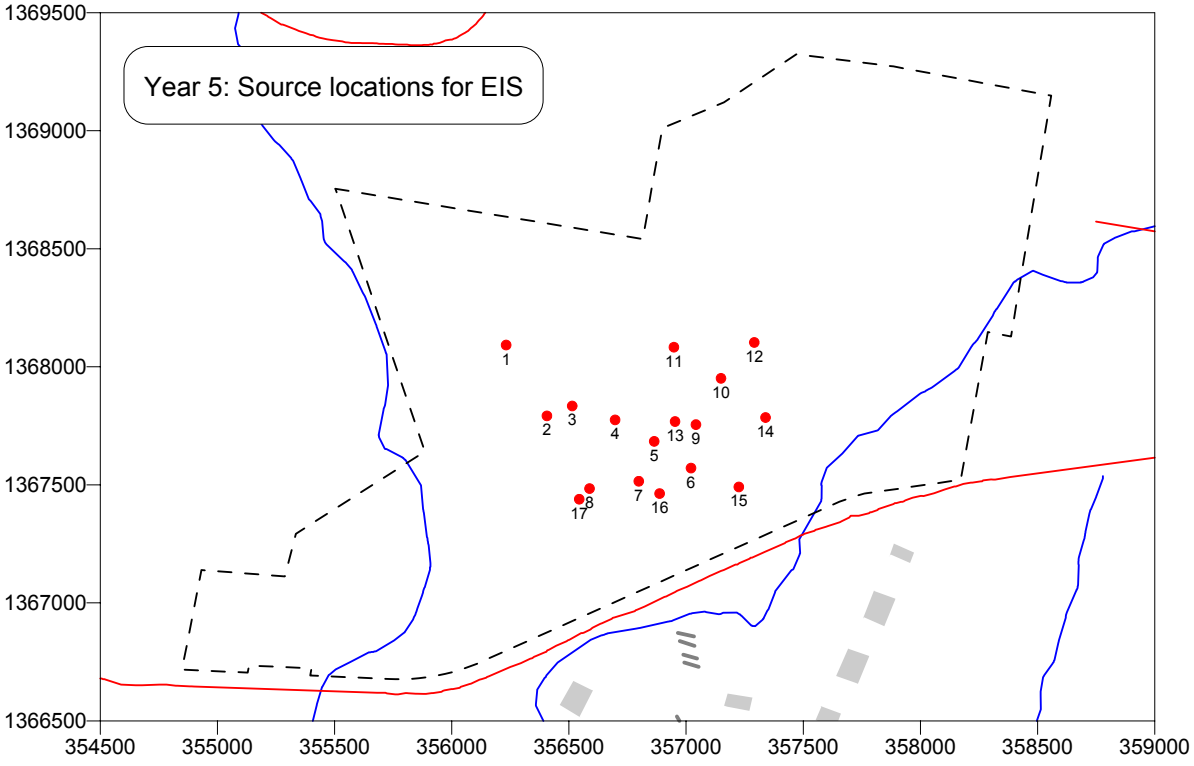


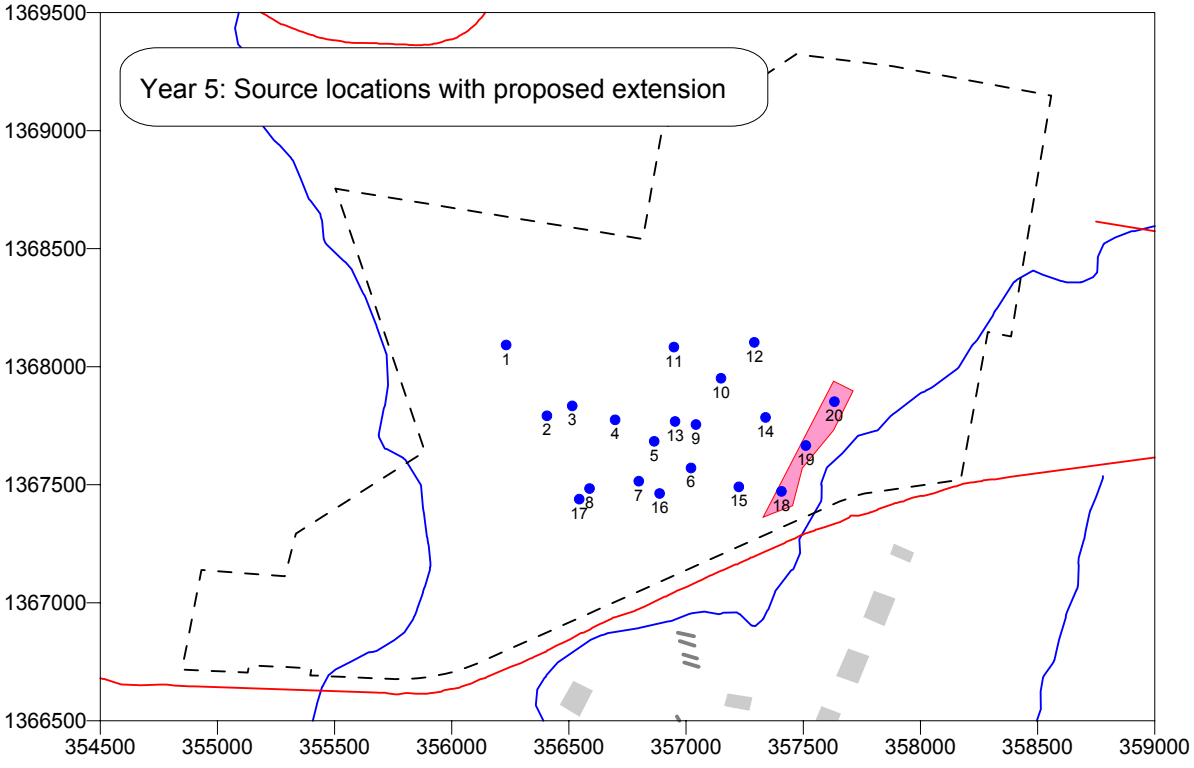
Winter
Calms = 20.6%



Spring
Calms = 15.0%

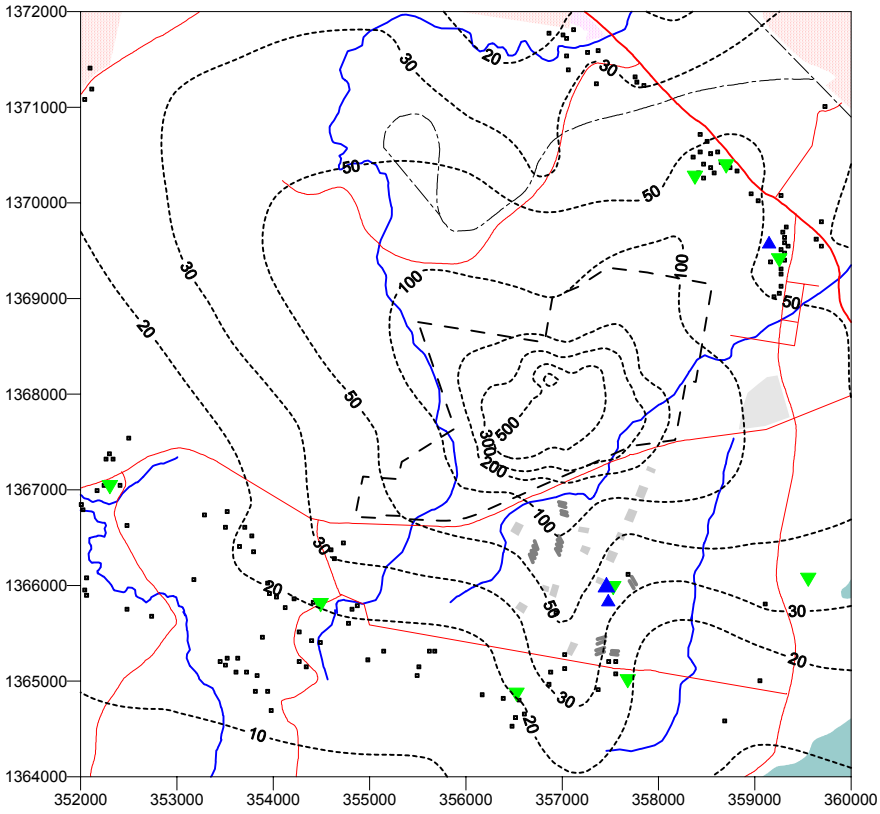
FIGURE 5



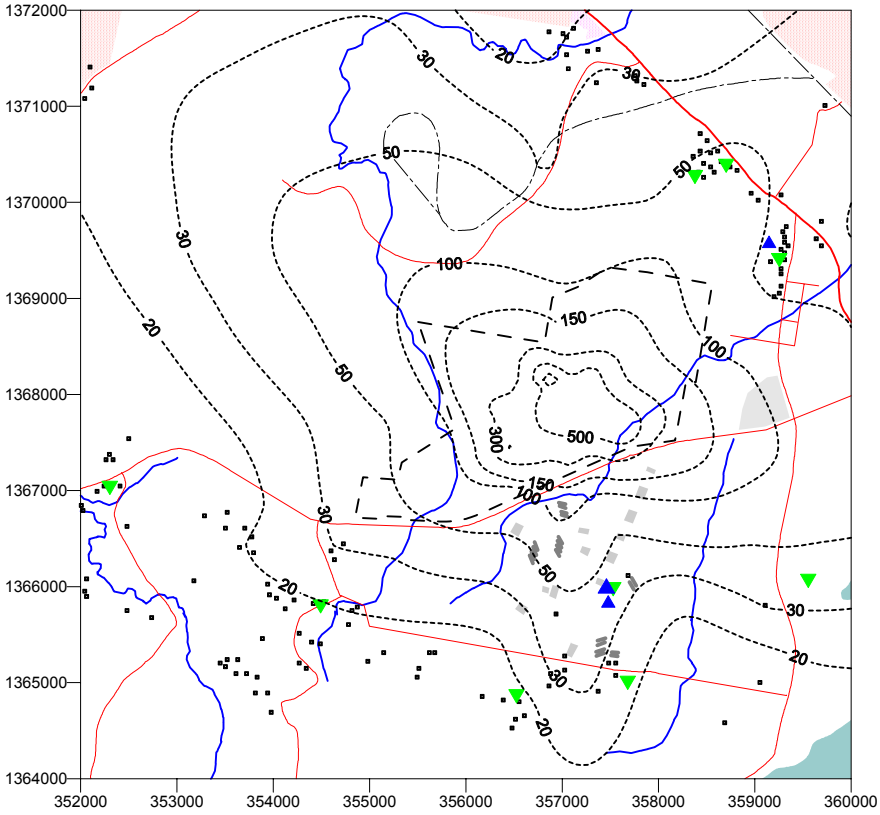


Location of dust emissions sources for use in the dispersion modelling

FIGURE 6



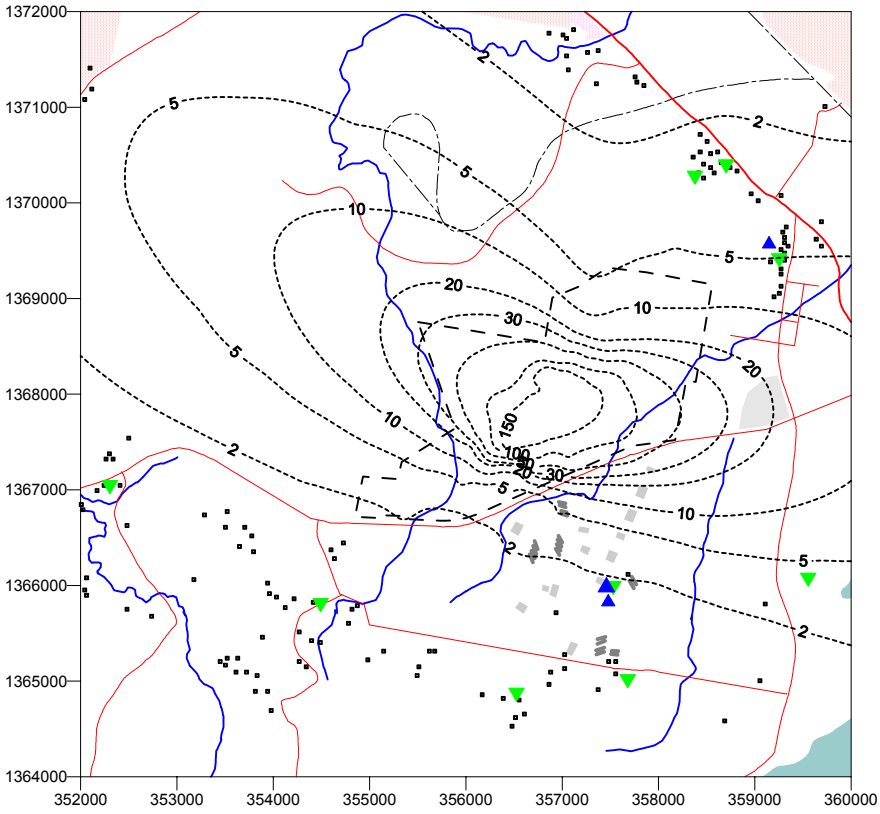
Updated EIS model predictions



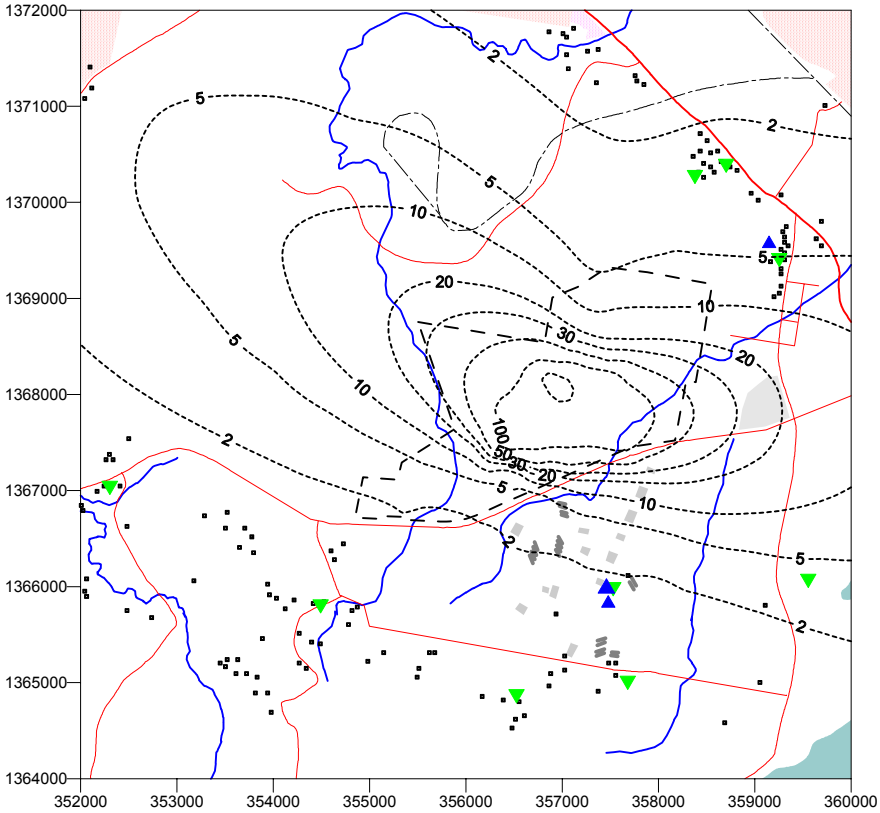
Predictions with proposed mine extension

Predicted maximum 24-hour average PM_{10} concentrations due to Donaldson mining operations in Year 5 ($\mu g/m^3$)

FIGURE 7



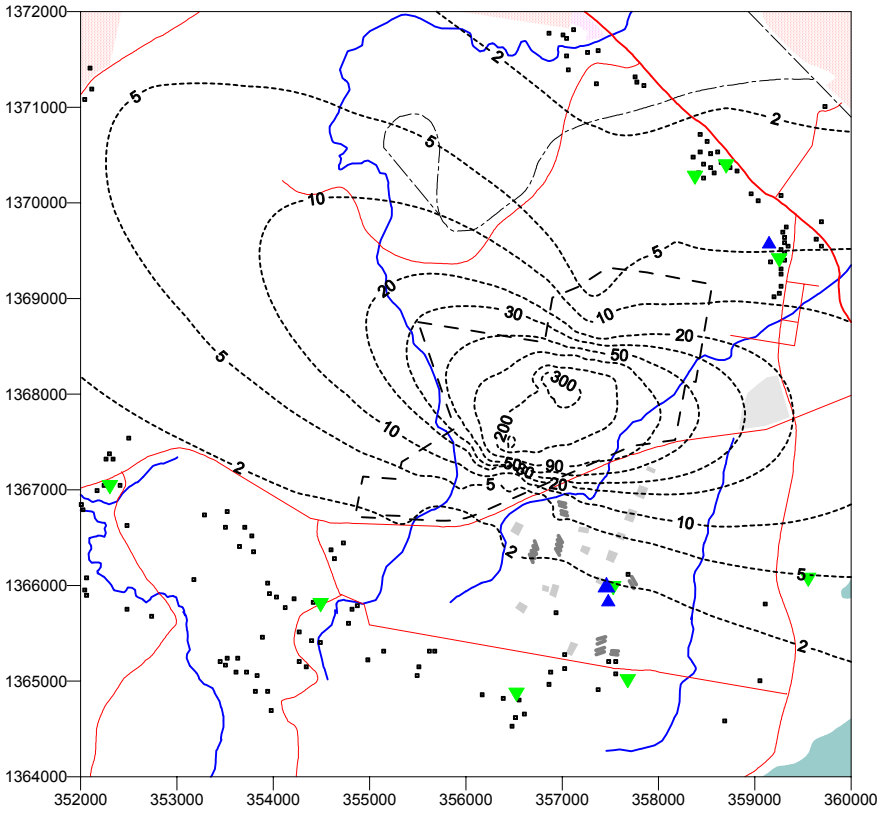
Updated EIS model predictions



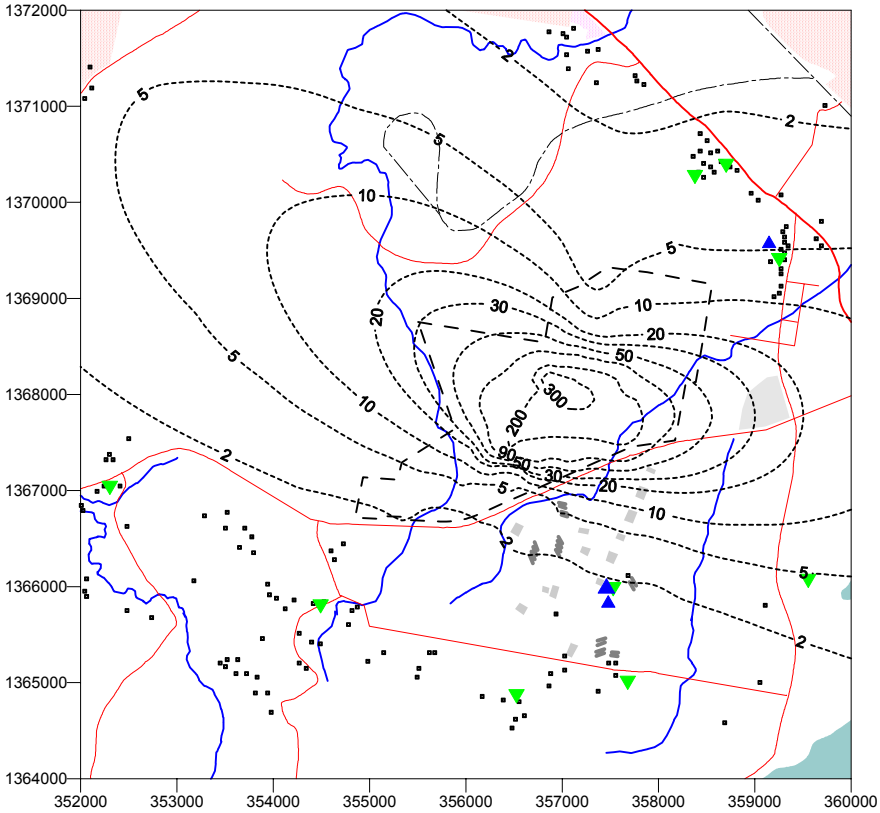
Predictions with proposed mine extension

Predicted annual average PM_{10} concentrations due to Donaldson mining operations in Year 5 ($\mu g/m^3$)

FIGURE 8



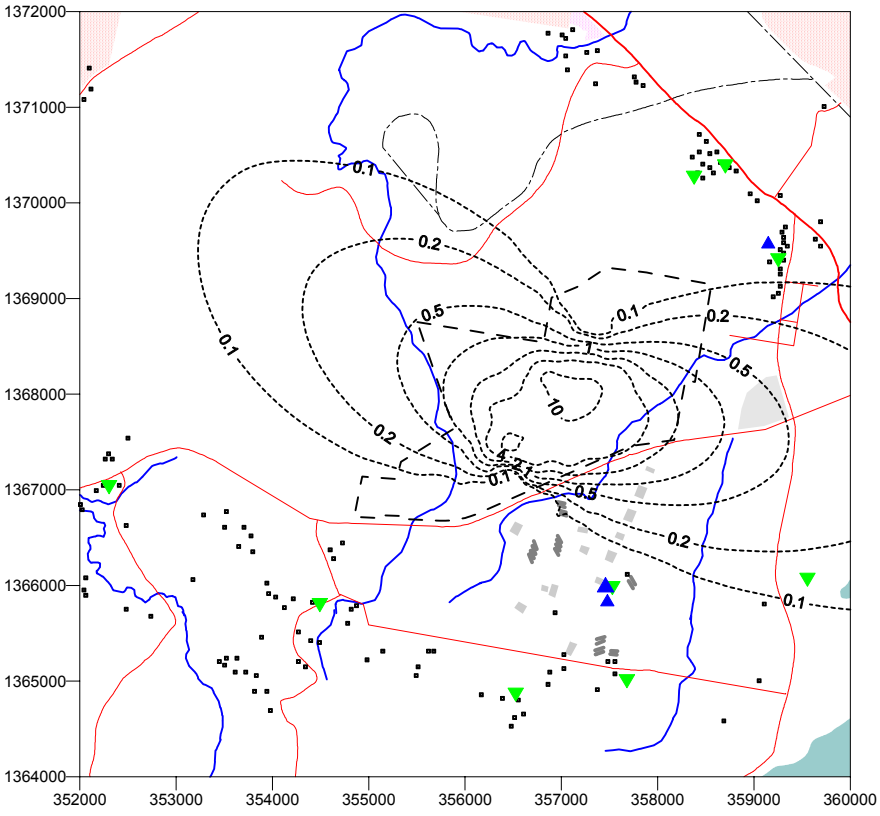
Updated EIS model predictions



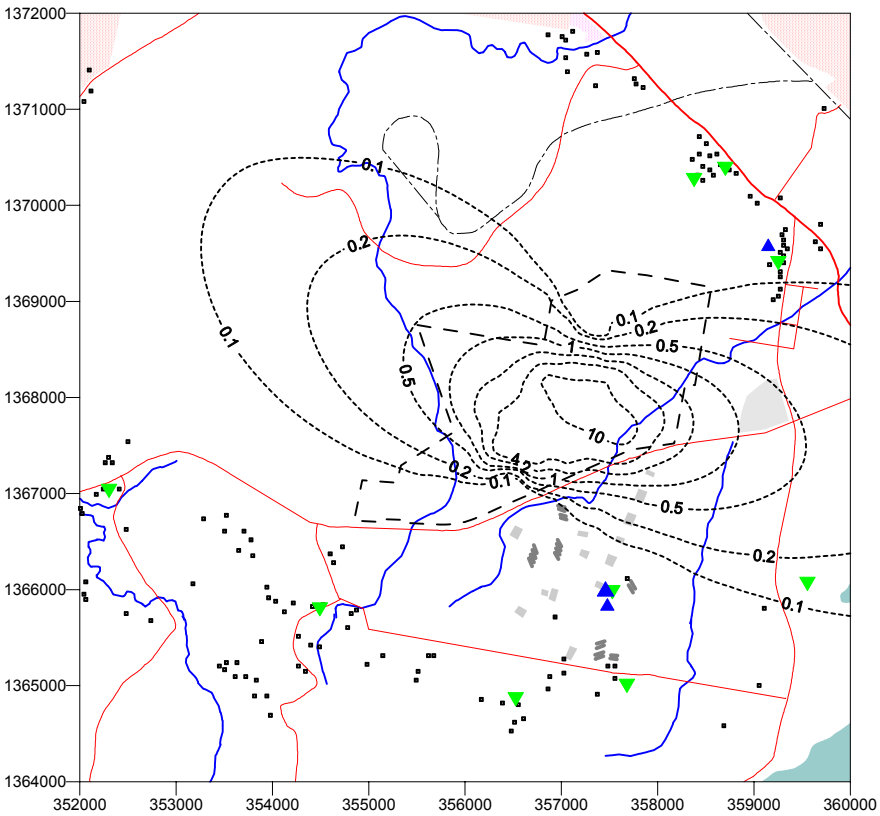
Predictions with proposed mine extension

Predicted annual average TSP concentrations due to Donaldson mining operations in Year 5 (µg/m^3)

FIGURE 9



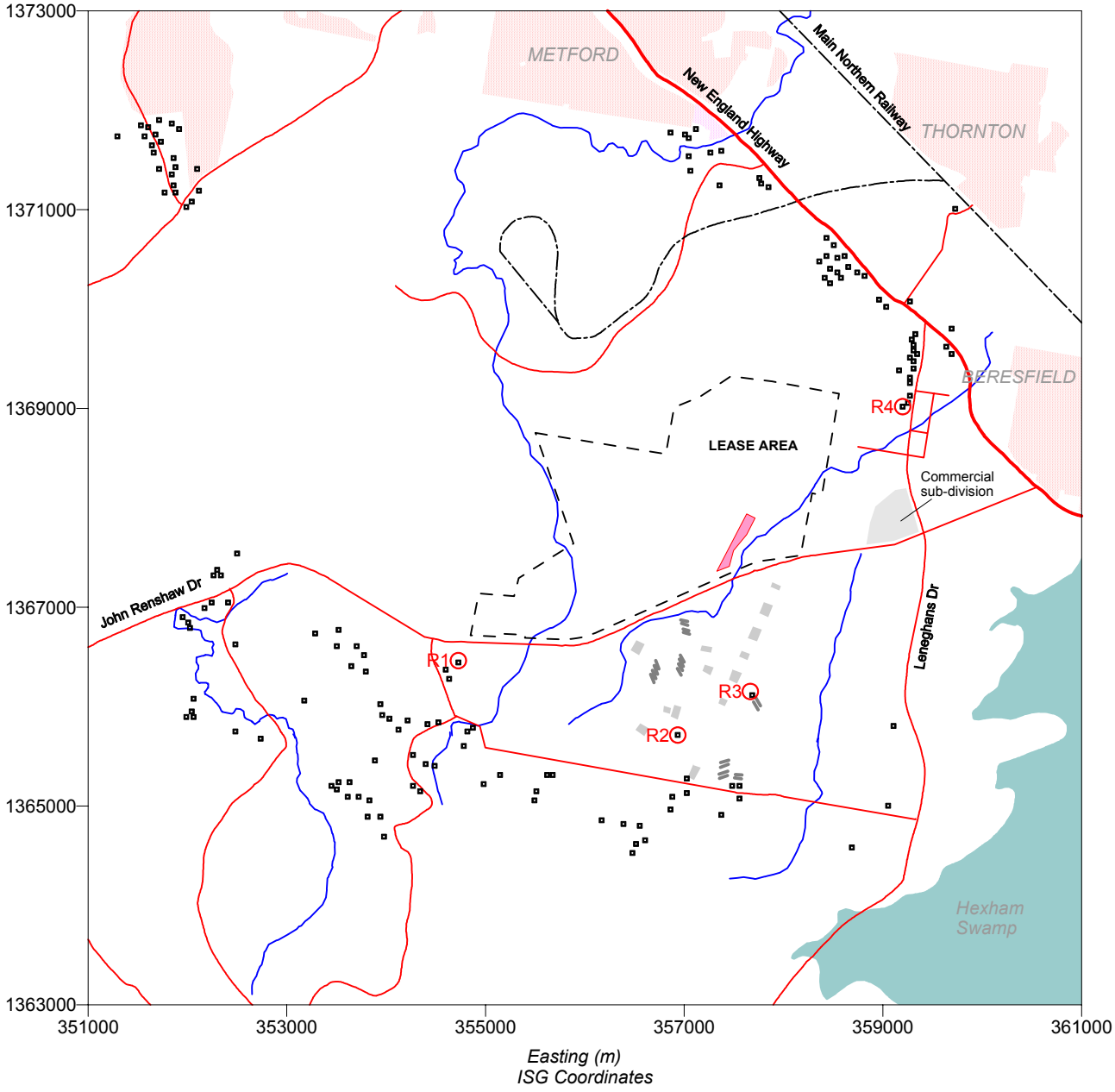
Updated EIS model predictions



Predictions with proposed mine extension

Predicted annual average dust deposition due to Donaldson mining operations in Year 5 (g/m^2/month)

FIGURE 10



Residences chosen for the impact assessment

FIGURE 11

Appendix H

Greenhouse Gas Emissions Assessment

URS

Memorandum

Date: 8 September 2004

To: Andrew Hutton, Chad Stockham – GSS Environmental

From: Andrew Dudgeon, Mike Stacey

Subject: Donaldson Coal Mine Extension – Greenhouse Gas Emissions

1. Introduction

This report estimates the emission of greenhouse gases (GHG) predicted from the proposed extension of the Donaldson coal mine. The discussion compares the level of emissions from the extension with those from the operation of the existing mine, and recommends strategies to minimise the emission of GHG that are predicted to result from the extension.

2. Background

The proposed extension to the Donaldson mine will result in an overall increase in coal extracted of 644,200 tonne ROM coal. This extra coal will be extracted over a two year period and will increase the operational life of the mine by approximately four months. The existing Donaldson coal mine has been projected to produce approximately 20,091kT of ROM coal over an eleven year operational life.

Coal mining results in the emission of gases into the atmosphere that contribute to the 'greenhouse effect'. The term 'greenhouse effect' refers to a natural process that occurs within the earth's atmosphere to maintain the Earth's climate. Certain gases such as water vapour, carbon dioxide, methane, nitrous oxide and ozone act to allow the sun's rays to enter the atmosphere and warm the planet while also preventing this heat from escaping, which in turn maintains the temperature of the earth. These gases are collectively referred to as greenhouse gases (GHG).

Various human activities result in the emission of GHG into the atmosphere. Extensive research carried out shows that the build up of these gases in the atmosphere in recent times has resulted in an enhanced greenhouse effect. This effect is predicted to have significant impacts on the climate, which in turn would result in significant environmental, social and economic costs for the global community.

3. Methodology

In order to estimate the GHG emissions associated with the mine extension it is necessary to understand how these GHG would be generated by the development. Coal mining operations at the Donaldson mine include four mechanisms that contribute to total GHG emissions:

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- Fugitive emissions - Most coal seams contain methane (CH_4) trapped in small pockets within the coal. When coal is extracted in an open cut mine the trapped gas is allowed to escape into the atmosphere.

- Mobile Combustion – A range of plant and vehicles are used to extract and handle the coal at the mine. These machines burn petroleum products (diesel) as an energy source and the combustion of these materials emits GHG into the atmosphere.

- Stationary Combustion – The Donaldson coal mine uses diesel generators to supply electricity for the office and staff facilities on the site. These diesel generators emit GHG into the atmosphere.

- Explosives – The use of explosives in mining operations emits GHG.

The method of calculating the projected GHG emissions from the proposed mine extension is based on data from existing mining operations and relevant industry emission factors. The total GHG emissions from the operational life of the existing mine have been calculated as a baseline comparison.

Rates of energy consumption and explosive use at the mine have been taken from data collected for the National Pollution Inventory 2002/2003. It is understood that the mine extension would not require any significant change in current coal extraction methods. Consequently, the rates of diesel consumption and explosive use per tonne of coal extracted have been assumed to be the same as those in 2002/2003.

The construction of a noise barrier has been proposed as part of the extension, but the method of construction has not yet been determined. Options being considered include an earth bund and a timber wall. Both options for the provision of this barrier are assumed to be 'greenhouse neutral' as the GHG emissions associated with any earth movement is already accounted for in the fuel use of existing mining operations, and total GHG emissions associated with a timber wall would be minimal.

Fugitive methane emission rates and GHG emission rates for the combustion of diesel and use of explosives have been taken from the Australian Greenhouse Office Factors and Methods Workbook V3, March 2003. This document sets out a standard approach for calculating greenhouse gas emissions in Australia.

GHG emissions are expressed in tonnes of CO_2 equivalent (CO_{2e}). Fugitive methane emissions are converted to CO_{2e} by multiplying the total emission amount by 21 (AGO, 2003) i.e. global warming potential of methane compared to CO_{2e}.

4. Discussion

The proposed mine extension will result in an increase in total energy consumption and GHG emissions at the Donaldson mine. Energy consumption due to the mine extension is

predicted to be 96,625 GJ, while total energy consumption over the operational life of the mine is estimated to be 3,009,603 GJ.

GHG emissions that are predicted to result from the mine extension are set out below in Table 4-1.

Table 4-1 : GHG Emissions from Donaldson Mine Extension

GHG Emission Mechanism	CO_{2e} Emission (tonne CO_{2e})
Mobile Combustion	6,402
Stationary Combustion	357
Explosives Use	34
Fugitive Emissions	29,356
TOTAL	**36,149**

GHG emissions from the existing mine are predicted to be 1,127,112 t CO_{2e} over its eleven year operational life. The mine extension represents a 3.2 % increase in total GHG emissions over the operational life of the mine. This increase is consistent with the expansion in operations at the mine.

As the proposed mine extension represents a minor lengthening of already approved mine areas, the rate of energy consumed per tonne of coal extracted will be maintained at current levels. The proposed extension will make use of existing haulage roads, fill areas and other existing infrastructure. Haulage distances for the extracted coal will not be significantly increased, hence minimising extra fuel consumption.

Data regarding the GHG emission per production unit of coal for similar coal mining operations in the Hunter Valley is not publicly available. As a result comparisons with other coal mines have not been undertaken.

5. Abatement Opportunities

GHG emissions, such as those from the mine extension, can be partly offset by undertaking some form of abatement strategy. A range of abatement options are available to Donaldson Coal including:

- Undertake a program of energy audits of mine operations to minimise energy consumption and hence GHG emissions. An accredited program such as the Greenhouse Challenge could be joined in order to obtain recognition of these emission reductions;

- As part of an energy management program, energy monitoring can be used to reduce the emission of GHG from energy use. Examining energy usage per unit of production, for a range of tasks will provide an indication of where inefficiencies have developed;
- Reduce the weight of vehicles and plant involved in mine operations. This can be done by selecting appropriate materials for vehicle construction, and also by limiting the incidence of impacted coal remaining in excavator buckets or trucks, as this can decrease operating efficiency;
- Improve staff awareness of energy management and GHG emissions issues;
- Tree planting of rehabilitated mine areas to increase carbon sequestration; and
- Purchase GHG emission credits.

6. Limitations

URS Australia Pty Ltd (URS) has prepared this report for the use of the Donaldson Coal in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 7 June 2004.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between 28 June 2004 and 8 September 2004 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners

Appendix I

Groundwater Assessment

DONALDSON COAL PTY LTD

DONALDSON COAL MINE EXTENSION

GROUNDWATER ASSESSMENT

PETER DUNDON AND ASSOCIATES PTY LTD

7TH SEPTEMBER 2004

04-0151-R01D

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FIGURES

Figure 1 Donaldson Coal Extension – Locality Plan

1 PROJECT BACKGROUND

Donaldson Coal Pty Ltd operates the Donaldson open cut coal mine south of Maitland in the lower Hunter Valley area of New South Wales. The mine commenced operation in January 2001, under a Consent granted in October 1999.

Coal is mined by open cut mining methods from four seams of the Late Permian Tomago Coal Measures, extending from the Beresfield to the Big Ben seams. The coal seams dip gently to the south-east, with a maximum dip of about 5°. Under current mine plans, the target seams extend to a maximum depth below surface of about 65 m, the deepest point being at the south-eastern limits.

The company is proposing to laterally extend the south-eastern limits by a further approximately 100 m to allow the extraction of additional coal. It is proposed to include all current target seams in this extension. Due to the 5° dip, this lateral extension would also lead to a deepening of the low point in the mine by up to 9 m in this area.

GSS Environmental is coordinating an environmental impact assessment of the proposed mine extension. Peter Dundon and Associates Pty Ltd has been engaged to undertake an assessment of groundwater impacts, in particular the potential impacts of the proposal on groundwater inflows and induced interconnection between the mine and Wheatleys Flat Creek.

2 THE PROPOSAL

2.1 Mine Extension

It is proposed to extend blocks EX16 to EX23 by up to 100 m to the east south east from the initially proposed pit limits (**Figure 1**). The extension would comprise all coal seams currently being mined, viz the Beresfield to the Big Ben Seams. This will result in the mine being taken closer to Weakleys Flat Creek, and will also cause the excavation to be taken to a slightly lower elevation compared with the approved Mine Plan.

The mine is proposed to approach close to Weakleys Flat Creek adjacent to blocks EX18 to EX21. Under the proposed mine extension, the crest of the high wall would be approximately 42 m from Weakleys Flat Creek at its closest point, compared with approximately 110 m under the current approved Mine Plan.

The proposed mine extension would result in mining extending to between 4 and 9 m greater depth than initially proposed. The lowest pit RL for the proposed extension is –24 m AHD, compared with approximately –15 m AHD in the approved Mine Plan.

2.2 Timing

It is anticipated that the proposed mine extension would take place over an approximately 2 year period, in years 5 to 6 of the project life.

3 THE ISSUES

The primary issues of concern with the proposed mine extension from a groundwater standpoint are:

- The potential increase in groundwater inflows; and
- The potential for impact on Weakleys Flat Creek due to an increased hydraulic interconnection between the mine and the creek.

Groundwater inflow rates are quite low in any event, due to the low permeability of the coal measures sediments, although the proposal to mine to greater depth in the planned extension could potentially increase the inflow rates from those expected to occur under the approved Mine Plan. This aspect is discussed in **Section 4**.

Draft guidelines have been prepared by DIPNR for mining in the vicinity of streams in the Hunter valley Region (DIPNR, 2002).

Different guidelines are proposed for streams classified as either Schedule 1, 2 or 3. Weakleys Flat Creek is classified as a Schedule 2 Stream under the guidelines, ie it is a third order or higher stream according to the Strahler stream order classification system, but is not one of the named Schedule 3 Streams that are associated with a mapped vulnerable alluvial groundwater system.

In the context of these guidelines, the potential impact of the proposed mine extension on the degree of hydraulic interconnection between the mine and Weakleys Flat Creek is discussed in **Section 5**.

4 GROUNDWATER INFLOWS

Mining has already extended below the water table, and the pumped discharge of groundwater inflows has led to lowering of groundwater levels within the coal measures. The impact on groundwater levels has extended beyond the area actually mined, although the impacts have been limited to the strata directly intersected by the mining excavation. Drawdown impacts have extended both east and west from the active mining areas, as discussed in Dundon and Associates (2003)

Mining commenced in January 2001 at the north-eastern end of the deposit, and the area of proposed extension is still ahead (south-west) of the areas mined to date. Groundwater levels have declined only slightly in the area of the proposed extension, by perhaps 2 to 3 m at most, from pre-mining levels of +12 to 15 m AHD, as indicated by Figure 24 in Dundon and Associates (2003).

Monitoring of the control bore REGDPZ1, located well away from the influence of mining, has shown a steady decline in water levels virtually continuously since July 2001, under influence of the extended drought conditions. A total decline of more than 2 m has been observed at REGDPZ1, which is totally attributable to the climatic conditions. It is likely that the small groundwater level declines that have been observed in the area of the proposed mine extension have likewise been due to the climatic conditions, and not due to mine dewatering.

However, as mining advances closer to the area of the proposed extension, dewatering is expected to cause a lowering of groundwater levels from the present approximately +10 to +13 m AHD to approximately –24 m AHD, the lowest point of the proposed excavation. This will be approximately 4 to 9 m lower than required under the current approved Mine Plan.

Initial groundwater modelling (Mackie Environmental Research, 1998) predicted that groundwater inflows during the period when mining will pass through the area of the proposed mine extension (ie between years 4 and 6) would be in the range 0.13 to 0.15 ML/d.

Using a simple analytical approach based on Darcy's Law, it is estimated that the impact of the proposed mine extension will be to temporarily increase groundwater inflow rates by less than 20 percent. The increase would be temporary, and would occur during the early stages of mining from the proposed extension cells, until backfilling with waste reaches this area. The period of increased inflow is expected to be approximately a year, based on current mining and backfilling rates. The inflow rate would settle back as mining advances through the extension zone, and would be followed by a slightly reduced rate of inflow following completion of mining from the extension area, due to the flow-on effects of dewatering to areas ahead of the active mining area.

The impact on total volumes to be pumped from the mine during the proposed mine life is calculated to be an additional 10 ML of groundwater inflow, or an increase of less than 3 percent in total volume of inflow over the mine life.

The proposed mine extension is not expected to have any detectable impact on groundwater quality.

It is considered that the existing surface water and groundwater monitoring network is adequate to monitor the impacts of the proposed mine extension. This includes quality monitoring of Weakleys Flat Creek both upstream and downstream of the mine, and water level and quality monitoring of nearby piezometers DPZ4 (shallow and deep piezometers), DPZ9 and DPZ10 (see **Figure 1**).

5 IMPACT ON WEAKLEYS FLAT CREEK

The current approved Mine Plan involves mining to within approximately 70 m of Weakleys Flat Creek. The proposed extension will bring the mine to 42 m from the edge of the alluvium flanking the creek at its closest point. This will be in the vicinity of cells EX19, EX20 and EX21 (**Figure 1**). Under the extension, cell EX16 will be at least 150 m, cell EX17 at least 100 m, and cells EX18 and EX22 at least 70 m from the edge of the alluvium.

The closer proximity to Weakleys Flat Creek could potentially lead to an increase in hydraulic interconnection between the mine and the creek. There is no known fault or other structural feature that may provide a preferred pathway for flow between the mine and the creek, so any increase in potential flow rates would arise due simply to a combination of the shorter distance and a steeper pseudo hydraulic gradient between the toe of the highwall and the base level of the creek. A known fault has recently been mined through, but this is well away from the proposed extension zone, and would have no bearing on the impact of the proposed mine extension.

Accordingly, the impact of the proposed change in setback from the creek is assessed by using Darcy's Law to calculate the potential flow rates between the creek and the mine under both the current Mine Plan and the proposed extension Mine Plan. The calculations are limited to the zone of the proposed extension, so that the impacts of the proposal can be isolated from other factors.

Darcy's Law states that

$$Q = kD\ i\ L$$

where
- k = permeability
- D = aquifer thickness (conservatively assumed to be 50 m)
- i = hydraulic gradient
- L = width of flow zone.

The hydraulic parameters and physical parameters assumed for these calculations are as follows:

- Undisturbed coal measures permeability[1] 5×10^{-4} m/d
- Assumed aquifer thickness (conservative) 50 m
- Assumed permeability of coal measures disturbed by mining activity for a distance of 20 m from the final pit limit 5×10^{-3} m/d

[1] Mackie Environmental Research (1998)

- Distance from high wall crest to creek under current Mine Plan — min 120 m, max 300 m
- Distance from high wall toe to creek (based on 70^0 slope) under current Mine Plan — min 133 m, max 313 m
- Distance from high wall crest to creek under proposed extension — min 42 m, max 150 m
- Distance from high wall toe to creek (based on 70^0 slope) under proposed extension — min 57 m, max 166 m
- Creek bed elevation — +11 m AHD
- Lowest point at toe of footwall under current Mine Plan — –15 m AHD
- Lowest point at toe of footwall under proposed extension — –24 m AHD

It is understood that limited blasting is involved in the mining operation, involving on average 2 to 3 blasts per week. It is assumed that any impacts of mining disturbance on the permeability of the pit wall rocks will be limited to a few metres of direct blast damage at most, and possibly some stress relief fracturing that may extend for perhaps a further 10 m from the high wall face. For the purposes of this assessment, it is conservatively assumed that the effect of mining disturbance will be to increase the average permeability of the coal measures between the pit high wall and the creek by an order of magnitude, for a distance of say 20 m from the face. Beyond that distance it is assumed that there will be no change to the coal measures permeability.

The length of the mine through the proposed extension area is broken down into four separate zones based on approximate distance between the mine and the creek. **Under the current approved Mine Plan**, it is calculated that the potential total flow between Weakleys Flat Creek and the pit through these four zones would be as follows:

- <u>Zone 1 – average setback from the creek 120 m, over a mine length of 150 m:</u>

  Average permeability between the pit and the creek would be 1.2×10^{-3} m/d. This is based on a permeability of 5×10^{-3} m/d for the first 20 m from the face, and 5×10^{-4} m/d for the remainder.

  Hydraulic gradient would be 0.195 (26 m elevation difference between the creek bed and the toe of the high wall, over a distance of 133 m).

  Average potential flow rate through Zone 1 would be 1.8 m^3/d.

- Zone 2 – average setback from the creek 150 m, over a mine length of 70 m:

  Average permeability between the pit and the creek would be 1.05×10^{-3} m/d (based on a permeability of 5×10^{-3} m/d for the first 20 m from the face, and 5×10^{-4} m/d for the remainder).

  Hydraulic gradient would be 0.160 (26 m elevation difference between the creek bed and the toe of the high wall, over a distance of 163 m).

  Average potential flow rate through Zone 2 would be 0.6 m^3/d

- Zone 3 – average setback from the creek 200 m, over a mine length of 250 m:

  Average permeability between the pit and the creek would be 9.3×10^{-4} m/d (based on a permeability of 5×10^{-3} m/d for the first 20 m from the face, and 5×10^{-4} m/d for the remainder).

  Hydraulic gradient would be 0.122 (26 m elevation difference between the creek bed and the toe of the high wall, over a distance of 213 m).

  Average potential flow rate through Zone 3 would be 1.4 m^3/d

- Zone 4 – average setback from the creek 300 m, over a mine length of 220 m:

  Average permeability between the pit and the creek would be 8.0×10^{-4} m/d (based on a permeability of 5×10^{-3} m/d for the first 20 m from the face, and 5×10^{-4} m/d for the remainder).

  Hydraulic gradient would be 0.083 (26 m elevation difference between the creek bed and the toe of the high wall, over a distance of 313 m).

  Average potential flow rate through Zone 4 would be 0.7 m^3/d

- The cumulative potential flow rate between the creek and the mine through Zones 1 to 4 would be (1.8 + 0.6 + 1.4 + 0.7) = 4.5 m^3/d.

Under the proposed pit extension, it is calculated that the potential total flow between Weakleys Flat Creek and the pit would be as follows:

- Zone 1 – average setback from the creek 42 m, over a mine length of 150 m:

  Average permeability between the pit and the creek would be 2.1×10^{-3} m/d (based on a permeability of 5×10^{-3} m/d for the first 20 m from the face, and 5×10^{-4} m/d for the remainder).

Hydraulic gradient would be 0.54 (31 m elevation difference between the creek bed and the toe of the high wall, over a distance of 57 m).

Average potential flow rate through Zone 1 would be 8.5 m^3/d.

- Zone 2 – average setback from the creek 70 m, over a mine length of 110 m:

  Average permeability between the pit and the creek would be 1.6 x 10^{-3} m/d (based on a permeability of 5 x 10^{-3} m/d for the first 20 m from the face, and 5 x 10^{-4} m/d for the remainder).

  Hydraulic gradient would be 0.39 (33 m elevation difference between the creek bed and the toe of the high wall, over a distance of 85 m).

  Average potential flow rate through Zone 2 would be 3.4 m^3/d

- Zone 3 – average setback from the creek 100 m, over a mine length of 110 m:

  Average permeability between the pit and the creek would be 1.3 x 10^{-3} m/d (based on a permeability of 5 x 10^{-3} m/d for the first 20 m from the face, and 5 x 10^{-4} m/d for the remainder).

  Hydraulic gradient would be 0.30 (35 m elevation difference between the creek bed and the toe of the high wall, over a distance of 116 m).

  Average potential flow rate through Zone 3 would be 2.1 m^3/d

- Zone 4 – average setback from the creek 150 m, over a mine length of 320 m:

  Average permeability between the pit and the creek would be 1.0 x 10^{-3} m/d (based on a permeability of 5 x 10^{-3} m/d for the first 20 m from the face, and 5 x 10^{-4} m/d for the remainder).

  Hydraulic gradient would be 0.21 (35 m elevation difference between the creek bed and the toe of the high wall, over a distance of 166 m).

  Average potential flow rate through Zone 4 would be 3.4 m^3/d

- The cumulative potential flow rate between the creek and the mine through Zones 1 to 4 would be (8.5 + 3.4 + 2.1 + 3.4) = 17.4 m^3/d.

These calculations suggest that the proposed mine extension could cause an increase in the **potential** throughflow rates from Weakleys Flat Creek over the length of the proposed extension from around 4.5 to 17.4 m^3/d. It is stressed that this is a very conservative calculation, and might apply only to the most adverse of conditions, while the creek was flowing strongly and the pit was at its greatest depth and closest proximity to the creek.

In any event, the magnitude of **potential** throughflow under both the current Mine Plan and the proposed pit extension is very small. There are no known stream flow records for this section of Weakleys Flat Creek, but approximate average flow rates can be calculated using typical runoff rates for the catchment.

The catchment of Weakleys Flat Creek above the proposed mine extension zone has an area of approximately 4.5 km^2. It largely comprises eucalypt forest, but about 25 % of the catchment is occupied by poultry farms. It is likely that runoff in this type of catchment would be around 10 to 15 % of rainfall. Annual average rainfall in the project area is approximately 940 mm.

Using the above values, average runoff from the catchment would be between 1160 and 1740 m^3/d. Compared with these runoff rates, the potential loss rates due to seepage from the creek to the mine are very small, under both the current approved Mine Plan and the proposed mine extension. The potential loss rate of 4.5 m^3/d under the current Mine Plan represents 0.3 to 0.4 % of the probable average runoff. The potential loss rate of 17.4 m^3/d under the proposed mine extension plan represents 1.0 to 1.5 % of the probable average runoff.

It is considered that the current monitoring program is adequate for the proposed mine extension. However, it is recommended that 3-monthly during the two-year period involved in the section of the mine proposed for extension, a visual inspection of the adjacent reach of Weakleys Flat Creek be undertaken to determine if any adverse impacts have occurred.

6 SUMMARY

Donaldson Coal Pty Ltd is proposing to laterally extend the south-eastern limits of the Donaldson open cut mine by up to 100 m to allow the extraction of additional coal. It is proposed to include all current target seams in this extension.

Under the current approved Mine Plan, the mine is expected to approach to approximately 100-120 m of Weakleys Flat Creek along a 1 km section of the creek, adjacent to mining blocks EX19 to EX21. The proposed extension would take the crest of the high wall to 42m from the bank of Weakleys Flat Creek at its nearest point. At other points within the proposed extension, the setback from the creek would range between 42 m and 230 m.

Due to the 5° dip, this lateral extension would also lead to a deepening of the low point in the mine by up to 9 m in this area.

The potential impact of this proposed extension on the groundwater and Weakleys Flat Creek has been assessed, with the principal issues being -

- Potential increases in groundwater inflows to the mine; and
- Potential increase in hydraulic interconnection between the creek and the mine.

It has been assessed that the proposed extension may lead to a temporary increase in groundwater inflow rate of less than 20 %, for a period of approximately one year. This would be followed by a period of slightly lower inflow rates, relative to the current Mine Plan, due to the advance dewatering effect ahead of the advancing face as a result of the temporary higher inflow rate.

The effect of the proposed extension would be an additional total inflow of approximately 10 ML, an increase of less than 3 % over the project life.

It has also been assessed that the closer proximity to Weakleys Flat Creek may lead to a potential increase in hydraulic interconnection between the creek and the mine. Over the section of the mine proposed for extension, it has been calculated that the **potential** seepage rate from the creek to the mine may increase from approximately 4.5 m^3/d under the current approved Mine Plan, to approximately 17.4 m^3/d under the proposed extension. This **potential** seepage rate would only apply under the most adverse of conditions, when the proposed extension had reached maximum depth and there was adequate streamflow in the creek.

It is estimated that average streamflow rate in Weakleys Flat Creek is probably in the range 1160 to 1740 m3/d, based on assumed runoff rates from the 4.5 km^2 catchment above the proposed mine extension. These above **potential** seepage rates equate to 0.3 to 0.4 % of probable average streamflow under the current approved Mine Plan, increasing to between 1.0 and 1.5 % under the proposed mine extension.

7 REFERENCES

Australian and New Zealand Environment and Conservation Council (ANZECC) / Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Department of Infrastructure, Planning and Natural Resources, 2002. *Draft Guidelines for Management of Stream / Aquifer Systems in Coal Mining Developments – Hunter Region.*

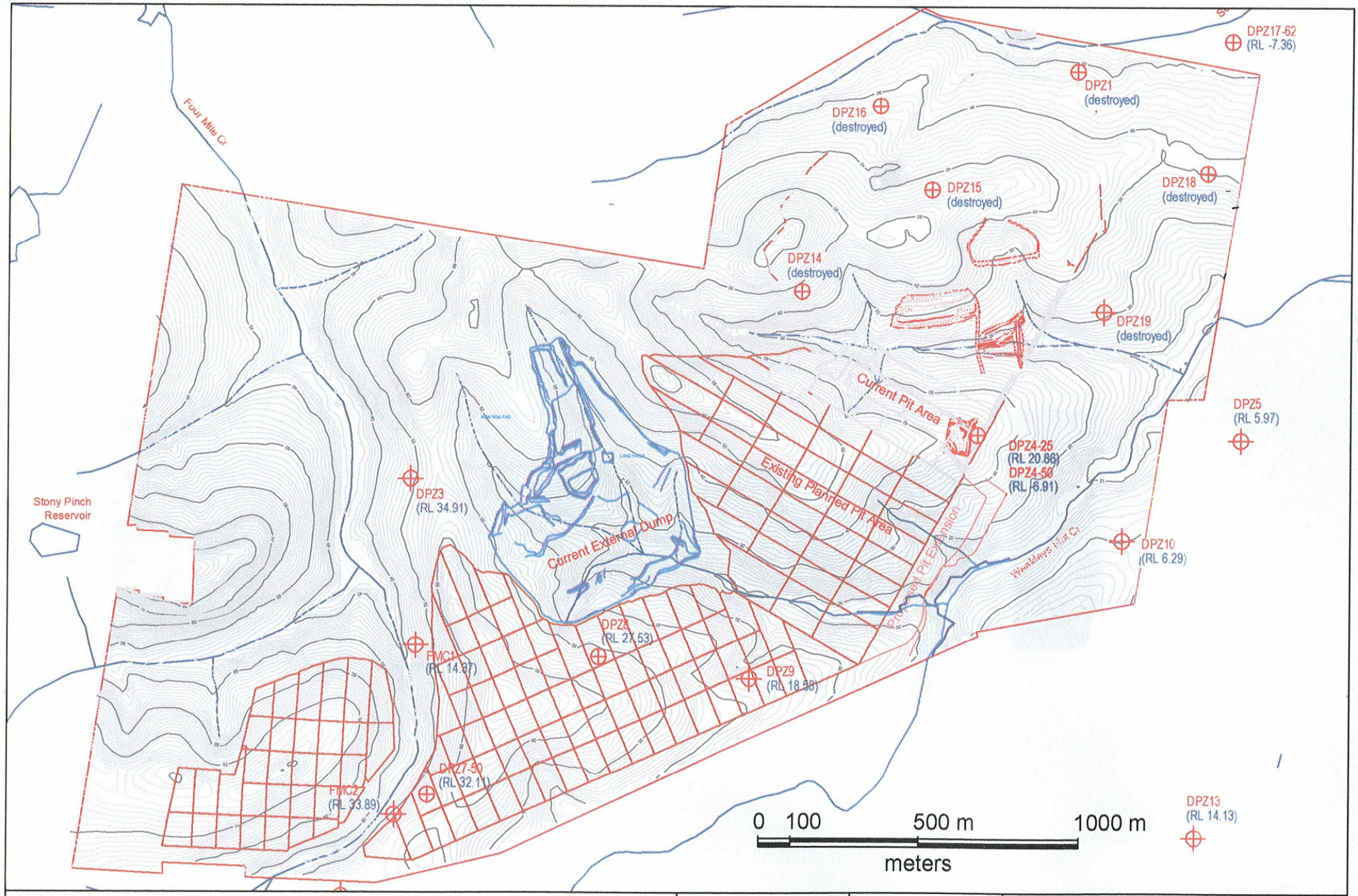
Department of Land and Water Conservation, 2001. *Background to Draft Guidelines for Management of Stream Systems in Coal Mining Developments – Hunter Valley.*

Dundon and Associates Pty Ltd and Hughes Trueman, 2003. *Donaldson Mine, Water Balance Review (Draft).* Consulting report prepared for Donaldson Coal Pty Ltd, dated May 2003.

Dundon and Associates Pty Ltd, 2001. *Proposed Deepening of the Donaldson Mine, Water Management Studies.* Consulting report prepared for Donaldson Coal Pty Ltd, dated July 2001.

Mackie Environmental Research, 1998. *Donaldson Coal Mine, Supplementary Water Management Studies (Addendum to EIS).* Consulting report prepared for Donaldson Projects Pty Ltd, dated August 1998.

Pells Sullivan Meynink Pty Ltd, 2001. *Donaldson Coal Pty Ltd – September 2001 Site Visit.* Consulting report PSM539.R1, dated September 2001.



LEGEND

DPZ4 (RL 35.01) Piezometer (Water Level April 2004)

DPZ11 (RL 19.00) Open Boreholes (Water Level April 2004)

Proposed Pit Extension

Lease Boundary

Date:	10 September 2004	Scale:	as indicated
Initials:	PJD	Job No:	04-0151
Drawing No:	04-0151-001d	Rev:	D

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DONALDSON COAL EXTENTION

Locality Plan

Figure 1

Appendix J

Visual Assessment

Donaldson Coal, Beresfield

Proposed open cut mine pit extension: Visual impact assessment.

1. Introduction

Donaldson Coal Pty Limited (Donaldson) operates an open cut coalmine on its own property in the vicinity of Beresfield in the Lower Hunter Valley of NSW with approval having been granted in 2000 for mining within a designated area. Donaldson wishes to extend the footprint of the mine at the south eastern side of the approved area by approximately 100m deep and 650m long. This report has been prepared to assess the visual impact of the proposed extension.

The EIS prepared for the Donaldson mine was supported by two visual impact assessments (EJE 1997; MGP 1998). The supplementary MGP assessment showed that while parts of the mine would be visible at different stages there would be no serious impact on visual amenity in the region. Specific viewpoints were selected for these original assessments and the potential for visual impact from these locations was included in this current assessment.

2. Method

2.1. Preparation of surface models

Donaldson Coal provided digital elevation models in the form of points drawings for the proposed extension as at July 2005, July 2006, January 2007 and July 2007 as well as for the current disturbance area and the wider surrounding area. All points were then combined into one model for each stage. In order to represent realistic visibility the model needed to be adjusted for the vegetated and cleared areas present. Data from the vegetation monitoring conducted regularly by EcoBiological in the habitat surrounding the mine showed that the mean tree height was 16m with 25% of trees having heights from 16m to 22m and 8% from 22m to 38m.

A recent aerial photograph was used to differentiate between cleared and forested areas. Forested areas were transferred to the model with 16m tree height being added to the AHD surface elevation for these areas. The process that was used for the differentiation of areas included all trees and any isolated patches or single trees in otherwise cleared farmland. Visible gaps in

forested areas or along road or power line easements were also included as cleared land. This resulted in a realistic model that not only took into consideration the tree cover around the mine itself but also the screening effect of trees close to any dwellings as well as the effect of trees or gaps in vegetation across the line of sight. The final result was a continuous model where cleared areas were at natural ground level with forested areas and trees at ground level plus 16m. The final points data was modelled as a surface at a cell size of 2m using ANUDEM (CRES 2004).

2.2. Visual Fields

An assessment of the models for each year that the proposed pit extension would be mined showed that the only feature (additional to that considered in previous assessments) having the potential for a visual impact would be the earth noise bund and the timber noise bund; it was the visibility of these structures that was assessed. Manifold System Surface Tools (Manifold 2004) was used to estimate areas from where any part of the bund walls would be visible. Visible areas were computed from a series of 9 points placed along the top of the bunds with an adjustment so that these areas would be computed as being viewed from an eye height of 1.8m. Additionally, it was determined whether there would be any locations from where all parts of the noise bund walls would be visible. In order to ensure that all points along the walls were located at an appropriate height above natural ground level a cross-section of the modelled ground level surface along the line of the proposed noise bunds was used to provide the height information.

2.3. View Points

Manifold is able to show a view across a terrain from any selected point and this function was used to determine whether a significant portion of the noise bund walls would be visible from locations inside the visible field. The area occupied by the noise bund walls was embedded into the terrain in red for clear visibility purposes in the modelled views. The field of view used was 135^0, which is the approximate field of view of the unaided human eye.

3. Results

There were no areas from where all parts of the noise bund walls would be visible. In particular the locations of the Maddox, Balcome, Steele and Williams residences along the western end of Black Hill Road were assessed as the visibilty from these residences was determined in the MGP (1998) report.

The View Points analysis showed that the only location from where any significant amount of the noise bund walls would be visible was from the east along a section of John Renshaw Drive close to the property. Even thought the model indicated that small parts of the bund wall would be visible from some of the Black Hill rural residences the amount of wall potentially visible was too small to be represented in an image. The broken tree canopy layer above the modelled tree hieght of 16m would further filter this amount of visibility.

4. Conclusion

The results of this visual amenity assessment show that only small portions of the noise bund walls associated with the proposed mine pit extension would be visible from some of the rural dwellings in the Black Hill area. However these visible parts of the wall could only be viewed through binoculars and not the naked eye. Nowhere would the entire wall be seen and the only location where substantial amounts of the wall would be seen was from a short section of John Renshaw Drive.

It is concluded that there would be no significant impact on visual amenity in the area resulting from the proposed mine pit extension. This result is entirely consistent with the fact that the proposed noise bund walls would be 8m in height and closely surrounded on the sides away from the pit by vegetation from the ground to a maximum height of 25m and having an average height of 16m.

5. References

CRES (2004) ANUDEM 5.1 *Surface modelling software.* Centre for Resource and Environmental Studies, The Australian national University, Canberra.

EJE (1997) *Donaldson Open Cut Mine, Beresfield Visual Assessment*. Report prepared for Wootmac/Donaldson Projects Pty Ltd by EJE Landscape Architecture, Newcastle.

Manifold (2004) Manifold System 6.0 *Geographic Information System*. CDA International. www.manifold.net.

MGP (1998) *Proposed Donaldson Coal Mine, Beresfield Supplementary report on visual impact and land use planning issues*. Report prepared by Mike George Planning Pty. Ltd., Crows Nest.