

NOISE MANAGEMENT PLAN CYGNIA COVE, WATERFORD

Prepared for:

Trustees of the Christian Brothers in Western
Australia Inc.
c/- Richard Noble & Co.
Level 1, 189 Hay Street
SUBIACO WA 6008

Report Date: 31 March 2009
Project Ref: 2006/276 V4

Written/Submitted by:

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Noel Davies
Principal

31 March 2009

Trustees of the Christian Brothers in Western Australia Inc.
c/- Richard Noble & Co.
Level 1, 189 Hay Street
SUBIACO WA 6008

Attention: Alex Gregg

Dear Alex,

RE: Cygnia Cove, Waterford Noise Management Plan - Version 4

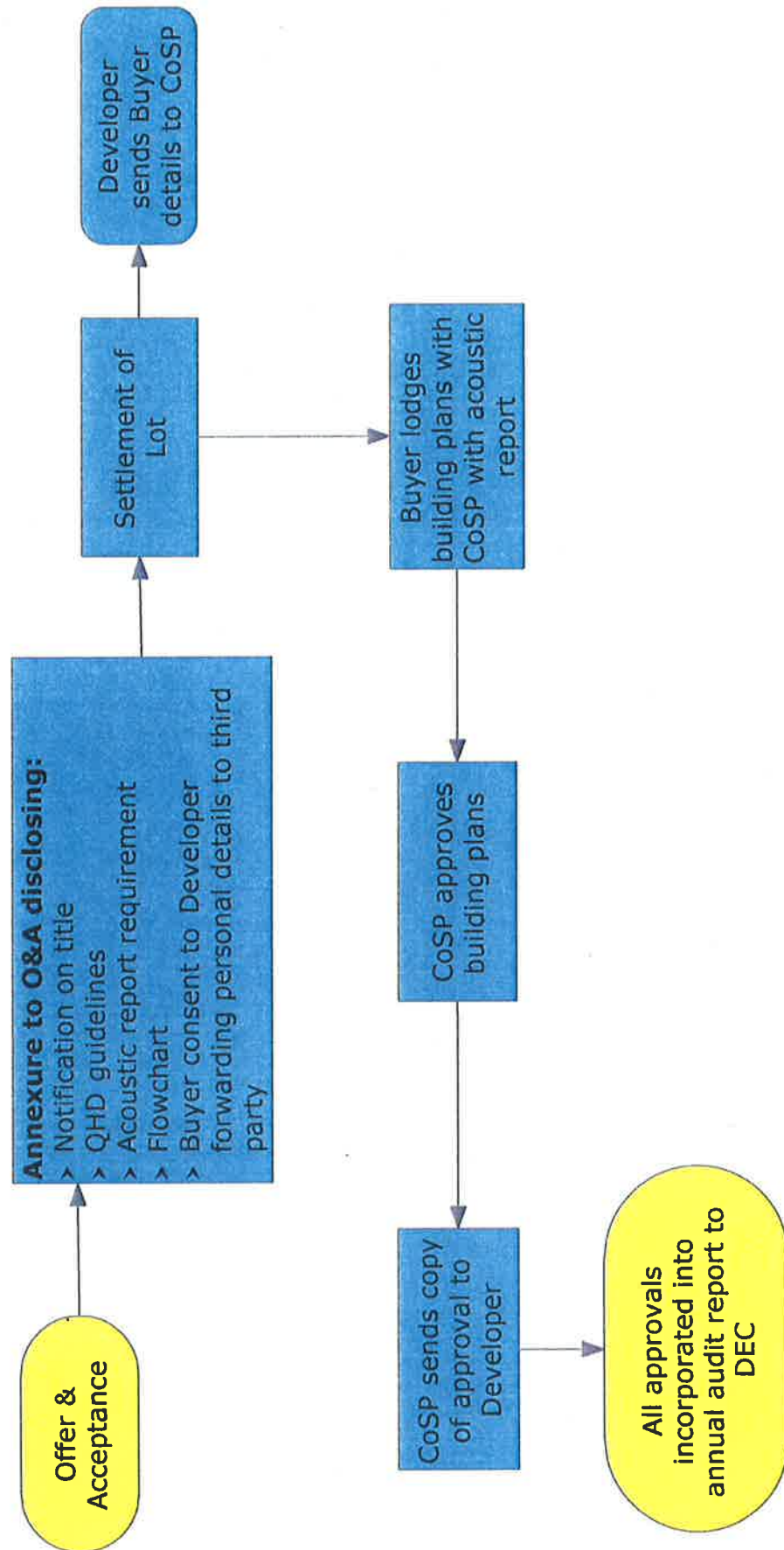
Enclosed is Version 4 of the Noise Management Plan for the Cygnia Cove development in Waterford. This Version has been amended in response to the Department of Environment and Conservation's comments on Version 3.

For and on behalf of Coffey Environments Pty Ltd



Paul Zuvela
Manager (Environmental Planning)

CYGNIA COVE NOISE MANAGEMENT PLAN POINT OF SALE PROCEDURE



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1 INTRODUCTION

1.1 Background

The Trustees of the Christian Brothers in WA Incorporated (the Proponent) propose to develop their land at Waterford for a residential subdivision to be known as Cygnia Cove (formerly known as East Clontarf).

The site is located approximately 8km south-east of the Perth Central Business District (Figure 1). The site is approximately 18ha in size and is bound by Manning Road to the north, Centenary Avenue to the east, the Clontarf Campus to the west, and the Canning River to the south (Figure 2). The coordinates of the centre of the site are approximately 395,730mE and 6,457,300mN.

A Public Environmental Review (PER) prepared for the site, provided a description of the proposal and an assessment of the environmental implications that may result from the project (ATA Environmental, 2004). The Environmental Protection Authority (EPA) released Bulletin 1156 containing its report and recommendations on 6 December 2004 (Environmental Protection Authority, 2004). The Proponent's development proposal was approved by the Minister for the Environment, subject to the fulfilment of conditions, on 11 October 2005. A copy of Ministerial Statement 692 is provided as Appendix A.

1.2 Purpose

Condition 2-1 of Ministerial Statement 692 requires that:

The proponent shall implement the environmental management commitments documented in schedule 2 of the statement.

Proponent Commitment 8 states that the proponent will:

Prepare and implement noise management procedures as part of the overall Construction Environmental Management Plan (CEMP) for the site.

Measures to minimise noise levels received by proposed residences within the development from existing roadways will include:

- *Construction of noise barriers between the roadway and residential lots;*
- *Specification of appropriate setbacks of proposed residences from existing roadways; and*
- *Specification of construction methods and materials (in keeping with "quiet house-design" principles).*

This Noise Management Plan presents strategies to ensure that noise impacts at proposed residences within the Cygnia Cove development site, are addressed during the construction phase of the project. Additionally, potential noise management measures to address noise impacts to surrounding sensitive premises as a result of site development works are included in this Noise Management Plan.

1.3 History of Approvals

In June 2004, the proponent submitted a proposal to redevelop a portion of their East Clontarf landholding. Due to the nature, scale and potential environmental and socio-economic issues relevant to the proposal, the EPA determined that the project was to be assessed at a formal PER level.

The PER produced by ATA Environmental on behalf of the Proponent, provided a description of the proposal and an assessment of the environmental implications that may result from the project being implemented (ATA Environmental, 2004).

The EPA released Bulletin 1156 containing its report and recommendations on 6 December 2004 (Environmental Protection Authority, 2004). The proposal was approved by the Minister for the Environment, subject to the fulfilment of conditions, on 11 October 2005. A copy of the Ministerial Statement (No.692) is provided as Appendix A. It should be noted that a request to modify the proposal was submitted to the EPA in accordance with Section 45C of the *Environmental Protection Act 1986*. The modification to the subdivision plan resulted in the removal of a causeway that dissected a portion of the wetland to be retained (Appendix B).

The Western Australian Planning Commission (WAPC) granted conditional subdivision approval for the site in January 2007 (WAPC Reference No. 121124).

1.4 Construction Environmental Management Plan

Proponent Commitment 1 specifies the need to prepare and implement a Construction Environmental Management Plan (CEMP). Proponent Commitment 8 of the Ministerial Statement relates to the preparation and implementation of a Noise Management Plan as part of a consolidated CEMP.

Other than the Noise Management Plan, the CEMP will incorporate a range of management plans and will be prepared to the satisfaction of the EPA prior to the commencement of construction. These include, but are not limited to:

- Site Remediation and Validation Plan;
- Acid Sulfate Soil Management Plan;
- Baseline Groundwater Monitoring and Management Plan ;
- Dust and Asbestos Management Plan;
- Foreshore Management Plan; and
- Wetland Management Plans for a constructed wetland and for the portion of the wetland being retained.

The development and presentation of each of the management plans will be conducted in a manner that rationalizes and simplifies the overall project reporting requirements. Environmental issues relevant to the project will therefore be addressed and managed during the design and construction phases of the project.

1.5 Proposed Site Works

It is proposed to develop the site for residential use with public open space (POS), with the core of the wetland retained as shown in Figure 3. The subdivision plan (Figure 3) has been modified slightly to that assessed in the PER and has been approved by the EPA as a part of Section 45C Referral (see Appendix B).

Remedial works will be undertaken prior to development in order to remove geotechnically unsuitable material (uncontrolled fill) which locally exceeds the Department of Environment and Conservation's (DEC's) Ecological Investigation Levels (EIL) guidelines for metals and contains some asbestos sheeting fragments.

The potential noise impacts considered in this management plan include construction noise on existing nearby residents and the potential for existing and future transport related noise on residences built within the subject land.

Key construction activities that can generate noise include:

- Vehicles including trucks;
- Excavation equipment;
- Dozers and front end loaders;
- Graders and scrapers; and
- Installation of infrastructure.

Construction noise will occur principally during weekdays during the hours of 7am-7pm. Some 'out of hours' construction activities (i.e. after 7pm and before 7am on weekdays, and on weekends and public holiday) may occasionally be required to be undertaken. All construction work conducted 'out of hours' will be subject to compliance with the Noise Management and Mitigation Procedures outlined in Section 3.3.1 of this Noise Management Plan.

The closest residents to the proposed development area are separated from the site by Manning Road and Centenary Avenue, and are therefore as close as 150m northeast and 50m east of the site boundaries.

1.6 Project Schedule

Remediation earthworks to remove uncontrolled fill are anticipated to commence in June 2009 and are expected to be completed within six months. Bulk earthworks associated with subdivision will then be carried out for each stage of development. In total there is expected to be five further stages developed entailing approximately two months duration each for earthworks. However, the timing of subsequent stages will be linked with lot sales. It is anticipated that the first stage of saleable lots will be available in 2010.

1.7 Surrounding Landuses

Clontarf Bay on the Canning River forms the southern boundary of the site, and approximately 30% of the site comprises a Resource Enhancement category wetland which trends east-west along the northern central portion of the site. The wetland drains to Clontarf Bay along a narrow drainage line situated near the western edge of the site.

Curtin University is located to the northwest of the site, with the Clontarf Aboriginal College to the west, and residential housing located both to the north and east (Figure 2).

The topography of the site has historically been modified and the original size of the wetland has been reduced. During the 1940s, pine plantations and market gardens were present at the site. Drainage channels were also created and maintained to assist in reducing groundwater levels. It is understood that uncontrolled fill was imported to the site prior to 1968 in order to elevate the area occupied by the Christian Brothers' Clontarf Orphanage playing fields, in the southern portion of the site.

The site is bound to the east by Centenary Avenue and to the north by Manning Road. Both of these roads carry high traffic volumes and this may impact on the residents of the proposed development. There is existing low density housing to both the east and northeast of the subject land.

2 DESCRIPTION OF ENVIRONMENTAL ISSUE

The potential noise impacts considered include construction noise on existing nearby residents and the potential for existing and future transport related noise on residences built within the subject land.

2.1 Noise Emissions from Local Roads

Future residences located adjacent to the northern and eastern boundaries of the development site will receive noise from vehicles travelling along Centenary Avenue and Manning Road. Transport noise can potentially impact on the health, welfare and amenity of future residents if not managed appropriately.

A noise assessment and predictive modelling has been undertaken to determine the impact of existing and future ambient traffic noise levels on the proposed residential development (Herring Storer Acoustics, 2003). The assessment was compared with the Main Roads of Western Australia (MRWA) Noise Level Objectives (Herring Storer Acoustics, 2003). A copy of the 2003 noise assessment report by Herring Storer Acoustics is provided in Appendix C.

In 2005 the Western Australian Planning Commission (WAPC) released the *Draft State Planning Policy: Road and Rail Transport Noise*. This document is the main policy that the EPA uses to assess traffic noise impacts on proposed residential developments. As this document was released after the original Herring Storer Acoustics' 2003 noise assessment, a second assessment was commissioned by the Proponent in 2008. The second assessment resulted in the collection of additional acoustic measurements from the Cygnia Cove development site using automatic noise data loggers by Herring Storer Acoustics. Noise modelling previously carried out by Herring Storer Acoustics (2003) was calibrated using the data collected from the noise data loggers during the 2008 investigation. A copy of the 2008 report prepared by Herring Storer Acoustics is provided in Appendix D.

The average weekday calculated day and night noise levels from the monitored data collected during the 2008 noise measurement investigation for Manning Road and Centenary Avenue are shown in Table 1.

TABLE 1: AVERAGE DAY AND NIGHT TIME NOISE LEVELS dB(A) MANNING ROAD AND CENTENARY AVENUE

Date	Manning Road		Date	Centenary Avenue	
	Day Period	Night Period		Day Period	Night Period
19/6/08	68.8	59.5	4/7/08	69.3	52.0
20/6/08	69.0	60.7	5/7/08	51.3	49.5
21/6/08	67.7	61.1	6/7/08	40.7	38.9
22/6/08	66.6	61.7	7/7/08	69.8	39.6
23/6/08	68.4	58.7	8/7/08	73.4	46.6
24/6/08	68.7	59.3			

Note: Average day and night noise values were calculated from on-site logger data. These values are defined as:

- Day = is the logarithmic average of the 15 minute L_{eq} values between 0600 hours and 2200 hours
- Night = is the logarithmic average of the 15 minute L_{eq} values between 2200 hours and 0600 hours on the same day.

Calculations to the year 2021 have been undertaken taking into account the expected increase in vehicular movements on major roads in the area. Herring Storer Acoustics (2008) modelled three scenarios, these being:

- No noise barrier walls along the Manning Road and Centenary Avenue interfaces;
- An 1800mm noise barrier wall along the Manning Road and Centenary Avenue interfaces; and
- A 2000mm noise barrier wall along the Manning Road and Centenary Avenue interfaces.

The noise model took into account gaps in the noise barrier walls for the entry and exit points to the Cygnia Cove development site. The results of the noise contours for the above three scenarios are shown in Appendix D.

2.2 Noise Emissions from Construction Activities

With regard to construction activity, the nearest noise sensitive premises are located approximately 50m east and 150m north-east of the site boundaries. Noise can be generated at the site by the operation of construction equipment including mobile earthmoving equipment.

Construction noise has the potential to impact on the health, welfare and amenity of nearby existing residents where not managed appropriately.

3 MANAGEMENT STRATEGIES

The following text has been written in a manner suitable for use in tender documentation and includes the following terms:

Principal:	Trustees of the Christian Brothers in Western Australia Incorporated.
Civil Works Contractor:	Civil earthworks contractor appointed by Trustees of the Christian Brothers.
Principal's Environmental Consultant:	Environmental consultant appointed by Trustees of the Christian Brothers.
Site Superintendent:	Site Superintendent appointed by Trustees of the Christian Brothers.

The following management strategy has been developed by Coffey Environments for application at the Cygnia Cove development site. The Civil Works Contractor will be responsible for ensuring that all management measures outlined in the management strategy (or as agreed otherwise) are adhered to for the duration of their contract.

3.1 Performance Criteria

Noise received at the existing residences surrounding the site from construction equipment will need to comply with the requirements of the *Environmental Protection (Noise) Regulations* 1997 and specifically Regulation 13 "Construction sites". Where construction is undertaken during the day (0700 to 1900 hours) only, the occupier of the construction site must:

1. Carry out work in accordance with Section 6 of AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites.
2. Use equipment that is the quietest reasonably available.
3. Prepare a noise management plan if required by the Chief Executive Officer of the DEC.

For the purposes of the adopted criteria, the following definitions are applicable:

Construction site~ means premises or a public place on which the sole or principal activity is the carrying out of construction work.

Construction work~ means:

- a. The construction, erection, installation, alteration, repair, maintenance, cleaning, painting, renewal, removal, excavation, dismantling or demolition of, or addition to, any building or structure, or any work in connection with any of these things, that is done at or adjacent to the place where the building or structure is located;
- b. Work on which a hoisting appliance or any scaffold or shoring is used;
- c. Work in driving or extracting piles, sheet piles or trench sheet;

- d. Work in laying any pipe or work in lining pipe that is done at or adjacent to the place where the pipe is laid or to be laid;
- e. Work in sinking or lining or altering, repairing, maintaining, renewing, removing, or dismantling a well or borehole; or
- f. Road works, earth works or other similar site works or reclamation.

Transport noise is specifically excluded from *the Environmental Protection (Noise) Regulations 1997* under Regulation 3(a). The Western Australian Planning Commission (WAPC) in May 2005 released a Draft Planning Policy for Road and Rail Transport Noise. The policy included measures relating to outdoor noise exposure criteria for noise-sensitive premises. The criteria stated in the draft policy are shown in Table 2.

TABLE 2: EXTERNAL NOISE EXPOSURE CRITERIA FOR NOISE SENSITIVE LAND USES

TIME PERIOD	External Noise Exposure Level ¹ Criteria (dB)		
	Exposure Level 1 (Target)	Exposure Level 2	Exposure Level 3
Day 6.00am – 10.00pm	Less than L_{Aeq} 55	L_{Aeq} 55-60	Above L_{Aeq} 60
Night 10.00pm – 6.00am	Less than L_{Aeq} 50	L_{Aeq} 50-55	Above L_{Aeq} 55
Additional criteria for railways	Less than L_{Amax} 75	L_{Amax} 75-80	Above L_{Amax} 80

Note 1 Noise levels is to be determined at a point 1 metre from the edge of the site or building façade that is the most exposed to traffic noise, and at a height of 1.5 metre from the ground level at that point. Noise assessments should generally reflect the impact of any future growth in road and rail traffic, based on a 20 year forecast period.

The WAPC (2005) Policy also describes a series of Exposure Levels with Exposure Level 1 (Target) – a desirable target for residential and other noise-sensitive development, through to Exposure Level 3 where the level of outdoor noise exposure is not generally regarded as acceptable for conventional residential or other noise-sensitive development.

3.2 Objective

To protect the amenity of any nearby residents from noise and vibration by ensuring the noise and vibration comply with the criteria in the *Environmental Protection (Noise) Regulations 1997*.

3.3 Noise Management and Mitigation Procedures

3.3.1 Out of Hours Operations

All construction work conducted 'out of hours' will require the submission of a separate Noise Management Plan and will be subject to approval by the City of South Perth.

In the 24 hours prior to the commencement of the 'out of hours' work, the Site Superintendent will provide written notification to surrounding residents affected by the work. This written notification will include a 24-hour 'manned' telephone number for the Civil Works Contractor.

3.3.2 General Noise Management – Site Remediation/Development Phase

Besides on-site earthmoving activity noise, the bulk of the earth to be excavated and removed from the site will be via an access onto Centenary Avenue located along the eastern side of the site. The following measures will be undertaken during bulk earthworks and other civil works activities during the site remediation and developments phase:

- Particularly noisy activities will be scheduled for implementation in accordance with the *Environmental Protection (Noise) Regulations 1997* criteria in order to minimise public disturbance. The majority of construction activities will be undertaken within normal working hours (0700–1900 hours Monday to Saturday). Works conducted outside of normal working hours will be subject to the requirements outlined in Section 3.3.1.
- Personnel shall be trained in the operation of equipment that has the potential to generate noise emissions.
- In accordance with *AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Site*, the equipment used will be the quietest reasonably available.
- Personnel shall have access at all times to operational manuals for equipment being utilised and must be familiar with the procedures detailed in the operations manual.
- Equipment maintenance and inspection schedules shall be implemented to ensure that all equipment is operating as per the manufacturer's instructions and within regulatory requirements. This will include ensuring all noise control equipment is correctly fitted and operating at design performance.
- Locate compressors, mobile generators etc, as far away as possible from sensitive premises, where practicable.
- Use silencers and noise attenuation on mobile equipment where practicable.

3.3.3 Noise Emissions from Local Roads

Noise modelling of road traffic has been undertaken to assess predicted noise levels received along the northern and eastern boundaries of the proposed residential development provided as Appendices B and C (Herring Storer Acoustics, 2003 and 2008).

In relation to potential road noise experienced by prospective residents of the proposed Cygnia Cove development, generic abatement methods have been identified to minimise noise impacts. Noise

reduction required by building construction will be achieved by incorporating any or all of the following measures:

- Construction of noise barriers between the roadway and residential lots;
- Specifying appropriate setbacks of proposed residences from existing roadways;
- Specification of construction methods and materials in keeping with “quiet house design” principles (further details provided in Section 3.3.4); and
- Inclusion of an Annexure detailing quiet house design principles and a buyer acknowledgement of the noise potential from the adjoining road.

The principal conclusion of the traffic noise assessment undertaken (Herring Storer Acoustics, 2008) was that noise control measures in the form of a 2m high perimeter wall or noise barrier, should be constructed along Manning Road and Centenary Avenue. Herring Storer Acoustics (2008) concluded that the 2.0m high wall when used in conjunction with “Quiet House Design” represents the best practicable design for the barrier wall. A copy of the complete noise assessment is provided as Appendix D. It is noteworthy that the noise model took into account gaps in the noise barrier walls for the entry and exit points to the Cygnia Cove development site (Figure 4).

Noise Barriers

Noise barriers are solid obstructions built between high use roads and homes. Barriers can be formed from earth mounds or “berms” along the road, from high, vertical walls, or from a combination of earth berms and walls. Earth berms have a very natural appearance and are usually attractive. They also reduce noise by approximately 3dB more than vertical walls of the same height. However, earth berms can require a lot of land to construct, especially if they are very tall. Given the amount of available land area between the road reserve and proposed development, 2m high vertical walls will be constructed in accordance with the noise assessment recommendations (Appendix E). Noise barriers do not *completely* block all noise. Low frequencies are more difficult to control with barriers. An example of the proposed noise wall is provided in Appendix F.

The minimum heights and locations of the perimeter walls required to ensure compliance with the Noise Level Objectives were determined and are shown in Figure 4. The typical wall height is 2.0m. The attenuated noise impacts following installation of the perimeter walls at noise sensitive premises is shown in Figure 5. In order to be effective, the sound barrier must be solid in construction, free of gaps and of minimum surface mass 20kg/m^2 (eg. concrete, limestone, brick, 18mm thick timber, *Hardifence*, 1.2mm thick sheet metal etc).

3.3.4 Quiet House Design Principles

Based on the results of the noise modelling, calculations were carried out to determine the noise that would be received within the apartments due to passing vehicles (Herring Storer Acoustics, 2008b). Guidance on the calculations was taken from AS 3671-1989 *“Acoustics – Road Traffic Noise Intrusion-Building Siting and Construction”*. From the modelling the noise level received at proposed residence located along Manning Road and Centenary Avenue would be up to an LA₁₀ noise level of 67 dB (Herring Storer Acoustics, 2008b).

Notification of road noise levels and the Quiet House Design Guide will be placed on the Certificate of Title for the lots that will front onto Manning Road and Centenary Avenue. It will be a requirement that dwellings constructed on the affected lots shall be designed to meet the following internal LAeq criteria for night periods (being between 2200 and 0600 hours):

- | | |
|--|----------|
| • Work areas (including Kitchens, Laundries and Bathrooms) | 45 dB(A) |
| • Living areas | 40 dB(A) |
| • Sleeping areas | 35 dB(A) |

Dwellings should be designed such that:

- It is preferable for bedrooms on the first floor not to be located on façade facing either Manning or Centenary Avenue.
- Bedrooms at ground floor should preferably be located on the opposite side of the dwelling away from Manning Road or Centenary Avenue.
- Laundry and Bathrooms are preferably on the same side as either Manning Road or Centenary Avenue.
- The main entrance is to be protected from road noise received from either Manning Road and/or Centenary Avenue.
- Entry doors should be a minimum of 40mm solid hardwood doors in a minimum of 80mm (or greater) hardwood timber frames with rebates and acoustic door seals. Glazing inserts of a minimum of 6.38mm laminated glass are acceptable.
- Double brick or tiltup concrete construction.
- Awning or casement windows (with winders) in timber or commercial steel frames and compressible seals (windows visible from either Manning Road or Centenary Avenue).

Glazing to be:

- A minimum 10.38mm thick laminated glass to all upper level windows facing either Manning Road or Centenary Avenue;
- A minimum 10.38mm thick laminated glass to all bedrooms when located at ground floor level facing either Manning Road or Centenary Avenue;
- A minimum 6.38mm thick laminated glass to all other rooms

Note: Although timber or commercial steel frames are preferred, alternative framing systems are acceptable provided they do not derate the acoustical performance of the window system.

- Sliding doors are acceptable on the face opposite to either Manning Road or Centenary Avenue provided they have interlocking meeting stiles (i.e. Capral 889 or equivalent).

- Eaves to be enclosed using 6mm thick compressed cement sheeting or equivalent.
- Roofs are to be colourbond steel (or equivalent) with minimum 50mm anticon, with ceilings under all roof areas to be minimum one layer 13mm thick plasterboard and R3 insulation laid over the top.
- Recessed light fittings in bedroom ceilings to the top storey are to be acoustically rated.

All dwellings required to comply with the Quiet House Design Guide must submit to the local authority an Acoustic Report by a qualified Acoustic Engineer stating that the design and construction of the dwellings adequately attenuates noise emissions from either Manning Road or Centenary Avenue.

Alternative constructions are acceptable providing that they comply with the Quiet House Design Principles and are supported by an Acoustic Report by a qualified Acoustic Engineer stating that the design and construction of the dwellings adequately attenuates noise emissions from either Manning Road or Centenary Avenue to achieve an internal L_{Aeq} of 35 dB(A) within bedrooms, an L_{Aeq} of 40 dB(A) within living spaces, an L_{Aeq} of 45 dB(A) within work areas (including kitchens, laundries and bathrooms).

3.3.5 Grouped Housing Site

A grouped housing site is proposed at the corner of Manning Road and Centenary Avenue (Figure 3). With regards to noise intrusion at this site, the same design guidelines as listed above for the housing should also apply. However, noise levels at the corner will be marginally higher than for noise received from either Manning Road or Centenary Avenue individually. Herring Storer Acoustics (2008b) recommended that the following internal acoustic criteria be adopted for the night period (being between 2200 and 0600 hours):

- Work Areas (including kitchens, laundries and bathrooms) 45 dB(A)
- Living Spaces 40 dB(A)
- Bedrooms 35 dB(A)

To ensure the above criteria are met, the developer of the Group Housing site will need to submit to the local authority an Acoustic Report by a qualified Acoustic Engineer stating that the design and construction of the building(s) adequately attenuates noise emissions from either Manning Road or Centenary Avenue to achieve an internal L_{Aeq} of 35 dB(A) within bedrooms, an L_{Aeq} of 40 dB(A) within living spaces, an L_{Aeq} of 45 dB(A) within work areas (including kitchens, laundries and bathrooms).

Such reports are currently required for developments within the City of Perth, EPRA development area and Port Coogee.

3.4 Monitoring

Given the proposed management measures outlined in this Noise Management Plan, on-site monitoring during the site development phase is not proposed. However, the following measures will be implemented to ensure that the noise complaints received are recorded and where warranted, follow up investigative and remedial actions implemented:

- A 24 hour manned telephone number direct to the Civil Works Contractor will be provided on perimeter signage.
- The Civil Works Contractor will be responsible for the establishment and maintenance of a complaints register which will be located at the site office. All noise complaints received by the Civil Works Contractor are to be recorded in the register with the following information being recorded:
 - Name of the complainant and their contact details, including telephone number and address);
 - The date, time and details of the incident including an estimate of its duration;
- The Civil Works Contractor will be responsible for notifying the Site Superintendent and the Principal's Environmental Consultant.
- The Principal's Environmental Consultant will contact the complainant to establish the nature and cause of the complaint.
- Where multiple complaints have been made, further site investigations (which may involve taking noise measurements) will be undertaken. Where on-site noise recordings are taken, the results of the measurements will be compared with relevant prescribed standards.
- The Principal's Environmental Consultant will work with the Civil Works Contractor and the Site Superintendent to identify suitable corrective actions.
- The Complaints Register will be updated to include information relating to the corrective action implemented and the date the corrective action was initiated.

4 REPORTING, TRAINING AND RESPONSIBILITY

4.1 Reporting

Reporting of the Noise Management Plan for the Cygnia Cove site will be broken down into a number of components as shown below.

4.1.1 General Reporting

The progress and management of noise impacts during site remedial and development works will be reviewed and reported on an on-going basis through established reporting regimes such as Annual Progress and Compliance Reports (PCR) to the DEC's Audit Section and the City of South Perth. The Annual PCR will be prepared for the duration of earthworks carried out on site.

The number of noise complaints received each year will be reported to the DEC as part of PCR reporting requirements.

Where site-specific noise surveys are conducted during the remedial and development works, the PCR will include:

- A summary of the results of the noise survey and discussion of any remedial actions implemented to minimise the likelihood of recurrence; and
- An assessment of the information against available previous monitoring results, licence limits or other appropriate measures (eg. standards or guidelines).

4.1.2 Complaints, Incidents and Exceedances

A Complaints Register will be established and maintained by the Civil Works Contractor in the site office to record any complaints received, date, nature, and resolution action undertaken. Reporting of complaints to the Principal's Environmental Consultant and Principal will be the responsibility of the Civil Works Contractor.

The Principal's Environmental Consultant will contact any complainants that have concerns related to noise levels and determine the nature of the noise nuisance.

If the nuisance is of an on-going nature as deemed from the receipt of repeated valid complaints, the Civil Works Contractor and the Site Superintendent in consultation with the Principal's Environmental Consultant will take steps to ensure that any identified noise source is addressed in accordance with Incident and Exceedance Management Procedures discussed below.

Where noise surveys are conducted following repeated noise complaints, the results of all measurements will be evaluated against the prescribed standards by the Principal's Environmental Consultant. Where the emission levels are exceeded, the Civil Works Contractor and the Site Superintendent will be notified and the activity causing the problem will cease immediately.

The following corrective action should be taken prior to recommencing work:

- Recording of the date, time and reason for the incident or exceedance;
- Estimation of the period over which the exceedance occurred;
- Establishment and implementation of corrective action taken or planned to mitigate the noise exceedance; and
- Establishment of corrective action taken or planned to prevent a recurrence of the exceedance.

The Site Superintendent must advise the DEC within 24 hours of becoming aware of an exceedance of any measurement which indicates that any prescribed limit has been exceeded. The Site Superintendent must advise the DEC in writing within 14 days of becoming aware of an exceedance of the status of corrective actions implemented to address the problem.

The Civil Works Contractor (including its employees and sub-contractors) will be responsible for reporting environmental incidents and complaints on a designated Accident and Incident Report. Environmental incidents are defined as discharges or impacts that result from site works that exceed or have the potential to exceed the criteria specified in this Management Plan, and result in environmental harm.

Environmental incidents will be reported by the Civil Works Contractor to the Site Superintendent and Principal's Environmental Consultant.

Accident and Incident Reports and contact details for management of site activities will be provided in the site office while site works are being carried out. This will ensure that staff is able to immediately complete and submit a written record in the event of any environmental incident.

The Accident and Incident Report will include:

1. An *Incident Reporting Section* to be completed by the person reporting the incident. This section will require input of initial details of the incident, including:
 - the name of the person submitting the report;
 - the source of off-site impacts or discharges, including a description of the details of the operations that were being undertaken that resulted in the discharge or impact;
 - the duration of the environmental incident if it results in, or had the potential to result in, unacceptable off-site impacts;
 - a description of equipment or machinery being operated at the time that caused the discharge or impact; and
 - a description of the impact management measures that were in place and being used when the discharge or impact occurred.
2. An *Assessment Section* of the Incident Form will be completed which requires the incident to be assessed in terms of urgency and actions considered appropriate to remedy the incident and minimise environmental impacts. Information to be supplied in this section includes:
 - a brief assessment of the urgency and immediate impacts of the incident;
 - a description of the actions to be taken to rectify the discharges or impacts; and
 - an Action Report Section which includes:
 - details of the actions taken to immediately remedy the incident;
 - a brief report on the success of those actions; and
 - a description of changes to work practices or operations that are required to ensure that the incident will not re-occur together with a timetable for implementation of those changes.

The Accident and Incident Report will be given a sequenced identification number so that each form may be accounted for.

4.2 Training and Awareness

4.2.1 Site Induction

Site inductions will be held prior to the commencement of works for all Civil Works Contractors and Sub-Contractors involved in the project. During the site induction, potential environmental impacts and issues will be communicated to all site personnel. These communications may be in the form of training sessions and notices in a prominent position in the work place and will include:

- Overview of regulatory requirements relevant to the project;
- Information on the potential impacts of on-site works;
- Information to assist site personnel in identifying unacceptable off-site environmental impact problems;
- Protocols for the reporting of Occupational, Health, Safety and Environmental (OHS&E) incidents including a list of site contacts to be notified. Incidents are to be reported on an Accident and Incident Report Form;
- Instructions that all site personnel are responsible for reporting and where appropriate, taking action in the event of unacceptable impacts; and
- An outline of the contingency action plan that is to be used to rectify unacceptable off-site environmental impact or discharge problems.

4.2.2 Personnel Training

The Civil Works Contractor will be assessed as to their ability to achieve environmental performance consistent with the requirements of this Management Plan. The Site Superintendent or delegated nominee will assess the requirements of the sub-contract package and, where considered necessary, the Sub-Contractor(s) will be required to attend a specific training session.

The Civil Works Contractor will ensure all personnel performing duties required by this Management Plan are properly briefed. Where a need is identified, arrangements shall be made for appropriate environmental training. If necessary, assistance shall be provided initially to personnel (including sub-Civil Works Contractors) when carrying out assigned environmental duties until such time as the required training has been completed.

4.3 Responsibilities

4.3.1 Principal

The Principal for the project is ultimately responsible for the overall compliance with prescribed Ministerial Environmental Conditions and legislation relevant to the project.

4.3.2 Site Superintendent

The Site Superintendent will be the main contact and conduit for on-going liaison between the proponent and regulatory authorities. Advice from the Principal's Environmental Consultant may be sought as required.

The Site Superintendent will ensure that the appointed Civil Works Contractor is required to prepare and implement environmental protection programs, appropriate to their activities and to cooperate in the implementation of any environmental management plans implemented on the project.

The Civil Works Contractor will report directly to the Site Superintendent and will be responsible for implementing the Noise Management Plan.

4.3.3 Principal's Environmental Consultant

The Principal's Environmental Consultant will be responsible for activities associated with the inspection, auditing, provision of specialist advice on noise issues and liaison with regulatory agencies and the public.

Where necessary, the Principal's Environmental Consultant will undertake monitoring as described in Section 3.4. The results of the monitoring will be included in the PCR's. The PCRs will be prepared and submitted on an annual basis to the DEC and the City of South Perth for the duration of earthworks that are carried out on site.

The Principal's Environmental Consultant will be available to provide on-going environmental advice and support to the Site Superintendent and Civil Works Contractor as needed.

All management plans prepared to meet the requirements for Ministerial Statement No.692 (Appendix A), including this plan, will be made publicly available by the Principal's Environmental Consultant in accordance with EPA requirements. Notification of the availability of all management plans will be advertised through relevant media outlets (e.g. local newspapers), and copies of all management plans being lodged with:

- DEC Library – 2 copies;
- City of Canning library – 2 copies;
- City of South Perth library – 2 copies; and
- JS Battye Library – 2 copies.

4.3.4 Civil Works Contractor's Site Manager

The responsibility for day-to-day site management lies with the Civil Works Contractor's Site Manager. The Civil Works Contractor's Site Manager will take overall responsibility for the environmental performance during construction and site development and will be assisted by the Principal's Environmental Consultant as necessary.

The Civil Works Contractor has responsibility to ensure activities under their direct control are completed in compliance with this Noise Management Plan and any related Work Procedures, Inspection Plans, Procedural Checklists and Environmental Management Plans, as applicable.

In the event of absence from site, the Civil Works Contractor Site Manager will be represented by his delegate responsible for civil works.

The Civil Works Contractor is responsible for ensuring that all employees and civil works Sub-Contractors are fully cognisant of, and abide by, the Noise Management Plan.

The Civil Works Contractor will ensure all employees and Sub-Contractors are responsible for putting into practice the Noise Management Plan and shall ensure that the factors which may compromise the achievement of overall project or environmental objectives are brought to the attention of the Site Superintendent and Principal's Environmental Consultant.

The Civil Works Contractor's Site Manager will:

- Be the initial central point of contact for all site related environmental issues;
- Be responsible for ensuring employee and Civil Works Contractor adherence to the Noise Management Plan;
- Maintain the content and implementation of induction training and tool box sessions;
- Keep records of who has been trained and to advise the Environmental Manager when new staff commence;
- Instigate a program of environmental recording and (as appropriate) environmental reporting against key performance objectives;
- Periodically inspect pollution management structures and equipment to confirm availability and completeness; and
- Be responsible for reporting all incidents of breach of this Noise Management Plan to the Site Superintendent for the project.

4.3.5 All Employees

All employees engaged in field activities and under the direct control of Civil Works Contractor shall comply with the requirements of this Noise Management Plan. Formal commitment to abide by project requirements will be ratified through the employees' respective employment contracts.

5 REFERENCES

ATA Environmental (2004) *Clontarf Residential Subdivision, Waterford, Public Environmental Review (EPA Assessment No. 1467) Vol I & II, ATA Report No. 2003/91 Version 5.* June 2004.

(EPA) Environmental Protection Authority (2004) *East Clontarf Residential Development, Report and Recommendations of the Environmental Protection Authority, Bulletin 1156.* Environmental Protection Authority, Perth, December 2004.

Herring Storer Acoustics (2003) *Noise Level Impact Assessment – Clontarf Residential Subdivision Manning Road, Waterford.* A report prepared for ATA Environmental.

Herring Storer Acoustics (2008) *Cygnia Cove (East Clontarf) Development Corner Manning Road and Centenary Avenue, Waterford – Noise Study.* A report prepared for Richard Noble & Co.

Western Australian Planning Commission (2005). *State Planning Policy: Road and Rail Transport Noise (Draft).* Western Australian Planning Commission, Perth.

6 GLOSSARY

Terms and Acronyms

AHD stands for Australian Height Datum. Height in metres above Mean Sea Level +0.026m at Fremantle

“construction site” means premises or a public place on which the sole or principal activity is the carrying out of construction work

“construction work” means —

- a. the construction, erection, installation, alteration, repair, maintenance, cleaning, painting, renewal, removal, excavation, dismantling or demolition of, or addition to, any building or structure, or any work in connection with any of these things, that is done at or adjacent to the place where the building or structure is located;
- b. work on which a hoisting appliance or any scaffold or shoring is used;
- c. work in driving or extracting piles, sheet piles or trench sheet;
- d. work in laying any pipe or work in lining pipe that is done at or adjacent to the place where the pipe is laid or to be laid;
- e. work in sinking or lining or altering, repairing, maintaining, renewing, removing, or dismantling a well or borehole; or
- f. road works, earth works or other similar site works or reclamation.

DEC stands for Department of Environment and Conservation

EPA stands for Environmental Protection Authority (Western Australia)

“influencing factor”, in relation to noise received at noise sensitive premises, means the influencing factor determined under Schedule 3

“ $L_{A\max}$ assigned level” means an assigned level which, measured as a $L_{A\text{ Slow}}$ value, is not to be exceeded at any time

“ L_{A1} assigned level” means an assigned level which, measured as a $L_{A\text{ Slow}}$ value, is not to be exceeded for more than 1% of the representative assessment period

“ L_{A10} assigned level” means an assigned level which, measured as a $L_{A\text{ Slow}}$ value, is not to be exceeded for more than 10% of the representative assessment period

PER stands for Public Environmental Review

Units

dB	decibels
dB(A)	decibels (A-weighted)
ha	hectares
km	kilometres
m	metres (length)
mm	millimetres (length)
m ²	square metres (area)
m ³	cubic metres (volume)
°C	degrees Celsius (or Centigrade)
%	percent

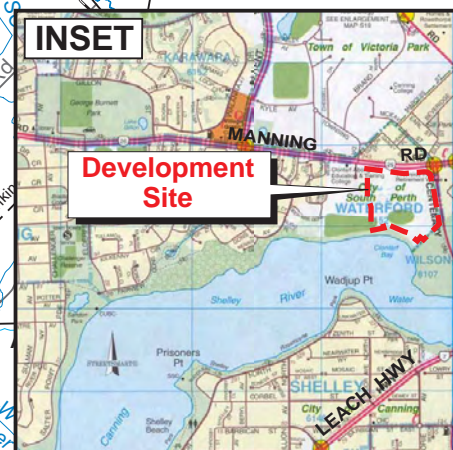
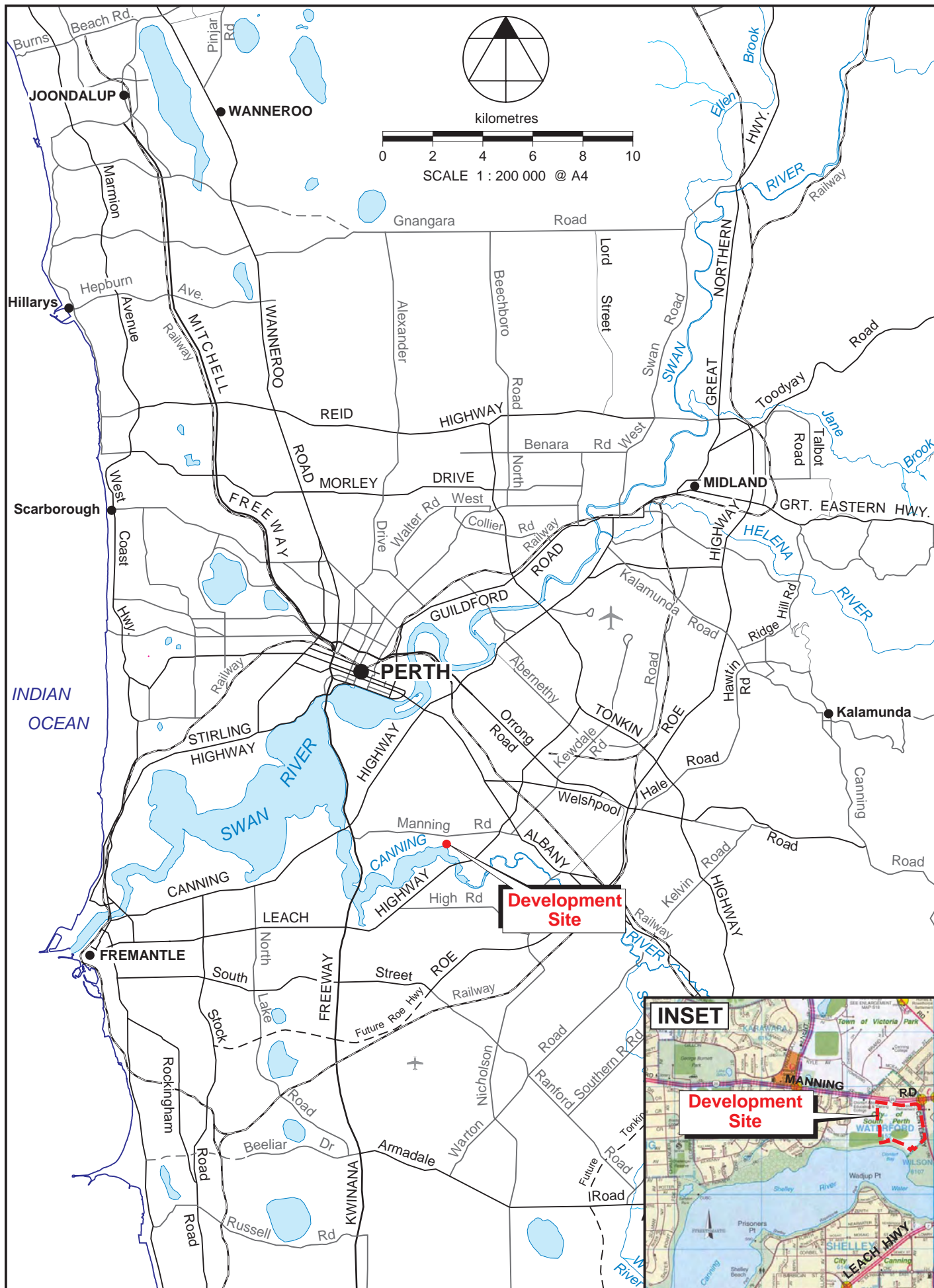
7 DISCLAIMER

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Figures

**Noise Management Plan,
Cygnia Cove Estate, Waterford**



NOISE MANAGEMENT PLAN
CYGNIA COVE, WATERFORD
REGIONAL LOCATION

FIGURE 1

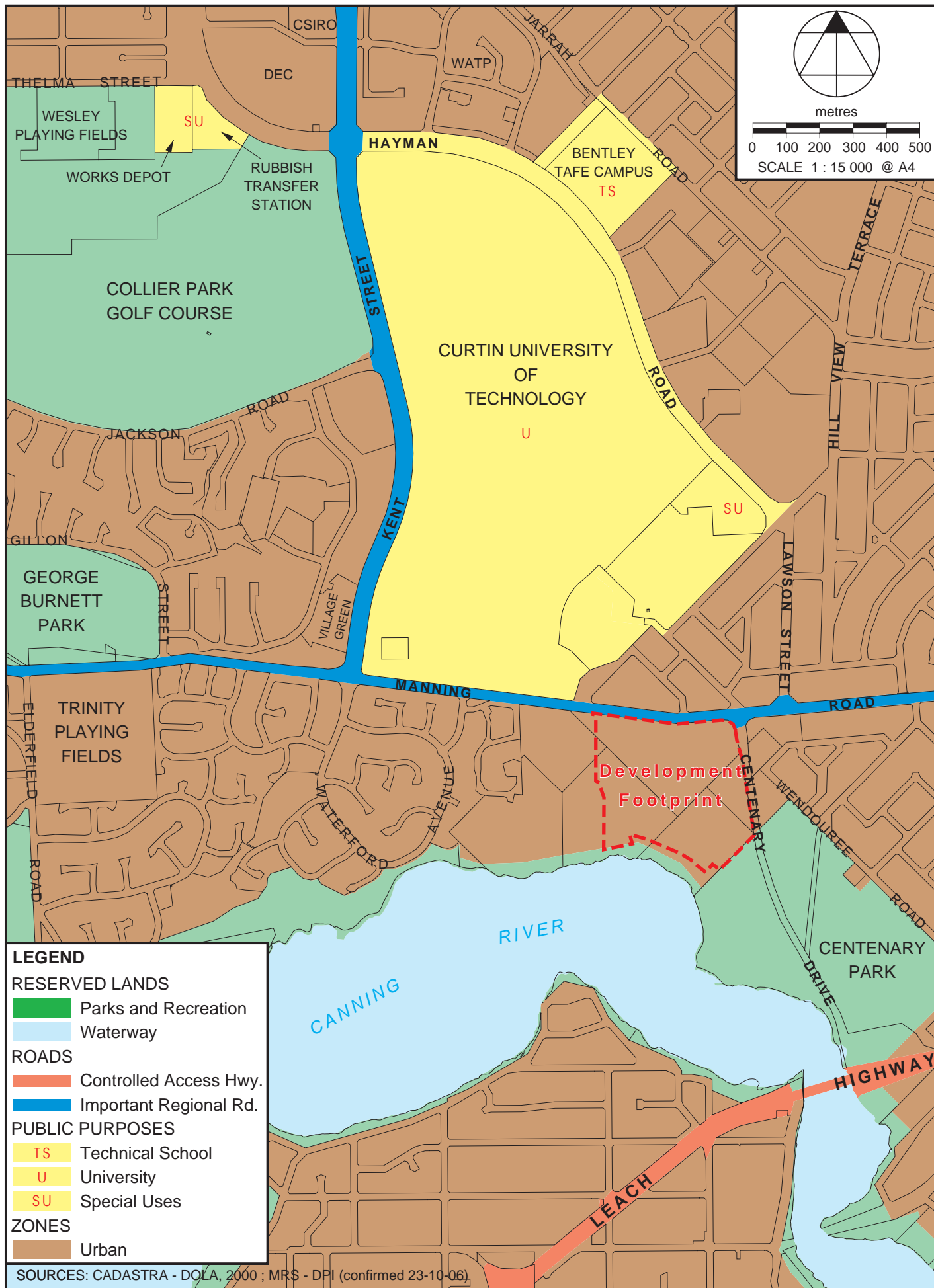
PRINTED: Tue 23 Sep 08

CHECKED: PZ 23-09-08

DRAWN: TE/OR 15-09-08

DATUM: MGA zn50

ENV/PERT/00212AA/Noise Management Plan/2006-276F02.dgn



NOISE MANAGEMENT PLAN CYGNIA COVE, WATERFORD **SURROUNDING LAND USE**

FIGURE 2



LEGEND

- Subdivision Application Area Boundary
- Development Footprint Boundary
- Easements

Areas and dimensions subject to survey.
Carriageways are diagrammatic only.

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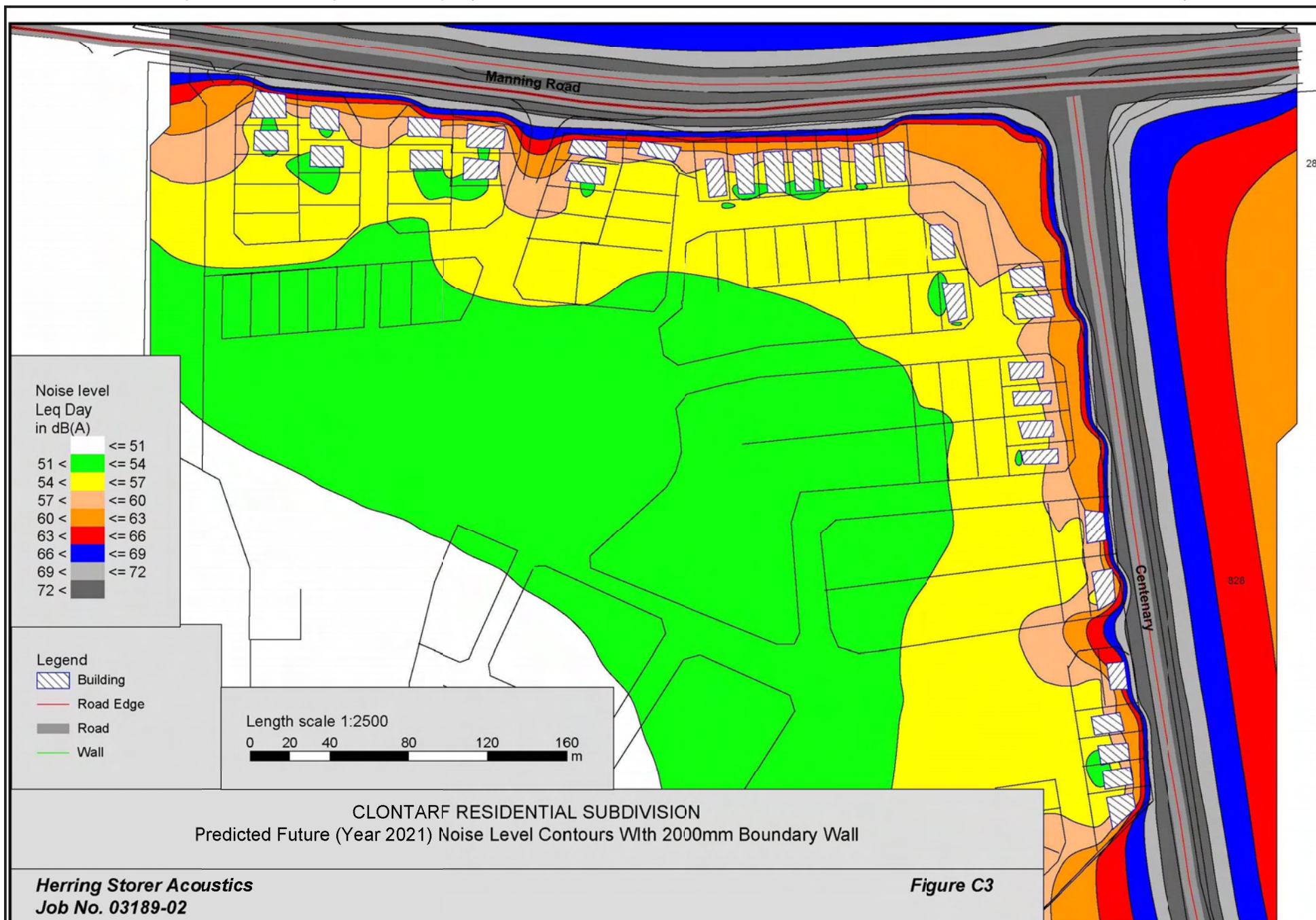
NOISE MANAGEMENT PLAN
CYGNIA COVE, WATERFORD
SUBDIVISION PLAN
FIGURE 3

SOURCES: SUBDIVISION : DPS, 23-3-06
AERIAL PHOTO : Landgate, 3-2008, Taken 12-2006



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**NOISE MANAGEMENT PLAN
CYGNIA COVE, WATERFORD
SOUND BARRIER DESIGN
FIGURE 4**

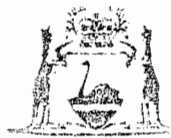


SOURCE: Herring Storer Acoustics

Appendix A

Ministerial Statement 692

**Noise Management Plan,
Cygnia Cove Estate, Waterford**



GOVERNMENT OF WESTERN AUSTRALIA

MINISTER FOR THE ENVIRONMENT; SCIENCE

Statement No.

000692

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)**

**EAST CLONTARF RESIDENTIAL DEVELOPMENT
WATERFORD, CITY OF SOUTH PERTH**

Proposal: The residential development of the East Clontarf site, Waterford, as documented in schedule 1 of this statement.

Proponent: Trustees for The Christian Brothers in Western Australia Inc

Proponent Address: c/- Richard Noble and Associates, PO Box 7071 Cloisters' Square, PERTH WA 6850.

Assessment Number: 1467

Report of the Environmental Protection Authority: Bulletin 1156

The proposal referred to above may be implemented by the proponent subject to the following conditions and procedures:

1 Implementation

- 1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent Commitments

- 2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

Published on

11 OCT 2005

3 Proponent Nomination and Contact Details

- 3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.
- 3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.
- 3-3 The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

- 4-1 The proponent shall substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment will determine any dispute as to whether the proposal has been substantially commenced.

- 4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

- 1. the environmental factors of the proposal have not changed significantly;
- 2. new, significant, environmental issues have not arisen; and
- 3. all relevant government authorities have been consulted.

Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

5 Compliance Audit and Performance Review

- 5-1 The proponent shall prepare an audit program and submit compliance reports to the Department of Environment which address:

1. the status of implementation of the proposal as defined in schedule 1 of this statement;
2. evidence of compliance with the conditions and commitments; and
3. the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environment is empowered to monitor the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

6 Wetland

- 6-1 Within 12 months following subdivision/development approval, the proponent shall substantially commence construction of an approximately 1.9-hectare wetland shown in Figure 1 of schedule 1 as Public Open Space, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This wetland shall include the following:

1. Black Swan breeding habitat;
 2. revegetation with local indigenous species;
 3. landform recontouring;
 4. establishment and maintenance of wetland connection to Clontarf Bay and the Canning River;
 5. weed control measures;
 6. water quality and quantity monitoring; and
 7. contingency measures to maintain or improve water quality of water flowing into Clontarf Bay and the Canning River.
- 6-2 Prior to commencement of construction of the wetland required by condition 6-1, the proponent shall prepare a Wetland Management Plan which includes identification of species to be used in revegetation works on site, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.
- 6-3 The proponent shall implement the Wetland Management Plan required by condition 6-2.
- 6-4 The proponent shall make the Wetland Management Plan required by condition 6-2 publicly available.

7 Water Quality

- 7-1 Prior to ground-disturbing activity, the proponent shall prepare a Drainage, Nutrient, Irrigation and Water Quality Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Plan shall address the following environmental quality objectives as described in *Riverplan – An Environmental Management Framework for the Swan and Canning Rivers (August 2004)* to protect, restore and maintain:

1. ecosystem health;
 2. biological diversity;
 3. natural landscape;
 4. recreation; and
 5. water supply.
- 7-2 The proponent shall implement the Drainage, Nutrient, Irrigation and Water Quality Management Plan required by condition 7-1.
- 7-3 The proponent shall make the Drainage, Nutrient, Irrigation and Water Quality Management Plan required by condition 7-1 publicly available.
- 7-4 Prior to ground-disturbing activity, the proponent shall prepare an Ecotoxological Testing Plan to monitor the benthic habitat at the wetland discharge point into Clontarf Bay, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.
- 7-5 The proponent shall implement the Ecotoxological Testing Plan required by condition 7-4.
- 7-6 The proponent shall make the Ecotoxological Testing Plan required by condition 7-4 publicly available.

8 Site Contamination

- 8-1 Prior to ground-disturbing activity, the proponent shall prepare a Site (Soil and Groundwater) Contamination Investigation, Remediation and Validation Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority with the concurrence of the Department of Health.

This Plan shall be prepared in general accordance with the Department of Environment *Contaminated Sites Management Series of Guidelines*, and shall include:

1. an Acid Sulfate Soil Management Plan; and
 2. an Asbestos Management Plan.
- 8-2 The proponent shall implement the Site (Soil and Groundwater) Contamination Investigation, Remediation and Validation Plan required by condition 8-1.
- 8-3 The proponent shall make the Site (Soil and Groundwater) Contamination Investigation, Remediation and Validation Plan required by condition 8-1 publicly available.

Procedures

- 1 Where a condition states “to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority”, the Environmental Protection Authority will provide that advice to the Department of Environment for the preparation of written notice to the proponent.
- 2 The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.
- 3 Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.

Notes

- 1 The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.

Dr Judy Edwards MLA
MINISTER FOR THE ENVIRONMENT; SCIENCE

11 OCT 2005

The Proposal (Assessment No. 1467)

The proposal is for:

- the residential development of the 18-hectare East Clontarf site bounded by Manning Road, Centenary Avenue, the Clontarf Aboriginal Campus and the Canning River, creating up to 200 lots, as shown in Figure 1;
- the filling and draining of approximately 2.1 hectares of Resource Enhancement wetland identified in the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* and the *Draft Environmental Protection (Swan Coastal Plain Wetlands) Policy 2004*;
- the creation of an approximately 1.9-hectare wetland and associated upland vegetation adjacent to the existing wetland and Canning River;
- increasing the river foreshore area by approximately 8350 square metres;
- investigation into soil and groundwater contamination, and remediation as required;
- installation of two additional monitoring bores to perform additional ground and surface water monitoring; and
- provision of road frontage along both the wetland and the river foreshore, but not including the western section of Public Open Space which is to be a revegetated dryland buffer.

Table 1 – Key Proposal Characteristics

Element	Description
Proposal	Creation of up to 200 residential allotments
Area of disturbance	Approximately 16 hectares
Major components – <ul style="list-style-type: none"> • Wetland modification • Dewatering • Disturbance to site hydrology • Remediation of site contamination • Additional foreshore reserve • Potential acid sulfate disturbance • Created wetland • Noise and dust creation 	<p>Draining and filling of approximately 2.1 hectares of Resource Enhancement wetland as depicted on schedule 1.</p> <p>Creation of not less than 1.9 hectares (approximately) of wetland.</p> <p>Provision of 8350 square metres of additional foreshore reserve.</p> <p>Hydrological maintenance – water quality and quantity.</p> <p>Remediation of on-site contamination.</p>

Figure (attached).

Figure 1 - Residential Development Plan

Schedule 2

Proponent's Environmental Management Commitments

(September 2005)

**East Clontarf Residential Development
Waterford, City of South Perth**

(Assessment No. 1467)

Trustees for
The Christian Brothers in Western Australia Inc

Proponent's Environmental Management Commitments – September 2005

EAST CLONTARF RESIDENTIAL DEVELOPMENT, WATERFORD (Assessment No. 1467)

Note: The term “commitment” as used in this schedule includes the entire row of the table and its six separate parts as follows:

- a commitment number;
- a commitment topic;
- the objective of the commitment;
- the ‘action’ to be undertaken by the proponent;
- the timing requirements of the commitment; and
- the body/agency to provide technical advice to the Department of Environment.

No.	Topic	Objective	Action	Timing	Advice
1.	Construction Management	<p>To protect the remnant wetland vegetation identified for protection within <i>Bush Forever</i> adjoining the development from potential impacts associated with construction.</p> <p>To minimise (direct and indirect) impacts associated with the construction of the residential development and surrounds on fauna, surface and groundwater quality and quantity and local residents.</p>	<p>Prepare and implement a Construction Environmental Management Plan (CEMP) to the satisfaction of the DoE and the Cities of South Perth and Canning, which addresses:</p> <ol style="list-style-type: none"> 1. Dewatering Program; 2. Detailed Remediation Assessment of Contaminated Soils; 3. Acid Sulfate Soils Management Plan; 4. Construction Noise Management Procedures; and 5. Construction Dust Management Procedures. 	<p>Prepared and approved prior to construction.</p> <p>Implemented during construction.</p> <p>Audits to be completed during construction works and post-construction.</p>	<p>City of South Perth</p> <p>City of Canning</p>

No.	Topic	Objective	Action	Timing	Advice
2.	Foreshore Management	<p>To protect the conservation values identified for protection within the development adjacent to the Canning River foreshore.</p> <p>To mitigate proposed clearing within the development and enhance linkages and habitat value.</p>	<p>Prepare and implement a detailed Foreshore Management Plan to the satisfaction of the DPI, the SRT and the City of South Perth, which will include:</p> <ol style="list-style-type: none"> 1. Comprehensive weed eradication program; 2. Revegetating and restoring foreshore POS adjoining conservation areas with appropriate indigenous flora of the Canning River; 3. Increase the area contained within POS adjoining Bush Forever Site No. 333; 4. Creation of habitat and wildlife corridors; 5. Controlling vehicle and pedestrian access; 6. Construction of a dog-proof fence along the existing Foreshore Reserve, if considered appropriate; 7. Provision of public facilities; 8. Soil and plant source material hygiene; 9. Fire management including provision of fire hydrants; 10. Provision of educational and interpretative materials within the area to raise awareness of JAMBA/CAMBA species which frequent the area; 11. Encouraging community involvement and awareness by promoting control of pets (eg cats and dogs); 12. Water conservation principles; 13. Monitoring re-establishment or native and exotic plant species for a period of not less than 2 years followed by review; 14. Monitoring criteria to determine the success of the revegetation and weed eradication program; 15. Progress and compliance reporting; and 16. Timing and implementation schedule. 	<p>Preparation prior to construction.</p> <p>Implementation to be as determined in schedule within the Foreshore Management Plan.</p>	<p>CALM SRT City of South Perth</p>
3.	Wetland Management	To minimise impacts on wetlands and to offset any wetland impacts to ensure no net loss of function or value.	<p>Prepare and implement a Wetland Management Plan to the satisfaction of the DoE and the City of South Perth which will include:</p> <ol style="list-style-type: none"> 1. Identification of existing wetland area to be retained; 2. Avoiding direct and minimising indirect impacts on the wetland; 3. Ensuring no net loss of wetland values and functions; 4. Rehabilitation techniques to be employed; 	<p>Preparation prior to construction.</p> <p>Implementation to be as determined in schedule within the Wetland Management Plan.</p>	City of South Perth

No.	Topic	Objective	Action	Timing	Advice
			<ol style="list-style-type: none"> 5. Selection of appropriate local wetland and dryland species to maintain and enhance existing habitats; 6. Mitigation strategies for loss of any vegetation will be investigated, including both on-site and off-site options; 7. Creation of a new wetland area to be located adjacent to the existing wetland and the river foreshore suitable for Black Swan breeding habitat; 8. adopt existing mosquito and midge management protocols currently utilised by the City of South Perth; 9. Monitoring criteria to determine the success of the plan; 10. Progress and compliance reporting; and 11. Timing and implementation schedule. 		
4.	Groundwater Management	<p>To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.</p> <p>To determine the potential impacts of dewatering during the construction phase on the vegetation within the wetland areas, Canning River and groundwater quality.</p>	<p>(1) Prepare and implement a Groundwater Management Plan as a component of the CEMP to the satisfaction of the DoE, SRT and Water Corporation which will include:</p> <ol style="list-style-type: none"> 1. Determining the nature and extent of groundwater contamination; 2. Installation of 2 additional monitoring bores; 3. Quarterly sampling of both additional and existing monitoring bores for a 12-month period; 4. Groundwater flow characteristics; and 5. Groundwater contamination plume management. <p>(2) Develop a Dewatering Program as a component of the CEMP to the satisfaction of the DoE.</p>	<p>Preparation of Groundwater Management Plan and Dewatering Program prior to construction.</p> <p>Implementation as per Plan/Program.</p> <p>Construction works to be timed and staged to minimise the volume of dewatering required.</p>	SRT Water Corporation

No.	Topic	Objective	Action	Timing	Advice
5.	Drainage, Nutrient, Irrigation and Water Quality Management	<p>To maintain acceptable water quality within the wetland and the Canning River in keeping with the Riverplan framework of management and best practice in urban stormwater management.</p> <p>To ensure that no road surface run-off directly enters the wetland.</p> <p>To ensure that there is provision for contaminant spillage entrapment.</p>	<p>Prepare and implement a Drainage, Nutrient, Irrigation and Water Quality Management Plan (DNIWQMP) to the satisfaction of the DoE, the SRT and the City of South Perth, which will include:</p> <ol style="list-style-type: none"> 1. Design and construction of the detention/infiltration basin; 2. Periodic monitoring of the infiltration basin (post-construction) to ensure continued function and maintenance as required; 3. Quarterly sampling of surface water body for a 12-month period; 4. Maximising infiltration of uncontaminated stormwater at sources to recharge the groundwater system; 5. Water conservation principles; 6. Nutrient control; 7. Prescribed fertilizer applications for areas of POS; 8. Determination of flushing requirements, associated impacts and management options; 9. Treating contaminated stormwater via gross pollutant and sediment traps; 10. Directing treated stormwater into the Canning River along the south-eastern corner boundary of the site (as per DoE advice); 11. Monitoring criteria to determine the success of the plan; 12. Develop and implement contingency measures to be implemented in the event that monitoring criteria are exceeded; 13. Progress and compliance reporting; and 14. Timing and implementation schedule. 	<p>Preparation prior to construction.</p> <p>Implementation to be as determined within the DNIWQM Plan.</p>	SRT City of South Perth
6.	Site Contamination Assessments	To determine nature and extent of any soil or groundwater contamination present within the site which may pose a risk to human health or the environment.	<p>(1) Prepare and implement a Site Remediation (Contaminated Soils) Management Plan as a component of the CEMP to the satisfaction of the DoE.</p> <p>(2) Areas of soil identified as contaminated in excess of EIL or HIL criteria will be excavated (if directed by DoE) and the base and walls of the excavations validated in accordance with relevant DoE Guidelines for the Remediation of Contaminated Land.</p>	Preparation and implementation prior to site works in areas identified in the DSI as potentially contaminated.	DoH Worksafe City of South Perth City of Canning

No.	Topic	Objective	Action	Timing	Advice
			<p>(3) The excavated soil will then be assessed to determine the appropriate management option. A final decision on the management of excavated contaminated soils will be made once analytical results are available for excavated soil.</p> <p>(4) An alternative that may be considered is to screen the material to remove geotechnically unsuitable materials and then re-use the material as fill in appropriate areas on the site, such as POS.</p> <p>(5) A remediation assessment report will be submitted to DoE on conclusion of remediation works which provides detailed information on:</p> <ol style="list-style-type: none"> 1. The remediation strategy implemented; 2. The results of validation and stockpile sampling; and 3. Details of the management of all contaminated material. <p>(6) Where areas have been identified as potentially affected by asbestos cement sheeting, prepare a specific Health and Safety Plan.</p> <p>This plan will be prepared as an appendix to the overall Site Remediation Management Plan.</p>	Before works commence	
7.	Water Conservation Principles	To conserve water.	<p>Water conservation measures will be applied within the development. These include:</p> <ol style="list-style-type: none"> 1. Promoting the use of plant species which have low water and fertiliser requirements; 2. Utilising local native plant varieties in landscaping; 3. Promoting landscape treatments sympathetic to climatic conditions and prevailing site conditions – soil types, topography, environment, wetlands etc.; 4. Utilising "cluster or clump" plantings to provide useable shade areas and better use of reticulated water in preference to single item or symmetrical planting regimes; 5. Irrigating POS areas at appropriate times so as to reduce evaporative loss and minimise transpiration losses; and 6. Ensuring that the irrigation regime applied to areas of POS is responsive to prevailing weather conditions. 	To be considered within preparation of the Foreshore Management Plan, Groundwater Management Plan and the DNIWQMP (Commitments 3 and 9).	SRT City of South Perth

No.	Topic	Objective	Action	Timing	Advice
8.	Noise	To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that the noise levels meet statutory requirements and acceptable standards.	<p>Noise Management Procedures will be prepared for the site as part of the overall CEMP (see commitment 1).</p> <p>Measures to minimise noise levels received by proposed residences within the development from existing roadways will include:</p> <ol style="list-style-type: none"> 1. Construction of noise barriers between the roadway and residential lots; 2. Specifying appropriate setbacks of proposed residences from existing roadways; and 3. Specification of construction methods and materials (in keeping with “quiet house design” principles). 	<p>Prepared and approved prior to construction. Implemented during construction.</p> <p>Audits completed during construction works and post-construction.</p>	City of South Perth City of Canning
9.	Dust	To protect the surrounding land users such that dust and particulate emissions will not adversely impact on their welfare and amenity or cause health problems in accordance with the EPA’s Guidance Statement No. 18: Prevention of Air Quality Impacts from Land Development Sites.	<p>(1) Dust generated during construction will be minimised by the application of EPA guidelines and best practice in dust suppression.</p> <p>(2) Dust Management Procedures will be prepared for the site as part of the overall CEMP (see commitment 1).</p> <p>Measures to minimise dust levels will include:</p> <ol style="list-style-type: none"> 1. Watering of exposed surfaces; 2. Minimising working surfaces at any one time; and 3. Progressive rehabilitation of disturbed areas. 	<p>Prepared and approved prior to construction. Implemented during construction.</p> <p>Audits to be completed during construction works and post-construction.</p>	City of South Perth City of Canning
10.	Acid Sulfate Soil (ASS)	To plan and manage development that may potentially impact on ASS to avoid adverse effects on the natural and built environment and human activities and health.	<p>Prepare and implement an Acid Sulfate Soil Management Plan as a component of the CEMP (see commitment 1) to the satisfaction of the DoE, which will include:</p> <ol style="list-style-type: none"> 1. The area of PASS soils to be disturbed by excavation or dewatering will be minimised as far as possible; 2. Where ASS must be disturbed: <ul style="list-style-type: none"> • Earthworks will be completed as quickly as possible to minimise the time that the walls and base of excavations are exposed to the atmosphere; 	<p>Prepared prior to commencement of any earthworks or dewatering in areas identified as having potential for Acid Sulfate Soils.</p> <p>To be implemented during construction.</p>	SRT

No.	Topic	Objective	Action	Timing	Advice
			<ul style="list-style-type: none"> • Un-neutralised ASS/PASS will be stored for only limited periods on on-site bunded hardstand areas constructed from alkaline materials; • The quality of groundwater and dewatering effluents will be monitored regularly to ensure early detection of any alteration in water chemistry; and • if necessary, dewatering effluent will be treated to ensure that appropriate water quality is maintained; and <p>3. Where excavated soils must be directed for off-site disposal, they will be directed to a site approved for acceptance and/or treatment of ASS by the DoE.</p>		
11.	Archaeological Investigations	To fulfil the requirements stipulated on the Section 18 clearance of the <i>Aboriginal Heritage Act 1972</i> .	<p>(1) Apply for clearance under Section 18 of the <i>Aboriginal Heritage Act 1972</i> to remove both previously recorded sites and any new sites that emerge as a result of earthmoving procedures located within the site which will be impacted by the development.</p> <p>(2) Also undertake further archaeological investigations if required as part of the Section 18 clearance. Such investigations may include:</p> <ol style="list-style-type: none"> 1. Surface recording, mapping and collection of archaeological material; 2. Archaeological excavation and/or sub-surface evaluation; 3. Recovery of samples for radiometric dating; and 4. Analysis of recovered material. 	Site Heritage Protocol will be prepared prior to commencement of construction and implemented during construction, with any statutory processes followed as per the requirements of the <i>Aboriginal Heritage Act 1972</i> .	DIA

Abbreviations:

ASS - Acid sulfate soils
 CAMBA – China-Australia Migratory Birds Agreement
 CALM - Department of Conservation and Land Management
 DIA - Department of Indigenous Affairs
 DoE - Department of Environment
 DoH - Department of Health

Assessment No. 1467

Abbreviations continued:

DPI – Department for Planning & Infrastructure
DSI – Detailed site investigation
EIL – Ecological Investigation Levels
HIL – Health Investigation Levels
JAMBA - Japan-Australia Migratory Birds Agreement
PASS – Potential acid sulfate soils
POS – Public Open Space
SRT - Swan River Trust

Appendix B

Section 45c EPA Approval

**Noise Management Plan,
Cygnia Cove Estate, Waterford**



Environmental Protection Authority

Westralia Square,
141 St Georges Terrace, Perth, Western Australia 6000.
Telephone: (08) 9222 7000. Facsimile: (08) 9222 7155.

Postal Address: PO Box K822,
Perth, Western Australia 6842.
Website: www.epa.wa.gov.au

Ms Bernadette Van Der Wiele
ATA Environmental
for Trustees of the Christian Brothers in Western Australia Incorporated
2 Bulwer Street
PERTH WA 6000



Dear Ms Van Der Wiele

CHANGES TO THE EAST CLONTARF DEVELOPMENT - THE REPLACEMENT OF THE CAUSEWAY WITH A PEDESTRIAN BOARDWALK (STATEMENT 692)

Under section 45C of the *Environmental Protection Act 1986*, I am able to approve a change to a Proposal, without a Revised Proposal being submitted to the EPA, when it is considered that the change will not have a significant detrimental effect in addition to, or different from, the effect of the original Proposal.

The attachment describes the changes as a decrease in draining and filling of Resource Enhancement wetland and the creation of less wetland; this is a result of replacing the causeway with a pedestrian boardwalk. I consider that the proposed change will not result in a significant detrimental impact on the environment and, therefore, approval is granted under section 45C for those changes.

You are reminded that this approval to implement the changes does not replace any responsibilities you may have for obtaining approvals from other government agencies to implement the changes and, secondly, for clearing any conditions that may be required.

Yours sincerely

Walter Cox
CHAIRMAN

25 MAY 2006

[REF: AEdwards CRN218867]

Attachment to Statement 692

Change to Description of Proposal

Proposal: East Clontarf Residential Development Waterford, City of South Perth

Proponent: Trustees for the development of the Christian Brothers in Western Australia Inc.

Change: to Schedule 1.

From:

Element	Quantities/Description
Major components – <ul style="list-style-type: none"> Wetland modification Dewatering Disturbance to site hydrology Remediation of site contamination Additional foreshore reserve Potential acid sulfate disturbance Created wetland Noise and dust creation 	Draining and filling of approximately 2.1 hectares of Resource Enhancement wetland as depicted on schedule 1. Creation of not less than 1.9 hectares (approximately) of wetland. Provision of 8350 square metres of additional foreshore reserve. Hydrological maintenance – water quality and quantity. Remediation of on-site contamination.

To:

Element	Quantities/Description
Major components – <ul style="list-style-type: none"> Wetland modification Dewatering Disturbance to site hydrology Remediation of site contamination Additional foreshore reserve Potential acid sulfate disturbance Created wetland Noise and dust creation 	Draining and filling of approximately 2 hectares of Resource Enhancement wetland as depicted on schedule 1 Creation of not less than 1.8 hectares (approximately) of wetland. Provision of 8350 square metres of additional foreshore reserve. Hydrological maintenance – water quality and quantity. Remediation of on-site contamination.

Figure 1b. Wetland and Residential Areas Plan

Approval Date: 25/05/06

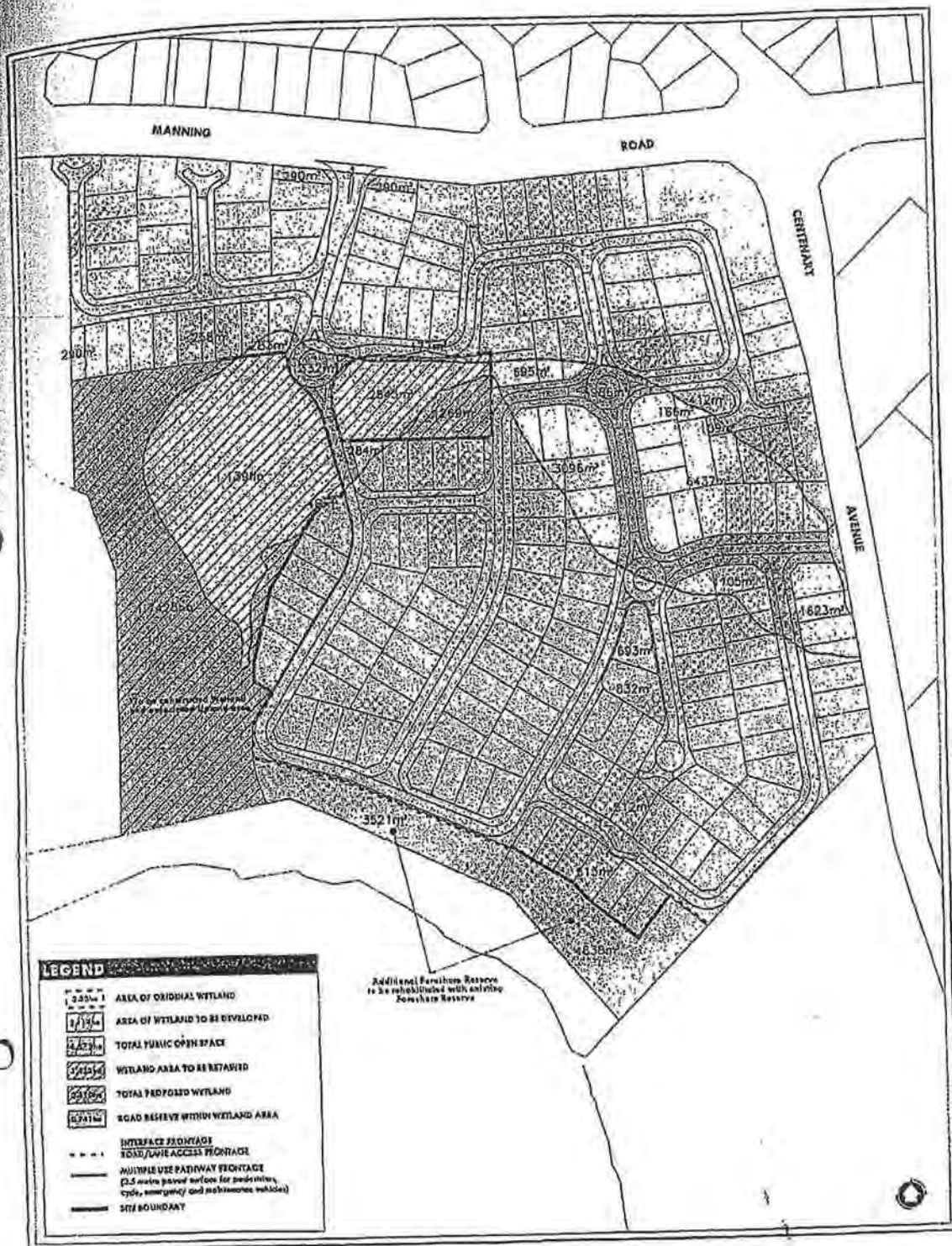
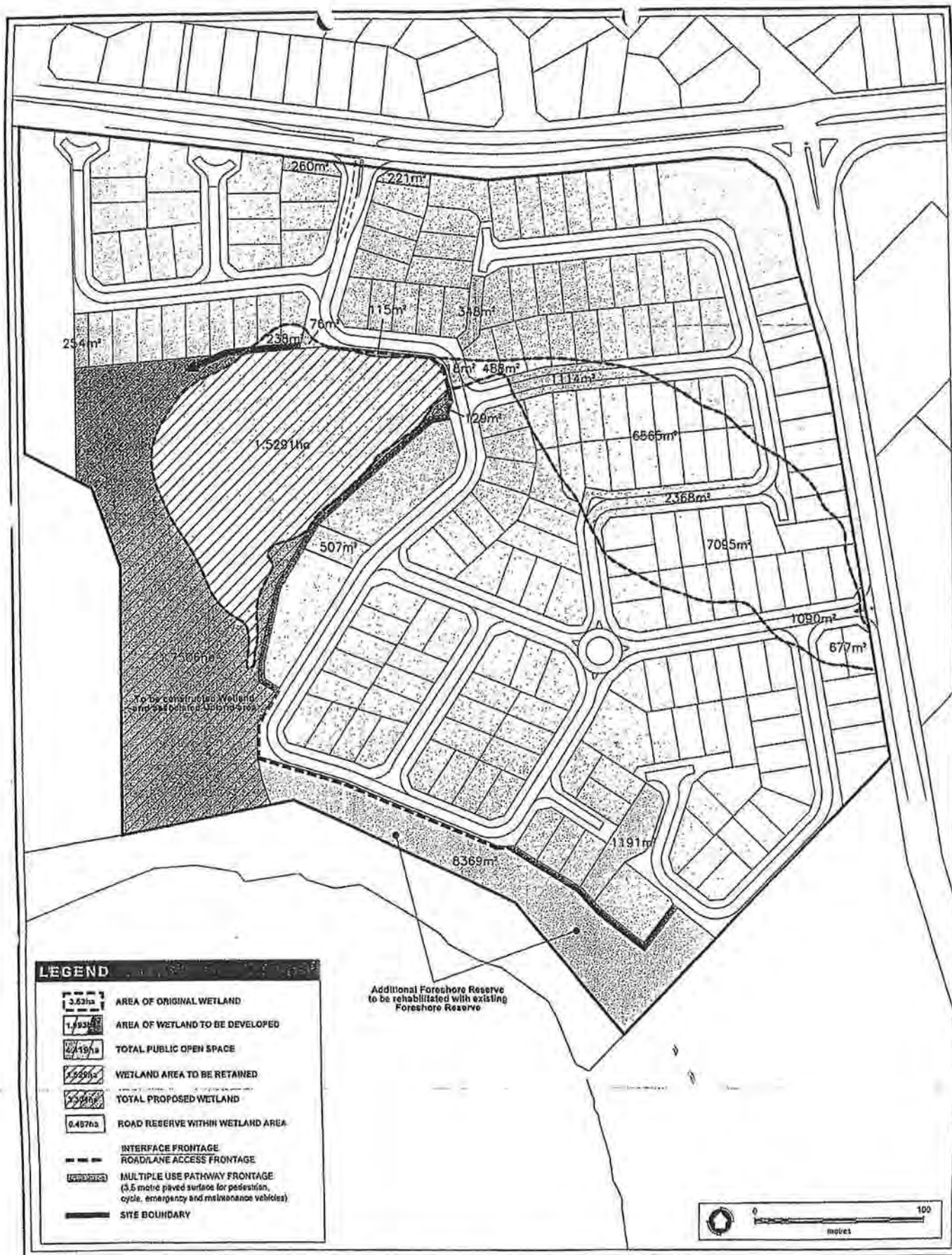


Figure 14 - Residential Development Plan

Note: The area for residential development is within the "site boundary", but excludes "Public Open Space", the "Wetland Area", and the "Area of Proposed Rehabilitated Wetland" indicated above.



WETLAND & RESIDENTIAL AREAS PLAN

EAST CLONTARF

Figure 1b

RICHARD NOBLE
Property consultants since 1913

DPS
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Appendix C
Herring Storer Acoustics' Noise
Assessment Report (2003)

Noise Management Plan,
Cygnia Cove Estate, Waterford

Rochdale Holdings Pty Ltd A.C.N. 009 049 067 trading as:

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ALLAN HERRING M.I.E. AUST. M.A.A.S.
LYNTON STORER M.A.I.E.A., M.A.A.S.
TIM REYNOLDS M.I.E. AUST. M.A.A.S.

NOISE LEVEL IMPACT ASSESSMENT

CLONTARF RESIDENTIAL SUBDIVISION MANNING ROAD, WATERFORD

FOR

ATA ENVIRONMENTAL

BY

HERRING STORER ACOSUTICS

DECEMBER 2003

REF: 2589-1-03189

CONTENTS

- 1.0 INTRODUCTION
- 2.0 SUMMARY
- 3.0 CRITERIA
- 4.0 METHODOLOGY
- 5.0 RESULTS

APPENDICIES

- A General Locality Map
- B Single Point Calculations
- C Noise Level Contour Maps
- D Sound Barrier Design

1.0 INTRODUCTION

Herring Storer Acoustics (HSA) has been commissioned by ATA Environmental (ATA), to assess the impact of existing and future ambient noise levels at a proposed residential development (Clontarf Residential Subdivision).

The development is located in the suburb of Waterford, on the southwest corner of Manning Road and Centenary Avenue.

The major contributor to ambient noise is road traffic from two boundary roads (Manning Road and Centenary Avenue). Accordingly, calculations have been made of the existing and future (Year 2021) traffic noise levels at the nearest proposed lots in order to assess the impact of the road traffic noise.

2.0 SUMMARY

Assessment of road traffic noise has been made in accordance with Main Roads Western Australia (MRWA) Noise Level Objectives. The objectives indicate acceptable noise levels of 63 dB $L_{A10(18\text{hour})}$ and 55 dB $L_{Aeq(8\text{hour})}$. The former covers the day period (0600 hours to midnight) and the latter the night period (2200 to 0600 hours).

Based on previous studies, it will be the $L_{A10(18\text{hour})}$ noise levels that determines compliance or otherwise, with the Noise Level Objectives. Hence, it is only this parameter that has been used in this report.

The predicted existing $L_{A10(18\text{hour})}$ noise levels at the nearest proposed residences ranges from 59 dB to 67 dB. Based on the estimated increase in road traffic volumes, the corresponding increase in noise level is 1 dB (i.e. 60 dB to 68 dB in the Year 2021).

Therefore, there are locations where the Noise Level Objective of 63 dB $L_{A10(18\text{hour})}$ is exceeded and noise control should be considered. The most practicable form of noise control is to construct a wall on the property boundaries. The minimum required wall heights to satisfy the objectives were determined and are shown in Appendix D, typically being 2.0 metres in height. The barrier is required to be solid in construction, free of gaps and of minimum surface mass 10kg/m² (e.g. concrete, limestone, brick, 18mm thick timber, hardifence, 1.2mm thick sheet metal etc).

3.0 CRITERIA

Main Roads Western Australia have criteria known as *Noise Level Objectives*, which include both a day and night time permissible noise level. These are stated as:

"Noise level criteria to be used in the assessment are the Noise Level Objectives specified in Table [3.1] below. Objectives are specified upper limits of traffic noise which it is intended, should not be exceeded. Objectives apply outside residential buildings, and outside public buildings such as hospitals, schools and libraries. In the case of public buildings there is a scope to relax the objectives if affected rooms are air-conditioned, and therefore normally used with windows closed."

TABLE 3.1 - NOISE LEVEL OBJECTIVES

Base Objective	Objective for High Ambient Areas
63 dB(A) $L_{10(18\text{hour})}$	Ambient + 3 dB(A)
55 dB(A) $L_{eq(8\text{hour})}$	Ambient + 3 dB(A)

Notes:

- (1) Noise levels are $L_{10(18\text{hour})}$ values, from 6am to midnight, and $L_{eq(8\text{hour})}$ values from 10 p.m. to 6 a.m.
- (2) Ambient noise is the level of noise before the road project commences
- (3) A high ambient area is where ambient noise is more than 60 dB(A) $L_{10(18\text{hour})}$, or 52 dB(A) $L_{eq(8\text{hour})}$.
- (4) Due to the impracticality of controlling noise at the upper floors of multi-storey buildings, noise assessment is restricted to the ground floor level.
- (5) Noise is assessed 1 metre from a building, and 1.2 to 1.5 metres above the ground floor level.
- (6) The objectives apply to the expected 15 to 20 years after opening of the road project, using available traffic forecasts.
- (7) Noise level objectives relate to the total traffic noise expected at a building facade, i.e. noise from the new road and any other roads.®

4.0 METHODOLOGY

Using the computer modelling programme SoundPlan 6.0, the existing and future noise immission levels were calculated. The input parameters used in the modelling are shown below in Table 4.1.

TABLE 4.1 – MODELLING INPUT PARAMETERS

Parameter	Manning Road	Centenary Avenue
Traffic Volumes		
Existing (vpd)	26410 ¹	16660 ¹
Future (vpd)	35000 ²	21919 ³
18 hour Traffic Volumes ⁴	94 % of 24 hour	94 % of 24 hour
Heavy Vehicles (%) ⁴	3	3
Speed (km/hr)	70	70
Ground	Flat	Flat
Road Surface	DGA ⁵	DGA ⁵
Façade Correction (+ 2.5) ⁶	+ 2.5	+ 2.5

Notes:

1. Obtained from Main Roads Western Australia website.
2. Manning Road has shown no growth in the past seven (7) years.
3. Based on 1.2% per annum increase in traffic volumes, aligning with past seven (7) years.
4. Based on past experience of typical traffic patterns.
5. Dense graded asphalt.
6. Accounts for reflection from dwelling façade.

It was assumed for both the existing and future noise levels that a 1.6 metre high boundary wall would be present.

Where it was calculated that the future noise levels will exceed the Main Roads Noise Level Objectives, the height of the boundary wall was increased until compliance was achieved.

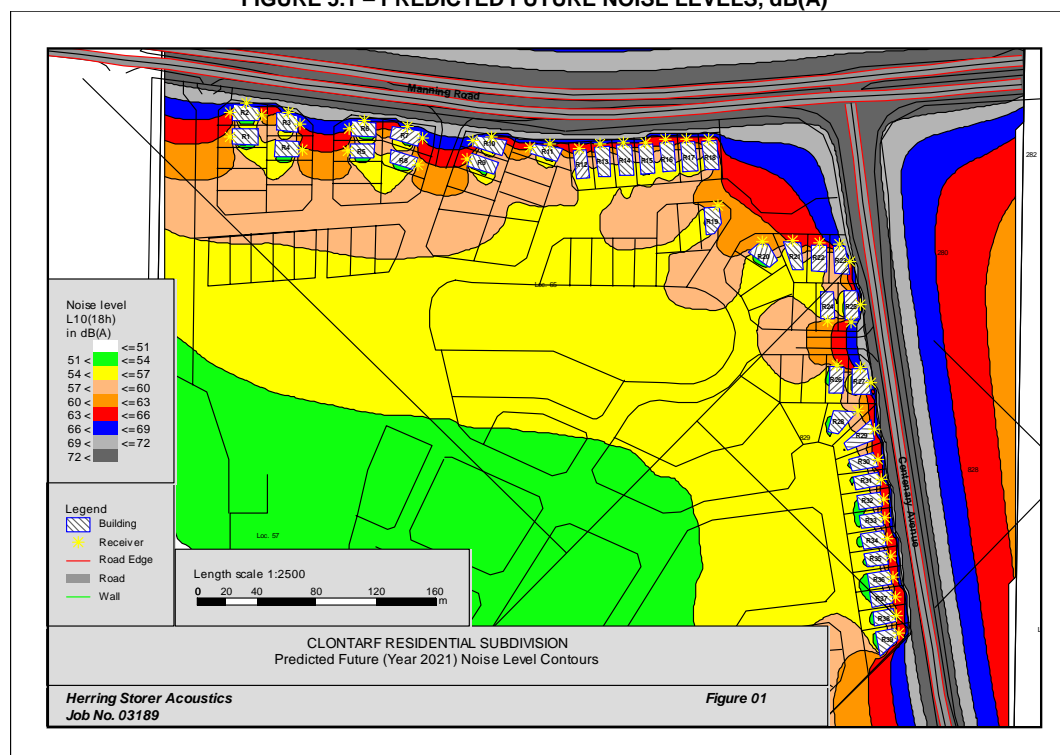
Note that in past projects, it has been found that the $L_{Aeq(8\text{hour})}$ is at least 8 dB less than the $L_{A10(18\text{hour})}$ values, such that it is the latter that is the determining parameter. Therefore, it is only the $L_{A10(18\text{hour})}$ value that has been calculated and assessed in this instance.

5.0 RESULTS

The $L_{A10(18\text{hour})}$ existing and future noise levels were calculated at the nearest future lots in the proposed Clontarf subdivision. The existing noise levels are shown in tabular format in Appendix B and range from 59 dB to 67 dB $L_{A10(18\text{hour})}$.

Future noise levels are also shown in tabular format in Appendix B as well as a noise level contour plot shown below in Figure 5.1 (refer Appendix C for full size plot). Future noise levels are predicted to increase by 1 dB compared to existing noise levels.

FIGURE 5.1 – PREDICTED FUTURE NOISE LEVELS, dB(A)

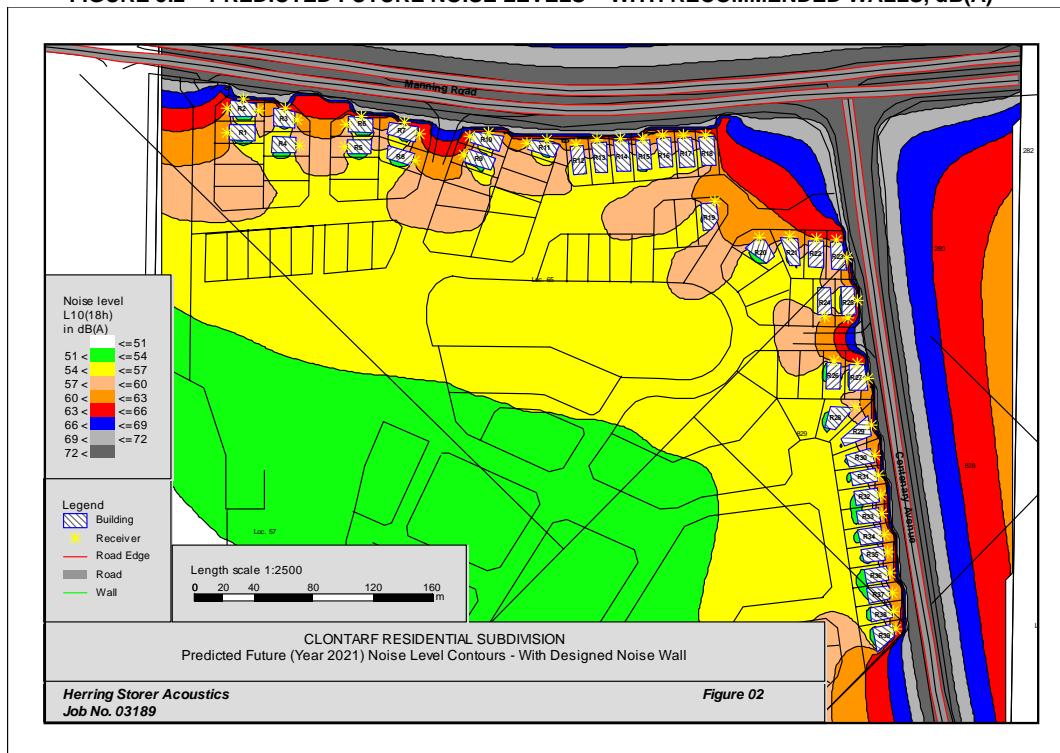


Noise levels are predicted to be above 63 dB $L_{A10(18\text{hour})}$, such that noise control is recommended. The most practicable form of noise control is to increase the height of the boundary walls.

The minimum heights and locations of the boundary walls required to ensure compliance with the Noise Level Objectives were determined and are shown in Appendix D. The typical wall height is 2.0 metres.

The noise model was then re-run with the specified walls and the results shown in Appendices B (single point calculations) & C (noise contour plot) as well as Figure 5.2 below.

FIGURE 5.2 – PREDICTED FUTURE NOISE LEVELS – WITH RECOMMENDED WALLS, dB(A)



Note that to be an effective sound barrier, it must be solid in construction, free of gaps and of minimum surface mass 10kg/m^2 (e.g. concrete, limestone, brick, 18mm thick timber, hardifence, 1.2mm thick sheet metal etc).

For: **HERRING STORER ACOUSTICS**

Terry George

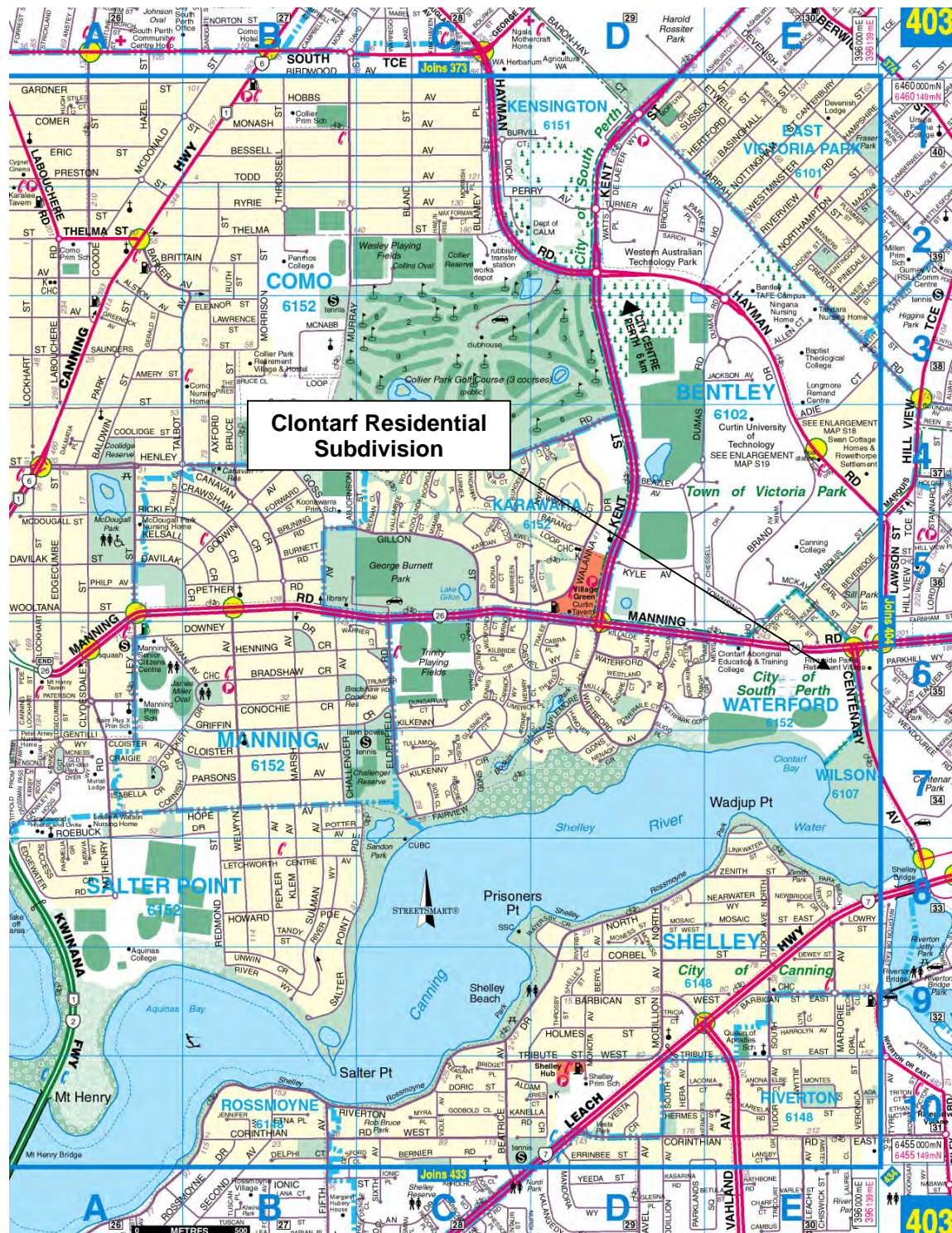
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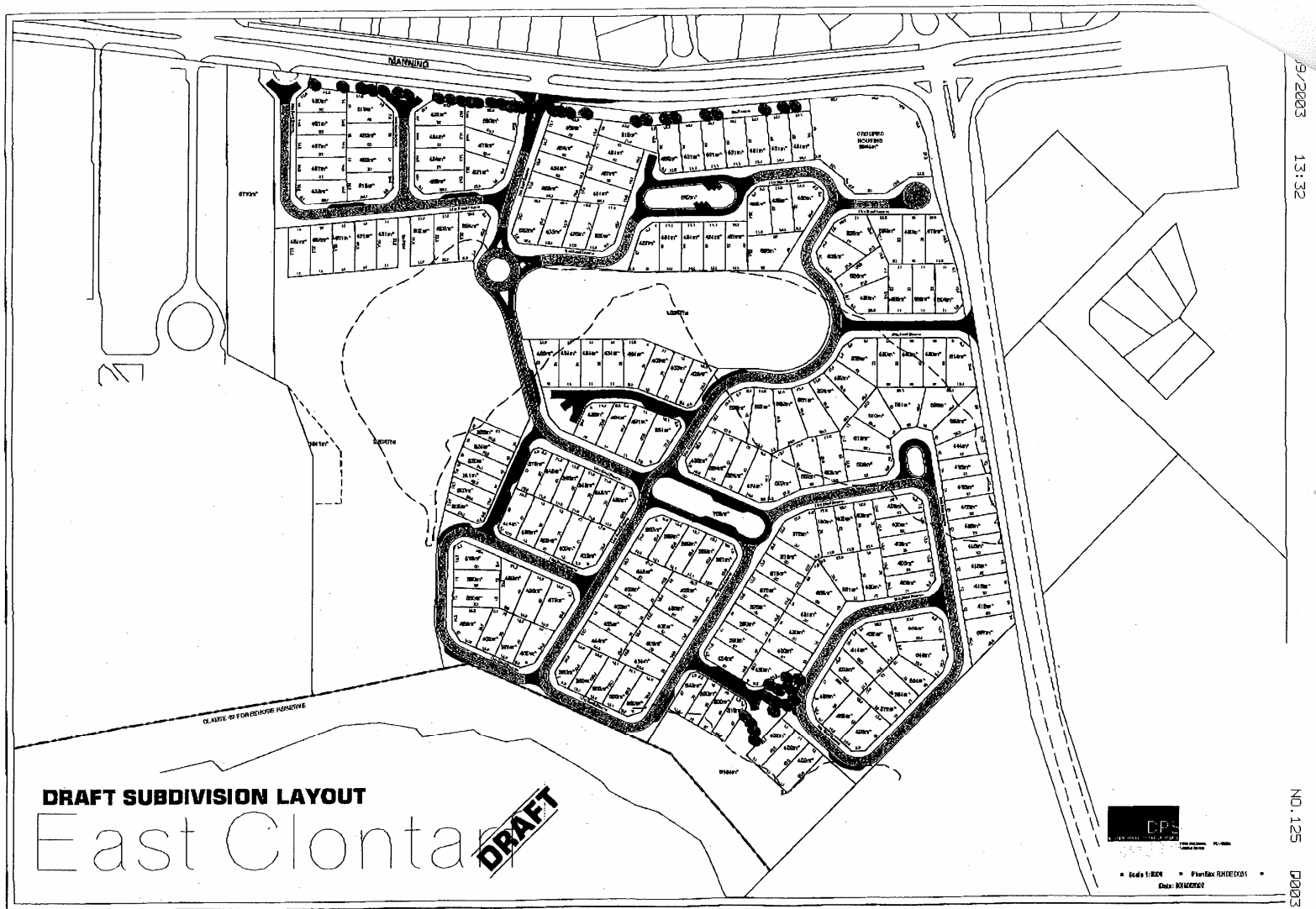
3 December 2003

APPENDIX A

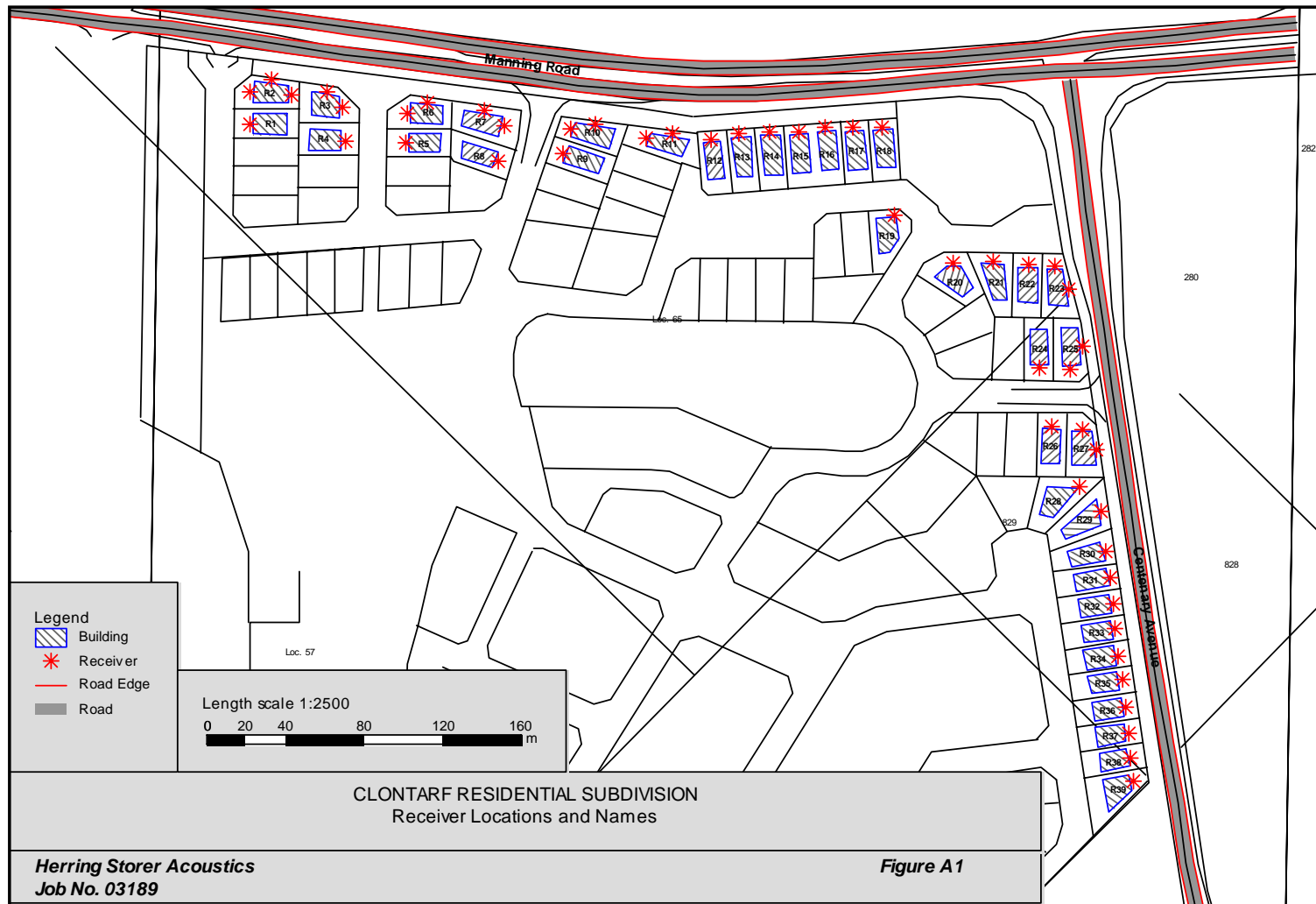
GENERAL LOCALITY MAP

Herring Storer Acoustics
Appendix A – General Locality Map





Herring Storer Acoustics
Appendix A – General Locality Map



APPENDIX B

SINGLE POINT CALCULATIONS

Herring Storer Acoustics
Appendix B – Single Point Calculations

RNo	Name	Existing L _{10,18hour} dB(A)	Future L _{10,18hour} dB(A)	Increase L _{10,18hour} dB(A)	Future With Designed Wall L _{10,18hour} dB(A)
1	R1 West	61.3	62.2	0.9	61.0
14	R2 East	62.2	62.5	0.3	60.9
15	R2 North	64.9	65.7	0.8	62.1
16	R2 West	64.7	65.6	0.9	63.1
30	R3 East	65.3	66.2	0.9	61.0
31	R3 North	66.0	66.6	0.6	62.7
42	R4 East	61.6	62.5	0.9	58.3
43	R5 West	61.3	62.2	0.9	58.0
44	R6 North	65.4	66.0	0.6	62.6
45	R6 West	65.0	65.9	0.9	60.7
46	R7 North	65.3	66.0	0.7	62.8
47	R7 West	65.3	66.3	1.0	62.4
48	R8 West	61.0	61.9	0.9	60.3
49	R9 West	62.9	63.8	0.9	62.2
2	R10 North	65.1	65.9	0.8	61.3
3	R10 West	66.3	67.2	0.9	62.8
4	R11 North	64.7	65.4	0.7	61.1
5	R11 West	62.8	63.1	0.3	60.6
6	R12 North	64.4	64.9	0.5	61.7
7	R13 North	64.8	65.4	0.6	61.6
8	R14 North	64.9	65.5	0.6	61.8
9	R15 North	64.9	65.4	0.5	62.0
10	R16 North	65.1	65.7	0.6	61.8
11	R17 North	64.9	65.3	0.4	62.2
12	R18 North	64.9	65.4	0.5	62.7
13	R19 North	60.9	61.8	0.9	61.2
17	R20 North	60.9	61.8	0.9	61.0
18	R21 North	62.4	63.3	0.9	62.2
19	R22 North	64.1	65.0	0.9	62.9
20	R23 East	65.3	65.8	0.5	63.0
21	R23 North	66.8	67.7	0.9	62.9
22	R24 East	66.0	66.6	0.6	63.0
23	R24 South	65.5	66.4	0.9	62.0
24	R25 South	60.5	61.4	0.9	59.8
25	R26 North	62.0	62.8	0.8	61.3
26	R27 East	65.9	66.5	0.6	61.9
27	R27 North	66.6	67.5	0.9	62.8
28	R28 East	59.9	59.9	0.0	59.1
29	R29 East	65.0	65.1	0.1	62.3
32	R30 East	64.7	64.8	0.1	62.9
33	R31 East	64.8	64.9	0.1	63.0

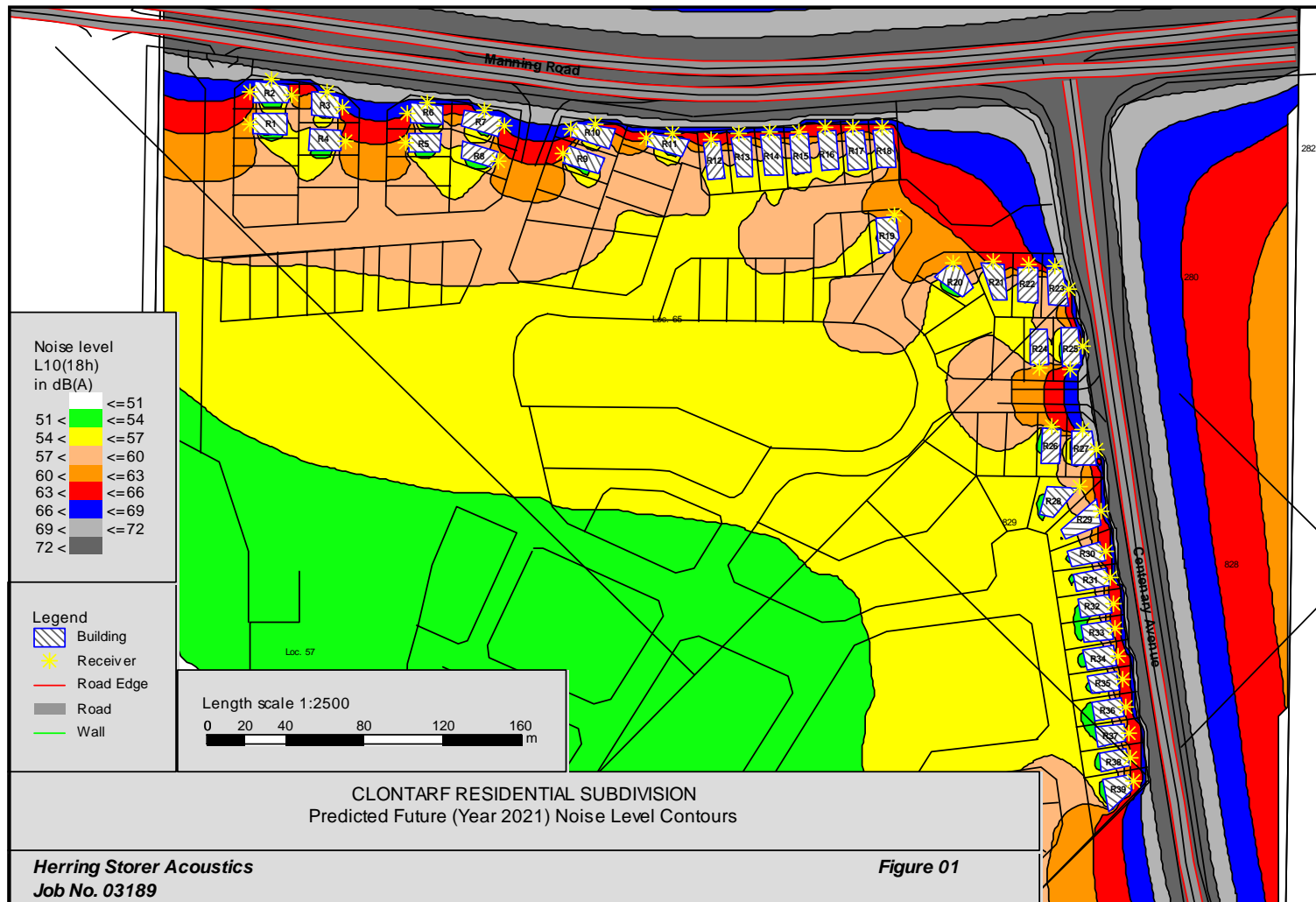
Herring Storer Acoustics
Appendix B – Single Point Calculations

RNo	Name	Existing L _{10,18hour} dB(A)	Future L _{10,18hour} dB(A)	Increase L _{10,18hour} dB(A)	Future With Designed Wall L _{10,18hour} dB(A)
34	R32 East	64.5	64.6	0.1	62.9
35	R33 East	64.2	64.2	0.0	62.6
36	R34 East	63.9	63.9	0.0	62.5
37	R35 East	64.2	64.2	0.0	62.6
38	R36 East	63.9	63.9	0.0	62.4
39	R37 East	63.8	63.8	0.0	62.4
40	R38 East	63.5	63.5	0.0	62.2
41	R39 East	63.5	63.6	0.1	62.9

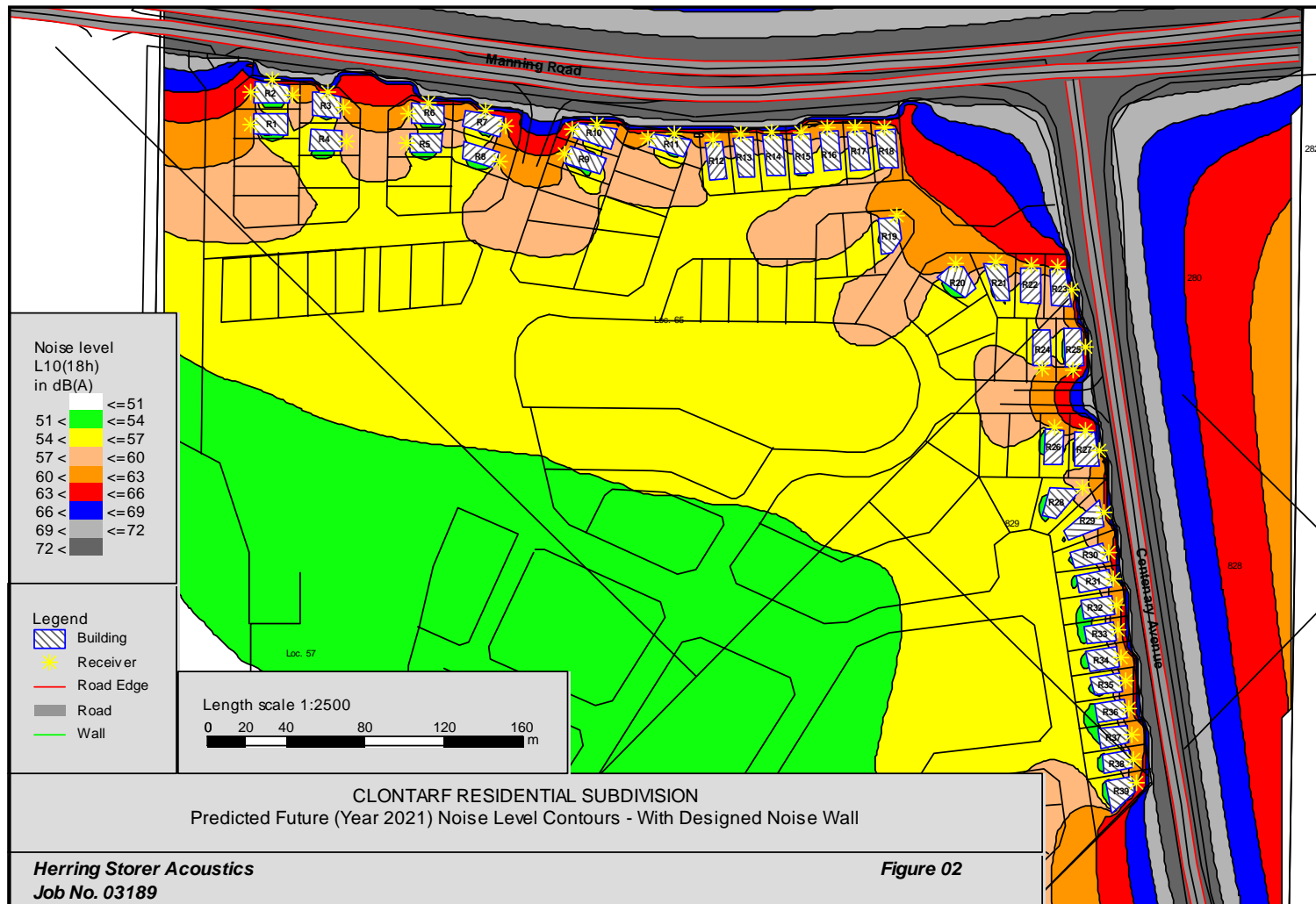
APPENDIX C

NOISE LEVEL CONTOUR PLOTS

Herring Storer Acoustics
Appendix C – Noise Level Contour Plots

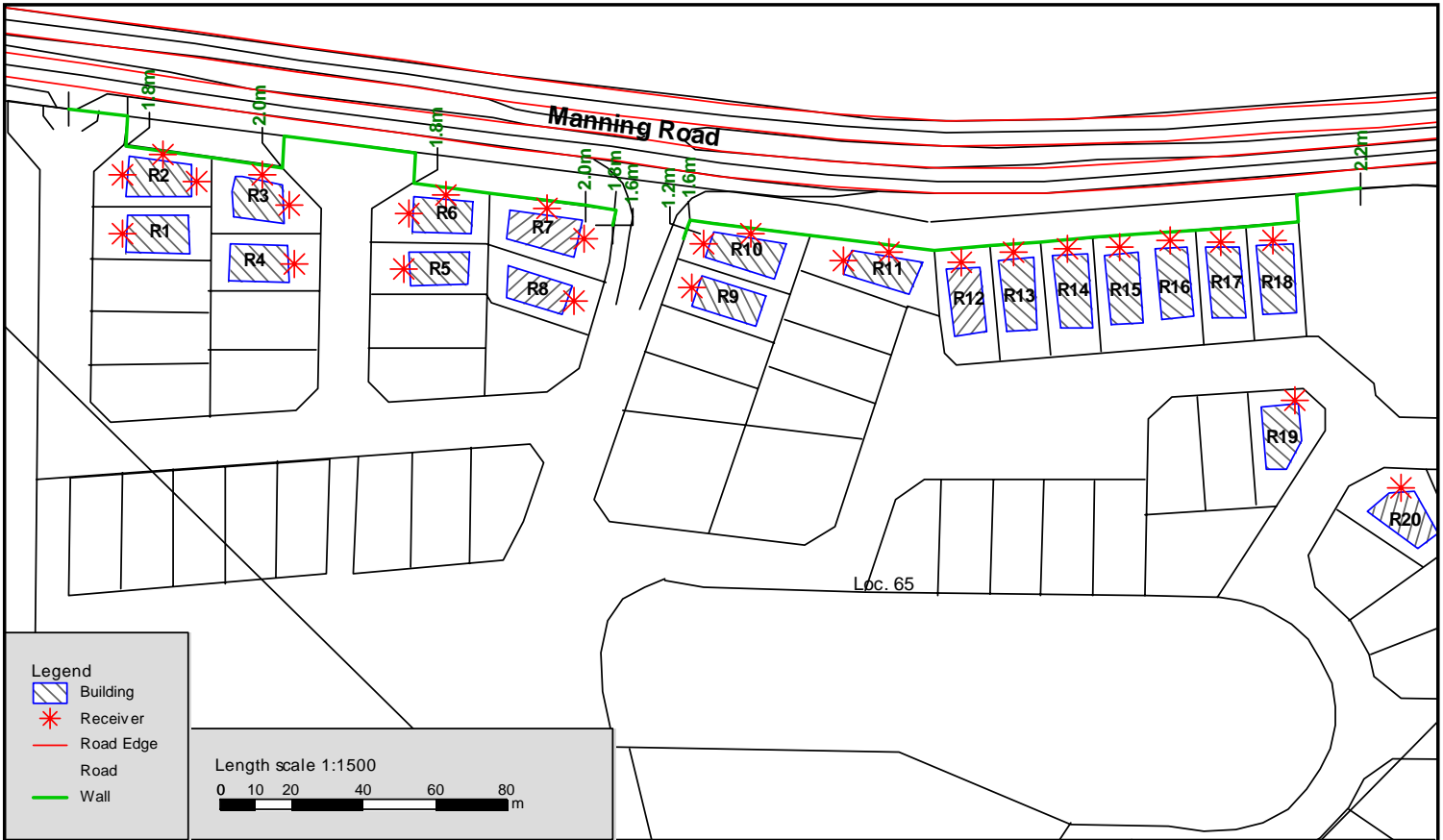


Herring Storer Acoustics
Appendix C – Noise Level Contour Plots

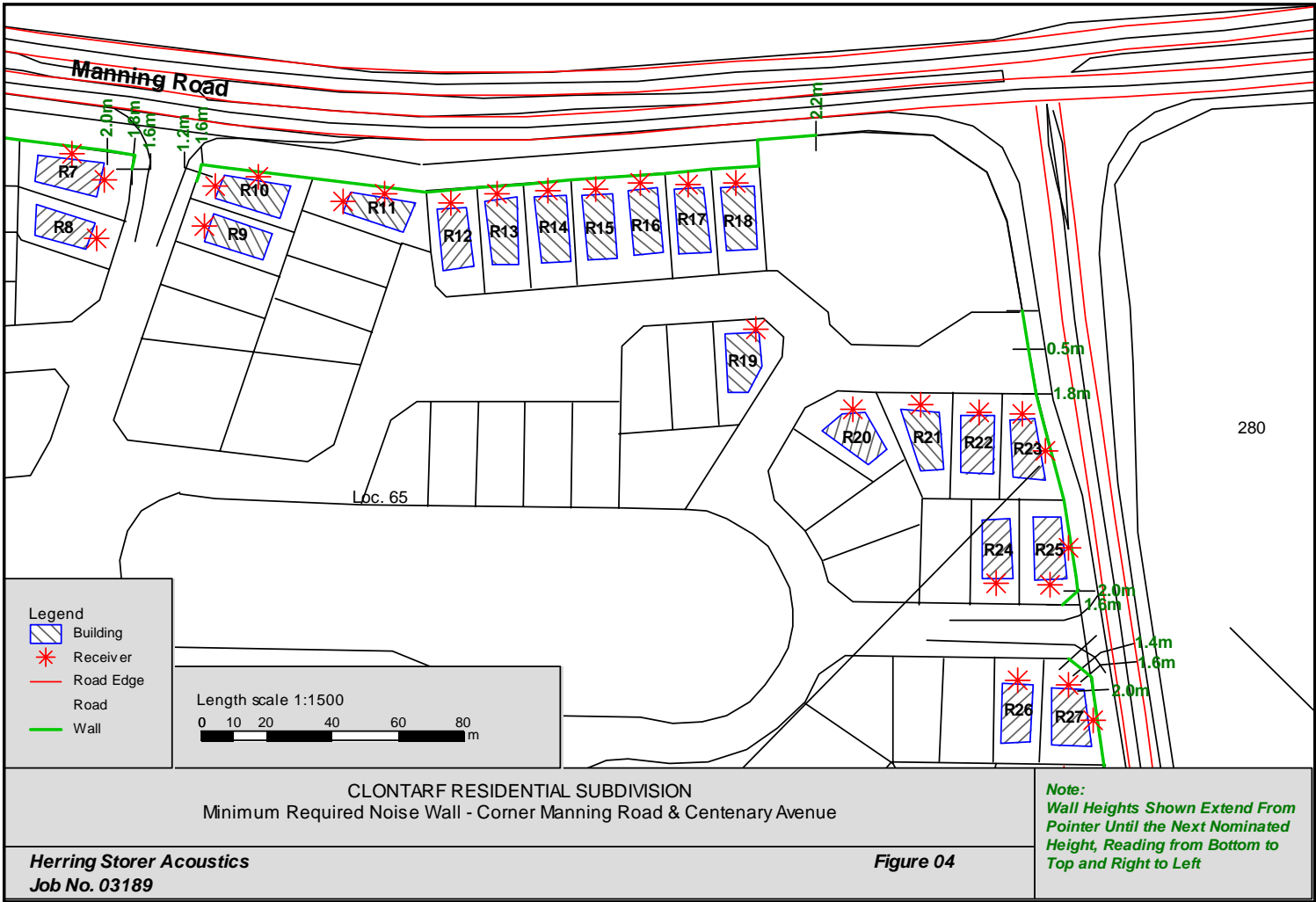


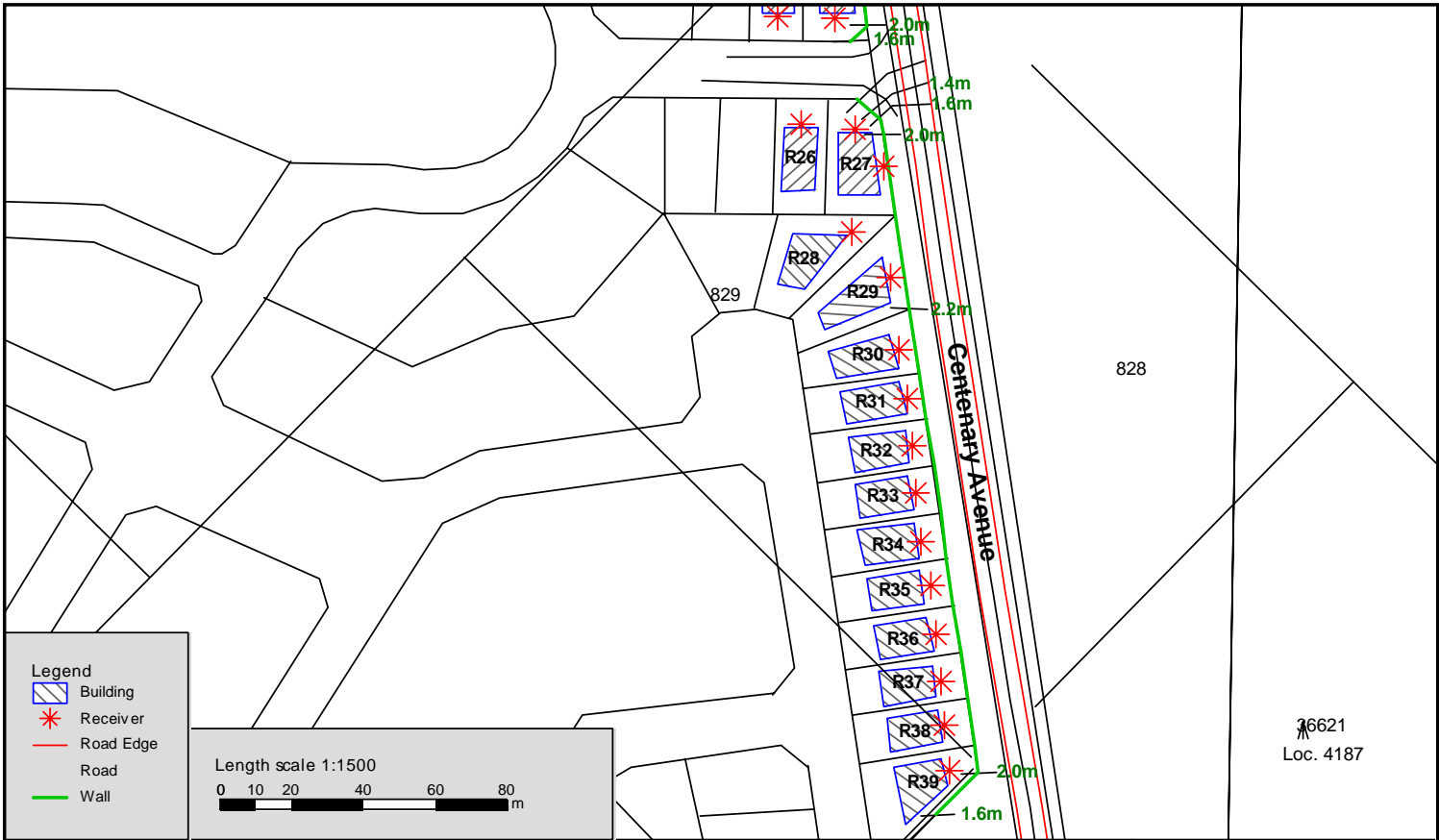
APPENDIX D

SOUND BARRIER DESIGN



CLONTARF RESIDENTIAL SUBDIVISION Minimum Required Noise Wall - Manning Road West End		<i>Note:</i> Wall Heights Shown Extend From Pointer Until the Next Nominated Height, Reading from Bottom to Top and Right to Left
Herring Storer Acoustics Job No. 03189	Figure 03	





Appendix D
Herring Storer Acoustics' Noise
Assessment Report (2008)

Noise Management Plan,
Cygnia Cove Estate, Waterford

HERRING STORER ACOUSTICS

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CYGNIA COVE (EAST CLONTARF) DEVELOPMENT Corner Manning Road and Centenary Avenue Waterford

NOISE STUDY

For
RICHARD NOBLE and COMPANY

July 2008

OUR REFERENCE: 9178-2-03189-02

DOCUMENT CONTROL PAGE

Noise Study
Corner Manning Road and Centenary Avenue
Waterford

Job No: 03189-02

Document Reference : 9178-2-03189-02

FOR

RICHARD NOBLE and COMPANY

DOCUMENT INFORMATION				
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Date of Issue :	6 August 2008			
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APPENDICES

A	Site Location Map
B	Monitoring Information
C	Noise Contours

1. INTRODUCTION

As recommended in Herring Storer Acoustics' letter dated 6 June 2008, Herring Storer Acoustics (HSA) was commissioned by Richard Noble and Company to measure the existing acoustic environment at the proposed Cygnia Cove (Clontarf East) development site, located at the corner of Manning Road and Centenary Avenue, Waterford.

The scope of work for the project was to:

- Measure the acoustic environment using automatic noise data loggers.
- Report on results of measurements.

This report details the methodology, site information and the results of the measurements.

2. SUMMARY

Noise modelling previously carried out was calibrated using the data collected from the noise data loggers.

Along Manning Road, the results of the revised noise modelling support the information provided in Herring Storer Acoustics' letter dated 6 June 2008. However, along Centenary Avenue the profile of noise received during the day is unusual, with the L_{Aeq} for the night period being around 25-30 dB less than for the day period, along Centenary Avenue compliance with the Planning Policy is achieved for the night period, but is exceeded during the day period.

Based on the revised noise modelling, as recommended in the letter from Herring Storer Acoustics dated 6 June 2008, a 2.0 metre high wall is recommended along both Manning Road and Centenary Avenue.

Note: The noise modelling has allowed for the gaps in boundary walls for the entry/exit points on both Manning Road and Centenary Avenue.

3. MONITORING

Two automatic noise data loggers were set-up at the development site. One logger was positioned on the north side of the development bordering Manning Road. The second monitor was set up on the eastern side, boarding Centenary Avenue. (Refer Appendix A for location map).

Two loggers were set up on 18 June 2008 and collected on 25 June 2008. However, there was a fault with the noise data logger located adjacent to Centenary Avenue. Therefore, another noise data logger was set up at the same location adjacent to Centenary Avenue on 3 July 2008 and collected on 9 July 2008.

The logger records statistical noise level data of which, the L_{A1} , L_{A10} , L_{Aeq} and L_{A90} levels are reported. These are defined below:

- | | |
|-----------|--|
| L_{A1} | The noise level exceeded for 1% of the time (in this instance, the noise level exceeded for 36 seconds in each 1-hour period). |
| L_{A10} | The noise level exceeded for 10% of the time (in this instance, the noise level exceeded for 6 minutes in each 1-hour period). |

- L_{Aeq} The energy equivalent noise level for the 1-hour period. A single number value that expresses the time-varying sound level for the 1-hour period as though it were a constant sound level with the same total sound energy as the time-varying level.
- L_{A90} The noise level exceeded for 90% of the time (in this instance, the noise level exceeded for 54 minutes in each 1-hour period).

The microphone of the logger was situated at 1.5 metres above ground level. Photographs were taken at the site showing the logger location and road layout. The logger was calibrated before and after the measurement period and has been subject to a laboratory calibration within the last 24 months.

Weather data from the Jandakot Bureau of Meteorology site was obtained to determine the influence, if any, of the wind conditions during the monitoring.

From the logger data, the Day, and Night noise levels were calculated, which are defined below:

- Day is the logarithmic average of the 15 minute L_{eq} values, between 0600 hours and 2200 hours.
- Night is the logarithmic average of the 15 minute L_{eq} values between 2200 hours and 0600 hours on the same day.

4. MONITORING RESULTS

The results of the monitoring are presented in the Appendices as follows:

Appendix A

Map showing locations of monitoring sites.

Appendix B

Recorded noise levels in graphical form.
Photographs recorded at each site.

The average weekday calculated Day and Night noise levels from the monitored data are shown below in Table 4.1 and 4.2.

**TABLE 4.1 - AVERAGE DAY and NIGHT TIME NOISE LEVELS dB(A)
MANNING ROAD**

Date	Manning	
	Day Period	Night period
19/06/2008	68.8	59.5
20/06/2008	69.0	60.7
21/06/2008	67.7	61.1
22/06/2008	66.6	61.7
23/06/2008	68.4	58.7
24/06/2008	68.7	59.3

**TABLE 4.2 - AVERAGE DAY and NIGHT TIME NOISE LEVELS dB(A)
CENTENARY AVENUE**

Date	Centenary	
	Day Period	Night period
4/07/2008	69.3	52.0
5/07/2008	51.3	49.5
6/07/2008	40.7	38.9
7/07/2008	69.8	39.6
8/07/2008	73.4	46.6

5. MODELLING

The noise model previously developed was upgraded to reflect the results of the noise monitoring. Modelling was based on the same parameters as listed in the December 2003 Report (Reference: 2589-1-3189).

With respect to the proposed subdivision, noise modelling was carried out for future traffic flows with :

- 1 No barrier walls
- 2 1800mm high barrier walls
- 3 2000mm high barrier walls.

The noise contours are attached in Appendix C, as Figure C1 to C3.

We note that the noise model has allowed for the gaps in the boundary walls for the entry/exit points to site. There is one access/egress located on both Manning Road and Centenary Avenue. We understand that these entry/exit points are a requirement of the WAPC sub-divisional approval.

6. DISCUSSION

The acoustic environment at the proposed development is main influence by traffic noise from Manning road and Centenary Avenue.

Noise modelling previously carried out was calibrated using the data collected from the noise data loggers.

Along Manning Road, the results of the revised noise modelling support the information provided in Herring Storer Acoustics' letter dated 6 June 2008. However, along Centenary Avenue the profile of noise received during the day is unusual, with the L_{Aeq} for the night period being around 25-30 dB less than for the day period, along Centenary Avenue compliance with the Planning Policy is achieved for the night period, but is exceeded during the day period.

Based on the revised noise modelling, as recommended in the letter from Herring Storer Acoustics dated 6 June 2008, a 2.0 metre high wall is recommended along both Manning Road and Centenary Avenue.

We believe that the 2.0m high wall when used in co-junction with "Quiet House Design" represents the best practicable design for the barrier wall.

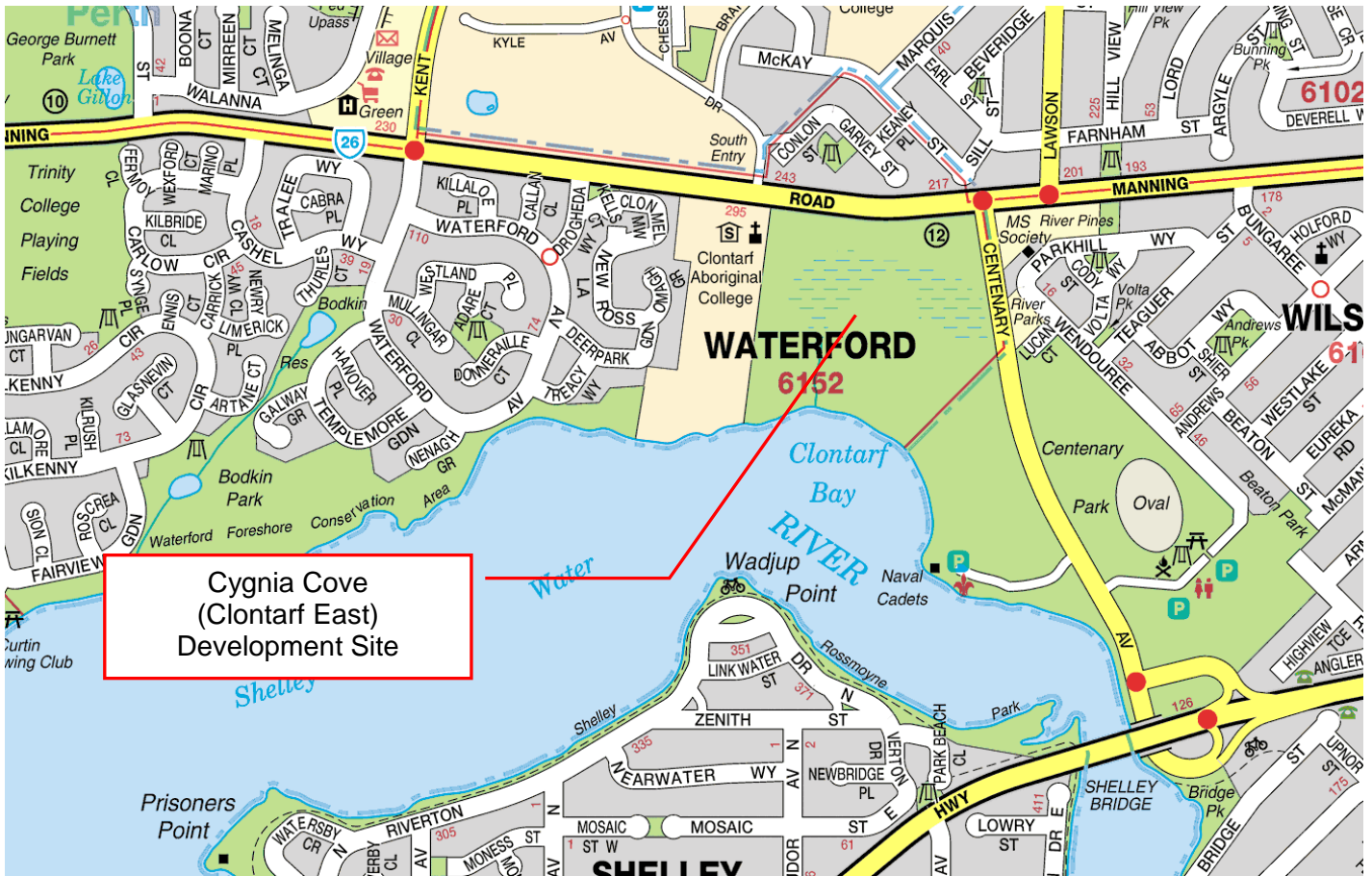
APPENDIX A

Site Location Map

Monitor Location – Cygnia Cove (East Clontarf)

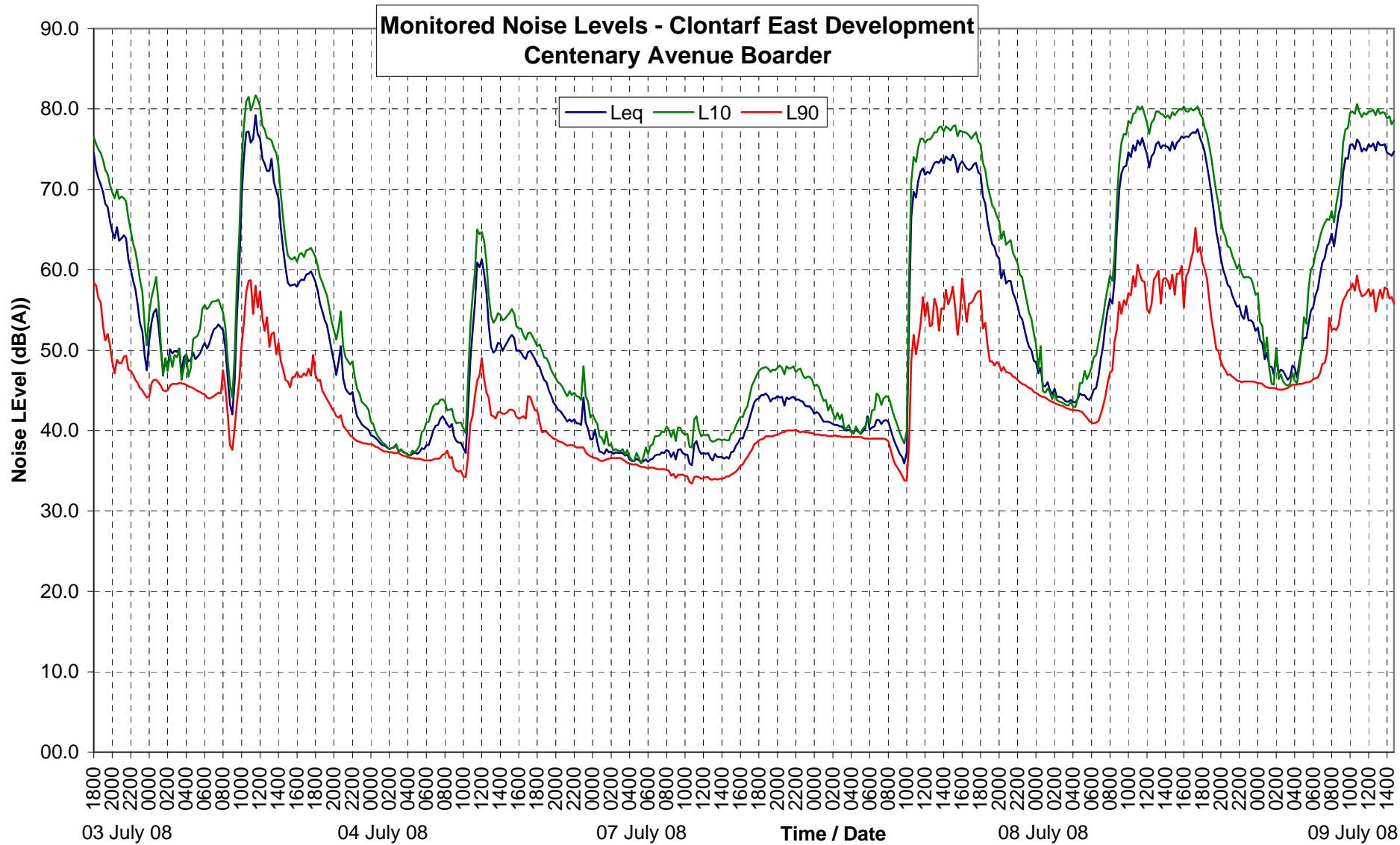


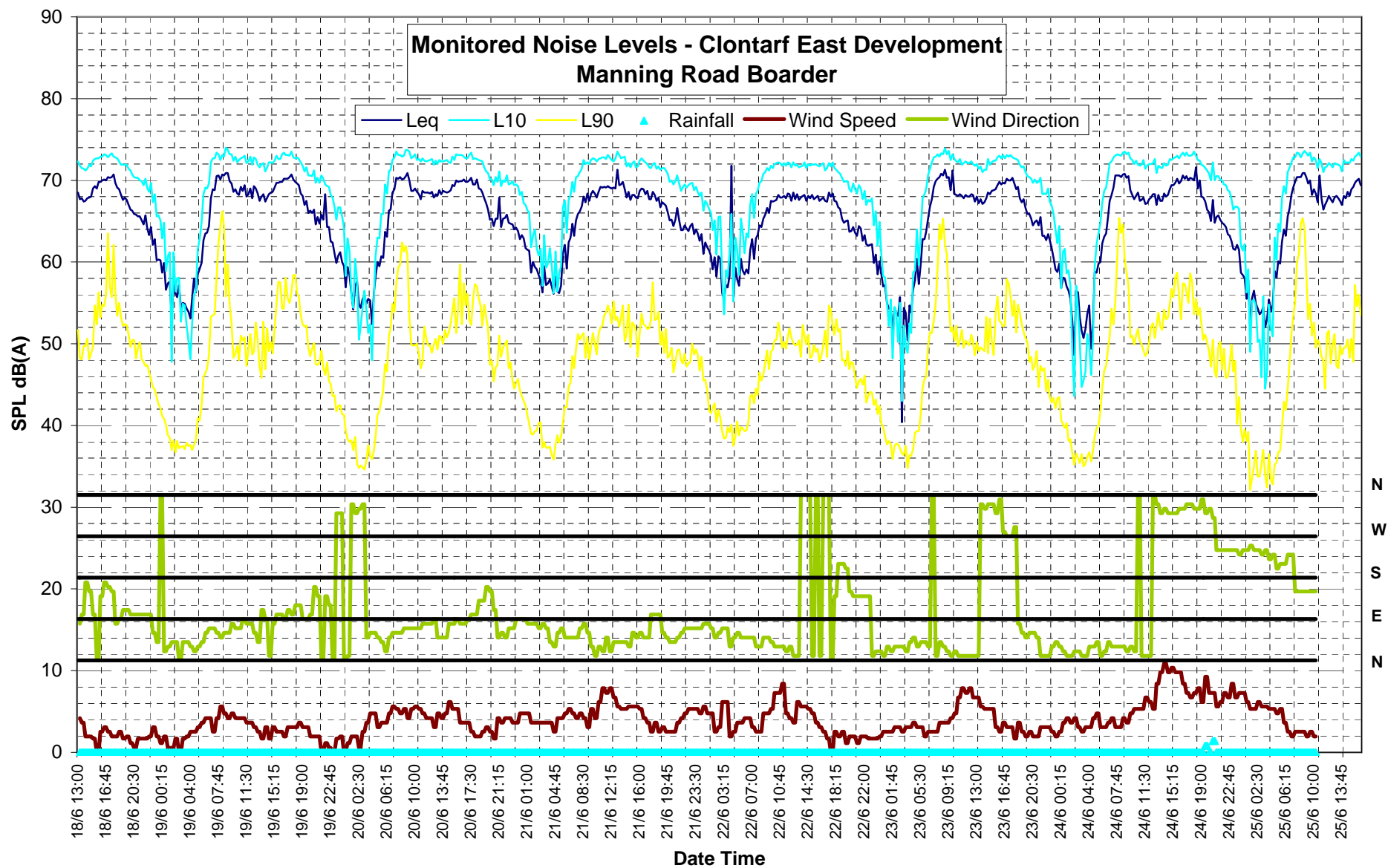
Overall Location Plan



APPENDIX B

Recorded Noise Levels in Graphical Form.
Photographs Recorded at Each Site.





Centenary Avenue Noise Monitor

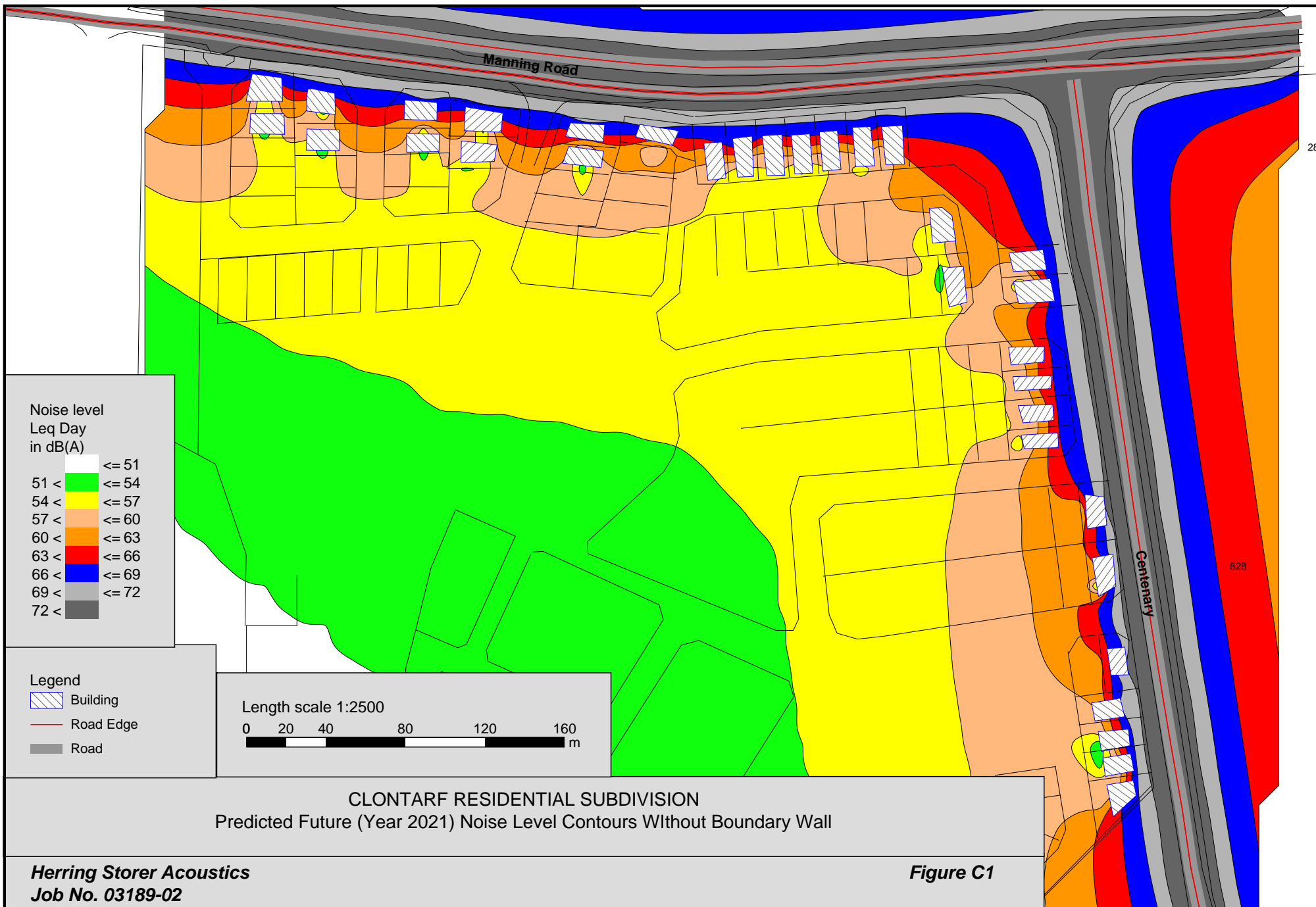


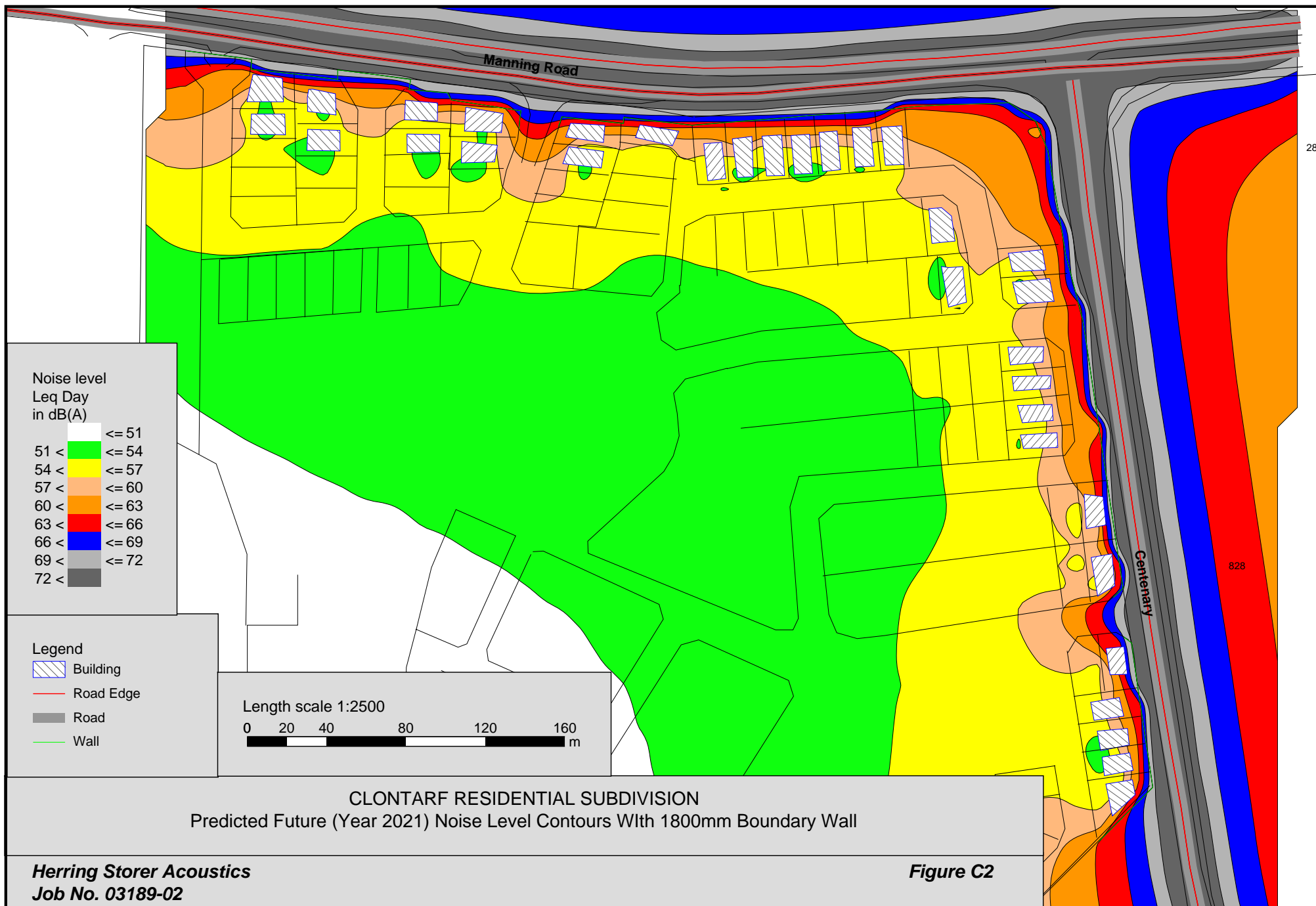
Manning Road Noise Monitor

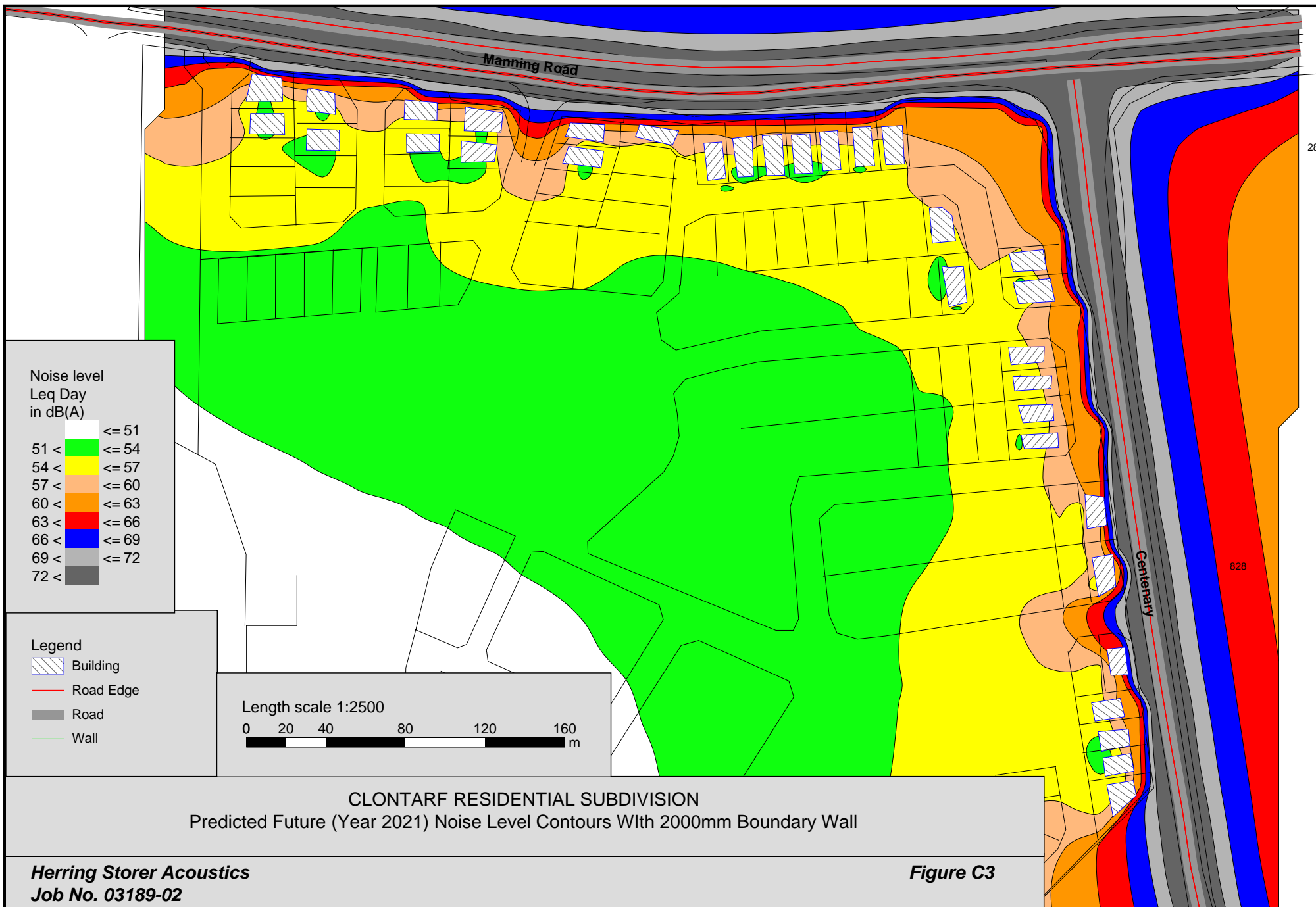


APPENDIX C

Noise Contours







Appendix E Herring Storer Acoustics' Letter Report

**Noise Management Plan,
Cygnia Cove Estate, Waterford**

HERRING STORER ACOUSTICS

Suite 34, 11 Preston Street, Como, W.A. 6152
P.O. Box 219, Como, W.A. 6952
Telephone: (08) 9367 6200
Facsimile: (08) 9474 2579
Email: hsa@hsacoustics.com.au



Our Ref : 9046-1-03189-02

6 June 2008

EndPlan Environmental Planning
42 Harvest Road
NORTH FREMANTLE WA 6159

Attention : Bernadette Vander Wiele

Dear Bernadette,

EAST CLONTAFF, CYGNIA COVE RESIDENTIAL DEVELOPMENT RESPONSE TO DEC COMMENTS

As requested, we have reviewed the DEC comments and provide the following information in response to those comments.

PLANNING POLICY

The Western Australian Planning Commission (WAPC) released in May 2005 a Draft Planning Policy for Road and Rail Transport Noise. Section 5 of the policy outlines the acoustic criteria, which states:

5. Policy measures

5.1 Exposure criteria for outdoor noise levels

Table 1 below sets out the outdoor noise exposure criteria for noise-sensitive premises as defined in this policy. These standards are generally consistent with noise criteria adopted in other Australian states where performance criteria or guidelines have been adopted in recent years.

TABLE 1 – EXTERNAL NOISE EXPOSURE CRITERIA FOR NOISE-SENSITIVE LAND USES

Time Period	External Noise Exposure Level ¹ Criteria (dB)		
	Exposure Level 1 (Target)	Exposure Level 2	Exposure Level 3
<u>Day</u> 6.00am – 10.00pm	Less than L_{Aeq} 55	L_{Aeq} 55-60	Above L_{Aeq} 60
<u>Night</u> 10.00pm – 6.00am	Less than L_{Aeq} 50	L_{Aeq} 50-55	Above L_{Aeq} 55
Additional criteria for railways	Less than L_{Amax} 75	L_{Amax} 75-80	Above L_{Amax} 80

Note ¹ Noise levels is to be determined at a point 1 metre from the edge of the site or building façade that is the most exposed to traffic noise, and at a height of 1.5 metre from the ground level at that point. Noise assessments should generally reflect the impact of any future growth in road and rail traffic, based on a 20 year forecast period.

5.2 Exposure Level 1 (Target)

Exposure level 1 refers to a level of outdoor noise that is considered a desirable target for residential and other noise-sensitive development. It will apply primarily to integrated greenfields planning of road or rail infrastructure and adjoining development. In situations where either infrastructure or residential development is already in existence, achievement of this target may not be practicable.

Where residential or other noise-sensitive development is proposed on a site, which is subject to Exposure Level 1, no action is required under this policy in relation to the management or amelioration of transport noise. However, it needs to be recognised that, because some people are more sensitive to noise than others, a proportion of the population may still be affected by noise which falls within Exposure Level 1.

5.3 Exposure Level 2

Exposure Level 2 refers to a level of outdoor noise exposure that would be acceptable for residential and other noise-sensitive development, subject to appropriate measures to ameliorate noise impact.

For road or rail infrastructure with a noise exposure level in this range, new noise sensitive development should be designed and constructed so as to comply with:

- *The 'target' Exposure Level 1 for required outdoor living areas; and*
- *The 'satisfactory' criteria under Australian Standard AS2107:2000 "Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors", for indoor areas.*

Exposure Level 2 generally represents the maximum noise exposure for proposed new road and rail infrastructure and noise-sensitive development on land adjoining such infrastructure, but may not be practicable for many of the existing major road and rail corridors.

5.4 Exposure Level 3

*Exposure Level 3 refers to a level of outdoor noise exposure that is not generally regarded as acceptable for conventional residential or other noise-sensitive development. For **new or upgraded roads and railways** where the predicted noise levels are in this range at nearby noise-sensitive site, noise management measures in conjunction with the new or upgraded infrastructure are mandatory, with the objective of achieving Exposure Level 2 or better.*

*For **existing road or rail infrastructure** with a noise exposure level in this range, new noise sensitive development should where practicable, be designed and constructed so as to comply with:*

- *the 'target' Exposure Level 1 for required outdoor living areas; and*
- *the 'satisfactory' criteria under Australian Standard AS2107:2000 "Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors", for indoor areas.*

In determining the practicability of compliance with the criteria, it needs to be recognised that a significantly higher level of noise attenuation would generally be required for sites affected by Exposure Level 3 compared to Exposure Level 2. Accordingly, it may not always be practicable to achieve compliance with the criteria, although special attention should be given to meeting the indoor noise standards. Refer to section 5.10 for guidance on the determination of practicability.

1 NOISE BARRIER

As requested, we have reviewed the proposed boundary wall heights for the proposed subdivision. Using the previous model, we note that in this case the incremental increase in noise reduction from increasing the barrier height from 2.0 to 2.2 metres is only around 0.5 dB(A), which in acoustical terms is negligible.

We also understand that the cost of constructing a wall increase exponentially with height above the standard wall height of 1.8 metres. Therefore, in this instance we believe that the recommended 2.0 metre high wall is the best practicable design for this subdivision.

2 QUIET HOUSE DESIGN

Based on the results of the noise modelling, calculations were carried out to determine the noise that would be received within the apartments due to passing vehicles. Guidance on the calculations was taken from AS 3671-1989 "Acoustics – Road traffic noise intrusion-Building siting and construction".

From the modelling the noise level received at proposed residence located along Manning Road and Centenary Avenue would be up to an L_{A10} noise level of 67 dB. Based on this noise level the following design guidelines are recommended :

- 1) *Where possible, locating bedrooms on opposite side of residence from either Manning Road or Centenary Avenue.*
- 2) *Locating of laundries, bathrooms and garages etc on same side as either Manning Road or Centenary Avenue.*
- 3) *Protecting main entrance from road noise.*
- 4) *Enclosing eaves.*
- 5) *Roof insulation.*
- 6) *Double brick construction.*
- 7) *Use of thicker glazing, with casement windows using winders.*

Some specific building guidelines to satisfy the quiet house design requirements includes:

- *Double brick or tilt up concrete construction.*
- *Casement windows in timber or commercial steel frames and compressible seals (windows visible from either Manning Road or Centenary Avenue).*
- *First floor glazing bedrooms facing either Manning Road or Centenary Avenue to be 10.38mm thick laminated glass. Other glazing on side(s) of residence visible from these roads to be minimum of 6.38mm laminated glass to bedrooms and 6mm float glass to living spaces.*
- *Eaves to be enclosed using 6mm thick compressed cement sheeting or equivalent.*
- *Roofs to be colourbond (or equivalent) with 50mm anticon, with ceilings on top floor to be one layer of 13mm plasterboard and 50mm thick (minimum 32 kg/m³) insulation laid over the top.*

Note: An acceptable solution to the top storey is to allow lofts. These spaces can have higher noise levels, and so long as the floor is concrete and there is a door to the loft then noise would be acceptable.

Alternative constructions are acceptable, provided they achieve the following internal noise levels during the night period (being between 2200 and 0600 hours) :

- | | | |
|---|---|----------|
| - | Work Areas
(including Kitchens, Laundries and Bathrooms) | 45 dB(A) |
| - | Living Spaces | 40 dB(A) |
| - | Bedrooms | 35 dB(A) |

If alternative constructions are proposed, then the proposed construction are supported within an Acoustic Report prepared by an Acoustical Engineer stating that the design and proposed construction of the dwelling adequately attenuates noise emissions from either Manning Road or Centenary Avenue to achieve internal noise levels as listed above.

The above guidelines are for the first row of residence abutting either Manning Road and/or Centenary Road.

Additionally, the above internal noise levels are industry standard within West Australia, and have been accepted by the DEC on previous projects.

3 GROUPED HOUSING – CORNER MANNING ROAD AND CENTENARY AVENUE

With regards noise intrusion into the grouped housing located on the corner of Manning Road and Centenary Avenue, the same design guidelines as listed above for the housing should also apply. However, noise levels at the corner are likely to be marginally higher than for noise received from either Manning Road or Centenary Avenue individually. Therefore, we recommend that the internal acoustic criteria be outlined, with the requirement that the proponent carry out noise level measurements and submit an acoustic consultants report addressing noise ingress.

Internal acoustic criteria to be achieve during the night period (being between 2200 and 0600 hours) :

- | | | |
|---|---|----------|
| - | Work Areas
(including Kitchens, Laundries and Bathrooms) | 45 dB(A) |
| - | Living Spaces | 40 dB(A) |
| - | Bedrooms | 35 dB(A) |

Note : Such reports are required for developments within the City of Perth, EPRA development area and Port Coogee.

4 GENERAL COMMENT

We note that the original assessment was based on noise modeling only. To quantify the existing conditions it is recommended that noise monitoring on site be carried out. This would then define the existing acoustic environment during the day and night periods and assist in calibrating the acoustic modeling.

Should you have any further queries, please do not hesitate to contact this office.

Yours faithfully,
for **HERRING STORER ACOUSTICS**

Tim Reynolds

Appendix F

Plan E Noise Barrier Indicative Design

**Noise Management Plan,
Cygnia Cove Estate, Waterford**

MIDLAND BRICK - CHARCOAL
SPLIT FACE BLOCKS
IN STACK BOND PATTERN

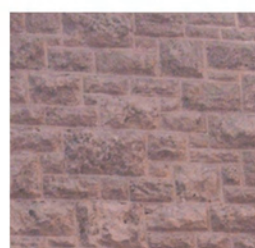
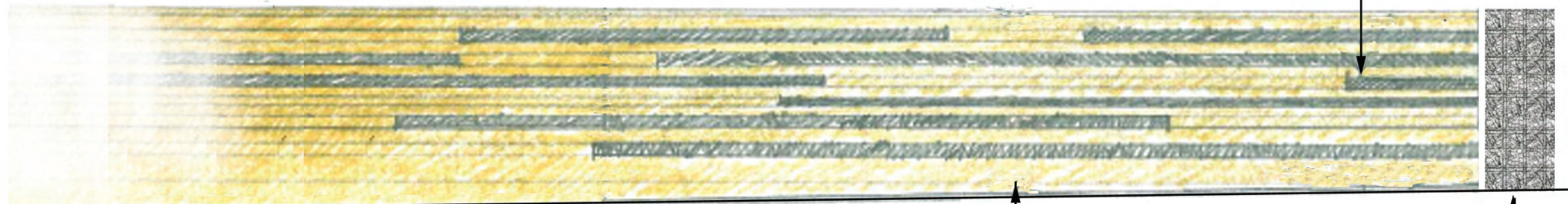
Lot 126.

EXISTING MATURE TREE PLANTING IN
VERGIE



ENTRY PUBLIC OPEN SPACE
WITH FEATURE WALLS & PIERS

DIORITE STONE BANDS
INLAID HORIZONTALLY
IN WALL



NATURAL LIMESTONE BLOCKS
THAT WILL FADE IN COLOUR
WITH AGE

NATURAL LIMESTONE

DIORITE BLOCK
PIERS TO MATCH
WALL DETAILS

