Buildcorp

BUILDING ON STRENGTH

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SUBJECT

1 Construction & Demolition, Environment Management Plan

2 Appendix A - Traffic Control Plan

3 Appendix B - Waste Management Plan

4 Appendix C - Site Management Plan

5 Appendix D - Stormwater & Sediment Control Plan

6 Appendix E - Noise and Vibration Report Part A & B

7 Appendix F - Demolition Plan

1.0 CONSTRUCTION AND DEMOLITION ENVIRONMENT MANAGEMENT PLAN

Rev Date	REVISION DESCRIPTION
21/06/08	Original Issue

Contents

Appendices

Appendix	Title
A	Traffic Control Plan
B	Waste Management Plan
C	Site Establishment
D	Stormwater & Sediment Control Plan
E	Noise and vibration report part A and B
F	Demolition plan

1. Introduction

1.1 Purpose

a) This Construction Plan describes how Buildcorp proposes to manage the construction phase of the project.

1.2 Scope

a) This plan describes the construction aspects of the project, which will need to be managed to achieve the desired outcomes, within the constraints imposed by legislative, regulatory and contractual requirements, so that the desired outcomes are achieved.

1.3 Project Description

a) Goodman International Limited proposes to construct a new purpose built medical facility for Australian Australian Red Cross Blood Service at 17 O'Riordan Street, Alexandria.

The project consists of the following:

- Demolition of all existing buildings and structures on the site;
- Construction of a new four storey building containing:
- A new purpose-built medical laboratory, research and development facility, ancillary office/ administration and warehouse and distribution functions having a total gross floor area (GFA) of approximately 13,500m^2
- Single level basement car parking; and
- Landscaping of the site.

1.4 Contact Details

1.4.1 Company Operational Details

Directors Name	Tony Sukkar
Company Name	Buildcorp Contracting NSW
Company Business Address	Level 4/10 Mallett St, Camperdown
Company Contact Number	02 9565 0000
24hr Contact Number	0418 251 353

1.4.2 Onsite contact person responsible for compliance with this Construction Management Plan

Name	Steve Taunton
Title	Senior Project Manager
Contact Number	0406 530 597

1.4.3 Contact person in control of the site

Name	Garry Werner
Title	Site Supervisor
Contact Number	0406 530 597
After Hours Contact Number	0417 491 639

2. Public Safety, Amenity and Site Controls

2.1 Objectives

a) The general public is adequately protected from activities occurring on building sites.

b) Buildcorp provides a safe and secure job site.

c) Demand for occupation of the street and protection of Council assets is well managed.

d) The building site is kept neat and tidy to maintain public safety and local amenity.

2.2 Permits/Licences and Approvals

a) The following permits/licences shall be obtained:

License/Permit	Issuing Authority
Construction Certificate	BM+G
Licence to excavate within the road reserve	RTA
Approval to stand and operate plant on a roadway	RTA
Approval for vehicle and pedestrian crossovers on roadways or footpaths	Sydney City Council
Water use permit	Sydney Water

2.3 Safety & Security

a) The site shall be secured by a fence and hoardings. Refer to Site Establishment Appendix C

b) Hoardings and perimeter fencing are designed to prevent climbing and unauthorised entry to the site

c) Excavations shall be fenced so that they do not pose a danger to life or property.

d) Hoardings shall be used to limit public viewing of construction activities. This will help ensure that pedestrian flow is not impeded.

e) Adequate lighting, safety signage and traffic controls shall be provided.

f) A clearly defined traffic management plan shall be implemented to ensure all motor vehicle movements, to and from the site, as a result of construction activities do not impede on the operations of the general public's carparking areas. A Traffic Control Plan has been developed for the site and is appended to this document in Appendix A

g) Security measures in place when the site is not occupied include:

- Perimeter barriers – fencing and hoardings
- Locks on gates
- Security lighting

2.4 Hazardous Chemicals

a) All dangerous chemicals shall be properly stored in secure areas located away from emergency exits, safety measures or stormwater pits.

b) Hazardous and flammable storage shall be provided on site.

c) Storage and handling of chemicals shall be in accordance with Material Safety Data Sheets, the Occupational Health & Safety Act 2000 and the Occupational Health and Safety Amendment (Dangerous Goods) Regulation 2005

d) Procedures are in place to control and clean up spills.

2.5 Signage

a) Signage specifying any security measures and key contact details shall be erected on the perimeter of the building site (i.e. attached to the building, fence or hoarding). A 24 hour contact

name and phone number shall be provided

b) Any sign, road markings, street furniture, parking meters, etc, affected by the works shall be relocated or protected and, or, kept in good repair.

c) When installing hoardings, attention shall be paid to the effects that such items may have on pedestrian travel paths at intersections. Temporary pedestrian ramps, etc shall be installed as required.

2.6 Public Domain

a) Buildcorp shall ensure that there are no tripping hazards from the hoarding or perimeter fencing on nearby footpaths. Electrical, plumbing and other services extending over footpaths shall be covered over, and pedestrian and disability access facilitated by a ramp. Ramps shall have a non-slip surface, a handrail, and a minimum gradient of 1:14 unless the existing topography of the street or road requires some variation to this ratio

b) The general public shall be protected from construction activities including vehicle loading and off-loading within the public domain. Precautions include the following measures:

- The use of spotters and traffic controllers. Refer to the Traffic Control Plan Appendix A
- Restriction on the hours of operation of these activities that is they will be carried out in non peak hours
- Restriction on the type of work being carried out eg welding
- Hoardings and or barriers shall be used to separate the public from the work area. Refer to The Site Establishment Plan Appendix C.

c) When cranes or mobile lifting equipment are used in the public domain the following steps shall be taken to prevent disruption to public areas:

- Where possible equipment shall be sited so as not to restrict public thoroughfares and pedestrian access. Where restricted access is unavoidable, gantries or other overhead protection shall be used.
- Pavements and streets shall be protected. A dilapidation surveys shall be conducted before and after works have taken place
- Safe working procedures and lifting techniques shall be implemented to ensure safety on adjoining streets and footpaths.
- Traffic management controls and signage shall be used. Refer to the Traffic Management Plan Appendix A.

d) All constructions materials shall be stored onsite and not in the street or public places.

2.7 Commercial Operations Neighbouring the Development

a) There are several facilities in the surrounding neighbourhood that operate commercially on a daily basis.

b) Buildcorp project team shall contact each commercial centre to establish a communication link to help deal with the concerns of the end users.

2.8 Street Space Occupation

a) All necessary permits shall be obtained from the Sydney City Council if space is to be occupied or used on the footpath.

b) Adequate barriers shall be installed to prevent public accessing such works.

c) Pedestrian access areas shall have a minimum width of 1.2m clear on footpaths.

2.9 Demolition of existing building

a) Once approval is obtained and the necessary notifications are in place, demolition will commence for the existing structural steel and precast concrete structure at 17 O'Riordan Street, Alexandria. It is anticipated the duration of the demolition works will be 6 to 8 weeks.

b) Refer to the demolition plan (Appendix F)

2.10 Excavation

a) Excavations adjacent to or in close proximity to the road or pathway have been designed to support the road and pathway.

b) The location and extent of excavations are detailed in the Bulk earthworks plan prepared by SCP included in the Major Project Application documentation.

2.10.1 Existing Trees

a) In accordance with the Environmental Management Plan (EMP), existing trees not identified to be removed will be protected to the requirements of the landscape Architect / Arborist in consultation with City of Sydney

2.11 Site Appearance

a) Raw materials stored on site shall be adequately secured so as to prevent unnecessary and unsightly disposal of materials around the site and public areas.

b) Trucks leaving the site shall be cleaned to ensure soil, mud and other site debris is prevented from spilling onto adjoining roads and footpaths. Rumble grids shall be installed on the main entry/exit corridors.

c) All loads shall be tarped /covered to prevent the accidental spilling of materials on roadways.

d) Hoardings are to be designed to reduce the likelihood of unauthorised bill postings and graffiti. This will be achieved by painting hoardings white. Graffiti and other posters or stickers shall be removed on a weekly basis. Offensive material shall be removed immediately.

2.12 Site Personnel Parking

a) As far as possible, Buildcorp will encourage site personnel to use public transport during the construction phases and will provide onsite secure materials and equipment storage to assist to this end.

b) In the eventuation that public transport is not possible, Buildcorp will direct light traffic to a designated parking area away from areas already in high demand. All associated parking fees will be paid as required.

2.13 Site Personnel Behaviour

a) Buildcorp understand that working within a commercially operating area inevitably means that site personnel will interact with the general public. Buildcorp have a strict policy for the behaviour of staff and subcontractors.

b) Buildcorp will instantly remove from site any person deemed to have acted inappropriately in this regard towards the public throughout the project, and will closely monitor this aspect on a daily basis.

3. Operating Hours, Noise and Vibration Controls

3.1 Objectives

a) To minimise the impact of noise and vibration on the immediate neighbourhood.

b) To provide a framework to plan and cater for construction activities outside of normal hours.

c) To minimise the likelihood of damage to adjacent buildings and structures.

d) To satisfy the noise and vibration requirements by Railcorp with respect to the nearby Airport Line Rail Corridor

3.2 Operating Hours

a) Construction activities are to complying with Sydney City Council's working hours, including:

- 7.00am to 5.00pm ..... Monday to Friday
- 7.00am to 3.00pm ..... Saturdays
- No work ..... Sundays and Public holidays

3.3 Noise & Vibration Controls

a) A noise and vibration management plan will be prepared prior to construction on site in accordance with the recommendation made to noise and vibration report by Acoustioc Logic Appendix E

Noise and Vibration Plan

Objectives

To control and minimise the impacts of construction noise on site and to surrounding areas.

Operational Controls

Noise during the construction process will be managed by;

- Advising surrounding neighbours three days prior to commencement of any noisy works.
- Limiting the operating noise of machinery brought on to the site. All plant and equipment used on site shall be fitted with noise suppressors or designed for quiet operation. Plant and equipment shall be maintained as per the manufacturers' specification.
- Where appropriate, obtaining acoustic test certificates for machinery brought on to the site.
- Banning blasting on site.
- Ensuring the exit ramps to the street and all internal haul roads are the lowest grade practicable.
- Ensuring the number of trucks on site at the commencement of site activities will be kept to the minimum required by the loading facilities on site.
- Informing interested parties, as far as practicable, of impending or current events which may cause high levels of noise (Minimum 3 days notice for all noisy works).
- Providing a Community Contact and prominently displaying a 24 hour telephone number at the front of the site.
- Issuing breach notifications of non-compliance and implementing corrective action procedure when required.
- Recording any incoming complaints in the Community Complaints Register. The registration of a particular item will remain open until the complaint has been appropriately dealt with.

3.4 Community Complaints

The Construction and Demolition Environmental Management Plan (CDMP) contains processes to deal with any complaints as well as a 24 hour phone number for the public to call will be located in a prominent position.

Noise Complaint Procedure

Upon receipt of a noise complaint Buildcorp Australia will:

3.4.1 Determine from the compliant the source noise and if it is inside or outside the site.

3.4.2 Establish from the monitoring equipment if the allowable noise levels have been complied with.

3.4.3 Establish if the source of noise has previously been highlighted as a problem. If not and the noise levels are above the allowable then the equipment and its position will be noted.

3.4.4 Move machinery if the allowable levels have been exceeded or take other acoustic remedial action.

3.4.5 If the activity is occurring outside approved working hours, the Site Supervisor will immediately stop the activity. Where stopping the activity would create a safety issue the activity will be permitted to continue only as long as is necessary to make the area safe. The activity will then be directed to cease.

3.4.6 Any activity which is directed to cease due to excessive noise may not recommence until the Project Manager is satisfied that the requirements of the "Code" can be met and has given permission to recommence the activity.

3.4.7 The Site Supervisor will ensure that a report of any incident is provided to the Project Manager and that it is recorded in the Community Issues Register.

3.4.8 The Project Manager will provide a report on the incident to the relevant stakeholders.

4. Air and Dust Management

4.1 Objective

a) That air quality (airborne dust and pollutants) in and around the construction site be maintained at acceptable levels throughout the construction period

4.2 Operational Controls

a) The following activities may cause excessive dust or otherwise affect air quality:

- Excavation of soil
- Movement of vehicles on site
- A Community issues process shall be implemented to ensure any issues regarding the site (includes environmental noise emissions/vibrations, waste, contamination etc) are recorded and investigated.
- In response to a Community Issue, corrective measures will be implemented to minimise the likelihood of reoccurrence.
- Community Issues resolution will be targeted for 7 days from the date of the lodgement.

4.3 Community Issues Procedure

Complaints Handling Procedure

a) A Community Contact/Complaints Process shall be implemented to ensure any complaints regarding the site (includes environmental noise emissions/vibrations, waste, contamination etc) are recorded and investigated.

b) To enable complaints to be managed onsite in the first instance, signage specifying security measures and key contact details shall be erected on the perimeter of the building site (i.e. attached to the building, fence or hoarding). A 24 hour contact name and phone number shall be provided.

c) The complaint response procedure will include the following key elements:

- Identify a site contact to whom the community can make a written or verbal complaint;
- Document all complaints as they are raised with the following details:
- Date of complaint
- Time of complaint
- Name and contact details of person raising the issue
- Details of the complaint (note time and location that the event occurred)
- Name of person responsible for action
- Assign the complaint to appropriate staff for resolution
- Investigate complaint and document actions/outcomes on the complaint record
- Details of actions to resolve the complaint/issue
- Date issue resolved

Managing the community and complaints

Site Supervisor

As a minimum ensure that a member of the community can contact the site at any time, by doing the following:

- establish a contact who is available 24 hours a day

Weekly liaison with the community

If required as a result of development approval to meet with a member of the community weekly to review construction related issues, use the Community liaison register to keep a record of these meetings.

Weekly Community Liaison Register

Project Name	Australian Red Cross Blood Service

Date	Time	Recorded by	Met with (Name and number)	Items discussed	Any action to be taken
08.09.08	11am	Anika Spears	Mary Smith 0438 466 911	Client requests that no noisy works take place Monday 13.19.08, as there is a school play on.	Anika to ensure all sub-contractors are aware by giving a tool box talk on Monday.

Site Team

What do you do if an issue is raised?

- record the issue in the Community issues register

Community issues register

Project	Australian Red Cross Blood Service
Address	17 O'Riordan Street, Alexandria
Project Manager	Steve Taunton
Project Supervisor	Garry Werner

Date	Time	Recorded by	Issue raised by (Name and number)	Details of issue	Actions to resolve	Date Advised (within 7 days)	Date
08.09.08	11am	Anika Spears	Mary Smith 0438 466 911	Mary rang to complain about dust on her car	Silt protection fence was broken and has been fixed back into position. Car was offered to be taken to car wash	09.09.08	15.09.08 Mary is happy

- investigate the issue or appoint an appropriate person
- rectify the situation
- document actions in the Community issues register
- contact the person who originally raised the issue of the resolution and how it has been closed out
- follow up after a week to ensure the corrective measures are satisfactory
- Keep all records in the project HS&E files

5. Stormwater and Sediment Control

5.1 Objective

a) To prevent contamination of, or damage to, stormwater drains and waterways and ensure sediment from the building site is retained on-site during construction work

5.2 Controls

a) Refer to the Stormwater & Sediment Control Plan, Appendix D.

6. Waste and Materials Re-use

6.1 Objective

a) To maximise the re-use and/or recycling of construction materials.

b) Waste material to be collected and stored on site until removed

6.2 Controls

a) Refer to the Waste Management Plan Appendix B.

7. Traffic Management

7.1 Objectives

a) To minimise disruption to traffic (vehicles, pedestrians and cyclists) caused by construction activities to ensure the safety of all road users.

7.2 Controls

a) Traffic management of the site shall to be managed throughout the activity period and periodic reports submitted as required.

b) Refer to The Traffic Control Plan Appendix A.

Appendix A
Traffic Control Plan

2.0 APPENDIX A TRAFFIC CONTROL PLAN

Buildcorp will allocate traffic controllers to direct all construction deliveries and to communicate changes to traffic conditions to the users of the precinct. The controllers will be certified as required.

Particular care will be taken to minimise any damage to the surrounding roads as a result of construction activity.

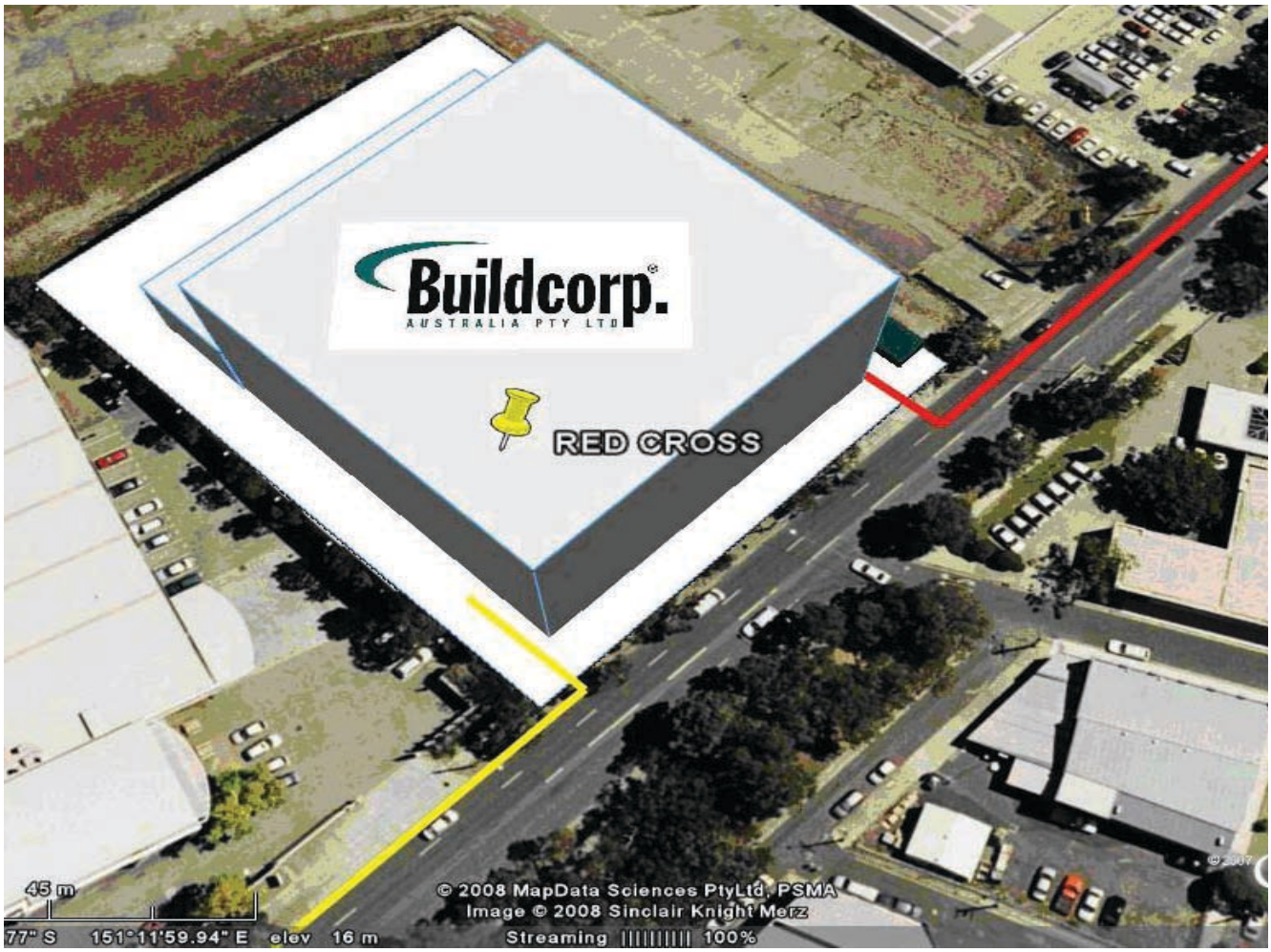
Traffic around the immediate blocks will as far as possible be managed so as construction traffic is one directional on and off O'Riordan street Alexandra. Traffic controllers during off peak times will direct construction traffic to approach the site from South O'Riordan Street with exit north bound to O'Riordan street. Traffic controllers will need to be engaged for the high movement days however the site entry will be constructed with the turning of large vehicles in mind.

The method of excavation of the basement level will start from the rear of the project with loading trucks working towards the front of the site. The environmental plane identifies the controls for the exiting with the excavated material, grid shakers that will be installed on the exit & entrance to the site.

The number of trucks estimated for the excavation phase is 50 to 80 truck movements per day.

At no time will there be a requirement to load the excavated material on the public property

The Placement of the concrete slabs / traffic flows - As the average pour will be around 280m^3 and will equal on average 56 trucks. We have considered that the concrete trucks waiting area should be located on site after the construction of the ground floor slabs & roads. During construction the use of 2 concrete pumps and the average of 6 trucks on site at any time. All other deliveries will be conducted from site.



Heavy vehicular exit

Heavy vehicular access

Public Safety and Security

As this project is located a heavy commercial area, we realise that safety to the public is of the highest importance. In order to reduce the risk to the safety of the public, all potential risks need to be identified before or as they appear. This includes both major and minor risks which will is covered in the Buildcorp Site Specific Safety Plan. This plan will take into account public safety both during the day-to-day operations.

In summary, practices that will be initiated for this project to assist with public safety will include:

- An A-class hoarding to the perimeter of the site to be used to eliminate the chance of public gaining access, and to reduce the visual impact of the construction zone.
- Gates to the site will monitored at all times. This would be by the Project Supervisor & site staff.
- There will be 2 points of access to the site. The point will be carefully signposted and monitored to reduce accidental public access.
- Additional temporary lighting installed to ensure public pathways around the site are well lit and sign posted at all times
- Daily monitoring and repair of all public access as a result of construction activities.
- Surrounding access paths to be cleaned daily in order to reduce the occurrence of slip zones.

A clearly defined traffic management plan will be implemented to ensure all motor vehicle movements to and from the site as a result of construction activities, do not impede on the operations of the parking of the general public. With the public's safety as our primary concern we will ensure licensed traffic controllers and the traffic management plan is approved by Buildcorp Contracting NSW management and is implemented

When addressing the traffic control requirements for this project, Buildcorp Contracting NSW will attempt to cover all issues applicable to the works.

1. Description of work.

Traffic Control:

a) Supply of traffic control equipment as required for the safe and effective control of traffic during Closure of Construction Loading Zone.

b) Set-up roadwork equipment at the various locations specified and in accordance with any guidelines stipulated by the MUTCD and tender/contract.

2. Statement of Quality Assurance Compliance.

Traffic Management Plan:

a) Will be conducted in a professional manner to minimise delays to reduce inconvenience to the public by authorised traffic controllers.

b) Maintain the traffic control equipment as required for the safe and effective control of traffic for the duration of the roadwork.

3. References

- Australian Standard AS 1742.3 - 1996
- MUTCD – Manual of Uniform Traffic Control Devices – Part 3
- Traffic Management Plan

4. Management Responsibility for Traffic Control

It is the responsibility of the senior traffic controller or nominated person on site to ensure that all

traffic control equipment and its allocation is in accordance with the MUTCD/contract specifications and guidelines.

At the start of each shift, a Daily Diary Form will record the starting time and signage identification. During the shift, random checks of all signs and their location will take place and be recorded on the same Daily Dairy Form. This record sheet can be produced at any time during the works program for inspection. In the Appendix is a copy of the Daily Dairy Form to be completed.

A further Daily Diary Form is completed on a daily basis, which is a checklist for permanent and temporary signage. The Daily Diary will record any changes to signage, signs that need cleaning or re-erecting, any checks on delay times for vehicles and any general comments as to how the Traffic Management Plan is working. Copies of all Traffic Management records will be submitted to the Site Supervisor at the completion of the project.

Traffic delays will be kept to an "absolute maximum" of fifteen (15) minutes (as per MUTCD guidelines) for any single vehicle. Routine work delays to traffic flow shall be targeted to no more than sixty (60) seconds.

Traffic delays shall be monitored on a regular daily basis and reported to the Site Supervisor. Areas of work under traffic control shall be programmed to achieve these times and other safety requirements. Any specified lengths of work under traffic shall be nominal distances only.

Queue congestion at closures will be monitored to ensure that any intersection and/or roundabout is not blocked at any time during the program unless unavoidable. Traffic Controllers and signage will direct traffic through the particular closure to ensure this is enforced and maintained.

5. Responsibility and Authority

Appropriately qualified personnel will undertake direct traffic control. The minimum qualification shall be a current Traffic Controllers' ticket and General Safety (Blue Card) Induction Card. Traffic Controller's will be responsible for ensuring traffic is not unduly delayed and that safety of the general public and workers on site is maintained.

Each traffic controller is required to take corrective action and notify the Site Supervisor if a problem occurs. The relevant parties will communicate via two-way radio, mobile telephone or direct oral communication.

The Traffic Controller's on site, in consultation with Buildcorp Contracting NSW representative, will be responsible for the control of traffic. Once the permanent (for the duration of each stage of the works) traffic control equipment is installed then City of Sydney shall be responsible for the day to day control and maintenance of this equipment.

The Traffic Management Plan is to be signed off by the representative prior to commencement of the project. Personnel on-site will rectify any non-conformances immediately and the Operations Manager will respond to all necessary reports.

6. Selection of Site Traffic Control Modes.

The following factors have been considered in selecting the appropriate site control modes:

a) Minimising hazard risk to the public and workers on site.

b) Minimising interaction between public traffic and work site pedestrian and construction vehicles.

c) Minimising traffic delays as specified in the Traffic Control at Worksites - 1998.

d) Minimising traffic stoppages.

7. Specific Traffic Control Modes.

At the location/s outlined in the job specification, the traffic will be controlled by: -

a) Traffic Controllers will maintain road/lane closures on the sections that are indicated as per Traffic

Control Plan and/or contract details.

b) A Buildcorp Contracting NSW representative prior to the commencement of any road/lane closures will complete any applicable application for Road Occupancy/Closure [if applicable] and all other relevant permits for closures.

c) Buildcorp Contracting NSW – Traffic Control Plans / Traffic Management Plan.

8. Public Notification

Notification will be by way of signage installed by Buildcorp Contracting NSW

9. Monitoring

Monitoring of Traffic Control:

The site supervisor shall complete the Daily Diary Form at a minimum of once per shift. Depending on the details of traffic control, or the discovery of any non-conformances in traffic control, the Daily Diary Form may be completed more frequently if deemed necessary by the client (e.g. every 2 hours).

10. Time Restrictions

As per APBC instructions and/or Main Road permit or City of Sydney restrictions.

11. Equipment List.

a) 1 x Traffic Controller

b) 1 x Specialised Traffic Control Vehicle.

c) All signage as specified in the STC Traffic Control Plan/s.

12. Pedestrians flow

Pedestrians will be required to follow the same directions/detour as vehicles.

No Unauthorised personnel shall be allowed within the construction zone.

All personnel (including authorised visitors) on site shall be required to wear as a minimum safety boots, hard hats and safety vests.

13. Anticipated traffic impact

As part of the TMP and CDEMP Buildcorp Contracting NSW encourage the use of car-pooling and public transport. It is anticipated that once the site is established sufficient on site parking will be available. There are several private car-parking facilities that will also be approached to facilitate the requirements of the site if required. Site contractors will be instructed not to park in the residential areas.

It is anticipated that the peak of construction traffic will result in approximately 150 car movement per day. To reduce the impact construction parking the Traffic Management Plan will be included in the tender documents to identify the requirements and procedures for gaining access on to site.

Appendix B
Waste Management Plan

3.0 APPENDIX B WASTE MANAGEMENT PLA

Introduction

We are proud of our leadership position within the context of the latest 'green' building codes. Our Building on Sustainability program has seen every person in the Group from Contracts Manager and above, become a Green Star Accredited Professional. Our internal experts are continually developing new, environmentally responsible techniques and systems, and training our people in their implementation.

We are also meticulous about our responsibility to protect the environment through every phase of a project. This was confirmed when we were awarded the opportunity to build Workplace 6, NSW's first 6 Green Star GBCA rated building at Darling Island Pyrmont.

Sustainability

The primary families of items which lend themselves to ESD improvement at a light industrial commercial business site are those which can be described as:

- People + Systems Management
- Transport Management
- Energy consumption
- Water Consumption
- Reduction of stormwater run-off
- Design Innovation

These are typically materialised through factors such as:

- Ensure all members of the project team to be encouraged to be accredited Green Star professionals. The majority of Buildcorp staff have achieved this level of proficiency.
- Explicit and high-profile management policy that constantly re-affirms the organisations commitment to the various ESD initiatives that ultimately are incorporated into the works.
- Construction activities to be subject to a comprehensive and audited environmental management plan.
- All landscape irrigation systems to be sub-soil drip type.
- Choice of native and drought-resistant vegetation instead of water-sensitive plantings
- Replacement of all temporary hard-standings (ie while waiting on future stages of works) with mesh-bashed surface cover / treatment that allows water drainage to soil whilst also providing durability of surface when under traffic loads
- Favour the application and use of building materials and methods that have embodied energy values that are less than the materials initially proposed (ie consider purchasing component and materials that incorporate an appreciable content that is a re-use of recovered materials, favour the use of materials that are not subject to extended transport distances)
- For the purposes of understanding – and therefore ameliorating – the potential energy consumption at the office zone, conduct and adapted ABGR analysis of that area. Similarly, conduct an adapted Green Star analysis such that additional ESD opportunities may be identified.
- Carry out assessment of any vehicle washing / cleaning operations likely to be carried out on the site, and investigate options to reduce environmental impact of same.
- All return air ducted to be fitted with CO2 monitoring.
- Introduction of fresh air into the air-conditioning system.

- Understanding of latest technologies in gas powered co-generation power supplementation.
- Exploration of the use of a blackwater recycling station to provide W.C and landscape irrigation water for the precinct.

Environmental Management in accordance with ISO 14001:2004

Buildcorp Environmental Department have developed and implemented a comprehensive Environmental Management System (EMS) that has been developed in accordance with ISO14001:2004 accreditation. Buildcorp are targeting to have full certification by August 2008. The EMS incorporates all policies and procedures required to manage all onsite activities and help ensure all environmental impacts concerning our operations are minimised or eliminated. A site-specific Environmental Management Plan is developed by the project team prior to site establishment and incorporated into the management system. The project team in consultation with the Buildcorp Environmental Department undertakes a comprehensive Environmental risk analysis of site activities; all documents are made available to the client and subcontractors involved in the project.

Environmental Management System

Buildcorp's Environmental Management System (EMS) is used to ensure the systematic management of the environmental issues concerning our activities. Buildcorp's EMS has been designed to ISO 14001:2004, to ensure that the company, its employees and our subcontractors are able to comply with the legislative requirements for environmental management.

In addition to the above standard, ISO 14001:2001, Buildcorp also utilises the legislation, codes and guidelines as they are issued from time to time in all of the jurisdictions where we operate.

Buildcorp's EMS Manual is under the authority of the Senior Management Group, which is the final authority for ensuring the minimal environmental impacts for all activities associated with Buildcorp work. The Senior Management Group comprises:

- The Managing Director
- The General Manager
- The Construction Manager
- The Group Financial Controller

Environment Protection and Biodiversity Conservation (EPBC) Act, 1999

The Environment Protection and Biodiversity Conservation (EPBC) Act, 1999 is the key environmental legislation that the EMS adheres to. This legislative instrument also draws up a wide range of National Codes of Practice, NSW WorkCover Codes and Australian Standards.

Environmental Legislation is governed by the Local, State and Commonwealth governments. Relevant Australian standards and National codes of practice detail best practice for the particular function.

There are several pieces of environmental legislation in NSW including variations throughout Local Government jurisdictions.

As well, the Act, regulations provide a framework by which employers and employees address environmental issues through consultative processes as well as setting a range of processes for management of environmental impacts in the construction industry.

Management of Environment Obligation within Buildcorp

Buildcorp's prime value is to meet all of our obligations in order to be a good corporate citizen and one of the major elements in abiding by this value is compliance with the law including Environmental Protection law. In order to meet our obligations under the law and, more importantly, to ensure that environmental impacts are eliminated or minimised as a result of our work, Buildcorp has developed an Environmental Management System (EMS). The EMS is the way Buildcorp ensures the environmental impacts are eliminated or minimised for all our activities.

ENVIRONMENTAL POLICY STATEMENT

Vision: **Buildcorp is committed to being an industry leader in the field of Environmental Management and Environmentally Sustainable Development.**

This policy covers the administration, design and construction operations of Buildcorp sites throughout Australia.

Buildcorp is an industry leader in the provision of high quality professional construction and development services and an essential part of this leadership is our fundamental commitment to environmental sustainability in:

- Planning and Development;
- Design Management;
- Construction Management; and
- Operations within all parts of the organisation.

Buildcorp is committed to continuous improvement in Environmentally Sustainable Development principles and best practice environmental management in all our activities, through the use of integrated environmental management procedures and planning.

Buildcorp will provide leadership in environmental management procedures and planning and work with our clients to achieve the best environmental outcomes possible for each and every project we undertake.

Our environmental objectives are:

- To conduct our activities in accordance with the law, global best practice guidelines, our company policies and our internal Buildgreen initiatives to ensure the protection of the environment is a high priority consideration in the planning, design and construction phases of all projects.
- To establish, maintain and continually improve our Environmental Management System in line with AS/NZ ISO 14001:2004.
- To develop, implement and review work practices and procedures to ensure waste, and pollution do not occur and that we achieve increased efficiency in the use of resources and reduce the environmental impacts of our work.
- To continuously review and update our policies, objectives and targets to ensure their relevance for high quality environmental performance.
- To strictly control the impact on flora, fauna, the community and our heritage of construction related waste, air emissions, soil damage, erosion, water contamination and noise.

Tony Sukkar
Managing Director
Buildcorp Pty Limited
Date 20/06/08

Scope of EMS

The EMS will encompass the environmental impact of all activities conducted by Buildcorp Pty Ltd. The organisation's policies and procedures provide a framework to manage risk in relation to the environmental at the company's work-places. The EMS identifies people responsible for ensuring work is carried out and records are kept.

The EMS is only valid under NSW law and any works conducted by Buildcorp outside NSW will refer to the individual state/territory law under which it operates its business.

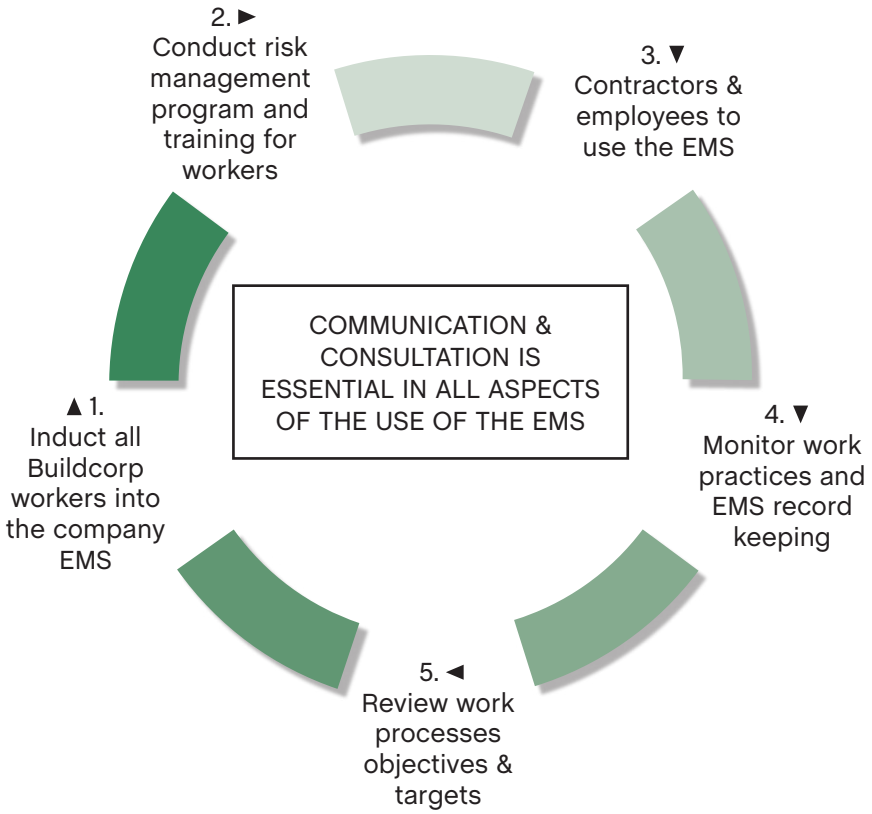
Site-specific Environmental Plans (SEPs) have been established for individual construction sites.

Construction activities have been identified as having the most significant environmental impacts. A SEP is adapted for each construction project.

The Process

Effective EMS is a dynamic process with changes being made on a constant basis as our industry introduces new processes, methods and equipment and identifies weaknesses in existing processes, methods and equipment. As a result, the EMS manual is subject to frequent change and it is the responsibility of individuals working in the design, development, implementation and enforcement of this manual to keep themselves informed of the changes in the EMS manual.

Figure 1 EMS Continuous Improvement Process



Monitoring of the Process

Buildcorp monitors the EMS through the Buildgreen Plan. The Buildgreen Plan details the precise steps in the design, development, implementation and review of Environmental policy, procedures, and training within Buildcorp. Responsibility for the Buildgreen Plan lies with the Senior Management Group and implementation and monitoring of the Plan against its set objectives lies with the Environmental Manager.

The Environmental Manager provides reports on a periodic basis to the Senior Management Group detailing compliance with the established plan and recommendations for changes when required. Monitoring of the Plan will be informed by data collected through management, audit, and consultation and investigation reports.

General

Buildcorp Pty Ltd employees and subcontractors will conduct their activities in such a way as to take account of the environmental impacts on workplaces controlled by Buildcorp Pty Ltd and give proper regard to the protection of the physical environment.

To implement this action statement Buildcorp Pty Ltd not only complies with requirements of relevant legislation, but promotes appropriate measures for the protection of the environment where it may be affected directly or indirectly by Buildcorp Pty Ltd activities.

In the event of an environmental incident through work practices, Buildcorp Pty Ltd will provide the highest possible standard of remediation and assist with authorities.

Management Commitment

Buildcorp Pty Ltd is committed to environmentally sustainable development and practices consistent with Environmentally Sustainable Design (ESD) principles and best practice environmental management in all its activities.

Our director, Tony Sukkar will ensure financial and human resources are available to fulfil requirements under environmental legislation. In addition planning and resources will be made available for continuous improvement of Buildcorp Pty Ltd EMS.

Environmental Policy

Buildcorp Pty Ltd undertakes to regularly review this Environmental policy to ensure it remains current and relevant.

Environmental Communication

All Buildcorp policies and procedures are available to all interested parties, copies of polices are required are required to be displayed onsite and a copy of the corporate EMS is available from the Project Supervisors or Environmental department.

Measuring Environment Performance against Corporate Objectives

In order for Buildcorp to achieve our Corporate Objectives in Environmental Management it is essential that we continuously and rigorously monitor our performance in this area. This procedure provides guidance on how Buildcorp, our management, employees and contractors will measure their performance and therefore our joint performance in ensuring a healthy and safe workplace.

Buildcorp has clearly established our corporate objectives for Environmental Management as:

- Make Environment Management a major priority and comply with Environmental legislation;
- Become an industry leader in Environmental Management and Sustainable Development;
- Update Environmental Management procedures as required;
- Ensure Environmental Management procedures are effectively carried out;
- Comply with standards and codes of practice related to Environmental Management.

The benchmarks which Buildcorp uses to measure our Environmental Management performance are:

Compliance with Environmental Legislation

Our compliance with Environmental Legislation will be measured by the number of infringements or improvement notices issued by inspectors.

Compliance with Buildcorp Environmental policies

Compliance with our internal policies and procedures in Environmental Management will be measured by the number of breach notices issued.

Update and Implement Change in our Environmental Processes, Policies and Procedures

All information relating to Environmental Management which is derived from audits, reporting processes, consultation with employees or via any other means is to be collated and acted upon according to its assessed level of urgency and seriousness. All of these activities are to be collated and analysed by the Environmental Department and consolidated reports provided according to our Environmental Reporting level.

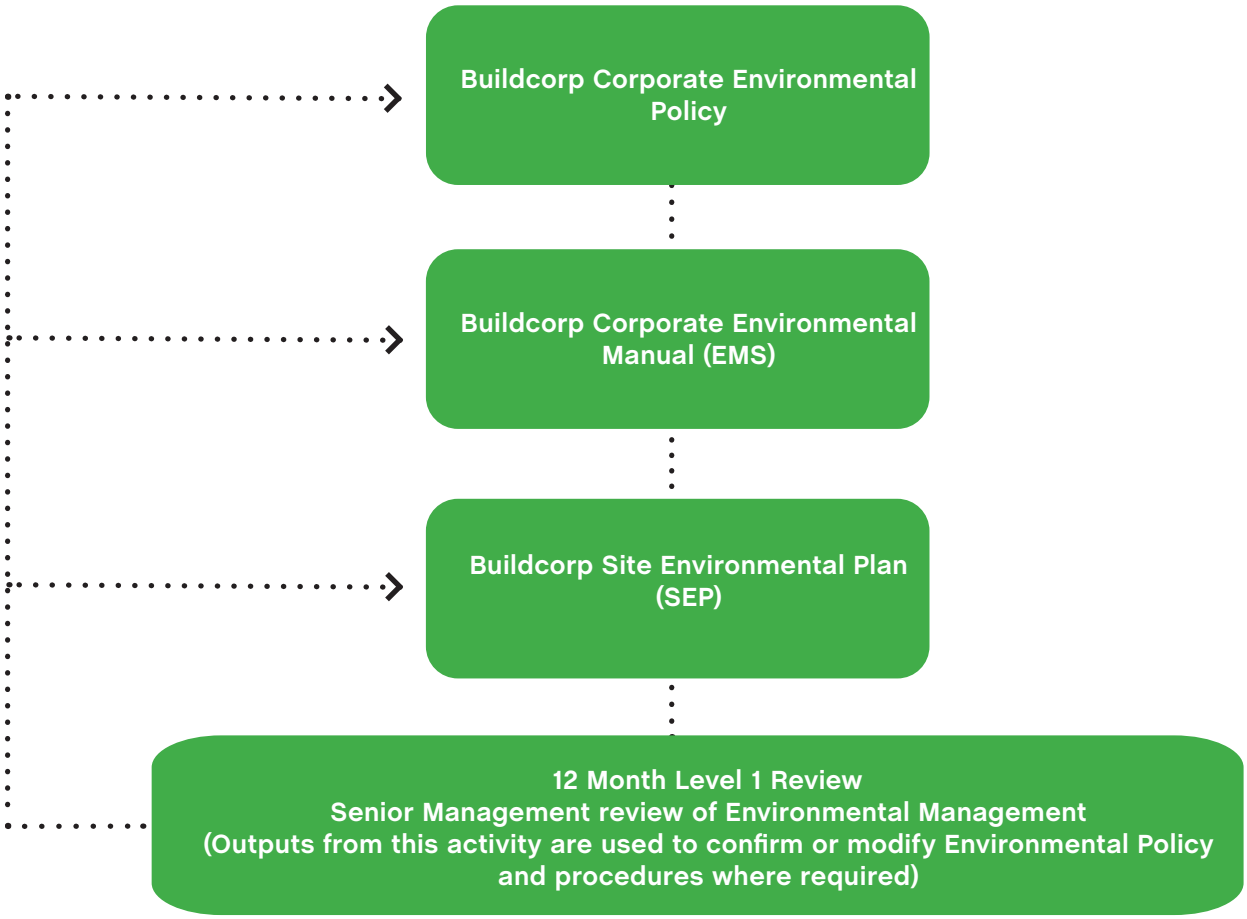
Hazard / Risk Management

Identify Hazards:

Risk identification, assessment and control of potential hazardous situations is the key to eliminating or minimising environmental impacts. To help find all potential hazards the job will be broken down into activities, which follow the sequence of the works. These activities are to be developed into an Occupational Health Safety & Environment (OHSE) Safe Work Method Statement (SWMS), which is a list of job procedures and other work related practices. The SWMS details the hazards associated with the task and the controls used to eliminate or control the risk. The SWMS details how the Scope of Work will be carried out on a specific project.

Buildcorp Pty Ltd will, in consultation with employees, identify potential environmental hazards for each work activity and develop a SWMS. The SWMS details how the Scope of Work will be carried out on a specific task.

Buildcorp Corporate Environmental Management System



Buildcorp Corporate Environment Management System Explanation

Buildcorp Corporate Environmental Policy

This corporate policy is the instrument through which Buildcorp's duties, obligations, process and procedures are described and enforced.

Buildcorp Corporate Environmental Management System Manual (EMS)

This manual sets the policy and procedures for environmental management within Buildcorp. It also establishes the duties and obligations of all personnel and sets out the consequences for non-compliance.

Buildcorp Corporate Site Environmental Plan (SEP)

This site-specific plan establishes the onsite environmental conditions and sets the environmental control measures that are put in place to ensure all environmental management obligations are identified and addressed on each individual construction site.

Legislative Requirements

Buildcorp Pty Ltd has established, implemented and maintains procedures to identify and access the applicable legal requirements and best practice guidelines related to environmental aspects of all its activities

Buildcorp Pty Ltd shall ensure these legal requirements and best practice guidelines are taken into account when implementing and maintaining this EMS.

Legislation and guidelines are to be reviewed on a regular basis to ensure they are up to date and cover any new initiatives Buildcorp Pty Ltd may introduce. Legislation and guidelines for site specific SEPs are to be revised for each project prior to construction.

Managing construction waste

Why do you need to manage construction waste?

Under the Protection of the Environment Operations Act 1997, waste must only be taken to a place that can be lawfully used as a waste facility for that waste.

Both the owner of the waste and transporter are each guilty of an offence when waste is transported to a place that cannot lawfully be used as a waste facility for that waste.

The maximum penalty is $5 Million or 7 years' jail

Site team

To ensure construction waste is managed correctly the following will be implemented:

Site Start up

Site sheds will include recycling bins for paper, combined glass and cans as a minimum

Where possible, approved waste management subcontractors will be employed who have proven offsite-sorting facilities, measure waste entering their sites and provide free monthly waste reports. The following waste contractors have demonstrated these capabilities:

- Dial a dump
- Bingo waste
- Reefway

If an alternative Waste subcontractor is selected, this will be done in consultation with the Environment Manager.

During construction

A record will be maintained of monthly waste reports in the projects HS&E filing system.

The site will be Inspected daily to ensure the worksite is left in a rubbish free state and no rubbish has been trapped against site fencing

A record will be maintained of all waste being generated on site using a Waste management plan form

Waste management plan form

1. Waste types being generated/ taken from site will be recorded: if its excavation material, the class will also be recorded, for eg Solid waste, class 2, VENM etc
2. Required transportation of waste in a bin or truck will be identified
3. The waste/ excavation subcontractor responsible for transporting the waste will be recorded
4. The name and address of the landfill, which the waste is being taken to will be recorded OR if the excavated material is classified as VENM (Virgin Excavated Natural Material) it is no longer considered 'waste' and it may be taken to another site willing to accept this material. If this is the case, the receiver of the VENM to sign a Section 143 form as proof that it has been legal taken away.
5. Site or landfill's contact phone number will be recorded
6. The Section 143 Notice or EPA licence number (this can be obtained from the landfill or from the EPA website) will be recorded and a copy kept of the Section 143 Notice or EPA licence on site
7. The Section 143 Notice or EPA licence number will be reviewed and recorded to ensure it is able to accept the VENM material or waste types

Generally, Buildcorp will:

- avoid over ordering of materials
- review packaging requirements for major deliveries of materials with each subcontractor prior to delivery on site
- review the potential to use reusable packaging, such as cloth bags or blankets for furniture and equipment
- where possible, buy environmentally approved and recycled content products
- ensure all loads of rubbish removed are securely covered before exiting the site to ensure no spillage

Waste management plan

Project	Australian Red Cross Blood Service
Address	17 O'Riordan Street, Alexandria

Waste type (and class for excavated material)	Tran-sported by bin or truck	Sub-contractor name and phone number	Site name (for VENM only)/ landfill name and address	Site or landfill contact details	Section 143 notice or EPA license number/	Site/ landfill is
Excavation waste Solid waste class 2	Truck	Deline Contracting 02 1234 1234	Erskine Park Landfill 22 Eskernville Rd Erskenville NSW	02 1234 1234	#4865	Yes
Insulation material	Con-struction waste bin					
Timber	Con-struction waste bin					
Glass	Con-struction waste bin					
Plastics	Con-struction waste bin					
Concrete blocks	Con-struction waste bin					
Packaging	Con-struction waste bin					

Concrete	Concrete bin (where possible)					
Steel, scrap metal etc	Scrap metal bin					
All food products and general non recycle rubbish	Food scrap/ general waste bin					
Paper and cardboard	Paper/ cardboard bin					
Glass bottles and Cans	Commingle					

Appendix C
Site Establishment Plan

4.0 APPENDIX C SITE ESTABLISHMENT PLAN

Site Set-up

Site Compound

It is proposed that the project will have site amenities & storage facilities located on the northern boundaries with access from O'Riordan Street. The main purpose of this is to allow access to the workspaces once the ground floor has been constructed without impeding access for construction of the new building. All site inductions & deliveries would be conducted from this location.

The site construction plan in this CDEMP identifies the requirement for parking next to the site for the construction team; we propose that the staging plan be considered as an option to save costs on the site setup & relocation. We have an option allowed for the construction zone, amenities as required. The facility will need to cater for a construction team peaking around the 120 people.

During the course of the project the facility for car parking will change to allow on site access into B1 or the vacant site. We will include the traffic management plan into the site management plan & induction.

Site access

During the different stages of the project the site access will be achieved via the early installation of stairs and the erection of stretcher scaffold stairs, as the ramps will have been completed from B1 to GF they will allow storage in the lower basements for the completion of the project as well as access for deliveries as required.

Further access will be from the Tower Crane located in the warehouse, the Precast concrete located on the western boundary will be installed as 4 panels with the use of the large tower crane. Materials will be delivered from O'Riordan Street that we assume we have full unimpeded access to the drive at all times and be craned into the required location. As we propose our construction design is a bondec, beam construction, this allows a more refined program on the structure.

The added use of an on site forklift will be looked at on an as need basis. We anticipate that we will need to adjust the plan as building constraints appear however this would be achieved thorough consultation & review with Goodman.

Site access from the amenities will be closely monitored to allow the access into the lower levels and wet weather access into the site. We propose that the site amenities will be added to as the requirement of the project labour increases however this will be set up for the maximum occupation of the structure trades.

Hoardings / Fences

The site has its own specific risks, that will need to be worked through. Risks involved are listed below:

Safety - Excavation in Sand, we propose that the site be surrounded with a purpose made fence in early works. Secondary fencing will be handled with hired fence panels as required at the edge of the excavation as required.

All street access will have gates and supervision controlling the public and deliveries. We anticipate that deliveries will be staged in the early works of the project during peak hours. During the excavation we will need to stage the works to enable the commencement of the piling while the retaining walls are benign constructed.

Site Storage

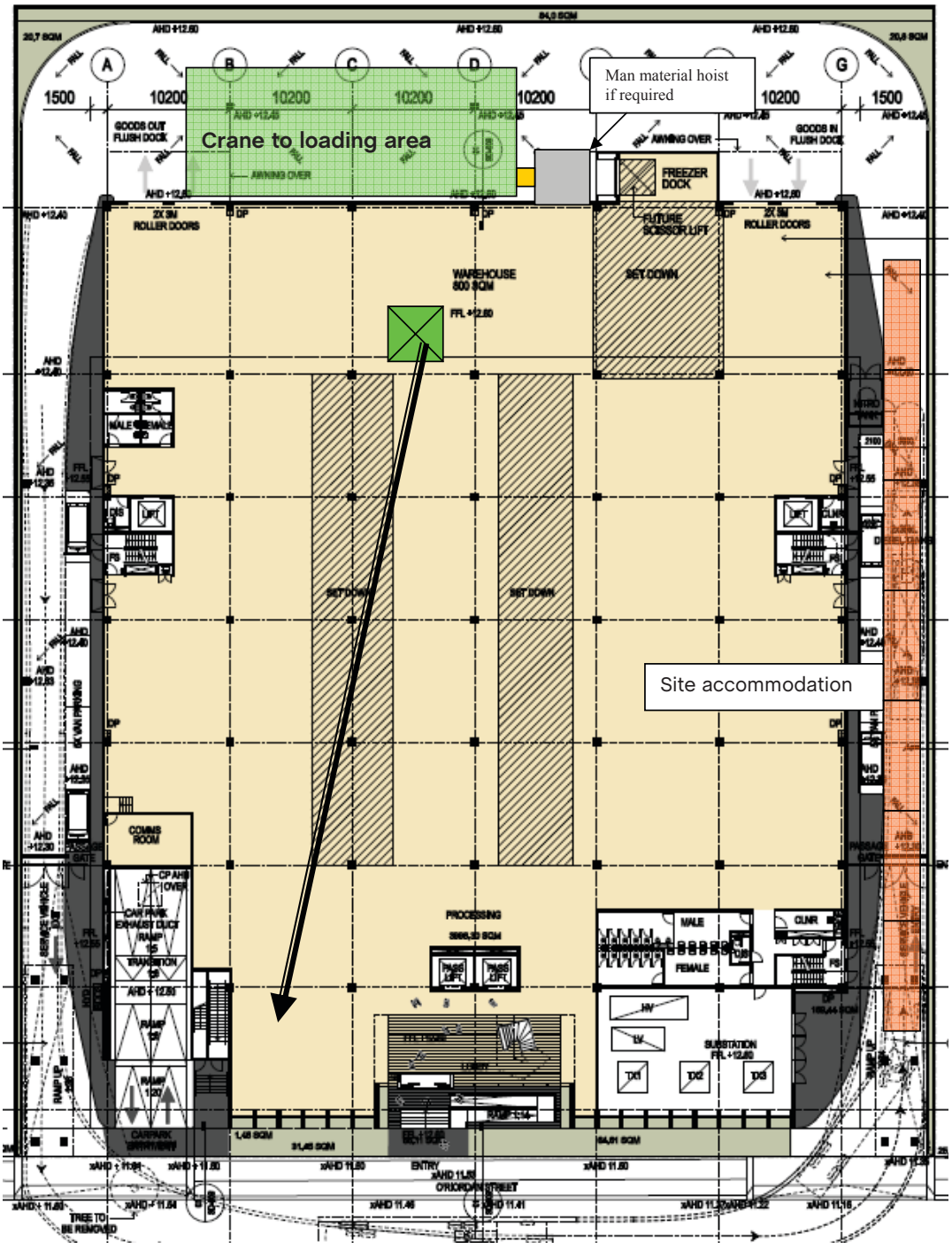
Site storage will need to be concealed from view to enhance the occupancy enjoyment of the surrounding buildings. The way that materials come to site will also play a part in the speed of constructing the project all materials must come to site in a packaged type of way for example, bulk materials i.e. bricks will need to be in pallets wrapped in safety plastic to allow the quick loading & unloading by the crane. Electric trolley jacks should be used to increase the speed of the materials handling form the loading platforms into the site on the floors into the required location.

Site Amenities

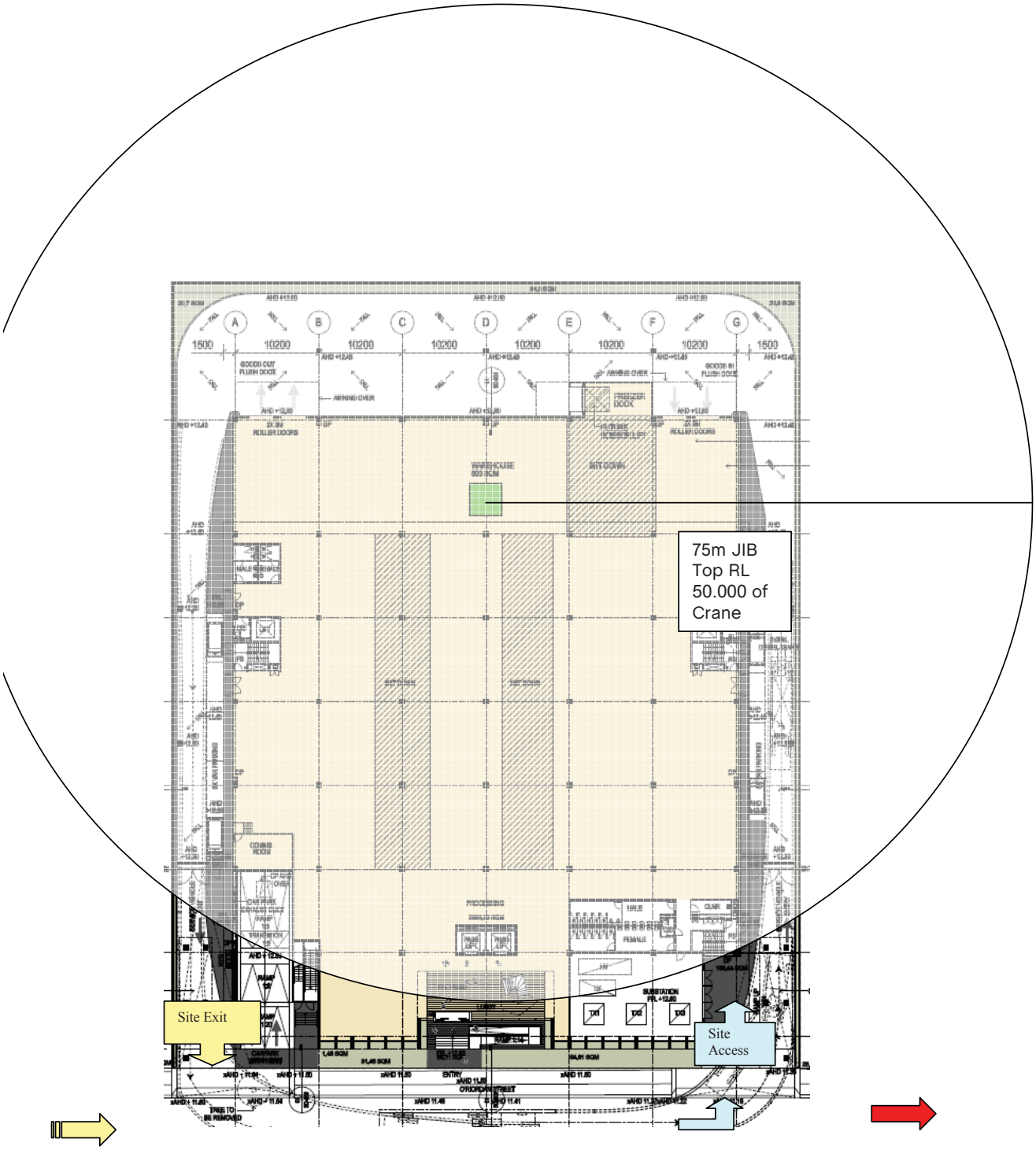
We have proposed the site amenities will be installed in the area located directly at the rear of the building along the western boundary as indicated in the attached plan. The warehouse balcony may need to have secondary amenities for toilets if required. We anticipate the site population at peak times to be around 120 people, in this case the starting times will need to be regulated and controlled, and further amenities will be placed in the car park on the northern side of the site if required.

As the contractors will need to go through the standard security checks prior to coming on site, the team will conduct all inductions & checks of SWMS prior to any contractor commencing on site in accordance with the BCNSW Safety system.

SITE AMENITIES PLAN



AUSTRALIAN RED CROSS CRANE LOCATION



Appendix D
Stormwater & Sediment
Control Plan

5.0 APPENDIX D STORMWATER & SEDIMENT CONTROL PLAN

Rev Date	REVISION DESCRIPTION
21/06/08	Original Issue

Contents

Appendices

Appendix	Title
A	Soil and Sediment Erosion Control Plan,
B	Sediment Controls drawings

1. Introduction

1.1 Purpose

a) This Stormwater and Sediment Control Plan describes how Buildcorp proposes to manage stormwater, prevent erosion, control sediment and prevent pollution

1.2 Scope

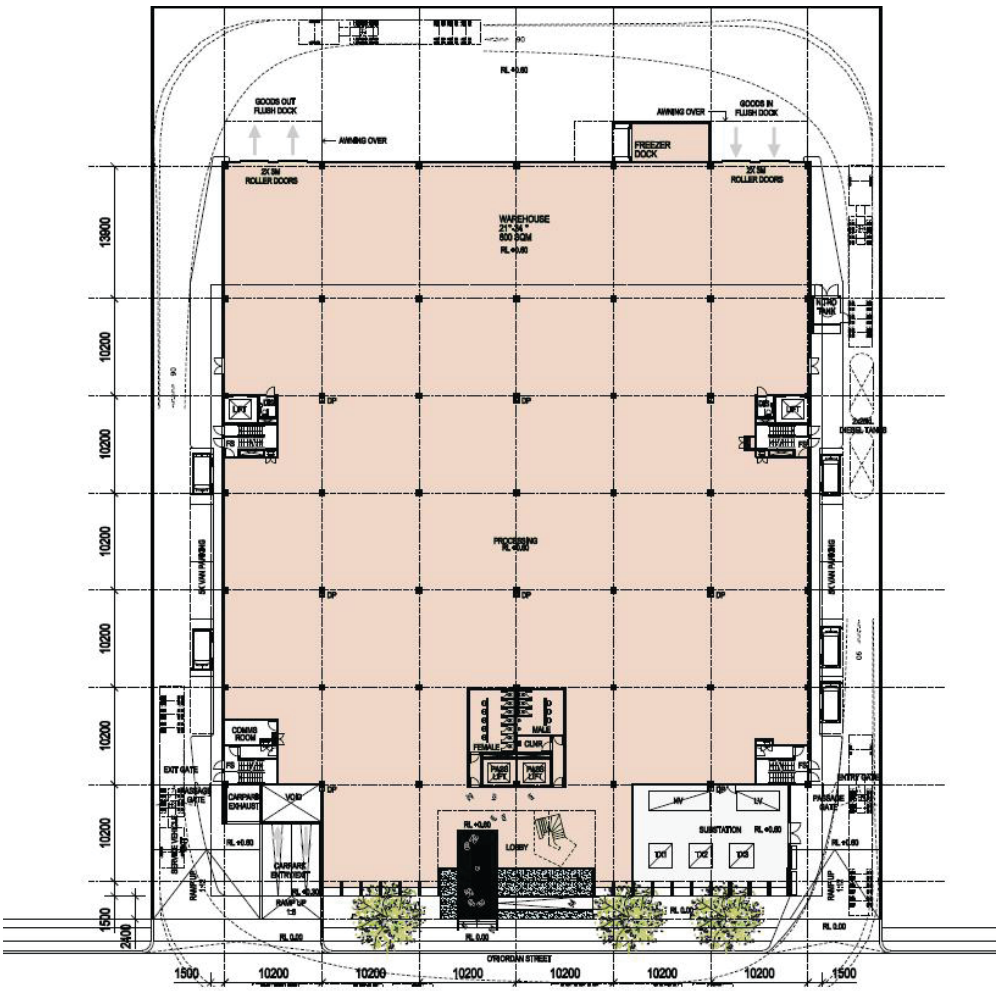
a) This plan describes the stormwater and sediment control aspects of the project, which will need to be managed to achieve the desired outcomes, within the constraints imposed by legislative, regulatory and contractual requirements, so that the desired outcomes are achieved.

1.3 Objectives

a) To prevent contamination of, or damage to, stormwater drains and waterways and ensure sediment from the building site is retained on-site during construction work.

1.4 Project Site

a) The project site and proposed structure is shown below:



b) The Site is a currently occupied site and will require demolition works.

1.5 Project Description

a) The site for the proposed development is known as Australian Red Cross with frontage to O'Riordan Street Alexandria.

b) The building will be of a commercial campus character with an innovative CBD style. The new building will be a commercial building with a high level of finish to the front façade.

1.6 Contact Details

1.6.1 Company Operational Details

Directors Name	Tony Sukkar
Company Name	Buildcorp Contracting NSW
Company Business Address	Level 4/10 Mallett St, Camperdown
Company Contact Number	02 9565 0000
24hr Contact Number	0418 251 353

1.6.2 Onsite contact person responsible for compliance with this Construction Management Plan

Name	Steve Taunton
Title	Senior Project Manager
Contact Number	0406 530 597

1.6.3 Contact person in control of the site

Name	Garry Werner
Title	Site Supervisor
Contact Number	0406 530 597
After Hours Contact Number	0417 491 639

1.7 Site Specific Details

a) The construction site is adjacent to vacant land on the northern and western boundaries. It is bordered by O'Riordan Street to the eastern boundary

b) The site is slightly elevated to roadway or walkways with drains that discharge stormwater system

c) There is no vegetation on the site.

d) The excavation for footings and alike will not encroach on the anticipated groundwater levels as nominated in the preliminary Geotechnical report. If however groundwater is encountered that is not expected then expert advice will be engaged to monitor the extraction & integration back into the water table at the end of the site away from the excavation of the lift pit or storm water lines that might be effected. This will ensure the separation of the contaminated ground water to rain water.

2. Operational Controls

a) Soil erosion and sediment control measures shall be designed in accordance with the document Managing Urban Stormwater-Soils & Construction (NSW Department of Housing, 1998.).

b) Stormwater and sediment controls are shown on the Soil and Sediment Erosion Control Plan, prepared by SCP:

- Stormwater retained on site will not cause structural damage to excavations or retaining walls
- Stormwater shall be drained to the legal point of discharge throughout construction

- Stormwater shall be prevented from entering adjoining properties or into the sewerage system
- Stormwater shall be captured and filtered in sediment control points before entering the legal point of discharge.

c) Rumble grids shall be cleaned daily with consideration given to water saving measures including recycling. Water run-off from cleaning the grid must be filtered prior to entering the legal point of discharge.

d) Grated drains shall be provided at stormwater exit points from the site to prevent uncontrolled run-off.

e) Stockpiles shall be located away from drainage lines and street drains and gutters. Where possible, stockpiles shall be located on the highest part of the site clear of main activity areas.

f) Designated truck / vehicle / equipment wash down areas shall be located near the site entrance and be designed to capture and treat water prior to discharge into the stormwater system. A water recycling system shall be installed if wash down areas exceed 3000 litres per day.

g) Wherever possible, natural vegetation shall be retained to absorb water flows and to minimise dust. Revegetation shall occur as soon as possible after the completion of works

h) Natural rainwater run-off shall be controlled to prevent sediment draining into the stormwater system. Upslope water shall be diverted to prevent it from travelling through the site. Downpipes shall be connected as soon as a roof is installed on the site. Natural falls of the site shall be identified and sediment filters such as straw bales filters, gravel surface barriers, sandbags, pit baskets or geo-textile mesh screens shall be installed at runoff points. Sediment shall be trapped as close to the source as possible.

i) Straw bales/geo-textile mesh screens shall be replaced on a regular basis so they remain effective.

j) Sediment traps or filters shall be placed around any drain affected by construction works to prevent sediment entering the stormwater system. Sediment controls shall be checked daily to ensure they are in place and operating properly. Additional inspections shall be undertaken immediately following or during heavy rain (10mm of more rainfall event) to confirm the operational adequacy of the facilities.

k) Water shall not be discharged to the stormwater system if oil is visible on the surface, or if there is reason to suspect that the pit is contaminated with fuel, sewage or other contaminants. In this case the water shall be taken away to an oil separation facility (such as Lidcombe Liquid Waste Facility);

l) Waste material, including liquid wastes such as paint, concrete slurries and chemicals, will not be discharged into a stormwater drain. Facilities shall be provided to enable paint brushes, rollers and spray equipment to be cleaned without any discharge of by-product into the stormwater system. Where possible, a depression or earth dam below brick, concrete or tile cutting shall be constructed. If this is not possible, site water shall be passed through a filtered pit.

m) Only clean water (less than 50mg/L total suspended solids and a pH in the range 6.5 to 8.5) will be discharged to the stormwater/harbour. Controls include:

- The water will be checked prior to discharge for pH and suspended solids;
- The Department of Environment and Commerce be contacted prior to discharge for any site specific advice;
- A float shall be attached to the end of the pump suction line to ensure that settled material at the bottom of excavations are not discharged together with clarified water to the stormwater system/ harbour;
- Discharging water through a filtration unit;

- Discharging only the top clarified portion, and tankering the remainder to a treatment facility. Alternatively, for where water is particularly dirty, the full amount will be tankered away to a treatment facility.;
- Leaving bottom slurries in excavations for subsequent covering with sand, or if necessary, removing them in sealed containers to acceptable and proper disposal locations;
- Pre-flocculating before using any of the above methods when dealing with very fine soils such as clay and silt;
- Wastewaters which are still “dirty” or contaminated will not be discharged to stormwater systems/ harbour, but instead collected and properly disposed

n) The design of sediment controls is detailed in the Sediment Controls drawing, prepared by SCP.

3. Water Saving

a) Permanent water saving measures shall be used on site. These include:

- All hoses must be in good condition and fitted with a trigger nozzle.
- A high pressure water cleaning unit is to be used for all washdown activities
- Applications will be made to Sydney water for the appropriate permits for the use of water.

Appendix E
Noise & Vibration
Report Part A & B

6.0 APPENDIX E NOISE & VIBRATION REPORT PART A AND B

ACOUSTIC LOGIC CONSULTANCY
noise and vibration consultants
abn 11 068 954 343

18 September 2008

Report: 2008499/0207A/R4/JZ

Prepared for: Goodman Property Services Pty Ltd

17 O'RIORDAN STREET GREEN SQUARE

PART A

ASSESSMENT OF IMPACTS ON THE PROPOSED DEVELOPMENT FROM ENVIRONMENTAL NOISE AND VIBRATION

Directors Matthew Palavidis | Victor Fattoretto | Matthew Carter | Matthew Shields

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1. INTRODUCTION

This report presents our assessment of the potential impact of traffic, aircraft and rail noise and vibration on the acoustic amenity of the proposed commercial development located at 17 O'Riordan Street, Green Square.

The assessment has been based on vibration levels generated by train movements within the tunnel of the Airport and East Hills Railway which runs underground next to the proposed site.

Vibration results have been used to predict internal noise and vibration levels within the future development. If necessary, appropriate indicative noise/vibration attenuation treatments will be recommended to prevent regenerated noise levels and tactile vibration from exceeding the specified levels.

External noise intrusion will be assessed within the development in accordance with the relevant Australian Standards requirements.

As the building will have a concrete roof construction, the main noise path requiring assessment will be through the glazing and doors. The glazing assemblies and external doors required to exclude traffic and aircraft noise are recommended based on noise levels measured to comply with the internal noise objectives recommended in the Australian Standards requirements.

This assessment is based on drawings provided by Goodman Property Services Pty Ltd with drawing numbers: SD-003 to SD-008 dated 6 June 2008.

2. SITE DESCRIPTION

The proposed development is located at the 17 O'Riordan Street bounded by O'Riordan Street to the East which is a four lane road carrying medium to high traffic volumes distributed throughout the day. Traffic noise would potentially affect the Eastern building façades. The site is close to the ANEF 20 contour for Sydney Airport and is therefore affected by aircraft noise.

With the Airport and East Hill rail corridor located immediately north western next to the site, the potential train vibration source is train passbys within the tunnel of the Airport and East Hill with 2 tracks located under the proposed site.

Detailed of the project site and measurement locations are presented in Figure 1.

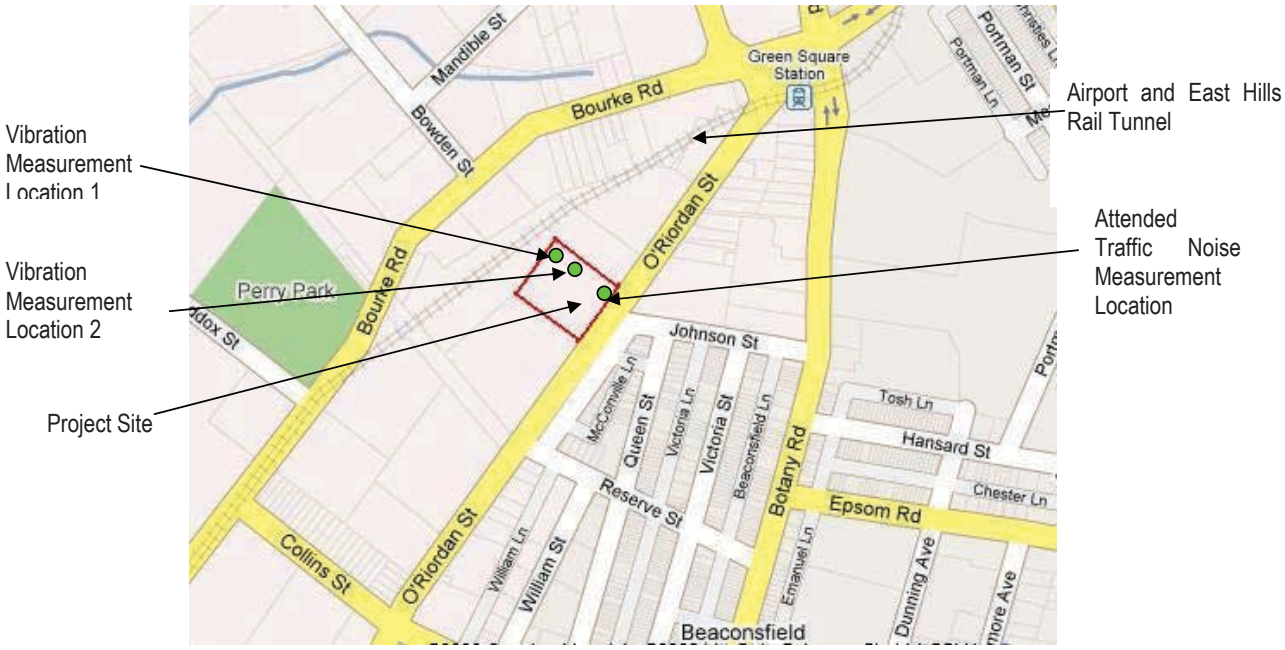

Figure 1 Site Map

3. RAILWAY VIBERATION ASSESSMENT

3.1 RAILWAY VIBRATION OBJECTIVES

Trains induce ground born vibration that is transmitted through the subsoil. This vibration can be perceptible close to railways, both as tactile vibration and as structure borne noise.

3.1.1 Tactile Vibration – Human Response

The vibration levels shall not exceed those given in AS 2670.2-1990. Australian Standard 2670 Part 1 "Evaluation of Human Exposure to Vibration and Shock in Buildings (1 to 80Hz)" recommends maximum vibration acceleration levels in buildings so as to ensure a low probability of disturbance to the occupants. The standard recommends that vibration spectra be assessed against criterion curves. A number of criterion curves are recommended, depending on the sensitivity of the occupancy to vibrations. The allowable level of vibration may be increased above the base vibration curve given in the standard (for the various occupancies) by the multiplication factors given in Table 1. The Environmental Protection Authority in their Noise Control Manual adopt the same criteria.

Table 1 - Range Of Multiplying Factors To Gauge Satisfactory Magnitudes Of Building Vibration With Respect To Human Response

Place	Time	Continuous or Intermittent vibration	Transient vibration excitation with several occurrences per day
Critical working areas e.g. Hospital operating theatres	Day Night	1	1
Residential	Day Night	2 to 4 1.4	30 – 90 1.4 to 20
Retail Shop/Offices	Day Night	4	60 to 128
Workshops	Day Night	8	90 to 128

The Australian Standard classifies building vibration as continuous/intermittent or transient in nature, and relates vibration conditions, which may cause adverse human response to annoyance curves. These curves are derived using multiplication factors. The multiplication factor used is dependant on the sensitivity of the occupancy to vibration (as indicated in the table).

For this project the rail tunnel vibration is regarded as intermittent in nature. Within commercial offices the most sensitive period is during the day or evening when it is recommended that vibration levels not exceed curve 4 which is the baseline curve multiplied by a factor of 4.

3.1.2 Structure Borne Noise

Vibration generated by train passbys within the train line next to the proposed development will potentially generate structure born vibration which will be radiated of internal building elements such as walls, floors and ceiling as audible noise. Internal noise levels associated with structure born noise generated from train passbys is required to comply with the following noise level objectives.

There are no documented rail structure borne noise level objectives for commercial buildings. For this reason, the rail structure borne noise level objectives will be based on the noise level recommended by Rail Infrastructure Corporation for residential buildings. The residential requirement is that the resulting structure borne noise level should not exceed 40 dB(A) L_{max}. Assuming this has been applied to limit loss of amenity in residential bedrooms, the corresponding difference in noise levels recommended in AS 2021 for these spaces will be used to adjust the bedroom level. AS 2021 recommends a noise level of 50 dB(A) L_{max} in sleeping areas, 50 dB(A) in laboratory areas, 65 dB(A) in generally office areas and 75 dB(A) in retail areas. Extrapolating this difference to railway induced noise gives a requirement of 40 dB(A) in laboratory areas, 55 dB(A) in office areas and 65 dB(A) in retail areas. At this level, structure radiated noise levels may be audible but would not be excessively intrusive.

Train vibration measurements conducted as part this assessment will be used to calculate internal noise levels generated from structure born vibration. Vibration measurements have been conducted at a number of locations as detailed in the sections below.

3.2 RAIL VIBRATION MEASUREMENTS

3.2.1 Vibration Measurements

Measurement Positions

Vibration from train passbys was measured at the locations shown in Figure 1. Loction1 was 15m from the site rear boundary and location 2 was 30m from the boundary.

Time of Measurements

The manned measurements were carried out on 24th April 2008.

Measurement Equipment

A Svan 912 AE vibration Analyser was used for the vibration measurements. The analyser was set to fast response and calibrated before and after the measurements using a SVANTEK SV03A calibrator. No significant drift was noted.

3.2.2 Tactile Vibration Levels

Measured tactile vibration levels were all well below the levels recommended in AS 2670.2 by at least 10 dB, and are also well below the criteria curve for critical situations such as hospitals, etc. The vibration levels measured were barely above ambient vibration levels (i.e. excluding the railway) even at 15m which is closer to the railway. Therefore, even allowing for any amplification of vibration levels at certain frequencies for the building on a suspended slab, treatment will not be required to comply with the tactile vibration criteria.

It is noted that a potential tenant is proposing to install vibration sensitive equipment within the building. We have not been provided with vibration limits for this equipment, however, because the levels of vibration induced by the railway are very low if these would effect the equipment then vibrations from traffic, people walking next to the equipment, etc would also affect the equipment. If the equipment is that sensitive to vibration it should be separately vibration isolated, notwithstanding any vibration produced by the railway.

3.2.3 Structure Born Noise Levels

Internal noise levels as a result of structure born noise have been calculated at a number of positions within the proposed development. Internal noise levels within the future development have been calculated based on the measured vibration levels.

These are presented in Table 2.

Table 2 – Calculated Structure Born Noise Levels

Position	Level	Calculated/Measured Noise Level dB(A) L_{max}
Location 1 (15m from north-western boundary)	Ground	39
	Level 1	35
Location 2 (30m from north-western boundary)	Ground	40
	Level 1	37

The predicted regenerated noise levels are well below recommended levels and are therefore acceptable.

3.3 Discussion and Recommendations

The results of the investigation of vibration generated from train passbys within the Airport and East Hills Tunnel revealed that:

- Tactile vibration levels were only barely above ambient levels and were clearly within acceptable vibration limits for normal office and laboratory tenancies. The vibration levels experienced would not affect vibration sensitive laboratory equipment, unless this equipment was ultra-sensitive to vibration in which case it would need its own vibration isolation treatment regardless of railway vibration.

- The internal regenerated noise levels will comply with recommended noise level recommendations, and no additional vibration isolation treatment needed.

4. TRAFFIC NOISE ASSESSMENT

Internal noise levels will primarily be as a result of noise transfer through the roof, windows and doors, as these are relatively light building elements that offer less resistance to the transmission of sound.

Noise transfer through the masonry and concrete elements will not be significant and need not be considered further.

The predicted noise levels through the roof, windows and doors are discussed below. The predicted noise levels have been based on the expected level and spectral characteristics of the external noise, the area of building elements exposed to aircraft noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

4.1 CRITERIA

Assessment of traffic noise shall be conducted in accordance with Australian Standards AS2107-2000 "Recommended Design Sound Levels and Reverberation Times for Building Interiors" and AS3671 "Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction". The standard recommends maximum design sound levels for different areas of occupancy in the commercial development. These are given in Table 3 below.

The noise criteria are expressed in terms of the repeatable maximum daytime L_{eq} (1 hour) parameter between 7 am and 10pm for traffic noise in all areas.

Table 3 - Traffic Noise Criteria for All Spaces Inside Commercial Buildings

SPACE/ACTIVITY TYPE	NOISE LEVEL dB(A) L_{eq}
General Office	45
Lab	50
Warehouse	60

4.2 TRAFFIC NOISE MEASUREMENTS

Measurements were performed generally in accordance with the Australian Standard AS 1055 - Description and measurement of environmental noise - General Procedures.

4.3 MEASUREMENT POSITIONS

Manned measurements were taken during December 2007. The measurement location was 3m back from the kerb facing O'Riordan Street. Unattended measurements over a number of days were also obtained using a noise logger.

4.4 TRAFFIC NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level.

To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4.5 MEASURED NOISE LEVELS

Table 4 lists the measured noise levels that occurred at the measurement location. These noise levels will be used to predict the resultant internal noise levels.

Table 4 - Measured Traffic Noise Levels

MEASUREMENT LOCATION	DAY TIME NOISE LEVEL dB(A) $L_{eq\ (1\ hour)}$
O'Riordan St @ 3m	74

5. AIRCRAFT NOISE OBJECTIVES AND ASSESSMENT

5.1 SITE EVALUATION OF AIRCRAFT NOISE

The aircraft noise intrusion into the proposed development is assessed in accordance with AS 2021-2000 "Aircraft Noise Intrusion - Building Siting and Construction".

The standard sets criteria for allowable levels of aircraft noise exposure depending on the proposed land use for the site being assessed.

The acceptability of a site in terms of aircraft noise exposure is assessed using the Australian Noise Exposure Forecast System (ANEF). Three basic parameters influence perception of aircraft noise: the frequency of aircraft movements overhead, the noise level and duration of individual aircraft movements, and the time of the day in which they occur. ANEF was developed to provide a rating system that reflects actual human response to these factors so that the noise exposure of a particular location can be readily assessed.

The proposed site is located near the 20 contour, based on the 2023/24 ANEF contour map as presented in Appendix 3. AS2021 allows industrial development in any ANEF zone. Not withstanding this, the proposed development must be assessed to ensure that internal noise levels are limited to those recommended in AS2021.

5.2 INTERNAL AIRCRAFT NOISE LEVELS

AS2021 states that a full evaluation of internal noise levels should be carried out for locations with an aircraft noise exposure close to or exceeding ANEF 20. This full evaluation requires an examination of likely levels of internal noise from aircraft flyovers.

AS2021 stipulates the internal noise levels listed in Table 5 for commercial/industrial buildings. These levels will be used to assess aircraft noise intrusion into the development.

Table 5 - Aircraft Noise Levels inside Commercial/Industrial Buildings

ACTIVITY	INDOOR DESIGN SOUND LEVEL FROM AIRCRAFT FLYOVER, dB(A)
Meeting room	55 dB(A)
General Offices	65 dB(A)
Laboratories	65 dB(A)
Warehouse	85 dB(A)

5.3 EXTERNAL AIRCRAFT NOISE LEVELS

Aircraft noise levels at the site were determined using AS 2021. The Standard gives aircraft noise levels for aircraft landing and taking off for locations near airports. The location of the runways was obtained from Sydney Airport 2023/24 ANEF map.

Based on the distance from the site to the runways, AS 2021 predicts that the loudest typical aircraft movement will be from 767 aircraft taking off from the third runway. The noise level at the site from 767 aircraft, as indicated by the standard, is 72dB(A). This noise level will be used to predict the resultant internal noise levels.

6. COMPLYING CONSTRUCTIONS

The measurements and analysis carried out indicate that the only environmental noise and vibration sources requiring treatment are traffic noise and aircraft noise.

Calculations of traffic and aircraft sources transmission into the proposed buildings were performed taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted. It's assumed that the meeting rooms and administration areas will be carpet floor finish, hard floor for remaining areas.

It is recommended that only window systems which have test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

6.1 GLAZING

The complying glazing/facade assemblies are indicated in Table 6. In all cases, the selected glazing type reduces internal noise levels to within the nominated criterion for the various space types. The recommended glazing has been designed to control traffic and aircraft noise intrusion.

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement.

All windows and doors require acoustic seals. Acoustics seals shall be equal to Schlegel Q-lon seals. In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC rating of the glazing assembly below the values nominated in Table 7 Note that mohair type seals will not be acceptable for the windows requiring acoustic seals.

Table 6 – Glazing Requirements

Facade	Location	Glazing Requirement	Acoustic Seals
North	Lab	6mm Float	Yes
	Administration	10mm Float	Yes
	Meeting	10mm Float	Yes
South	Lab	6mm Float	Yes
	Administration	10mm Float	Yes
	Meeting	10mm Float	Yes
East	Administration	12.38mm Laminated	Yes
	Meeting	12.38mm Laminated	Yes
West	Lab	6mm Float	Yes

Table 7 - Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
6mm Float	Yes	29
10mm Float	Yes	33
12.38mm Laminated	Yes	37

6.2 ROOF/ CEILING CONSTRUCTIONS

The proposed concrete roof construction will not require additional acoustic treatment.

6.3 EXTERNAL WALLS CONSTRUCTION

The glass element of the external walls shall be designed to meet the indicated thicknesses in Table 6 glazing requirements. Any external wall element constructed of concrete or masonry will not require further acoustic treatment save for seals to doors and windows where indicated.

6.4 MECHANICAL VENTILATION

As internal noise levels from aircraft and traffic movements cannot be achieved with windows open it is required that an alternative outside air supply system or air conditioning be installed in accordance with AS 1668.2 requirements. The mechanical ventilation system that is installed should be acoustically designed such that the acoustic performance of the recommended constructions are not reduced by any duct or pipe penetrating the wall/ceiling/roof. Noise emitted to the property boundaries by any ventilation system shall comply with Australia Standard requirements.

7. CONCLUSION

This report provides the results of an assessment of traffic, rail and aircraft noise intrusion into the proposed Commercial development at 17 O'Riordan Street Green Square.

Traffic noise and vibration levels were measured and the results used to determine treatments required for compliance with relevant Australian Standards requirements for internal noise and vibration levels.

Provided the recommendations documented in Section 6 of this report are implemented noise and vibration levels will comply with the criteria nominated in this report.

Vibration measurements conducted on site indicate that vibration attenuation measures are not required in order to:

- Ground vibration levels at the site were measured to be only barely above ambient levels. Cosequently, the vibration levels in the completed building would be clearly within acceptable vibration limits for normal office and laboratory tenancies.

- Comply with project requirements for reradiated noise levels within the future building.

We trust that this information is satisfactory. Please contact us should you have any further queries.

Report prepared by

ACOUSTIC LOGIC CONSULTANCY PTY LTD
Judy Zhang

APPENDIX 1

MEASURED VIBRATION

APPENDIX 2

SYDNEY AIRPORT 2023/24 ANEF CONTOUR MAP

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17 September 2008

Report: 2008499/1609B/R3/JZ

Prepared for: Goodman Property Services Pty Ltd

DRAFT

17 O'RIORDAN STREET GREEN SQUARE

PART B

ASSESSMENT OF NOISE AND VIBRATION IMPACTS ON SURROUNDING PROPERTIES

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1. INTRODUCTION

This report presents our assessment of the potential impact of noise and vibration emissions arising from the construction and operation of the proposed Australian Red Cross Blood Service (ARCBS) facility to be located at 17 O'Riordan Street, Green Square on the surrounding properties.

Noise objectives and a preliminary assessment of potential noise emissions from process equipment, mechanical services plant and equipment, and vehicle movements generated by the proposed development has been undertaken. Noise emissions during the demolition, excavation and construction phase of the project has also been identified and assessed as part of the study.

This assessment is based on drawings provided by Goodman Property Services Pty Ltd with drawing numbers: SD-003 to SD-008 dated 6 June 2008 and A.2002 to A.2005 revision G dated June and July 2008.

2. SITE DESCRIPTION

The proposed development is located at the 17 O'Riordan Street bounded by O'Riordan Street to the east, which is a four lane road carrying medium to high traffic volumes distributed throughout the day. The proposed ARCBS is a commercial/industrial facility consisting of:

- Underground car parking level
- Ground level for warehouse and distribution, plant & office level
- Level 1 and Level 2 laboratory & offices

Details of the project site, noise measurement locations and potential noise receivers are presented in Figure 1.

Figure 1 Site Map

2.1 POTENTIAL AFFECTED NOISE RECEIVERS

The potentially most affected noise receivers will be the commercial/industrial buildings located around the site and residential properties to the south-eastern across Reserve Street presented in Figure 1.

3. NOISE EMISSIONS FROM THE SITE

Noise emissions from plant and activities shall comply with the '*Provisions of the Protection of the Environment Operations Act 1997 and DECC* Industrial Noise Policy. The guidelines in the Industrial Noise Policy provide assessment objectives depending on the time of day. There are two requirements which both have to be complied with, that is the intrusiveness and the amenity criteria. Sleep arousal from night time operations should also be assessed.

3.1 NOISE EMISSION OBJECTIVES

3.1.1 Requirements

Noise emissions from plant and equipment, and other activities carried out on the site should be assessed using the DECC Industrial Noise Policy.

3.1.2 Noise Emission Limits

The DECC Industrial Noise Policy provides guidelines for assessing noise impacts from industrial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The DECC Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion. In addition, the DECC in its Environmental Noise Control Manual states that noise controls should be applied with the General intent to protect residences from sleep arousal.

3.1.3 Intrusiveness Criterion

The operation of all plant and vehicle movements on site shall not give rise to an equivalent continuous (L_{Aeq}) sound pressure level at any point on any residential property greater than 5dB(A) above the existing background L_{A90} level (in absence of the noise under consideration).

For assessment purposes, the above L_{Aeq} sound level shall be assessed over a period of 10-15 minutes and adjusted in accordance with DECC guidelines for tonality, frequency weighting, impulsive characteristics, fluctuations and temporal content where necessary.

3.1.4 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

Based on the DECC's requirement the following acceptable noise levels would apply to existing residences and industrial properties potentially affected by the proposal.

Table 1 –Recommended Acceptable Noise Levels

Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}	
	Residential	Industrial/Commercial
Day (7am to 6pm)	55	65
Evening (6pm -10pm)	45	65
Night (10pm -7am)	40	65

If the existing amenity noise levels due to industrial noise are close to or above the recommended acceptable noise levels then operation of the site shall be designed to a lower level than the acceptable noise level.

If the existing amenity levels from industrial noise and other transportation noise sources are more than 2 dB(A) above the acceptable levels, and there is no prospect of these levels reducing in the future, then the amenity criterion is set at 10 dB(A) below the existing level. In practice, this prevents any audible increase in the existing noise level.

3.1.5 Sleep Arousal

To minimise the potential for sleep arousal the L_1 noise level of any specific noise source does not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Since the minimum repeatable noise level is 41dB(A) the sleep disturbance criterion is 56dB(A) L_1 outside the closest bedroom window.

If the L_1 noise level emitted by the proposed development from new plant and equipment exceeds 56 dB(A) an assessment of the proposed development's potential to significantly increase sleep arousal (when compared to the existing noise sources) should be carried out.

3.2 BACKGROUND NOISE MEASUREMENTS

Measurement of background noise was conducted from 9 September 2008 to 17 September 2008 using a noise logger located in the front yard of residential property along Reserve Street approximately 30m from O'Riordan Street. Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode. The results of the monitoring are below in Table 2.

Table 2 – Rating Background Noise Level

Time Period	Background Noise Level dB(A) L_{90}
Day (7am – 6pm)	55
Evening (6pm – 10pm)	48
Night (10pm – 7pm)	41

3.3 NOISE ASSESSMENT OBJECTIVES

Under the current DECC requirements the Industrial Noise Policy supersedes the requirements of the Noise Control Manual for assessment of mechanical plant noise. In addition we note that compliance with the Industrial Noise Policy will also indicate compliance with the Protection of the Environment Operations Act.

Based on the DECC's Industrial Noise Policy, Table 3 and Table 4 provide a summary of the assessment criteria applicable to the subject premises at the neighbouring potentially affected residential properties based on noise monitoring conducted for the subject site. The intrusiveness and amenity criteria for this project have been determined using the DECC guidelines and the noise monitoring results.

Table 3 –Noise Level Objectives for Continuously Operating Plant

Time Period	Noise Level dB(A) L_{eq}	
	Residential	Commercial
Day (7am to 6pm)	55	65
Evening (6pm -10pm)	45	65
Night (10pm -7am)	40	65

Table 4 –Noise Level Objectives for Infrequent or Intermittent Noise Sources

Time Period	Noise Level dB(A) L_{eq}
	Residential
Day (7am to 6pm)	60
Evening (6pm -10pm)	53
Night (10pm -7am)	46
Sleep Disturbance Objective L_1	56dB(A) L_1

Noise level criteria are to be applied to traffic generated from vehicle movements on the site and noise emissions from plant and equipment installed on the site, as presented by the Industrial Noise Policy.

3.4 PLANT NOISE EMISSIONS

Detailed plant selections are not available at this stage, so it is not possible to carry out a detailed examination of the ameliorative measures that may be required to achieve the noise targets. However, a preliminary assessment has been undertaken based on indicative plant noise levels, and applying the recommended noise control principles outlined below.

The majority of major plant would be located in a roof plant room comprising, emergency generator, air handling units an fans, boilers, pumps, air cooled chillers and associated minor plant.

The loudest normally operating plant would be the chillers that proposed to be located in an open roof plant area that would be screened off from the nearby residences by the other plant rooms surrounding this area. The expected noise levels from this plant at the sensitive receivers are indicated below:

	dB(A)
Chiller Sound Power Level (low noise model with compressor jackets and low noise fans)	95
3 chillers max at evening/night	+5
Barrier effect from enclosure	-20
Distance Loss to residential receiver	-45
Receiver Level	35
Night Noise target	40

(Note: An alternative to using a low noise chiller would be to roof the plant room and install acoustic silencers on the air intake and discharge points.)

The generator room is also a significant noise source. This would be housed in a masonry plant room (or other material to give an equivalent acoustic rating) with attenuated air inlets and exhausts, and

residential class mufflers fitted to the engine exhaust. Acoustically rated plant room doors would be provided. An analysis of the inlet and exhaust noise is provided below.

	dB(A)
Generator Sound Power Level	125
Plant room losses	-5
Barrier effect from roof (based on east or south facing louvre (worst case))	-5
Distance Loss to residential receiver	-43
Silencer Insertion Loss	35
Receiver Level	37
Night Noise target	40

	dB(A)
Fume Cupboard Fan Sound Power Level	85
Directivity losses – vertical discharge	-7
Distance Loss to residential receiver	-46
Receiver Level	32
Night Noise target	40

All remaining plant major would be located within plant rooms. For these plant rooms the enclosure materials can be selected to prevent excessive sound transmission. Similarly, and air intake and discharge points can be suitably attenuated.

A substation and passive electrical equipment are proposed to be located in a louvred plant room at the front of the building. No noise impacts will not be produced by this plant as this equipment generates relatively low levels of noise emissions.

It is concluded that noise emissions to all residential receivers can be made to comply with the nominated noise objectives with the application of standard noise control methods (as indicated below).

For the adjacent commercial and industrial properties, the proposed plant would be well below the noise emission limits at the given the relatively high noise level goals for these occupancies.

The preliminary assessment indicates that the recommended noise objectives could be readily achieved at all surrounding receivers with the application of standard noise control treatments that are routinely applied such as

- Selecting quite plant
- Barriers and enclosures
- Acoustic louvers and silencers
- Duct treatment
- Vibration isolation
- Speed control
- Time control

It is appropriate that a full acoustic analysis be carried out during the building design once sufficient information regarding the type of plant to be installed is known and the treatment and recommendations arising from this assessment be implemented.

3.5 NOISE EMISSIONS RESULTING FROM INTERNALLY GENERATED NOISE

3.5.1 Process and Warehouse Noise

The process and warehouse areas will be fully enclosed including masonry walls and a concrete cover (ie the other levels of the building), Openings located on the western facade which is screened and well away from the sensitive recievers. There are louvres located on the northern and southern facades which are proposed to be backed with acoustic splitters.

The only potential source of significant noise emissions are the louvres on the north and soutth facades. However, there are proposed to be treated and even for relatively high internal noise levels such as 85 dB(A), noise emissions would be well below the requried noise emission limits at all recievers with the proposed treatment.

3.5.2 Office Areas

Office Areas would generate relatively low noise levels that would be totally inaudible at the residential recievers.

3.5.3 Carpark Roller Door

A roller door for the carpark is located on the western facade. The main potential noise impact from this source would be on residential recievers opposite at night.

Based on an expected noise level of 65 dB(A) at 5m, and operation of the door for a total or 1.5 minutes in every 15 minutes at night gives an expected noise level at the nearest reciever of 35 dB(A) L_{eq} and 45 dB(A) L_1 , which are well below the target noise levels for intermittently operating plant at night (ie 46 L_{eq} and 56 L_1).

3.6 EXTERNAL VEHICLE MOVEMENTS ON THE SITE

Vehicle movements would include:

- Passenger vehicles from employees and vehicles, which would mainly be directly into the underground carpark
- Commercial vehicle movements, are predominantly small vans and "Hi-Ace" delivery vans with a limited number of larger vehicles. The proposed main loading docks will be located on the southern side of the building with drive ways on the northern side and southern sides of the building. All loading docks are screened from sensitive residential receivers and are located well away from these receivers.

Noise emissions from vehicle movements associated with the loading activities, and loading activities in the southern docks were predicted at the sensitive receivers. Expected noise emission levels were corrected for distance attenuation, acoustic screening, façade attenuation and air absorption to determine the resultant noise level at the nearest potentially affected residential receiver. Calculations were based on noise emission levels from similar activities obtained at a warehouse facility. Noise measurements were conducted using a Norsonics SA-110 precision sound level analyser, set to fast response. The precision sound level analyser was calibrated before and after the measurements using a RION NC-73 precision sound level calibrator. No significant drift was recorded. The noise source emission levels used in calculations are presented in Table 5.

Table 5 - Noise Source Emission Levels

Noise Source	Sound Emission Level dB(A) at 7m	Type of Noise Source
Small Truck Reversing alarm	75[1]	Quasi-Steady, tonal
Trucks Manoeuvring/Reversing	75	Quasi-Steady
Truck Air Brakes	89	Transient
Truck Door Closing	75	Transient
Truck Starting	72	Transient
Semi-trailer Starting	89	Transient
Van Starting	75 at 3m	Transient

[1] A 5 dB(A) penalty has been applied to this source to account for the tonal characteristic of noise produced.

Calculations for the day, evening and night time assessment periods are based on worst case vehicle movements scenarios predicted by traffic engineers Masson Wilson Twiney Traffic and Transport Consultants dated 7 August 2008 for this project

Day and Evening– *Worst case scenario with 10 vans/ courier taxi and 2 trucks in and out the worst one hour.*

Night Time - *Worst case scenario with 1 truck in and out the worst one hour.*

Table 6 presents the predicted noise levels at the nearest potentially affected residential receivers situated on Reserve Street *(Refer to Figure 1)* compared to the recommended acceptable noise levels.

Table 6 – Predicted Noise Emission Levels at the Nearest Potentially Affected Residential Receivers

Location	Time of day	Predicted Noise Emission Level dB(A) $L_{Aeq\ (15\ minutes)}$	Constant Noise** Source Criteria dB(A) L_{Aeq}	Intermittent Noise Source Criteria dB(A) L_{Aeq}	Complies
Residential Receivers	Day	43	55	60	Yes
	Evening	43	45	53	Yes
	Night	39 L_{eq} / 58 L_1	40	46 L_{eq}/56 L_1	Yes*
Commercial Receivers	Day	<55	65	65	Yes

* - Refer discussion below
** - Because the tabled traffic noise levels are based on peak movement levels, and vehicle movements are intermittent, comparison with the criteria for constantly operating sources is conservative as traffic noise levels averaged over the day, evening and night periods will be less. Notwithstanding this, the predicted peak noise levels are still less than the criteria.

The predicted noise levels are below the criteria in all cases, except for late night truck movements. The L_1 noise level of 58 dB(A) is produced with the truck entering/leaving the site at the south east entrance. As the predicted noise level exceeds background plus 15 dB(A) it is necessary to compare the sleep arousal impact of this noise source to the existing sleep arousal impacts from ambient short term events.

These movements will be limited to 2 to 3 movements per night causing a noise level of 58 dB(A). The noise monitoring results obtained indicates that noise peaks from existing traffic movements regularly exceed 75 dB(A). In this context, the limited number of night time vehicle movements would cause no perceptible change in potential sleep arousal, and therefore no adverse impacts.

The noise predictions clearly illustrate that noise emissions from operations associated with the proposed development will comply during the day and night time assessment periods.

4. NOISE FROM TRAFFIC GENERATED BY THE PROPOSAL ON PUBLIC ROADS

The level of noise from traffic generated by the proposed development will be assessed based on DECC's guidelines.

4.1 ENVIRONMENTAL CRITERIA FOR ROAD AND TRAFFIC NOISE

The DECC "Environmental Criteria for Road Traffic Noise" (ECTRN) guidelines for new development are presented in Table 7.

Table 7 - Criteria for Traffic Noise for New Developments

Type of Development	Day (7am to 10pm)	Night (10pm to 7am)	Where Criteria Are Already Exceeded
Land use developments with potential to create additional traffic on collector road	60 $L_{Aeq(1hr)}$	55 $L_{Aeq(1hr)}$	In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB

4.2 TRAFFIC NOISE GENERATION

4.2.1 Traffic Noise Measurements

The noise monitor use to measure background noise levels also provides an indication of existing traffic noise levels at the nearest affected residential receivers. The results of the monitoring are below in Table 8.

Table 8 – Measured Traffic Noise Level

Time Period	Traffic Noise Level dB(A) L_{eq}
Day (7am – 10pm)	66
Night (10pm – 7pm)	57

The existing traffic noise levels exceed the noise objectives in the ECRTN, therefore the proposed development should not increase existing noise levels by more than 2 dB(A).

4.2.2 Generated Traffic Noise

The traffic assessment report undertaken by Masson Wilson Twiney Traffic and Transport Consultants dated 7 August 2008 for this project, indicates the estimated development traffic volumes generated by the development is significantly less than existing traffic volumes. The site will generate approximately 100 peak hour movements whereas the existing movements are in the order of 2000.

Any additional noise generated by traffic associated with the site would produce a noise increase well below 2 dB(A), and would be imperceptible.

5. CONSTRUCTION NOISE AND VIBRATION

5.1 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

A description of each of these processes and the associated equipment proposed to be used on the site are presented below:

5.1.1 Demolition and Excavation

The site will require demolition, excavation and removal of waste material at the site.

5.1.2 Erection of Structure

This involves the construction of new building structure. The processes involved in this activity include delivery of materials, pouring of slabs, erection of formwork, steel erection, etc. All materials for construction are transported to the work site using O'Riordan Street.

Descriptions of noise generated from activities associated with the procedures detailed above are outlined in Table 9 below.

Table 9 – Noise Levels Generated from Construction Activities

CONSTRUCTION ACTIVITY	EQUIPMENT /PROCESS	SOUND POWER LEVEL dB(A)
1 – Demolition and Excavation	Bulldozers	Medium to High
	Truck	Medium
	Bobcat	Medium
	Angle grinders	Medium
2 – Erection of Structure	Cement mixing truck	Medium to High
	Concrete pumps	Medium to High
	Concrete vibrator	Medium
	Electric Saw	Medium
	Drilling	Medium
	Hammering	High
	Air Compressors	Medium
	Nail Guns	Medium

5.2 PROPOSED CONSTRUCTION OPERATION HOURS

Construction activities operating hours are as following:

- Monday to Friday: 7:00am to 5:00pm
- Saturdays: 7:00am to 3:00pm
- Sundays and Public holidays: no work

5.3 CONSTRUCTION NOISE AND VIBRATION OBJECTIVES

5.3.1 Noise

The applicable guidelines and standards are:

- Draft DECC Noise Control Manual Construction Noise and Vibration Guideline. This guideline nominates acceptable levels of noise emissions above the background noise level depending on the total construction period. For periods up to 6 months the guideline recommends a noise level of 10 dB(A) above the background.

- Australian Standard 2436-1981 "Guide to Noise Control on Construction Maintenance and Demolition Site". In particular, the requirements stipulated in Section 3 of the standard will be followed.

The Draft DECC guideline and Section 3 of AS 2436 states that care shall be taken in applying criteria that normally would be used to regulate noise emitted from industrial, commercial and residential premises to construction, particularly for those activities which are transitory and of short duration. For the control and regulation of noise from construction sites AS2436 nominates the following:

- That reasonable suitable noise criterion is established.
- That all practicable measures be taken on the building site to regulate noise emissions, including the sitting on noisy static processes parts of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours
- The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the building site.

Based on these the following procedure will be used to assess noise emissions:

- Predict noise levels produced by typical construction activities at the sensitive receivers.

- If noise levels exceed "background + 10 dB(A)" noise goal at sensitive receiver locations, investigate and implement all practical and cost effective techniques to limit noise emissions.

- If the noise goal is still exceeded after applying all practical engineering controls to limit noise emissions investigate management and other techniques to mitigate noise emissions.

A construction & demolition noise and vibration management plan is to be developed by the builder to ensure this occurs.

5.3.2 Vibration Criteria

Building Damage

Australian Standard 2187-1993, "SAA Explosives Code, Part 2 - Use of Explosives" stipulates in Section 11 acceptable levels of ground vibration to limit the probability of structural damage and human discomfort. The criteria presented in this Standard are summarised below.

Table 10 - AS2187 Recommend Peak Particle Velocity

TYPE OF BUILDING OR STRUCTURE	PEAK PARTICLE VELOCITY (V_p) mm/s
1 Historical buildings and monuments, and buildings of special value and significance	2
2 House and low rise residential buildings: Commercial buildings not included in item 3 below	10
3 Commercial and industrial buildings or structures of reinforced concrete or steel construction	25

The properties near 17 O'Riordan Street site would fall into Category 2 or 3. Notwithstanding this, ground vibration during excavation would also induce structure radiated noise within the surrounding buildings. This may limit permissible vibration levels below that permitted by structural damage considerations.

Railcorp generally adopts a 20mm/s limit to prevent potential damage to rail infrastructure. Monitoring would be implemented, as required by Railcorp to ensure the vibration levels are not exceeded in the rail tunnels near the site.

Amenity

Vibration objectives for residential and commercial receivers are based on DECC "Assessing Vibration: A technical Guideline" document.

The document provides assessment goals depending on the type of vibration being produced and procedures for assessing vibration impacts. The recommendations of this document shall be used to guide the assessment, selection of processes and methods and implementation of ameliorative treatment where appropriate.

Ground vibration during excavation can also induce structure radiated noise within the surrounding buildings. This may limit permissible vibration levels below that permitted by structural damage considerations and the resultant impacts would be assessed as indicated above for other noise emissions.

5.4 MITIGATION TREATMENTS, MANAGEMENT METHODS

5.4.1 Noise Control Methods

The determination of appropriate noise control measures will be dependant on the particular activities and construction appliances. This section provides an outline of available methods.

Selection of Alternate Appliance or Process

Where a particular activity or construction appliance is found to generate noise levels that exceed the criteria, it may be possible to select an alternative approach or appliance.

Acoustic Barrier

Barriers or screens can be an effective means of reducing noise. Barriers can be located either at the source or receiver.

The placement of barriers at the source is generally only effective for static plant (tower cranes). Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependant on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15 dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8 dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance which is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10 or 15mm plywood would be acceptable for the barriers.

Silencing devices

Where construction process or appliances are noisy, the use of silencing devices may be possible. These may take the form of engine shrouding, or special industrial silencers fitted to exhausts.

Material handling

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

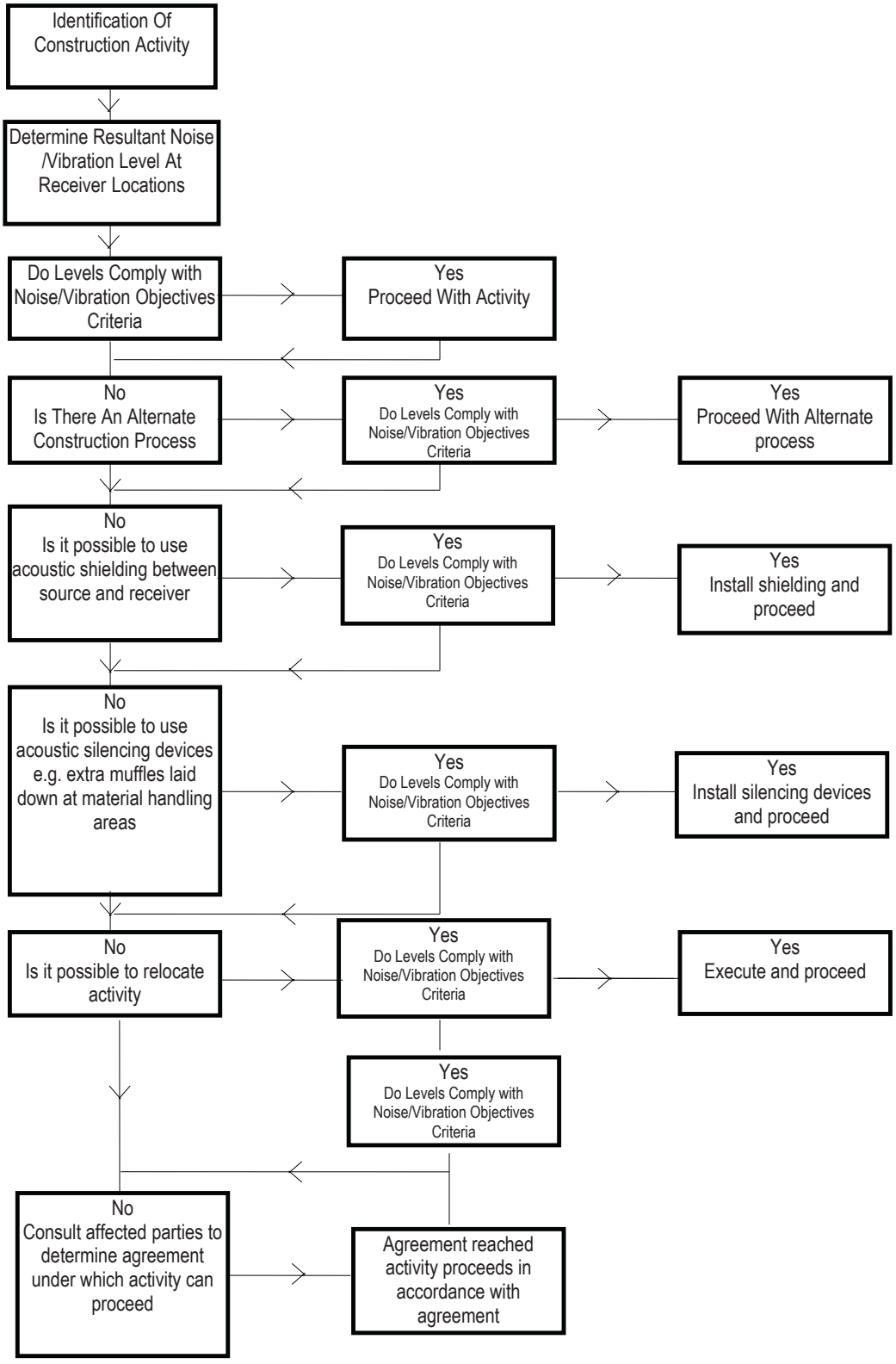
Treatment of specific equipment

In certain cases it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

Establishment of Site Practices

This involves the formulation of work practices to reduce noise generation. A noise plan will be developed for this project outlining work procedures and methods for minimising noise.

CONTROL OF NOISE



5.4.2 Vibration

To minimise vibration from construction activities it is proposed that non percussive activities will be used where possible.

It is not expected that the proposed construction activities will generate vibration which will exceed proposed criteria.

6. RECOMMENDATIONS

- Noise and vibration from demolition and construction should be minimised through the development and implementation of a noise and vibration management plan that regulates activities so that all noise emissions from processes are minimised to the extent that it is feasible and reasonable, as outline in Section 5 of this report.

- A detailed assessment of noise emissions from the proposed mechanical plant and equipment should be undertaken by a specialist acoustic consultant and these recommendations shall be implemented in the design and construction of the building and equipment selection to ensure that the combine noise emissions from the site do not exceed the noise levels stipulated in Section 3 of this report.

- The louvres proposed for the north and south facades shall acoustically treated ensure that the combine noise emissions from the site do not exceed the noise levels stipulated in Section 3 of this report.

7. CONCLUSION

This report provides the results of an assessment of the potential impact of noise and vibration emissions arises from the construction and operation of the proposed commercial development located at 17 O'Riordan Street, Green Square on the surrounding properties.

Noise from by traffic movements generated by the proposed development will have no audible effect on existing levels of noise.

Noise emissions from the proposed operations and plant associated with the proposed development will comply at all times. The noise and vibration emissions from construction activities taking place on the site will be managed in accordance with the recommendations of this report.

Report prepared by

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APPENDIX 1

MEASURED NOISE LEVELS

Appendix F
Demolition Plan

7.0 APPENDIX F DEMOLITION PLAN

Demolition Staging plan