

TWEED VALLEY HOSPITAL

– STAGE 2

CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN

20/09/2019 | Revision No: 3



Sub- Plan Revision Status				
Date	Revision (in numbers)	Purpose and Summary of Amendments	Reviewed by	Approved by
30/11/2016	2	General update including LLB GMR and legislative amendments.	Tracey Wallbridge	Brian Falls
09/07/2019	2.1	Project Specific – Preliminary	Luis Biaggini	Luis Biaggini
12/07/2019	2.2	SSD Requirements Added	AW	Luis Biaggini
05/09/2019	2.3	Updated Introduction	AW	Luis Biaggini
20/09/2019	3.0	EIS Submission Finalisation	MW	Luis Biaggini

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1. OVERVIEW

1.1 Overview

On the 11 June 2019 the Minister for Planning and Public Spaces granted approval for the Concept Proposal and Stage 1 Early and Enabling Works for the new Tweed Valley Hospital (SSD 9575) located at 771 Cudgen Road, Cudgen (Lot 11 DP1246853). All documents relating to this consent can be found on the major project website of DPIE at <https://www.planningportal.nsw.gov.au/major-projects/project/10756>.

The Environmental Impact Statement (EIS) has been prepared to assist in the State Significant Development (SSD) Stage 2 Application for the Tweed Valley Hospital which will be assessed under Part 4 Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This, along with supporting documentation, provides a clear outline of the Stage 2 Application.

The Tweed Valley Hospital Project broadly consists of:

- Construction of a new Level 5 major regional referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region (in conjunction with the other hospitals and community health facilities across the region);
- Delivery of the supporting infrastructure required for the Tweed Valley Hospital, including green space and other amenities, roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

1.1.1 Stage 2 Hospital Delivery - Main Works and Operation

The Stage 2 SSD component will seek consent for the Main Works and Operation of the Tweed Valley Hospital, including:

- **Construction of Main Hospital Building**
 - Main entry and retail area
 - Administration
 - Community health
 - In-Patient units
 - Outpatient clinics and day only units
 - Child and Adolescent Services
 - Intensive Care Unit
 - Mental Health Unit
 - Maternity Unit and Birthing Suites
 - Renal Dialysis
 - Pathology
 - Pharmacy
 - Radiation Oncology as part of integrated Cancer Care
 - Emergency Department
 - Perioperative Services
 - Interventional Cardiology
 - Medical Imaging
 - Mortuary
 - Education, Training, Research
- Back of House services
- Rooftop Helipad
- **Construction of Support Building, referred to as the 'Health Hub', containing:**
 - Oral Health
 - Community Health
 - Aboriginal Health
 - Administration
 - Education, Training and Research
- **Internal Roads and carparking, including multi-deck parking for staff, patients and visitors;**
- **Construction of a temporary building for the 'Tweed Valley Skills Centre'**
- **External road infrastructure upgrades and main site access**
- **Environmental and wetland rehabilitation, including rehabilitation of existing farm dam as outlined in the Biodiversity Development Assessment Report (BDAR) prepared for the Concept Proposal and Stage 1 works**
- **Site landscaping**
- **Signage**
- **Utility and service works**

The works outlined above comprise five key components, which are subject to various funding allocations and may be delivered independently to each other. Stage 2 has therefore been defined in the following sub-stages¹:

- Stage 2A – Main Hospital Building complete with supporting roads, services infrastructure and landscaping
- Stage 2B – Main Hospital Building incremental expansion areas
- Stage 2C – Health Hub
- Stage 2D – Tweed Valley Skills Centre
- Stage 2E – Multi-deck car park.

Development consent is sought for the all 5 components of Stage 2 under this SSDA.

Plans for Stage 2 Main Works and Operation are attached in Appendix B of the EIS. Approval of Stage 2 will enable the new Tweed Valley Hospital to be built which will provide a much-needed contemporary health service facilities for the surrounding region.

1.1.2 Potential Future Expansions

Any subsequent stages or modifications to the proposal would be subject to separate applications as required including the potential future expansion of the facility.

2. SSD REQUIREMENTS

State Significant Development Conditions	
Name of this Plan (as per SSD Conditions): Construction Noise and Vibration Management Sub-Plan (CNVMSP)	
B25. The Stage 2 application must be accompanied by a detailed Noise and Vibration Impact Assessment Report prepared by a suitably qualified person including (but not limited to):	
(a) details of the main construction and operational noise and vibration sources and activities including future mechanical plants, additional noise due to on-site traffic, additional noise due to construction works on the Tweed Coast Road / Cudgen Road intersection upgrade site, additional traffic on the surrounding roads due to the hospital, emergency vehicles and helicopter operations	Noise and vibration monitors were established during Early Works in 3 locations, covering the area's most susceptible to construction noise and vibration. The sensors will trigger a warning (sent to the nominated recipient) if the maximum allowed levels are exceeded. Refer Appendix B of this Plan for monitor locations.

¹ Stages are not listed in chronological order and may be delivered independently to each other

(b) outlining all feasible and reasonable noise and vibration mitigation and management measures to reduce the impact of the noise generated by the construction and operation of the future hospital and associated facilities (including the intersection upgrade works), in accordance with Noise and Vibration Impact Assessment Report prepared by Acoustic Studio dated 17 October 2018 and the addendum Stage 1 Works – Site Access and Associated Road Works prepared by Acoustic Studio dated 18 January 2019

Refer to;

3. Scope of Project and Plan

- a. Summary of Site Controls
- b. Construction Methodology to mitigate Noise and Vibration & Mitigation measures for Noise Generated during Roadworks
- c. Intersection Upgrades and Vehicular Access Points

4. Implementation of the Plan

(d) demonstrate that the maximum noise emission from the 24 hours plant operations within the Site would comply with the recommendations of the Noise and Vibration Impact Assessment Report prepared by Acoustic Studio dated 17 October 2018.

Refer to;

3. Scope of Project and Plan –

- d. Summary of Site Controls
- e. Construction Methodology to mitigate Noise and Vibration & Mitigation measures for Noise Generated during Roadworks
- f. Intersection Upgrades and Vehicular Access Points

4. Implementation of the Plan

B29. The Stage 2 application must be accompanied by a detailed Geotechnical Assessment Report with details of proposed mitigation measures during excavation works and measures to control impacts on adjoining properties due to vibration during construction.

Refer to Section 4: Implementation of the Plan for mitigation measures

Methodology for bulk excavation and civil activities, and particularly for those activities that generate more noise such as rock excavation, have been adopted taking in consideration the Geotechnical Investigation Reports prepared by Morrison Consultants. The methodology is influenced by the selection of best suited equipment to reduce noise and vibration generation.

3. SCOPE OF PROJECT AND PLAN

Project Details	
Scope of the Plan	This Noise and Vibration Management Plan provides strategies and measures to minimise and control the generation of noise and vibration. It outlines the measures used to ensure that the identification of noise and vibration is managed appropriately during the construction phase, including the site establishment, construction, fit out and commissioning, of a project. It describes measures to be implemented during relevant construction activities, which enables control of the impacts of construction activities on potentially affected receivers, and contingency measures that may be implemented if complaints are received or measured limits exceeded.
Objectives of the Plan	<ul style="list-style-type: none"> • To achieve compliance with regulatory requirements and standards for noise and vibration management. • To avoid excessive noise and vibration generation through site planning and the adoption of appropriate work methods and site management practices. • To prevent or minimise to the greatest extent, the impact of construction noise and vibration on neighbours and the community. • To establish and maintain positive relationships with project stakeholders. • To establish noise and vibration measures raised in the Biodiversity Management Plan (refer Appendix U of the EIS) to reduce impact on local fauna and flora. • Adopt measures recommended in the Noise and Vibration Impact Assessment (refer Appendix O of the EIS).
Scope of Works	<p>This Plan has been prepared based on consideration of the following scope of works:</p> <ul style="list-style-type: none"> • Site establishment including ATF, fixed temporary fence and hoarding installation, office and compound setup; • Civil Works, including carparks and roads for Stage 2 • Monitoring and maintenance of existing Sedimentation Basins; • Construction of the multi-level Main Works Stage. This new build will include a new emergency department, helipad, IPUs, ICU, MAU, expanded rehab and ambulatory care facilities and operating theatres • Landscaping

Project Details	
Key Issues and Risks	<p>The works described above have the potential to generate noise and vibration at levels, or at times, that may affect nearby residents, businesses and other community facilities. The closest sensitive receivers to the site have been identified as:</p> <p>Construction works noise impacts will be greatest at Residential Catchment B and the educational receiver (TAFE) is the next most sensitive / noise impacted receiver. Refer to Appendix A for location of catchment areas and to Appendix C for expected noise levels at these receivers.</p> <p><u>Catchment Area A</u></p> <ul style="list-style-type: none"> • Residential (440m from Building Footprint) • Educational (560m from Building Footprint) <ul style="list-style-type: none"> ▪ Kingscliff High School to the southeast (closest and most affected educational receiver) ▪ Kingscliff Library to the northeast • Passive Recreation Area - Jack Julius Park (750m from Building Footprint) • Commercial including (530m from Building Footprint) <ul style="list-style-type: none"> ▪ Kingscliff Community Health Centre ▪ Civic Swimming Pool ▪ Life Bridge Australia <p><u>Catchment Area B</u></p> <ul style="list-style-type: none"> • Residential (140m from Building Footprint) • Educational – North Coast TAFE Kingscliff Campus (TAFE) (180m from Building Footprint) • Agricultural / Commercial (160m from Building Footprint) <p><u>Catchment Area C</u></p> <ul style="list-style-type: none"> • Residential (440m from Building Footprint) • Agricultural (85m from Building Footprint)

Project Details	
	<p>The activities with the greatest potential to create noise and/or vibration include:</p> <ul style="list-style-type: none"> ○ The transport of materials to and from site on local roads; ○ Servicing of waste management and storage areas; ○ The use of hand tools, small generators and compressors; ○ Concreting works; and ○ Out of hour works. <p>High or prolonged levels of construction noise and vibration can cause annoyance to local receivers and damage to adjacent structures. The main risks associated with the works that will be conducted on this site are identified as:</p> <ul style="list-style-type: none"> ○ Noise affecting residents' use of their property or causing annoyance and resulting in complaints and negative comment; ○ Noise disrupting local events, the use of public facilities or educational programs and exams; ○ Noise affecting local businesses including cafes with outdoor areas; ○ Noise occurring outside of normal or approved construction hours; ○ Vibration affecting structures or causing concerns/fright within the community. <p>A noise/acoustic assessment including background noise monitoring has been prepared for this project. The assessment concluded that:</p> <ul style="list-style-type: none"> ○ Noise associated with the main works activities is expected to have an impact on the surrounding areas and the recommendations of the assessment have been addressed in this Plan; <p>The implementation of the control measures identified in this Plan are intended to mitigate the risks and any potential impacts of noise and vibration on the environment and local community.</p>
Legislation, Approval and Guidelines	<p>Federal/National:</p> <p>ANZECC Guidelines Technical Basis for Guidelines to minimise Annoyance due to Blasting Over pressure and Ground Vibration</p> <p>Australian Standard AS2436 (1981) Guide to Noise Control on Construction, Maintenance and Demolition Sites</p> <p>Australian Standard AS2601 (1991) Demolition of Structures.</p> <p>AS 1055.1-1997 Acoustics – Description and measurement of environmental noise – General Procedures</p> <p>AS 1055.2-1997 Acoustics – Description and measurement of environmental noise – Application to specific situations</p>

Project Details	
	<p>State:</p> <p>NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NSW NPI) 2017.</p> <p>NSW EPA Interim Construction Noise Guideline 2009.</p> <p>NSW EPA Assessing Vibration: A Technical Guideline 2006.</p> <p>Local:</p> <p>Local Government Act 1993</p> <p>Lendlease Requirements:</p> <ul style="list-style-type: none"> • 4.13 Degradation or Pollution of the Environment • 4.15 Uncontrolled Release of Stored Energy (non-electrical)) • Lendlease Building Workplace Delivery Code (WDC)
Summary of Site Controls	<p>Site specific controls, monitoring, reporting and performance measurements have been identified in this Plan to minimise and where possible prevent, the impacts of construction noise and vibration on the environment and community. These include but are not limited to:</p> <ul style="list-style-type: none"> ○ Performing and monitoring works in accordance with the project approval; ○ Restricting works to approved construction hours; ○ Assessing the potential impact of works that may be required or extend outside of approved construction hours (e.g. delivery of plant, large concrete pour) and seeking approval; ○ Selecting appropriately sized plant, equipment and tools; ○ Retrofitting plant with noise silencing devices; ○ Substituting noisy processes or plant with less noisy options; ○ Restricting the times and/or duration of noisy works; ○ Communicating with project neighbours on a regular basis and providing advanced notification of noisy works; and ○ Installing acoustic barriers or enclosures where they are deemed to be feasible and effective.

Project Details	
	<p>Vibration:</p> <p>The project will make all practical efforts to protect vibration sensitive buildings and the amenity of the occupiers of the buildings.</p> <p>The project will apply a practical and economical combination of vibration control measures to manage vibration impacts such as:</p> <ul style="list-style-type: none"> • Substitution by an alternative process • Restricting times when work is carried out • Screening or enclosures • Consultation with affected residents. <p>During leisure hours, vibration disturbance from construction operation must be kept to a minimum.</p> <p>The basis for this vibration management strategy will be to limit the times that certain vibration producing activities may be carried out.</p> <p>Generally, this will be accomplished by performing such work during (nominate daylight or after hours)</p> <p>No construction or demolition works is permitted within 50m vicinity of any heritage listed items or features of cultural significance.</p> <p>Any activities potentially resulting in vibrations should be at greater distances to avoid disturbance of these protected items, feature (nominate particulars) located on the site.</p> <p>Construction stage noise and vibration minimisation and monitoring requirements will be included in relevant specifications, contract agreements, plant supply agreements, quality assurance documents, and subcontractor work method statements.</p> <p>Site inspections, monitoring and reporting will be undertaken by Lendlease and subcontractors as detailed in the following implementation table.</p>
Stakeholder Management and Complaints Handling	A Community Consultation Management Plan under this approval will be developed prior to the commence of Main Works.
Construction Methodology to mitigate Noise and Vibration	<p>During the tender process and scope of works preparation for trade works, mitigation and methodology is to consider and implement, if feasible, activities that will minimise noise and vibration emissions.</p> <p>i.e. rock ripping using large plant</p> <p>Mitigation measures agreed in the tender and confirmed in scope of works are to be included within subcontractor's Safety Plan and SWMS.</p>

Project Details	
Mitigation measures for Noise Generated during Roadworks, Intersection Upgrades and Vehicular Access Points	<ul style="list-style-type: none"> • Maintaining Standard Work Hours • Limiting more intensive works, such as excavator hammering to the least sensitive times of the day (i.e. avoid early morning, early evening where practical) • Including Respite Periods where activities are found to exceed the 75 dB(A) Highly Affected Noise Level at receivers. • Consideration of localised screening or barriers for high noise level / isolated works. • Unnecessary idling of vehicles and equipment is to be avoided. • Adopt quieter methodologies. For example, where possible, use concrete sawing and removal of sections as opposed to jackhammering.

4. IMPLEMENTATION OF THE PLAN

Control Measure	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measurement
Planning and Site Establishment					
Undertake dilapidation surveys of nominated properties, utilities and structures.	Completed prior to commencement of early works	Appoint a consultant to undertake dilapidation surveys pre- and post-construction and review findings.	CM/SM	Surveys reviewed and works planned with consideration of the findings (as relevant).	No damage to properties or buildings.
Address noise minimisation, management, plant noise monitoring and maintenance as part of risk assessments and work planning.	Prior to commencing works	WMSs prepared by major subcontractors to identify high noise and vibration generating activities, compliance with approved work hours, the duration of works, and the selection, substitution and use of appropriate plant.	SM	Discussion in planning sessions. Addressed in IHRA and WMS. Inspection of work activities. Noise monitoring results. Complaints.	No complaints from the community. No work outside of hours without approval.

Prepare a Noise and Vibration Impact and Monitoring Environmental Management Diagram (EMD) identifying the location of potentially affected receivers, monitoring locations and work areas where noise will be generated.	Prior to works commencing	<p>Prepare EMD.</p> <p>Plan works with consideration to the location of sensitive receivers.</p> <p>Position noisy plant and equipment away from sensitive receivers and as far apart as practicable. Assess whether altering the orientation and/or location of the plant will reduce noise impacts.</p>	PM/CM	Diagram prepared and communicated.	Sensitive receptors identified so that communication can be maintained.
Include information in the Site Induction about noise and vibration minimisation, management and monitoring.	Prior to works commencing	<p>Revise Lendlease induction package to include site specific risks and information.</p> <p>Deliver induction material.</p>	CM/SM	WMSs prepared by subcontractor's address noise and vibration minimisation, work hours, duration and the selection and use of plant.	Site induction delivered to all workers on site.
Install a noise barrier/hoarding along project boundaries (as feasible).	Prior to works commencing	Identify the location of project neighbours and assess the feasibility and benefits of installing a barriers/hoarding to reduce noise transmission.	CM/SM	<p>Noise monitoring results.</p> <p>Number of complaints.</p>	<p>No complaints.</p> <p>No exceedances of predicted levels.</p>
Design the site entry and internal roads to minimise and regulate truck movements and ensure vehicles enter and exit in a forward direction (to reduce beeper noise).	Prior to works commencing	<p>Address in site setup design.</p> <p>Include this requirement in the Traffic Management Plan.</p>	CM/SM	Continuous monitoring of traffic movements during construction.	No complaints from adjoining residents or authorities.
Provide advanced notification of the commencement of work.	Prior to works commencing	Establish a list of project stakeholders including potentially affected neighbours, community, health and business facilities	CM/SM	<p>List established and maintained.</p> <p>Feedback recorded.</p>	<p>No community complaints.</p> <p>Positive relationship established with project neighbours.</p>

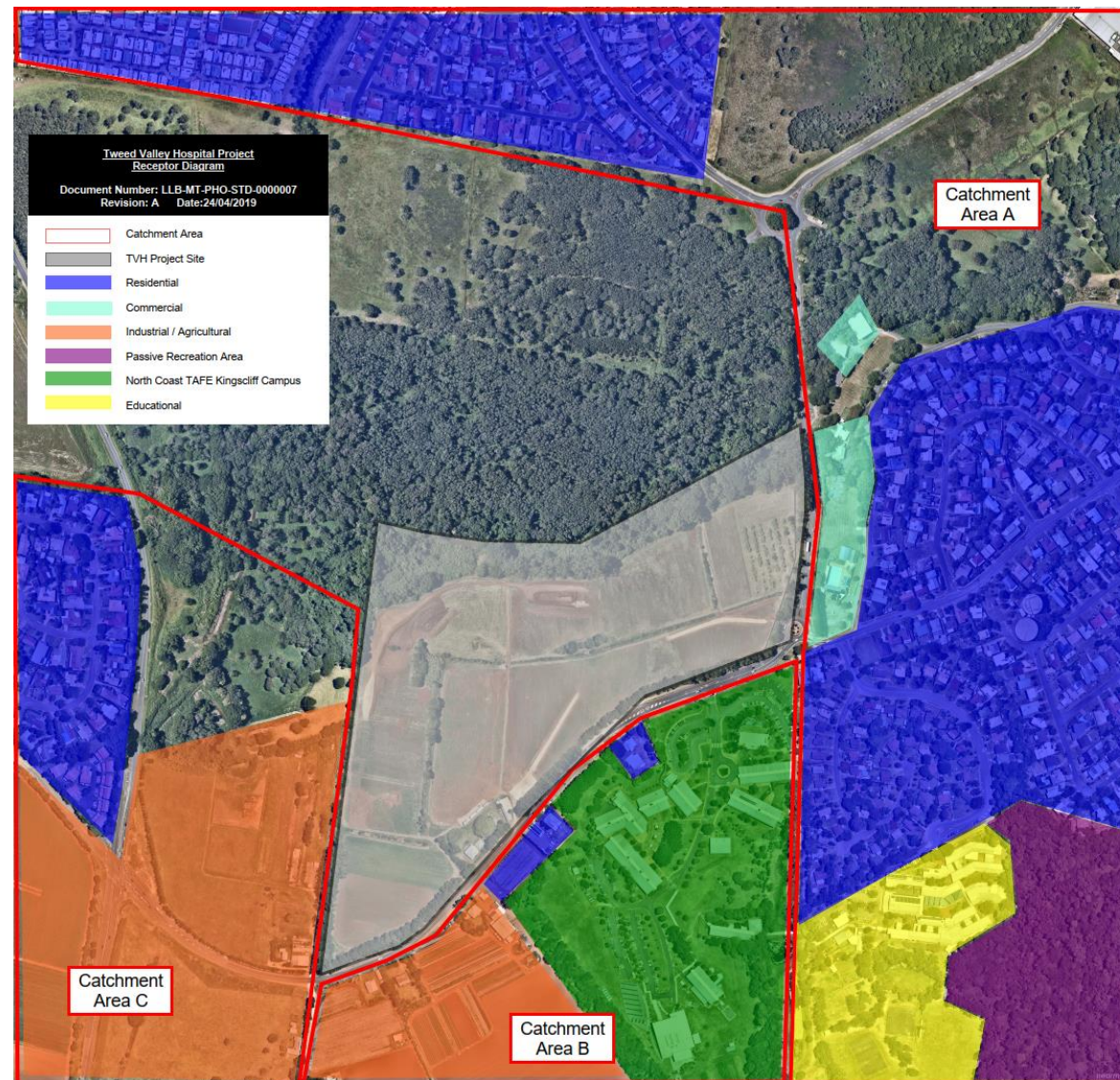
		Prepare appropriate information and distribute to the community.			
Issue appropriate PPE for use on site where noise exceeds 75dB(A).	Prior to commencing and at all times	Identify areas of the site where PPE is required. Install appropriate signage. Monitor compliance.	SM	Daily surveillance. Weekly inspection checklist.	PPE consistently worn.
Establish a Plant & Equipment Register with details of approved equipment, noise compliance certificates and relevant restrictions/conditions of use (if any) if applicable.	Prior construction	Subcontractor to address in WMS and submit Plant & Equipment Register or service records.	GF	Included in subcontractor work method statements. Sub-contractor audit.	All operators licensed. No inappropriate use of plant or equipment.
If applicable, high noise or vibration works should be performed further away from the perimeter boundary and native fauna areas (i.e. koala habitat).	At all times	Identify the location of project neighbours and assess the feasibility and benefits of locating works away from receptors.	CM/SM	Noise monitoring results. Number of complaints.	No complaints. No exceedances of predicted levels.
Implement community consultation or notification measures	For expected high dB works.	Review expected dB levels to determine whether additional mitigation measures are required.	CM/SM	Notice Contacted Receivers	complaints.
Work Hours					
Comply with approved work hours. Monday to Friday 7:00 am to 6:00 pm; Saturday: 8:00 am to 1:00 pm	At all times	Identify and communicate approved work hours/days. Plan works and complete within approved hours. Provide notification to the community.	CM/SM	Documented approval received for work outside of approved hours. Monitoring of work outside of approved hours.	Timely approval of work outside of hours. No complaints. No work outside of approved hours without prior impact assessment and approval from the relevant regulatory authority. No fines.

If work needs to be performed due to unforeseen circumstances (e.g. concrete pour) outside the hours nominated, consent from the Department of Planning must be obtained.	At all times	Prior notice and approval from the Department of Planning must be sought.	GF	Continuous as required.	No complaints from public or adjoining residents or authorities.
Provide advanced notification to potentially affected community stakeholders of out of hour's work/deliveries and high noise or vibration activities.	Prior to works commencing	Prepare appropriate information and distribute to the community at least 3 days prior to the works occurring.	CM/SM	Feedback recorded.	No community complaints. Positive relationship established with project neighbours.
Where applicable if work activities involve noisy works, controls measure MUST be detailed as part of the Work Method Statement	Prior to works commencing	In accordance with the Noise and Vibration Management Plan.	Contractor	Continuous	Work Method Statement to contain details of schedule of work and equipment being used.
Where applicable, activities that are found to exceed the 75dB (highly affected noise level) at receivers, respite periods (such as three hours on and 1 hour off).	During noisy works.	Regular monitoring to be undertaken and controls addressed during pre-starts and tool box talks if required,	CM/SM	Noise monitoring results. Number of complaints.	No complaints. No exceedances of predicted levels.
Where feasibly noise activities are to be scheduled to less sensitive times to minimise potential noise impacts – Refer to Appendix E for noise management levels.	At all times.	Project coordinate meetings and site safety walks.	CM/SM	Noise monitoring results. Number of complaints.	No complaints. No exceedances of predicted levels.
Noise and Vibration Minimisation – Plant and Equipment					
Ensure that public address systems are not used (except in emergencies)	During construction	Orientate speakers away from sensitive receivers.	SM	Monthly inspection. Review of effectiveness during emergency drills.	No complaints.
Operate plant and equipment in a proper and efficient manner and avoid unnecessary idling or engine noise.	At all times	WMS prepared by subcontractor to address proper operation of plant and equipment and education of operators.	SM Sub-contractor	Ongoing inspection of operators and operations.	All operators are licensed. No inappropriate use of plant or equipment.

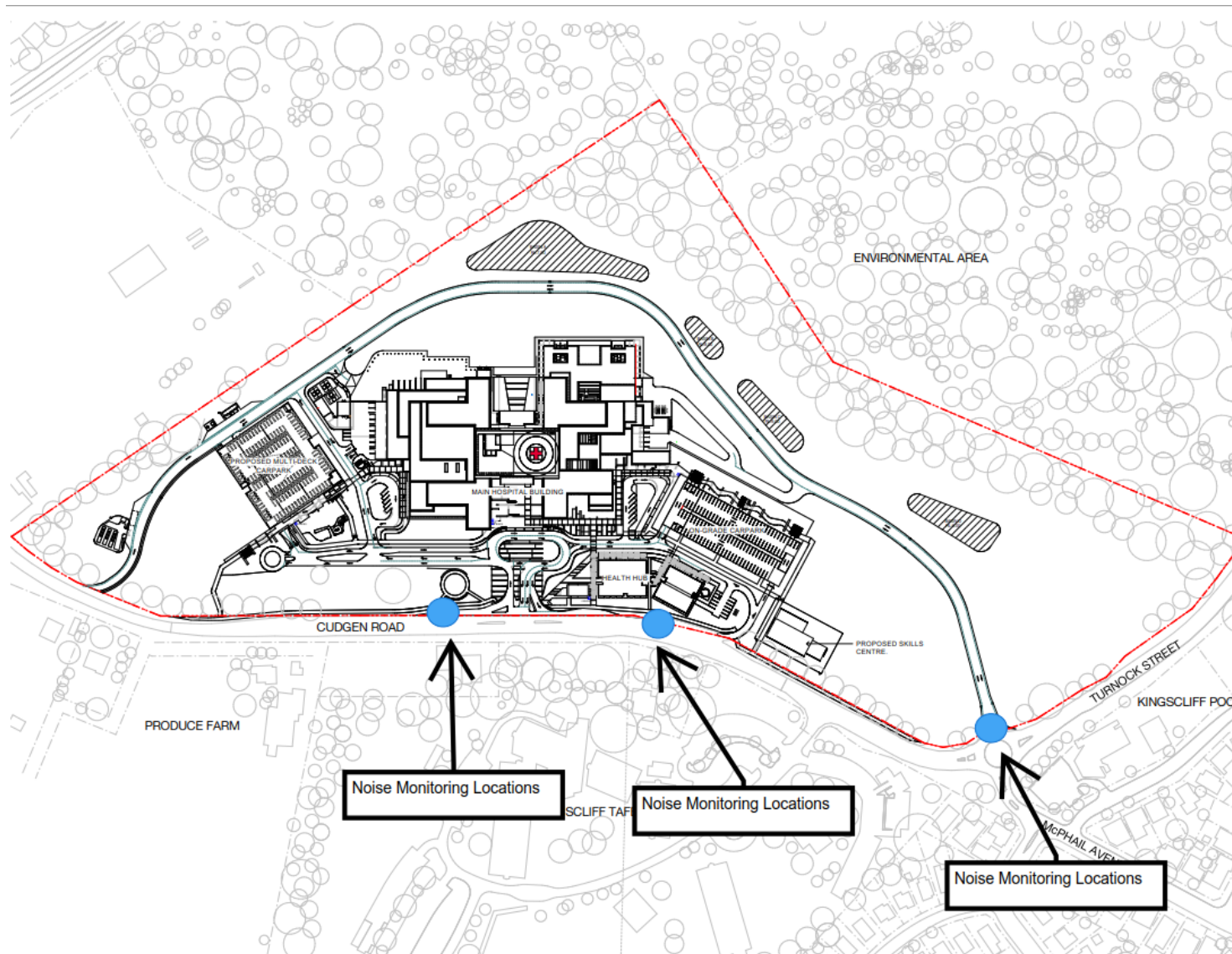
Ensure plant is fitted with silencers, acoustical enclosures or other noise attenuation measures.	At all times	Subcontractor to address the risk based selection of appropriate plant and equipment in WMS. Include requirement in subcontracts. Subcontractor to submit Plant & Equipment Register or service records.	SM/ Foreman	Ongoing inspection of operators, activities and plant. Daily surveillance of noise levels.	All operators are licensed. No inappropriate use of plant or equipment.
Avoid rock-hammering where feasible and use alternative methods such as rock-saws and rippers where possible.	At all times	Subcontractor to address in WMS. If the use of rock-hammers is unavoidable, use smaller rock breakers with quiet 'city hammers'.	SM/ Foreman	Detailed SWMS prepared and communicated. Ongoing inspection of operators, activities and plant. Weekly inspection checklist	All operators are licensed. No inappropriate use of plant or equipment.
Consider the merits of different construction activities (e.g. piling techniques) in relation to noise and vibration impacts.	At all times	Subcontractor to address in WMS and submit Plant & Equipment Register or service records. E.g. Use non-percussive piling techniques where practicable. If impact piling is required, consider hours of operation, lowering hammer height, shielding with equipment or using acoustic shrouding and resilient dollies.	SM/ Foreman	Detailed SWMS prepared and communicated. Ongoing inspection of operators, activities and plant. Weekly inspection checklist.	All operators are licensed. No inappropriate use of plant or equipment.
Ensure that vibratory compactors are not used closer than 30 metres from residential buildings	At all times	Included in subcontractor tenders.	SM/ Foreman	Ongoing surveillance.	All operators licensed. No inappropriate use of plant or equipment.

unless vibration monitoring confirms compliance with specified criteria.		Subcontractor to submit Plant & Equipment Register or service records. 'Buffer zones' clearly marked out to prevent entry of plant.			
Turn off vehicles and plant when not in use and avoid queuing and idling outside the site, particularly prior to the construction start time.	At all times	Address in site induction. Subcontractors to address in WMS and communicate to all personnel.	SM/ Foreman	Daily surveillance Weekly inspection checklist.	No complaints from local community.
Where possible, limit the number of trucks and heavy vehicles on site at any given time (through scheduling deliveries at different times).	At all times	Discuss in planning of deliveries.	SM/ Foreman	Delivery Schedule	Control of plant No complaints.
Traffic routes are to be prepared to minimise the noise impact on the community.	Prior to commencement.	Address in site setup design. Include this requirement in the Traffic Management Plan.	CM/SM	Continuous monitoring of traffic movements during construction.	No complaints from adjoining residents or authorities.
Vibration Survey to be performed prior to vibratory activities.	At all time	Prior to activities that generate vibration, assess the influence zone of vibration and implement relevant controls as list in the table above.	CM/SM	Vibration Assessment	No exceedance of vibration limits at receivers.

APPENDIX A: Noise Receptors of the Site



APPENDIX B: Location of Noise and Vibration Monitors (if required for Stage 2)



APPENDIX C: Typical Noise Levels of Major Plant and Instances where receptors will experience noise greater than 75dB

Item	Typical Plant or Equipment	Max Noise Level (at 7 metres)	Activities Performed along Site Boundary that will Exceed 75dB	Activities Performed within 25m of Site Boundary that will Exceed 75dB	Activities Performed within 50m of Site Boundary that will Exceed 75dB	Activities Performed within Building Footprint that will Exceed 75dB
Rock Breaker	Hydraulic on Kato 750	97				
Air Track Drill	800 CFM Compressor	96				
Dump Trucks	35 Tonne	96				
Bulldozer	Caterpillar D10	93				
Piling Hammer	For piles and casing	93				
Compactor	Vibrating Plate	92				
Asphalt Truck		92				
Front End Loader	Wheeled	90				
Scraper	Caterpillar 631	89				
Vibratory Roller	10-12 Tonne	89				
Asphalt Paver		89				
Bulldozer	Caterpillar D7, D9	88				
Water Cart		88				
Backhoe		88				
Excavator	Kato 750	86				
Jack Hammers	With silencing bags	85				
Scraper	Caterpillar 651	85				
Grader	Caterpillar 16	85				
Compactor	Caterpillar 825	85				
Crane	Truck Mounted	85				
Drill	Air	85				
Drill	Pneumatic	85				
Welders		85				
Concrete Pump		84				
Tip Truck		83				

Mechanical Broom		83				
Concrete truck		83				
Truck		80				
Compressor	1500 CFM	80				
Concrete Vibrators		80				
Generator	Diesel	79				
Compressor	600 CFM	75				
Spraying Machine		75				
Spreader	Asphalt, concrete	70				

APPENDIX D: Guideline for Roller Use near Structures

Roller Class & Weight Range	Centrifugal Force Range	Example of Rollers	Distance from Building A B		Remarks
Very Light Less than 1.25 tonnes	10-20kN	Coates 32RD tandem Davleco 32CR tandem	3m	--	Maintenance and patching rollers. Generally, not restricted for normal
Light 1 to 2 tonnes	20-50kN	Coates 42RD tandem Pannell 54T drawn	5m	--	Generally, not restricted for normal road use.
Medium 2 to 4 tonnes	50-100kN	Coates 66Tdrawn Davleco 66 drawn	6m	12m	
Medium-Heavy 4 to 6 tonnes	100-200kN	Coates 72Tdrawn Davleco 72 drawn Pacific V12 drawn Raypo Rascal 400	12m	24m	Not advised for city and suburban streets.
Heavy 7 to 11 tonnes	200-300kN	Coates 78Tdrawn Pacific V24D drawn Raypo Rascal 600	25m	50m	Restricted. Not advised built-up areas.
Very Heavy 12 tonnes and over	Over 300kN	Coates 96Tdrawn Pacific V36D drawn	25m	50m	Restricted to major construction areas away from structures and buildings.

APPENDIX E: Project Specific Noise Management Levels (Extracted from Acoustic Report by Acoustic Studios)

Location	Period	Rating Background Level RBL, dB(A)	Noise Management Level Leq (15 min) dB(A)
Residential (Catchment A)	Recommended Standard Hours	Monday to Friday 7am to 6pm	45
		Saturday 8am to 1pm	45
			RBL + 10
	Outside Recommended Standard Hours ³	Monday to Friday 6am to 7am	38
		Saturday 1pm to 6pm	45
			RBL + 5
Residential (Catchment B)	Recommended Standard Hours	Monday to Friday 7am to 6pm	47
		Saturday 8am to 1pm	47
			RBL + 10
	Outside Recommended Standard Hours	Monday to Friday 6am to 7am	34
		Saturday 1pm to 6pm	47
			RBL + 5

Table 5: Project Specific residential construction Noise Management Levels for **airborne** noise

Time of Day	Noise Management level LAeq (15 min)
Evening (6pm to 10pm)	40 dB(A) - Internal
Night (10pm to 7am)	35 dB(A) - Internal

Table 6: Residential construction Noise Management Levels for **ground-borne** noise

Occupancy	Management level LAeq (15 min)
Industrial / Agricultural ⁴ premises	75 dB(A) - External
Offices, retail outlets	70 dB(A) - External
Classrooms at schools and other educational institutions	45 dB(A) - Internal / 55 dB(A) - External ⁵
Passive recreation areas	60 dB(A) - External

Table 7: Industrial, commercial, educational and hospital construction Noise Management Levels for airborne noise

APPENDIX F: Expected Noise Levels at Receivers (Extracted from Acoustic Report by Acoustic Studios)

Location and Construction Activity	Predicted equipment noise levels at surrounding community receivers, in dBL _{Aeq,15min}						
	Residential		Commercial	Agricultural	Passive Recreation Area	Educational	
						TAFE	KHS
	Catchment						
	A	B	A	B	A	B	A
	Noise Management Level, dB(A)						
	50 ¹⁷ / 55 ¹⁸	52 ¹⁷ / 57 ¹⁸	70	75	60	55	55
Trucks ¹⁹	52-61	63-77	51-59	58-77	47-49	59-66	50-52
Concrete Mixer Truck	50-59	61-75	48-56	56-75	45-47	57-64	48-50
Compactor	51-60	64-76	49-57	57-76	46-48	58-65	49-51
Grader / Roller	48-57	61-73	46-54	54-73	43-45	57-64	46-48
Excavator with Hammer / Saw	60-69	71-85	59-67	66-85	55-57	67-74	58-60
Excavator with bucket / Backhoe / Front loader	54-64	68-80	52-60	60-79	49-51	61-68	52-53
Bobcat	51-60	64-76	49-57	57-76	46-48	58-65	49-51
Concrete Pump	51-60	64-76	49-57	57-76	46-48	58-65	49-51
Mobile Crane	52-61	63-77	51-59	58-77	47-49	59-66	50-52
Jackhammer	51-60	64-76	49-57	57-76	46-48	58-65	49-51
Piling Rig	54-63	67-78	52-60	59-78	49-51	60-67	52-54
Rock Crushing	60-69	71-85	59-67	66-85	55-57	67-74	58-60
Grinder	42-51	53-67	41-49	48-67	37-39	49-56	40-42
Hand Tools / Drills	45-54	56-70	44-52	51-70	40-42	52-59	43-45
Wood Chipper	60-69	71-85	59-67	66-85	55-57	67-74	58-60
Chain / Circular Saw	55-64	66-80	54-62	61-80	54-52	62-69	53-55
Forklift	45-54	56-70	44-52	51-70	40-42	52-59	43-45

APPENDIX G: Expected Vibration Levels at Receivers (Extracted from Acoustic Report by Acoustic Studios)

Plant item	Rating / description	Safe Working Distance – metres (m)	
		Cosmetic Damage (BS 7385)	Human Response (BS 6472)
Vibratory roller (<i>vibration source</i>)	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (Typically >18 tonnes)	25 m	100 m
Small Hydraulic Hammer	(300 kg – 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Piling rig (vibratory)	Sheet piles	2m	20m
Piling rig (bored)	<= 800 mm	2m (nominal)	N/A
Piling rig (hammer)	12 tonne down force	15m	50m
Jack Hammer (<i>also attracts 5dB impulsive noise penalty</i>)	Hand held	1m (nominal)	Avoid contact with structure

Table 1: Recommended safe work distances for vibration-intensive plant and activities, from TfNSW I&S CNVS (2018)