19 November 2013

TNT WAREHOUSE AND DISTRIBUTION CENTRE (SSD 6040)

RESPONSE TO SUBMISSIONS

Issues	Responses
Penrith City Council	
Architectural merit of the proposed building Consideration should be given to the design elements of the northern elevation of the building including: • Breaking up the roof form; • Greater use of articulation and colour; and • Utilising exposed frames and oversized elements such as downpipes to create visual interest.	The northern elevation of the building has been improved by adding: • Precast panels extending to the eaves line to breakup the roof form and geometry; • Additional colour to intersperse the corporate colour and help punctuate the wall panels; and • Oversized downpipes painted in contrasting colours to provide more contrast and visual interest. Attachment 1(a) is revised drawing DA-002(B); Attachment 1(b) revised drawing DA 200(B); and Attachment 1(c) is a new drawing to the original DA set. This drawing DA 201(A) was added as the scale of the overall elevation was a little difficult to read at A3 size.
Awning on the northern elevation Council considers the depth of the awning inappropriate to provide all-weather protection.	The awning has been specifically designed to meet TNT's requirements and is appropriate for their use.
Additional facilities Provision of sleep quarters/washing facilities within the building should be considered.	TNT considered the additional facilities Council suggests but decided to include a dedicated yard area for prime-mover parking instead. This will allow interstate drivers to sleep in their sleeper cabins where necessary. These drivers will be able to access amenities (shower, toilet and lunch room) at the site.
Landscaping and fencing The applicant is to use black, open style fencing to all boundaries with a high quality at the street frontage setback behind landscaping.	The development will incorporate black, open-style fencing to all boundaries behind the landscaping.

Sydney Suite 59, Jones Bay Wharf, 26-32 Pirrama Road, Pyrmont NSW 2009 **T** 61 2 9506 1400 **Melbourne** Level 8, Como Office Tower, 644 Chapel St, South Yarra VIC 3141 **T** 61 3 9829 0200
Brisbane Level 1, 12 Riverview Terrace, Indooroopilly QLD 4068 **T** 61 7 3878 8316 **Perth** Level 11, St Georges Square, 225 St Georges Terrace, Perth WA 6000 **T** 61 8 9269 5900
Adelaide Suite 604, 147 Pirie Street Adelaide SA 4000 **T** 61 8 8232 1384

NSW Department of Primary Industries	
NSW Office of Water recommends that detailed assessment demonstrated that groundwater is below the proposed earthworks.	Development pads have been established as part of the estate works approved in the concept plan. The earthworks proposed as part of this development are relatively minor and will not impact the groundwater. The maximum proposed cut over the site is 1m below current ground level on the higher eastern pad. Section 3.2 of the geotechnical report completed by JK Geotechnics dated 27 September 2013 (refer to Attachment 2) shows that ground water is not present on the site. 13 borehole test pits were performed at depths between 3-6m over the site and all were reported to be dry on completion of drilling/ excavation. The design of all the retaining walls is free-draining. All retaining walls have appropriate rear wall subsoil drainage to prevent build up of groundwater behind walls and to mitigate any concentration of salinity (if present) within soils. Detail of the intended wall construction which shows the drainage components is included on drawing Co12156.00-DA65 (refer to Attachment 3).
NSW Fisheries, Agriculture NSW and Crown Lands do not have any comments.	Note.

NSW Environment Protection Authority	
Questioned whether an environment protection licence (EPL) is required for the development.	An EPL is not required for the development as the proposed quantity of chemicals is less than 10% of the threshold level detailed in the POEO Act (1997). Refer to Attachment 4.

NSW Roads & Maritime Services	
RMS has no objection to the proposed development.	Note.

Local Resident	
Requested additional information on the volume of heavy trucks on Erskine Park Road, between Lenore Lane and the M4, during 11pm and 6am. Concerned about the potential noise impacts from trucks late at night.	TNT estimates the following truck movements, associated with the proposed development, will occur between the hours of 11.00pm and 6.00am: • four line-haul movements, which can be B-doubles – a prime mover towing two trailers with a maximum total length of 25m; • up to 12 trailers (ie. prime-mover with a 45-foot trailer) or B-double trucks moving each way, to and from the site; and • no rigid trucks (ie. with a 3 to 8 tonne capacity). However 80% of these vehicles will travel between the hours of 11.00pm and 12.00pm as well as 5.00am and 6.00am. Noise from these vehicles will be minimal as there is only one set of traffic lights between Erskine Park Industrial Estate and the M4 connection at the intersection of Erskine Park Road and Swallow Drive. As a result, there should be minimal acceleration and deceleration by trucks along Erskine Park Road. There are also signs at Erskine Park Road indicating to drivers to reduce noise by limiting compression braking in residential areas, and TNT drivers comply with this. The Noise Impact Assessment by EMM, dated 23 August 2013, assessed the potential impacts of traffic noise resulting from both construction and operational traffic on public roads against criteria defined in the NSW Government's Road Noise Policy. Operational noise predictions indicate that sensitive receivers will not be exposed to noise above relevant criteria. Refer to Attachment 5 for the Noise Impact Assessment.

Department of Planning & Infrastructure	
The current version of the Concept Plan should be in the EIS.	Please refer to the additional information from SJB Planning in Attachment 6.
Application numbers of each subsequent Project Approval is required.	Please refer to Attachment 6.

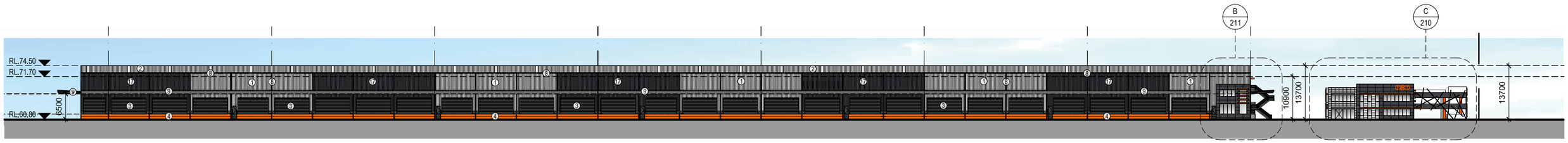
Attachment 1

Including 1(a), 1(b) & 1(c)

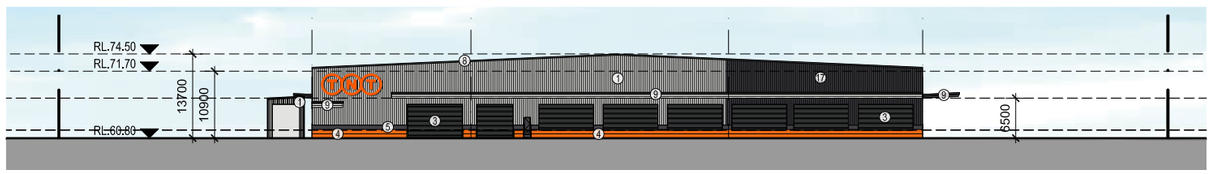
REVISIONS

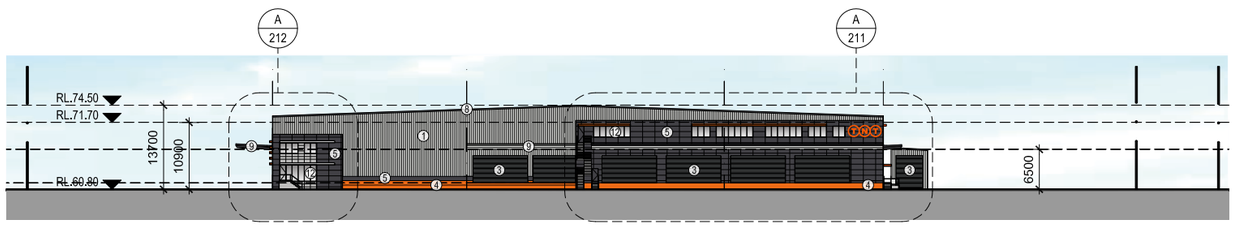
A	DEVELOPMENT APPLICATION	21.08.13
B	ORANGE PRECAST PANELS ADDED ALONG NORTHERN ELEVATION	18.11.13

A 200 NORTH ELEVATION
Scale 1:1000

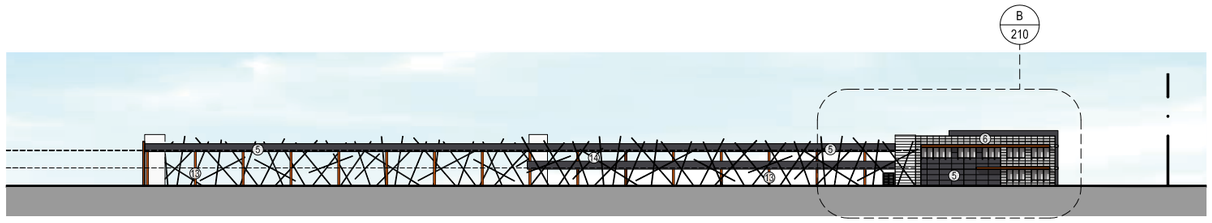


B 200 SOUTH ELEVATION
Scale 1:1000

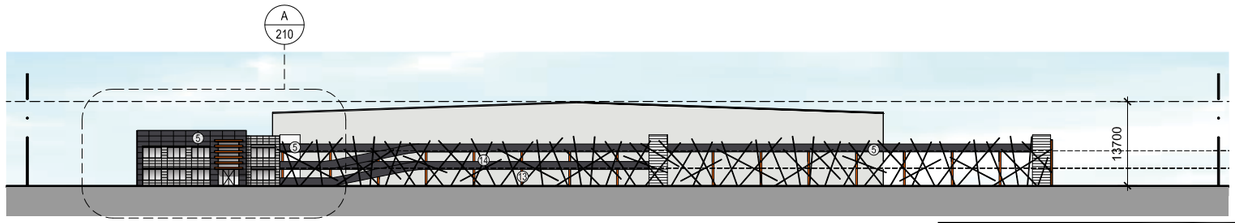




C 200 WEST ELEVATION- WAREHOUSE
Scale 1:1000



D 200 EAST ELEVATION- WAREHOUSE
Scale 1:1000



E 200 WEST ELEVATION- OFFICE & CARPARK
Scale 1:1000

F 200 EAST ELEVATION- OFFICE & CARPARK
Scale 1:1000

EXTERNAL FINISHES LEGEND

1. COLORBOND METAL CLADDING 1- 'SURFMIST'
2. ZINCALUME ROOF SHEETING WITH 10% TRANSLUCENT SHEETING
3. ROLLER SHUTTER DOORS - COLORBOND 'WINDSPRAY'
4. PAINTED CONCRETE PRECAST - PAINT FINISH TO MATCH PANTONE ORANGE 021
5. PAINTED CONCRETE PRECAST - PAINT FINISH (DARK GREY) TO MATCH COLORBOND 'MONUMENT'
6. PAINTED CONCRETE PRECAST - PAINT FINISH (LIGHT GREY)
7. PAINTED CONCRETE PRECAST - PAINT FINISH (WHITE)
8. GUTTERS, DOWNPIPES & TRIMS - COLORBOND 'MONUMENT'
9. WAREHOUSE AWNING- COLORBOND 'MONUMENT'
10. FEATURE PAINTED STEEL AWNINGS TO OFFICE- 'WHITE'
11. FEATURE PAINTED STEEL AWNINGS TO OFFICE- PANTONE ORANGE 021
12. SELECTED GLAZING TO COMPLY WITH SECTION J OF BCA
13. PAINTED CONCRETE COLUMNS TO CARPARK- PANTONE ORANGE 021
14. CARPARK FEATURE ELEMENT- PAINTED ALUMINIUM
15. ALUCOBOND CLADDING OR SIMILAR- DARK GREY
16. ALUCOBOND LOUVERS- 'WHITE'
17. COLORBOND METAL CLADDING 1- 'MONUMENT'

FILE LOCATION: J:\Arch\Enquiries\NSW\2-047 CBRE Transport Terminal\02_DA\2-047-275903-DA

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PROJECT
TNT WAREHOUSE & DISTRIBUTION FACILITY
LOT 201, DP 1133028
LOCKWOOD RD, ERSKINE PARK NSW

DRAWING TITLE
ELEVATIONS- OVERALL

GPT The GPT Group

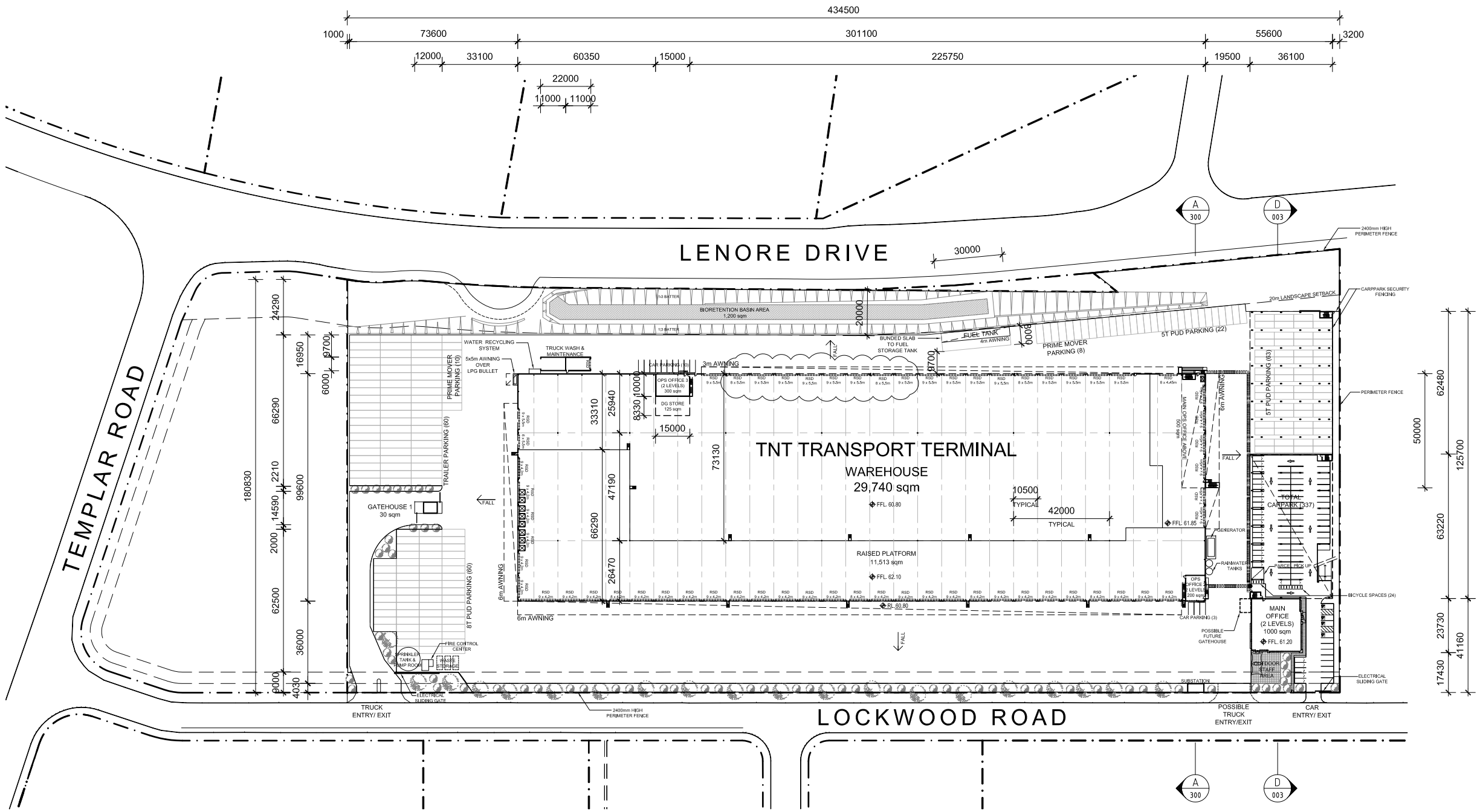
0 5 10 15 20 25 50m
SCALE: 1 : 1000 @ A3

CREATE DATE : 18.11.2013 PLOT DATE : 18.11.2013
LAST SAVED BY: mhassoun

2-047-275903-DA - 200 B

REVISIONS

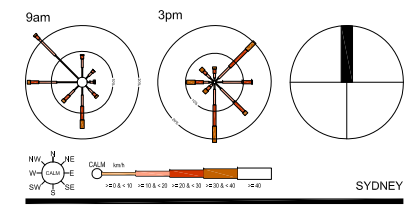
A	DEVELOPMENT APPLICATION	21.08.13
B	EGRESS DOORS & SMALLER RSD ON NORTH WALL RELOCATED TO SUIT VERTICAL PRECAST PANELS	18.11.13



DEVELOPMENT SUMMARY

TOTAL SITE AREA	78,189 sqm
WAREHOUSE (INCLUDING RAISED DOCK 11,513 sqm)	29,740 sqm
MAIN OPS OFFICE 1 (MEZZANINE)	500 sqm
OPS OFFICE 2 (2 LEVELS)	200 sqm
OPS OFFICE 3 (2 LEVELS)	300 sqm
MAIN OFFICE (2 LEVELS)	1,000 sqm
GATEHOUSE	30 sqm
TRUCKWASH & MAINTENANCE BAY	132 sqm
TOTAL BUILDING AREA	31,902 sqm
EFFICIENCY	40.8 %
AWNING (3m)	630 sqm
AWNING (6m)	2,658 sqm
FUEL TANK AWNING (4m)	120 sqm
CARPARK DECK- LEVEL 1	2,285 sqm
CARPARK DECK- LEVEL 2	4,538 sqm
TOTAL CARPARK DECK AREA	6,823 sqm
ACCESSIBLE CARPARKING- GF	4 spaces
CARPARKING PROVIDED- GF	87 spaces
CARPARKING PROVIDED- L1	74 spaces
CARPARKING PROVIDED- L2	172 spaces
CARPARKING- HARDSTAND	13 spaces
TOTAL CARPARK SPACES	350 spaces
BICYCLE SPACES	24 spaces
TRAILER PARKING (13.5m LONG)	60 spaces
PRIME MOVERS	18 spaces
5T PUDS	85 spaces
8T PUDS	60 spaces
OUTDOOR STAFF AREA	180 sqm
HEAVY DUTY PAVEMENT (H)	32,940 sqm
LIGHT DUTY PAVEMENT (L)	2,589 sqm

CARPARKING REQUIRED (AS PER COUNCIL DCP)	
WAREHOUSE - 1 per 100 sqm	300 spaces
OFFICE - 1 per 40 sqm	50 spaces
TOTAL CARPARKING REQUIRED	350 spaces



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PROJECT

TNT WAREHOUSE & DISTRIBUTION FACILITY

LOT 201, DP 1133028
LOCKWOOD RD, ERSKINE PARK NSW

DRAWING TITLE

SITE PLAN- OVERALL

The GPT Group

0 10 20 30 40 50 75 100m

SCALE: 1:2000 @ A3

CREATE DATE: 18.11.2013 PLOT DATE: 18.11.2013

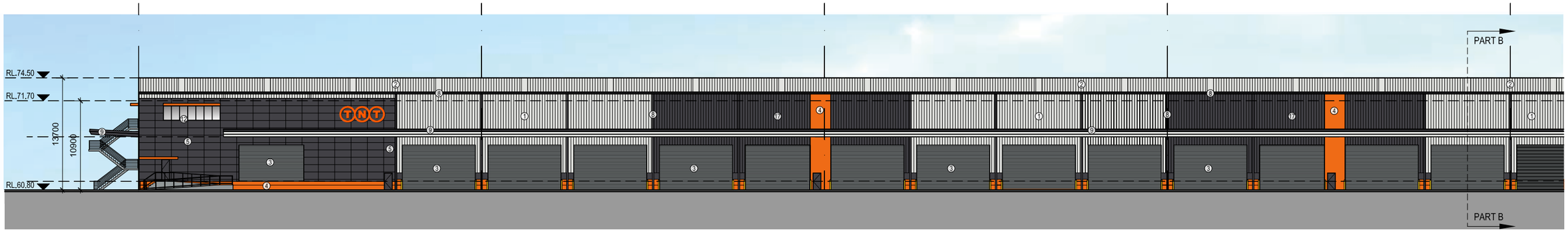
LAST SAVED BY: mhassoun

2-047-275903-DA - 002 B

FILE LOCATION: J:\Arch\Enquiries\NSW\2-047 CBRE Transport Terminal\02_DA\2-047-275903-DA

REVISIONS

A	DEVELOPMENT APPLICATION	18.11.13



A 201 NORTH ELEVATION- PART A
Scale 1:500

A 201 NORTH ELEVATION- PART B
Scale 1:500

EXTERNAL FINISHES LEGEND

1. COLORBOND METAL CLADDING 1- 'SURFMIST'
2. ZINCALUME ROOF SHEETING WITH 10% TRANSLUCENT SHEETING
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PROJECT
TNT WAREHOUSE & DISTRIBUTION FACILITY
LOT 201, DP 1133028
LOCKWOOD RD, ERSKINE PARK NSW

DRAWING TITLE
ELEVATIONS- NORTH ELEVATION
LENORE DRIVE

GPT The GPT Group

0 5 10 15 20 25 50m
SCALE: 1 : 1000 @ A3

CREATE DATE : 18.11.2013 PLOT DATE : 18.11.2013
LAST SAVED BY: mhassoun

2-047-275903-DA - 201 A

FILE LOCATION: J:\Arch\Enquiries\NSW\2-047 CBRE Transport Terminal\02_DA\2-047-275903-DA

Attachment 2

REPORT

TO
CIP CONSTRUCTIONS (NSW) PTY LTD

ON
GEOTECHNICAL INVESTIGATION

FOR
PROPOSED WAREHOUSE DEVELOPMENT

AT
LENORE DRIVE, ERSKINE PARK, NSW

27 September 2013
Ref: 26848ZNrpt Rev0

JK Geotechnics
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

PO Box 976, North Ryde BC NSW 1670
Tel: 02 9888 5000 Fax: 02 9888 5003
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Jeffery & Katauskas Pty Ltd, trading as JK Geotechnics ABN 17 003 550 801

Date: 27 September 2013
Report No: 26848ZNrpt
Revision No: 0

Report prepared by:

Nicholas Smith
Associate

Report reviewed by:

Agi Zenon
Senior Associate

For and on behalf of
JK GEOTECHNICS
PO Box 976
NORTH RYDE BC NSW 1670

TABLE OF CONTENTS

1 INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed warehouse development at Lenore Drive, Erskine Park, NSW. The investigation was commissioned by Mr Mark Buffin of CIP Constructions (NSW) Pty Ltd (CIP) by email dated 4 September 2013 and was carried out generally in accordance with our proposal Ref: 'P37569ZN dated 4 September 2013.

From the supplied marked up Overall Site Plan, Ref: '2-047-275903-FS18-002 dated 21 October 2013, prepared by CIP, we understand that it is proposed to construct a new transport warehouse at the above site. The warehouse is to have an area of approximately 30,000m^2 (approx. 300m by 100m in plan) and will be located centrally on the site. An associated multistorey carpark and office building is proposed in the south-east corner of the site. Heavy duty pavements are to surround the warehouse. From the marked up details on the supplied plan, we understand that additional filling is proposed over the southern portion of the proposed warehouse and the western end of the site.

The purpose of the investigation was to obtain geotechnical information on subsurface conditions as a basis for comments and recommendations on site preparation and earthworks, retention, footings, on-grade floor slabs, external pavements and additional geotechnical work required.

This report confirms and amplified the preliminary advice provided by email on 18 September 2013.

2 INVESTIGATION PROCEDURE

Prior to any drilling or excavation commencing, the borehole and test pit locations were electromagnetically scanned for buried services by a specialist subcontractor.

Nine boreholes, BH1 to BH9, were drilled to depths between 3.7m (BH1) and 7.5m (BH7 and BH8) using spiral augering techniques with our track mounted JK300 drill rig, and four test pits, TP10 to TP13 were excavated to depths between 1.0m (TP12) and 3.0m (TP13) using a 7.5 tonne backhoe. The apparent compaction of the fill and strength of the residual silty clays were assessed from the results of Standard Penetration Tests (SPTs) completed within the boreholes and Dynamic Cone Penetrometer (DCP) tests completed adjacent to the test pits, augmented by hand penetrometer tests on recovered cohesive soil samples from the SPT split

spoon sampler and backhoe bucket. The strength of the bedrock was assessed from the resistance of a tungsten carbide (TC) drill bit attached to the augers, resistance of the backhoe bucket, and tactile examination of recovered rock chips and correlation with subsequent laboratory moisture content testing. Groundwater observations were made both during and on completion of augering and excavation. No longer term groundwater monitoring was completed.

The borehole and test pit locations, as shown on the attached Test Location Plan (Figure 1) were set out using a hand held GPS. The order of accuracy of such equipment is about 5m. Figure 1 is based on available Google overhead imagery.

Our geotechnical engineer, Adrian Callus, was on site full time during the fieldwork, and was responsible for setting out the borehole and test pit locations, directing the electromagnetic scanning, nominating the sampling and testing and preparing logs of the encountered subsurface profile. The borehole and test pit logs are attached to this report with a set of Report Explanation Notes which define the logging terms and symbols used and describe the investigation techniques adopted.

Selected soil and rock chip samples were submitted to Soil Test Services Pty Ltd (STS), a NATA registered laboratory, for Atterberg Limit, linear shrinkage, moisture content, Standard compaction and 4 day soaked CBR testing. The results of the testing are presented on the attached Tables A and B. Selected samples were also submitted to Envirolab Services Pty Ltd for soil pH, sulphate content and chloride content testing and the results are summarised in Section 3.3 below and are presented in the attached Envirolab Certificate of Analysis (Appendix A).

3 RESULTS OF INVESTIGATION

3.1 Site Description

The site is located in gently sloping terrain which grades down to the west at between about 1^0 and 2^0. The site itself is about 420m (east-west) by 180m (north-south) in plan. Lenore drive forms the northern site boundary, and Lockwood Road the southern site boundary.

At the time of the fieldwork, the site had been formed into two cleared and generally level pads with a 2m high batter slope grading down to the west at about 30^0 formed towards the western end of the site. A small detention basin was located on the northern site boundary, just to the east of the batter slope.

To the east of the site was a warehouse development with concrete pavements adjoining the site boundary.

To the west of the site was a cleared level lot.

3.2 Subsurface Conditions

The 1:100,000 Geological Map of Sydney indicates the site is underlain by Bringelly Shale of the Wianamatta Group.

The boreholes and test pits exposed a subsurface profile comprising clayey fill and residual silty clay over shale bedrock at generally shallow depth. Groundwater was not encountered during our investigation. For details of the encountered subsurface profile, reference should be made the attached borehole and test pit logs. A summary of the encountered subsurface conditions is presented below:

Fill: Fill comprising silty clay was encountered to a depth of 0.1m in BH1 and BH9, 0.5m in TP12 and 1.0m in TP13.

Residual Silty Clay: Residual silty clay of medium and high plasticity was encountered from surface in BH1, BH2, BH3, BH4, BH5, BH7, BH8, and TP11 and from beneath the fill in BH6 and TP13. The residual silty clays were of hard strength.

Shale Bedrock: Shale bedrock was encountered in all of the boreholes and test pits at depths between 0m (TP10) and 3.4m (BH1) but generally less than 2m. The shale bedrock ranged from extremely low to high strength on first contact and generally increased in strength with depth.

Groundwater: All of the boreholes and test pits were 'dry' during and on completion of drilling/excavation. No longer term groundwater monitoring was completed.

3.3 Laboratory Test Results

The Atterberg limits tests on the recovered residual silty clays samples confirmed them to be of medium and high plasticity. The linear shrinkage tests indicated the residual clays to be moderately to highly reactive to moisture content change.

The moisture content tests on the recovered rock chip samples generally correlated well with our field assessment of the in-situ bedrock strength.

The four day soaked CBR tests returned CBR values of between 1% and 2% for the clayey fill and residual silty clays when compacted to 98% of Standard Maximum Dry Density (SMDD). The CBR samples swelled by between 3% and 4.5% during soaking which also indicates the fill and residual silty clays are reactive to moisture content change. The in-situ moisture content of the fill and residual silty clays was between 2.2% and 4.9% 'dry' of their respective Standard Optimum Moisture Content (SOMC).

The results of the soil pH, soil sulphate content and soil chloride content testing are summarised in the following table:

	BH1 0.5m to 0.95m	BH1 1.5m to 1.95m	BH5 0.5m to 0.85m	BH6 0.5m to 0.95m
pH	4.8	6.4	8.4	5.3
Chloride Content (mg/kg)	760	370	530	800
Sulphate content (mg/kg)	420	15	250	600

3.4 Existing Fill

Review of the provided Ground Technologies Level 1 Report for Geotechnical Testing Ref: 'GT971' dated March 2008 indicates the following:

- Prior to any fill being placed, existing topsoil and uncontrolled fill was stripped, and the exposed subgrade proof rolled. Further, the subgrade was reported to perform adequately under proof rolling.
- 69 in-situ density tests were completed on approximately 20,000m^3 of fill. The in-situ density tests all returned relative densities between 98% and 104% of SMDD and moisture contents within 2% of SOMC which complied with the specification for the project.

We note that the upper bound compaction limit of 104% to be slightly higher than the 102% of SMDD which we would normally recommend for a clay which is moderately to highly reactive to moisture content change. However, as the moisture content has been specified as being no more than 2% 'dry' of SOMC, we consider the upper bound compaction limit of 104% of SMDD to be acceptable for the fill already placed.

Based on the above, we consider the existing fill is suitable to support the proposed development.

4 COMMENTS AND RECOMMENDATIONS

4.1 AS2870 Site Classification

Based on the depth of fill present in areas of the site on the site alone, the site would be classified as Class P in accordance with AS2870-2011 – Residential Slabs and Footings.

However, in accordance with Clause 2.5.3 (c) of AS2870-2011, where fill has been placed as 'controlled fill' the site may be reclassified. Based on the results of the linear shrinkage testing characteristic surface movements of 35mm are expected and we consider the site can be reclassified as Class M in accordance with AS2870-2011.

4.2 Soil Aggressivity

Based on the results of the soil pH, sulphate content and chloride content tests, the exposure classification for buried concrete structures is considered to be 'Mild' in accordance with Table 6.4.2(c) of AS2159-2009 "Piling-Design and Installation".

4.3 Site Preparation and Earthworks

4.3.1 Site Drainage

The clayey subgrade materials at the site are expected to undergo substantial loss in strength if they are exposed and allowed to become wet, as evidenced by the low CBR values. Furthermore, the clayey fill materials have a moderate shrink-swell reactive potential, and likely a moderate potential for dispersive behaviour. Therefore, it is important to provide good and effective site drainage both during construction and for long-term site maintenance. The principle aim of the drainage is to promote run-off and reduce ponding. A poorly drained clay or silt subgrade may become untraffickable when wet. The earthworks should be carefully planned and scheduled to maintain good cross-falls during construction.

4.3.2 Site Preparation

Given the earthworks completed to date, we consider that no general site stripping is required for the proposed development beyond any excavation required to achieve design subgrade levels.

Towards the eastern end of the site, even excavation to limited depth will extend through the fill and natural soil profile and into the shale bedrock.

Excavation of the fill and natural soils, as well as any extremely weathered shale, is expected to be readily achieved using buckets fitted to hydraulic excavators. Excavation of low and greater strength shale is expected to require the assistance or rock breaking and or ripping equipment.

Further, over the footprint of the temporary detention basin on the northern site boundary of the site, any softened soils in the base of the detention basin should be stripped. If such materials are dried back, we consider they would be suitable for re-use as engineered fill as detailed below.

4.3.3 Subgrade Preparation

Following stripping as outlined above and boxing out to design subgrade level where required, the exposed subgrade across the entire site should be proof rolled with at least 8 passes of a 10 tonne minimum deadweight smooth drum roller. The final pass of proof rolling should be carried out under the direction of an experienced geotechnical engineer for the detection of unstable or soft areas.

The purpose of the proof rolling is to assist in the detection of any soft or unstable areas where replacement or improvement of the existing subgrade is required.

Subgrade heaving during proof-rolling may occur in areas where clayey soils have been allowed to become “over-wet”. Heaving areas should be locally removed to a stable base and replaced with engineered fill, as outlined below. Possible alternatives to stripping the full depth of the heaving areas (e.g. by using geotextiles and/or bridging layers) should be provided by the geotechnical engineer during the proof rolling inspection, as appropriate.

If soil softening occurs after prolonged periods of rainfall, then the subgrade should be over-excavated to below the depth of moisture softening and replaced with engineered fill. If a clayey subgrade exhibits shrinkage cracking, then the surface should be watered and rolled until the shrinkage cracks are no longer evident.

Engineered fill must be used where site levels need to be raised unless the building, including the floor slab, is to be supported on piles or footings founded below the base of the fill profile (existing and new), in which case, the fill would not need to be placed as engineered fill.

4.3.4 Engineered Fill

The existing fill encountered in the boreholes is considered suitable for reuse as engineered fill on condition that it is free of organic matter and contains a maximum particle size not exceeding 75mm. If material is being imported to raise site levels, then we recommend that a granular fill material (e.g. crushed/ripped sandstone) be sourced, as such materials will form a better quality fill material than clayey soils.

Engineered fill comprising well graded granular material (e.g. gravels and crushed/ripped bedrock) should be compacted in maximum 200mm loose thickness layers to a density ratio of at least 98% of Standard Maximum Dry Density (SMDD).

Engineered fill comprising clayey soils should be compacted in maximum 200mm thick loose layers to a density ratio strictly between 98% and 102% of SMDD at a moisture content within 2% of Standard Optimum Moisture Content (SOMC). We note that moisture conditioning of such clays may be required in order to conform to the above moisture specification.

Edge Compaction

In order to achieve adequate edge compaction, we recommend that the outer edge of each fill layer extend a horizontal distance of at least 1m beyond the design fill platform geometry.

The roller must extend over the edge of each placed layer in order to seal the batter surface. On completion of filling, the excess under-compacted edge fill should be trimmed back to the design lines.

Retaining Wall and Trench Backfill

Due to limited access for machinery, compaction of retaining wall and trench backfill will need to be completed using smaller compaction equipment (e.g. upright rammer compactors, sled compactors or small rollers). Due to the reduced energy output of such equipment, fill in such areas must be placed in maximum 100mm loose thickness layers, and have a maximum particle size not exceeding 40mm.

Compaction of engineered fill behind free standing retaining walls can be problematic and the use of a single sized durable gravel, such as “blue metal” or crushed concrete gravel (free of fines), which do not require significant compactive effort could be considered if good performance is a priority. Such material should be nominally compacted using a hand operated vibrating plate (sled) compactor in 200mm thick loose layers. Where a single size gravel backfill material is

adopted, then a geofabric separation layer must be provided between the general fill/natural soil profile and the single size gravel to protect against the migration of fines into the gravel profile. Further, the geofabric must be wrapped over the top of the grave and a 300mm thick clay plug must be provided at the top of the gravel profile to protect against surface water ingress.

Earthworks Inspection and Testing

Density tests should be regularly carried out on the engineered fill to confirm the above specifications are achieved, as outlined below:

- The frequency of density testing for general engineered fill should be at least one test per layer per 2,500m^2, or one test per 500m^3 distributed reasonably evenly throughout the full depth and area, or 3 tests per lot, whichever requires the most tests. A "lot" is defined in Clause 1.2.8 of AS3798-2007.
- The frequency of density testing for free standing retaining wall backfill should be at least one test per two layers per 50m^2 (assumes maximum 100mm thick loose layers). If a single size gravel backfill is adopted, no density testing of the retaining wall backfill would be required.
- The frequency of testing for service trench backfill should be at least one test per two layers per 40 linear metres of trench.

If the engineered fill is to support the proposed building, we recommend that Level 1 control of fill placement and compaction in accordance with AS3798-2007 be carried out, including for the trench and retaining wall backfill. Where engineered fill is to support proposed pavements, we recommend that Level 2 testing in accordance with AS3798-2007 be carried out. Due to an inherent conflict of interest, the geotechnical testing authority (GTA) should be directly engaged by the client, and not by the earthworks contractor or sub-contractors.

Batter Slopes

Permanent batter slopes for the new fill platform should be formed at no steeper than 1V to 2.5H with measures taken to protect such slopes against ongoing erosion by means of fast growing vegetation or similar. If access for mowing of such batter slopes is required, they should be flattened to no steeper than 1V to 4H.

4.4 Retention

The major consideration in the selection of earth pressures for the design of retaining walls is the need to limit deformations occurring outside the excavations. If retaining walls are proposed, the

following characteristic earth pressure coefficients and subsoil parameters may be adopted for a static design.

- For allowable bearing pressure recommendations, refer to Section 4.5 below.
- For free-standing cantilever walls which are retaining areas where minor movements can be tolerated (i.e. where only garden or grassed areas are to be retained), a triangular lateral earth pressure distribution may be adopted with an 'active' earth pressure coefficient, Ka, of 0.35, for the soil profile assuming a horizontal backfill surface.
- For cantilever walls where the tops are restrained by the permanent structure or which retain areas where movements need to be reduced or for propped walls, a triangular lateral earth pressure distribution should be adopted with an 'at rest' earth pressure coefficient, Ko, of 0.55, for the soil profile assuming a horizontal backfill surface.
- A bulk unit weight of 20kN/m^3 should be adopted for the soil profile.
- Any surcharge affecting the walls (e.g. traffic loading, construction loads, nearby high level footings, etc.) should be taken into account in the wall design using the appropriate earth pressure coefficient from above.
- We note that compaction of the backfill material will impose additional stresses on the retaining which must be considered in the retaining wall design. A rectangular lateral earth pressure distribution of 15kPa should be adopted from ground surface level down to the point where such a distribution meets the K_0 or K_a line as appropriate, assuming light weight compaction equipment is adopted.
- The retaining walls should be designed as drained and measures taken to provide complete and permanent drainage of the ground behind the walls. Subsurface drains should incorporate a non-woven geotextile fabric (eg. Bidim A34) to act as a filter against subsoil erosion.
- Lateral toe restraint may be achieved by suitably embedding the retaining wall footing to sufficient depth. The embedment design should be based on a triangular lateral earth pressure distribution and a 'passive' earth pressure coefficient, Kp, of 3, assuming horizontal ground in front of the wall. We note that significant movement is required in order to mobilise the full passive pressure of a soil, and therefore a factor of safety of at least 2 should be adopted to reduce such movements. Any localised excavations, such as for buried services, in front of the walls should be taken into account in the embedment design. Alternatively, in areas where bedrock is shallow, lateral toe restraint may be achieved by keying the retaining wall footing into bedrock. An allowable lateral stress of 200kPa may be adopted for key design, provided the rock is of at least low strength. Where there is a change from founding in soil to rock, construction joints must be installed within the

retaining wall close to the change in founding conditions, so as to permit relative movements. Where walls are keyed into the bedrock, the soil profile above the bedrock should be ignored when assessing the passive resistance due to strain incompatibility between the bedrock and the soil above.

4.5 Footings

For the proposed buildings, we expect that shallow footings founded within the fill or natural soil profile, will be suitable, however, footings or piles founded within the underlying weathered shale bedrock could also be considered. We note that the weathered shale is at surface or only shallow depth in areas, and footings on the shale would be appropriate in these areas.

Pad or strip footings founded in the existing fill or new engineered fill (placed under Level 1 control to the specification above) profile or natural clays of at least very stiff strength can be designed based on an allowable bearing pressure of 150kPa.

We note that the underlying clayey fill and natural silty clays have a moderate to high shrink swell reactivity with changes in moisture content. Characteristic shrink-swell movements may be as high as 30mm. The proposed warehouse building must therefore be designed to accommodate the above movement, if founded on high level footings. The effects of differential movements associated with the reactive soils would be reduced where pavements extend around the entire perimeter of the warehouse. Planters, garden or grassed areas immediately adjacent to the building must be avoided, if the warehouse building is founded on high level footings.

Pad or strip footings founded on, or piles socketed a nominal 0.3m into, shale bedrock of extremely low or greater strength can be designed based on an allowable bearing pressure of 700kPa. Where the footings are extended to found on, or be socketed into, shale bedrock of at least low strength, and allowable bearing pressure of 1,500kPa could be adopted. For piles socketed more than the 0.3m into the shale bedrock profile, allowable shaft adhesions of 10% of the above allowable bearing pressure could be adopted in compression, and 5% in tension (uplift) provided the sockets are appropriately roughened.

Where the proposed buildings are variably founded, i.e. part of the building within the fill profile and part of the building on the weathered shale bedrock, consideration must be given to providing adequate articulation to accommodate shrink-swell movements between the two portions of the building. Further, for ground beams spanning between footings or piles founded on the weathered shale bedrock, a void former suitable for swell up to 30mm must be provided.

All footings and bored piles must be clean of any loose or water softened material and free of standing water prior to pouring concrete. If a delay in pouring high level footings is anticipated, consideration should be given to covering the base of the footing with a protective layer of blinding concrete.

The initial stages of shallow footing excavation or bored pile drilling should be inspected by a geotechnical engineer to confirm that an appropriate foundation material has been achieved. The need for further inspections can be assessed at this time.

4.6 On-Grade Floor Slabs

Slab-on-grade construction is feasible for the proposed warehouse provided the subgrade has been prepared in accordance with recommendations described in Section 4.2 above. The on-grade floor slab should be designed using a CBR value of 1.0% or a Short Term Young's Modulus of 9MPa or a Long Term Young's Modulus of 6MPa. The design subgrade CBR of 1.0% could be improved by the inclusion of a 0.3m thick (compacted) select fill layer of CBR≥20% crushed sandstone which would increase the equivalent subgrade design CBR value to 3.5%.

Furthermore, the inclusion of a 0.3m thick select layer would reduce characteristic surface shrink-swell movements to a maximum of about 20mm to 25mm.

The select fill must comprise a well graded, granular crushed sandstone (maximum particle size of 75mm) with a soaked CBR value of at least 20%. If the available sandstone is assessed by tactile examination or laboratory testing to be a borderline material (i.e. achieving a CBR value of just over 20% at a compaction density ratio of 100% of SMDD), then we expect that it will break down and degrade during compaction with a heavy roller to a material with an 'insitu' CBR value less than 20%. As such, we recommend that the CBR testing allow for the degradation of the crushed sandstone. The standardised RTA Specification T102 method, which attempts to replicate the degradation process by pre-treatment of the crushed sandstone with 3 cycles of repeated compaction, would be appropriate. All crushed sandstone select fill should be compacted in maximum 200mm thick loose layers to at least 100% of SMDD.

An alternative subgrade improvement measure to increase the design CBR would be to add lime to the subgrade. The lime must be thoroughly mixed with the clayey fill using specialist blending machines and then compacted to not less than 98% SMDD and within 2% of SOMC. If lime stabilisation of the clayey fill is to be carried out, then laboratory soaked CBR testing should be

completed to assess the appropriate amount of lime to be added and resulting improvement in subgrade CBR. Nevertheless, as a guide, we expect that if 3% to 4% lime is added this would result in an equivalent subgrade design CBR of at least 4%, if a 300mm layer is treated.

The on-grade floor slab should be isolated from the walls, columns and footings to allow for shrink-swell movements in the underlying clays. Joints in the concrete on-grade floor slab should be designed to accommodate shear forces but not bending moments by using dowelled or keyed joints.

The detailing of the ground floor slab within the warehouse building as a slab-on-grade that can accommodate shrink-swell movements of the underlying soils, as well as the relative differential movements associated with a piled structure, is extremely difficult. We therefore recommend the perimeter walls of the warehouse be provided with an edge beam that is founded at least 0.6m below surrounding ground surface levels, with the warehouse surrounded by concrete pavements that are at least 2m wide and which abut the warehouse building. The gap between the warehouse and concrete pavements must be appropriately sealed to prevent water ingress.

4.7 External Pavements

The design parameters for on-grade floor slabs provided in Section 4.7 above are also appropriate for the design of the external pavements.

Subgrade improvement such as that described in Section 4.7 above could also be completed to improve the design CBR in the pavement areas.

We recommend that all base course materials for flexible pavements and sub-base materials for rigid pavements comprise DGB20 in accordance with RTA QA Specification 3051 unbound base. The DGB20 material should be compacted in maximum 200mm thick loose layers using a large smooth drum roller to at least 98% of Modified Maximum Dry Density (MMDD). Adequate moisture conditioning to within 2% of Modified Optimum moisture Content (MOMC) should be provided during placement so as to reduce the potential for material breakdown during compaction.

We further recommend that all sub-base materials for flexible pavements comprise DGS40 in accordance with RTA QA Specification 3051 unbound base. Recycled materials may be used provided they conform to the specification requirements of DGS40. If the recycled materials contain brick or ceramic fragments, it is highly unlikely that they will conform to the specification

requirements. The DGS40 material should be compacted in maximum 200mm thick loose layers using a large smooth drum roller to at least 95% of MMDD. Again, adequate moisture conditioning to within 2% of MOMC should be provided during placement so as to reduce the potential for material breakdown during compaction.

Density tests should be regularly carried out on the granular pavement materials to confirm the above specifications are achieved. The frequency of density testing should be at least one test per layer per 2,500m^2 or three tests per visit, whichever requires the most tests. Level 2 testing of fill compaction is the minimum permissible in AS3798-2007. The geotechnical testing authority (GTA) should be directly engaged by the client (or their representative) and not by the earthworks contractor or sub-contractors.

Subsoil drains should be provided below the perimeter of the proposed pavements, including any internal planters etc. with invert levels at least 200mm below subgrade level. The drainage trenches should be excavated with a uniform longitudinal fall to appropriate discharge points so as to reduce the risk of water ponding. The subgrade should be graded to promote water flow towards the subsoil drains. Discharge from the subsoil drains should be piped to the stormwater system.

4.8 Additional Geotechnical Work Required

The following summarises the further geotechnical input which is required and which has been detailed in the preceding sections of this report:

- Proof rolling of exposed subgrade.
- Density testing of engineered fill and granular pavement layers.
- Geotechnical footing and/or pile inspections.
- Additional CBR testing, if appropriate.

5 SALINITY

The site is located in an area where soil and groundwater salinity is known to occur. Salinity can affect the longevity and appearance of structures as well as causing adverse horticultural and hydrogeological effects. The local council has guidelines relating to salinity issues which should be checked for relevance to this project.

6 GENERAL COMMENTS

The recommendations presented in this report include specific issues to be addressed during the construction phase of the project. As an example, special treatment of soft spots may be required as a result of their discovery during proof-rolling, etc. In the event that any of the construction phase recommendations presented in this report are not implemented, the general recommendations may become inapplicable and JK Geotechnics accept no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full and properly tested, inspected and documented.

The long term successful performance of floor slabs and pavements is dependent on the satisfactory completion of the earthworks. In order to achieve this, the quality assurance program should not be limited to routine compaction density testing only. Other critical factors associated with the earthworks may include subgrade preparation, selection of fill materials, control of moisture content and drainage, etc. The satisfactory control and assessment of these items may require judgment from an experienced engineer. Such judgment often cannot be made by a technician who may not have formal engineering qualifications and experience. In order to identify potential problems, we recommend that a pre-construction meeting be held so that all parties involved understand the earthworks requirements and potential difficulties. This meeting should clearly define the lines of communication and responsibility.

Occasionally, the subsurface conditions between the completed boreholes and test pits may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact this office.

This report provides advice on geotechnical aspects for the proposed civil and structural design. As part of the documentation stage of this project, Contract Documents and Specifications may be prepared based on our report. However, there may be design features we are not aware of or have not commented on for a variety of reasons. The designers should satisfy themselves that all the necessary advice has been obtained. If required, we could be commissioned to review the geotechnical aspects of contract documents to confirm the intent of our recommendations has been correctly implemented.

A waste classification will need to be assigned to any soil excavated from the site prior to offsite disposal. Subject to the appropriate testing, material can be classified as Virgin Excavated Natural Material (VENM), General Solid, Restricted Solid or Hazardous Waste. If the natural soil

has been stockpiled, classification of this soil as Excavated Natural Material (ENM) can also be undertaken, if requested. However, the criteria for ENM are more stringent and the cost associated with attempting to meet these criteria may be significant. Analysis takes seven to 10 working days to complete, therefore, an adequate allowance should be included in the construction program unless testing is completed prior to construction. If contamination is encountered, then substantial further testing (and associated delays) should be expected. We strongly recommend that this issue is addressed prior to the commencement of excavation on site.

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SOIL TEST SERVICES
ABN 43 002 145 173

TABLE A
MOISTURE CONTENT, ATTERBERG LIMITS AND LINEAR SHRINKAGE TEST REPORT

Client: JK Geotechnics
Project: Proposed Warehouse
Location: Lenore Drive, Erskine Park, NSW

Ref No: 26848ZN
Report: A
Report Date: 26/09/2013
Page 1 of 1

AS 1289	TEST METHOD	2.1.1	3.1.2	3.2.1	3.3.1	3.4.1
BOREHOLE NUMBER	DEPTH m	MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	LINEAR SHRINKAGE %
1	0.50-0.95	13.3	39	17	22	10.5
1	3.50-3.70	3.0				
2	1.30-1.50	8.4				
2	4.20-4.50	7.0				
3	1.20-1.50	7.5				
4	2.70-3.00	6.6				
4	4.20-4.70	5.8				
5	0.50-0.85	9.4	37	14	23	9.5
5	2.80-3.10	9.0				
6	0.50-0.95	15.6	55	19	36	15.0
6	2.00-2.30	7.0				
6	3.80-4.00	6.0				
7	1.30-1.50	8.8				
7	4.20-4.40	4.5				
8	1.30-1.50	10.5				
8	4.30-4.50	7.7				
9	0.10-0.30	8.7	37	14	23	9.5
9	1.30-1.50	9.0				
9	4.30-4.50	2.1				

Notes:

- The test sample for liquid and plastic limit was air-dried & dry-sieved
- The linear shrinkage mould was 125mm
- Refer to appropriate notes for soil descriptions
- Date of receipt of sample: 16/09/2013

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SOIL TEST SERVICES

ABN 43 002 145 173

TABLE B
FOUR DAY SOAKED CALIFORNIA BEARING RATIO TEST REPORT

Client: JK Geotechnics
Project: Proposed Warehouse
Location: Lenore Drive, Erskine Park, NSW

Ref No: 26848ZN
Report: B
Report Date: 26/09/2013
Page 1 of 1

SAMPLE NUMBER	BH 2	BH 5	BH 9	TP 13
DEPTH (m)	0.00 - 0.50	0.50 - 1.00	0.10 - 0.30	0.00 - 0.50
Surcharge (kg)	9.0	9.0	9.0	9.0
Maximum Dry Density (t/m^3)	1.76 STD	1.82 STD	1.82 STD	1.79 STD
Optimum Moisture Content (%)	13.3	12.8	12.4	16.0
Moulded Dry Density (t/m^3)	1.73	1.78	1.80	1.76
Sample Density Ratio (%)	98	98	99	98
Sample Moisture Ratio (%)	98	97	95	98
Moisture Contents				
Insitu (%)	8.4	10.6	8.7	13.5
Moulded (%)	13.0	12.4	11.8	15.6
After soaking and				
After Test, Top 30mm(%)	24.5	26.0	24.3	24.3
Remaining Depth (%)	18.1	20.4	18.8	18.0
Material Retained on 19mm Sieve (%)	1*	2*	1*	0
Swell (%)	3.0	4.0	4.5	3.5
C.B.R. value: @5.0mm penetration	1.5	1.0	1.5	2.0

- Refer to appropriate logs for soil descriptions
- Test Methods :
  - (a) Soaked C.B.R. : AS 1289 6.1.1
  - (b) Standard Compaction : AS 1289 5.1.1
  - (c) Moisture Content : AS 1289 2.1.1
- Date of receipt of sample: 16/09/2013
- * Denotes not used in test sample

NATA

NATA Accredited Laboratory Number:1327

Authorised Signature / Date
(A. Tatikonda) 26/9/13

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 1
1/1

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 5-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		CL	SILTY CLAY: medium plasticity, orange brown and brown, with fine to medium grained shale and ironstone gravel.	MC<PL	H		RESIDUAL
				■	N = 12 4,6,6							>600 >600 >600	
						1							
				■	N = 14 3,7,7							>600 >600 >600	
						2							
									SILTY CLAY: high plasticity, orange brown and light grey, with ironstone gravel.				
				■	N > 18 7,12, 6/50mm	3						>600 >600 >600	
				■	REFUSAL			-	SHALE: grey and brown, with occasional fine grained sandstone bands.	DW	H		MODERATE 'TC' BIT RESISTANCE
									END OF BOREHOLE AT 3.7m				'TC' BIT REFUSAL
						4							
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 2
1/1

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 6-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION					SPT 12/150mm REFUSAL	0		CH	SILTY CLAY: high plasticity, light grey and orange brown, with fine to coarse grained shale and ironstone gravel, roots and root fibres.	MC<PL	(H)		RESIDUAL
						1		-	SHALE: grey and orange brown, with occasional XW bands.	DW	VL-L		LOW 'TC' BIT RESISTANCE
						2			SHALE: dark grey and grey, with occasional iron indurated bands.	DW-SW	M		LOW TO MODERATE RESISTANCE
						3							MODERATE RESISTANCE
						4							
						5							
						6			END OF BOREHOLE AT 6.0m				
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 3
1/1

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 6-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		CH	SILTY CLAY: high plasticity, light grey, with fine to coarse grained shale and ironstone gravel, roots and root fibres.	MC<PL	(H)		RESIDUAL
								-		XW-DW	EL-VL		VERY LOW TO LOW 'TC' BIT RESISTANCE
				■	N > 7 10,7/50mm REFUSAL	1			SHALE: orange brown and grey, with iron indurated bands and occasional XW bands.				
				■					SHALE: dark grey and brown.	DW	VL-L		LOW RESISTANCE
				■		2					L-M		MODERATE RESISTANCE
				■		3							
				■		4							
				■		5					L		LOW TO MODERATE RESISTANCE
				■		6			END OF BOREHOLE AT 6.0m				
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 4
1/1

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 6-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		CL-CH	SILTY CLAY: medium to high plasticity, light grey and orange brown, with fine to coarse grained shale and ironstone gravel and root fibres.	MC<PL	H		RESIDUAL
					SPT 10/150mm REFUSAL							>600	
						1		-	SHALE: grey and orange brown, with occasional XW bands.	DW	L	>600 >600	LOW 'TC' BIT RESISTANCE
						2			SHALE: dark grey, with occasional iron indurated bands.	SW	M		MODERATE RESISTANCE
						3							
											L-M		LOW TO MODERATE RESISTANCE
						4							
						5							
									SHALE: dark grey.		M		MODERATE TO HIGH RESISTANCE
						6			END OF BOREHOLE AT 6.0m				
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 5
1/1

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 5-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION					N > 22 7,14, 8/50mm REFUSAL	0		CL	SILTY CLAY: medium plasticity, light grey mottled orange brown and red brown, with fine to coarse grained ironstone gravel, roots and root fibres.	MC<PL	H		RESIDUAL TOO FRIABLE FOR HP TESTING
					N > 15 14,15/ 150mm REFUSAL	1						>600	
						2		-	SHALE: orange brown and grey.	DW	VL	>600	VERY LOW 'TC' BIT RESISTANCE
						3			SHALE: light grey and dark grey.	DW-SW	L		LOW TO MODERATE RESISTANCE
						4					M-H		MODERATE TO HIGH RESISTANCE
											H		HIGH RESISTANCE
						5			END OF BOREHOLE AT 4.5m				PRACTICAL 'TC' BIT REFUSAL
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 6
1/1

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 5-9-13
Method: SPIRAL AUGER JK300
R.L. Surface: N/A
Datum:
Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		CH	FILL: Silty clay, high plasticity, light grey and brown, with fine to coarse grained shale and ironstone gravel, roots and root fibres.	MC<PL			
										MC<PL	H		RESIDUAL
				■	N = 29 6,9,20				SILTY CLAY: high plasticity, light grey mottled red and orange brown, with fine to coarse grained shale gravel.			>600 >600 >600	
						1							
				■	N > 20 9,20/ 150mm								
					REFUSAL								
				■		2		-	SHALE: grey and orange brown.	DW-SW	VL-L		LOW 'TC' BIT RESISTANCE
									SHALE: dark grey and light grey.	SW	L-M		LOW TO MODERATE RESISTANCE
				■		3							
						4							
				■		5			END OF BOREHOLE AT 5.0m				
						6							
						7							

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BOREHOLE LOG

Borehole No. 7
1/2

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 6-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		CH	SILTY CLAY: high plasticity, light grey and orange brown, wit fine to coarse grained shale and ironstone gravel.	MC<PL	(H)		RESIDUAL
								-	SHALE: grey and orange brown.	DW	L-M		LOW 'TC' BIT RESISTANCE
						1			SHALE: dark grey.	DW-SW	M		MODERATE TO HIGH RESISTANCE
											L-M		MODERATE RESISTANCE
						2							
						3							
						4							
											M		MODERATE TO HIGH RESISTANCE
						5							
						6							
						7							

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BOREHOLE LOG

Borehole No. 7
2/2

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 6-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
				■					SHALE: dark grey.	SW	H		HIGH RESISTANCE
									END OF BOREHOLE AT 7.5m				'TC' BIT REFUSAL
						8							
						9							
						10							
						11							
						12							
						13							
						14							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **8** 1/2

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 6-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		CL-CH	SILTY CLAY: medium to high plasticity, light grey, with fine to medium grained shale and ironstone gravel.	MC<PL	(H)		RESIDUAL
								-	SHALE: grey and brown.	DW	VL-L		LOW 'TC' BIT RESISTANCE
						1					L		LOW TO MODERATE RESISTANCE
						2							
						3			SHALE: dark grey, with occasional XW bands and H strength fine grained sandstone bands.	DW-SW	M		MODERATE RESISTANCE
						4							
						5					M-H		MODERATE TO HIGH RESISTANCE
						6							
						7							

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BOREHOLE LOG

Borehole No. **8** 2/2

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 6-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
				■					SHALE: dark grey.	SW	H		HIGH RESISTANCE
									END OF BOREHOLE AT 7.5m				'TC' BIT REFUSAL
						8							
						9							
						10							
						11							
						12							
						13							
						14							

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BOREHOLE LOG

Borehole No. 9
1/2

Client: CIP
Project: PROPOSED WAREHOUSE
Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN
Date: 6-9-13
Method: SPIRAL AUGER JK300
Logged/Checked by: A.P.C./N.E.S.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION			■			0		CL	FILL: Silty clay, medium to high plasticity, light grey, with fine to coarse grained shale and igneous gravel, roots and root fibres.	MC<PL			
										MC<PL	(H)		RESIDUAL
				■	SPT 6/100mm REFUSAL			-		XW-DW	EL-VL		
						1			SILTY CLAY: medium plasticity, light grey and orange brown, with ironstone gravel.	DW	VL-L		MODERATE RESISTANCE
									SHALE: light grey and orange brown. SHAKE: dark grey and brown.				
						2							LOW TO MODERATE RESISTANCE
				■						SW	L-M		MODERATE RESISTANCE
						3							
						4							
				■									LOW TO MODERATE RESISTANCE
						5							
											M		MODERATE RESISTANCE
				■		6							MODERATE TO HIGH RESISTANCE
						7							

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BOREHOLE LOG

Borehole No. **9** 2/2

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 6-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
				■					SHALE: dark grey.	SW	H		HIGH RESISTANCE
									END OF BOREHOLE AT 7.4m				'TC' BIT REFUSAL
						8							
						9							
						10							
						11							
						12							
						13							
						14							

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TEST PIT LOG

Test Pit No. **10** **1/1**

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** JCB 7.5 TONNE BACKHOE **R.L. Surface:** N/A

Date: 12-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION				■		0			SHALE: grey and brown, with iron indurated bands.	XW-DW	EL-VL		
						1			SHALE: dark grey and brown.	DW	VL-L		
									END OF TEST PIT AT 1.1m				PRACTICAL BUCKET REFUSAL
						2							
						3							
						4							
						5							
						6							
						7							

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TEST PIT LOG

Test Pit No. **11** **1/1**

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** JCB 7.5 TONNE BACKHOE **R.L. Surface:** N/A

Date: 12-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION					REFER TO DCP TEST RESULTS	0		CL-CH	SILTY CLAY: medium to high plasticity, light grey, with fine to coarse grained ironstone gravel, roots and root fibres.	MC<PL	H	>600 >600 >600	RESIDUAL
						1		-	SHALE: dark brown and grey, with iron indurated bands.	DW	VL VL-L		
									END OF TEST PIT 1.2m				PRACTICAL BUCKET REFUSAL
						2							
						3							
						4							
						5							
						6							
						7							

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TEST PIT LOG

Test Pit No. **12** **1/1**

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** JCB 7.5 TONNE BACKHOE **R.L. Surface:** N/A

Date: 12-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION				■		0			FILL: Silty clay, high plasticity, light grey and red brown, with fine to medium grained shale gravel and root fibres.	MC<PL			GRASS COVER
								-	SHALE: light grey and brown, with iron indurated bands.	XW	EL		
										DW	VL-L		
						1			END OF TEST PIT AT 1.0m				PRACTICAL BUCKET REFUSAL
						2							
						3							
						4							
						5							
						6							
						7							

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TEST PIT LOG

Test Pit No. **13** **1/1**

Client: CIP

Project: PROPOSED WAREHOUSE

Location: LENORE DRIVE, ERSKINE PARK, NSW

Job No. 26848ZN **Method:** JCB 7.5 TONNE BACKHOE **R.L. Surface:** N/A

Date: 12-9-13 **Datum:**

Logged/Checked by: A.P.C./N.E.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION					REFER TO DCP TEST RESULTS	0			FILL: Silty clay, high plasticity, grey and brown, with fine to coarse grained shale gravel, roots and root fibres.	MC>PL			APPEARS WELL COMPACTED
						1		CH	SILTY CLAY: high plasticity, red brown mottled grey, with fine to medium grained ironstone gravel.	MC>PL	H	450 500 470	RESIDUAL
						2						>600 >600 >600	
						3		-	SHALE: light grey and orange brown.	XW	EL	500 >600 >550	
									END OF TEST PIT AT 3.0m				
						4							
						5							
						6							
						7							

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DYNAMIC CONE PENETRATION TEST RESULTS

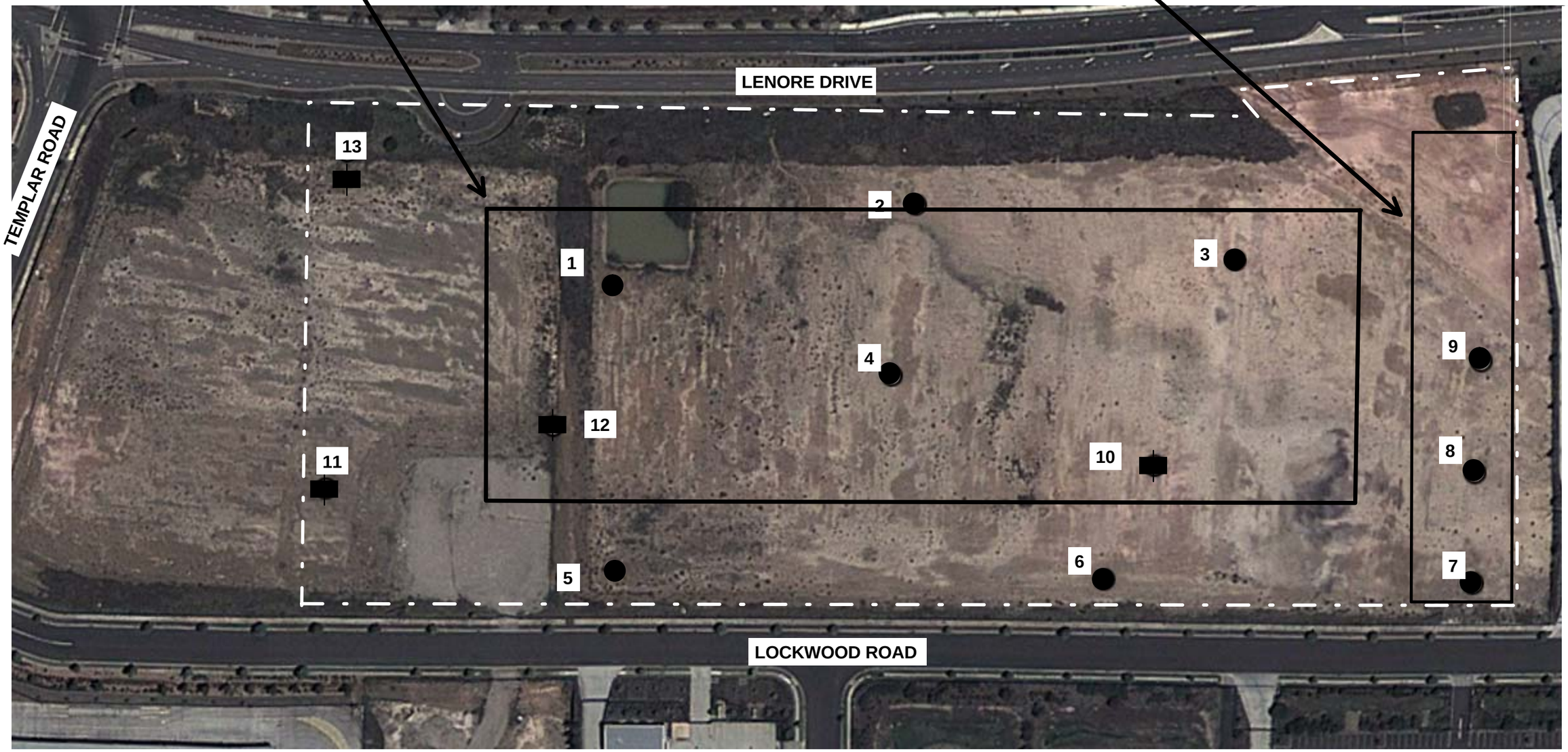
Client:	CIP		
Project:	PROPOSED WAREHOUSE		
Location:	LENORE DRIVE, ERSKINE PARK, NSW		
Job No.	26848ZN	Hammer Weight & Drop:	9kg/510mm
Date:	12-9-13	Rod Diameter:	16mm
Tested By:	A.P.C.	Point Diameter:	20mm

	Number of Blows per 100mm Penetration						
Test Location							
Depth (mm)	**10**	**11**	**12**	**13**			
0 - 100	10	11	6	10			
100 - 200	21	10	6	11			
200 - 300	REFUSAL	25	5	16			
300 - 400		REFUSAL	3	13			
400 - 500			7	19			
500 - 600			17	17			
600 - 700			REFUSAL	19			
700 - 800				9			
800 - 900				12			
900 - 1000				15			
1000 - 1100				END			
1100 - 1200							
1200 - 1300							
1300 - 1400							
1400 - 1500							
1500 - 1600							
1600 - 1700							
1700 - 1800							
1800 - 1900							
1900 - 2000							
2000 - 2100							
2100 - 2200							
2200 - 2300							
2300 - 2400							
2400 - 2500							
2500 - 2600							
2600 - 2700							
2700 - 2800							
2800 - 2900							
2900 - 3000							

Remarks: 1. The procedure used for this test is similar to that described in AS1289.6.3.2-1997, Method 6.3.2.
2. Usually 8 blows per 20mm is taken as refusal

APPROXIMATE OUTLINE OF PROPOSED WAREHOUSE

APPROXIMATE OUTLINE OF PROPOSED OFFICE AND CAR PARK



LEGEND

- BOREHOLE
- TEST PIT AND DCP TEST

Approximate Scale (m): 0 75

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Title: **TEST LOCATION PLAN**

Report Number: 26848ZN

Figure Number: 1

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

Sampling is carried out during drilling or from other excavations to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N>30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "N_c" on the borehole logs, together with the number of blows per 150mm penetration.

Static Cone Penetrometer Testing and Interpretation: Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

  The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

The borehole or test pit logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than “straight line” variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or ‘reverted’ chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'*. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed that at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

iii) full time engineering presence on site.

GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

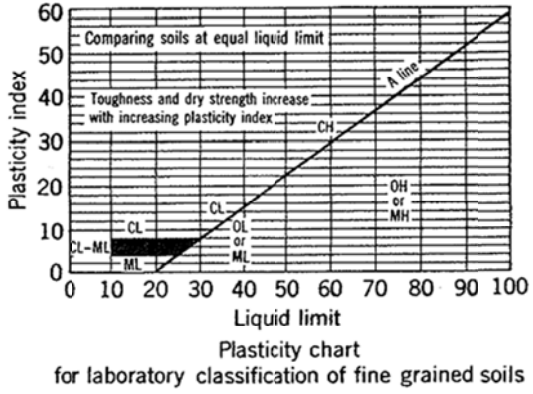
OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)				Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits above "A" line, with *PI* greater than 7 $C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW* Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits below "A" line with *PI* greater than 7
		Gravels with fines (appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing	*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		
			Nonplastic fines (for identification procedures see *ML* below)	*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)	*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	*SW*	Well graded sands, gravelly sands, little or no fines		
			Predominantly one size or a range of sizes with some intermediate sizes missing	*SP*	Poorly graded sands, gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)	*SM*	Silty sands, poorly graded sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)	*SC*	Clayey sands, poorly graded sand-clay mixtures		
Fine-grained soils More than half of material is *smaller* than 75 μm sieve size (The 75 μm sieve size is about the smallest particle visible to naked eye)	Identification Procedures on Fraction Smaller than 380 μm Sieve Size						
		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)			
	Silts and clays liquid limit less than 50	None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)
		Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
		Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity	
	Silts and clays liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays	
		Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity	
Highly Organic Soils		Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils	



Plasticity chart
for laboratory classification of fine grained soils

Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	C	Extent of borehole collapse shortly after drilling.
	▶	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos screening.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
(Cohesionless Soils)	D	DRY – Runs freely through fingers.
	M	MOIST – Does not run freely but no free water visible on soil surface.
	W	WET – Free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – Unconfined compressive strength less than 25kPa
	S	SOFT – Unconfined compressive strength 25-50kPa
	F	FIRM – Unconfined compressive strength 50-100kPa
	St	STIFF – Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF – Unconfined compressive strength 200-400kPa
	H	HARD – Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)**
	VL	Very Loose <15 0-4
	L	Loose 15-35 4-10
	MD	Medium Dense 35-65 10-30
	D	Dense 65-85 30-50
	VD	Very Dense >85 >50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

LOG SYMBOLS continued

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL		Easily remoulded by hand to a material with soil properties.
----------	----------	0.03	
Very Low:	VL		May be crumbled in the hand. Sandstone is "sugary" and friable.
----------	----------	0.1	
Low:	L		A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
----------	----------	0.3	
Medium Strength:	M		A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
----------	----------	1	
High:	H		A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
----------	----------	3	
Very High:	VH		A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
----------	----------	10	
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

Attachment 3

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 97483

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Adrian Callus

Sample log in details:

Your Reference:	**26848ZN, Erskine Park**
No. of samples:	4 Soils
Date samples received / completed instructions received	16/09/2013 / 16/09/2013

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	23/09/13 / 20/09/13
Date of Preliminary Report:	None Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

Miscellaneous Inorg - soil					
Our Reference:	UNITS	97483-1	97483-2	97483-3	97483-4
Your Reference	----------	BH1	BH1	BH5	BH6
Depth	----------	0.5-0.95	1.5-1.95	0.5-0.85	0.5-0.95
Date Sampled		5/09/2013	5/09/2013	5/09/2013	6/09/2013
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	19/09/2013	19/09/2013	19/09/2013	19/09/2013
Date analysed	-	19/09/2013	19/09/2013	19/09/2013	19/09/2013
pH 1:5 soil:water	pH Units	4.8	6.4	8.4	5.3
Chloride, Cl 1:5 soil:water	mg/kg	760	370	530	800
Sulphate, SO4 1:5 soil:water	mg/kg	420	15	250	600

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110 -B.

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			19/09/2013	[NT]	[NT]	LCS-1	19/09/2013
Date analysed	-			19/09/2013	[NT]	[NT]	LCS-1	19/09/2013
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-1	101%
Chloride, Cl 1:5 soil:water	mg/kg	2	Inorg-081	<2	[NT]	[NT]	LCS-1	95%
Sulphate, SO4 1:5 soil:water	mg/kg	2	Inorg-081	<2	[NT]	[NT]	LCS-1	107%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

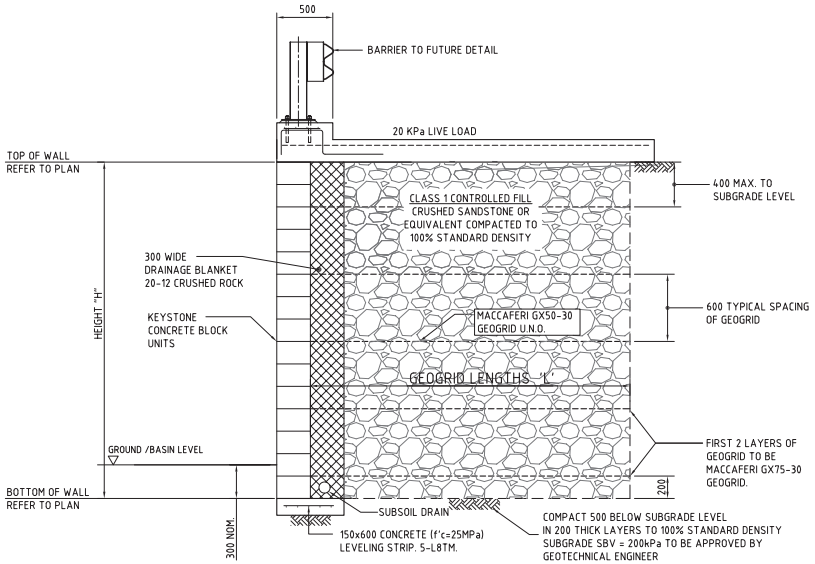
Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

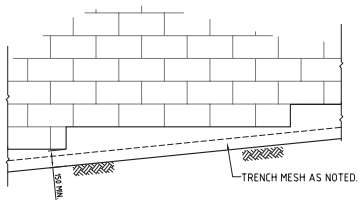
When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.



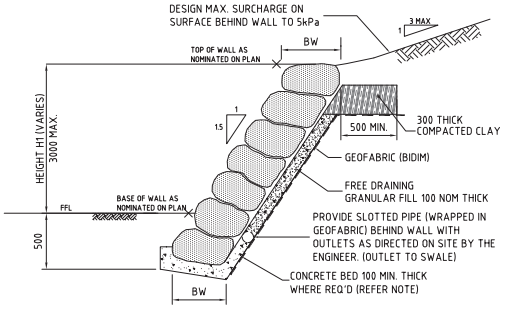
REINFORCED EARTH KEYSTONE WALL TYPICAL DETAIL
UP TO 3m MAXIMUM HIGHT
SCALE 1:20

RETAINING WALL 1 SPECIFICATIONS :	
RETAINED HEIGHT (mm)	GEOGRID LENGTH "L" (mm)
UP TO 3000	3500

× INDICATIVE LENGTHS SHOWN ONLY. FINAL GEOGRID LENGTH T.B.C DURING DETAIL DESIGN STAGE



CONCRETE BLOCK REINFORCED EARTH WALL
TYPICAL LEVELLING STRIP STEP DETAIL
SCALE 1:20



BOULDER RETAINING WALL TYPICAL DETAIL
N.T.S.

BOULDER RETAINING WALL NOTES

MINIMUM BEARING CAPACITY OF FOUNDATION TO BE 100kPa ASSUMING THE FOLLOWING:
- CLAY FOUNDATION Cu=50kPa, ϕ=0

SLIDING STABILITY IS BASED ON THE FOLLOWING
- FRICTION ANGLE OF BOULDER WALL: NOT LESS THAN 40°
- EFFECTIVE FRICTION ANGLE OF SOIL SUBGRADE: NOT LESS THAN 30° FOR SOIL OR 35° FOR ROCK

SOIL AND ROCK DESIGN PARAMETERS SHALL BE CONFIRMED BY GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF BOULDERS OR CONCRETE BED.

BOULDERS TO BE A NOMINAL 750mm DIA. (400mm DIA. UP TO 800mm DIA.) PLACED ON THEIR BROADEST BASE. BOULDERS TO BE PLACED IN AN INTERLOCKING ARRANGEMENT ON THE CONTACT SURFACES DIPPING TOWARDS BACK OF THE WALL AT 10° AND SHALL BE INSPECTED BY THE ENGINEER DURING CONSTRUCTION

DENSITY OF INDIVIDUAL BOULDERS SHALL BE MINIMUM 2.5 TONNES/m

FOR WALLS ABOVE 1000mm IN HEIGHT, THE FIRST LAYER OF BOULDERS ARE TO SET IN A BED OF N15 CONCRETE AND THE JOINTS BETWEEN SHALL BE FILLED WITH CONCRETE TO A LEVEL EQUAL TO THE SURFACE LEVEL OF THE TOE OF THE WALL.

NO STRUCTURE TO BE BUILT WITHIN H1 FROM THE BACK OF THE TOP OF THE WALL (WHERE H1=HEIGHT OF WALL), UNLESS THE STRUCTURE IS FOUNDED ON ROCK WITH SBV=150kPA

CONSTRUCTION METHODS AND SEQUENCE TO ENSURE THAT DESIGN MAX. SURCHARGE OF 5kPa IS NOT EXCEEDED.

CONSTRUCTION TO BE IN ACCORDANCE WITH AS 4678:2002

WALL DIMENSIONS	
HEIGHT H1	BW
500	500
1000	500
1500	600
2000	700
2500	800
3000	950

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT B1 SIZE PLOT

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR DEVELOPMENT APPLICATION	27.08.13	B
FOR INFORMATION ONLY	22.08.13	A

ARCHITECT

CLIENT
CIP Developing Relationships Building Success
Sydney | Melbourne | Brisbane | Adelaide | Perth
www.cipworks.com.au | National Enquiries: 1800 809 807

PROJECT
TNT WAREHOUSE & DISTRIBUTION FACILITY
ERSKINE PARK NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE
HW	MJC	13.08.13		B1	AS SHOWN

CAD REF: C012156.00-DA65

Costin Roe Consulting Pty Ltd.
Consulting Engineers
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 8251-7600 Fax: (02) 8241-3721
email: mail@costinroe.com.au ©

CostinRoe Consulting
Value in Engineering and Management

DRAWING TITLE
RETAINING WALL DETAILS

DRAWING No C012156.00-DA65
ISSUE B

Attachment 4

Our Reference: d:\rawrisk\TNT\EPA Reply Letter – 30Sep13

Suite BG401, Level 4
201 Kent Street
Sydney NSW 2000
Ph: (02) 9929 6605

30 September 2013

Mr. Mark Buffin
Commercial Industrial Property
Suite 59, Jones Bay Wharf
26-32 Pirrama Road
Pyrmont NSW 2009

Dear Mark,

Regarding: Environmental Protection Licence Requirements – Proposed TNT Facility, Erskine Park, NSW

Thank you for forwarding the letter from the Environmental Protection Authority (EPA) regarding the potential requirement for an Environmental Protection Licence (EPL) at the proposed TNT distribution warehouse, Erskine Park, NSW (SSD - 6040). The reason for not including the details of the requirement for an EPL is related to the quantity of Dangerous Goods proposed for storage at the site.

The EPA has correctly identified, in its letter, that the facility is solely used for the storage of Dangerous Goods (chemicals), no other operations are conducted with respect to the Dangerous Goods (chemicals) stored at the proposed facility. Hence, as a chemical storage operation alone, Clause 9 of Schedule 1 of the Protection of the Environment Operations (POEO) Act (1997) applies to the facility.

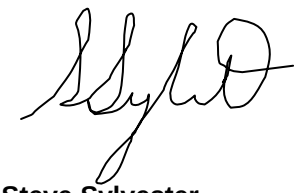
Clause 9 of Schedule 1 of the POEO Act (1997) relates to the storage of chemicals, indicating that for general chemical storage in containers or bulk receptacles, quantities of chemicals stored in excess of 2,000 tonnes would be subject to the provisions of the POEO Act (1997). The quantity of chemicals proposed for storage at the proposed TNT Erskine Park facility is a maximum of 180.3 tonnes, which is less than 10% of the threshold level detailed in the POEO Act (1997).

Based on this analysis, an EPL is not be required for the site as the quantity of chemicals proposed for storage at the facility is significantly less than the threshold levels listed in Clause 9 of Schedule 1 of the POEO Act (1997).

Should you require any further information or details regarding this subject, please call me on the mobile (0411 659 309) or via e-mail at steve@rawrisk.com.

Yours sincerely,

RAWFire Safety Engineering



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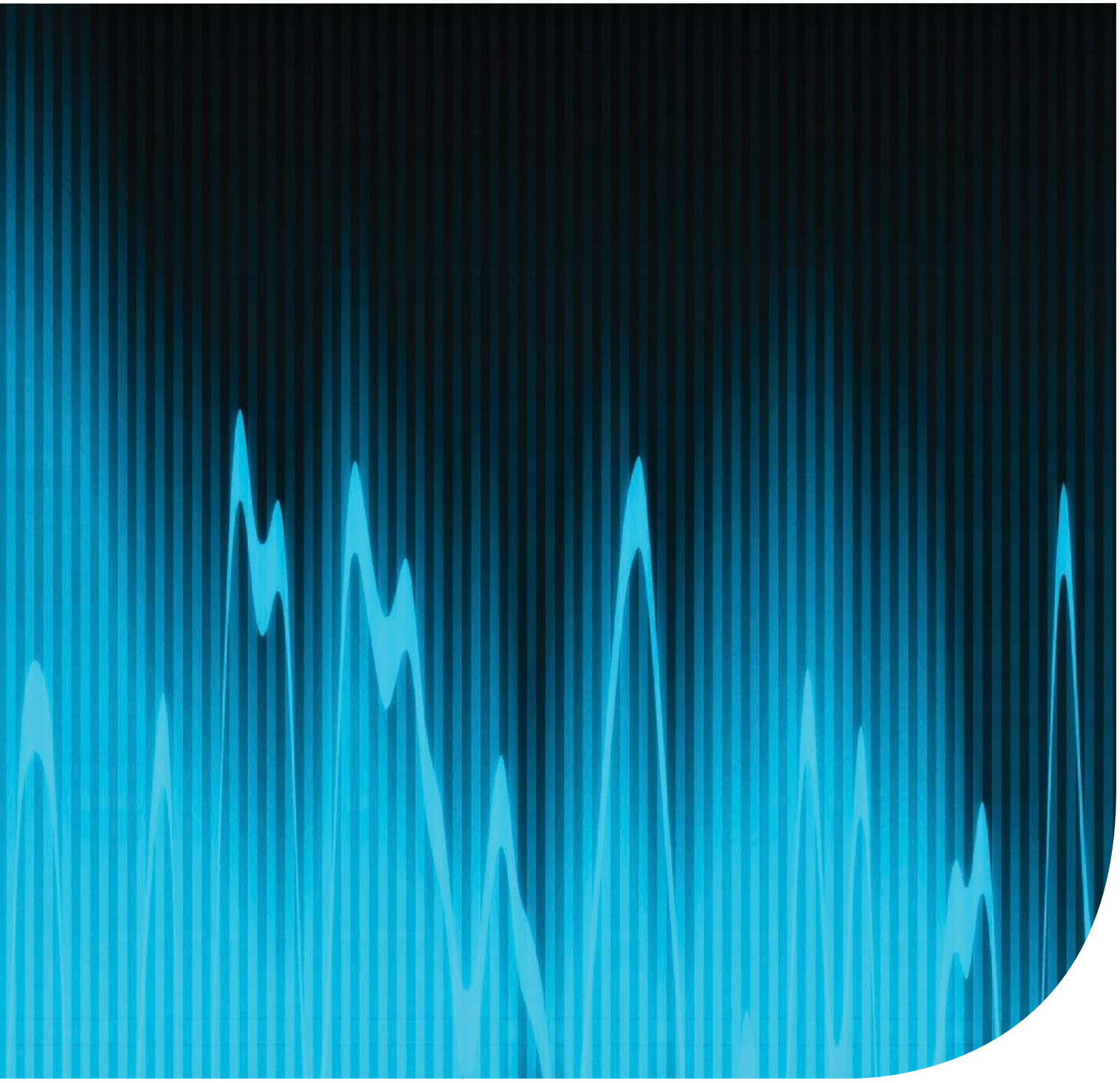
Attachment 5

EMGA Mitchell McLennan

TNT Warehouse and Distribution Facility, Erskine Park

Prepared for Commercial & Industrial Property Pty Ltd| 23 August 2013



Planning + Environment + Acoustics

TNT Warehouse and Distribution Facility, Erskine Park

Prepared for Commercial & Industrial Property Pty Ltd | 23 August 2013

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Final

Report J13058RP2 | Prepared for Commercial & Industrial Property Pty Ltd | 23 August 2013

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Tables

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1 Introduction

This noise impact assessment has been prepared to accompany a State Significant Development Application for a proposed TNT Warehouse and Distribution Facility, Erskine Park (TNT). The proposed development is located at Lockwood Road, Erskine Park, within the Penrith Local Government Area.

The facility will consist of a large warehouse for bulk freight delivery and dispatch with an office building and parking for heavy and light vehicles accessing the site. The facility will be designed to operate 24 hours seven days per week.

Local residences are located to the north within the residential area of Erskine Park, approximately 670 m from the proposed site. Approximately 1100 m south of the site, is the Emmaus Retirement Village. Further south on Bakers Lane are the Emmaus Catholic College, Trinity Catholic Primary School and Mamre Christian College.

1.1 Glossary of acoustic terms

A number of technical terms are required for the discussion of noise and vibration. These are explained in Table 1.1**.**

Table 1.1 Glossary of acoustic terms

Term	Description
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
EPA	The NSW Environment Protection Authority
RNP	NSW Road Noise Policy (Published by the OEH, 2011).
INP	NSW Industrial Noise Policy (Published by the Environment Protection Authority (now OEH) in 2000).
L_1	The noise level exceeded for 1 % of a measurement period.
L_{10}	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
L_{90}	Commonly referred to as the background noise, this is the level exceeded 90 %of the time.
L_{eq}	It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period. The $L_{eq,15min}$ descriptor refers to an Leq noise level measured over a 15 minute period.
L_{max}	The maximum root mean squared sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound Power Level	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature Inversion	A positive temperature gradient. A meteorological condition where atmospheric temperature increases with altitude.
($\sigma\theta$) sigma-theta	The standard deviation of horizontal wind fluctuation.

It is useful also to have some appreciation of the scale of decibels, the unit of noise measurement. The following gives some practical indication as to what an average person perceives about changes in noise levels:

- differences of less than approximately 2 dB are imperceptible in general, ie, most people would find it difficult to discern which is the louder of two noise sources having levels within 2 dB of each other; and
- a difference in noise levels of around 10 dB appears as either doubling or halving of loudness.

1.2 Key noise issues

The main potential noise issues with respect to the proposal are broadly as follows:

- noise from earthworks. We understand that the major bulk earthworks for the subject site have been completed;
- noise associated with the construction of the project;
- noise associated with the operation, which is expected to be dominated by on-site trucking movements and loading/unloading at the docks;
- noise associated with the traffic to/from the site during construction and operation; and
- cumulative noise from all existing and proposed industrial operations part of the larger development precinct incorporating similar operations.

The acoustic study focussed on the key issues and included noise measurement, derivation of suitable criteria in accordance with the NSW Government's Industrial Noise Policy (INP) and recommendations for suitable mitigation such that sensitive receptors are not adversely impacted. The assessment will also extend to traffic noise impact on residences in accordance with the NSW Road Noise Policy (RNP).

2 Existing acoustic environment

A key element in assessing environmental noise impact from industry is to quantify the ambient and background noise, including any existing industrial noise where present. From our observations, the dominant noise sources at existing residential areas at the time are related to traffic on Erskine Park Road and Mamre Road.

The existing acoustic environment was measured by means of short-term attended and long-term unattended noise monitoring. Long term unattended noise monitoring was conducted to establish the level of ambient noise at residences. This was supplemented by attended noise monitoring to quantify the existing industrial and road traffic noise at potentially affected receivers.

2.1 Unattended noise monitoring

Long term noise monitoring was conducted at two locations from 17 to 29 July 2013 as described in Table 2.1 and shown in Figure 2.1.

Table 2.1 Noise logging details

ID	Location	Approximate position with respect to the site
Location 1	69 Weaver Street, Erskine Park	900 m north-east
Location 2	Emmaus Village, Bakers Lane, Erskine Park	1100 m south

The Rating Background noise Levels (RBL) and ambient noise levels derived from long term noise monitoring at the two locations are summarised in Table 2.2. Appendix A contains daily noise data and charts for each location. The measurement data was analysed in accordance with the INP, using weather data from the Bureau of Meteorology's Horsley Park station.

Table 2.2 Summary of measured background and ambient noise levels

Location	Rating Background Level, dB(A) [1]			Ambient (L_{eq}) Noise Level, dB(A) [1]		
	Day	Evening	Night	Day	Evening	Night
Location 1 (NE)	36	37	34	53	48	48
Location 2 (S)	35	36	35	47	42	42

Notes: 1. levels shown are weather excluded.

Large distribution and warehouse developments currently operate in the area surrounding the site and several more were under construction during the noise surveys. Ambient noise at Location 1 was not influenced by such activity and is therefore representative of the background noise levels in the area.

The noise environment at Location 2 was dominated by natural noise sources, occasional hobby aircraft noise with a relatively minor traffic noise contribution. No industrial noise or construction activity was audible at this location.

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Locality plan and assessment locations

TNT Australia Pty Ltd - Sydney Basin Freight Transport Facility

Figure 2.1

2.2 Prevailing weather conditions

The site's operational criteria are derived from the NSW Government INP which prescribes criteria that are assessable during prevailing weather conditions.

The efficiency of noise propagation over long distances can be significantly affected by the weather conditions. Of most interest are source to receiver winds and the presence of temperature inversions as both these conditions can enhance received noise levels. To account for these phenomena the EPA in their INP specify meteorological analysis procedures to determine the prevalent weather conditions that enhance noise propagation with a view to determining whether they can be described as a feature of the project area.

In this study one year's half-hourly weather data from the Bureau of Meteorology's weather station at Penrith was analysed. This was done in accordance with the procedures defined in the INP, and as otherwise advised by the EPA.

2.2.1 Prevailing winds

The INP recommends consideration of wind effects if they are a "feature" of the area. The INP defines "feature" as the presence of source-to-receiver wind speed (measured at 10 m above ground level) of 3 m/s or less, occurring for 30% of the time in any assessment period and season.

This is further clarified by defining source-to-receiver wind direction as being the directional component of wind. The INP states that where wind is identified to be a feature of the area then assessment of noise impacts should consider the highest wind speed below 3 m/s, which is considered to prevail for at least 30% of the time.

A thorough review of the vector components of the half-hourly wind data described above was undertaken. The INP assessable wind directions are identified in Appendix B, where the wind analysis indicates that occurrences approach or exceed the 30% threshold.

It is demonstrated that assessable source-to-receiver winds do not occur during day period. Winds from the south and south-west are however prevalent during the evening and nights which will enhance noise levels from the site towards Erskine Park residences. The site will operate 24 hours 7 days a week so a worst case 3 m/s wind from the south has therefore been assessed.

2.2.2 Temperature inversions

The INP states that the assessment of the impact of temperature inversions be confined to the night time noise assessment period where temperature inversions occur.

3 Noise criteria

3.1 Operational noise

3.1.1 Industrial noise criteria

The NSW Government's INP stipulates guidelines for assessment of noise from the operation of industrial facilities. The main objectives of the policy are to protect the community from excessive intrusive noise, and to preserve the amenity for specific land uses. In order to do so the INP provides two criteria to assess industrial noise sources, namely, the intrusiveness criteria and the amenity criteria.

3.1.2 Intrusive criteria

The intrusiveness criterion requires that the $L_{eq,15min}$ noise levels from the newly-introduced source during each of the day, evening and night time periods do not exceed the existing rating background noise levels (RBL) by more than 5 dB at the most affected noise sensitive location. Table 3.1 shows the derived noise criteria adopting the INP's minimum recommended background level, used in the absence of monitored data (or unsuitable data as described earlier).

Table 3.1 Intrusiveness noise criteria

Receiver No	Location	Noise Level Criteria, $L_{eq, 15min}$ dB(A)		
		Day	Evening[1]	Night
1	*Erskine Park residences*	41	41	39
2	*Emmaus Village, Baker Lane*	40	40	40

Notes: 1. The evening criteria adopts the daytime levels as per the INP, where evening background levels are higher than day

3.1.3 Amenity criteria

The INP stipulates acceptable and maximum noise levels from all industry consistent with maintaining amenity for specific land uses. The acceptable target noise levels are presented in Table 3.2 for each assessment period and for appropriate surrounding land uses. In this case the 'suburban' category has been applied to determine the target noise levels at the existing residences. Also presented are goals for school classrooms that apply to the teaching facilities on Bakers Lane, Erskine Park.

Table 3.2 Noise amenity targets for specific land uses

Residential land use	Target acceptable amenity industrial noise levels, dB(A) $L_{eq,period}$		
	Day	Evening	Night
Suburban	55	45	40
Urban	60	50	45
School classroom - internal	35 - 40 Noisiest 1-hour when in use		

Notes: 1. These target levels apply to the total noise attributable to all industrial sites (as scheduled in the Protection of Environment (Operations) Act).

Table 3.3 summarises the applicable criteria. In all cases, the intrusiveness criteria have been adopted as they are the limiting (lower) criteria.

Table 3.3 Project specific noise criteria

Locations	Period	RBL, dB(A)	Intrusiveness, dB(A) $L_{eq,15min}$	Amenity (suburban), dB(A) $L_{eq,period}$	Project specific noise level, dB(A)
Northern Residences	Day	36	41	55	**41**
	Evening	37	41	45	**41**
	Night	34	39	40	**39**
Southern Residences	Day	35	40	55	**40**
	Evening	36	40	45	**40**
	Night	35	40	40	**40**

3.2 Sleep disturbance

The INP criteria are appropriate for assessing noise from continuous and intermittent sources, such as engine noise from mobile plant and general processing plant and equipment. However, transient noise sources also require assessment.

Given the transient nature of these events, the L_{eq} noise level from such sources would not be representative since the noise in question may not be present for much of the time. Hence, the above criteria are not appropriate for this type of noise. The most important effect of these transient noises would be the possibility of disturbing the sleep of nearby residents. The EPA's INP Application Notes indicates that to prevent sleep disturbance, the $L_{1,1min}$ noise level from an intrusive source should not exceed the background noise level by more than 15 dB. More recent advice from the EPA has confirmed that the L_{max} and $L_{1,1min}$ descriptor can be considered interchangeable for such assessments. On this basis, the maximum noise level from any operational event should not exceed the levels shown in Table 3.4 for the night time assessment period.

Table 3.4 Sleep disturbance noise criteria (10pm to 7am)

Location	Location	Sleep disturbance criteria, L_{max} dB(A)
Northern Residences	Erskine Park	49
Southern Residences	Emmaus Village, Bakers Lane, Erskine Park	50

Notes 1. Sleep disturbance criteria apply during the night assessment period only.

2. Criteria are assessable at the façade of the most affected sleeping area.

However, this criterion does not take account of more recent research on the effects on sleep of road traffic noise. The EPA's Road Noise Policy (RNP) indicates that maximum noise levels below 50 to 55 dB(A) inside residences from road traffic sources are unlikely to cause awakening reactions. If bedroom windows are partly open, this corresponds to an external maximum noise level of approximately 60 to 65 dB(A) outside a residence.

In our experience, adopting the former more stringent criterion would be desirable in the first instance, and if exceedances are predicted, consideration should be given to the potential number of such events and the more recent research above.

3.3 Construction noise criteria

The Office of Environment and Heritage OEH's (OEH) Interim Construction Noise Guidelines (ICNG) provides guidelines for the assessment and management of noise from construction works. The ICNG recommends a qualitative approach for relatively small scale projects such as this.

i Noise management level

The ICNG suggests the following time restriction for construction activities where the noise is audible at residential premises:

- Monday to Friday 7.00 am - 6.00 pm
- Saturday 8.00 am - 1.00 pm
- No construction work is to take place on Sundays or public holidays.

Notwithstanding the ICNG standard hours above, other project approvals from developments in the Erskine Park area nominate construction hours of 7:00 am to 1:00 pm on Saturdays (one example is approval 07_0153 for the *Jacfin Warehouse Project*). It is expected that conditions for the proposed development would be consistent with the other developments in the area when approved.

Table 3.5 is an extract from the ICNG and provides noise management levels for residential receivers for day and out of hours periods. These time restrictions are the primary management tool of the ICNG.

Table 3.5 ICNG residential criteria

Time of day	Management level $L_{eq, 15min}$	How to apply
Recommended standard hours: Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: i) times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences ii) if the community is prepared to accept a longer period of

Table 3.5 ICNG residential criteria

Time of day	Management level $L_{eq, 15min}$	How to apply
		construction in exchange for restrictions on construction times
Outside recommended standard hours	Noise affected RBL + 5dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2.

In summary, the ICNG noise level goals for activities during the standard hours are 10 dB above the existing background levels. For activities outside of the above hours the noise levels should be no more than 5 dB above the existing background levels.

The residential construction noise criteria for the proposal are therefore provided in Table 3.6.

Table 3.6 Projects construction noise criteria

Location	Noise criteria, $L_{eq,15min}$, dB(A)
Erskine Park residences	46
Emmaus Village, Bakers Lane, Erskine Park	45
Commercial	70
Industrial	75

3.4 Road traffic noise

The potential impacts of traffic noise resulting from both the construction and operational related traffic on public roads are assessed against criteria defined in the NSW Government's Road Noise Policy (RNP). The application of appropriate criteria for this project has followed the two-step process identifying the assessment and relative increase criteria as outlined in Section 3.4.1 of the RNP.

Site related traffic will use routes that are currently relatively heavily trafficked and part of the broader road network. Within closer proximity to the site are Lenore Drive, Templar Road and Lockwood Road and no residences front these roads. Hence, no further analysis of road traffic noise is included in this report.

The key noise issues associated with the proposed development include operational noise (related to transportation) and construction noise. These issues have been addressed based on worst case scenario predictions and past experience with similar developments.

4 Predicted noise levels

The key noise issues associated with the proposed development include operational noise (related to transportation) and construction noise. These issues have been addressed based on worst case scenario predictions and past experience with similar developments.

4.1 Operational noise

The following assessment is based on Site Plan drawing 2-047-275903-DA-002 (revision A) dated 21 August 2013, and as provided by CIP (refer to Appendix C). It is understood that the proposed site will be used 24 hours a day, 7 days a week. Site traffic access will be via Lockwood Road, which runs east off Templar Road.

General noise producing operations on site would include pallet handling and truck movements. In particular, on-site trucking activities will be the dominate noise source. The site plans indicate 19 potential B-double truck access points for bulk freight delivery at the north facade of the warehouse. Dispatch docks are located at the west facade (8 docks) and south facade (27 docks) of the warehouse. Onsite parking for freight trailers (60), prime movers (18), 8T and 5T delivery trucks (80 and 85 respectively) is also provided.

For the day a worst case 15 minute scenario has been assumed consisting 3 B-double trucks arriving/leaving the access points at the north facade, 8 trucks at the west dispatch docks and 27 at the south dispatch docks. A single truck parking in each respective truck parking area has been assumed to occur for half of the 15 minute period (total of two B-doubles, one 8T and one 5T delivery truck).

For the evening/night a worst case 15 minute scenario has been assumed consisting 3 B-doubles arriving/leaving the access points at the north facade, 2 trucks at the west dispatch docks and 27 at the south dispatch docks. A single truck parking in each respective truck parking area has been assumed to occur for half of the 15 minute period (total of two B-doubles, one 8T and one 5T delivery truck).

The above quantities of trucks are considered representative of typical operations.

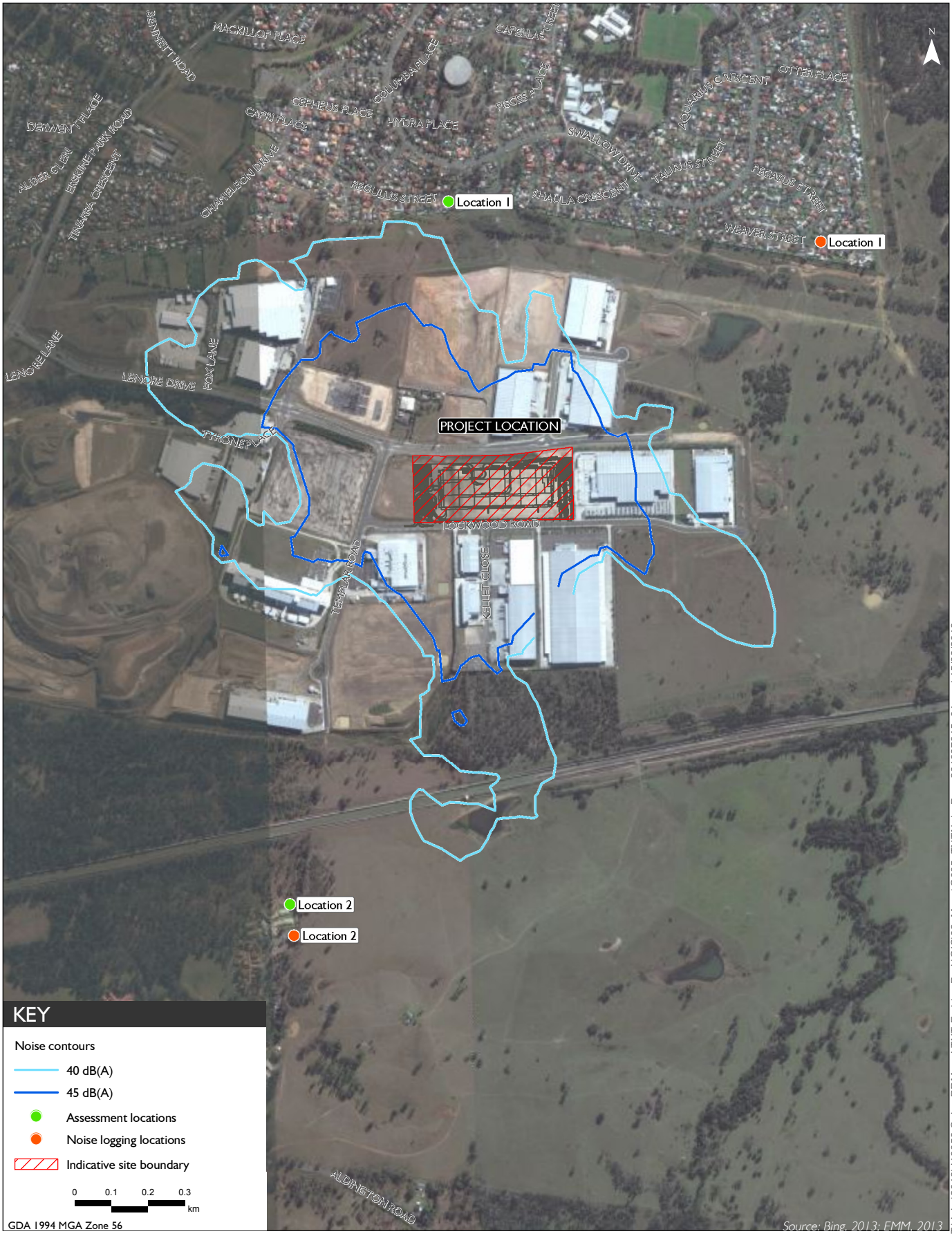
For both day and evening/night scenarios, the noise predictions consider a typical to worst case scenario whereby all trucks indicated above are in use simultaneously on site. That is, trucks are producing noise by moving around the site or idling while being loaded/unloaded. Trucks will reverse into the docks and powered or unpowered forklifts will be used to load/unload them from beneath awning structures on the west and south side of the building.

Based on data in our files for similar operations, the noise emission levels from on-site trucking operations were used to predict received noise at residences. The representative sound power level used was 99 dB(A) $L_{eq,15min}$ for B-double and line haul trucks and 96 dB(A) for 8T and 5T delivery trucks.

The proposed layout of the loading docks as shown will be partly or totally shielded from offsite receivers including residences to the north and east of the site. The effects on noise emanating from the site is impeded by existing or proposed neighbouring buildings to some extent in most directions as depicted in the noise contours shown in Figures 4.1 (day, calm) and 4.2 (night, 3 m/s southerly wind). It is expected the shielding effect will increase as the surrounding area is further developed as planned. The results of noise predictions are summarised in Table 4.1.

Table 4.1 Operational noise predictions

Receptor	Period	Predicted $L_{eq,15min}$ noise level, dB(A)		Criteria, $L_{eq,15min}$, dB(A)
		Calm	3 m/s Southerly wind	
Erskine Park Residences	Day	35	n/a	**41**
	Evening	33	39	**41**
	Night	33	39	**39**
Emmaus Retirement Village	Day	35	n/a	**40**
	Evening	35	32	**40**
	Night	35	32	**40**



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Predicted noise levels - Day, calm

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Figure 4.1

Predicted noise levels - Evening and night, 3 m/s southerly wind

TNT Australia Pty Ltd - Sydney Basin Freight Transport Facility

Figure 4.2

4.2 Sleep disturbance

The loading of trucks during the night time period has been assessed. Typical maximum noise level event activities are likely to include reversing alarms. A typical L_{max} sound power level of 110 dB(A) (ie 105 dB(A) Lw for the reverse alarms plus a 5 dB tonality correction as per the INP) has been used in the noise model. Results are provided in Table 4.2.

Table 4.2 Predicted maximum noise levels at worst affected residential receivers

Receiver	Predicted L_{max} Noise Level, dB(A)		L_{max}, Noise Criteria, dB(A)
	Calm	3 m/s south wind	
Erskine Park	37	46	49
Emmaus Village	33	<30	50

Results show that the sleep disturbance criterion will be met during calm and wind conditions.

4.3 Cumulative industrial noise

Currently approved industrial developments adjacent to the project have the potential to generate noise at the same residential receivers assessed in this study. A 3 dB reduction in the amenity noise criteria has been applied. This accounts for an equivalent environmental noise contribution from one neighbouring site. This implies a modified suburban residential amenity goal for the subject site of 52 dB(A)$L_{eq,11hr}$, 42 dB(A)$L_{eq,4hr}$ and 37 dB(A)$_{Leq,9hr}$ for the daytime, evening and night time periods respectively (see Table 3.2).

This generally does not alter the project specific noise targets derived earlier, apart from reducing the night period criterion to 37 dB(A) $L_{eq,9hr}$ at all surrounding residential receivers. The predicted noise level during the night at Erskine Park residences is 39 dB(A) $L_{Aeq(15\ min)}$, however this assumes a worst case 15 minute operation which will be much less when averaged over the night-time period (ie 9 hours). In practice it is common for an $L_{eq,9hr}$ noise level to be at least 3 dB(A) less than an $L_{Aeq(15\ min)}$ noise level for a site of this nature. The corresponding $L_{Aeq(9\ hour)}$ operational noise level during the night-time period is therefore 36 dB(A) which is below the adjusted 37 dB(A)$_{Leq,9hr}$ limit.

It is also anticipated that as the surrounding sites are developed, the shielding provided by surrounding buildings to the north will increase, which will reduce the potential influence of which the TNT site will have on the received cumulative noise levels, given its central location in the overall complex.

4.4 Construction noise

4.4.1 Earthworks noise

We understand that all earthworks have been completed for the subject site and therefore no further assessment is provided. However, as shown later for building construction, similar plant is modelled that could equally be used for earthworks and hence impacts from either can be assessed.

4.4.2 Building construction

Noise from proposed building works on site was predicted for the surrounding residential locations. Simultaneous operation of 6 trucks, 2 cranes, 2 scrapers, 2 dozers and 5 excavators (30T) were used to represent typical activities.

Representative sound power levels associated with these equipment used in noise modelling are summarised in Table 4.3.

Table 4.3 Representative equipment sound power levels

Equipment	$L_{eq,15min}$ Sound Power Level, dB(A)
Dump Trucks	100
Dozer	113
Scraper	103
Excavator	109
Crane	105

A worst case scenario assuming the simultaneous operation of all aforementioned construction equipment was used for the analysis to the south of the proposed construction site. Table 4.4 presents the predicted noise levels at the potentially worst affected residential receivers due to construction activities.

Table 4.4 Predicted construction noise levels at worst affected residential receivers

Receiver	Predicted $L_{eq,15min}$ Noise Level, dB(A)	Daytime $L_{eq,15min}$ Noise Criterion, dB(A)	Highly affected criterion, dB(A)
Erskine Park	52	46	75
Emmaus Village	49	45	75

The predicted construction noise levels are expected to exceed criteria at the nearest northern Erskine Park receptors and the nearest southern receptors in Emmaus Village, although noise levels will be below the highly affected noise criteria. Construction noise management and mitigation measures are provided in Section 5.1.

5 Recommendations and mitigation

5.1 Construction

While there is the potential for construction noise to exceed the recommended criteria (without mitigation) at the potentially closest residences to the south, there are several mitigation measures that may be employed to reduce noise impacts. These include:

- scheduling construction activities such that the concurrent operation of plant is limited;
- preparation of a construction noise management plan (to be included in the project Construction Environmental Management Plan) prior to construction to ensure that all employees understand and take responsibility for noise control at site;
- properly maintaining plant to ensure rated noise emission levels are not exceeded;
- undertaking construction activities guided by AS2436-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites"; and
- providing a contact telephone number via which the public may seek information or make a complaint. A log of complaints should be maintained and actioned by the site superintendent in a responsive manner.

5.2 Operations

Operational noise predictions indicate that sensitive receivers will not be exposed to noise above relevant criteria. There are mitigation measures that may be employed to further reduce noise impacts. These include:

- scheduling truck movements and loading dock operations such that concurrent operation of vehicles is minimised. This would include limiting onsite vehicle idling while loading;
- closing roller doors at the north facade when not in use during the evening and night-time period; and
- preparation of an operational noise management plan (to be included in the project Construction Environmental Management Plan) prior to operation to ensure that all employees understand and take responsibility for noise control at site.

6 Conclusion

EMM have completed a noise impact assessment of the proposed construction and operation of a TNT Warehouse and Distribution Facility, Lockwood Road, Erskine Park. The assessment included baseline noise logging, establishment of criteria for construction and operations, and predicted noise levels at the potentially most exposed receptors to the site.

Based on the conservative noise assessment herein, noise impacts are not anticipated from the proposed development as predictions for operational noise indicate that recommended INP noise criteria will be satisfied at sensitive residential locations.

Appendix A

Noise logging data and charts

Table A.1 69 Weaver St, Erskine Park

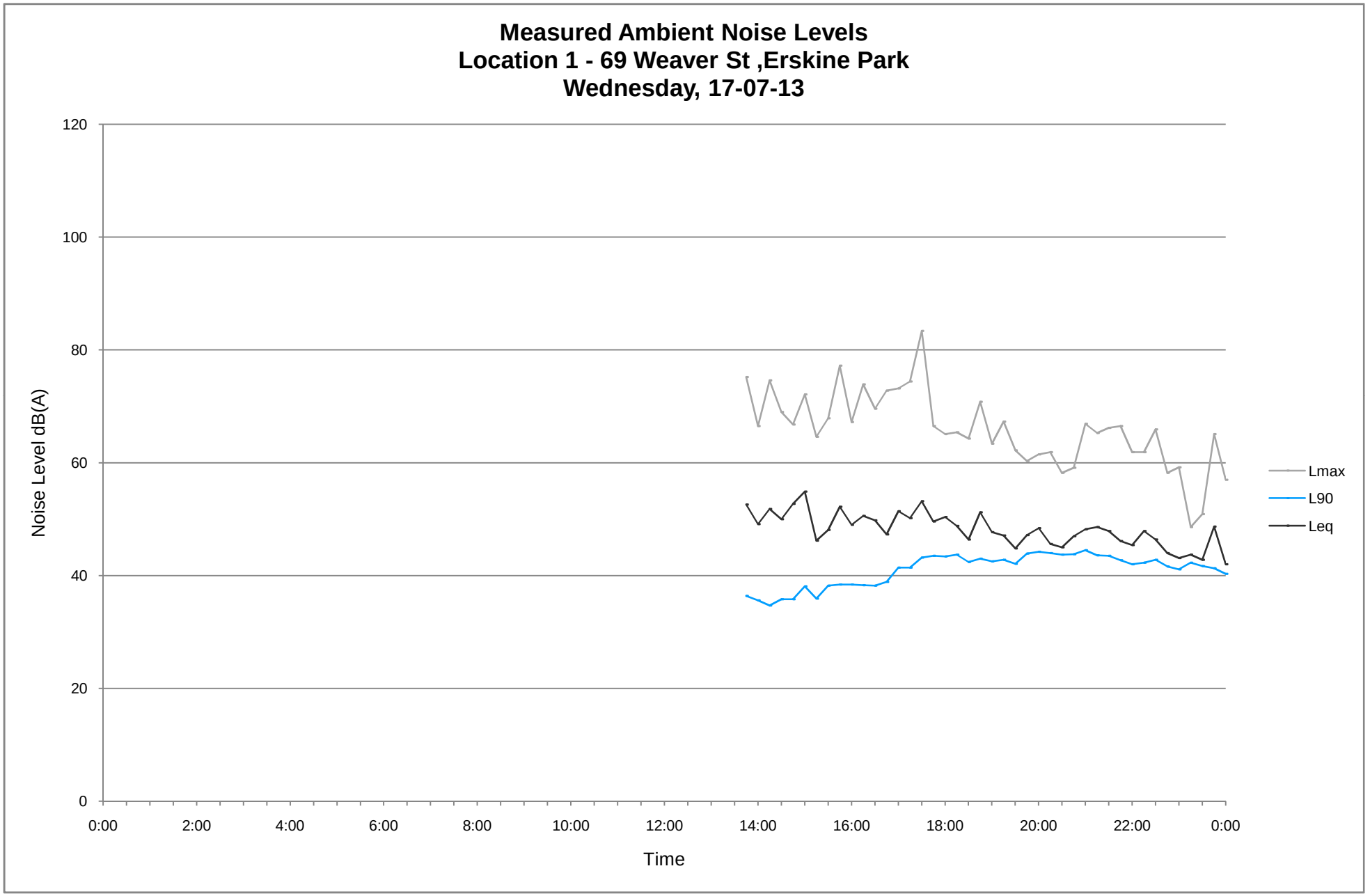
Date	ABL Day	ABL Evening	ABL Night	Leq 11hr Day	Leq 4hr Evening	Leq 9hr Night
Wednesday, 17-07-13	0	42.1	39.8	0	47.5	50.4
Thursday, 18-07-13	36.1	39	37.9	52.1	48.7	45.6
Friday, 19-07-13	0	39.2	34.1	0	47.3	49.7
Saturday, 20-07-13	40.6	36.9	31.5	54.4	52.8	47.8
Sunday, 21-07-13	35.6	34.9	32.1	54.1	44.3	50.3
Monday, 22-07-13	38.6	35.4	33.5	53.4	45.9	44.5
Tuesday, 23-07-13	32.1	34.5	35.6	50.1	45.1	43.1
Wednesday, 24-07-13	34.5	0	0	47.7	0	0
Summary Values						
RBLs	**35.9**	**36.9**	**34.1**			
Avg Leq				**52.5**	**48.3**	**48.1**

Notes: 1. 0 indicates periods with too few valid samples due to weather or logger operation.

Table A.2 Emmaus Village, Bakers Lane

Date	ABL Day	ABL Evening	ABL Night	Leq 11hr Day	Leq 4hr Evening	Leq 9hr Night
Wednesday, 17-07-13	0	40.4	38.7	0	43.8	44.4
Thursday, 18-07-13	39	40	39.2	47	45.2	46
Friday, 19-07-13	0	39.6	37	0	45.8	41.8
Saturday, 20-07-13	0	36.6	30.9	0	46	37.9
Sunday, 21-07-13	0	34.3	34.7	0	39.5	41.3
Monday, 22-07-13	0	35.3	36.4	0	40.6	42.9
Tuesday, 23-07-13	37.6	33.4	33.4	46.9	38.5	40.6
Wednesday, 24-07-13	35.1	34.2	34.2	46.9	38.6	42.2
Thursday, 25-07-13	37.2	38.1	34.5	48.8	41.6	41.9
Friday, 26-07-13	33.3	32.9	32	45.5	38	39.4
Saturday, 27-07-13	33.1	36	35.6	46.1	39.5	41.2
Sunday, 28-07-13	33.8	36.2	36.4	44.9	39.5	43.3
Monday, 29-07-13	0	0	0	0	0	0
Summary Values						
RBLs	**35.1**	**36.1**	**35.2**			
Avg Leq				**46.7**	**42.4**	**42.4**

Notes: 1. 0 indicates periods with too few valid samples due to weather or logger operation.


Measured Ambient Noise Levels
Location 1 - 69 Weaver St ,Erskine Park
Wednesday, 17-07-13
Noise Level dB(A)
120
100
80
60
40
20
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
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20:00
22:00
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Time
Lmax
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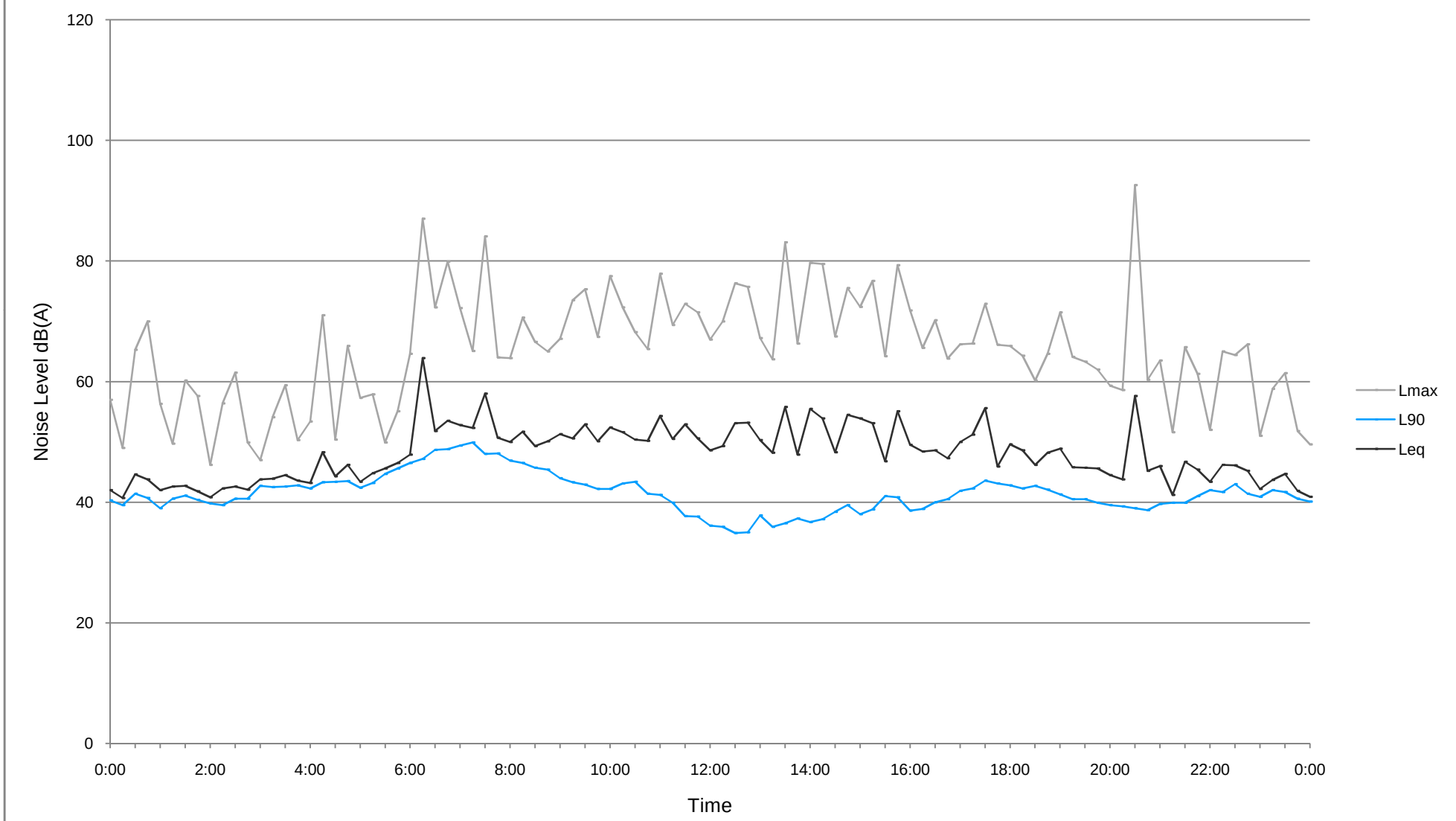
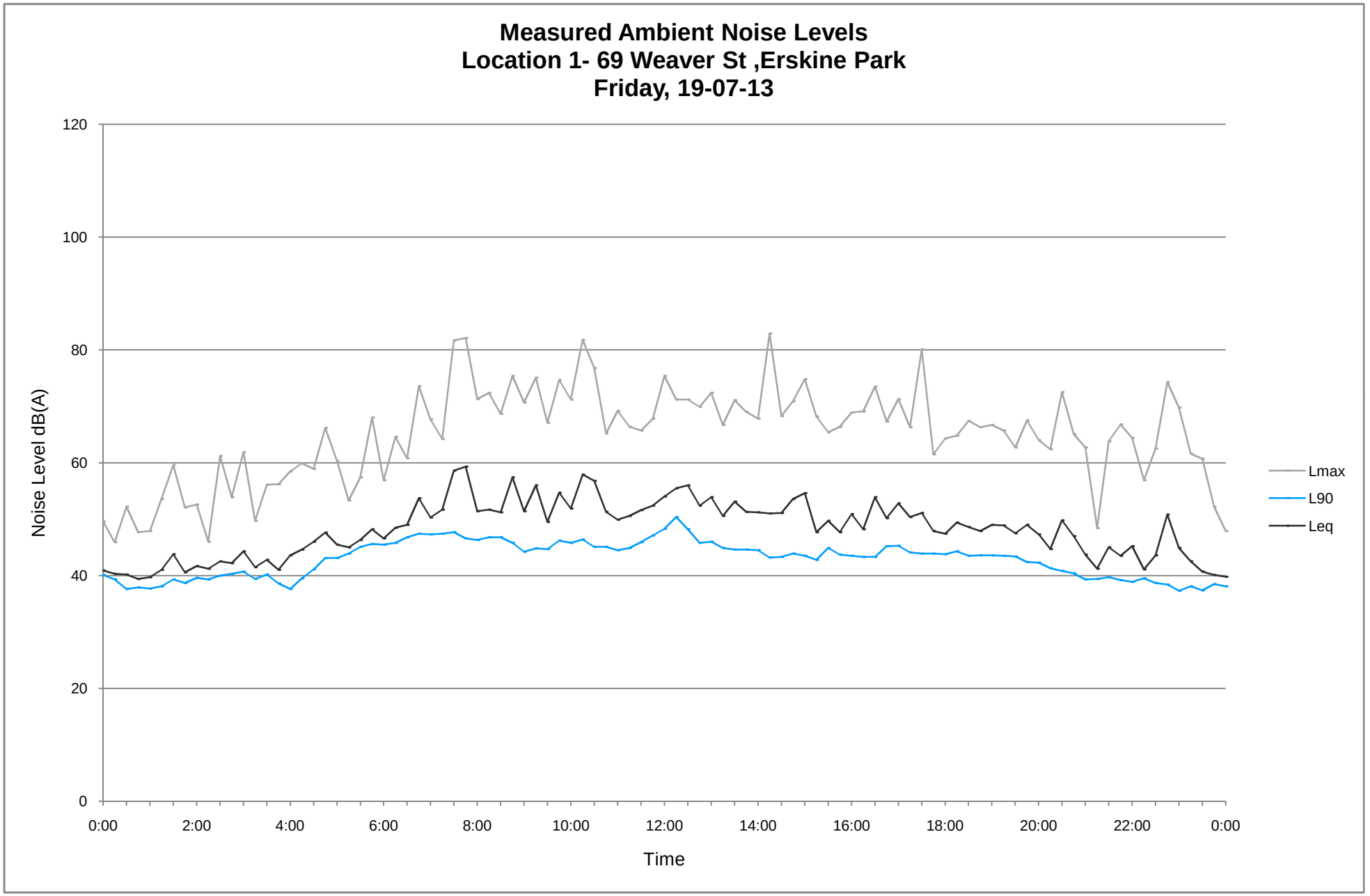
Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Thursday, 18-07-13




Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Friday, 19-07-13
Noise Level dB(A)
120
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0:00
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Time
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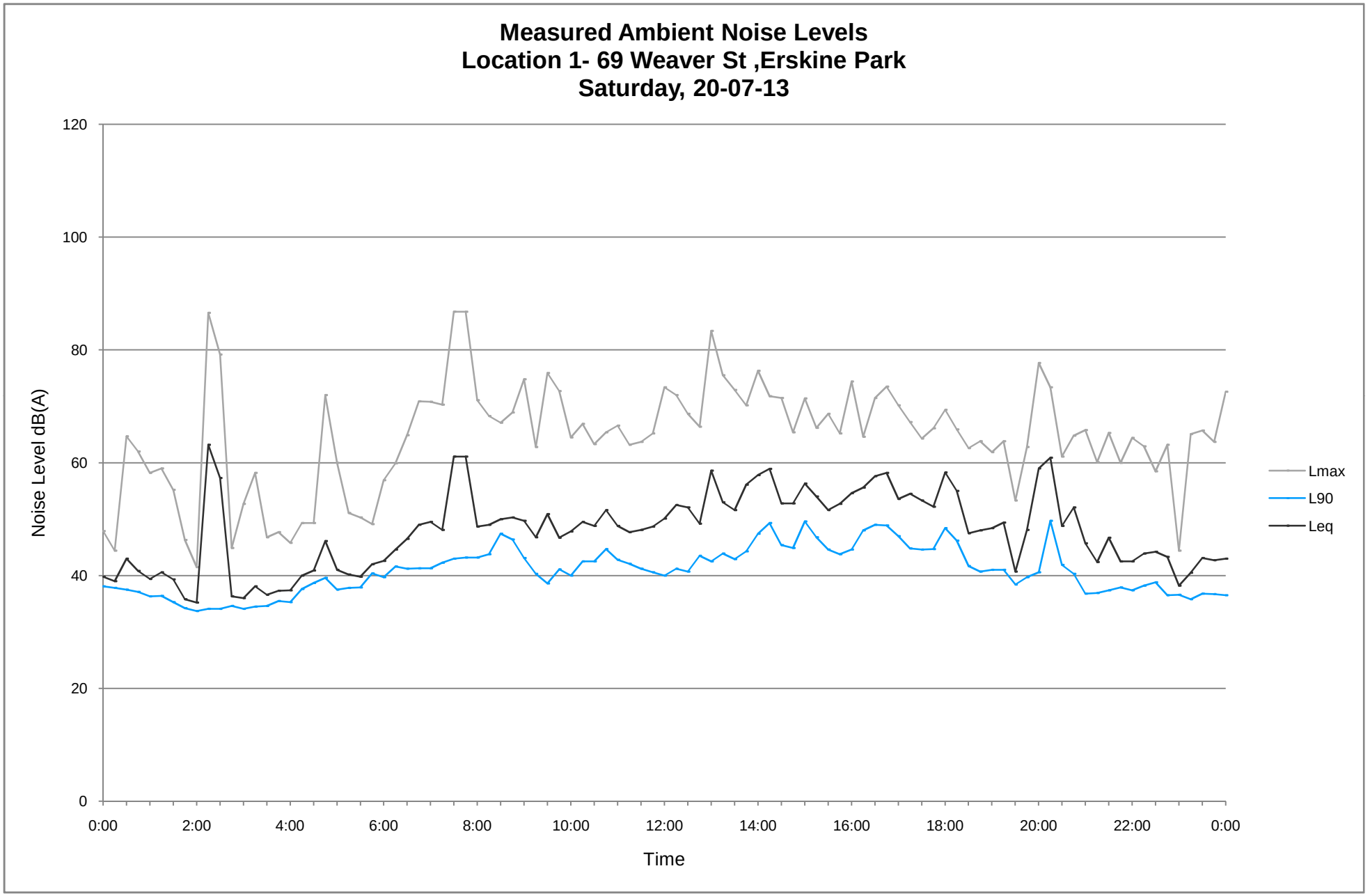
Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Saturday, 20-07-13
Noise Level dB(A)
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100
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0
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22:00
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Time
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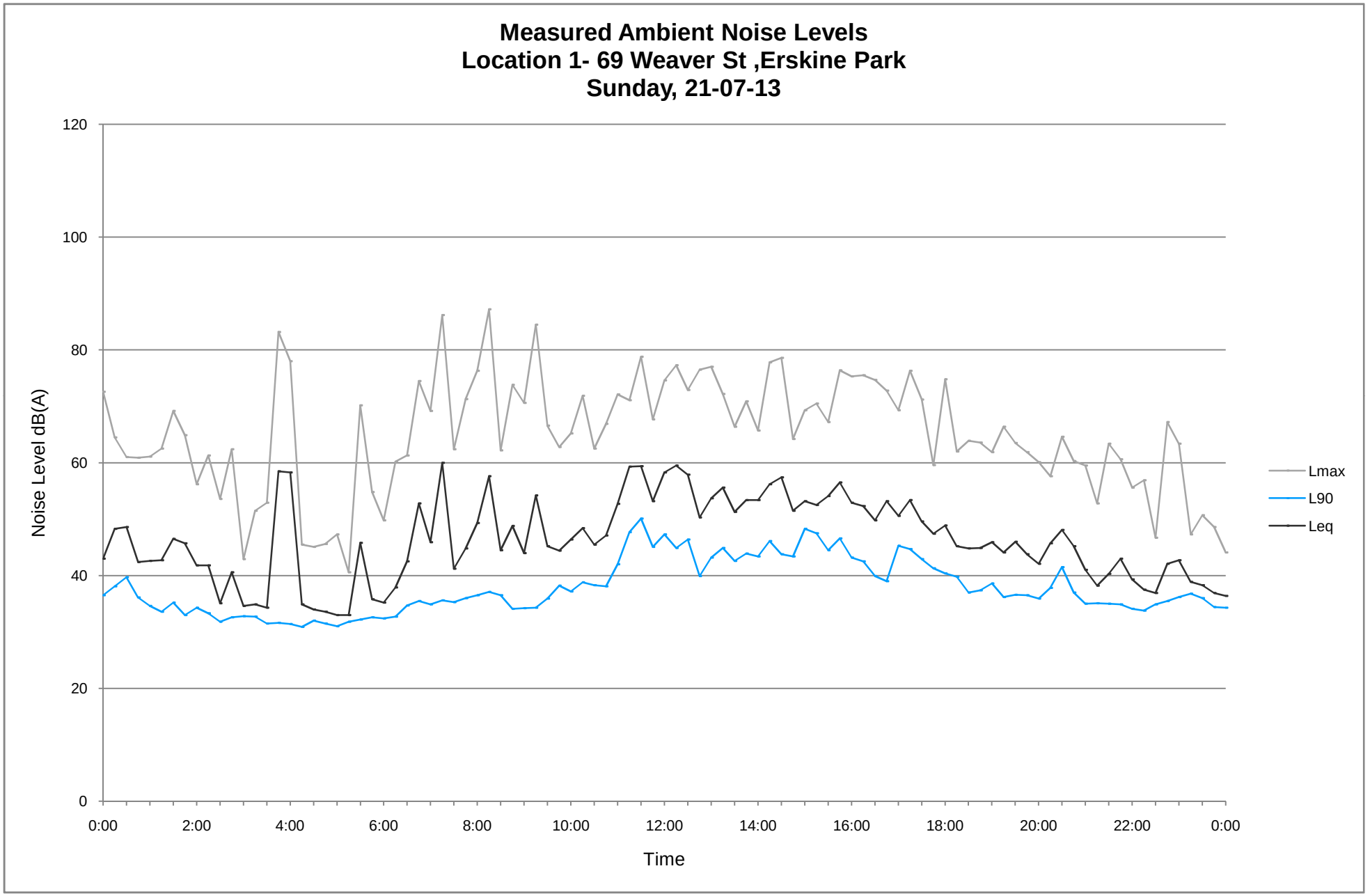
Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Sunday, 21-07-13
Noise Level dB(A)
120
100
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60
40
20
0
0:00
2:00
4:00
6:00
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12:00
14:00
16:00
18:00
20:00
22:00
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Time
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L90
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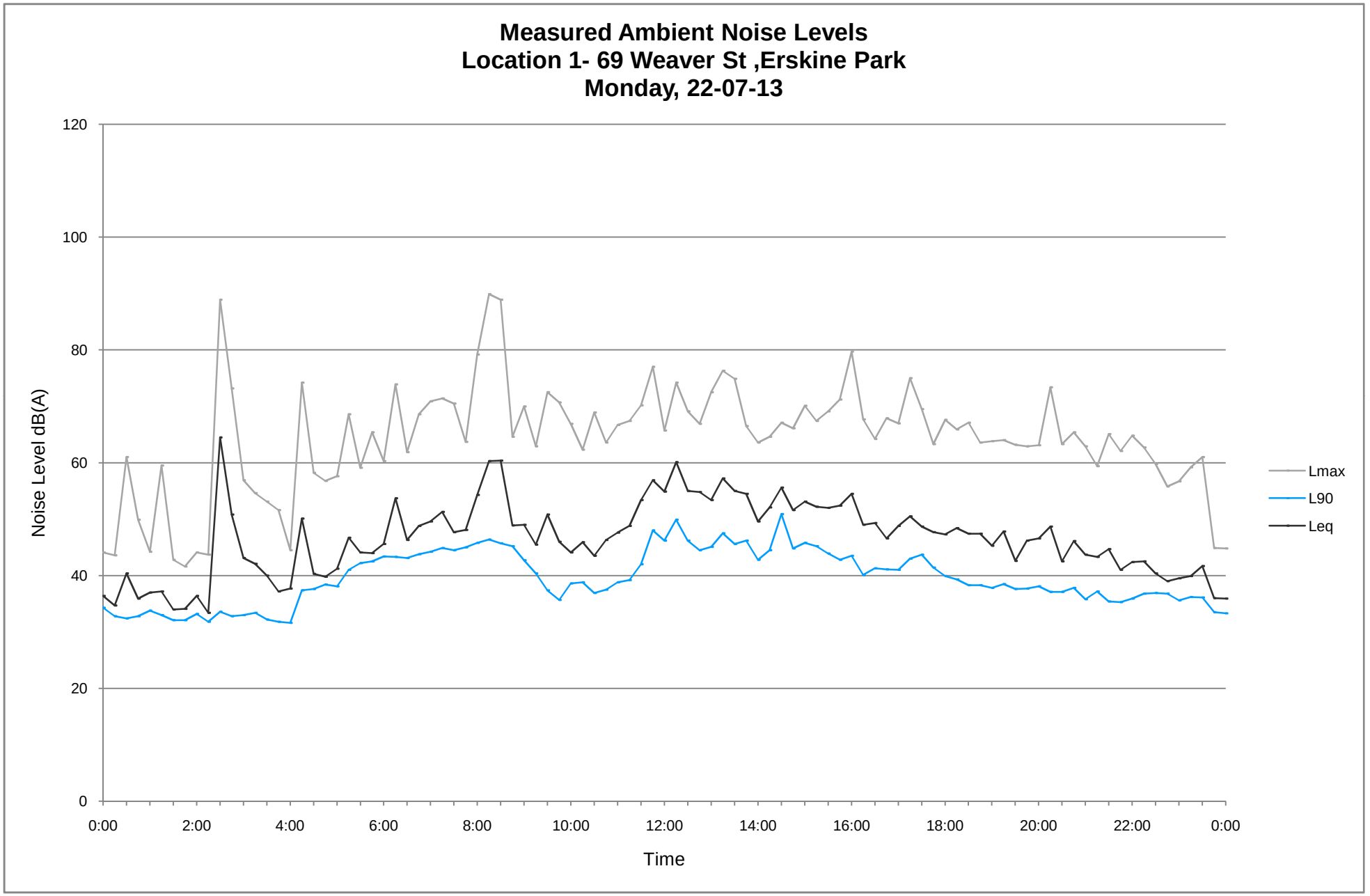
Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Monday, 22-07-13
Noise Level dB(A)
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100
80
60
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0
0:00
2:00
4:00
6:00
8:00
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12:00
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16:00
18:00
20:00
22:00
0:00
Time
Lmax
L90
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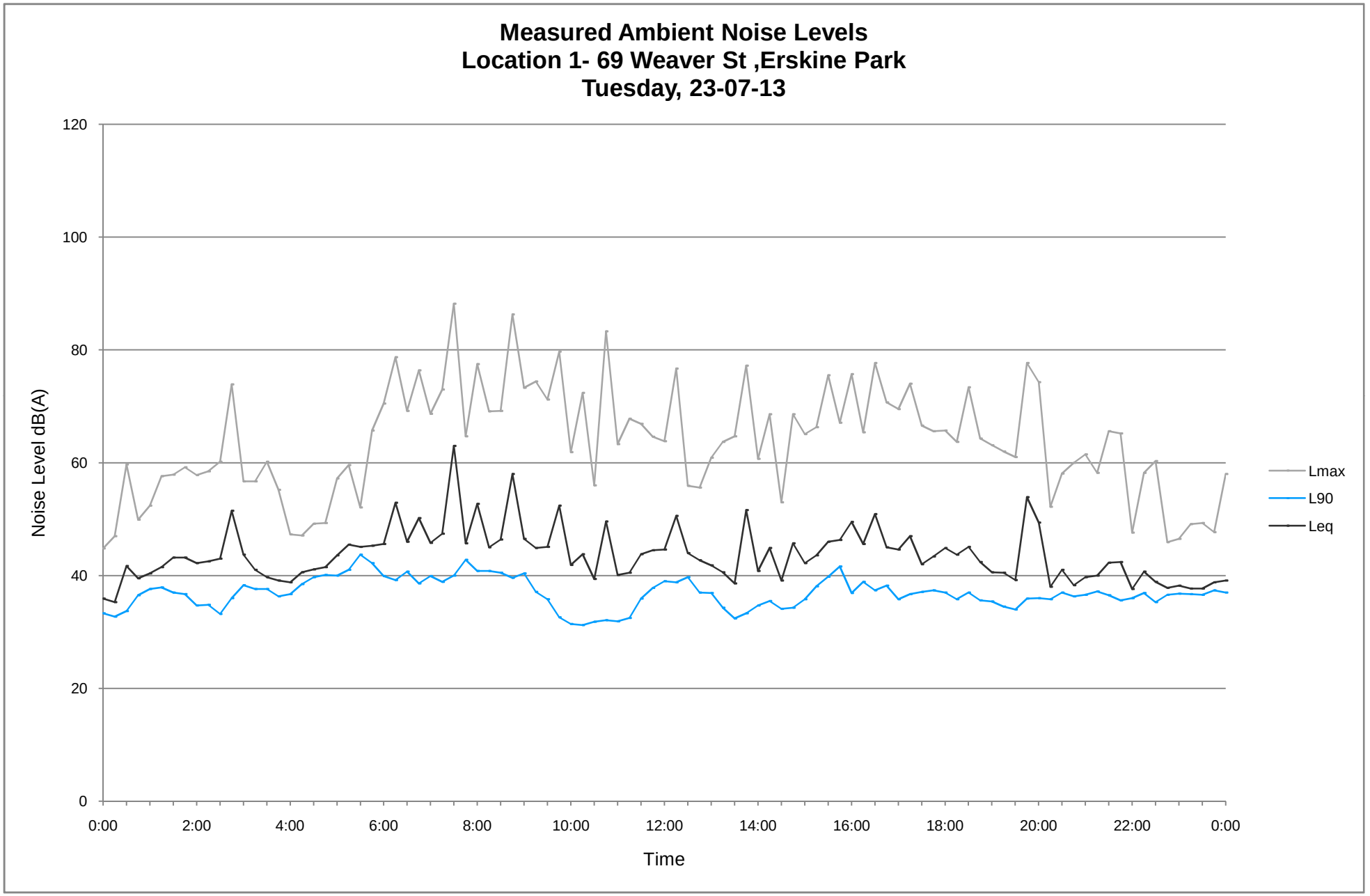
Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Tuesday, 23-07-13
Noise Level dB(A)
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100
80
60
40
20
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time
Lmax
L90
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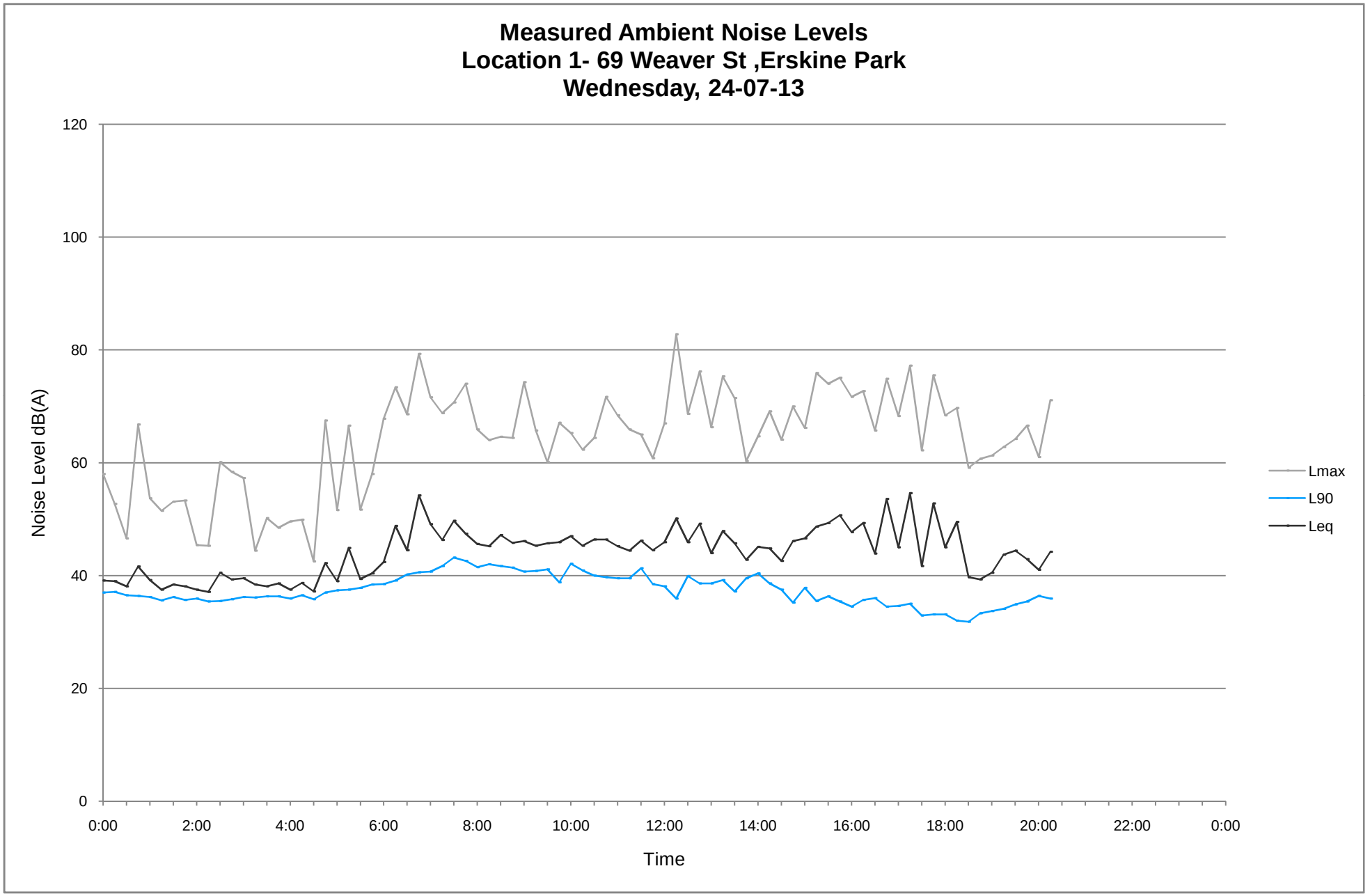
Measured Ambient Noise Levels
Location 1- 69 Weaver St ,Erskine Park
Wednesday, 24-07-13
Noise Level dB(A)
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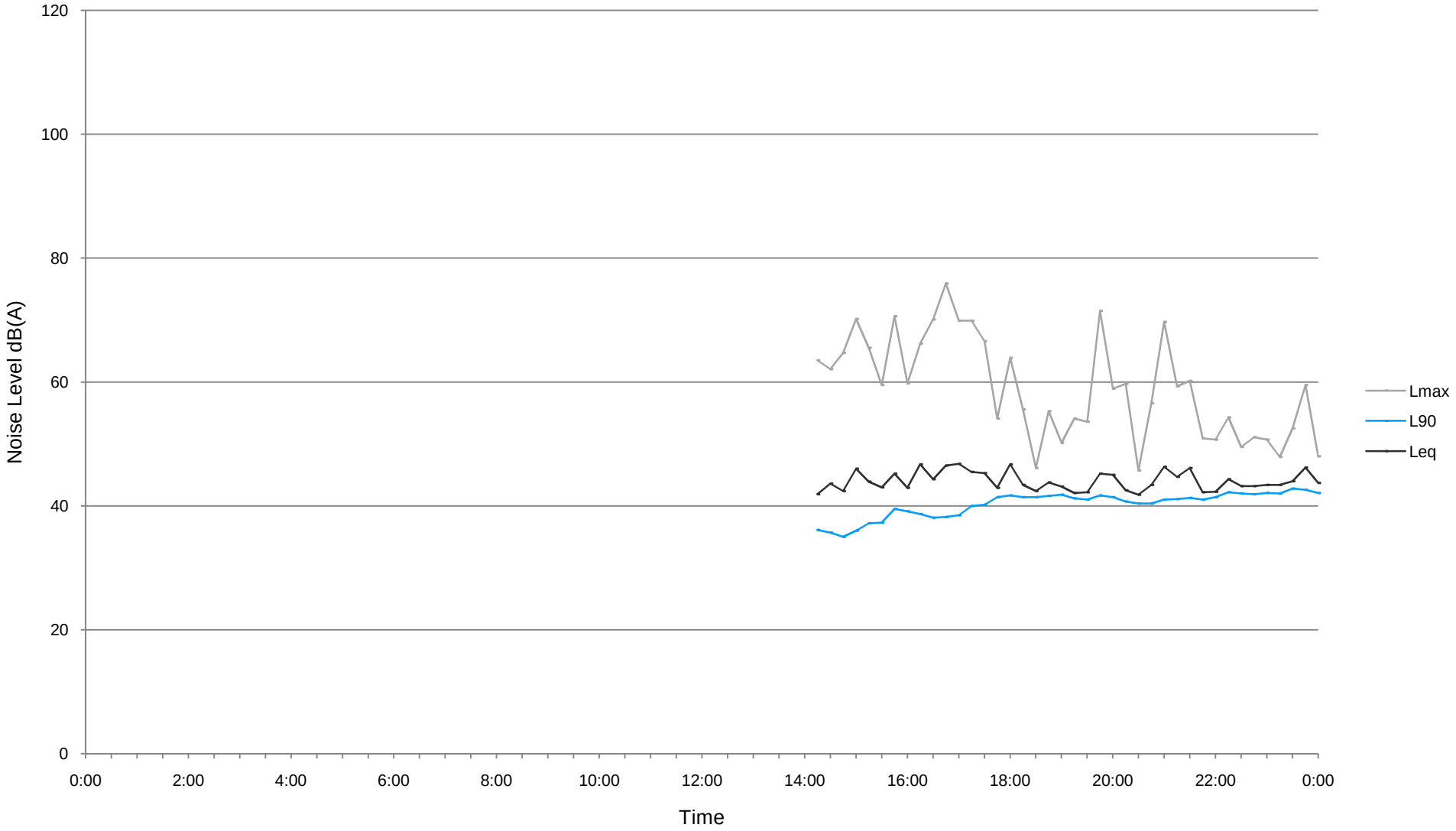
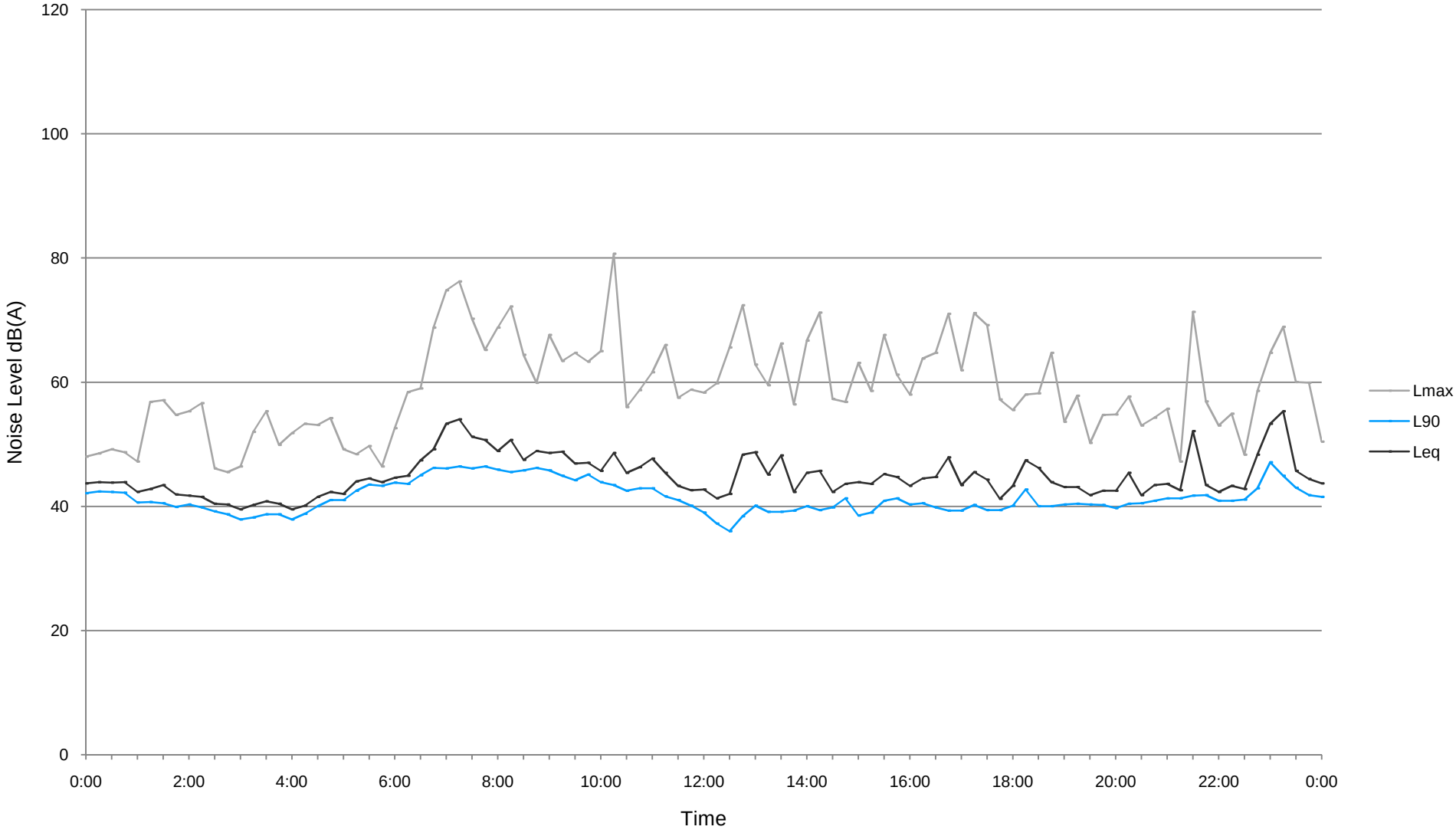
100
80
60
40
20
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time
Lmax
L90
Leq

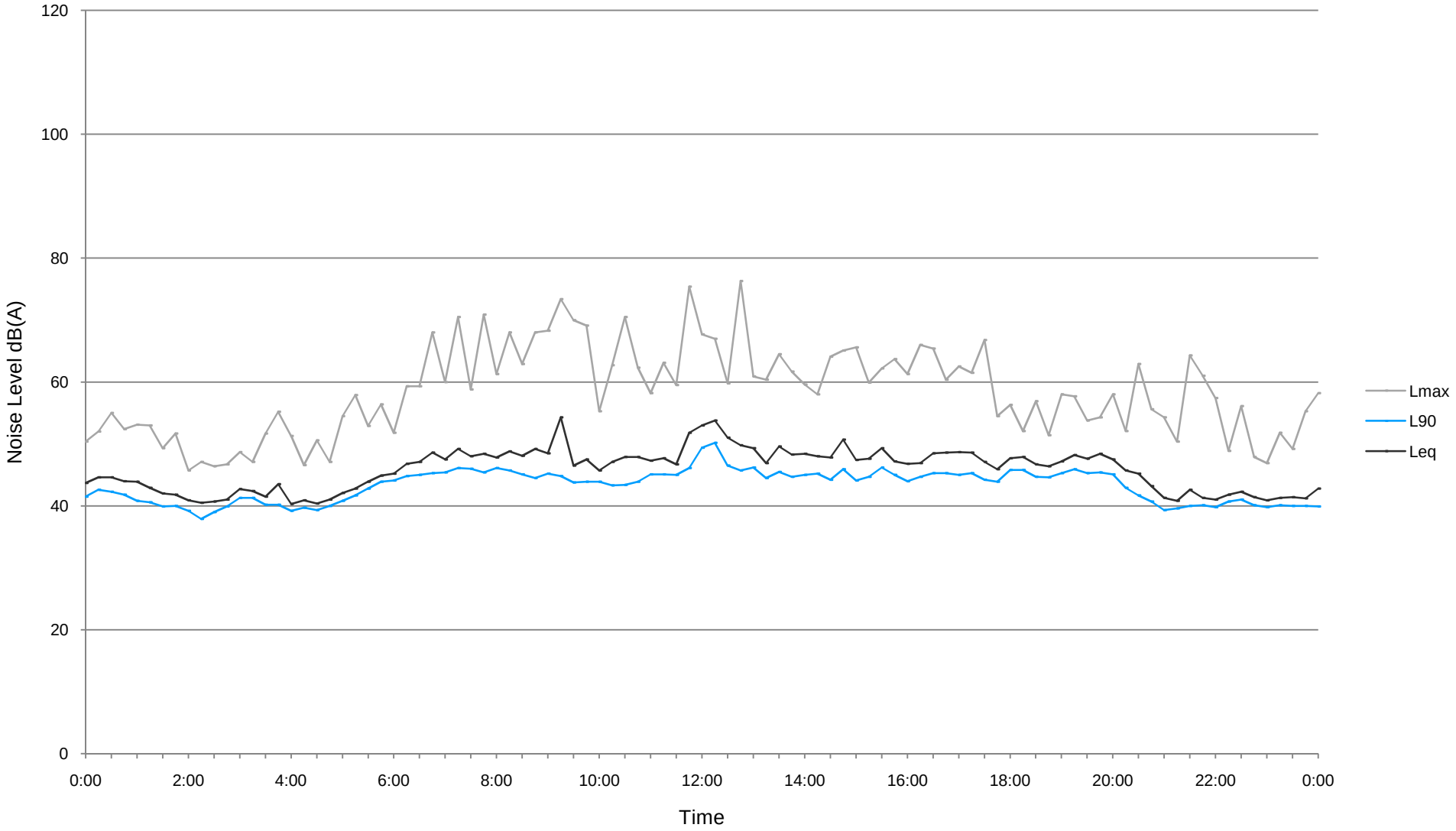
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Wednesday, 17-07-13

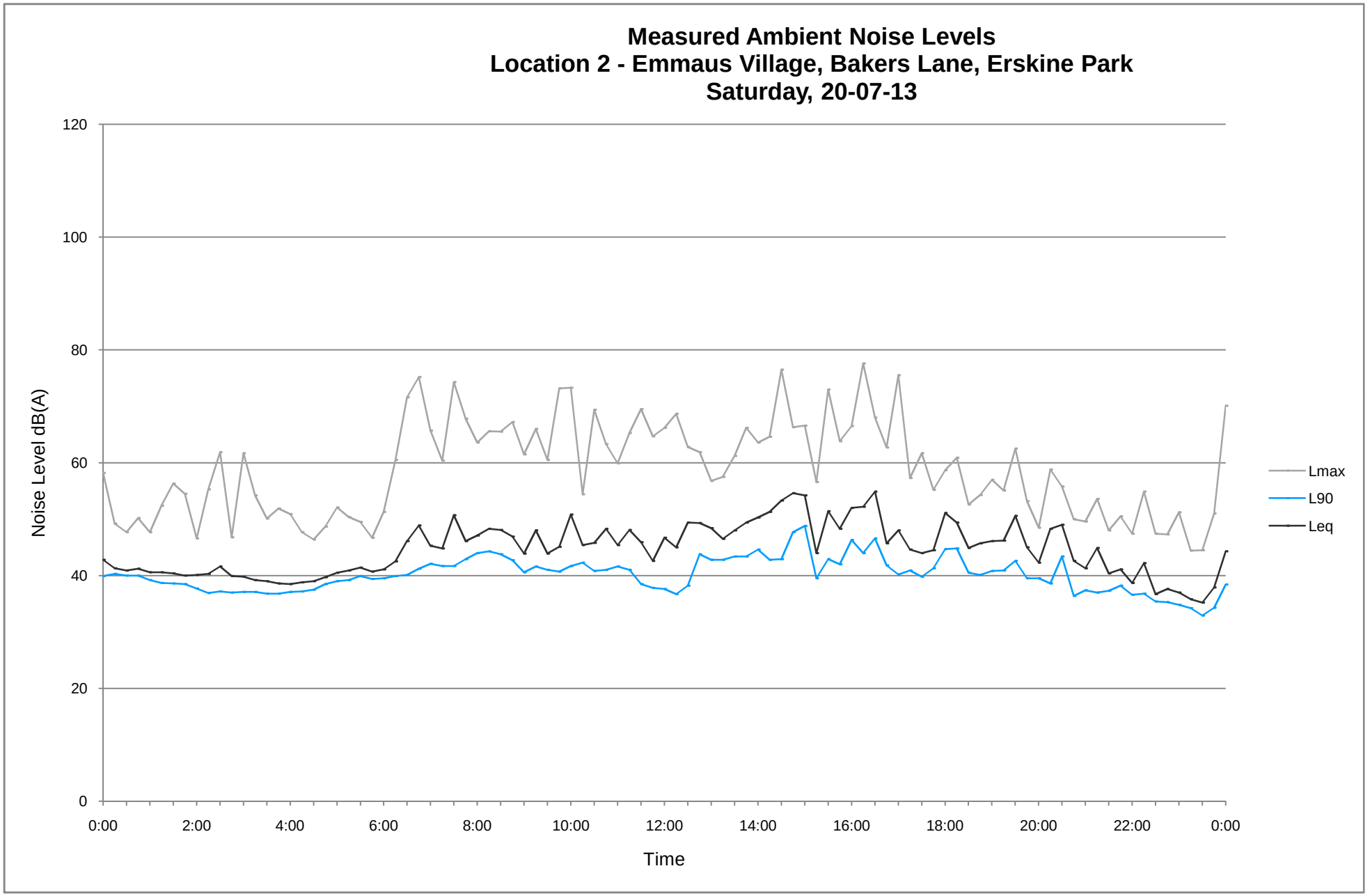


Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Thursday, 18-07-13



Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Friday, 19-07-13




Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Saturday, 20-07-13
Noise Level dB(A)
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100
80
60
40
20
0
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time
Lmax
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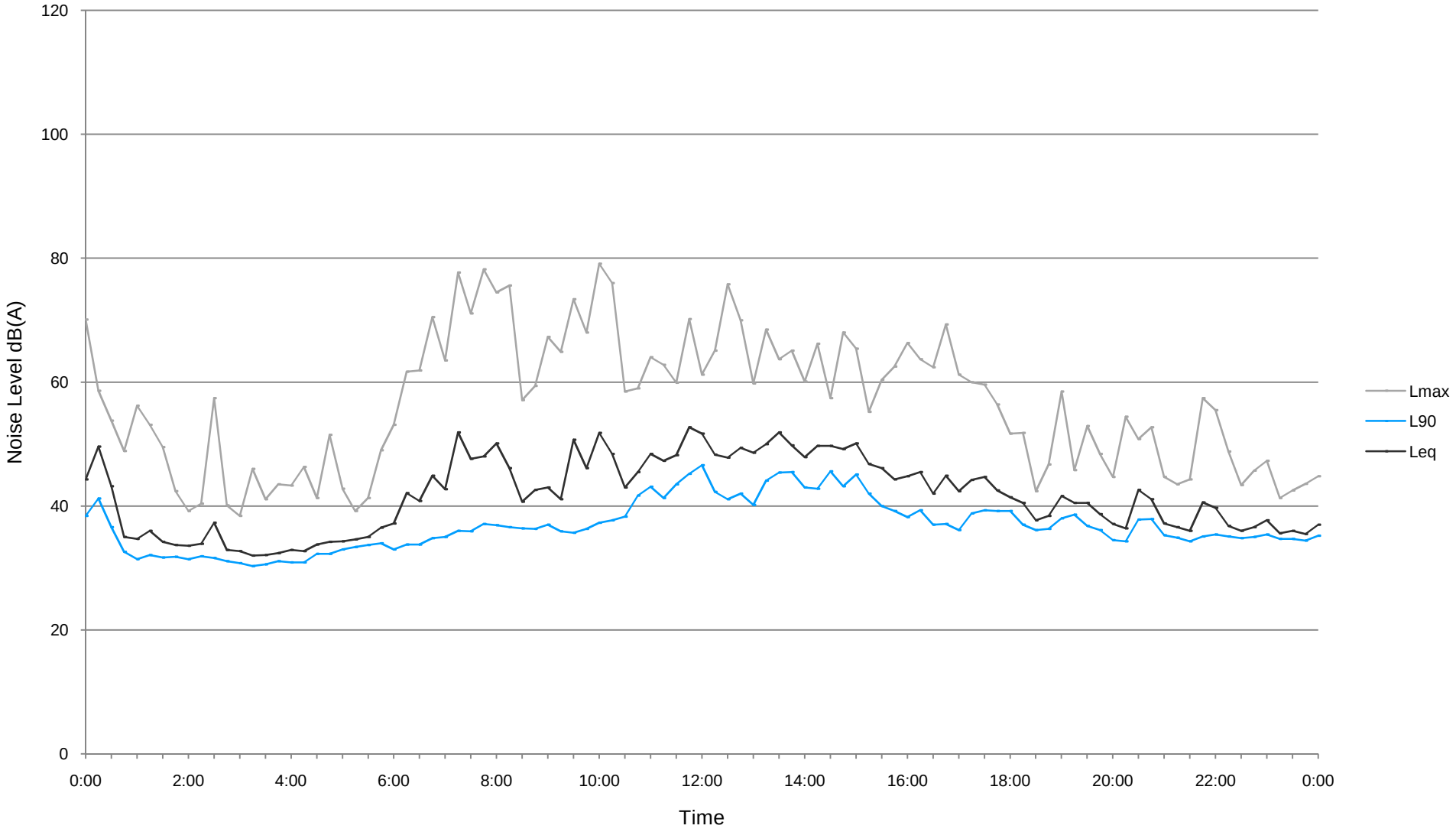
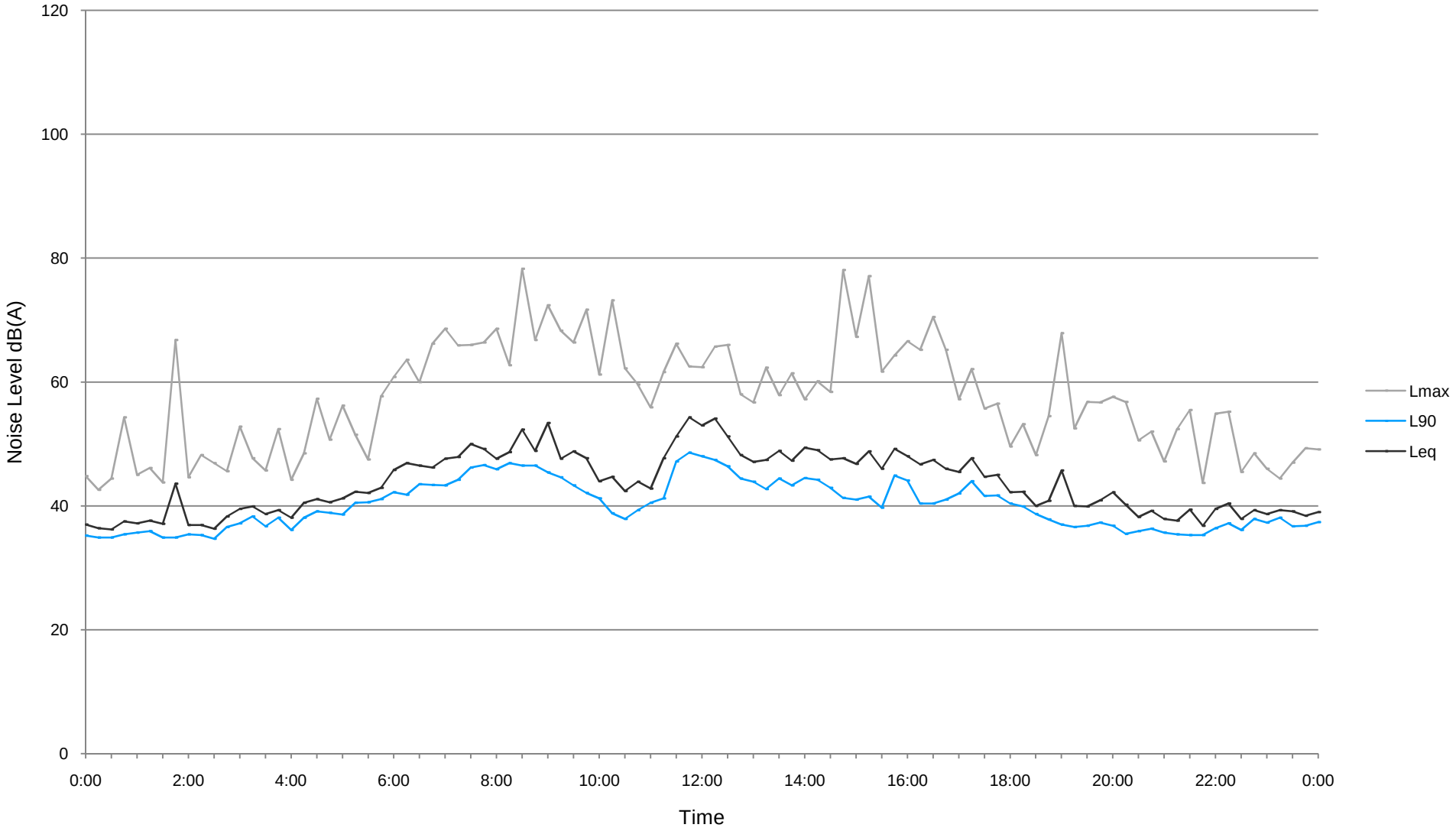
Leq

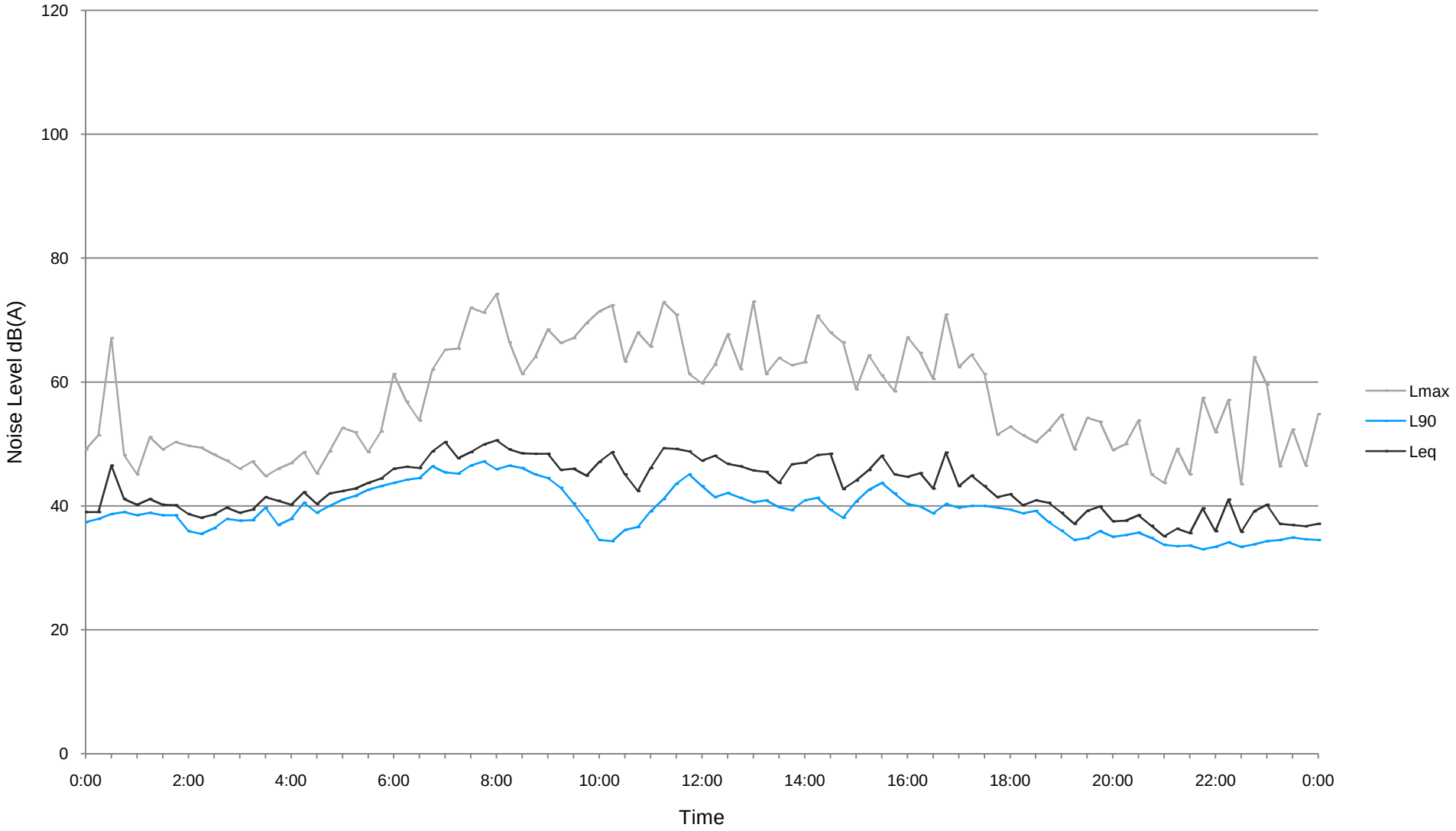
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Sunday, 21-07-13



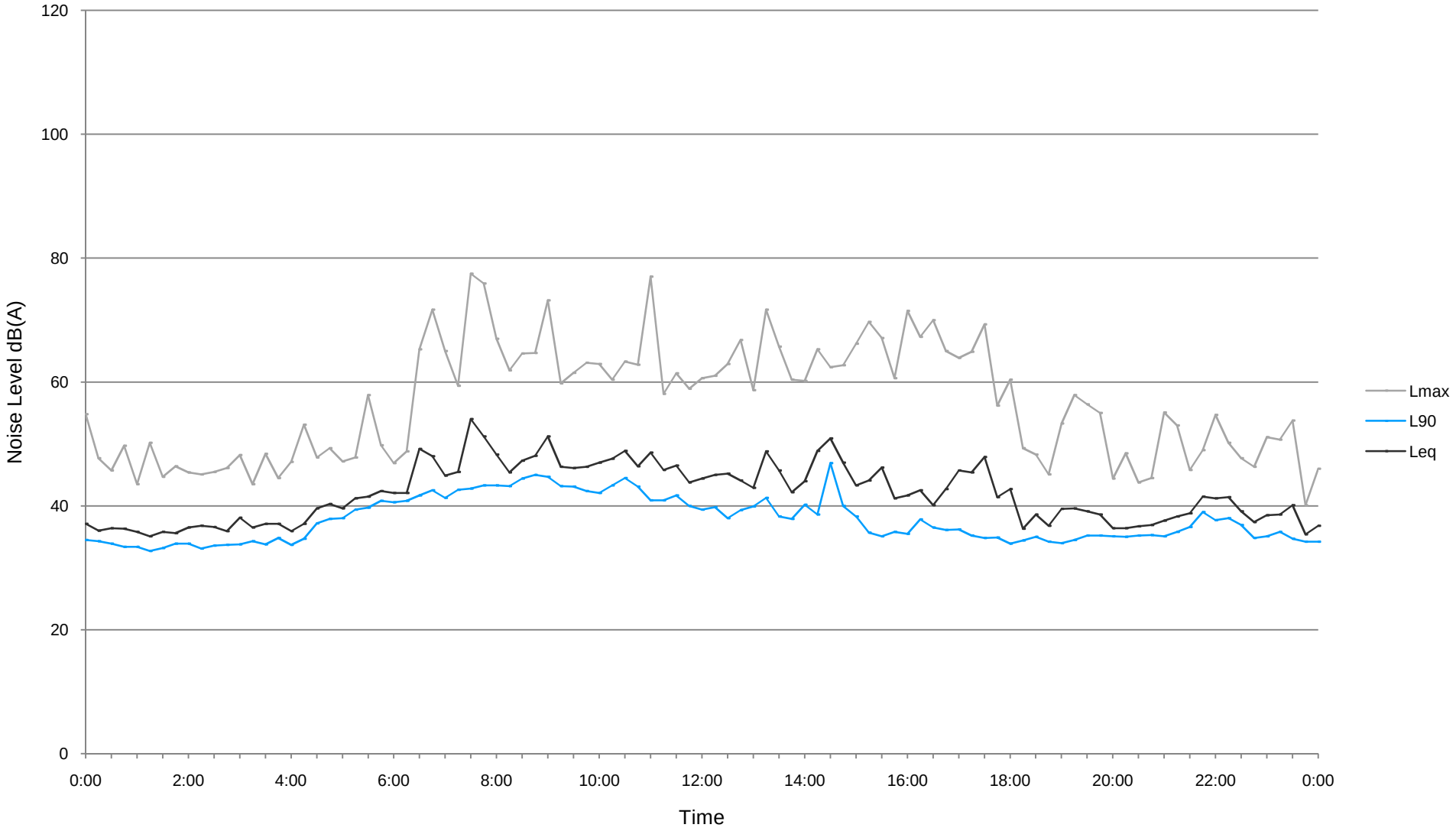
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Monday, 22-07-13



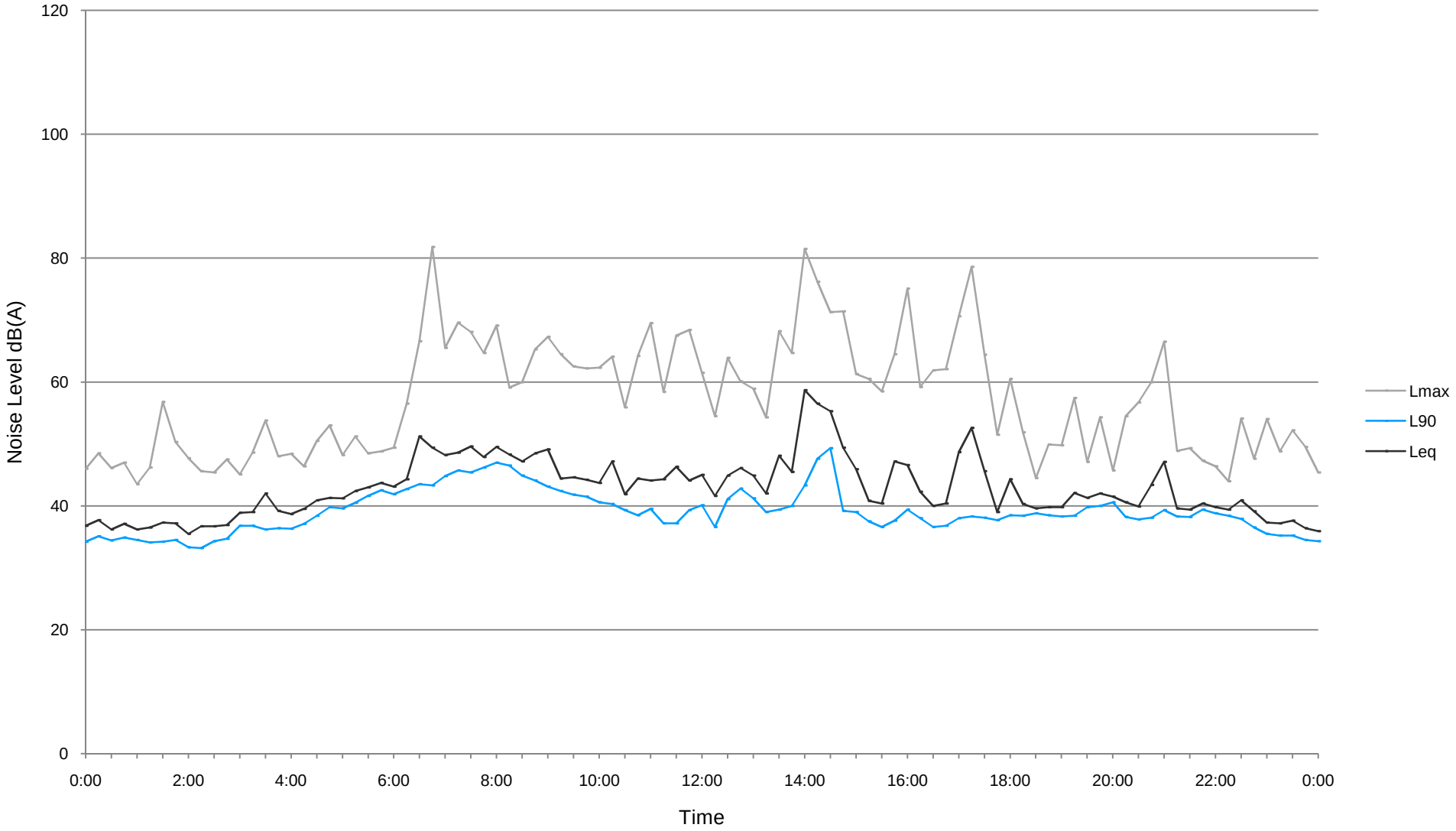
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Tuesday, 23-07-13



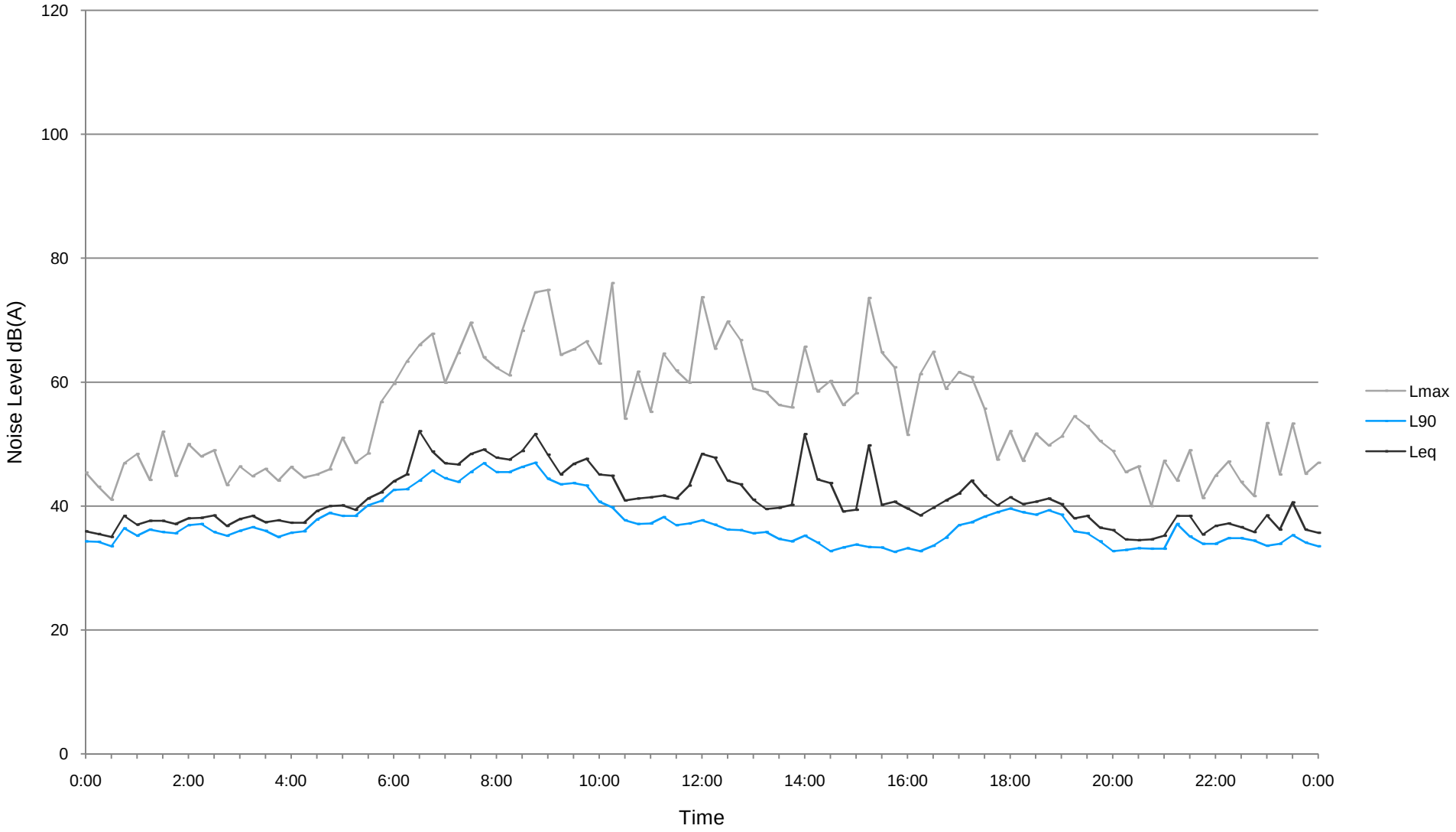
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Wednesday, 24-07-13



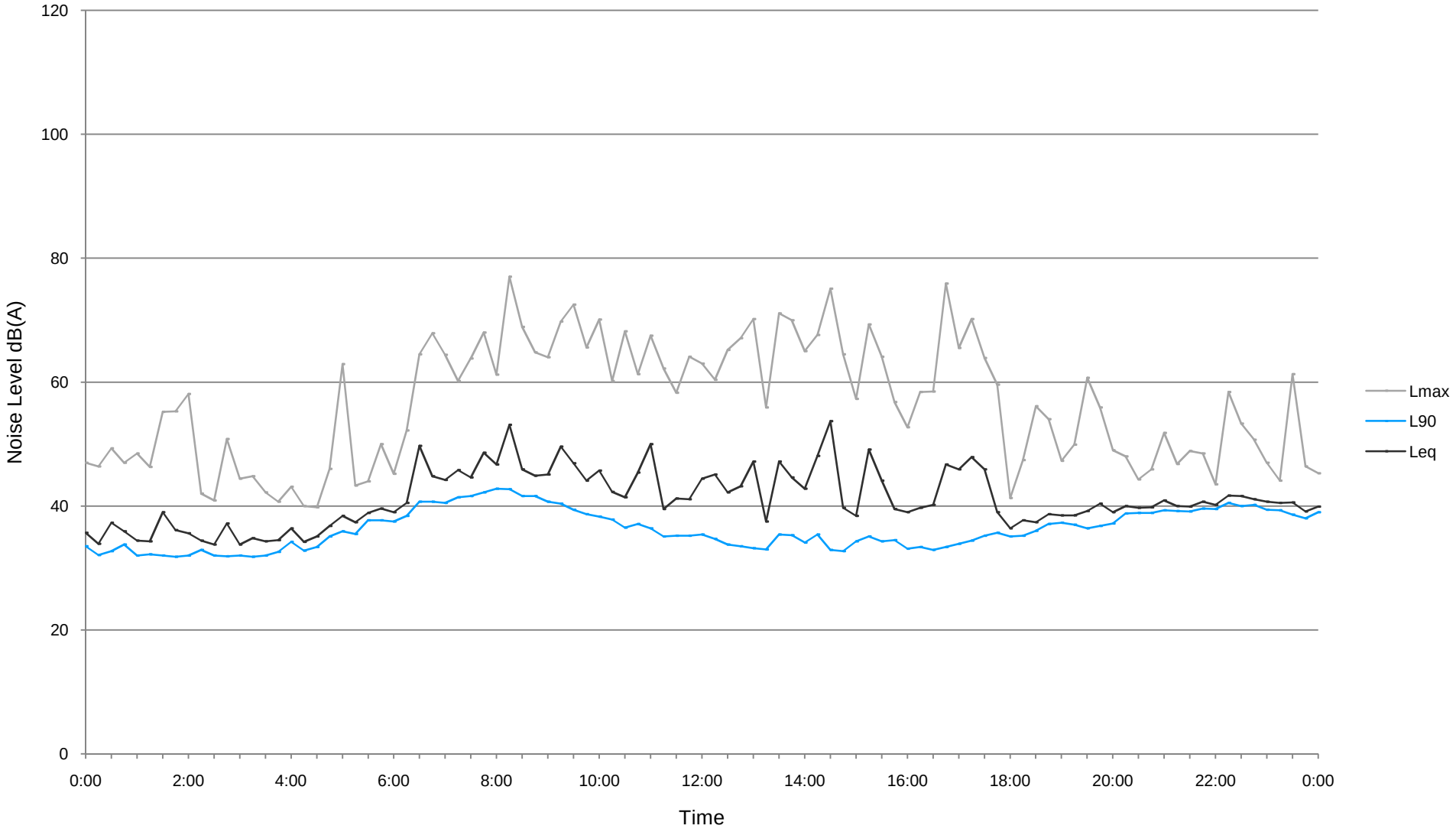
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Thursday, 25-07-13



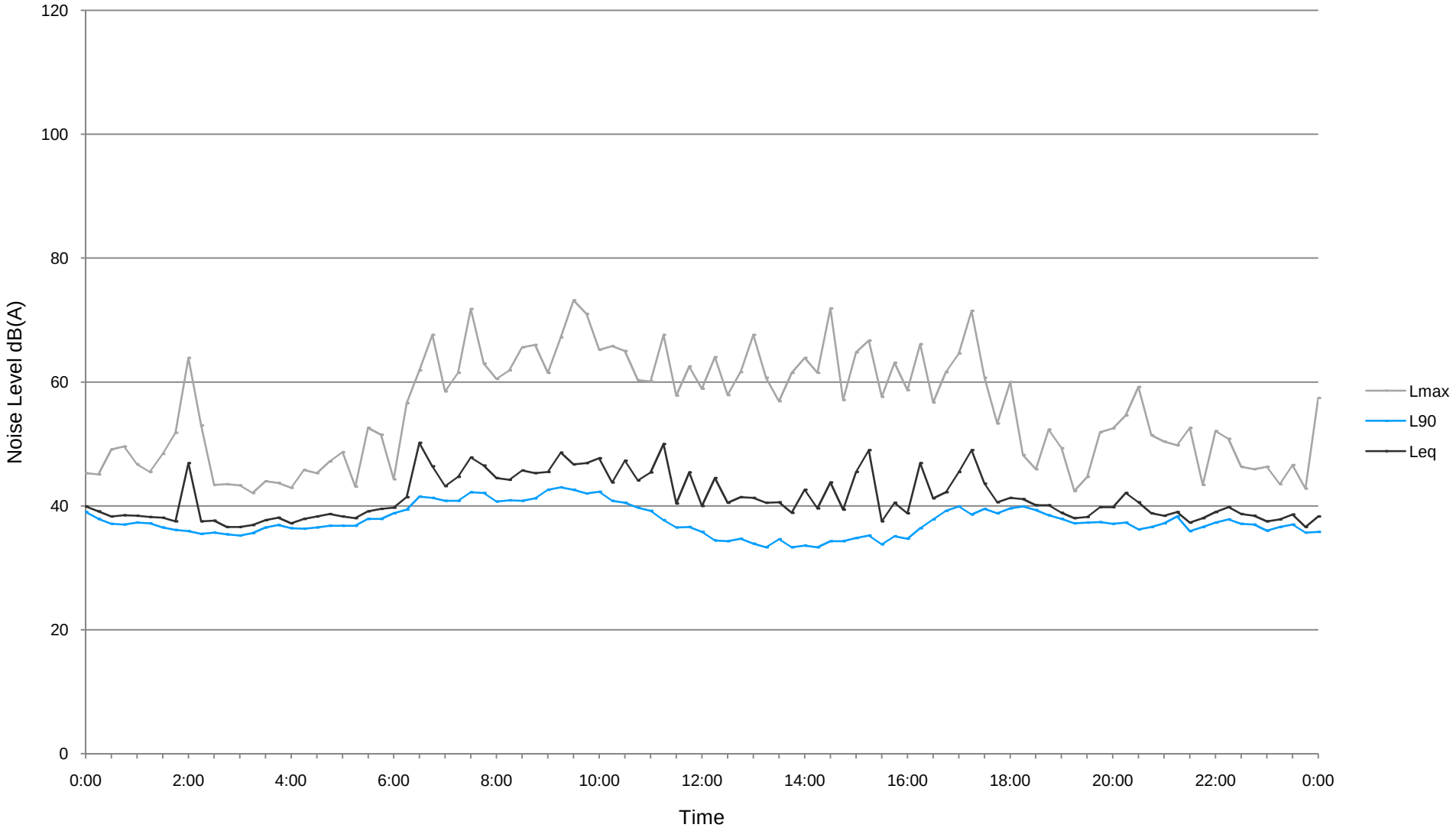
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Friday, 26-07-13



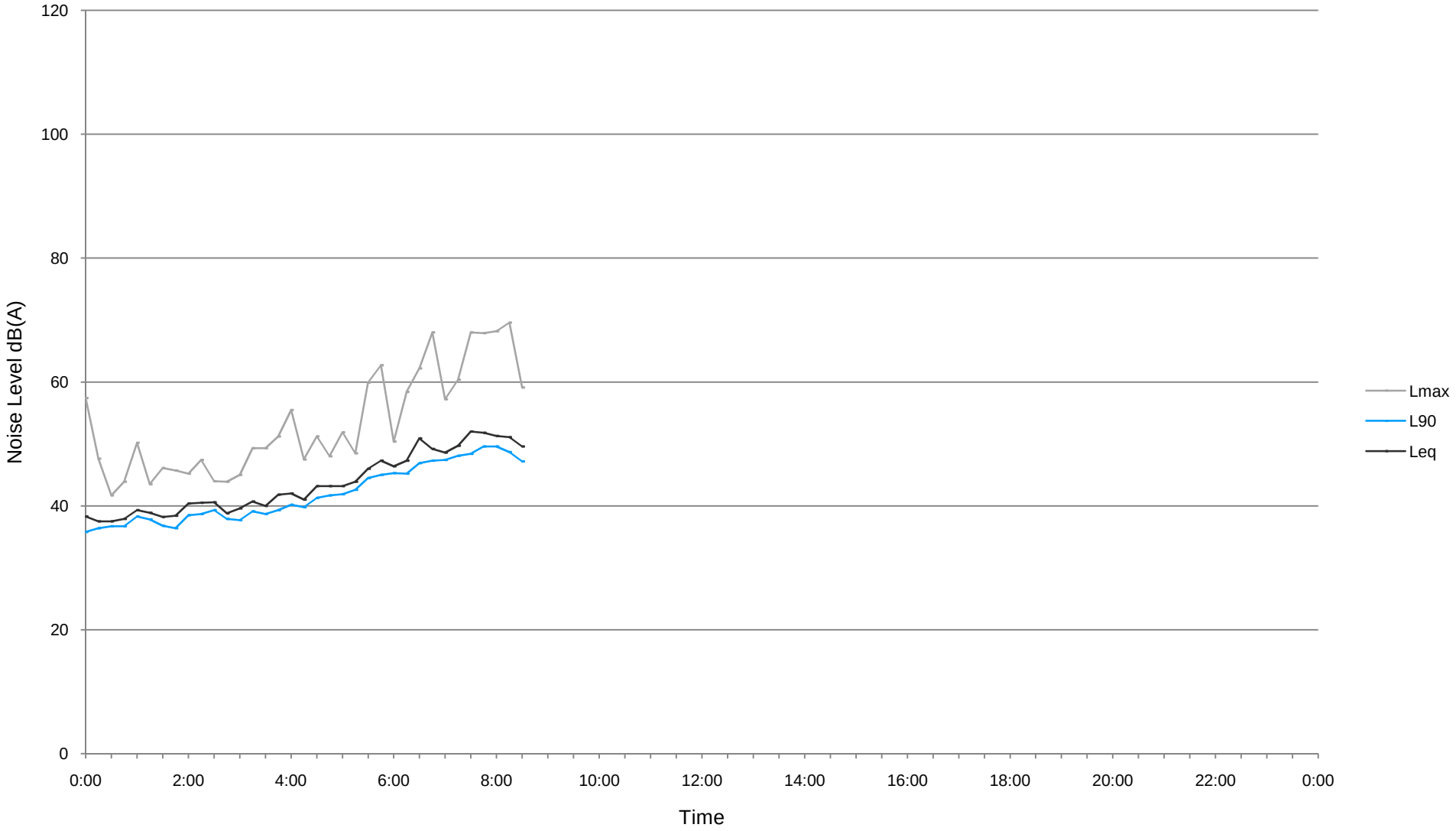
Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Saturday, 27-07-13



Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Sunday, 28-07-13



Measured Ambient Noise Levels
Location 2 - Emmaus Village, Bakers Lane, Erskine Park
Monday, 29-07-13



Appendix B

Wind Analysis

Table B.1 Day percentage of wind speed (vector at 22.5° intervals)

Direction	Winter	Autumn	Spring	Summer
22.5°	20	29.2	24.9	23.8
45°	14.9	25.4	25.6	23.6
67.5°	11	24.2	24.2	22.5
90°	7.8	22.7	21.9	20.7
112 .5°	10.8	22.2	23.2	20.4
135°	14.3	22.8	23.7	24.3
157.5°	19.4	24.7	24.8	25
180°	21.1	24.3	23	23.3
202.5°	23.1	23.2	20.2	21.5
225°	22.7	20.9	15.9	17.6
247.5°	22.1	19.6	12.6	13.8
270°	21.6	19.1	11	9.8
292.5°	22.3	20.9	14.3	11.7
315°	21.7	24.9	19.6	16.4
337.5°	22.5	29.4	22.6	19
360°	21.7	29.5	23.6	21.6

Notes: 1. Bold highlight denotes occurrence of 30 % and greater.

Table B.2 Evening percentage of wind speed (vector at 22.5° intervals)

Direction	Winter	Autumn	Spring	Summer
22.5°	13.3	17.9	24.7	25.2
45°	10.3	17.4	25.8	**30**
67.5°	7.9	17.7	24.2	29.4
90°	6.6	15.6	25.3	**31.4**
112.5°	9.7	22.1	26.6	**35.6**
135°	20.1	26.9	27.2	**34.2**
157.5°	28.5	**35.3**	28.8	26.1
180°	**34**	**37.5**	28.8	20.6
202.5°	**37.2**	**38.8**	28	19
225°	**38.8**	**37.2**	26.2	18.6
247.5°	**36.6**	**36.3**	25	14.4
270°	**30.7**	25.6	20.6	8.5
292.5°	25	18.7	18.9	6.8
315°	22	16.7	15.7	7.2
337.5°	17.7	19.3	18.6	10
360°	14.6	18.7	22.2	17.7

Notes: 1. Bold highlight denotes occurrence of 30 % and greater.

Table B.3 Night percentage of wind speed (vector at 22.5° intervals)

Direction	Winter	Autumn	Spring	Summer
22.5°	16.4	11.1	12.6	12.3
45°	12.9	8.2	9.5	12.4
67.5°	8.1	6.4	7.8	11.3
90°	7.3	6.1	7.2	9.8
112.5°	13.6	10.6	10.5	16
135°	23	21.4	19.9	29.6
157.5°	**30.9**	**30**	**32.7**	**38.9**
180°	**30.9**	**33.6**	**37.5**	**43.2**
202.5°	**30.3**	**35.5**	**40**	**43.9**
225°	26.5	**32.9**	**38.7**	**43.5**
247.5°	24	**31.2**	**36.5**	**38.6**
270°	20	25.8	28.6	25.7
292.5°	18.5	21	21.7	12.7
315°	18	15.6	17.7	8.9
337.5°	18.4	15.8	18	10.4
360°	17.4	12.7	14.3	10.8

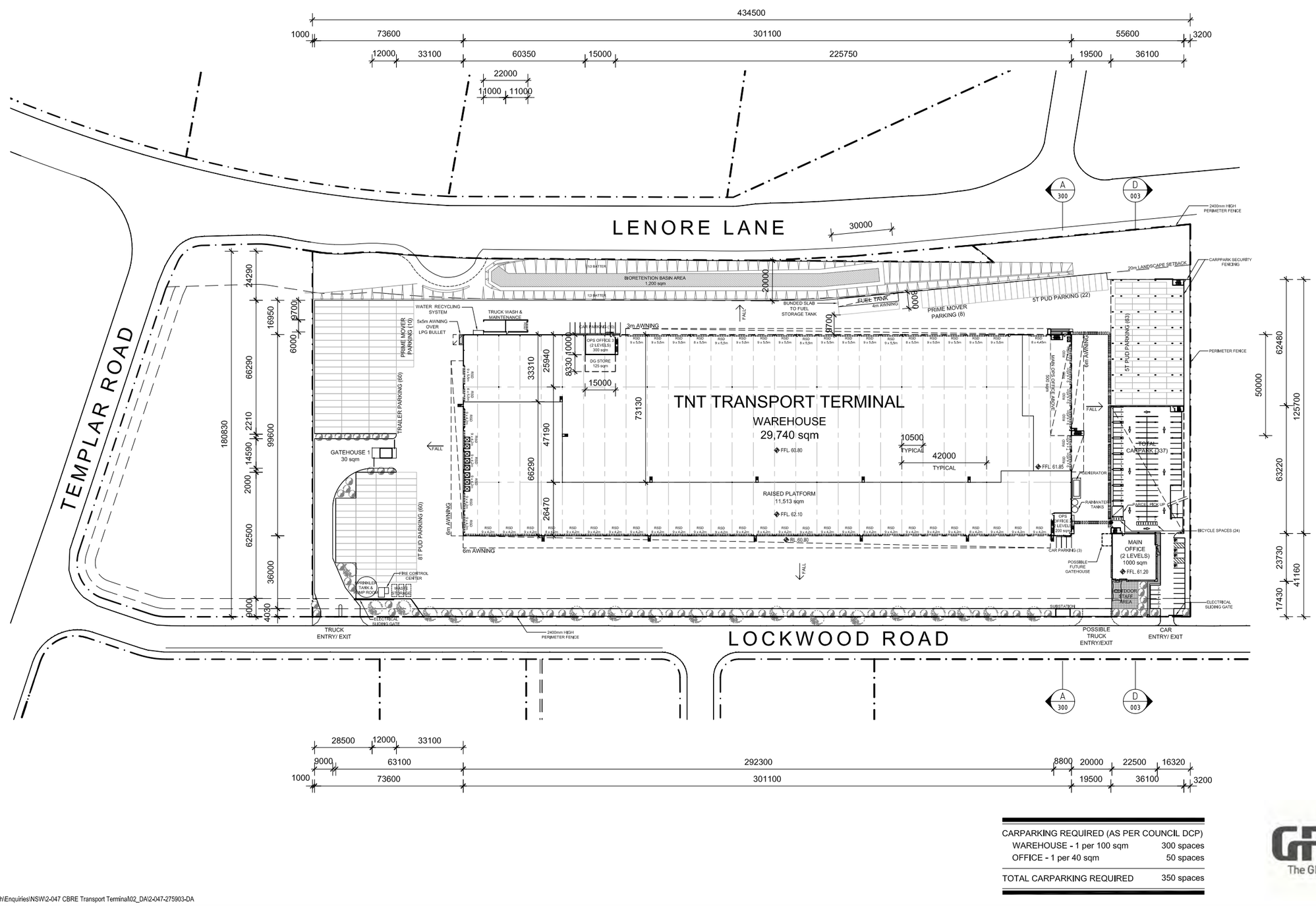
Notes: 1. Bold highlight denotes occurrence of 30 % and greater.

Appendix C

Site plan

REVISIONS

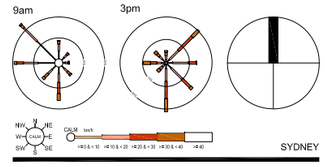
A	DEVELOPMENT APPLICATION	21.08.13



DEVELOPMENT SUMMARY

TOTAL SITE AREA	78,189 sqm
WAREHOUSE (INCLUDING RAISED DOCK 11,513 sqm)	29,740 sqm
MAIN OPS OFFICE 1 (MEZZANINE)	500 sqm
OPS OFFICE 2 (2 LEVELS)	200 sqm
OPS OFFICE 3 (2 LEVELS)	300 sqm
MAIN OFFICE (2 LEVELS)	1,000 sqm
GATEHOUSE	30 sqm
TRUCKWASH & MAINTENANCE BAY	132 sqm
TOTAL BUILDING AREA	31,902 sqm
EFFICIENCY	40.8 %
AWNING (3m)	630 sqm
AWNING (6m)	2,658 sqm
FUEL TANK AWNING (4m)	120 sqm
CARPARK DECK- LEVEL 1	2,285 sqm
CARPARK DECK- LEVEL 2	4,538 sqm
TOTAL CARPARK DECK AREA	6,823 sqm
ACCESSIBLE CARPARKING- GF	4 spaces
CARPARKING PROVIDED- GF	87 spaces
CARPARKING PROVIDED- L1	74 spaces
CARPARKING PROVIDED- L2	172 spaces
CARPARKING- HARDSTAND	13 spaces
TOTAL CARPARK SPACES	350 spaces
BICYCLE SPACES	24 spaces
TRAILER PARKING (13.5m LONG)	60 spaces
PRIME MOVERS	18 spaces
5T PUDS	85 spaces
8T PUDS	60 spaces
OUTDOOR STAFF AREA	180 sqm
HEAVY DUTY PAVEMENT (H)	32,940 sqm
LIGHT DUTY PAVEMENT (L)	2,589 sqm

CARPARKING REQUIRED (AS PER COUNCIL DCP)	
WAREHOUSE - 1 per 100 sqm	300 spaces
OFFICE - 1 per 40 sqm	50 spaces
TOTAL CARPARKING REQUIRED	350 spaces



PROJECT

TNT TRANSPORT TERMINAL

LOT 201, DP 1133028
LOCKWOOD RD, ERSKINE PARK NSW

DRAWING TITLE

SITE PLAN- OVERALL

0 10 20 30 40 50 75 100m

SCALE: 1:2000 @ A3

CREATE DATE: 21.08.2013 PLOT DATE: 22.08.2013

LAST SAVED BY: mhassoun

2-047-275903-DA - 002 A

The GPT Group

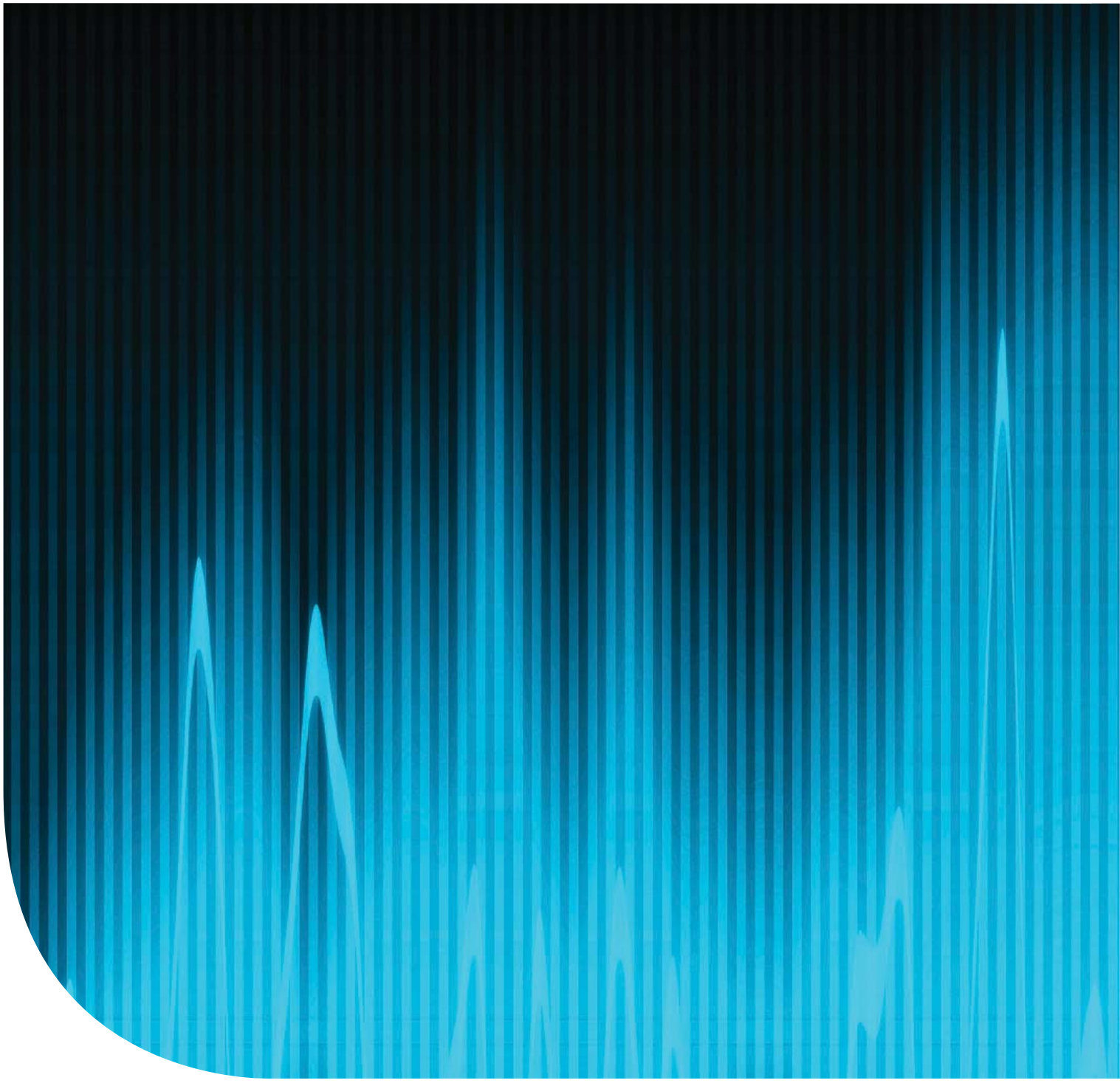
FILE LOCATION: J:\Arch\Enquiries\NSW\2-047 CBRE Transport Terminal\02_DA\2-047-275903-DA

EMM
EMGA Mitchell McLennan

SYDNEY
Ground floor, Suite 1, 20 Chandos Street
St Leonards, New South Wales, 2065
T 02 9493 9500 F 02 9493 9599

NEWCASTLE
Level 1, 6 Bolton Street
Newcastle, New South Wales, 2300
T 02 4927 0506 F 02 4926 1312

BRISBANE
Suite 1, Level 4, 87 Wickham Terrace
Spring Hill, Queensland, 4000
T 07 3839 1800 F 07 3839 1866



Attachment 6

SJB Planning

Pascale van de Walle Senior Planning Officer
Major Projects Assessment
NSW Department of Planning
23 – 33 Bridge Street
Sydney NSW 2000

16 October 2013

Re: TNT Warehouse and Distribution Facility Lot 201 Lockwood Road, Erskine Park (SSD-6040)

Dear Pascale,

I refer to your email of 3 October 2013 to Jason Shepherd of CIP requesting:

- A copy of the current (modified) approved Concept Plan layout
- Demonstration that proposed SSD 6040 is consistent with the terms of Concept Plan Approval 06_0208, particularly condition 1; and
- Provision of a plan showing the dimensions of the residual development parcel of site C.

Each of these items is addressed below.

Current Approved Concept Plan layout

We understand that the last modification to concept approval (06_0216) was granted on 28 December 2008. A copy of this determination is included at Attachment 1 to this letter. The determination includes a copy of the approved modified concept plan.

Consistency with Concept Plan Approval 06_0208

Item 1 of the General Terms of Approval for application 06_0216 at 1(c) confirmed that approval was granted for:

> *(c) Construction and use of an interchangeable maximum gross floor area of 193,500m^2 for warehouse distribution , and associated uses;*

The following table details the gross floor areas approved for the land covered by the Concept Plan Approval.

6945_3.2_L001_2013_10_16 Final

L2/490 Crown St, Surry Hills
Sydney NSW 2010
planning@sjb.com.au
sjb.com.au
T 61 2 9380 9911
F 61 2 9380 9922

Site	Approved/proposed GFA	Notes
Site C	-	Vacant development parcel of 17,130m^2 site area
Site D	31,902m^2 (*)	SSD_6040 - TNT
Site E	14,000m^2	08_0085 determined 4/8/2008 – Goodman Fielder
Site F	23,940m^2 (*)	DA 13/0815- RAND distribution
Site G	21,017m^2 (*)	SSD_6030 – Retail Ready Meat facility
Site H	40,000m^2	Mod 1 06_0208 determined 21/4/2009
Total	**130,859m^2**	

Table 1 Summary of approved and proposed GFA (*) denotes applications pending determination

The table demonstrates that existing approvals and current applications account for 130,859m^2 of the approved quantum of gross floor area (GFA) of 193,500m^2. A balance of 62,641m^2 therefore remains available. Assuming the pending applications are all approved the balance of 62,641m^2 would be accommodated on site C and the undeveloped portion of site E.

The current applications that are undetermined will not exceed the quantum of GFA approved for the land under the Concept Plan and leave substantial unused GFA that could be accommodated on the undeveloped land.

Site C plan

A plan showing the residual area of site C is provided at Attachment 2. The plan identifies that the residual land has an area of 17,130m^2 in area which is well in excess of the minimum lot size of 10,000m2 that applies under the DCP applying to the area.

Further it is noted that modification to concept approval (06_0216) granted on 28 December 2008 expanded the range of permitted uses to permit “Amenity” uses on Site C. Amenity uses were identified to include business premises, food and drink premises, pubs, recreational facilities, service stations and neighbourhood shops. The residual parcel is well suited to accommodate any of these potential uses.

We trust that this information addresses your query, however if you have any questions regarding this matter, please do not hesitate to contact me on (02) 9380 9911 or by email at sbarwick@sjb.com.au.

Yours sincerely

Scott Barwick
Associate Director

Attachment 1 – Modification to 06_0216 dated 28 December 2006
Attachment 2 – Plan of Site C residual land

Attachment 1

SJB Planning

SJB Planning (NSW) Pty Ltd ACN 112 509 501

Notice of Modification

Section 75W of the *Environmental Planning and Assessment Act 1979*

I, the Executive Director, Major Project Assessment, under delegated authority of the Minister for Planning, approve the modification to the concept plan referred to in schedule 1, subject to the conditions in schedule 2.

Chris Wilson
Executive Director
Major Project Assessment

Sydney 29 December 2008 File No: 9043259

SCHEDULE 1

The concept approval (06_0216) granted by the Minister for Planning for the construction and use of a manufacturing, warehouse and distribution complex and associated infrastructure, including certain amenity uses on site C at Erskine Park.

SCHEDULE 2

The Concept approval (06_0216) is modified by:

1. Replace the description of land in schedule 1 with:

   Land: Lot 201 DP 1133028; Lot 23 DP 1120114; and a portion of adjoining Crown Road (see Appendix 1)

2. Replace the definition for Amenity Uses in schedule 2 with the following:

   Amenity Uses — Amenity uses for Site C include business premises, food and drink premises, pubs, recreational facilities, service stations and neighbourhood shops

3. Add the following definition after DWE in the definitions:

   EA — The Environmental Assessment titled "Environmental Assessment to accompany a concept plan and stage 1 project application – storage and distribution facilities and site preparation works" and dated 24 August 2006

4. Delete condition 1 in schedule 2 and replace with:

   1. Concept plan approval is granted for:
      (a) subdivision of the site;
      (b) bulk earthworks across the site;
      (c) construction and use of an interchangeable maximum gross floor of 193,500m² for manufacturing, warehouse, distribution, and certain amenity on site C including business
      (d) premises, food and drink premises, pubs, recreational facilities, service stations and neighbourhood shops;
      (e) provision of a range of associated infrastructure to provide essential services to the site;
      (f) a stormwater management scheme, including the realignment of the creek on site; and
      (g) a landscape concept plan.

Note: The general scope of this approval is depicted in the:

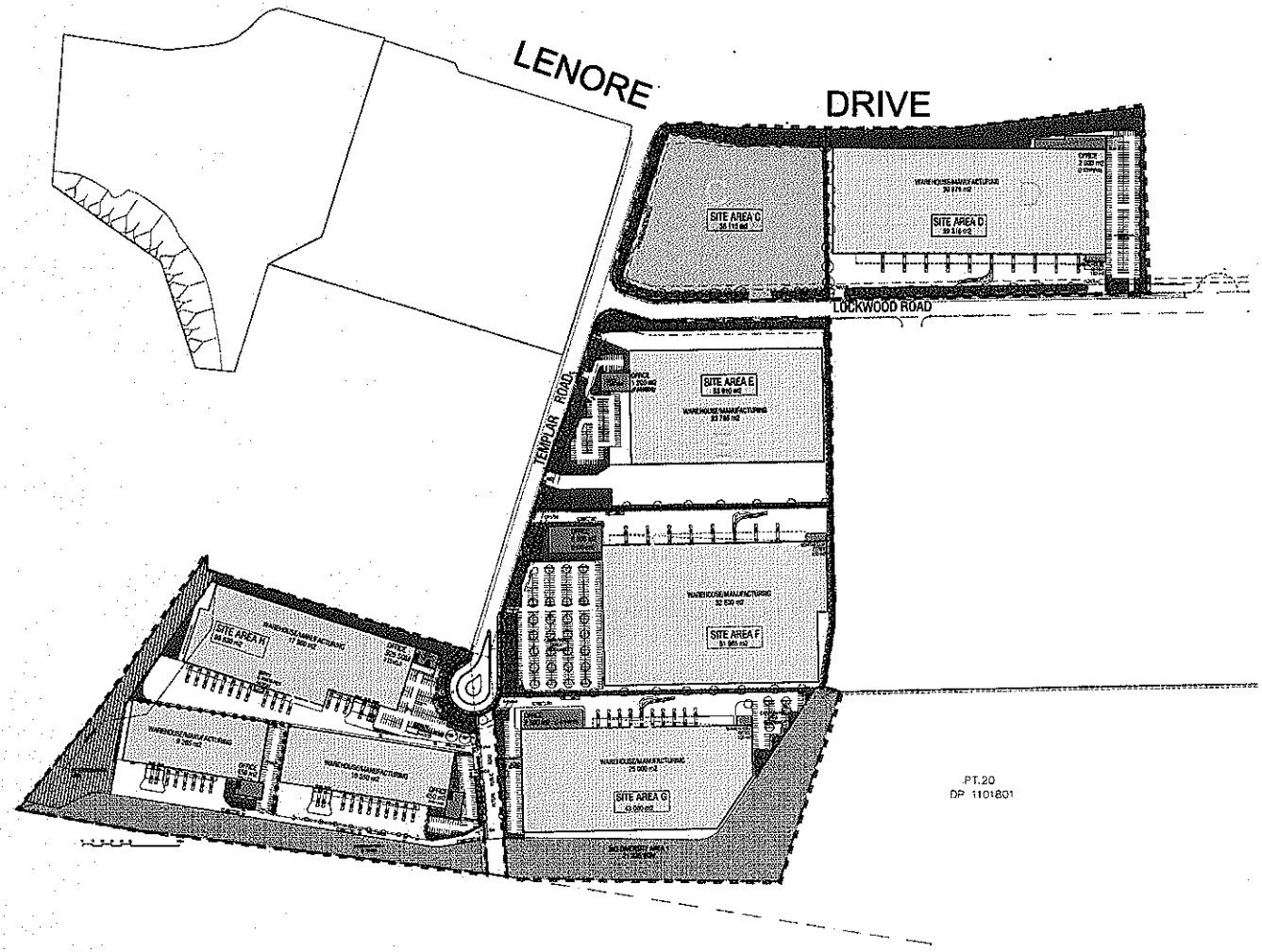
- *concept master plan (see Appendix 1), (which amends the following plans);*
- *plan of subdivision of Lot 20 DP 1101801, as detailed in Subdivision Certificate No 11554, approved by Land Development Certificates Pty Ltd and dated 19 February 2008;*
- *bulk earthworks plan (see drawings numbered DA 101-112 , prepared by Brown Consulting, submitted to the Department 18 May 2007 and approved 28 June 2007);*
- *streamworks design concept (see drawings numbered DA 201-228, prepared by Brown Consulting, submitted to the Department 18 May 2007 and approved 28 June 2007); and*
- *stormwater concept plan (see drawings numbered DA 301-313, prepared by Brown Consulting,submitted to the Department 18 May 2007 and approved 28 June 2007).*

5. Replace condition 4 with:

4. The Proponent shall ensure that all development on site is carried out generally in accordance with the:
   (a) concept plan (see condition 1 above);
   (b) EA;
   (c) 06_0216 Mod 1 (as described in the EA for project application 08_0085);
   (d) 06_0216 Mod 2 (as described in the EA for project application 08_0187);
   (e) statement of commitments; and
   (f) conditions of this approval.

6. Replace Appendix 1 – Indicative layout of the concept plan with:

APPENDIX 1
INDICATIVE LAYOUT OF THE CONCEPT PLAN



DEVELOPMENT DATA SHEET

OVERALL SITE AREA	37.44 Ha

	BUILDING AREA	SITE AREA
SITE AREA C BUILDING	18 000 m2	35 115 SQM.
SITE AREA D BUILDING	33 125 m2	59 315 SQM.
SITE AREA E BUILDING	24 995 m2	53 910 SQM.
SITE AREA F BUILDING	35 750 m2	81 985 SQM.
SITE AREA G BUILDING	27 850 m2	45 000 SQM.
BIO-DIVERSITY AREA 1		21 255 SQM.
SITE AREA H BUILDING	39 050 SQM.	96 830 SQM.

CLIENT: GPT

PROJECT: LENORE DRIVE ERSKINE PARK

TITLE: CONCEPT PLAN

hansen yuncken
ABN 38 063 384 056
Level 4, 5 Rosebery Ave,
Rosebery
NSW 1445

SCALE 1:2000 @ A1
JOB GP-LE-MP-032

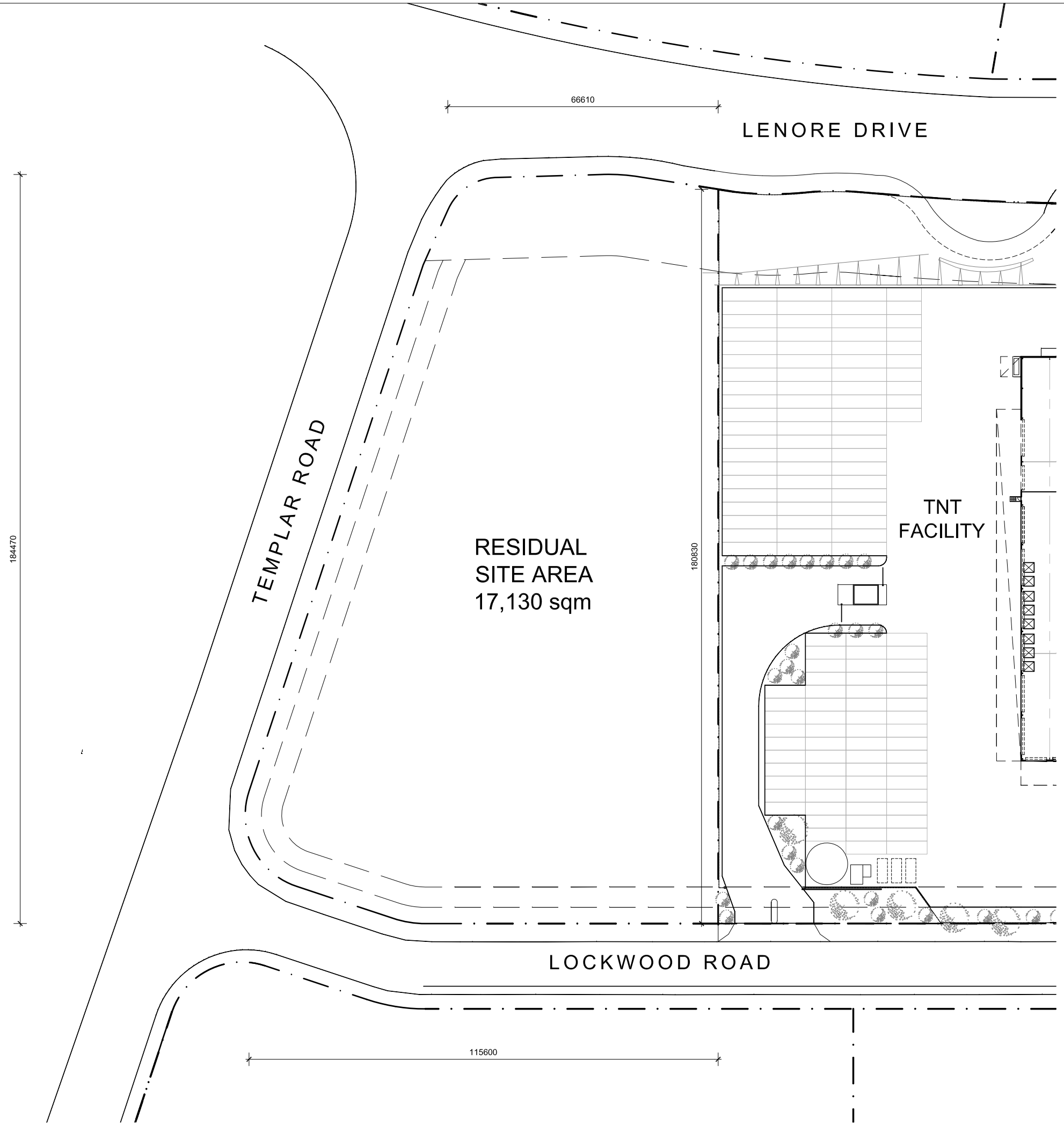
Attachment 2

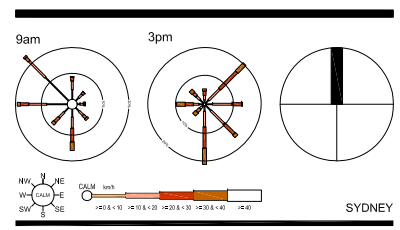
SJB Planning

SJB Planning (NSW) Pty Ltd ACN 112 509 501

REVISIONS

A	PRELIMINARY	09.10.13





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PROJECT

TNT WAREHOUSE & DISTRIBUTION FACILITY

LOT 201, DP 1133028
LOCKWOOD RD, ERSKINE PARK NSW

DRAWING TITLE

SITE PLAN- RESIDUAL SITE

0 5 10 15 20 25 50m

SCALE: 1 : 1000 @ A3

CREATE DATE : 21.08.2013 PLOT DATE : 09.10.2013

LAST SAVED BY: mhassoun

2-047-275903-DA - 005 A

GPT The GPT Group

FILE LOCATION: J:\Arch\Enquiries\NSW\2-047 CBRE Transport Terminal\02_DA\2-047-275903-DA