Infrastructure New South Wales

Sydney Football Stadium Redevelopment

SFSR Stage 2 - Construction Noise and Vibration Management Sub Plan

AC09 JH-NVMP-PLN-001

Issue 5 | 13 March 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 259997

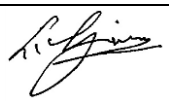
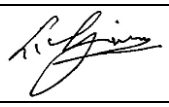
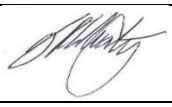
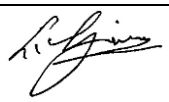
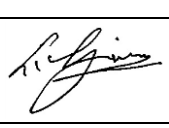
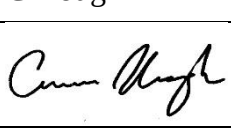
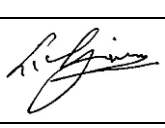
Arup
Arup Pty Ltd ABN 18 000 966 165

Arup
Level 17
1 Nicholson Street
East Melbourne VIC 3002
Australia
www.arup.com

ARUP

Document Verification

ARUP

Job title		Sydney Football Stadium Redevelopment			**Job number** 259997
Document title		SFSR Stage 2 - Construction Noise and Vibration Management Sub Plan			**File reference** AC09
Document ref		AC09	JH-NVMP-PLN-001		
Revision	**Date**	**Filename**	AC09-v1_SFSR_CNVMSP.docx		
Draft 1	22 Oct 2019	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	M Simon	G Wheatley	G Wheatley
		Signature			
Draft 2	6 Dec 2019	**Filename**	AC09-v2_SFSR_CNVMSP.docx		
		Description	Second draft		
			Prepared by	Checked by	Approved by
		Name	M Simon	G Wheatley	G Wheatley
		Signature			
Issue 1	28 Jan 2020	**Filename**	AC09-v3_SFSR_CNVMSP.docx		
		Description	Incorporated JHG comments		
			Prepared by	Checked by	Approved by
		Name	M Simon	G Wheatley	G Wheatley
		Signature			
Issue 2	17 Feb 2020	**Filename**	AC09-v4_SFSR_CNVMSP.docx		
		Description	Incorporated JHG comments		
			Prepared by	Checked by	Approved by
		Name	M Simon	C Hough	M Simon
		Signature			
				Issue Document Verification with Document	✓

Document Verification

Job title		Sydney Football Stadium Redevelopment		**Job number** 259997
Document title		SFSR Stage 2 - Construction Noise and Vibration Management Sub Plan		**File reference** AC09
Document ref		AC09	JH-NVMP-PLN-001	
Revision	**Date**	**Filename**	AC09-v5 SFSR Stage 2 CNVMSP.docx	
Issue 3	19 Feb 2020	**Description**	Updated construction staging	
			Prepared by	Checked by	Approved by
		Name	M Simon	G Wheatley	M Simon
		Signature			
Issue 4	5 Mar 2020	**Filename**	AC09-v6 SFSR Stage 2 CNVMSP.docx	
		Description	Amended as per FSA and CoS review comments	
			Prepared by	Checked by	Approved by
		Name	M Simon	G Wheatley	M Simon
		Signature			
Issue 5	13 Mar 2020	**Filename**	AC09-v7 SFSR Stage 2 CNVMSP.docx	
		Description	Amended to respond to DPIE RFI dated 12 March 2020	
			Prepared by	Checked by	Approved by
		Name	M Simon	G Wheatley	M Simon
		Signature			
		Filename		
		Description		
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

Figures

Tables

Appendices

1 Terms and Acronyms

Table 1: Terms and Acronyms

Acronym	Term
AAS	Australian Acoustical Society
AAAC	Association of Australasian Acoustical Consultants
CC	Crown Certificate
CEMP	Constriction Environmental Management Plan
CNVMSP	Construction Noise and Vibration Management Sub-Plan
DEFRA	Department for Environment, Food & Rural Affairs
EPA	Environment Protection Authority
ICNG	Interim Construction Noise Guideline
NCA	Noise Catchment Areas
NML	Noise Management Levels
NPfI	Noise Policy for Industry
NVIAR	Noise and Vibration Impact Assessment Report
RBL	Rating background level
SCG	Sydney Cricket Ground
SFS	Sydney Football Stadium
SSD	State Significant Development

2 Introduction

This Construction Noise and Vibration Management Sub-Plan (CNVMSP) has been prepared in accordance with the Stage 2 approval for the Sydney Football Stadium, State Significant Development (SSD) 9835. The report outlines the relevant assessment criteria, assessment of impacts and the management techniques that must be used to manage noise and vibration impacts from the Stage 2 works, of which the most significant noise and vibration generating activities are the stadium bowl construction and infrastructure works.

A *Stage 2 SSDA - Noise and Vibration Impact Assessment Report* (NVIAR) was prepared by ARUP on 30 August 2019 for the project application, which presented preliminary assessments of construction noise and vibration impacts along with establishment of background noise levels utilised in this CNVMSP.

The SSD DA approval has been informed by the findings of that NVIAR.

2.1 Review and approval of this CNVMSP

Stage 2 of the Sydney Football Stadium (SFS) Redevelopment (SSD 9835) was approved by the Minister for Planning and Public Spaces on 6 December 2019.

In accordance with conditions B28 – B30 of the consent, a Construction Noise and Vibration Management Sub-Plan (CNVMSP) must be prepared by a suitably qualified and experienced person(s) and in consultation with the EPA prior to commencement of construction. The CNVMSP must be approved by the Planning Secretary and a copy submitted to Council and the Certifying Authority prior to the commencement of any works. In addition, all mitigation and management measures identified in the CNVMSP, must be installed or implemented where reasonable and practical on the site prior to commencement of works on site.

The purpose of this document is to address the requirements of Conditions B28 – 30 inclusive as they relate to the first stage of construction (refer to Section 3 for details).

Pursuant to Condition B29, the CNVMSP is required to be approved by the Planning Secretary. In addition, this CNVMSP is required to be submitted to the Environment Protection Authority (EPA) prior to be being finalised, with evidence of this consultation to be provided to the Planning Secretary.

Further reviews would be undertaken through the construction period, as required, in response to revised methods and equipment, as well as in response to the monitoring and evaluation of actual impacts.

2.2 Qualification

This CNVMSP was prepared by Mathew Simon and reviewed by Glenn Wheatley, both suitably qualified and experienced acousticians from the Arup Acoustics team, who hold good working knowledge of the relevant standards, specifications and conditions applicable to this project.

Mathew and Glenn each hold over 10 years' experience as acoustic consultants and are qualified and operating members of the Australian Acoustical Society (AAS). Arup are a member firm of the Association of Australasian Acoustical Consultants (AAAC).

3 Project Description

The project involves the construction of a new stadium on the site of the existing Allianz Stadium within Moore Park. The Stage 2 works, for which this CNVMSP applies, relates to the construction of the new stadium.

Demolition works approved under Stage 1 (SSD 9249) were completed on 28 February 2020. Project Development Consent – Stage 2

The Stage 2 redevelopment of the Sydney Football Stadium as approved under SSD 9835 provides consent for the following works:

- Construction of a new stadium with up to 45,000 seats (55,000 capacity in concert-mode), including playing pitch, grandstands, sports and stadium administration areas, food and drink kiosks, corporate facilities and all other aspects of a modern stadium;
- Operation and use of the stadium and surrounding site area for a range of sporting and entertainment events;
- Vehicular and pedestrian access and circulation arrangements, including excavation to deliver a partial basement level for storage, internal loading and servicing at the playing pitch level;
- Reinstatement of the MP1 car park following the completion of construction, including enhanced vehicle rejection facilities and direct vehicular connection to the new stadium basement level;
- Public domain improvements within the site boundary, including hard and soft landscaping, to deliver a range of publicly accessible, event and operational areas;
- Provision of new pedestrian and cycling facilities within the site;
- Signage, including building identification signage, business identification signage and a wayfinding signage strategy; and
- Extension and augmentation of physical infrastructure/ utilities for the development within the site

The project is proposed to be delivered in five (5) stages set out in Table 2 to respond to the proposed design milestones, construction program and the conditions of approval. Initially, piling and sub structure elements were included within CC1 and formed the basis of communication to stakeholders. Further analysis of the conditions has subsequently occurred and it has been identified that a new stage (stadium sub-structure elements including pile, foundations and footing construction) is required.

This CNVMP has been prepared for all five stages. Subsequent updates will be made only if required. Should updates be required, the CNVMP will be submitted to the Planning Sectary for approval.

Table 2: Proposed Construction Stages

Stage	Proposed Works	Duration	Start Date	Finish Date
CC1	Bulk earthworks, retaining walls, enabling and temporary works (for example shoring) to facilitate future stages.	11 months	March 2020	February 2021
CC2	Stadium sub-structure elements including piles, foundations, footing construction and in-ground services	7 months	April 2020	October 2020
CC3	Structure - basement to concourse level construction.	9 months	July 2020	March 2021
CC4	Above concourse level works (structure – Level 1 to Level 5)	7 months	November 2020	May 2021
CC5	Roof, façade, fit-out and remaining elements.	18 months	February 2021	July 2022

3.1 Surrounding land-use

Residential zones are located to the north and north-east in Paddington, east and south-east in Centennial Park, as well as west along South Dowling Street in Surry Hills and Redfern. Non-residential premises also surround the site, with scattered child cares, places of worship, educational facilities and Paddington Town Hall located in Paddington and Centennial Park, high schools located across Anzac Parade and various recreation areas nearby, shown in Figure 1.

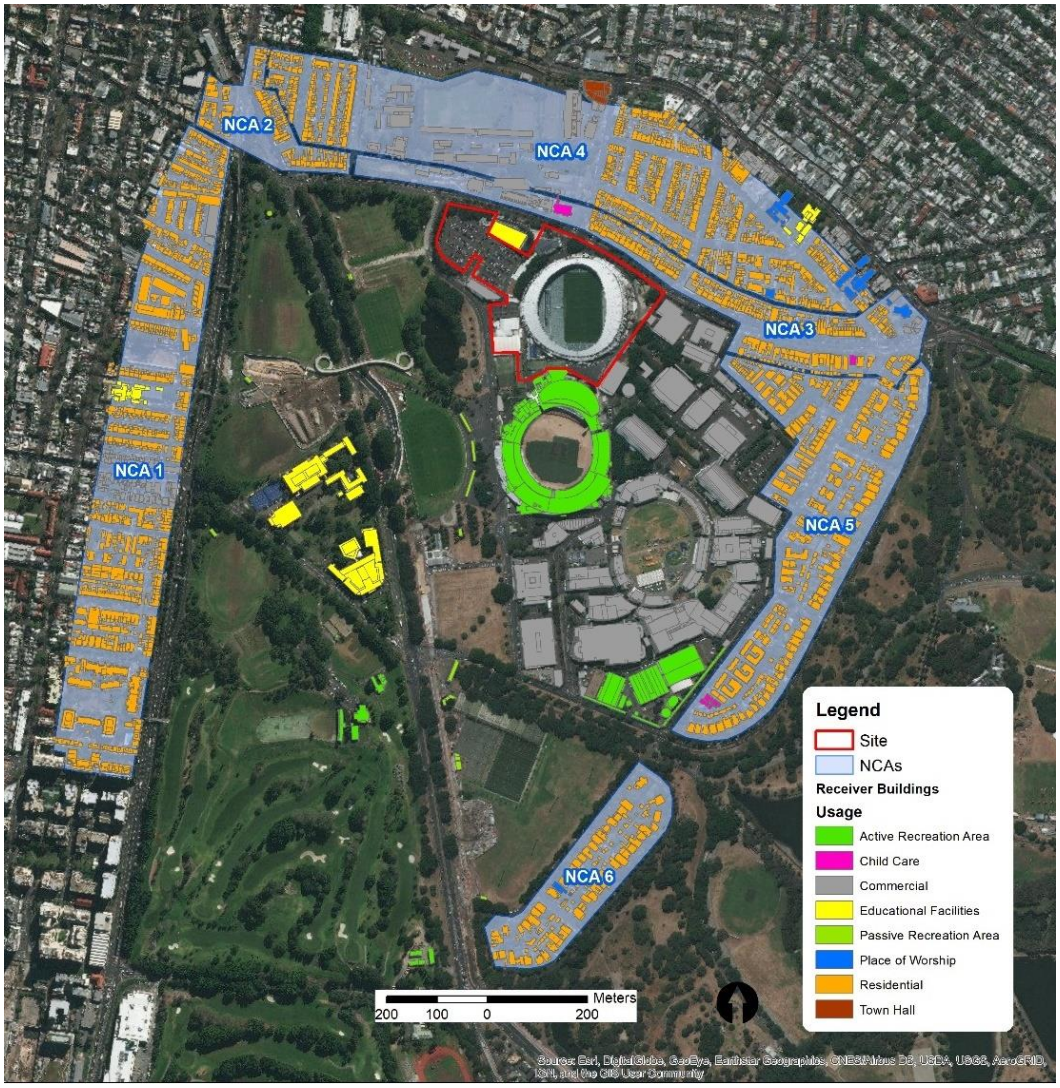


Figure 1: Noise sensitive receiver locations and NCAs

Residential receivers located within similar environments and with comparable relationship to surrounding noise sources have been grouped into Noise Catchment Areas (NCAs), also shown in Figure 1 and described in Table 3.

Table 3: NCAs and description (refer to Figure 2 for details of locations)

NCA	Description	NSW NPfI area classification
NCA 1	Surry Hills & Redfern along South Dowling Street	Urban
NCA 2	Surry Hills intersection between Anzac Parade and Flinders Street	Urban
NCA 3	Paddington, Moore Park Road	Urban
NCA 4	Paddington local roads	Urban
NCA 5	Centennial Park Lang Road and local roads	Suburban
NCA 6	Centennial Park Robertson Road and local roads	Suburban

NCA boundaries have been determined from site observations and attended measurements. Classifications of NCAs 1, 2, 3 and 4 as ‘Urban’ are based on on-

site observations, and based on the NSW EPA's Noise Policy for Industry (NPfI), given that these areas have '*through-traffic with characteristically heavy and continuous traffic flows during peak periods'*. and NCAs 5 and 6 are categorised as 'Suburban' having *'local traffic with characteristically intermittent traffic flows'* and have the following characteristic: '*evening ambient noise levels defined by the natural environment and human activity*' (NPfI [1]).

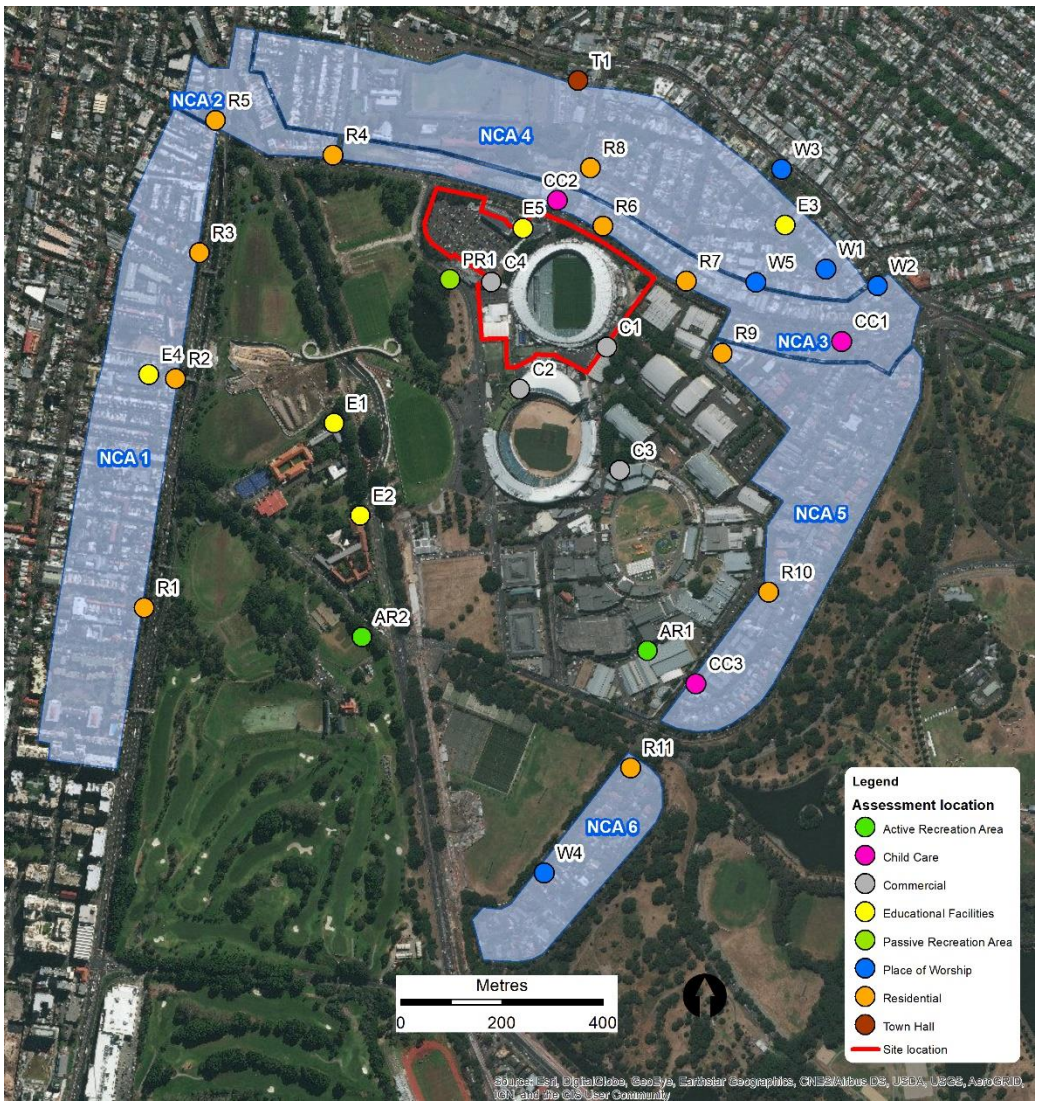


Figure 2: Assessment locations and NCAs

3.2 Assessment locations

In accordance with the NPfI the reasonably most-affected residences have been identified in each NCA have been identified and are presented in Table 4. While noise predictions have been carried out to each receiver, for clarity, the assessment of residential receivers presented in this CNVMSP is isolated to the reasonably most-affected receivers.

Table 4: Reasonably most-affected residential receivers (refer to Figure 2 for details of locations)

Receiver ID	Address	No. of floors	NCA
R1	749 South Dowling Street, Redfern	2	1
R2	635 South Dowling Street, Surry Hills	3	1
R3	553 South Dowling Street, Surry Hills	3	1
R4	111 Greens Rd, Paddington	2	2
R5	479 South Dowling Street, Surry Hills	3	2
R6	252 Moore Park Road, Paddington	2	3
R7	314 Moore Park Road, Paddington	2	3
R8	45 Oatley Road. Paddington	2	4
R9	5 Poate Road, Paddington	2	5
R10	107 Cook Road, Centennial Park	2	5
R11	2 Martin Road, Moore Park	3	6

A list of all non-residential noise sensitive receivers within the study area is presented in Table 5.

Table 5: Non-residential receivers (refer to Figure 2 for details of locations)

Receiver ID	Name	Address	No. of floors
Active Recreation Area			
AR1	Centennial Parklands Equestrian Centre	114-120 Lang Road, Moore Park	2
AR2	Moore Park Golf Course	Cleveland Street, Moore Park	0
Commercial			
C1	Fox Studios	38 Driver Avenue, Moore Park	2
C2	Sydney Cricket Ground	Driver Avenue, Moore Park	3
C3	Entertainment Quarter	122 Lang Road, Moore Park	3
C4	NRL building	Moore Park Road and Driver Avenue, Moore Park	3
Child Care			
CC1	Gumnut Gardens Early Learning and Long Day Care Ce	61 Moore Park Road, Centennial Park	1
CC2	Kira Child Care Centre	230 Moore Park Road, Paddington	1

Receiver ID	Name	Address	No. of floors
CC3	Bambini's Child Care Centre	157/159 Cook Road, Centennial Park	2
Educational Facilities			
E1	Sydney Boys High School	556 Cleveland Street, Moore Park	3
E2	Sydney Girls High School	Corner of Anzac Parade and Cleveland Street, Surry Hills	2
E3	Paddington Public School	399-435 Oxford Street, Paddington	2
E4	Bourke Street Public School	590 Bourke Street, Surry Hills	2
E5	University of Technology Sydney Rugby Australia	Moore Park Road and Driver Avenue, Moore Park	5
Passive Recreation Area			
PR1	Moore Park	Moore Park	0
Town Hall			
T1	Paddington Town Hall	249 Oxford Street, Paddington	2
Place of Worship			
W1	St Francis of Assisi Catholic Church	64 Gordon Street, Paddington	3
W2	St Mattias Anglican Church	471-475 Oxford Street, Paddington	2
W3	Paddington Uniting Church	395 Oxford Street, Paddington	2
W4	St. Vladimir's Russian Orthodox Church	31 Robertson Rd, Centennial Park	2
W5	Kingdom Hall of Jehovah's Witnesses	20 Leinster St, Paddington	2

3.3 Construction works and predicted noise levels

The appointed contractor has advised Arup that the construction equipment identified in Table 6 will be used for construction works during each stage.

Equipment sound power levels have been determined by reference to AS2436 [2], DEFRA [3], and Arup's measurement database. The equipment below has been assumed to operate concurrently and continuously over a full 15-minute period (a typical worst-case assumption).

The locations of equipment have been based on the locations of the construction works around the precinct.

Table 6: Construction equipment usage and associated sound power levels (L_w)

Approx. duration	Description of works in sub-stage	Equipment	Total number of units on site	No. operating within worst case 15-min	Sound Power dBL_{eq} (15min)
CC1 – Site Excavation and Earthwork					
11 months	Bulk earthworks, retaining walls, enabling and temporary works (for example shoring) to facilitate future stages.	Trucks	10	3	98
		50 tonne excavators	10	8	115
		Bulldozer	2	2	108
		Moxies/large truck	25	20	106
		Water cart	2	1	107
		Bobcats	4	1	104
		Franna	2	2	92
		Front end loader	4	2	113
		Crawler cranes	4	2	115
		Tower crane	6	3	99
		Concrete Pumps/boom	6	2	109
		Concrete Trucks	40	10	109
		Forklifts	2	1	106
		Hand tools	12	3	102
		Air compressors	2	1	110
		Roller (up to 15T)	4	2	107
		Material/man hoists	6	3	92
		Concrete float / vibrators	3	1	113
		Compactor	**4**	**3**	**113**
		Angle Grinder	**2**	**1**	**111**
CC2 – Stadium Sub-structure					
7 months	Stadium sub-structure elements including piles, foundations, footing construction and in ground services	Trucks	10	3	98
		Crawler cranes	4	2	115
		Franna	2	2	92
		Forklifts	2	1	106
		Hand tools	6	2	102
		Angle Grinder	**2**	**1**	**111**
		Concrete Pumps/boom	6	2	109
		Concrete Trucks	40	10	109

Approx. duration	Description of works in sub-stage	Equipment	Total number of units on site	No. operating within worst case 15-min	Sound Power dBL_{eq} (15min)
		Roller (up to 15T)	4	2	107
		Concrete float / vibrators	3	1	113
		Compactor	**4**	**3**	**113**
		Jackhammering	**2**	**1**	**113**
		Impact Piling Rig	**5**	**3**	**121**
CC3 – Basement to concourse level construction					
9 months	Structural works - basement to concourse level construction.	Trucks	2	1	98
		40 tonne excavators	4	1	115
		Bobcats	2	1	104
		Concrete Pumps	1	1	109
		Concrete Trucks	2	1	109
		Forklifts	2	1	106
		Tower crane	2	1	99
		Hand tools	6	2	102
		Franna	2	2	92
		Electric Saw	**2**	**1**	**118**
		Angle Grinder	**2**	**1**	**111**
		Jackhammering	**2**	**1**	**113**
		Impact Piling Rig	**3**	**1**	**121**

Approx. duration	Description of works in sub-stage	Equipment	Total number of units on site	No. operating within worst case 15-min	Sound Power dBL_{eq} (15min)
CC4 – Above concourse level works					
7 months	Structural works – Level 1 to Level 5	Trucks	2	1	98
		Bobcats	2	1	104
		Forklifts	3	1	106
		Hand tools	12	3	102
		Electric Saw	**4**	**1**	**118**
		Franna	2	2	92
		Concrete float / vibrators	2	1	113
		Angle Grinder	**1**	**1**	**111**
		Jackhammering	**2**	**1**	**113**
		Hand Held Impact Drill	**4**	**1**	**121**
CC5 – Roof, façade, fit-out and remaining elements					
18 months	Roof installation, installation of internal building elements	Trucks	10	3	98
		Crawler cranes	4	2	115
		Tower crane	6	3	99
		Electric Saw	**4**	**1**	**115**
		250 tonne cranes	2	1	106
		Franna	2	2	92
		Forklifts	3	1	106
		Hand tools	12	3	102
		Hand Held Impact Drill	**4**	**1**	**121**
		Angle grinder	**2**	**1**	**111**

Notes:

- Equipment highlighted in BOLD defined as ‘high noise impact’

Predicted construction noise levels at surrounding receivers are presented in Table 7, along with the relevant NML for the intended working hours.

Table 7: Predicted construction noise levels, $dBL_{Aeq\ (15\ min)}$

Receiver	NML	Construction stage				
		CC1 – Site Excavation and Earthwork	CC2 – Stadium Sub-structure	CC3 – Basement to concourse level	CC4 – Above concourse level works	CC5 – Roof, façade, fit-out and remaining
		Highest predicted noise level				
Residential receivers						
R1 - 749 South Dowling Street, Redfern	**68**	55	53	49	48	48
R2 - 635 South Dowling Street, Surry Hills	**68**	58	56	52	51	51
R3 - 553 South Dowling Street, Surry Hills	**68**	59	57	53	53	52
R4 - 111 Greens Rd, Paddington	**66**	53	51	48	47	47
R5 - 479 South Dowling Street, Surry Hills	**66**	61	59	55	54	54
R6 - 252 Moore Park Road, Paddington	**62**	**80**	**78**	**75**	74	74
R7 - 314 Moore Park Road, Paddington	**62**	72	70	67	66	66
R8 - 45 Oatley Road. Paddington	**53**	64	62	58	58	58
R9 - 5 Poate Road, Paddington	**49**	64	62	58	58	58
R10 - 107 Cook Road, Centennial Park	**49**	56	54	50	50	50
R11 - 2 Martin Road, Moore Park	**57**	52	50	46	45	45
Non-residential receivers						
AR1 - Centennial Parklands Equestrian Centre	**65**	41	39	35	35	35
AR2 - Moore Park Golf Course	**65**	55	53	49	49	49
C1 - Fox Studios	**70**	**76**	74	70	70	70
C2 - Sydney Cricket Ground	**70**	60	58	54	54	54
C3 - Entertainment Quarter	**70**	61	59	55	54	54
C4 – NRL Building	**70**	**74**	72	69	68	68
CC1 - Gumnut Gardens Early Learning and Long Day Care Centre	**55**	62	60	56	55	55
CC2 - Kira Child Care Centre	**55**	**75**	73	69	68	68
CC3 - Bambini's Child Care Centre	**55**	42	40	36	36	36
E1 - Sydney Boys High School[1]	**55**	62	60	56	55	55
E2 - Sydney Girls High School[1]	**55**	60	58	54	54	54
E3 - Paddington Public School[1]	**55**	51	49	45	45	45
E4 - Bourke Street Public School[1]	**55**	53	51	48	47	47
E5 - University of Technology Sydney and Rugby Australia[2]	**55**	**77**	**75**	71	71	71
PR1 - Moore Park	**60**	66	64	60	59	59

T1 - Paddington Town Hall[1]	**45**	63	61	57	57	57
W1 - St Francis of Assisi Catholic Church[1]	**55**	54	52	48	48	48
W2 - St Mattias Anglican Church[1]	**55**	51	49	45	44	44
W3 - Paddington Uniting Church[1]	**55**	52	50	46	45	45
W4 - St. Vladimir's Russian Orthodox Church[1]	**55**	51	49	45	45	45
W5 - Kingdom Hall of Jehovah's Witnesses[1]	**55**	59	57	54	53	53

- Levels shaded in grey indicate a notional exceedance of NMLs based on the worst-case assumptions noted above.
- Levels in **Bold Red** indicate 'highly affected' noise levels of 75dBA or above.
- High noise impact works during each stage include:
    - CC1 – Compactor, angle grinder
    - CC2 – Angle grinder, compactor, jackhammer, impact piling rig
    - CC3 – Electric saw, angle grinder, jackhammer, impact piling rig
    - CC4 – Electric saw, angle grinder, jackhammer, hand held impact drill
    - CC5 – Electric saw, hand held impact drill, angle grinder

1. Internal noise levels conservatively predicted based on a 10dB noise reduction through an open window
2. Internal noise levels predicted based on external levels, façade constructions, room and façade dimensions

4 Conditions of Consent

The Conditions of Consent pertaining to construction noise and vibration have been addressed in this report are as follows:

Conditions of Consent addressed	Report section
Pre-Construction Dilapidation Report B6. Prior to the commencement of construction, the Applicant must submit a pre-commencement dilapidation report to Council, NSW Heritage Division and the Certifying Authority. The report must provide an accurate record of the existing condition of: (a) adjoining private properties; (b) the surrounding heritage items; (c) Council assets (where relevant) that could be impacted by the proposed works; and (d) infrastructure located within Moore Park East (between the western boundary of the site and Kippax Lake) including (but not limited to) Driver Avenue, existing bollards, lights, street furniture etc.	Section 6 - Reporting
Community Communication Strategy B19. No later than two weeks before the commencement of any works, a Community Communication Strategy must be submitted to the Planning Secretary for approval. The CCS must be approved by the Planning Secretary prior to the commencement of any works or within another timeframe agreed with the Planning Secretary. The Community Communication Strategy must provide mechanisms to facilitate communication between the Applicant, the relevant Council and the community (including adjoining affected landowners / occupants, sensitive receivers and others directly impacted by the development), during the design and construction of the development and for a minimum of 12 months following the completion of construction. The Community Communication Strategy must: (a) identify people to be consulted during the design and construction phases; (b) set out procedures and mechanisms for the regular distribution of accessible information about or relevant to the development; (c) provide for the formation of community-based forums, if required, that focus on key environmental management issues for the development; (d) set out procedures and mechanisms: (i) through which the community can discuss or provide feedback to the Applicant; (ii) through which the Applicant will respond to enquiries or feedback from the community; and (iii) to resolve any issues and mediate any disputes that may arise in relation to construction and operation of the development, including disputes regarding rectification or compensation.	Section 10 – Community and Stakeholder Communication and Engagement
Construction Noise and Vibration Management Plan B28. Prior to the commencement of construction, the Applicant must prepare a Construction Noise and Vibration Management Sub-Plan (CNVMP). The plan must address, but not be limited to, the following:	This document

Conditions of Consent addressed	Report section
(a) be prepared by a suitably qualified and experienced noise expert and in consultation with the EPA;	Section 2.2 - Qualification
(b) provide details of all the residential and non-residential receivers including the Kira Child Care Centre, University of Technology Sport Sciences Faculty Building (UTS) and Fox Studios, identified in Stage 2 SSDA – Noise and Vibration Assessment prepared by ARUP dated 30 August 2019; (c) provide details of the project specific construction noise management levels (NMLs) at all the identified receivers (B28(b)) considering the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009) (ICNG) and the relevant provisions of Australian Standard 2436 - 2010 Guide to Noise Control on Construction and Maintenance and Sites, at all identified receivers;	Section 3.2 – Assessment locations
(d) identify the 'High Noise Impact works' with the associated predicted construction noise levels that would exceed the NMLs and reach or exceed the Highly Affected Noise Level of 75dB(A) $L_{Aeq(15min)}$, at the identified the residential and non-residential receivers; Note: High noise impact works mean: • jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics that exceed the NML; or • continuous noisy activities where 'continuous' includes any period during which there is less than a 1-hour respite between ceasing and recommencing any of the work that is the subject of this condition.	Section 3.3 – Construction works and predicted noise levels
(e) describe all reasonable and feasible management and mitigation measures to be implemented when the predicted construction noise levels exceed the NMLs LAeq(15min) at the identified residential and non-residential receivers, including (but not limited to) the recommendations in the draft Construction Noise and Vibration Management Plan (Appendix E) of the Stage 2 SSDA – Noise and Vibration Assessment prepared by ARUP dated 30 August 2019) and the following:	Section 5
(i) "stop-work" procedures; (ii) proposing specific plant and equipment to ensure lower noise generation; (iii) proposing suitable location of the noise generating equipment so that the predicted construction noise levels at the residential and non-residential receivers is lowered;	Section 8 – Vibration management Sections 5 – Construction activities and equipment
(iv) the following intra-day respite periods (as defined by ICNG) for works exceeding 75dB(A) LAeq(15 mins), unless otherwise agreed with the identified sensitive receivers such as UTS, Kira Child Care Centre and / or Fox Studios and evidence of the agreement provided to the Planning Secretary, prior to the commencement of the works:	Section 9 – Hours of work

Conditions of Consent addressed	Report section
- in continuous blocks not exceeding 3 hours each with one hour of respite every three hours block; - scheduling of works outside of the examination time for educational establishments; and - noise intrusive works commencing after 8am and be undertaken within the approved standard construction hours.	
(v) proposing where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers';	Sections 5 – Construction activities and equipment
(vi) 'Toolbox talks' at regular intervals with contractors' and other staff training methods;	Section 4.3 – Site personnel
(vii) use of broadband, non-tonal reversing alarms where possible and ensure that warning devices are no more than 5dB above the relevant Australian Standard level; (viii) proposing appropriate material handling methods (avoid dropping from a height); (ix) use of noise shields (such as hoardings where applicable and possible) along the specific boundaries facing the identified sensitive receivers.	Sections 5 – Construction activities and equipment
(f) describe the measures to be implemented to monitor and manage high noise generating works in close proximity to sensitive receivers including the location of noise loggers associated with the noise monitoring;	Sections 5, 6 and 9 set out all measures proposed to be utilised to manage and monitor noise generating works (Note: short term attended monitoring is proposed in accordance with Condition C17).
(g) include strategies that have been developed in consultation with the community (especially all identified residential and non-residential receivers in condition B28(b) including UTS, Kira Child Care Centre and Fox studios), for managing high noise generating works, including any alternate intra-day respite periods that suit the sensitive receivers; (h) include details of management measures to avoid any adverse vibration impacts on the nearby following heritage items during construction: (i) Member's stand, SCG; and (ii) Lady's Member Stand, SCG. (i) include details of management measures to protect the archaeological heritage items including Busby's Bore in accordance with the requirements of the Methodology Statement – Working Near Busby's Bore prepared by Infrastructure NSW dated September 2018 as updated by condition B22;	Section 10 – Community Communication Strategy Section 8 – Vibration management
(j) describe the community consultation undertaken to develop the strategies in condition B28(h), including but not limited to:	Section 10 - Community and Stakeholder

Conditions of Consent addressed	Report section
(i) evidence regarding agreed (if any) intra-day respite periods with Kira Child Care Centre, UTS and Fox Studios (where applicable) as an alternate measure to B28(e); and (ii) evidence of agreed scheduling of construction work activities outside of sensitive times of the day or specific times of the year (where applicable) with UTS and Fox Studios. (k) include a complaints management system that would be implemented for the duration of the construction including a chain of responsibilities for dealing with and responding to noise complaints and noise management.	Communication and Engagement
B29. The Applicant must not commence any works until: (a) evidence of consultation with the EPA in the preparation and finalisation of the Construction Noise and Vibration Management Plan (CNVMP) is provided to the Planning Secretary; (b) the CNVMP is approved by the Planning Secretary; and (c) a copy submitted to Council and the Certifying Authority.	Section 2.1
B30. Prior to commencement of works on the site, all mitigation and management measures identified in the CNVMP, must be installed or implemented on the site.	Measures required (as applicable to the task) referenced throughout document.
Construction Hours C3. Construction works, including the delivery of materials to and from the site, may only be carried out between the following hours: (a) between 7am and 6pm, Mondays to Fridays inclusive; (b) between 8am and 1pm, Saturdays; and (c) No construction work may be carried out on Sundays or public holidays. C4. Construction works on the days when events occur at SCG land must be undertaken in accordance with the following requirements unless prior approval for alternative arrangements is granted by Sydney Coordination Office and Transport Management Centre within TfNSW with respect to vehicle movements and SCSGT with respect to event noise and impacts: (a) construction or associated works must cease at least two hours prior to an event; (b) no construction works are to be undertaken during an event; and (c) no construction works are to be undertaken for at least two hours after the completion of an event. C5. Activities may be undertaken outside of the hours in condition C3: (a) if the delivery of oversized plant or structures has been determined by the police or other public authorities to require special arrangements to transport along public roads; or (b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or (c) where the works and activities do not cause, when measured at the boundary of the most affected noise sensitive receiver: (i) Leq (15 minute) dB(A) noise levels greater than 5dB above the day, evening and night rating background level (RBL) as applicable; and	Section 9 – Hours of work

Conditions of Consent addressed	Report section
(ii) L1(1 minute) dB(A) or LFmax dB(A) noise levels greater than 15dB above the night RBL for night works; (iii) continuous or impulsive vibration values greater than those for human exposure to vibration, set out for residences in Table 2.2 in "Environmental noise management - Assessing Vibration: a technical guideline" (Department of Environment and Conservation, February 2006); and (iv) intermittent vibration values greater than those for human exposure to vibration, set out for residences in Table 2.4 in "Environmental noise management - Assessing Vibration: a technical guideline" (Department of Environment and Conservation, February 2006); or Note: For the purpose of this condition, the RBLs are those contained in an environmental assessment for the scheduled activity subject to this licence prepared under the Environmental Planning and Assessment Act 1979. Alternatively, the licensee may use another RBL determined in accordance with the NSW Noise Policy for Industry (EPA, 2017) and provided to the EPA prior to carrying out any works or activities under this condition. C6. The variation to the works hours in condition C5 must be approved in advance in writing by the Planning Secretary or her nominee if appropriate justification is provided for the works. Notification of the activities in condition C5 must be given to affected residents before undertaking the activities or as soon as is practical afterwards. C7. All works that generate noise exceeding 75dB(A) LAeq (15mins) are subject to the intra-day respite periods, as approved by the Planning Secretary in the CNVMP in condition B28.	
Construction Noise C15. The noise generated by construction activities must be managed in accordance with the CNVMP (condition B28).	Throughout document
C16. The Applicant must ensure all construction vehicles (including concrete agitator trucks) do not arrive at the site or surrounding residential precincts outside of the hours of work outlined under condition C3, C4 and C5.	Section 9 – Hours of work
C17. The Applicant must undertake short term attended noise monitoring for all 'High Noise Impact Works' that predicted to exceed the NMLs, identified in the CNVMP (B28). and any other works that generate noise exceeding 75dB(A) LAeq (15mins) and a noise monitoring report must be produced and submitted to the Planning Secretary every three months following commencement of the construction to verify that:	Section 6 – Noise monitoring
(a) construction noise levels do not exceed the recommended NMLs identified in the Stage 2 SSDA – Noise and Vibration Assessment prepared by ARUP dated 30 August 2019; and	Discussed in Section 4.1
(b) Noise management and mitigation measures have been implemented where the NMLs are exceeded.	Throughout report
C18. The intra-day respite periods, required by condition B28 of this development consent must be reviewed on a monthly basis (or another timescale as agreed with the child care centre, UTS or Fox Studios) in consultation with Kira Child Care Centre, UTS and Fox Studios. The respite periods are to be maintained / or amended as agreed with the sensitive noise receivers. The details of any amendments to the intra-	Section 10 – Community and Stakeholder Communication and Engagement

Conditions of Consent addressed	Report section
day respite periods due to agreement with the sensitive receivers, must be provided to the CCC and the Planning Secretary for information at least seven days prior to the implementation.	
Vibration Criteria C19. Vibration caused by construction activities at any residence or adjoining structure including all surrounding heritage items within or outside the boundary of the site must be limited to: (a) the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation) for structural damage; (b) the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC 2006) (as may be updated or replaced from time to time), for human exposure; and (c) the vibration requirements of the Methodology Statement – Working Near Busby's Bore prepared by Infrastructure NSW dated September 2018 as updated by condition B22 (being part of the CNVMP in condition B28). (d) a maximum peak particle velocity of 5 mm/second in the vicinity of Shafts 9 and 10 of the Busby's Bore.	Section 8 – Vibration management and Appendix (for Methodology Statement – Working Near Busby's Bore)
C20. Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C19.	Section 5 – Construction activities and equipment
C21. Vibration during the construction works must comply with the limits specified in conditions C19 and C20, unless otherwise agreed in the CNVMP as required by condition B28 and forming a part of the CEMP. C22. Ongoing vibration monitoring must be conducted during the excavation works in the vicinity of Shafts 9 and 10 of the Busby's Bore.	Section 8 – Vibration management
Post-construction Dilapidation Report D4. Prior to commencement of operation of the stadium (including any office or administrative functions within the stadium), or within two months of completion of all construction works within the site (whichever occurs earlier), the Applicant must engage a suitably qualified person to prepare a post-construction dilapidation report. This report is: (a) to ascertain whether the construction created any structural damage to adjoining buildings or infrastructure; (b) to be submitted to the Certifying Authority. In ascertaining whether adverse structural damage has occurred to adjoining buildings or infrastructure, the Certifying Authority must: (i) compare the post-construction dilapidation report with the pre-construction dilapidation report required by these conditions; and (ii) have written confirmation from the relevant authority that there is no adverse structural damage to their infrastructure and roads. (c) to be submitted to Council, CCC, Heritage Division and the Planning Secretary for information.	Section 6 - Reporting

4.1 Comments on Conditions of Consent

Condition C17: States monitoring is required to verify that *"construction noise levels do not exceed the recommended NMLs"* but also states *"noise management and mitigation measures have been implemented where the NMLs are exceeded"*

Application of noise management levels as limits goes against the intent of the Interim Construction Noise Guideline (ICNG, DECC 2009). As outlined in the Stage 2 SSDA, the noise management levels were predicted to be exceeded and thus it has been interpreted that the construction activities should aim not to exceed the noise management levels by application of all reasonable and feasible mitigation measures.

The ICNG states "*the noise levels in section 4 (Noise Management Levels) apply to quantitative assessment. In all cases these levels should not simply be included in licence or planning approval conditions, but rather are intended to guide the need for, and the selection of, work practices to minimise noise impacts.*

To most effectively manage noise and satisfy the intent of the ICNG and Conditions of Consent, all feasible and reasonable noise mitigation measures have been implemented where relevant and applicable for the scope of work, as outlined in the following Sections of this document.

In the context of the ICNG guidance on NMLs highlighted above, stop-work procedures would be considered necessary to address safety concerns or immediate risks of damage on the SFSR, with the noise related risk to safety being hearing loss. The *Workplace Health and Safety Regulation, 2011* specifies the exposure standard for noise for a person is:

- $L_{Aeq,8h}$ of 85 dB(A)
- $L_{C,\ peak}$ of 140 dB(C)

In the very unlikely event that either of these two parameters are exceeded as a result of construction activities, a 'stop work' notice will be issued (refer to Sections 5 and 8 of this CNVMP)

4.2 Environmental Site Representative

As outlined in the CNVMP, required in Condition B22 e).

A member of the site staff (Environmental Site Representative) will act as the Responsible Person with respect to noise and vibration. They will be responsible for implementing the measures within this CNVMP.

Specifically, the Environmental Site Representative is to:

- Regularly train workers and contractors (such as at toolbox talks) to use equipment in ways to minimise noise;
- Ensuring good work practices are adopted to avoid issues such as noise from dropped items and noise from communication radios is kept as low as is practicable;

- Ensure the use of radios or stereos outdoors is avoided; and
- Ensure shouting, talking loudly and slamming vehicle doors is avoided.

4.3 Site personnel

The following measures must be implemented for staff working on site:

- Ensuring good work practices are adopted to avoid issues such as noise from dropped items, noise from communication radios is kept as low as is practicable;
- Avoid the use of stereos/radios outdoors;
- Avoid shouting and minimise talking loudly, swearing and slamming vehicle doors.
- 'Toolbox talks' will be held at regular intervals with the contractor workers, including discussion of noise and vibration mitigation, monitoring and assessment. These topics will also be covered under induction processes.
- Operate two way radios at the minimum effective volume, and avoid shouting or whistling at the site.
- Identification of reasonable and feasible noise mitigation methods will be conducted by the Environmental Site Representative on a daily basis during noisy works. The Environmental Site Representative will have the authority to modify work practices in response to complaints, where investigation has identified it is required.

5 Construction activities and equipment

As outlined in the Draft CNVMP as required in Condition B22 e)[1].

The appointed contractor commits to employing the following initiatives to mitigate and manage the noise and vibration generating activities. It should be noted that these initiatives may be updated as construction progresses. Should the initiatives require revision, the CNVMP will be amended and re-submitted to the Planning Secretary for approval. Equipment selection

- Site noisy equipment away from noise-sensitive areas where possible.
- Fixed plant known to emit noise strongly in one direction is to be orientated so that the noise is directed away from noise-sensitive areas
- Where possible, maintenance work on construction plant will be undertaken away from noise sensitive receivers.
- Locate site access roads and site compounds as far away as possible from noise sensitive receptors. Truck routes to and from the worksite will be via major roads where possible, in accordance with the Construction Traffic and Pedestrian Management Plan endorsed by the Sydney Coordination Office within Transport for NSW and available on the Infrastructure SFSR webpage at: http://www.infrastructure.nsw.gov.au/projects-nsw/sydney-football-stadiumredevelopment/.

5.1 Plant and equipment

- Where possible stationary equipment must be located behind structures such as demountable buildings, hoardings or stockpiles to maximise shielding to receivers;
- Consider using electric / hydraulic equipment where possible
- Using the smallest equipment as is practical
- All plant and equipment used on site must be:
  - maintained in a proper and efficient condition; and
  - operated in a proper and efficient manner.
- Turn off all vehicles, plant and equipment when not in use for more than 15 minutes.
- Powered equipment used on site daily will be subject of a pre-start check by the operator to ensure plant is properly maintained and that noise is kept as low as practicable.

In accordance with Condition C20:

[1] Condition B22(e) specifically refers to the 'Draft' CNVMP, hence the reference.

- Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria outlined in Section 8.3.
- If vibration intensive works are required within the safe working distances, vibration monitoring or attended vibration trials would be undertaken to ensure that levels remain below the cosmetic damage criterion where possible. Measures such as static rolling and consideration of smaller equipment when working in close proximity to existing structures would be considered to reduce levels.

5.2 Movement alarms

- The use of audible movement alarms of a type that would minimise noise impacts on surrounding noise sensitive receivers must be implemented.
- Where practicable, broadband, non-tonal reversing alarms must be utilised on site equipment.
- Ensure that the difference in volume between the reversing warning devices and the base machine noise level (at maximum governed speed under no load at any given test location) is minimised (in accordance with International Standard ISO9533:1989), and ensure that warning devices are no more than 5 dB above the Australian Standard level.
- Compounds, refuelling areas and where possible sensitive works areas will be designed to promote one-way traffic so that vehicle reversing movements are minimised to prevent Compounds, refuelling areas and where possible sensitive
- works areas will be designed to promote one-way traffic so that vehicle reversing movements are minimised to prevent nuisance caused by reversing alarms as far as practicable.

5.3 Scheduling of activities

Ensure that the Environmental Site Representative controls the working hours on site to ensure that work is only done during the acceptable periods (7am to 6pm on weekdays and 8am to 1pm on Saturdays. No work on Sundays or public holidays)

High noise activities will be programmed to occur during the daytime hours wherever possible and will be scheduled with due consideration to the nearest sensitive receivers.

For approved out-of-hours work, noisy activities must be scheduled early in the night to minimise the impact on adjacent residents. Limit number of consecutive nights receivers are impacted

5.4 Permitted hours of work

Construction works, including the delivery of materials to and from the site, will only be carried out between the approved construction hours unless otherwise authorised.

The hours of work have been approved under Condition C3 of SSD 9835 and are identified in Section 9.1 of this CNVMSP.

5.5 Material handling

Avoid dropping equipment/materials from a height or into trucks.

Where practicable, use sound dampening material to cover the surfaces on to which any materials must be dropped.

Loading and unloading must be carried out away from sensitive receivers, where reasonable and feasible.

5.6 Worker Induction Program

As per the Construction and Environmental Management Plan (CEMP), the appointed contractor John Holland will undertake an on-site induction program with workers prior to their accessing the site. This will include educating workers on all aspects of the proposed construction methodology including the proposed control and mitigation measures identified above.

Internal communication will also be used throughout the construction works as highlighted in the CEMP to reiterate and reinforce controls and measures. This will include pre-start meetings, toolbox talks, project team meetings, Health, Safety, Environment and Quality (HSEQ) team meetings, client meetings, subcontractor meetings, and HSEQ system review meetings.

The CEMP is available on the Infrastructure SFSR webpage at: http://www.infrastructure.nsw.gov.au/projects-nsw/sydney-football-stadiumredevelopment/

5.7 Stop-work notice

A stop-work notice will be issued if either of the following two parameters are exceeded as a result of construction activities:

- LAeq,8h of 85 dB(A)
- LC, peak of 140 dB(C).

6 Noise monitoring

This Section outlines a noise and vibration monitoring programme to monitor construction noise and vibration levels at critical locations around the site.

The appointed contractor commits to employing the following initiatives to monitor the noise and vibration generating activities. It should be noted that these initiatives may be updated as construction progresses. Should the initiatives require revision, the CNVMP will be amended and re-submitted to the Planning Secretary for approval. *In accordance with Condition C17:*

Short term attended noise monitoring (15 minutes) is to be conducted at four locations:

1. University of Technology Sport Sciences Faculty Building (UTS)
2. Kira Child Care, 230 Moore Park Road, Paddington
3. Fox Studios Australia Sound Stage 2
4. 252 Moore Park Road.

This monitoring will be conducted on at the beginning of each stage of works, and on an on-going monthly basis during 'High Noise Impact Works' on site, which are defined as:

- jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics; or
- continuous noisy activities where 'continuous' includes any period during which there is less than a 1-hour respite between ceasing and recommencing any of the work that is the subject of this condition.
- Noise monitoring would also be conducted where works generating in excess of 75dB(A) are predicted.

6.1 Complaints

Monitoring will be conducted in the event of a noise complaint, in which case attended noise monitoring will be conducted in the proceeding 24 hours at the property of the complainant to verify whether measurements indicate noise levels are over the 'stop work' noise levels outlined in Section 9.5. If found to be the case, a review of work practices will be undertaken to reduce noise impacts to within these levels.

6.2 Equipment specifications

All monitoring equipment must comply with AS IEC 61672.1 2004 "Electroacoustics - Sound Level Meters" and designated as Class 1 for attended monitors.

6.3 Maintenance

All equipment to monitor the performance of the development must be:

- maintained in a proper and efficient condition;
- maintained and checked by a suitably qualified acoustician; and
- operated in a proper and efficient manner.

7 Reporting

This Section outlines reporting requirements in accordance with the Conditions of Consent and best practices.

The appointed contractor commits to employing the following initiatives when reporting on the noise and vibration generating activities. These initiatives may be updated as construction progresses. Should the initiatives require revision, the CNVMP will be amended and re-submitted to the Planning Secretary for approval.

7.1 Prior to construction

7.1.1 Dilapidation reporting

In accordance with Condition B6:

Prior to the commencement of construction, the Applicant must submit a pre-commencement dilapidation report to Council, NSW Heritage Division and the Certifying Authority. The report must provide an accurate record of the existing condition of:

1. adjoining private properties;
2. the surrounding heritage items;
3. Council assets (where relevant) that could be impacted by the proposed works; and
4. infrastructure located within Moore Park East (between the western boundary of the site and Kippax Lake) including (but not limited to) Driver Avenue, existing bollards, lights, street furniture etc.

7.2 During construction

In accordance with Condition C17:

A noise monitoring report must be produced and submitted to the Planning Secretary every three months following commencement of the physical works which presents:

- recommended NMLs identified in the Stage 2 SSDA – Noise and Vibration Assessment prepared by ARUP dated 30 August 2019;
- measurement results of construction activities predicted to exceed NMLs or exceed 75 dBA $L_{Aeq(15min)}$; and
- where noise management and mitigation measures have been implemented where the NMLs are exceeded, or in case that measured levels exceed 75 dBA $L_{Aeq(15min)}$. The report would detail corrective actions to reduce the likelihood for a repeat non-conformance.

7.3 Post-construction

7.3.1 Dilapidation reporting

In accordance with Condition D4:

Prior to commencement of operation of the stadium (including any office or administrative functions within the stadium), or within two months of completion of all construction works within the site (whichever occurs earlier), the Applicant must engage a suitably qualified person to prepare a post-construction dilapidation report. This report is:

1. to ascertain whether the construction created any structural damage to adjoining buildings or infrastructure;
2. to be submitted to the Certifying Authority. In ascertaining whether adverse structural damage has occurred to adjoining buildings or infrastructure, the Certifying Authority must:
    a. compare the post-construction dilapidation report with the pre-construction dilapidation report required by these conditions; and
    b. have written confirmation from the relevant authority that there is no adverse structural damage to their infrastructure and roads.
3. to be submitted to Council, CCC, Heritage Division and the Planning Secretary for information.

8 Vibration management

8.1 Busby's Bore

In accordance with Condition C19 and C22:

Vibration management measures are outlined in "*SFS Response to Submissions (SSD9249) Attachment 8- Methodology Statement- Working Near Busby's Bore"* (INSW, September 2018), and reproduced as an Appendix to this CNVMP. It states vibration monitoring devices will be installed within the shafts of Busby's Bore in a location agreed by the project archaeologist, structural engineer and acoustic consultant. The project is committed to implementing the suggested management measures as described in Methodology Statement – Working Near Busby's Bore prepared by Infrastructure NSW dated September 2018. (Appendix A of this plan)

Within the methodology statement, a vibration criterion of 5 mm/s peak particle velocity, is to be initially applied. The vibration monitors will be calibrated to generate real-time alerts (SMS messages and/or flashing lights) when vibration criterion is exceeded.

In the event that the vibration criterion is exceeded by works on site an alert will be sent to the Environmental Site Representative. This alert will trigger a cessation of the subject works and the project archaeologist and structural engineering advisor will be notified and requested to attend site. A visual inspect of the pits and/or Bore will be undertaken to determine whether any damage has been sustained.

An exceedance of the vibration criterion will necessitate a change in demolition and/or construction management and methodology. This will include:

1. Re-evaluation of the vibration criterion based on results of the initial condition investigation and inspections of the structure following the commencement of works.
2. Maintain vibration monitoring throughout Stage 2 works.
    a. Reduce the size of demolition and construction equipment and develop alternative methodologies to minimise vibration.
    b. Use less vibration emitting demolition methods if necessary closer to Busby's Bore.
    c. Use rubber tracked excavators and machinery if required where works are located in close proximity to Busby's Bore.
    d. Balance variable speed vibrating plant and operate at speeds that do not produce resonance.

1. Ensure all fixed plant at the site are appropriately selected (on a risk assessment approach), and where necessary, fitted with vibration attenuation measures.
2. Position vibrating plant and equipment as far apart as it practicable from each other and consider whether orientation and location of the plant can reduce vibration impacts at sensitive receivers such as Busby's Bore.
3. Use non-percussive piling techniques for all piles where practicable.
4. Maintain machinery and equipment.
5. If necessary plan traffic flow, parking, loading/unloading areas to minimise movements within the area of Busby's Bore.

8.2 SCG Members Stands

In accordance with Condition C19:

Minimum working distances must be adhered to in order to minimise adverse vibration impacts on the nearby following heritage items during demolition (excluding demolition soft-strip):

- Member's Stand, SCG; and
- Lady's Member Stand, SCG.

Both stands are located more than 60 metres from the nearest proposed demolition works.

The minimum working distance in Table 8 is based on international standards and guidance. It pertains to cosmetic damage of typical buildings under typical geotechnical conditions, considered to represent the structural nature of the stands.

Table 8: Indicative minimum working distances for vibration intensive plant – Structural damage

Plant Item	**Rating / Description**	**Minimum working distance**
		Cosmetic damage (3mm/s ppv – DIN 4150-3 sensitive structure)
Jackhammer	Hand held	7 m
Impact Piling	3500 J	24 m

Due to the distances of the stands from the proposed works, no adverse vibration impacts are predicted. Should vibration intensive works be required within the nominated safe working distances vibration monitoring must be conducted.

Structural damage criterion for 'sensitive structures' in DIN 4150 – Part 3 will be applied. The vibration monitors will be calibrated to generate real-time alerts (SMS messages and/or flashing lights) when vibration criterion is exceeded.

In the event that the vibration criterion is exceeded by works on site an alert will be sent to the Site Environmental Representative. An exceedance of the vibration criterion will necessitate a change in construction methodology, as outlined in

Section 8.1. All Environmental Representatives employed by the appointed contractor are authorised stop construction works to address any complaints by the community or general members of the public, including agencies.

8.3 Fox Studios

Ground-borne noise impacts have the potential to affect operations within the sound stages in Fox Studios.

To manage ground-borne noise impacts at these locations, minimum working distances are presented in Table 9. These minimum working distances are based on international standards and guidance; however they are preliminary distances based on predictions of vibration levels and propagation under typical geotechnical conditions and are required to be verified based on the actual plant used and the actual site-specific ground conditions (propagation).

Table 9: Indicative minimum working distances for vibration intensive plant – ground borne noise

Plant Item	**Rating / Description**	**Minimum working distance**
		Ground-borne noise (25 dBA[1])
Jackhammer	Hand held	85 m
Impact Piling	3500 J (2)	125 m

Note:

1. Based on recommended design sound level for 'Sound Studio' in AS/NZS 2107:2016 Recommended design sound levels and reverberation times for building interiors.
2. Impact distances for other piling impact energies, if desired, must be determined as part of more-detailed construction noise and vibration modelling prior to construction and verified by measurement at the commencement of piling works.

The nearest sound stages in Fox Studios are approximately 90 metres from the nearest site boundary, however it is understood that no piling is proposed within 125 metres of the sound stages.

It is recommended that consultation with Fox Studios be undertaken to avoid piling during noise sensitive periods within the sound stages wherever possible.

Vibration monitoring is required at a location near the site boundary in the direction of the nearest sound stage. During construction, attended vibration monitoring and noise monitoring will be conducted within the nearest Fox Studios sound stage and will be used to refine minimum working distances presented in Table 9 if required. Real-time alerts (SMS messages and/or flashing lights) will then be calibrated for vibration levels which correspond to noise level exceedances within the sound stages .

8.4 Residences

In accordance with Condition C19:

The safe working distance in Table 8 should be maintained for residential buildings. Should vibration intensive works be required within the nominated structural damage safe working distance vibration monitoring will be conducted.

Structural damage criterion for ‘dwellings and buildings of similar design and/or use’ in DIN 4150 – Part 3 will be applied. The vibration monitors will be calibrated to generate real-time alerts (SMS messages and/or flashing lights) when vibration criterion is exceeded.

In the event that the vibration criterion is exceeded by works on site an alert will be sent to the Environmental Site Representative. An exceedance of the vibration criterion will necessitate a change in construction methodology, as outlined in Section 8.1.

9 Hours of work

9.1 Permitted hours of work

In accordance with Condition C3:

Construction works, including the delivery of materials to and from the site, will only be carried out between the following hours:

1. between 7 am and 6 pm, Mondays to Fridays inclusive;
2. between 8 am and 1pm, Saturdays; and
3. No construction work will be carried out on Sundays or public holidays.

In accordance with Condition B28:

In addition, construction activities which are predicted to generate noise levels in exceedance of 75 dBA $L_{Aeq(15min)}$ must not be conducted between 7 am and 8am Monday to Friday, and must not occur within respite periods or sensitive times which are to be determined as discussed in Section 10.1.

9.2 Activities outside of permitted hours

In accordance with Condition C5:

Pursuant to Condition C4 of SSD 9835, activities may be undertaken outside of the approved hours of construction in the following circumstances if required:

1. the delivery of oversized plant or structures has been determined by the police or other public authorities to require special arrangements to transport along public roads; or
2. in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or
3. where the works and activities do not cause, when measured at the boundary of the most affected noise sensitive receiver:
    a. $L_{eq\ (15\ minute)}$ dB(A) noise levels greater than 5dB above the day, evening and night rating background level (RBL) as applicable; and
    b. $L_{1(1\ minute)}$ dB(A) or L_{Fmax} dB(A) noise levels greater than 15dB above the night RBL for night works;
    c. continuous or impulsive vibration values greater than those for human exposure to vibration, set out for residences in Table 2.2 in "Environmental noise management - Assessing Vibration: a technical guideline" (Department of Environment and Conservation, February 2006); and
    d. intermittent vibration values greater than those for human exposure to vibration, set out for residences in Table 2.4 in "Environmental noise

management - Assessing Vibration: a technical guideline" (Department of Environment and Conservation, February 2006); or

e. where a variation is approved in advance in writing by the Planning Secretary or her nominee if appropriate justification is provided for the works.

Note: For the purpose of this condition, the RBLs are those contained in an environmental assessment for the scheduled activity subject to this licence prepared under the Environmental Planning and Assessment Act 1979. Alternatively, the licensee may use another RBL determined in accordance with the NSW Noise Policy for Industry (EPA, 2017) and provided to the EPA prior to carrying out any works or activities under this condition.

In accordance with Condition C7:

The variation to the works hours above must be approved in advance in writing by the Planning Secretary or her nominee if appropriate justification is provided for the works.

Notification of the activities above must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

9.3 Event days

In accordance with Condition C4:

Construction works on the days when events occur at SCG land must be undertaken in accordance with the following requirements unless prior approval for alternative arrangements is granted by the Sydney Coordination Office and Transport Management Centre within TfNSW:

1. construction or associated works must cease at least two hours prior to an event;
2. no construction works are to be undertaken during an event; and
3. no construction works are to be undertaken for at least two hours after the completion of an event.

9.4 Respite periods

For 'High Noise Impact Works' on site, which are defined in Section 6, continuous work blocks will not exceed 3 hours each with one hour of respite every three hours block.

See Section 10.1 for additional requirements for identified highly impacted receivers.

9.5 Stop-work notice

A stop-work notice will be issued if either of the following two parameters are exceeded as a result of consruction activities:

- $L_{Aeq,8h}$ of 85 dB(A)
- $L_{C, peak}$ of 140 dB(C).

A review of work practices will identify activities which these noise levels are attributed and mitigation measures developed.

10 Community and Stakeholder Communication and Engagement

In accordance with Condition B19:

A Community Communication Strategy (CCS) has been prepared (SFSR Community Communication Strategy, INSW, January 2020) which provides mechanisms to facilitate communication between the Applicant and the community during the construction works. The CCS was endorsed by the Planning Secretary's delegate on 4 March 2020 and is available on the Infrastructure SFSR webpage at: http://www.infrastructure.nsw.gov.au/projects-nsw/sydney-football-stadiumredevelopment/.

Consistent with the approved CCS, there are several tools and activities that are being employed to notify the community about the project. These include:

- Availability of all approved project related information on the Infrastructure SFSR webpage at: http://www.infrastructure.nsw.gov.au/projects-nsw/sydney-football-stadiumredevelopment/
- Project updates area also available on Infrastructure NSW's SFSR website.
- A letter box drop to all property owners within the bounded area of Appendix 1 of the approved CCS in the week commencing 16 March 2020.

A community forum will also be arranged once the COVID-19 threat passes. Community consultation conducted to date

Consultation with the potential worst affected receivers, UTS, Kira Child Care and Fox Studios, has been undertaken, with the following outcomes:

UTS Sports Science Facility

Noise sensitive spaces within the UTS Sports Science Facility include teaching spaces, study areas and research laboratories. Some of these are located along the southern façade, directly facing the proposed construction activities, however some spaces more shielded from construction noise along the northern façade may be able to be used in lieu of these.

Three sessions take place throughout the calendar year:

- March – June & July – October: Regular classes and research taking place Monday to Friday, 8:00 am to 9:00 pm
- November – March: Research projects taking place on site but no classes, so this is the least noise sensitive period of the year.

Informal exams may take place on a weekly basis from March to October, which are more noise sensitive.

Formal exams occur at the end of each session, however take place off-site.

Confirmation of the above must be sought prior to the commencement of construction. The nominated contact at UTS was Rob Bower - Senior Lecturer.

A meeting was held on 25 February 2020 and the draft CNVMP provided to UTS for review and comment. UTS advised on 9 March 2020 that it had no further comments to make. Evidence of that consultation with UTS is provided under separate cover.

During the meeting with UTS, it was also agreed that:

- The appointed contractor would meet with UTS every 6 weeks to discuss the project, including noise and vibration matters if relevant.
- The Stage 2 construction will adopt the same respite periods as agreed during Stage 1 for continuity, unless consultation uncovers future sensitive times when other respite needs to be considered.

Kira Child Care

Kira Child Care has been consulted to determine noise sensitive periods, which are understood to vary from day to day depending on rest times for children. An initial meeting was held on 21 February 2020 and the draft CNVMP provided to Kira for review and comment. On 10 March 2020, Kira advised '….no reply of concern is needed from our end'. Evidence of consultation with Kira Child Care is provided under separate cover.

During the meeting with Kira Child Care, it was also agreed that:

- The appointed contractor would meet with Kira Child Care every 6 weeks to discuss the project, including noise and vibration matters if relevant.
- The Stage 2 construction will adopt the same respite periods as agreed during Stage 1 for continuity, unless consultation uncovers future sensitive times when other respite needs to be considered.

Fox Studios

Vibration impacts at Fox Studios due to demolition works are predicted to meet vibration criteria for structural damage and human comfort in accordance with Condition C19.

More stringent vibration limits which could apply to recording equipment or other vibration sensitive equipment / operations at Fox Studios require consultation with Fox Studios. Confirmation of these vibration limits by Fox Studios has been requested by INSW, however no confirmation has been received.

A meeting was held on 13 February 2020 and the draft CNVMP provided to Fox Studios for review and comment. Fox Studios provided a response in a letter dated 28 February 2020. The matters raised by Fox Studios have been considered by the project team and responses provided in the Arup File Note dated 9 March 2020 (provided under separate cover).

10.1 Prior to construction

In accordance with Condition B28:

Previous consultation with stakeholders has revealed the most appropriate respite periods would vary depending on activities taking place at each premise.

Consultation with stakeholders of surrounding receiver buildings, including the UTS, Kira Child Care and Fox Studios, must therefore be sought when developing a construction schedule and respite periods, with focus on known noise sensitive periods identified in Section 10.

Evidence of the agreements between these receivers must be provided to the Planning Secretary prior to commencing works.

Upon confirmation of the Planning Secretary approving the CNVMP, copies will be provided to Council and the Certifying Authority in accordance with the requirements of the consent and evidence of that occurring will be provided to the DPIE.

Prior to commencement of any works on the site, the Contractor will install and implement of all noise mitigation and management measures set out within this CNVMP.

In accordance with Condition C18:

The appointed contractor commits to complying with intra-day respite period requirements mandated by the conditions of consent that continuous work blocks will not exceed 3 hours each with one hour of respite for every three hours block.

The intra-day respite periods, must be reviewed on a monthly basis (or another timescale as agreed with the child care centre, UTS or Fox Studios during the construction works) in consultation with Kira Child Care Centre, UTS and Fox Studios. The respite periods are to be maintained / or amended as agreed with the sensitive noise receivers. The details of any amendments to the intra-day respite periods due to agreement with the sensitive receivers, must be provided to the Community Consultative Committee (CCC) and the Planning Secretary for information.

10.1.1 Submission of Community Communication Strategy

In accordance with Condition B19:

As outlined above, the CCS was endorsed by the Planning Secretary's delegate on 4 March 2020, pursuant to the requirements of Condition B19. During construction

10.1.2 Signage

A sign will be displayed at the site indicating the Site Manager to the general public and their contact telephone number.

10.1.3 Complaints handling

In accordance with Condition B28 k):

Appropriate records are to be maintained of complaints to include timing, reported issues, actions taken and measures to be included for on-going works. The complaints log will need to be filed with a nominated person from the appointed contractor's project team. The nominated person will be responsible for receiving and responding to enquiries, feedback and complaints. The protocols and procedures set out in Section 5 of the approved CCS will be in place during the construction period and 12 months following the commencement of operations, to effectively manage enquiries and complaints received from the community and other stakeholders. The nominated person will be supported by an Infrastructure NSW Communications and Engagement Manager. The CCS sets out the complaints handling and dispute resolution procedures. Given the degree of sensitivity previously expressed by the community and sensitive receivers regarding noise and vibration impacts, it is recommended that should a noise (or vibration) complaint be received the complaint must be recorded on a Noise or Vibration Complaint Form. The complaint form must list:

- the name and address of the complainant (if provided);
- the time and date the complaint was received;
- the nature of the complaint and the time and date the noise was heard;
- the name of the employee who received the complaint;
- actions taken to investigate the complaint, and a summary of the results of the investigation;
- required remedial action, if required;
- validation of the remedial action; and
- summary of feedback to the complainant.

A permanent register of complaints must be held.

All complaints received must be fully investigated and reported to management. The complainant must also be notified of the results and actions arising from the investigation.

The investigation of a complaint will involve where applicable:

- noise measurements at the affected receiver, see Section 9.5;
- an investigation of the activities occurring at the time of the incident;
- inspection of the activity to determine whether any undue noise is being emitted by equipment; and
- whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an item of plant is found to be emitting excessive noise, the cause is to be rectified as soon as possible. Where work practices within established guidelines are found to result in excessive noise being generated then the guidelines must be modified so as to reduce noise emissions to acceptable levels. Where guidelines are not being followed, the additional training and counselling of employees must be carried out.

Measurement or other methods will validate the results of any corrective actions arising from a complaint where applicable.

10.2 Key Personnel - HSEQ Manager and Senior Site Manager

The HSEQ Manager and Site Manager will have responsibility for overall compliance with the consent.

The HSQE Manager's role and responsibilities will include:

- implementing the Construction Environmental Management Plan and associated sub plans, including the CNVMP (all available on the project website)
- overseeing the activities required for compliance with those plans in conjunction with the Environmental Manager; and
- coordinating and managing all internal and external notifications in accordance with internal, legislative and Contract requirements.

The Senior Site Manager's roles and responsibilities will include:

- overseeing on-site construction and operational delivery of the project to ensure effective performance; and
- providing leadership to the site workforce to implement of site safety, quality and environment controls and risk management, including managing environmental controls in conjunction with the Environmental Manager.

Appendix A

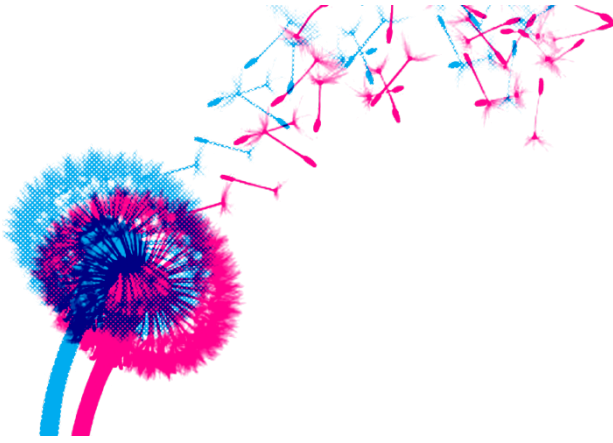
Working near Busby's Bore
Methodology Statement

SFS Response to Submissions

(SSD9249)

Attachment 8- Methodology Statement- Working Near Busby's Bore

September 2018



This methodology has been developed to support demolition and construction around Busby's Bore. It has been developed with the input of Arup (acoustics and vibration), Curio Project (heritage and archaeology) and Aver (construction and demolition management). In particular it has been developed to respond to the comment DPE12:

While the proposal is for a concept building envelope, it is considered that further assessment regarding the protection of Busby's Bore during demolition and construction works would be required. The report should include a methodology of how the bore would be identified, protected, assessed and monitored throughout the demolition and construction works. The method should be included in detail in an updated Construction Management Plan, supported by the HIA. This document should be submitted for further consideration.

This methodology also addresses comment COS34:
The site is affected by a State Heritage Listing and General Terms of Approval should be obtained from the Heritage Council. There is a potential that the demolition works through vibration could impact Busby's Bore.

It is noted that approval for construction works is not being sought as part of the Stage 1 SSDA, however it is considered the principles contained within this methodology will be applicable to those works. Adjustments may be made to this methodology to support the construction as part of the Stage 2 application when further detail regarding the construction methodology is known.

1. Identification and Assessment

Prior to the commencement of demolition, investigations will be undertaken in an effort to determine the condition of the bore through the site. This will entail access through the existing shafts on site with known locations (Shafts 9 and 10). The exact path as the Bore crosses beneath the site, and the precise locations of Shafts 11 and 'Intervening Shaft 4' remain unknown.

The steps to be followed will include:

- Land owners consent for access and support for the methodology for the investigative works to be obtained from Sydney Water prior to seeking approval from the NSW Heritage Division to undertake investigative works of the Bore.
- If land owners consent if provided, then a Section 57 (2) Heritage Exemption will be prepared by qualified historical archaeologist and submitted to the NSW Heritage Division in accordance with the requirements of the NSW Heritage Act (1977) to undertake investigation works.
- Safe Work Method Statement for access to be developed.

The results of the investigation works will be utilised to determine the current state of the Bore, where possible to further inform the design and management of impacts to known and potential sections of the Bore during Stage 1 demolition works and future Stage 2 construction works.

Figure 1, below, demonstrates the location of the known shafts and an indicative path of the tunnel beneath the site, with reference to the proposed indicative footprint of the new stadium envelope.

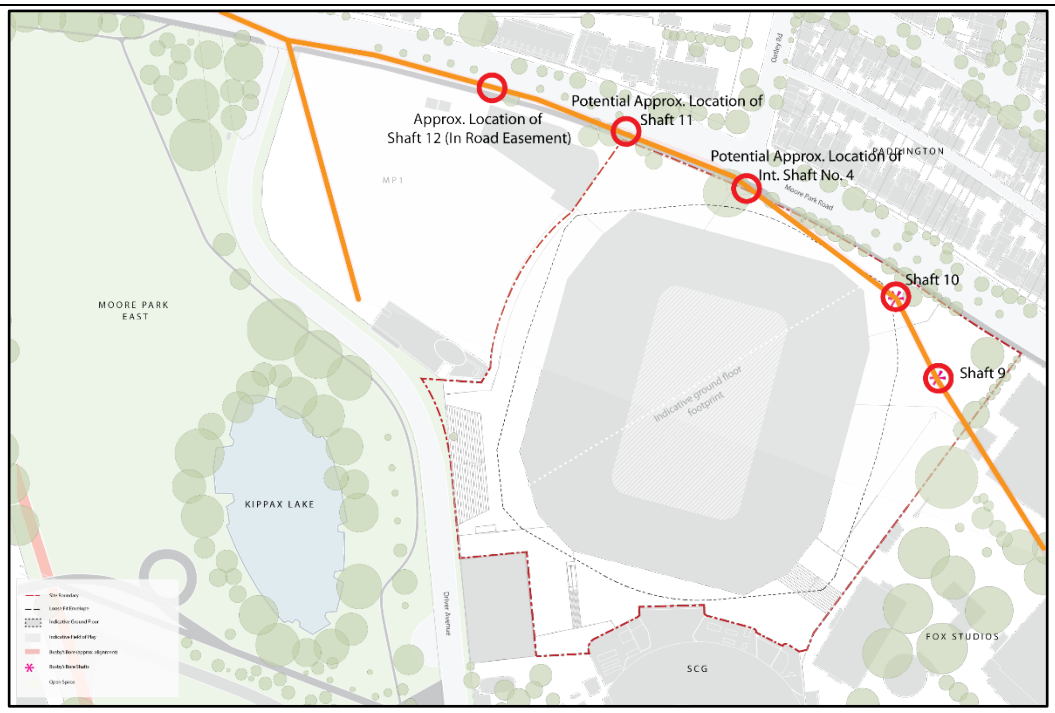


Figure 1: Locational Map of known and possible Busby's Bore shafts within SFS Redevelopment Site (Source: SJB Architects with Curio Additions 2018)

2. Protection

A physical exclusion zone will be maintained around the existing shafts and the Bore (if found during investigation works). The project archaeologist and the Site Manager will liaise regarding the best location for these barriers.

Vibration monitoring devices will be installed within the shafts of Busby's Bore in a location agreed by the project archaeologist, structural engineer and acoustic consultant. A conservative vibration criterion of 3mm/s, based on structural damage criterion for 'sensitive structures' in DIN 4150 – Part 3[1] will be applied. The vibration monitors will be calibrated to generate real-time alerts (SMS messages and/or flashing lights) when vibration criterion is exceeded.

3. Monitoring

In the event that the vibration criterion is exceeded by works on site an alert will be sent to the Site Manager. This alert will trigger a cessation of works and the project archaeologist and structural engineering advisor will be notified and requested to attend site. A visual inspect of the pits and/or Bore will be undertaken to determine whether any damage has been sustained.

An exceedance of the vibration criterion will necessitate a change in demolition and/or construction methodology. This could include:

- Re-evaluation of the vibration criterion based on results of the initial condition investigation and inspections of the structure following the commencement of works.
- Maintain vibration monitoring throughout Stage 1 and Stage 2 works.

[1] German Standard DIN 4150-Part 3 'Structural vibration in buildings – Effects on Structure'

- Reduce the size of demolition and construction equipment and develop alternative methodologies to minimise vibration.
- Use less vibration emitting demolition methods such as concrete pulverisers and smaller percussive hammers if necessary closer to Busby's Bore.
- Use rubber tracked excavators and machinery if necessary closer to Busby's Bore.
- Balance variable speed vibrating plant and operate at speeds that do not produce resonance.
- Ensure all fixed plant at the site are appropriately selected (on a risk assessment approach), and where necessary, fitted with vibration attenuation measures.
- Position vibrating plant and equipment as far apart as it practicable from each other and consider whether orientation and location of the plant can reduce vibration impacts at sensitive receivers such as Busby's Bore.
- Use non-percussive piling techniques for all piles where practicable.
- Ensure that vibratory compactors must not be used closer than 30 meters from sensitive receivers unless vibration monitoring confirms compliance with the vibration criteria specified.
- Maintain machinery and equipment.
- If necessary plan traffic flow, parking, loading/unloading areas to minimise movements within the area of Busby's Bore.

Appendix B

Construction noise contour maps

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

Site location

Sound Pressure Level, L_{Aeq}, dBA

50 55 60 65 70 75 80

Client
Infrastructure NSW

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Noise contours
CC1 – Site Excavation and Earthwork

Metres
0 100 200

Issue	Date	By	Chkd	Appd
D1	16/03/2020	KJ	MS	MS

ARUP

Level 10, 201 Kent Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:8,000	Draft

Coordinate System
GDA 1994 MGA Zone 56

Job No	Drawing No
259997-00	001

\\global.arup.com\australasia\SYD\Projects\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_5.mxd

©Copyright Information

© Arup

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

Site location

Sound Pressure Level, L_{Aeq}, dBA

50 55 60 65 70 75 80

Metres

0 100 200

Issue	Date	By	Chkd	Appd
D1	16/03/2020	KJ	MS	MS

Client
Infrastructure NSW

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Noise contours
CC2 – Stadium Sub-structure

ARUP

Level 10, 201 Kent Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:8,000	Draft

Coordinate System
GDA 1994 MGA Zone 56

Job No	Drawing No
259997-00	001

\\global.arup.com\australasia\SYD\Projects\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_5.mxd

©Copyright Information

© Arup

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

Site location

Sound Pressure Level, L_{Aeq}, dBA

50 55 60 65 70 75 80

Client
Infrastructure NSW

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Noise contours
CC3 – Basement - conc. construction

Metres
0 100 200

Issue	Date	By	Chkd	Appd
D1	16/03/2020	KJ	MS	MS

ARUP
Level 10, 201 Kent Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:8,000	Draft

Coordinate System
GDA 1994 MGA Zone 56

Job No	Drawing No
259997-00	001

\\global.arup.com\australasia\SYD\Projects\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_5.mxd

©Copyright Information
© Arup

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

Site location

Sound Pressure Level, L_{Aeq}, dBA

50 55 60 65 70 75 80

Client
Infrastructure NSW

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Noise contours
CC4 – Above concourse level works

Metres
0 100 200

Issue	Date	By	Chkd	Appd
D1	16/03/2020	KJ	MS	MS

ARUP
Level 10, 201 Kent Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:8,000	Draft

Coordinate System
GDA 1994 MGA Zone 56

Job No	Drawing No
259997-00	001

\\global.arup.com\australasia\SYD\Projects\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_5.mxd

©Copyright Information
© Arup

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

Site location

Sound Pressure Level, L_{Aeq}, dBA

50 55 60 65 70 75 80

Metres

0 100 200

Issue	Date	By	Chkd	Appd
D1	16/03/2020	KJ	MS	MS

Client
Infrastructure NSW

Job Title
Sydney Football Stadium Redevelopment

Drawing Title
Noise contours
CC5 – Roof, façade, fit-out, etc.

ARUP

Level 10, 201 Kent Street
Sydney , NSW 2000
Tel +61 (2)9320 9320
www.arup.com

Scale at A3	Drawing Status
1:8,000	Draft

Coordinate System
GDA 1994 MGA Zone 56

Job No	Drawing No
259997-00	001

\\global.arup.com\australasia\SYD\Projects\259000\259997-00 Sydney Football Stadium\Work\Internal\4_Dwgs\4.1_Arcmap\Maps\SFSR_Stage 2_5.mxd

©Copyright Information

© Arup