TABLE 1

CATEGORIES OF WORKING HOURS, AND NOISE CRITERIA

DAY	TIME ZONE	CATEGORY	NOISE CRITERIA (which must not be exceeded)
Monday to Friday	00.00 - 07.00 07.00 - 08.00 08.00 - 19.00 19.00 - 23.00 23.00 - 24.00	4 1 1 2 4	Background + 0 dBA Background + 5 dBA Background + 5 dBA + 5 dBA to be determined on a site basis Background + 3 dBA Background + 0 dBA
Saturday	00.00 - 07.00 07.00 - 08.00 08.00 - 17.00 17.00 - 23.00 23.00 - 24.00	4 1 1 2 4	Background + 0 dBA Background + 5 dBA Background + 5 dBA + 5 dBA to be determined on a site basis Background + 3 dBA Background + 0 dBA
Sundays and Public Holidays	00.00 - 07.00 07.00 - 17.00 17.00 - 24.00	4 3 4	Background + 0 dBA Background + 3 dBA Background + 0 dBA

NOTE: 00.00 or 24.00 means 12.00 midnight.

1. All noise levels to be $L_{A\,av\,max}$ (15 minute) measured at the nearest Nominated Occupancy.

2. The permissible noise level is to be complied with during each fifteen (15) minute period during the relevant Category of Hours.

3. The guidelines for control of construction noise as outlined in AS2436 shall be applied, where appropriate.

4. Background is "Background Noise Level" as defined in para 18.j (page 5).

For the control and regulation of noise from demolition, demolition/excavation and construction sites AS2436 nominates the following:

1. That reasonable suitable noise criteria be established.

2. That all practicable measures be taken on the building site to regulate noise emissions, including the sitting of noisy static processes on parts of the site where they can be shielded, selecting less noisy processes.

3. The undertaking of noise monitoring to assist in the management and control of noise emission from the building site.

3.2 NOISE MANAGEMENT

The finding of this report, which studied the noise impact of the site, indicated that *'the site can work during normal construction hours and fully comply with the above proposed criteria'.*

4. STUDY OVERVIEW

The following report presents a number of proposed strategies to be used by the Bovis Lend Lease to reduce *Environmental Noise Impact* and the possibility of complaint.

The aim of this study is to undertake an analysis of noise impact arising from site activities undertaken in normal construction hours, i.e. 7:00am to 7:00pm Monday to Friday, and 7:00am to 5:00pm Saturday. No work is permitted on Sundays.

During the above hours it is anticipated that works will fully comply with suitable noise control criteria. These activities will be carefully managed and appropriate noise mitigate measures will be strictly implemented where required. The formulation of noise management plans for the various activities will arise from the assessment carried out in this report and the strict enforcement of all determined control measures.

5. CONSTRUCTION NOISE

The level of noise generated by a construction site is largely dependent on the activities, which are in progress. It can not be categorically stated that all construction sites emit the same level of noise no matter what stage or part of the construction programme they are at.

The generalisation, that all construction work is noisy is fallacious. The levels of noise generated are dependent on the activities occurring. In addition, it is possible to undertake construction work in a controlled manner so that noise is minimised. This requires the formulation of noise control strategies, and stringent supervision.

A study of a typical construction site is presented below to show the varying levels of noise generation from various activities.

5.1 CATEGORISATION OF CONSTRUCTION ACTIVITIES

The construction activities, which occur during the typical process in constructing a building from start to finish, can be separated into five categories, namely;

1. Demolition

2. Demolition/excavation

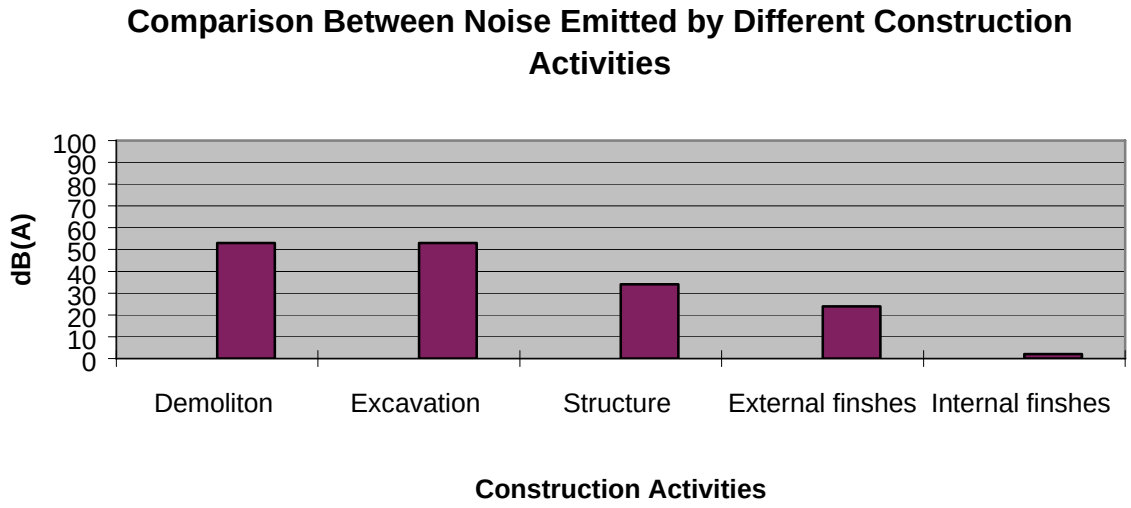
3. Erection of structure

4. Installation of facade/external finishes

5. Internal fit out/internal finishes

The noise levels generated by each of these activities will vary and be largely dependent on the process undertaken. The graph below illustrates typical sound pressure levels resultant at a residential location (approximately 55 metres) from an active construction site. The levels in the table below are derived from measured field attenuation from the GPO Re-Development, No. 1 Martin Place site to a residential receiver. As such these levels represent a real case scenario and are not theoretical. The objective of presenting these sound levels is to present a relative comparison between the five categories of construction activities described above. The comparative levels presented below indicate the maximum noise, which can be generated by the specific activities.

The histogram below shows that the nosiest construction activities are the demolition and demolition/excavation, which generate equivalent noise levels due to the similar activities



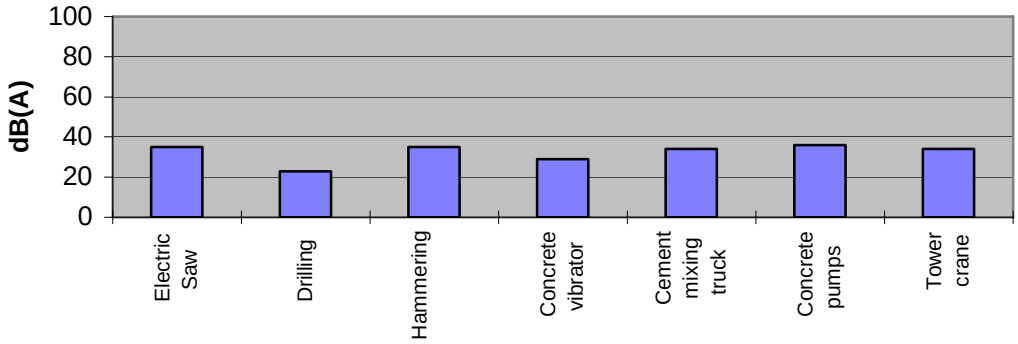
Erection of structure is next, and then external finishes. Internal finishes is the quietest of activities as it occurs internally. The histogram above represents the maximum noise levels emitted by the entire construction activity, but does not take into account, that within each process there are loud and quiet component processes. To further clarify this point each of the five construction activities outlined above will be further broken down into discrete processes. This will permit the determination of which components of a particular process generate the highest noise levels.

5.2 ERECTION OF STRUCTURE

This activity refers to the erection of the structure of the building, which includes lift cores, and general building structure. Lift cores are generally constructed in advance of the remainder of the building structure using either jump or slip forms.

The general processes involved in this activity include the delivery of materials, erection of formwork, installation of structural steel, pouring of concrete, and stripping of formwork. All materials for form working and structural steel are transported to the work face using the site tower cranes and man/material hoist. Concrete is pumped up the building using concrete pumps.

COMPARISON OF NOISE LEVELS EMITTED BY DIFFERENT PROCESSES DURING ERECTION OF STRUCTURE



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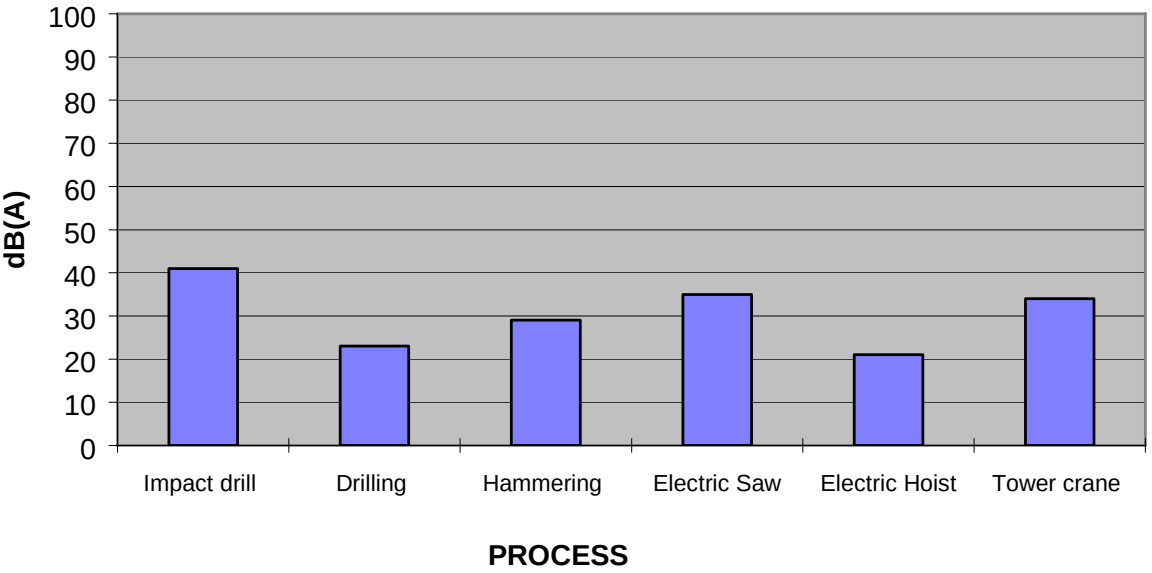
5.3 EXTERNAL FINISHES

This can involve processes ranging from the erection of facade systems, curtain walls pre-cast etc, to the installation of windows and the fixing of stone. Typical noise levels, which may be generated by this activity, are illustrated in the chart, which follows.

COMPARISON OF NOISE LEVELS EMITTED BY DIFFERENT PROCESSES DURING EXTERNAL FINISHES



5.4 INTERNAL FINISHES

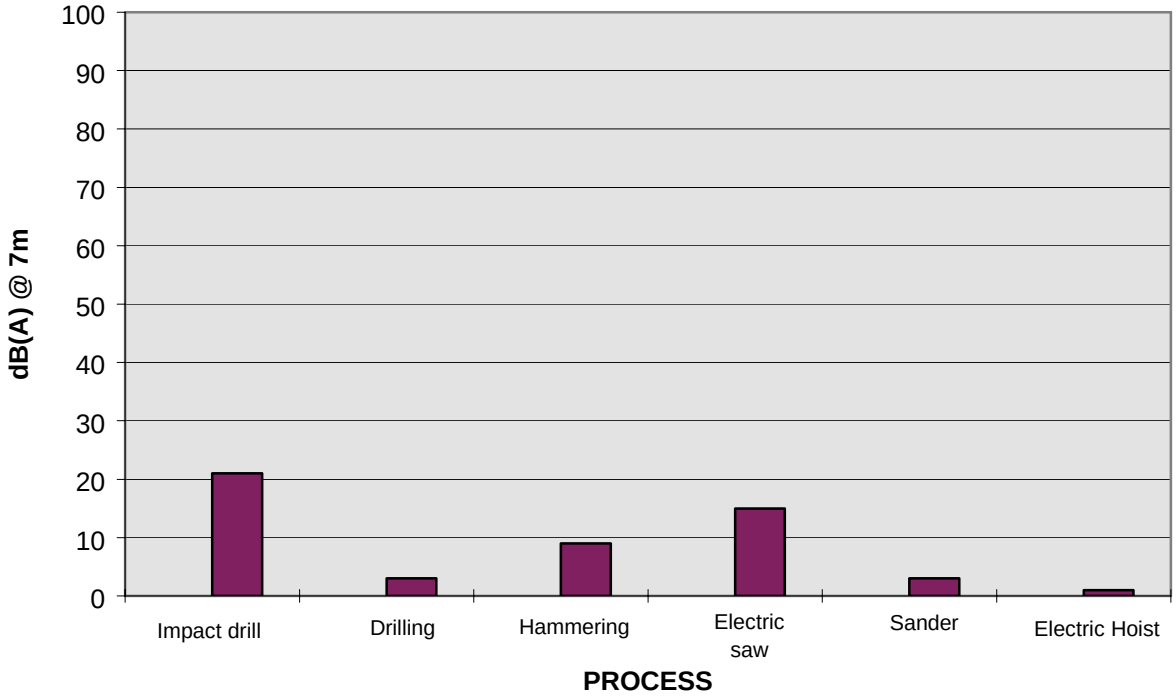
This involves all internal fit out work including painting, partitioning joinery and the laying of carpet and other finishes, as well as the installation of services.

This work is generally carried out once the facades have been erected. All work covered under this section will be contained within the building, with the facade providing a barrier to the direct transmission of noise to the exterior.

The services work includes plumbing mechanical, lifts, fire and electrical.

Typical noise levels, which may be generated by this activity, are illustrated in the chart,which follows.

COMPARISON OF NOISE LEVELS EMITTED BY DIFFERENT PROCESSES DURING INTERNAL FINISHES



The above histogram clearly shows that noise levels emitted from this activity are significantly quieter than the four previously discussed activities

5.5 DISCUSSION

From the information presented in the above section it can be clearly seen that the noise emitted from a construction site will be dependent on which activities are taking place. More specifically, the particular process within those activities. For example there is a difference of 16 dB(a) between using a hydraulic hammer and loading a truck during demolition. A difference of 16dB(A) is substantial. Therefore by limiting the activities which take place on a construction site at particular time's noise emissions can also be regulated.

6. SITE DESCRIPTION AND POTENTIALLY AFFECTED LOCATIONS

The Darling Walk site is located on Harbour St in Darling Harbour between the Chinese Gardens and Imax. It currently comprises a large area of public domain and the purpose built 2 storey Sega World building, constructed in the 1990's as a games and amusement complex.

The proposed development will involve the demolition of the existing building and associated public domain. The new development will incorporate 4 levels of basement parking, a ground level retail floor including a children's theatre and up to 8 storeys of A grade office space. The associated public domain area will be upgraded including a new children's Playground.

The following are the residential and other noise sensitive locations in close proximity to the site.

Location 1.Millenium Towers located at the corner of Day and Bathurst St.
Location 2.Emporio Apartments located at Cnr Day & Liverpool St.
Location 3.Union Offices located at 176-182 Day St; Global College located at 188 Day St; Police Building located at the corner of Day and James St.
Location 4.Imax Building.
As construction will be carried out during 7am to 7:00 pm Mondays to Fridays and 7am to 5:00pm on Saturdays the above listed premises will not be affected at night

7. NOISE CRITERIA

The noise goals for demolition/excavation and construction activities on this project are aimed at minimising adverse impacts within the surrounding commercial and residential/hotel buildings. The noise goals adopted by the code of practice are outlined below:

- 7am to 8am $L_{av\ max} \leq$ Background + 5 dB(A)
- 8am to 7 pm $L_{av\ max} \leq$ Background + 10 dB(A)

Demolition/excavation and construction noise intrusion into Imax cinemas shall comply with criteria NC-25 while the cinemas are on operation.

The existing background noise levels were measured along Day St. The typical background noise is presented as below.

Table 1 – Measured Background Noise Level

Measurement Location	Time Period	Background Noise Level L_{90} dB(A)
Along Day St	7am-8am	59
	8am- 7pm	60

8. VIBRATION CRITERIA

Two sets of vibration criteria will be used on this project, namely;

- Australian Standard 2187
- Australian Standard 2670

The criteria and the application of these Standards are discussed in separate sections below.

8.1 AS2187

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.

AS2187 RECOMMEND PEAK PARTICLE VELOCITY

	Type of building or structure	Particle velocity (Vp) 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

This standard will be used principally for the determination of potential structural damage to surrounding buildings. The Standard does not provide suitable criteria for the determination of acceptable levels of vibration for human comfort in sensitive areas, such as a dental surgery.

8.2 AS2670

Australian Standard 2670.2 - 1990 "Evaluation of human exposure to whole body vibration, part 2: continuous and shock induced vibrations in buildings (1 to 80Hz)", provides criteria for the assessment of annoyance of human beings subject to continuous and intermittent vibration.

The criteria set out in this standard will be used to determine the acceptability of vibration levels for human comfort and satisfactory work environment.

8.3 VIBRATION CRITERIA APPLICABLE FOR THIS PROJECT

Structural Damage

The structural vibration criteria applicable to this project will depend on the building type affected.

Human Comfort

Based on Australian Standard 2670.2 - 1990 the applicable human comfort criterion will be that vibration velocity levels do not exceed 0.5mm/sec RMS.

9. DETERMINATION OF CONSTRUCTION NOISE IMPACT

Using the noise levels presented in Table 1 below, the resultant noise impact was determined at the worst affected locations. These locations were identified in Section 6, above. If noise levels comply with the criteria at these locations, then they will be acceptable at all other locations.

All construction noise sources were assumed to be located at the nearest point on the construction site to the receiver locations under study. In this way the worst and majority case noise level situations are determined, with noise levels arising from an activity occurring on any other part of the site being equal to or lower than those determined for the nearest point scenario.

The calculations determine the A-Weighted max noise levels over a 15-minute period, from all sources, which may operate simultaneously. Noise emanating from the respective activities will comply with the required criterion, provided all noise from all individual plant and equipment comply.

10. SOUND DATA

Noise impact will be determined from all processes and equipment, which are involved in the activities outlined below by defining the levels of sound, which they generate.

The A-weighted sound pressure levels at 7m distance for all the component parts of the above-described activities are outlined in the tables below.

Sound Data

CONSTRUCTION ACTIVITY	EQUIPMENT /PROCESS	SOUND PRESSURE LEVEL @7m - dB(A)
Piling Works	Bored Piling	88
	CFA Piling	88`
Demolition/excavation	Bulldozer- Caterpillar D7, D9	88
	Bulldozer- Caterpillar D10	93
	Front End Loader – Wheeled	90
	Jack Hammers with Silencing Bags	83
	Air Track Drill-800 CFM Compressor	96
	Scraper Caterpillar 631	89
	Scraper Caterpillar 651	85
	Grader Caterpillar 16	85
	Compactor Caterpillar 825	85
	Compactor Vibrating Plate	92
	Vibratory Roller	89
	Water Cart	88
	Dump Trucks- 35 Tonne	96
	Excavator – Kato 750	86
	Rock Breaker Hydraulic on Kato 750	97
	Truck	80
	Crane- Truck Mounted	85

Construction	Compressor- 600CFM	75
	Compressor- 1500 CFM	80
	Backhoe	88
	Spreader- Asphalt, concrete	70
	Asphalt Truck	92
	Asphalt Paver	89
	Tip Truck	83
	Generator- Diesel	79
	Spraying Machine	75
	Mechanical Broom	83
	Concrete Truck	83
	Concrete Pump	84
	Concrete Vibrators	80
	Drill- Air	85
	Drill- Pneumatic	85
	Welders	85
	Concrete Saw	93
	Concrete Leveller	90
	Cherry Picker- on Truck	80

The noise levels presented in the above table are derived from the following sources, namely:

1. Noise data provided by client.
2. On-site measurements
3. Table D2 of Australian Standard 2436-1981
4. Data held by this office from other similar studies.

11. NOISE PREDICTIONS

11.1 PILING WORKS

11.1.1 Noise Receiver 1

LOCATION 1 – RESIDENTIAL BUILDING-MILLENIUM TOWERS (168 DAY SY) - MONDAY To FRIDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Piling Works	61	59	2	5	YES
08.00 to 19.00	Piling Works	61	60	1	10	YES

LOCATION 1 – RESIDENTIAL BUILDING-MILLENIUM TOWERS (168 DAY SY) - SATURDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Piling Works	61	59	2	5	YES
08.00 to 17.00	Piling Works	61	60	1	10	YES

11.1.2 Noise Receiver 2

LOCATION 2 – RESIDENTIAL BUILDING-EMPORIO (CORNER OF DAY AND LIVERPOOL ST) - MONDAY To FRIDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Piling Works	64	59	5	5	YES
08.00 to 19.00	Piling Works	64	60	4	10	YES

LOCATION 2 – RESIDENTIAL BUILDING-EMPORIO (CORNER OF DAY AND LIVERPOOL ST) - SATURDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Piling Works	64	59	5	5	YES
08.00 to 17.00	Piling Works	64	60	4	10	YES

11.1.3 Noise Receiver 3

LOCATION 3- COMMERCIAL BUILDING ACROSS DAY ST (UNION OFFICES, GLOBAL COLLEGE AND POLICE BUILDING) - MONDAY To FRIDAY									
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL AS2107	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERION	COMPLIES YES/NO
07.00 to 08.00	Piling Works	64	59	5	39[1]	45	-6	5	YES
08.00 to 19.00	Piling Works	64	60	4	39[1]	45	-6	10	YES

Notes;

1. The above assessment assumes that 6mm glass is used in the windows of the commercial buildings.

LOCATION 3- COMMERCIAL BUILDING ACROSS DAY ST (UNION OFFICES, GLOBAL COLLEGE AND POLICE BUILDING) - SATURDAY									
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL AS2107	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERION	COMPLIES YES/NO
07.00 to 08.00	Piling Works	64	59	5	39[1]	45	-6	5	YES
08.00 to 17.00	Piling Works	64	60	4	39[1]	45	-6	10	YES

Notes;

1. The above assessment assumes that 6mm glass is used in the windows of the commercial buildings.

11.1.4 Noise Receiver 4

LOCATION 4- IMAX BUILDING - MONDAY To FRIDAY								
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	COMPLIES YES/NO
07.00 to 08.00	Piling Works	64	59	<5	23[1]	30	-7	YES
08.00 to 19.00	Piling Works	64	60	4	23[1]	30	-7	YES

Notes;

1. The above assessment is based on a review of the cinemas external shell by this office.

LOCATION 4- IMAX BUILDING - SATURDAY								
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	COMPLIES YES/NO
07.00 to 08.00	Piling Works	64	59	5	23[2]	30	-7	YES
08.00 to 17.00	Piling Works	64	60	4	23[2]	30	-7	YES

Notes;

1. The above assessment is based on the cinemas structure by this office.

11.2 DEMOLITION/EXCAVATION

11.2.1 Noise Receiver 1

LOCATION 1 – RESIDENTIAL BUILDING-MILLENIUM TOWERS (168 DAY SY) - MONDAY To FRIDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	< 64[1]	59	<5	5	YES
08.00 to 19.00	Demolition/excavation Works	65[1]	60	5	10	YES

Notes:

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise receivers

LOCATION 1 – RESIDENTIAL BUILDING-MILLENIUM TOWERS (168 DAY SY) - SATURDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	< 64[1]	59	<5	5	YES
08.00 to 17.00	Demolition/excavation Works	65[1]	60	5	10	YES

Notes:

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise receivers.

11.2.2 Noise Receiver 2

LOCATION 2 – RESIDENTIAL BUILDING-EMPORIO (CORNER OF DAY AND LIVERPOOL ST) - MONDAY To FRIDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	< 64[1]	59	<5	5	YES
08.00 to 19.00	Demolition/excavation Works	65[1]	60	5	10	YES

Notes:

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise

LOCATION 2 – RESIDENTIAL BUILDING-EMPORIO (CORNER OF DAY AND LIVERPOOL ST) - SATURDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	< 64[1]	59	<5	5	YES
08.00 to 17.00	Demolition/excavation Works	65[1]	60	5	10	YES

Notes:

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise

11.2.3 Noise Receiver 3

LOCATION 3- COMMERCIAL BUILDING ACROSS DAY ST (UNION OFFICES, GLOBAL COLLEGE AND POLICE BUILDING) - MONDAY To FRIDAY									
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL AS2107	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERION	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	<63[1]	59	<5	38[2]	45	-7	5	YES
08.00 to 19.00	Demolition/excavation Works	68[1]	60	8	43[2]	45	-2	10	YES

Notes;

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise

2. The above assessment assumes that 6mm glass is used in the windows of the commercial buildings.

LOCATION 3- COMMERCIAL BUILDING ACROSS DAY ST (UNION OFFICES, GLOBAL COLLEGE AND POLICE BUILDING) - SATURDAY									
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL AS2107	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERION	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	<63[1]	59	<5	38[2]	45	-7	5	YES
08.00 to 17.00	Demolition/excavation Works	68[1]	60	8	43[2]	45	-2	10	YES

Notes;

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise

2. The above assessment assumes that 6mm glass is used in the windows of the commercial buildings.

11.2.4 Noise Receiver 4

LOCATION 4- IMAX BUILDING - MONDAY To FRIDAY								
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	<64[1]	59	<5	23[2]	30	-7	YES
08.00 to 19.00	Demolition/excavation Works	69[1]	60	9	26[2]	30	-4	YES

Notes;

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise

2. The above assessment is based on the cinema structure information reviewed by this office.

LOCATION 4- IMAX BUILDING - SATURDAY								
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	COMPLIES YES/NO
07.00 to 08.00	Demolition/excavation Works	<64[1]	59	<5	23[2]	30	-7	YES
08.00 to 17.00	Demolition/excavation Works	69[1]	60	9	26[2]	30	-4	YES

Notes;

1. It is proposed to rip the majority of the site in lieu of hammering where possible.

   A localised imperforate line of sight barrier installed between the site and the noise receiver

   Compressors shall be screened from the noise

2. The above assessment is based on the cinema structure information reviewed by this office.

11.3 CONSTRUCTION

11.3.1 Noise Receiver 1

LOCATION 1 – RESIDENTIAL BUILDING-MILLENIUM TOWERS (168 DAY SY) - MONDAY To FRIDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Construction Works	< 61	59	<2	5	YES
08.00 to 19.00	Construction Works	62	60	2	10	YES

LOCATION 1 – RESIDENTIAL BUILDING-MILLENIUM TOWERS (168 DAY SY) - SATURDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Construction Works	< 61	59	<2	5	YES
08.00 to 17.00	Construction Works	62	60	2	10	YES

11.3.2 Noise Receiver 2

LOCATION 2 – RESIDENTIAL BUILDING-EMPORIO (CORNER OF DAY AND LIVERPOOL ST) - MONDAY To FRIDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Construction Works	< 61[1]	59	<2	5	YES
08.00 to 19.00	Demolition/excavation Works	62[1]	60	2	10	YES

LOCATION 2 – RESIDENTIAL BUILDING-EMPORIO (CORNER OF DAY AND LIVERPOOL ST) - SATURDAY						
TIME	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACKGROUND NOISE LEVEL L_{90} dB(A)	EXCEEDENCE ABOVE B'GROUND	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERIA	COMPLIES YES/NO
07.00 to 08.00	Construction Works	< 61[1]	59	<2	5	YES
08.00 to 17.00	Construction Works	62[1]	60	2	10	YES

11.3.3 Noise Receiver 3

LOCATION 3- COMMERCIAL BUILDING ACROSS DAY ST (UNION OFFICES, GLOBAL COLLEGE AND POLICE BUILDING) - MONDAY To FRIDAY									
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL AS2107	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERION	COMPLIES YES/NO
07.00 to 08.00	Construction Works	<60	59	<1	35[2]	45	-10	5	YES
08.00 to 19.00	Construction Works	65	60	5	38[2]	45	-7	10	YES

LOCATION 3- COMMERCIAL BUILDING ACROSS DAY ST (UNION OFFICES, GLOBAL COLLEGE AND POLICE BUILDING) - SATURDAY									
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL AS2107	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	PERMISSIBLE EXCEEDENCE ABOVE B'GROUND/ CRITERION	COMPLIES YES/NO
07.00 to 08.00	Construction Works	<60	59	<1	35[2]	45	-10	5	YES
08.00 to 17.00	Construction Works	65	60	5	38[2]	45	-7	10	YES

11.3.4 Noise Receiver 4

LOCATION 4- IMAX BUILDING - MONDAY To FRIDAY								
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	COMPLIES YES/NO
07.00 to 08.00	Demolition/exc avation Works	<61	59	<2	20	30	-10	YES
08.00 to 19.00	Demolition/exc avation Works	66	60	6	23	30	-7	YES

LOCATION 4- IMAX BUILDING - SATURDAY								
PERIOD HOURS	ACTIVITY	EXTERNAL LEVEL OF NOISE AT AFFECTED OCCUPANCY L_{10} dB(A)	BACK- GROUND L_{90} MEASURED AT THE AFFECTED OCCUPANCY	EXTERNAL LEVEL OF ACTIVITIES RELATIVE TO B'GROUND	INTERNAL NOISE LEVEL AT AFFECTED L_{avmax} dB(A)	CRITERION: INTERNAL NOISE LEVEL	LEVEL OF ACTIVITIES RELATIVE TO INTERNAL CRITERION	COMPLIES YES/NO
07.00 to 08.00	Demolition/exc avation Works	<61	59	<2	20	30	-10	YES
08.00 to 17.00	Demolition/exc avation Works	66	60	6	23	30	-7	YES

12. VIBRATION - ACCEPTABLE WORK PRACTICES

Department of Environment and Conservation NSW "Assessing Vibration: A Technical Guideline" (Feb 2006) will be used to assess human discomfort caused by vibration generated by demolition activities.

Vibration Criteria for building damage will be based on the following:

- Highly sensitive structures – 2mm/s PPV
- Sensitive structures – 10mm/s PPV
- Other non-sensitive or modern structures – 20mm/s (vibration in these structures would most likely be limited by human comfort criteria).

The following vibration criteria shall be applied to this project.

Location		Vibration Limitation PPV
Nearest Residential Building Façade		10 mm/s
Cross City Tunnel		20 mm/s
Service Authorities Infrastructure (Drains, Sewers, etc)	Steel Structure	20 mm/s
	Brick/ Masonry Structure	5 mm/s
	Other Fragile Structure	2 mm/s

To regulate vibration emanating from both the demolition and excavation processes and ensure the vibration levels comply with the criteria above the demolition and excavation contractors will need to operate particular machinery at certain distance from affected buildings to comply within the criteria. The following is an estimate of the distances that may be required for the various equipments.

Piling

Bored or CFA piling shall be 1m from brick/masonry service authority structure to comply with 5mm/s PPV.

Ripping

10m from nearest residence to comply with 10mm/sec PPV.

Milling

No limit from nearest residence to comply with 10mm/sec PPV and 0.5mm/sec RMS for human comfort.

13. ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

In order for any construction noise management programme to work effectively, continual communication is required between all parties, which may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process, which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation process is to:

Inform and educate the groups about the project and the noise controls being implemented.

Increase understanding of all acoustic issues related to the project and options available.

Identify group concerns generated by the project, so that they can be addressed.

14. STATEMENT OF INTENT TO COMPLY

The calculation procedure used to predict the noise levels above has been verified with field measurements on building sites in the inner city including the Grace Plaza, GPO, 400 George Street, Aston and Sydney Central Plaza projects.

In addition, a contact number of the Liaison Officer will be advertised outside the building site, so that residents and other interested parties may contact him, should they believe a noise breech is occurring.

15. FINAL STATEMENT

The finding of this document indicates that noise levels and vibration levels from construction activities taking place on the Darling Walk, Darling Harbour will comply with the criteria nominated in Section 3 of this report at all times, provided times of operation indicated in this document and the recommendations are observed.

Demolition activities noise levels generated by the project site will comply with the requirements of Sydney City Council "Code of Practice for Construction Hours/Noise within the Central Business District" with the recommendations provided in this report.

Vibration levels from demolition and construction activities will fully comply with the vibration criteria nominated in Section 8, provided the recommendations in this document are observed.

Report prepared by,

Acoustic Logic Consultancy Pty Ltd

George Wei

APPENDIX: CONSTRUCTION NOISE/ VIBRATION MANAGEMENT PLAN

14 March, 2008

Report: 2008246/0503A/R0/GW

Prepared for: Bovis Lend Lease

DARLING WALK, DARLING HARBOUR

CONSTRUCTION NOISE AND VIBRATION ASSESSMENT AND MANAGEMENT PLAN

ACOUSTIC LOGIC CONSULTANCY PTY LTD

9 Sarah St, Mascot, NSW 2020 Tel: 8338 9888 Fax: 8338 8399

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1. INTRODUCTION

This document presents a discussion on the process which will be followed in order to manage noise and vibration from the construction of the proposed Darling Walk Darling Harbour.

In recognition of the requirement to minimise noise emissions from the site to surrounding residential and commercial premises Bovis Lend Lease have commissioned this study. The principal objective of this study is to undertake advanced evaluation of all work to be performed during the demolition, excavation and construction phase of the project and forecast the potential impact of noise. The noise forecasts will be used to formulate and streamline effective regulation and mitigation measures. As a part of this process on going testing will be used to evaluate the noise regulation strategies and ensure that they are effective.

To further ensure compliance with appropriate standards on going monitoring will be instigated.

The principal issues which will be addressed in this document are:

- Identification of the specific activities that will be carried out and associated noise sources,
- Identification of all potentially affected sensitive receivers including residences, schools and properties containing noise sensitive equipment,
- Determination of appropriate noise and vibration objectives for each identified sensitive receiver,
- Noise and vibration monitoring, reporting and response procedures.
- Assessment of potential noise and vibration from the proposed construction activities including noise from construction vehicles and any traffic diversions,
- Description of specific mitigation treatments, management methods and procedures that will be implemented to control noise and vibration during construction
- Identification of the noise and vibration standards which will be applicable to this project.
- Formulation of a strategy for construction to comply with the standards identified in the above point.
- Construction timetabling to minimise noise impacts including time and duration restrictions, respite period and frequency,
- Procedures for notifying residents of construction activities that are likely to affect their amenity through noise and vibration,
- Establishment of direct communication networks between affected groups, Planning NSW, Bovis Lend Lease and Acoustic Logic Consultancy.

2. PROJECT OBJECTIVE

The objective of this management plan is to minimise noise & vibration emissions from the construction work associated with this project and assist in maintaining a satisfactory environment around the site. .

3. NOISE CRITERIA

The noise goals for excavation and construction activities on this project are aimed at minimising adverse impacts within the surrounding commercial and residential/hotel buildings. The noise goals adopted by the code of practice are outlined below:

- 7am to 8am $L_{av\ max} \leq$ Background + 5 dB(A)
- 8am to 7 pm $L_{av\ max} \leq$ Background + 10 dB(A)

Excavation construction intrusion into Imax cinemas shall comply with criteria NC-25 whilst cinemas in operation.

4. VIBRATION CRITERIA

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.

AS2187 RECOMMEND PEAK PARTICLE VELOCITY

	Type of building or structure	Particle velocity (Vp) 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

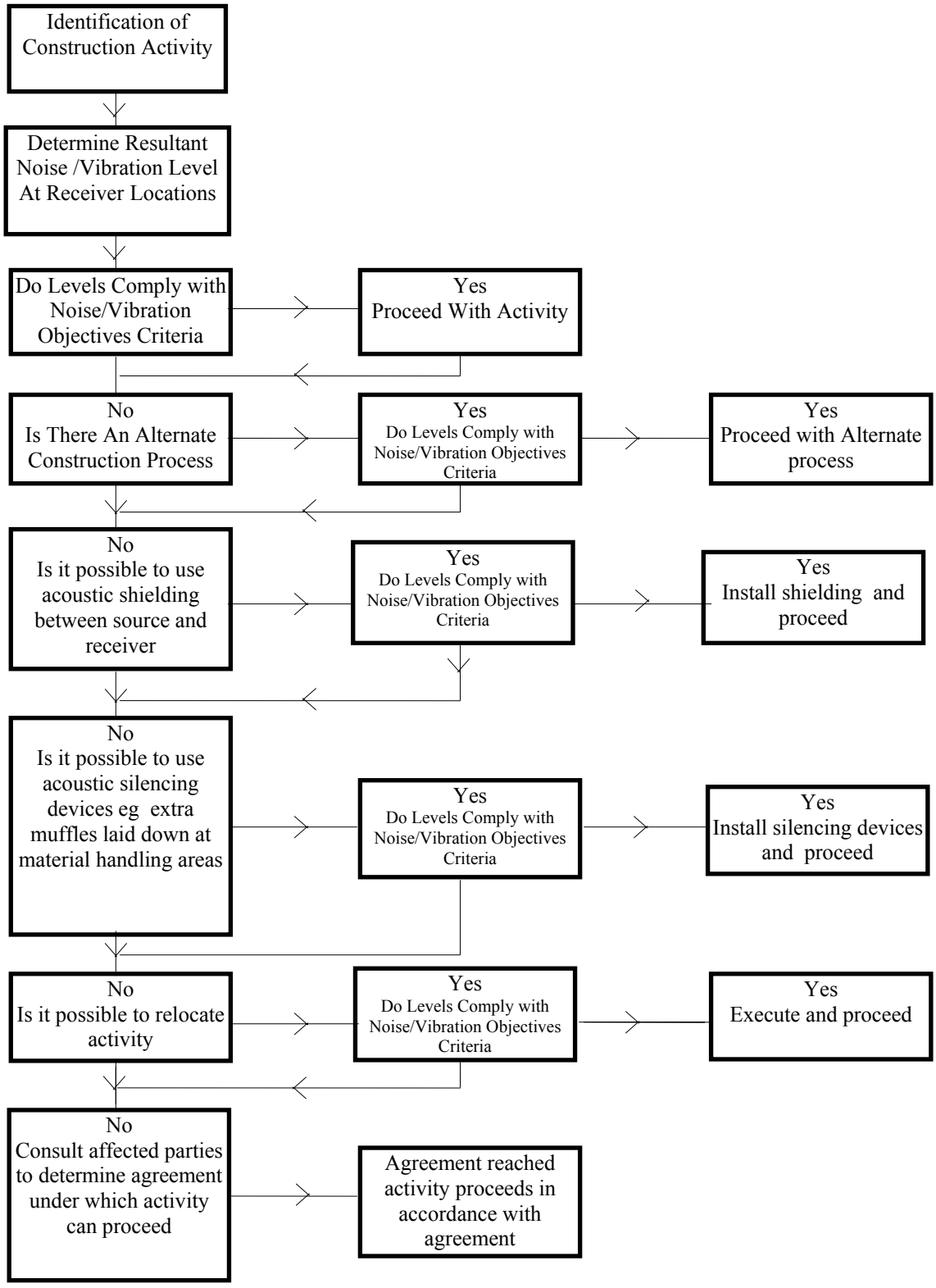
5. CONTROL OF CONSTRUCTION NOISE

As a part of the noise management plan a detailed study will be undertaken of each of the proposed activities which will occur as a part of the demolition, excavation and construction works on this project.

The execution of this work will facilitate the formulation of noise control strategies for this project.

The flow chart which follows illustrates the process which will be followed in assessing construction activities.

CONTROL OF NOISE AND VIBRATION



6. 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.

6.1 SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. By carrying this activity by use of pneumatic hammers, bulldozers ripping and/or milling machines lower levels of noise will result.

6.2 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.

6.3 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.

6.4 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).

6.5 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.

6.6 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.

6.7 REGULAR NOISE CHECKS OF EQUIPMENT

To determine the requirement for silencing devices on machinery it is proposed to undertake fortnightly noise check. Noise levels of all machines on site will be measured and if they are found to be higher than nominated for that equipment type, items such as mufflers and engine shrouds will be examined to ensure they are in good working order.

A record of these measurements will be kept on a form similar to that shown below.

This measure is expected to maintain noise at constant levels, and prevent any increases.

BOVIS LEND LEASE

DARLING WALK DARLING HARBOUR

Construction Appliance Compliance Certificate

Month .....

Year .....

Plant Item .....

Allowable Noise Level .....

Measured Noise Level .....

Complies Yes ☐ No ☐

Issuing Engineer .....

Sub-Contractor .....

Project Manager .....

6.8 NOISE MONITORING

Noise monitoring can be undertaken to determine the effectiveness of measures which are been implemented. The results of monitoring can be used to devise further control measures.

6.9 COMBINATION OF METHODS

In some cases it may be necessary that two or more control measures be implemented to minimise noise.

7. ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

In order for any construction noise management programme to work effectively, continual communication is required between all parties which may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation processes is to:

Inform and educate the groups about the project and the noise controls being implemented.

Increase understanding of all acoustic issues related to the project and options available.

Identify group concerns generated by the project, so that they can be addressed.

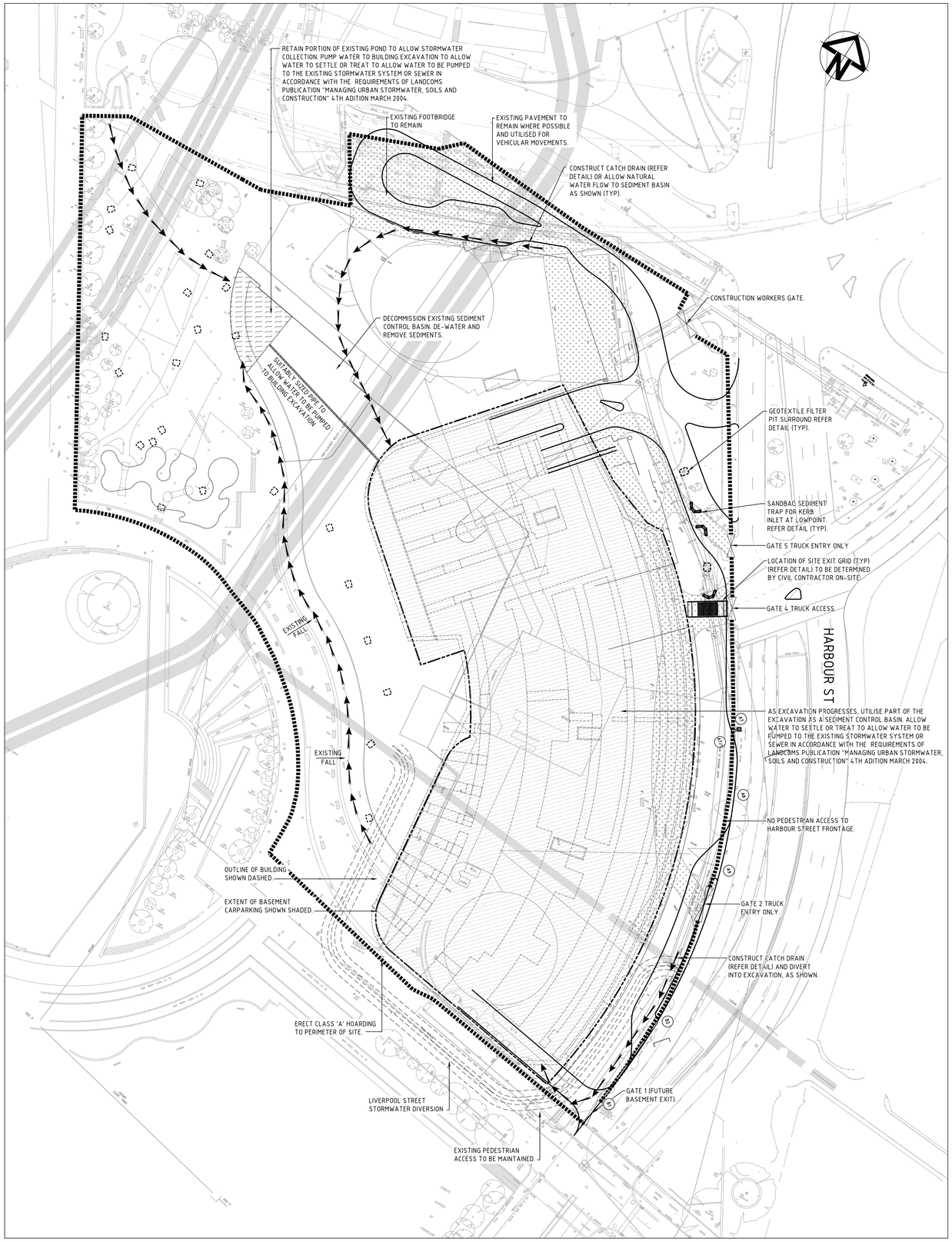
Ensure that concerned individuals or groups are aware of and have access to the Bovis Lend Lease. Complaints Register which will be used to address any construction noise related problems should they arise.

To ensure that this process is effective, regular scheduled meetings will be required for a finite period, until all issues have been addressed and the evidence of successful implementation is embraced by all parties.

An additional step in this process is to produce a newsletter informing the groups of the progress of the works and the upcoming construction activities.

Appendix 3

Hyder Sediment and Erosion control plan and details CD442002 08



PLAN
1 : 500

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

1. THE SITE SUPERINTENDENT/ENGINEER WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS DOCUMENTED.
2. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH
   a. LOCAL AUTHORITY REQUIREMENTS
   b. EPA REQUIREMENTS
   c. NSW DEPARTMENT OF HOUSING MANUAL "MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION", 4th EDITION, MARCH 2004 (AKA – THE BLUE BOOK).
3. MAINTAIN THE EROSION CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.
4. WHEN STORMWATER PITS ARE CONSTRUCTED, PREVENT SITE RUNOFF ENTERING UNLESS SEDIMENT FENCES ARE ERECTED AROUND PITS.
5. CONTRACTOR IS TO ENSURE ALL EROSION & SEDIMENT CONTROL DEVICES ARE MAINTAINED IN GOOD WORKING ORDER AND OPERATE EFFECTIVELY. REPAIRS AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.

LAND DISTURBANCE

6. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
   (A) INSTALL CLASS 'A' HOARDING ALONG THE BOUNDARIES
   (B) CONSTRUCT SITE EXIT GRID TO LOCATION AS DETERMINED BY SUPERINTENDENT/ENGINEER. REFER DETAIL
   (C) INSTALL SEDIMENT BASIN AS SHOWN ON PLAN
   (D) UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. WHERE POSSIBLE, PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.
7. ACTIVITIES WHICH HAVE THE POTENTIAL TO CAUSE EROSION AND GENERATE SEDIMENT INCLUDE (BUT ARE NOT LIMITED TO):- DEMOLITION, EXCAVATION, MATERIAL HANDLING AND STOCKPILES STORM EVENTS, WATER RUNOFF AND HOSING, MACHINERY MOVEMENTS.

EROSION CONTROL

8. DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.
9. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.
10. EXISTING PAVEMENTS ARE TO BE RETAINED (WHERE POSSIBLE) FOR AS LONG AS POSSIBLE TO MINIMISE EROSION.

SEDIMENT CONTROL

11. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.
12. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) WILL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
13. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
14. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

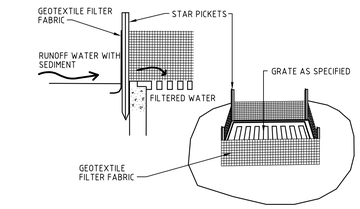
EROSION AND SEDIMENT CONTROL NOTES

OTHER MATTERS

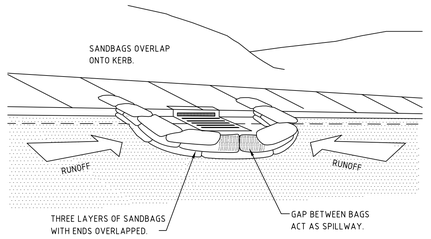
15. TO COMPLY WITH THE PROTECTION OF THE ENVIRONMENT ACT 1997 WHEREBY IT IS AN OFFENCE TO POLLUTE CLASSIFIED WATERS THE FOLLOWING MEASURES (AS A MINIMUM) MUST BE IMPLEMENTED:-
   (A) CONCRETE TRUCKS, CONCRETE PUMPS, AND THEIR ATTACHMENTS AND TRUCKS USED FOR THE DISPOSAL OF SPOIL SHALL NOT BE WASHED OUT ON THE PUBLIC WAY.
   (B) ANY WATER COLLECTED FROM ON-SITE WASHING DOWN OF VEHICLES OR THEIR ATTACHMENTS SHALL NOT BE PUMPED, DIRECTED OR ALLOWED TO FLOW TO THE STREET STORMWATER SYSTEM.
   (C) ANY SEEPAGE OR RAINWATER COLLECTED ON-SITE DURING WORKS SHALL NOT BE DISCHARGED TO THE PERMANENT STORMWATER SYSTEM UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM THE OWNER OF THAT STORMWATER SYSTEM.
16. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
   (A) PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE
   (B) ENSURING THAT NOTHING IS NAILED TO THEM
   (C) PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS.
      (I) ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIP LINE AND THE TRUNK, WHICH EVER IS THE GREATER
      (II) A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALL FILL LAYERS OF MORE THAN 300 MILLIMETRES DEPTH
      (III) CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO COMPACT THE SOIL AROUND THEM.
17. THE SITE SUPERINTENDENT/ENGINEER WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS DOCUMENTED.
18. A TEMPORARY SEDIMENT BASIN IS PROPOSED TO COLLECT AND TREAT SITE RUNOFF. THIS BASIN IS TO BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BLUE BOOK.
19. THE WATER TO BE DISCHARGED FROM THE SEDIMENT BASIN MUST MEET THE NSW DEC WATER QUALITY DISCHARGE REQUIREMENTS FOR DISCHARGE INTO WATERWAYS.
20. VEHICLES CARRYING SPOIL OR RUBBLE TO OR FROM THE SITE SHALL BE COVERED AT ALL TIMES TO PREVENT THE ESCAPE OF DUST OR OTHER MATERIAL.
21. IF DURING THE PROPOSED WORKS MATERIALS ARE ENCOUNTERED ON-SITE THAT ARE DIFFERENT TO THOSE FOUND DURING THE PREVIOUS SITE INVESTIGATIONS, AN ASSESSMENT OF THE MATERIALS MUST BE UNDERTAKEN IN ACCORDANCE WITH THE CERTIFIED RAP PREPARED BY ENSR 2008, WITH ANY ADDITIONAL MANAGEMENT MEASURES IMPLEMENTED IN ACCORDANCE WITH THE RAP.
22. THE MANAGEMENT STRATEGIES WITHIN THE ACID SULPHATE SOILS MANAGEMENT PLAN PREPARED BY ENSR AUSTRALIA PTY LTD DATED 8 JULY 2008 MUST BE IMPLEMENTED AT THE SITE DURING CONSTRUCTION WORKS.

GENERAL NOTES

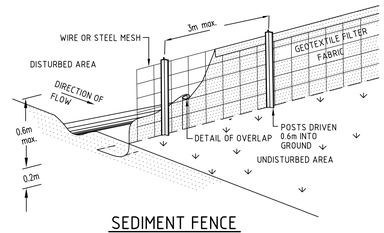
- ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
- ALL LEVELS RELATIVE TO AUSTRALIAN HEIGHT DATUM
- DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS ONLY.



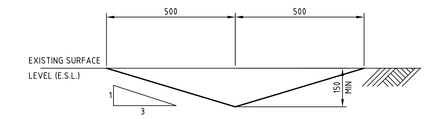
GEOTEXTILE FILTER PIT SURROUND
NTS



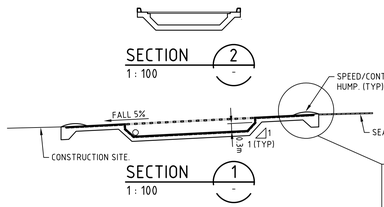
SANDBAG SEDIMENT TRAP FOR KERB INLET AT LOWPOINT
NTS

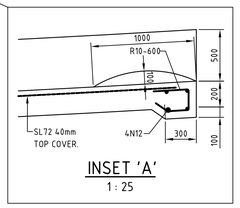


SEDIMENT FENCE
NTS

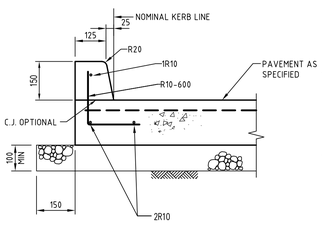


TEMPORARY CATCH DRAIN
(MIN FALL 1%)
SCALE 1:10

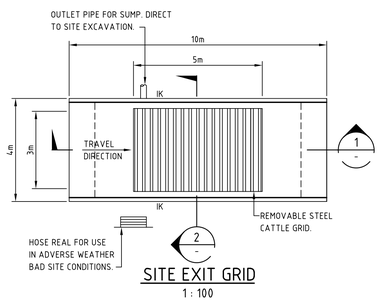




INSET 'A'
1 : 25



INTEGRAL KERB (IK)
SCALE 1:10



SITE EXIT GRID
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0 100 200 400 600 800 1000mm
1 : 10

0 500 1000 1500 2000mm
1 : 20

0 2 4 6 8 10m
1 : 100

0 10 20 30 40 50m
1 : 500

REV.	DATE	DESCRIPTION	BY
08	03.07.09	REVISE SED CONTROL CONCEPT	MK
07	30.06.09	RELOCATE SED CONTROL BASIN	MK
06	23.06.09	REVISED TO INCLUDE PUBLIC DOMAIN	MK
05	18.03.09	DRG NUMBER CHANGED FROM CD55002	MK
04	05.11.08	NOTES AMENDED	MK
03	09.04.08	ISSUE FOR REVIEW	NH
02	08.04.08	ISSUE FOR REVIEW	NH
01	04.04.08	ISSUE FOR REVIEW	NH

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Hyder

PROJECT
DARLING WALK

BOVIS LEND LEASE

TITLE
SEDIMENT AND EROSION CONTROL PLAN AND DETAILS

SCALE	AS SHOWN @ A1	DRAWN	NH
DATE	APR 2008	APPROVED	–
PROJECT CODE	NS03788		

SHEET NO.
CD442002 08

Appendix 4

BLL Waste Management Plan

Bovis
Lend Lease

Darling walk
Waste Management Plan

Objectives

The objectives of the Waste Management Plan are based on the hierarchy of avoidance/reduce, re-use, recycle, treat and dispose as outlined in the National Waste Minimisation and Recycling Strategy.

To re-use and/or recycle a minimum of 80% of all Hard Waste Material, and Soft Waste Material generated on the construction site, thus achieving up to 80% reduction/avoidance in waste to landfill.

Best Practice should be adopted wherever possible, to achieve waste minimisation and reduction. Key areas that will be targeted in the Waste Management Plan are:

- To avoid, whenever possible, the generation of wastes
- Demolition Materials (including hazardous building materials i.e. asbestos)
- Construction Materials
- Excavated Fill Materials
- Domestic & Human Waste
- Wastewater
- Litter generation due to construction activities

In addition the project will:

- liaise with Subcontractors to identify areas where they can reduce waste and reuse materials in their respective trades;
- meet local, state and federal waste minimisation legislation and environmental standards;
- prevent pollution and damage to the environment; and
- protect the safety and health of our employees, site personnel and the public.

Key Management Issues

The waste management strategy has been developed from best practice models. Waste Materials generated on site are to be managed such that recycling is maximised and the volume of waste transported to landfill is minimised.

Construction waste minimisation requires early planning and establishment of “Waste minimisation Culture” by all participants in the Design, Construction and End User process. Waste minimisation is a key element in life cycle analysis, material selection and specification.

Materials selected must be fit for use. The use of building materials that are fully recycled and/or include recycled material in their production will be maximised where practicable.

All disposal documentation from construction processes should be supplied to BLL and filed in the site records for verification purposes.

Site Controls

Planning

A Waste Management Contractor will be involved in the early stage of the project to ensure effective planning for the waste management.

Major Subcontractors will be asked to submit prior to commencement on site waste minimisation details including as a minimum the following:

- practical measures associated with their works to prevent waste entering on site;
- waste streams resulting from their works which can be recycled and will be actively managed as part of their waste reduction plan; and
- alternative products containing recycled material that could be utilised in their works, in place of more traditional materials, which conform and meet with the design specification.

All suppliers of building materials will be encouraged to nominate packaging minimisation and reuse initiatives, which have been implemented, as part of product supply to the project.

Bulk handling and reusable/returnable transport containers will be encouraged.

Site set up will include measures to prevent litter entering the stormwater drains and waterways feeding to the adjacent parks, roadways and waterways.

Waste Management will be addressed at the design coordination meetings.

A Waste storage and Handling Diagram Waste will be prepared for the site showing details of the designated storage locations of Segregated waste, water / washout waste etc.

Pre Construction Phase:

Demolition

Demolition will be conducted in a manner to maximise material recycling and removed from site by the demolisher . Materials such as copper , aluminium , steel , concrete , masonry/ stone and timber shall be separated and transported to various recycling depots .

Construction Phase:

Excavated Fill Materials

Any fill materials identified as requiring excavation from within development footprints will, where suitable, be re-used on the site as part of the site engineering or landscape works.

In the event that excavated soils are deemed unsuitable for re-use on site, the excavated fill materials will require initial waste classification testing in accordance with relevant authorities. Depending on the outcome of the waste classification, a suitably licensed landfill will be chosen to receive and dispose of the soils. Appropriate waste documentation and permits will be maintained throughout this process.

Options for either re-use or off-site disposal of excavated soil materials will be assessed at the design stage of the project.

Waste Bins

The Subcontractors will be responsible for the daily cleaning of their respective work areas and placing of their waste in the bins.

Adequate number of litter bins be made available within the construction site areas, including work and lunch areas. These bins will be regularly emptied.

The Subcontractors working on site will place all their waste in the bins on site.

Waste Water / Washout Areas

Washout processes and facilities for paint and/or finishing trades are to be minimised and water recycling for these activities are encouraged where possible.

Utilisation of BLL guidelines/management plan for disposal of paint and associated wastes are to be implemented.

Finishing trades washout facilities will NOT be plumbed to any building services and will be of a stand-alone nature. The maintenance of these facilities should be the subcontractor's responsibility and should comply with all appropriate Environmental Legislation and local authority guidelines.

Packaging

All suppliers of building materials will be encouraged to nominate packaging minimisation and reuse initiatives, which have been implemented, as part of product supply to the project. Bulk handling and reusable transport containers will be encouraged.

Recycled Materials

Suppliers will be encouraged to nominate products that include a recycled component and ability/opportunity for recycling of unused components in accordance with the specified 80% waste reduction target. Product selection will include a selection factor associated with recyclability and percent of recycled product.

Training

Communication and education material on the waste management system will be part of the Site Environmental Awareness Program that will be incorporated into the site induction program.

Additional third party training will be investigated when a waste contractor is nominated.

The responsibility to ensure that waste materials go into the correct bins will be with everyone on site.

Performance Measures

A Waste Management Contractor will be involved in the early stage of the construction project to ensure effective planning for the waste management.

The Waste Management Contractor will coordinate waste recycling, recovery and disposal of all waste during all stages of the project.

The waste system (bins / signage / training) is in place prior to any major waste generation works.

All waste transportation and disposal documentation to be maintained on-site and signed as received or disposed by the appropriate contractor or waste receiving facility.

Destination of all wastes to be approved by the receiving waste facility prior to the commencement of works.

Monitoring and Reporting

The Waste Management Contractor will be responsible for providing monthly reports to the SM: the number and size of bins taken away, tonnage's and m^3 taken away and tonnage's and m^3 recycled. This will include the final destination of materials for recycling.

The Waste Management Contractor will be responsible for providing dockets to the SM for the removal and appropriate disposal of scheduled waste from the project.

The SM will produce monthly reports and other statistic information as per BLL EH&S requirements.

The BLL Project EH&S Manager will formally audit the progress on waste management from the above monthly reports to ensure waste reduction targets are met and appropriate waste documentation maintained.

Corrective Actions

Non-conformances are to be recorded by way of the System Defects.

The Subcontractor and BLL SM/CM if applicable shall review and analyse the cause of detected non-conformance and develop a corrective action to prevent recurrence. Details of the non-conformance including any immediate corrective actions undertaken are to be recorded, reviewed and accepted by the CM.

It is the responsibility of the CM to immediately initiate corrective actions following approval. The non-conformance and corrective action must include details of the action proposed, desired performance target and action close out date. The system defects report should be signed, dated and filed.

All corrective and preventative action taken by the Subcontractor will be carried out by and at the cost of the Subcontractor.

If such corrective and preventative action leads to further non-conformance, any further action shall be subject to approval by the CM in consultation with the Project EH&S Manager.

Waste Management Implementation Plan

Control	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measure
Waste Identification					
A Waste storage and Handling Diagram Waste will be prepared for the site showing details of the designated storage locations of Segregated waste, water / washout waste etc.	Prior to works commencing	In accordance with the Waste Management Plan.	CM/SM	Review of Diagram prior works commencing.	Diagram Map prepared & containing all relevant details.
Hazardous building materials to be identified in Hazardous Materials Building Survey	prior demolition works commencing	Independent surveyor to prepare a Hazardous Materials Register	CM	To be reviewed by PM and incorporated into WMP.	Preparation of a functioning HazMat Register for building materials.
Project waste types to be identified and quantified.	Prior to works commencing	Coloured bins will be supplied for the nominated waste streams in accordance with the Waste Management Plan.	CM/ PM	To be reviewed by PM and incorporated into Waste Management Plan.	List of relevant waste streams and volumes from construction & demolition.
Waste Disposal					
Remove all hazardous building materials off-site.	Prior demolition works	Appropriately licensed contractor to remove and transport waste to licensed landfill	SM	Air quality monitoring daily. Clearance Survey by hygienist as required.	Non detect asbestos during ambient air monitoring. Landfill disposal dockets.
Segregation and storage construction/ demolition and	At all times	Waste contractor to address and follow	SM	Weekly inspection of Waste Collection	No cross contamination of

Control	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measure
domestic waste prior off site disposal.		legislative requirements.		Areas.	wastes. No spillage or loss of wastes from collection containers in storage compound. Waste Dockets.
Transport and handling of demolition/ construction waste and domestic waste by licensed contractors.	At all times	Only approved contractor to be used. Appropriate SWMS for transportation of waste	SM	Random inspection of waste transport licenses. Random inspection of waste transport vehicles.	Correct covers and containers for waste transfer. No spillages/loss of waste during transport.
Demolition/ construction and domestic waste disposal to correct licensed waste receiving facilities.	All times	Only approved waste receiving facilities to be used.	SM	Waste classification reports. Inspect as required.	Waste disposal dockets correspond to waste types/ volumes.
Disposal of excavated fill materials deemed for off-site disposal.	Prior construction	Waste soils (if any) classified in accordance with relevant authority Guidelines (eg: DEC, EPA etc). Licensed waste contractor and landfill used	SM	Waste classification reports. Inspect as required.	Waste disposal dockets correspond to waste types/ volumes.
Collection and storage of wastewater from site operations (i.e. paint washing) or temporary facilities (i.e. toilets).	At all times.	Design and installation of appropriate wastewater collection/storage system.	SM	Weekly inspection of bunds, drains and sumps.	No wastewater spills or uncontrolled discharges.
Appropriate disposal of all wastewater from site operations (i.e. paint washing) or temporary facilities (i.e. toilets).	At all times	Collection and disposal of wastewater by approved licensed contractor	SM	As required	Waste disposal dockets correspond to waste types/ volumes.
Recycling					
Waste building or demolition materials (i.e. concrete, timber, steel, etc) to be segregated and stored in separate site bins.	All times	Appropriately designed waste storage areas with designated recycling bins.	SM	Weekly inspection	Clean waste bin area. No cross contamination of waste types.
Segregated waste building/demolition materials are appropriately recycled.	All times	Approved waste recycling contractor to collect bins for recycling.	SM (Environment Manager if appropriate)	Established collection schedule. Audit actual recycling volumes compared to waste recycling targets (%).	Waste recycling dockets. Waste recycling targets are met.
Minimisation					

Control	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measure
Excavated material to be reused or recycled where possible.	As required	Independent contractor to test soils for environmental/ geotechnical parameters.	CM/SM	Soil testing report to confirm suitability for re-use. Review by Environment Manager.	No contaminated soils re-used on site.
Any fill imported onto the site is to consist of certified clean material only	As required	Indentation of material	CM/SM	Certificate of suitability.	Certificate provided prior to bring to site.
Minimise packaging and maximise use of recycled products by contractors.	At all times	Review contractor materials and packaging proposals	CM/SM	Inspect material deliveries/ specifications.	Proven examples of minimal packaging and recycled materials.