Pre-Construction Minor Works Approval Form

Minor Works are defined as any low impact activities that are undertaken prior to the commencement of 'construction' as defined in the project's applicable planning approval. However if Minor Works affect or potentially affect heritage items, threatened species, populations or endangered ecological communities, these works are defined as 'construction' unless otherwise determined by the applicable planning authority.

Minor Works approvals do not remove any obligation to comply with the project's applicable planning approval conditions (including requirements prior to 'any works' commencing) or obtain any other applicable permits, licenses or approvals as necessary.

This application and all supporting information must be submitted to TfNSW/the Environmental Representative as one (1) PDF file at least 10 business days prior to the commencement of the proposed Minor Works.

Part 1: Application	
Contractor:	A W Edwards
Project:	Sydney City and Southwest Metro – Crows Nest Station
Application Title: (e.g. Smith St trenching works)	Detailed Excavation
Application Number:	CN-MW-004
Application Date:	12/02/2021
Planning Approval:	Sydney Metro City & Southwest – Chatswood to Sydenham - Environmental Impact Statement Sydney Metro City & Southwest - Environmental Impact Statement – Sydenham Station and Sydney Metro Trains Facility South Modification Report (MOD 4) Sydney Metro City & Southwest - Environmental Impact Statement – Sydenham Station and Sydney Metro Trains Facility South Modification Submissions Report Sydney Metro City & Southwest Infrastructure Approval SSI 7400 and subsequent modifications
Minor Works Categories: • Highlight as applicable. • If Items 4, 8 or 11 are applicable, this form must be endorsed by an Environmental Representative.	1. Survey, survey facilitation and investigations works (including road and building dilapidation survey works, drilling and excavation). 2. Treatment of contaminated sites. 3. Establishment of ancillary facilities (excluding demolition), including construction of ancillary facility access roads and providing facility utilities. 4. Operation of ancillary facilities that have minimal impact on the environment and community. 5. Minor clearing and relocation of vegetation (including native). 6. Installation of mitigation measures, including erosion and sediment controls, temporary exclusion fencing for sensitive areas and acoustic treatments. 7. Property acquisition adjustment works, including installation of property fencing and utility relocation and adjustments to properties. 8. Utility relocation and connections. 9. Maintenance of existing buildings and structures. 10. Archaeological testing under the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010) or archaeological monitoring undertaken in association with other Minor Works to ensure there is no impact on heritage items. 11. Any other activities that have minimal environmental impact, including construction of minor access roads, temporary relocation of pedestrian and cycle paths and the provision of property access.
Planning Authority Determination: Will the proposed works affect or have the potential to affect heritage items, threatened species, populations or endangered ecological communities?	*If 'Yes', this completed form must be endorsed by an Environmental Representative, approved by TfNSW and submitted to the applicable planning authority to determine that the works are not defined as 'construction'.* No

Part 2: Details

Describe the proposed Minor Works:

Including work methodologies, site location(s) and site description(s) (e.g. landscape type, waterways, etc.).

Site Description Overview

Crows Nest Station is located on the western fringe of the Crows Nest village, between the Pacific Highway and Clarke Lane (on the eastern side of the Pacific Highway), and Oxley Street.

The Crows Nest construction package consists of two separate station entrances and the enabling works to support future OSD sites:

(a) the western station entry located on the Pacific Highway between Hume and Oxley Streets

(b) the eastern station entry located on Clarke Street at the corner of Hume Street, opposite Hume Street Park

Crows Nest Station is a cut and cover station and the main box is approximately 220m long and 25m below street level.

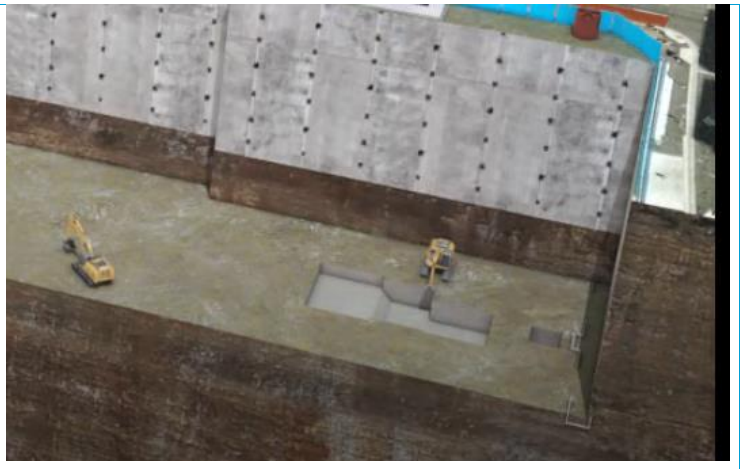
The area is surrounded by a mixture of industrial/commercial properties and residential properties as outlined by the figure below.

Figure 1 – Crows Nest Station Construction Site and Receiver Areas

Description of Works

A list of the proposed activities is outlined below. The extent and location of these activities is shown in the Work Area drawing and Environmental Control Map included in Appendix 1:

- Mobilisation of plant to station box using tower crane.
  - The tower crane will be used to mobilise plant and equipment into the station box.
- Detailed excavation for lift, stair and escalator bases in Site A and B.
  - The excavation in Site A will be approximately 213 m2 and the excavation in Site B will be approximately 242 m2. Excavations will be to a maximum depth of 3.5 m.

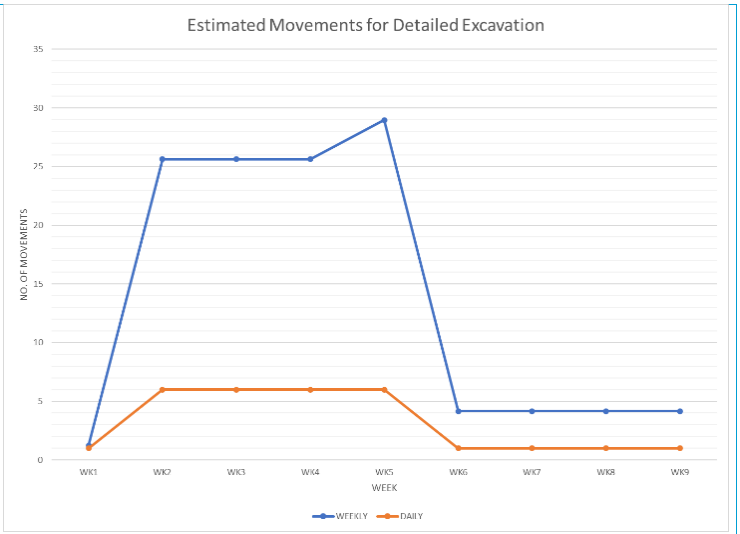


- Removing sections of existing slab in station box lowest level.
  - This includes a 1.25m strip around the perimeter of the station box, to a depth of 275mm;
  - The tunnel boring machine guide infill slab 1.5 m wide and 150 mm deep; and
  - Excavation of in-ground services including earthing, drainage etc.

- Removal of excavated material (spoil) and off-site disposal.
  - Using an excavator with a clamshell bucket at the surface, near the logistics lane, lift spoil to the surface and load out via truck and dogs in the logistics lane.
  - The table below estimates the spoil tonnages and potential movements weekly and daily:

Task	Tonnes	%ALLOC	Start	End	Duration	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
Pits	3150	80%	WK2	WK4	4		20.06%	20.06%	20.06%	20.06%				
Perimeter	194	5%	WK4	WK9	5					0.95%	0.95%	0.95%	0.95%	0.95%
Trenches	360	9%	WK4	WK9	5					1.76%	1.76%	1.76%	1.76%	1.76%
Trackway	14.4	0%	WK1	WK1	1	0.35%								
Material deliveries	240	6%	WK1	WK9	9	0.65%	0.65%	0.65%	0.65%	0.65%	0.65%	0.65%	0.65%	0.65%
Total amount	**3959**	**100%**												
Weekly progress						1%	21%	21%	21%	23%	3%	3%	3%	3%
Weekly tonnage (t)						40	820	820	820	927	133	133	133	133
Weekly movements						1	26	26	26	29	4	4	4	4
Daily movements						1	6	6	6	6	1	1	1	1
Cumulative progress						1%	22%	42%	63%	87%	90%	93%	97%	100%
Cumulative movements						1	27	52	78	107	111	115	120	124

  - Loadouts will not occur every day during the works but only as the stockpiles on-site begin to reach a substantial level where it is practicable to do so. As shown in the graph below, there will be a peak load-out period (~6 movements per day) when the pits are being excavated. The number of loadouts will reduce thereafter.



- The Road Occupancy Licence enables the logistics lane from 10am to 6pm. Therefore load-out movements would be outside peak traffic periods.

- Installation of drainage pipes and conduits to trenches
  - Installation of inground drainage pipes and underline crossing conduits in excavated trenches.
  - This will include delivery to site of back fill material in prefilled covered craneable bins on flat-bed trucks.
  - The Tower Crane will lift the prefilled bins into the station box where the backfill material will be unloaded.
  - Back filling of the trenches using an excavator.

Methodology

- With the use of road saw in the station box, saw cut the concrete in the shape required.
- With the use of an excavator in the station box, break out the concrete in the sections that have been saw cut, to the depth required.
- With the use of an articulated 10t dump truck in the station box, remove sections of concrete to the designated spoil areas.
- With the use of an excavator with clamshell bucket at the surface, remove spoil to waiting truck and dog for offsite disposal.

The first week of the proposed works would be used to verify potential noise and vibration impacts of the above methodology with a reduced plant list and all mitigation measures implemented. This stage is necessary to gain an understanding of the actual measured impacts, as opposed to modelled estimates, and verify the accuracy of the model. Attended monitoring (airborne noise, ground-borne noise and vibration) would be done during this first week, in conjunction with unattended real-time monitoring, and identified sensitive receivers would be proactively consulted during this period.

If the attended and unattended monitoring results are within the noise limits estimated by the model and no noise complaints specific to the detailed excavation works are validated, then additional plant and equipment will be progressively added to the works. Real-time noise and monitoring will continue to be used to manage the works and ensure the modelled noise levels are not exceeded.

Duration and working hours

The proposed work would commence in February and be completed by the end of March. Work in Site A would be simultaneous with work in Site B.

All works are proposed to be delivered during standard construction hours.

When hammering or saw cutting the following work hours (and respite periods) will be implemented: 8-11am; 12-3pm; 4-6pm.

Trial plant / equipment

- 1x Excavator (20t)
- 1 x Excavator (14t)

	• 1 X Excavator (8t) • Excavator attachments – rock breaker, buckets for trenching • 1 x Articulated Dump Truck (10t) • 1 x Road Saw • 1 x Tower Crane • Powered Hand Tools **<u>Full plant / equipment</u>** • 1 x Excavator (24t) (at the surface (Pacific Highway) for load out) • 2 x Excavator (20t) (one in Site A, one in Site B) • 2 x Excavator (14t) (one in Site A, one in Site B) • 2 X Excavator (8t) (one in Site A, one in Site B) • Excavator attachments – rock breaker, clamshell bucket, buckets for trenching • 1 x Articulated Dump Truck (10t) • 2 x Road Saw (for concrete) • 2 x Tower Crane (Note- Tower Crane utilisation shared between Waterproofing and Detailed Excavation) • Truck and Dogs (spoil removal) (spoil removal workload will be distributed between approved Site Establishment and Enabling works [CN-MW-001] and Detailed Excavation works) • Truck (delivery of material and plant distributed between approved Site Establishment and Enabling works [CN-MW-001] and Detailed Excavation works) • Powered Hand Tools • Bins (holding backfill material) **Note -** The same plant and equipment utilised for the excavation and spoil removal will be used for the services back-filling activities. **<u>General Notes:</u>** No out of hour work (OOHW) is planned.
Planned Commencement Date:	February 2021

Local Sensitivities:
Describe the presence (if any) of local sensitive environmental areas and community receptors
	• Noise – Traffic on the Pacific Highway is the dominant source of noise during the day and early evening. The location of adjacent sensitive receivers include:
	  ○ Residences;
	  ○ Childcare facilities;
	  ○ Recording studios;
	  ○ Medical rooms; and
	  ○ Commercial properties.
	  Consultation with nearby sensitive receivers reflects a noise profile with a higher tolerance to construction noise, most likely due to the construction activities that have occurred on the site since 2017. Where face-to-face interactions with sensitive receivers near the site has occurred, receivers have not had any issues with the proposed works, proposed working hours and respite periods.
	• Traffic – the Pacific Highway is located adjacent to the site and represents a major arterial road.
	• Pedestrians – The Pacific Highway, Clarke Street, Clarke Lane, Oxley Street and Hume Street surround the site and are in frequent use by pedestrians. Changed access routes and perceived access challenges could disrupt pedestrian access.
	• Business Impacts - Businesses could be disrupted by planned or temporary closures of Clarke Lane and the closure of Hume Street. The potential impacts would relate to servicing and delivery constraints for business located along the Pacific Highway and in surrounding streets such as Clarke Street, Hume Street and Oxley Street. Changed access routes and perceived access challenges could affect the visibility of businesses.
	• Heritage – 28 Clarke Street (Sydney Metro and A W Edwards Site Office) has local heritage significance.

Part 3: Environmental Risk Assessment and Management

Prepare an Environmental Risk Assessment (in accordance with the *Sydney Metro Risk Management Standard*) and an Environmental Control Map for the proposed Minor Works and attach as Appendix 1.

If an Environmental Risk Assessment and/or an Environmental Control Map for the proposed Minor Works is/are already contained in existing documentation, attach the relevant section(s) as Appendix 1.

Documentation:

List any existing documents (including those referenced above) that the proposed Minor Works will be undertaken in accordance with and attach as Appendix 2 (e.g. plans, procedures, procedures, etc.).

- An Environmental Risk Assessment is included within Appendix 1.
- All works associated with this minor works approval will be subject to the requirements of the following documents:
  - Sydney Metro OCCS
  - Sydney Metro Unexpected Heritage Finds Procedure
  - Sydney Metro Unexpected Finds Procedures for contamination
  - Crows Nest ISD Construction Traffic Management Plan (CTMP)
  - Sydney Metro Construction Environmental Management Framework
  - Sydney Metro City & Southwest Out of Hours Work Strategy Protocol (SM ES-PW-317)
- Noise and vibration impact from the detailed excavation works has been considered in the Crows Nest Station Development Construction Noise and Vibration Impact Statement (CNVIS) (Revision A, 7/2/2021).
  - The excavation scenario calculated a cumulative noise level for the noisiest plant / equipment to be used for excavation, this cumulative noise level was then applied to site A and site B. The potential noise and vibration impact in the CNVIS are therefore indicative of the work occurring across the two work fronts. The cumulative noise level in Table 1 of the advisory letter (Appendix 2) for the months February, Marh and April include an excavator (and other louder plant) operating at the surface (Pacific Highway) and in the station box.
  - The CNVIS anticipates the detailed excavation work will exceed the noise management levels at five properties, triggering letter box drops and noise verification monitoring. Table 10, extracted from the CNVIS, identifies the relevant properties and additional mitigation measures.

Table 10 - Receivers exceeding the NMLs and triggering additional noise mitigation measures

PHASE	NCA	ADDRESS	RECEIVER ID	RECEIVER TYPE	MITIGATION
Phase 1 - Excavation (A,B)	C	22-26 CLARKE ST, CROWS NEST NSW 2065	464	MED and Recording Studio	LB / M
	C	20 CLARKE ST, CROWS NEST NSW 2065	1002	Recording Studio	LB / M
	D	306/10-12 CLARKE ST, CROWS NEST NSW 2065	282	MED and Recording Studio	LB / M
	D	107/6-8 CLARKE ST, CROWS NEST NSW 2065	610	Recording Studio	LB / M
	E	8/473 PACIFIC HWY, CROWS NEST NSW 2065	541	RES	LB / M

  - The detailed excavation work requires the use of an excavator with attachments (i.e. hammer), which is considered high vibration generating equipment. It is noted that high vibration generating equipment is not expected to be within the minimum working distances for cosmetic damage to adjacent structures. There are however several receivers identified in the CNVIS that are within the minimum distance for human annoyance, triggering attended vibration monitoring; these receivers are listed in Table 14 (below) from the CNVIS.

Table 14 - Receivers predicted to be within the minimum distances for human annoyance

PLANT ITEM	WORK SITE	PROPERTIES	LAND USE
Excavator with rock hammer (24t)	A,B,C	20 CLARKE ST	Recording Studio
		374 PACIFIC HWY	COM and Heritage
		22-26 CLARKE ST	MED and Recording Studio
		28-34 CLARKE ST	MED and Heritage
		348 PACIFIC HWY	RES
		469 PACIFIC HWY	RES
		402-420 PACIFIC HWY	RES
		10-12 CLARKE ST	MED and Recording Studio
		473 PACIFIC HWY	RES
		471 PACIFIC HWY	RES
		35 CLARKE ST	EDU
		6-8 CLARKE ST	Recording Studio

  - Ground-borne noise impacts have also been considered in the CNVIS, with several adjacent receivers potentially impacted when high vibration generating equipment is utilised, triggering attended ground-borne noise monitoring; these receivers are listed in Table 16 (below) from the CNVIS.

Table 16 - Receivers predicted to exceed the GBN criterion for standard working hours

RECEIVER	MINIMUM DISTANCE BETWEEN SOURCE AND RECEIVER, m	PREDICTED GBN LEVEL, dB(A)	STANDARD HOURS CRITERION INTERNAL, dB $L_{Aeq(15minute)}$	PREDICTED GNML EXCEEDANCE (dB)
20 Clarke Street	25	> 60	60	< 10
22-26 Clarke Street	25	> 60	60	< 10
18-34 Clarke Street	25	> 60	60	< 10
10-12 Clarke Street	25	> 60	60	< 10
6-8 Clarke Street	25	> 60	60	< 10
473 Pacific Hwy	25	> 60	60	< 10

- Cumulative noise – Noise levels for each construction scenario were predicted and presented in the CNVIS. Potential cumulative noise impacts for the carrying out of works on the logistics lane (MWA-001), waterproofing (MWA-003) and detailed excavation (MWA-004) are summarised in Table 2 below (refer Appendix 2). These cumulative levels take into consideration a 5dB penalty applicable when using high noise generating equipment.

Table 2 Additional receivers to notify via letter box drops for February, March, April 2021

Receiver NCA	Receiver Address	ID	Receiver Type	ANML Exceedance (dB) / Mitigation		GNML Exceedance (dB) / Mitigation		VNML Exceedance / Mitigation	
A	348 PACIFIC HWY, CROWS NEST NSW 2065	10	RES	13	LB, M	-	-	Human Annoyance	LB, M, RO
A	382 PACIFIC HWY, CROWS NEST NSW 2065	57	COM	19	LB, M	-	-	-	-
A	378 PACIFIC HWY, CROWS NEST NSW 2065	375	COM	18	LB, M	-	-	-	-
A	360 PACIFIC HWY, CROWS NEST NSW 2065	426	COM	16	LB, M	-	-	-	-
A	374 PACIFIC HWY, CROWS NEST NSW 2065	456	COM and Heritage	17	LB, M	-	-	Human Annoyance	LB, M, RO
A	360 PACIFIC HWY, CROWS NEST NSW 2065	693	COM	19	LB, M	-	-	-	-
A	402-420 PACIFIC HWY, CROWS NEST NSW 2065	232	RES	9	-	-	-	Human Annoyance	LB, M, RO
B	460 PACIFIC HWY, ST LEONARDS NSW 2065	502	EDU	12	LB, M	-	-	-	-
B	454-456 PACIFIC HWY, ST LEONARDS NSW 2065	1000	COM	12	LB, M	-	-	-	-
C	20 CLARKE ST, CROWS NEST NSW 2065	1002	Recording Studio	12	LB, M	<10	LB	Human Annoyance	LB, M, RO
C	28-34 CLARKE ST, CROWS NEST NSW 2065	690	MED and Heritage	12	LB, M	-	-	Human Annoyance	LB, M, RO
C	22-26 CLARKE ST, CROWS NEST NSW 2065	464	MED and Recording Studio	14	LB, M	<10	LB	Human Annoyance, Sensitive Equipment	LB, M, RO
D	10-12 CLARKE ST, CROWS NEST NSW 2065	282	MED and Recording Studio	11	LB, M	<10	LB	Human Annoyance	LB, M, RO
D	6-8 CLARKE ST, CROWS NEST NSW 2065	610	Recording Studio	12	LB, M	<10	LB	Human Annoyance	LB, M, RO
E	469 PACIFIC HWY, CROWS NEST NSW 2065	35	RES	14	LB, M	-	-	Human Annoyance	LB, M, RO
E	473 PACIFIC HWY, CROWS NEST NSW 2065	541	RES	22	LB, M	<10	LB	Human Annoyance	LB, M, RO
E	463 PACIFIC HWY, CROWS NEST NSW 2065	514	RES	12	LB, M	-	-	-	-
E	471 PACIFIC HWY, CROWS NEST NSW 2065	719	RES	18	LB, M	-	-	Human Annoyance	LB, M, RO

(1) Note 1: Noise and vibration monitoring would be conducted at the nearest most potentially affected receivers first and the outset of the high noise and vibration generating construction work. Subject to the results of the initial monitoring it may not be necessary to monitor at all identified receivers.

(2) LB: Letterbox Drops

(3) M: Attended Noise or Vibration Monitoring.

(4) RO: Respite Offers: It should be that consultation is already underway with directly potentially impacted receivers in accordance with Conditions E37 / E38.

(5) ANML: Airborne NML

(6) GNML: Ground-borne NML

(7) VNML: Vibration NML

It should be noted the mitigation measure "RO" refers to the implementation of respite periods during the works, in accordance with the Sydney Metro Construction Noise and Vibration Strategy (CNVS).

- A short-duration noise and vibration verification exercise of the excavation works including an excavator with hammer was conducted in order to confirm the assumptions used in predicting the airborne and ground-borne noise and vibration levels. The trial found that the measured levels of these parameters were in line with what was predicted in the CNVIS. The results of this trial can be found in Appendix 2.

Part 4: Workforce Notification

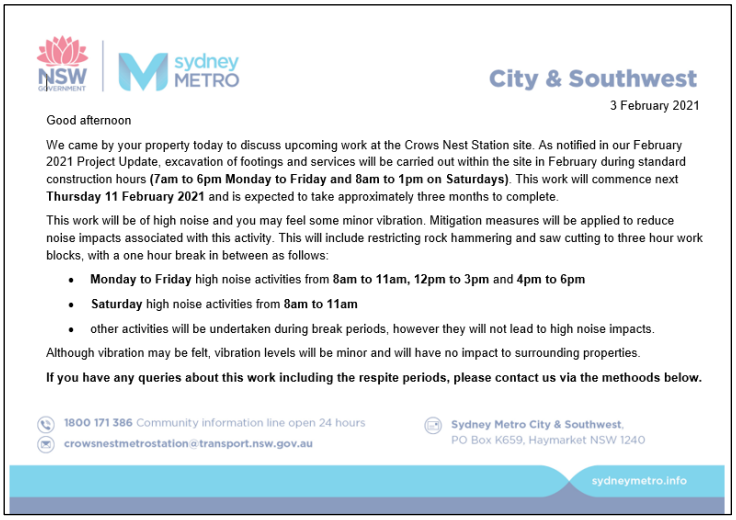
How will the environmental and community risks and associated mitigation measures of the proposed Minor Works be communicated to the contractor's workforce?	A W Edwards has been awarded the contract to undertake these works, they will be required to implement the delivery of a site induction to all personnel working on the project site. The induction will include relevant environmental aspects and risks associated with works on the project site. Works will be undertaken in accordance with a SWMS. SWMS will be reviewed by the Contractor Environmental Manager.

Part 5: Community Consultation

What community consultation has been undertaken already?	• Community consultation with residential and other sensitive receivers commenced in early January. • Works associated with the installation of a logistics lane along the Pacific Highway required the use of an excavator (14t) and hammer to break out a

capping beam. During this work, no complaints were received regarding the hammering.

- Sensitive receivers which trigger the thresholds described in E37 have been consulted on the proposed works and respite periods. These receivers are listed below:
  - 20 Clarke Street;
  - 22-26 Clarke Street;
  - 18-34 Clarke Street;
  - 10-12 Clarke Street;
  - 6-8 Clarke Street; and
  - 473 Pacific Highway.
- A copy of the slips provided to receivers, or left behind where they were not available, is included below:



NSW GOVERNMENT | sydney METRO

City & Southwest

3 February 2021

Good afternoon

We came by your property today to discuss upcoming work at the Crows Nest Station site. As notified in our February 2021 Project Update, excavation of footings and services will be carried out within the site in February during standard construction hours **(7am to 6pm Monday to Friday and 8am to 1pm on Saturdays)**. This work will commence next **Thursday 11 February 2021** and is expected to take approximately three months to complete.

This work will be of high noise and you may feel some minor vibration. Mitigation measures will be applied to reduce noise impacts associated with this activity. This will include restricting rock hammering and saw cutting to three hour work blocks, with a one hour break in between as follows:

- **Monday to Friday** high noise activities from **8am to 11am, 12pm to 3pm** and **4pm to 6pm**
- **Saturday** high noise activities from **8am to 11am**
- other activities will be undertaken during break periods, however they will not lead to high noise impacts.

Although vibration may be felt, vibration levels will be minor and will have no impact to surrounding properties.

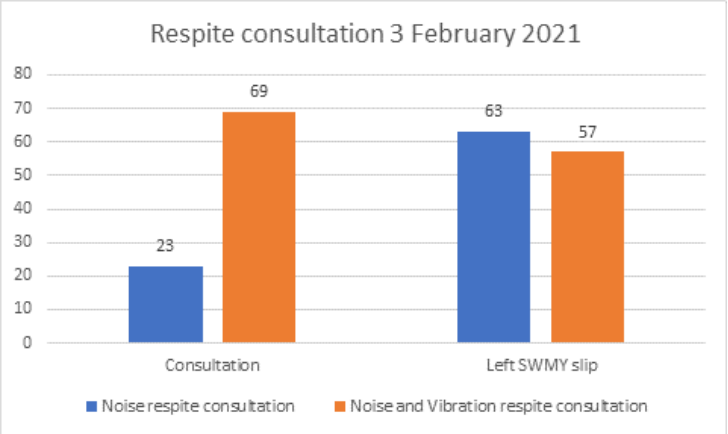
If you have any queries about this work including the respite periods, please contact us via the methoods below.

1800 171 386 Community information line open 24 hours
crowsnestmetrostation@transport.nsw.gov.au

Sydney Metro City & Southwest,
PO Box K659, Haymarket NSW 1240

sydneymetro.info

- Over 200 receivers were door knocked (refer figure below), not all consultations were face-to-face as some receivers did not respond to the door knock.



- There were no face-to-face interactions where the sensitive receiver rejected the proposed work hours and respite periods; there have been no responses from those sensitive receivers who did not respond to the door knock.

What community consultation is planned to be undertaken?	AWE proposes to proactively contact (check-ins) the receivers listed above during the proposed works, while noise and vibration monitoring is being undertaken, to verify the actual measured levels compared to the perceptions of the receivers. This will enable the data model to be fine tuned and better represent site conditions.

If drafted already, attach applicable Community Notification as Appendix 3.

Part 6: Contact Details

Nominate project manager, environmental and communications contact(s).

Name:	Colin Danby	**Position:**	Project Director	**Phone:**	0448 810 628
	Darren Green		Environmental Manager		0418 969 624
	Elle Mursell		Stakeholder, Engagement and Public Affairs Manager		0419 525 484

Part 7: Signature			
This signature acknowledges that the proposed Minor Works will be undertaken in accordance with this application, have minimal environmental impact and are not defined as 'construction' in accordance with the applicable planning approval.			
Name:	Darren Green		
Signature:		**Date:**	Original submission: 12/01/2021 Last amended: 12/02/2021

Determination Page

(TfNSW/Environmental Representative Use Only)

12. Endorsement/Approval

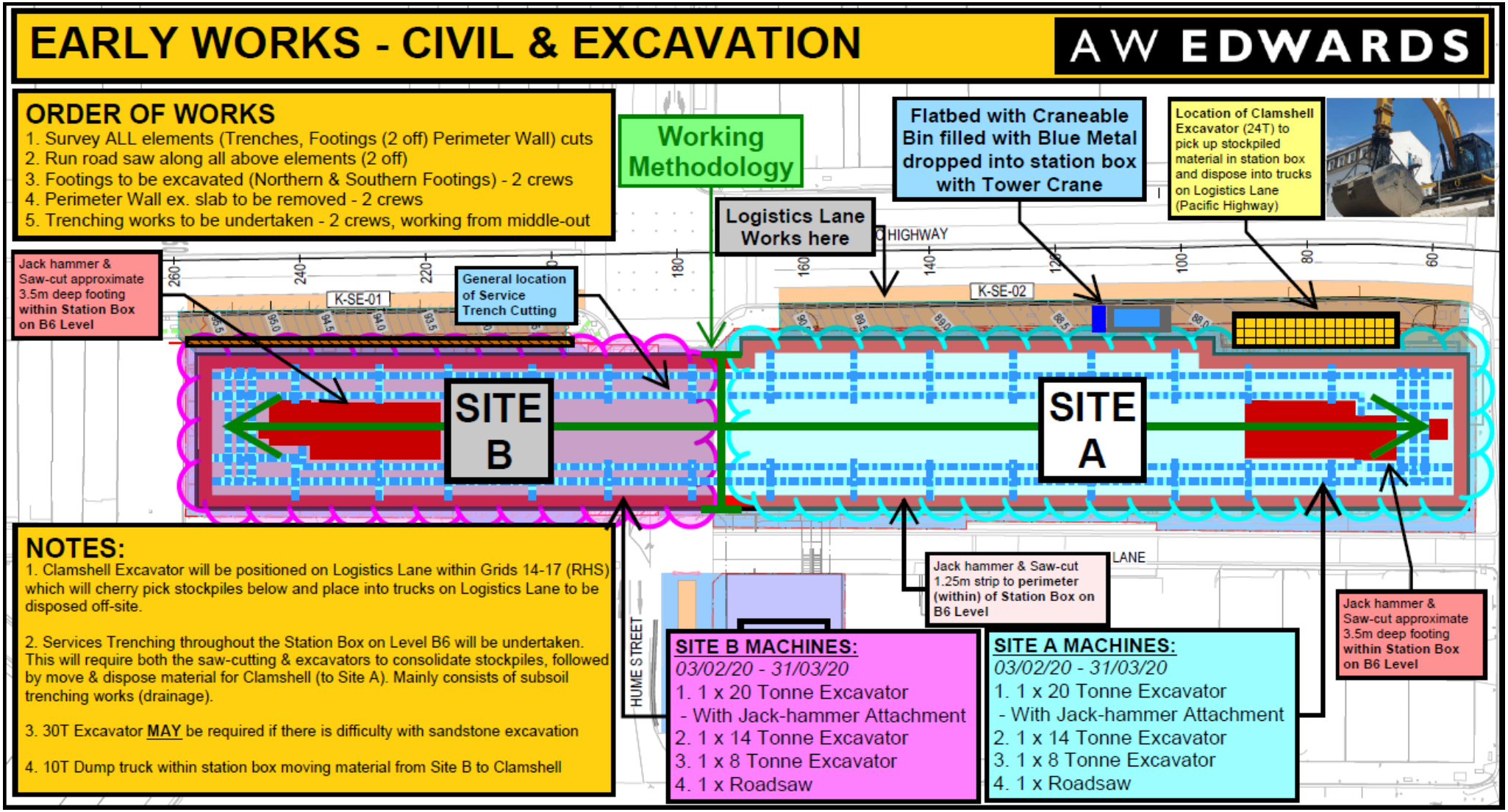
These signatures represent formal endorsement/approval for the proposed Minor Works to commence in accordance with this application and the applicable planning approval requirements (subject to any determination from the applicable planning authority as may be required by the planning approval conditions).

	TfNSW Principal Manager, Communication & Engagement – Endorsement (required for all applications)	**TfNSW Principal Manager, Sustainability, Environment & Planning** – Approval (required for all applications)	**Environmental Representative** – Endorsement (required as necessary in accordance with the applicable planning approval, optional for all other circumstances)
Signature:			
Name:	Harsatnam Hundal	Fil Cerone	George Kollias
Date:	12/02/21	12 Feb 2021	12/02/21
Comments:		Noted that this application is subject to an initial 2 week trial period in order to ascertain effectiveness of control/mitigation measures	*Supporting letter attached as Appendix 4 if necessary.* See Supporting Letter dated 12/02/21 for conditional approval of a 2 week Trial Period.
Conditions:			*Supporting letter attached as Appendix 4 if necessary.* See Supporting Letter dated 12/02/21 for conditional approval of a 2 week Trial Period.

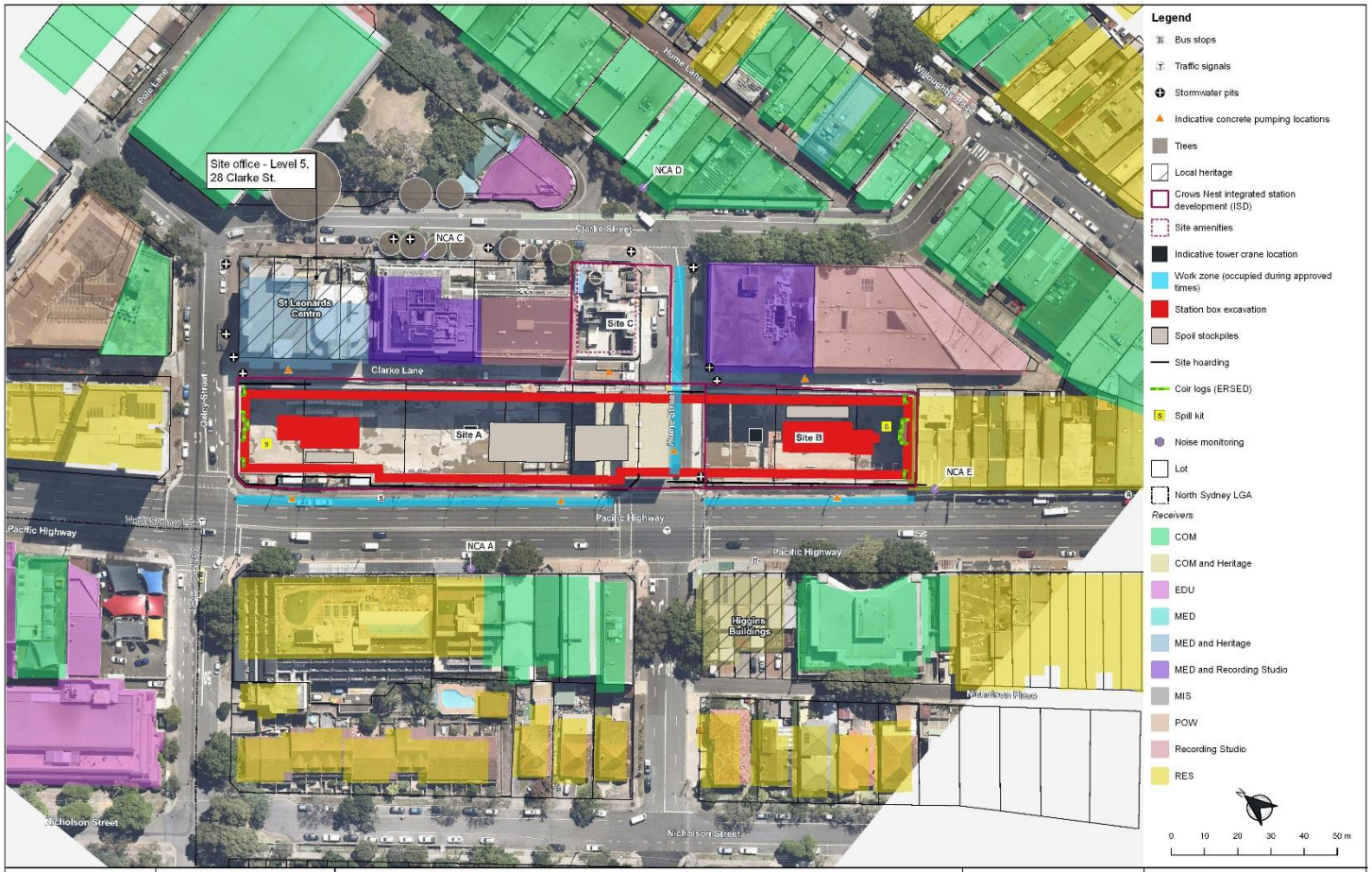
☒	Approved (by TfNSW)
☐	Endorsed (by Environmental Representative)
☐	Rejected

Appendix 1: Work Area and Environmental Risk Assessment

Work Area – Crows Nest



Environmental Control Map of Crows Nest Site



AW EDWARDS	DRAWING TITLE	ENVIRONMENTAL CONTROL MAP	DRAWN	M. RYAN
	PROJECT NAME	CROWS NEST CONSTRUCT ONLY PACKAGE	REVIEWED	D. GREEN
	LOCATION	CROWS NEST, NORTH SYDNEY	REVISION NO.	4
	SHEET NUMBER	1	REVISION DATE	28/1/2021

Risk Assessment

This Risk Assessment has been undertaken in accordance with the requirements of *Sydney Metro Risk Management Standard.*
Note; **C** = Consequence & **L** = Likelihood as per *Sydney Metro Risk Management Standard – Appendix A Sydney Metro Risk Matrix*

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating		
		C X	L =	Risk		C X	L =	Risk
1. Excavation								
Contamination uncovered during works	Mixing of contaminated materials with non-contaminated materials	**C4**	**L4**	**Med**	Induction to include contamination management requirements. Implement Sydney Metro Unexpected Finds Procedures for contamination (the Contractor may choose to develop their own Procedure which will need to meet the minimum requirements of the Sydney Metro Procedure).	**C4**	**L5**	**Low**
Uncontrolled runoff from works	Uncontrolled water entering local stormwater and impacting on water quality	**C4**	**L4**	**Med**	Set up erosion and sediment controls as per the ECM (e.g. sandbags, coir logs, etc).	**C4**	**L5**	**Low**
Spoil Management	Incorrect handling or disposal of spoil leading to environmental degradation	**C4**	**L4**	**Med**	The waste will be lawfully transported and disposed of at a licenced facility. Stockpiles of materials will be segregated per waste type to maximise resource recovery opportunities.	**C4**	**L5**	**Low**
Items of heritage significance uncovered during excavation works	Damage to uncovered heritage items or archaeological deposits	**C3**	**L5**	**Med**	Induction includes heritage management requirements. Previous intrusive investigations have not identified any items of heritage significance, as such the implementation of the Sydney Metro Unexpected Heritage Finds Procedure.	**C3**	**L6**	**Low**

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating		
		C X	L =	Risk		C X	L =	Risk
Noise and vibration	Excessive noise resulting from the works causing disturbance to sensitive receivers Human annoyance	**C4**	**L3**	**Med**	Work will occur during standard construction hours. Workers to be inducted and tool boxed prior to commencing works. Hoarding will be established around the perimeter of the site which will provide acoustic screening. Temporary and movable acoustic shielding installed around work area (path control). Non-tonal reverse beepers to be fitted to all plant. Respite periods will be implemented when undertaking saw cutting or hammering (no saw cutting or hammering before 8am, continuous blocks not exceeding 3 hours within a minimum respite period of 1 hour). Consultation with potentially affected stakeholders to be undertaken prior to the commencement of works. Proactively contact nearest sensitive receivers during saw cutting or hammering to understand potential impacts and whether any additional respite periods need to be implemented. Attended noise, ground-borne noise and vibration monitoring to be undertaken at representative locations. While attended monitoring is being undertaken, consult with nearest sensitive receivers to understand recorded noise/vibration levels versus perceived noise/vibration levels. Real-time noise and vibration monitoring. If works are approaching noise or vibration trigger points including during use of hammer, works are to cease and be	**C4**	**L5**	**Low**

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating		
		C X	L =	Risk		C X	L =	Risk
					reassessed to ensure compliance with noise and vibration goals. A 24-hour complaint line is available for the public who experience excessive noise.			
Chemical handling and storage	Poor storage and handling of chemicals causes spills	**C4**	**L4**	**Med**	Any chemicals and fuels are to be stored within a bunded area with 110% of the capacity of the largest stored container Refuelling to occur more than 20m away from stormwater sump Spill kits will be available near chemical handling, mobile/stationary plant and storage areas Site induction includes spill response awareness.	**C4**	**L5**	**Low**
Waste	Incorrect disposal of waste	**C4**	**L4**	**Med**	Induction includes waste management practices Waste to be classified in accordance with the Waste Classification Guidelines (NSW EPA, 2014) prior to disposal The waste will be lawfully transported and disposed of to a licenced facility.	**C4**	**L5**	**Low**
Air Quality	Dust generation during works	**C4**	**L4**	**Med**	Induction includes air quality management practices. Material will be wetted down to prevent dust generation. Conditions will be monitored and work will cease where dusty conditions are observed.	**C4**	**L5**	**Low**

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating		
		C X	L =	Risk		C X	L =	Risk
Traffic	Traffic congesting the Pacific Highway	**C4**	**L4**	**Med**	A Construction Traffic Management Plan (CTMP) approved by RMS and SCO is implemented prior to works being carried out. Where possible traffic movements will be outside of peak traffic hours.	**C4**	**L5**	**Low**
Pedestrians	Impacts on pedestrians	**C4**	**L4**	**Med**	Implement the CTMP and provide alternative pedestrian routes Undertake work outside of peak hours, where possible Bus users will be directed towards existing bus stops located to the north and south of the site, signage has been installed to inform pedestrians and bus users of the location of these bus stops.	**C3**	**L6**	**Low**

A1 Consequence Table

Consequence Table						
Rating	**C6**	**C5**	**C4**	**C3**	**C2**	**C1**
Descriptor/ Impact Area	**Insignificant**	**Minor**	**Moderate**	**Major**	**Severe**	**Catastrophic**
Health and Safety (Injury and Disease)	Illness, first aid or injury not requiring medical treatment.	Illness or minor injuries requiring medical treatment.	Single recoverable lost time injury or illness, alternate/restricted duties injury, or short-term occupational illness.	1-10 major injuries requiring hospitalisation and numerous days lost, or medium-term occupational illness.	Single fatality and/or 10-20 major injuries/permanent disabilities/chronic diseases.	Multiple fatalities and/or >20 major injuries/permanent disabilities/chronic diseases.
Environment	No appreciable changes to environment and/or highly localised event.	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries.	Short-term and/or well-contained environmental effects. Minor remedial actions probably required.	Impacts external ecosystem and considerable remediation is required.	Long-term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required.	Irreversible large-scale environmental impact with loss of valued ecosystems.
Customer Experience/ Operational Reliability	Short duration disruptions affecting part of one transport mode.	Minor disruptions affecting several parts of one transport mode.	Serious disruptions affecting operation of one complete transport mode.	Major disruptions affecting operations of one transport mode with network-wide effects on one or more other modes of transport.	Short duration shutdowns or substantial disruptions affecting multiple transport modes with sector-wide cascading effects.	Extensive shutdowns or extended disruptions with economy-wide effects.
Government/ Stakeholder / Public Trust/ Confidence	Negative article in local media. No discernible reaction/apprehensi on. Goodwill, confidence and trust retained.	Unease – Series of negative articles in local/state media. Confidence remains with some minor loss of goodwill or trust. Recoverable with little effort or cost. Some continuing scrutiny/attention.	Disappointment – Extended negative local/state media coverage. Confidence and trust dented but are quickly recoverable at modest cost within existing budget and resources.	Concern – Short-term negative state/national media coverage. Confidence and trust are diminished but are recoverable with time, staff effort and additional funding.	Displeasure – Extended negative state/national media coverage. Confidence and trust are damaged but recoverable at considerable cost, time and staff effort.	Outrage – Material change in the public perception of the organisation. Confidence and trust are severely damaged, possibly irreparably, and full recovery both questionable and costly.
Regulatory or Legal Breach	Low-level non-compliance with legal and/or regulatory requirement or duty by individuals or TINSW.	Minor non-compliance with legal and/or regulatory requirement or duty. Investigation and/or report to authority.	Moderate non-compliance. Subject to comment and monitoring from applicable regulator. Small fine and no disruption to services.	Major breach resulting in enforcement action and/or prohibition notices. Substantial fine and no disruption to services.	Substantial breach resulting in prosecution, fines and/or litigation. Licence or accreditation restricted or conditional affecting ability to operate.	Prosecution leading to imprisonment of TINSW executive. Loss of operating licence.
Management Effort/ Organisational Fatigue	An event, the impact of which can be absorbed as part of normal activity.	An event, the impact of which can be absorbed but some additional management effort is required.	An event, the impact of which can be absorbed but much broader management effort is required.	Major event which can be absorbed, but substantial management effort is required.	Severe event which requires extensive management effort but can be survived.	Catastrophic event with the clear potential to lead to the collapse of the organisation.
Benefit Realisation of Initiative, Program or Project	No time delay with initiative or project but it will incur a slight decrease in the benefits realised.	Minor delay with the initiative and/or a minor decrease in the benefits realised; or minor delay on the project or another project, with no public implications.	Several delays with the initiative and/or moderate decrease in benefits realised; or completion date missed for non-critical path project.	Major delays with the initiative and/or major decrease in benefits realised; or publicly announced portion/milestone missed or final completion date missed with demonstrable mitigating external circumstances.	Severe delays with initiative, which impacts across divisions and/or significant decrease in benefits realised; or publicly announced portion/milestone missed or final completion date missed on critical path project.	Failure to realise benefits of the initiative which adversely affects the enterprise-wide operations of TINSW; or publicly announced portion/ milestone significantly missed or final completion date significantly missed on critical path project.
Budget, Costs or Revenue	< $100k	$100k – $1m	$1m – $10m	$10m – $50m	$50m – $100m	> $100m

A2 Likelihood Criteria

Likelihood						
Rating	**L6**	**L5**	**L4**	**L3**	**L2**	**L1**
Descriptor/ Definition	**Almost Unprecedented**	**Very Unlikely**	**Unlikely**	**Likely**	**Very Likely**	**Almost Certain**
Qualitative Expectation	Not expected to ever occur during time of activity or project	Not expected to occur during the time of activity or project	More likely not to occur than occur during time of activity or project	More likely to occur than not occur during time of activity or project	Expected to occur occasionally during time of activity or project	Expected to occur frequently during time of activity or project
Sydney Metro Probability Analysis	<10%	10-25%	25-50%	50-75%	75-90%	>90%
Quantitative Frequency	Less than once every 100 years	Once every 10 to 100 years	Once every 1 to 10 years	Once each year	1-10 times every year	10 times or more every year

A3 Risk Matrix

Risk Rating A – Very High B – High C – Medium D - Low			Consequence					
			Insignificant	Minor	Moderate	Major	Severe	Catastrophic
			C6	**C5**	**C4**	**C3**	**C2**	**C1**
Likelihood	Almost certain	**L1**	C	B	B	A	A	A
	Likely	**L2**	C	C	B	B	A	A
	Possible	**L3**	D	C	C	B	B	A
	Unlikely	**L4**	D	D	C	C	B	B
	Rare	**L5**	D	D	D	C	C	B
	Almost unprecedented	**L6**	D	D	D	D	C	C

Appendix 2: Advisory letter from subject matter expert (noise and vibration) (Ref: S200740LT1B, 11 February 2021)

Thursday, 11 February 2021

Project number: S200740
Reference: S200740LT1B

Darren Green
Element Environment
PO Box 156
Warriewood NSW 2102

Dear Darren,

Sydney Metro Crows Nest Station Construction Noise and Vibration Assessment of Potential Cumulative Impacts Due to Concurrent Works

1 Introduction

A program of minor works is proposed to be completed concurrently during the months of February, March and April 2021. The purpose of this letter is to provide an assessment of potential cumulative noise and vibration impacts and determine whether additional mitigation measures are required.

2 Construction Methodology

The following works were previously approved or are currently proposed. The approximate location of the works are shown on Figure 1.

MWA-001 (Approved): Site establishment and enabling works, and includes

- Relocation of services and utilities along the Pacific Highway to enable installation of the logistics lane;
- Installation of the logistics lane;
- Realignment of perimeter site hoardings;
- Reconfiguration of lanes; and
- Delivery and installation of site sheds and other amenities.

MWA-002 (Approved): Tower crane establishment

- Delivery and installation of two tower cranes. The first tower crane is completed

MWA-003 (Proposed): Waterproofing internal walls of station box.

- Prepare wall surface for sheet membrane;
- Apply sheet membrane to wall and base of station box.

MWA-004 (Proposed): for detailed excavation will include the following works:

- Excavate 3.5m deep footing for elevator in site A and site B (i.e. 2 footings to be excavated);
- Excavate a strip around the internal perimeter of the station box (1.25m wide by 150mm deep);
- Remove tunnel boring machine guide infill slab (1.5m wide by 150mm deep);
- Excavation of service trenches throughout the station box; and
- Remove spoil from station box to truck and dogs in the logistics lane

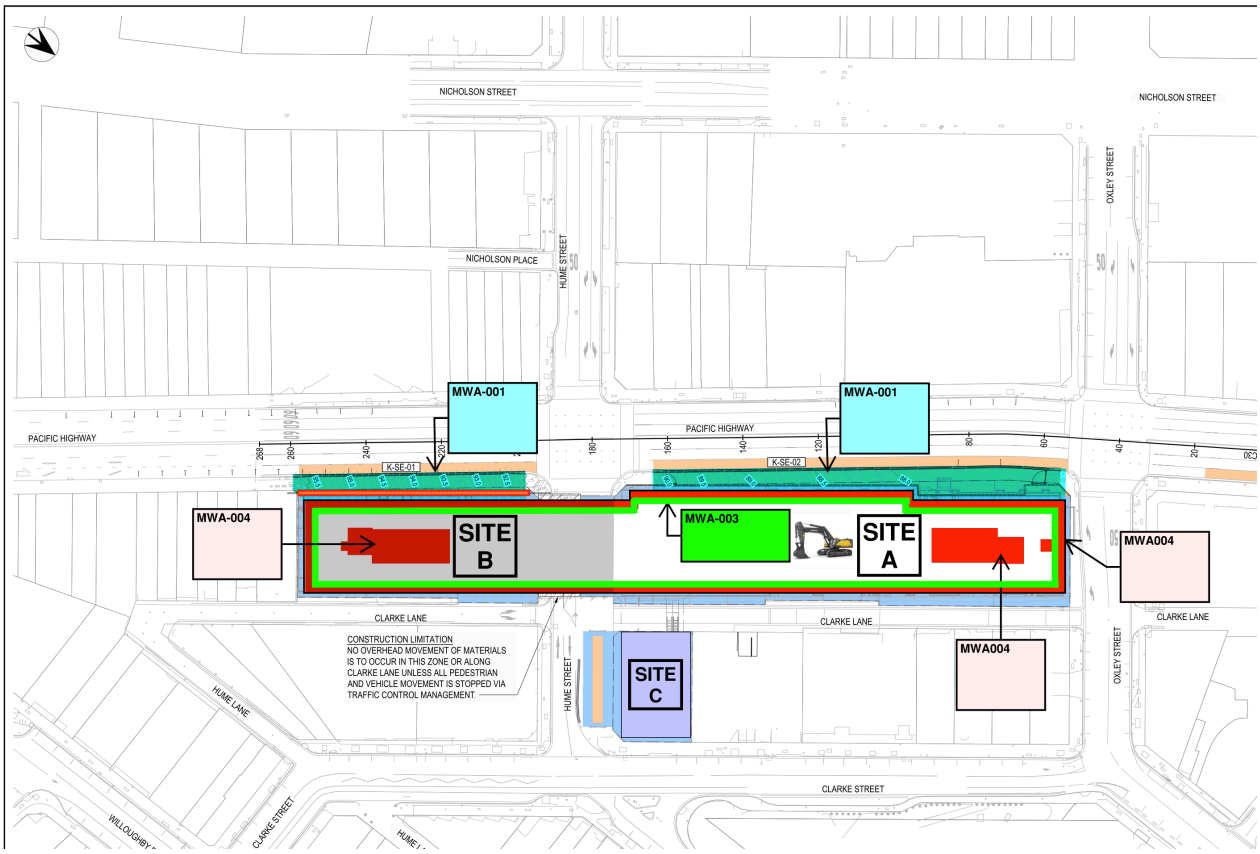


Figure 1 Site plan showing locations of potential concurrent works

3 Noise and vibration measurements

An initial version of this letter was provided (S200740LT1A) to provide an explanation of predicted cumulative noise and vibration levels and proposed mitigation measures.

Subsequently, a short-duration trial of the excavation works including an excavator with hammer was conducted in order to confirm the assumptions used in predicting the airborne and ground-borne noise and vibration levels.

The trial involved the following:

- Measurement of ground-borne noise and vibration within 28-34 Clarke Street for varying offset distances of rock hammering.
- Measurement of external and internal airborne noise levels at 28-34 Clarke Street in order to verify the predicted noise levels.
- A nearfield airborne noise measurement in order to validate the assumed sound power level of the 14 Tonne excavator with hammer.

3.1 Summary of outcomes

3.1.1 Ground-borne noise

The ground-borne noise levels were measured in the first basement level of 28-34 Clarke Street at a typical minimum offset slant distance from the proposed rock hammering activities. The highest measured L_{Aeq} noise level was

52 dB(A), or 57 dB(A) after adding a 5 dB annoyance factor. This aligns with the predictions in the CNVIS in that no receivers were predicted to exceed the ground-borne NML of 60 dB(A). This confirms that the noise mitigation measures relating to ground-borne noise are appropriate.
It should be noted that ground-borne noise levels were approximately 10 dB less when rock hammering was being conducted on the opposite (western) side of the station box. The ground-borne noise component would less at upper levels of buildings and at locations further offset from the site.

3.1.2 Vibration

Vibration levels were measured in the first basement level and ground floor of 28-34 Clarke Street at a typical minimum offset slant distance from the proposed rock hammering activities. Vibration from rock hammering activities was not perceptible at either measurement location.

Maximum vibration levels did not exceed VC-A (50 um/s rms) in the basement and was generally in line with VC-B (25 um/s) on the ground floor. It should be noted that the vibration levels reduced to be in line with VC-B at approximately 30m slant distance. VC-B was the criterion established for the medical facilities on Clarke Street.

This is generally in line with the predicted vibration levels provided within the CNVIS and confirms that the mitigation measures are appropriate. The measured vibration levels indicate there is a reduced risk of human annoyance noting the vibration levels were not perceptible at the test location.

The coordination with the medical facilities (including the eye surgery) would be ongoing such that works would occur such there would be no impacts during times sensitive operations.

3.1.3 Airborne noise

Noise levels were measured at street level outside 28-34 Clarke Street facing the site. Noise levels were also measured inside the offices directly facing the site.

The noise levels were clearly audible and in the order of 50 dB(A) inside the offices noting the excavator was located directly opposite this location albeit in the bottom of the box. Even with the addition of a 5 dB factor for impulsiveness the noise level would be less than the upper/lower E37 triggers (60 dB(A)/55 dB(A)) for a large proportion of locations.

The measured L_{Aeq} noise level on the street just outside 28-34 Clarke Street was approximately 70 dB(A) and was within 2 dB(A) of the predicted noise level at the same location. This verifies the accuracy of the modelling and proposed noise mitigation measures.

The measured internal noise level was approximately 50 dB(A) and factoring a 5 dB for impulsiveness the final level would be less than the upper/lower E37 triggers (60 dB(A)/55 dB(A)) for a large proportion of locations.

However, it should be noted that the higher noise generating aspects of the excavation works would occur at the bottom of the station box and would control noise levels at receivers to the east of the site, whereas noise levels from the logistics lane works would control noise levels to the north, south and west of the site. Due to the location of the excavation works and barrier effect from the site hoardings, NML exceedances at the receivers to the east of the site are likely to be lower than presented in Table 2. However, the mitigation strategy is considered appropriate incorporating letter box drops and monitoring.

3.2 Airborne noise sound power level

A nearfield measurement of the 14 Tonne excavator with hammer was conducted in order to determine the approximate sound power level for the activity. A sound power level of 118 dB(A) was derived from the measurements. This aligns with the sound power level of 118 dB(A) assumed in the CNVIS.

4 Assessment and Outcome

Noise levels for each construction scenario were predicted and presented in the Construction Noise and Vibration Impact Statement (CNVIS). The predicted noise levels for the cumulative scenarios were determined at each noise sensitive receiver on basis of the CNVIS predictions. Table 1 shows the single scenario Sound Power Levels (Lw) compared to the cumulative Sound Power Levels based on the proposed minor works schedule. Table 1 shows the overlapping works. While MWA-002 is planned to be finished by the end of January, there is potential that the works will continue during the first week of February.

Table 1 Minor works schedule

	Jan 2021	Feb 2021	Mar 2021	Apr 2021	Lw dB(A)
MWA-001	Y	Y	N	N	118
MWA-002	Y	Y (1st week)	N	N	109
MWA-003	N	Y	Y	Y	112
MWA-004	N	Y	Y	Y	118
Cumulative Lw	**119**	**122**	**119**	**119**	

Table 1 shows that noise levels would be in the range of 1dB to 4 dB(A) higher where works occur simultaneously relative to MWA-001/MWA-002 which already have approval. Receivers that qualify for additional standard hours mitigation are listed in Table 2. The mitigation measures include consultation, letterbox drops and monitoring. The monitoring relates to vibration and noise emissions from high vibration generating plant required for the excavation and logistics lane works. The receivers identified for vibration monitoring are located within the minimum working distances for human comfort or operation of sensitive spaces.

Table 2 Additional receivers to notify via letter box drops for February, March, April 2021

Receiver NCA	Receiver Address	ID	Receiver Type	ANML Exceedance (dB) / Mitigation		GNML Exceedance (dB) / Mitigation		VNML Exceedance / Mitigation	
A	348 PACIFIC HWY, CROWS NEST NSW 2065	10	RES	13	LB, M	-	-	Human Annoyance	LB, M, RO
A	382 PACIFIC HWY, CROWS NEST NSW 2065	57	COM	19	LB, M	-	-	-	-
A	378 PACIFIC HWY, CROWS NEST NSW 2065	375	COM	18	LB, M	-	-	-	-
A	360 PACIFIC HWY, CROWS NEST NSW 2065	426	COM	16	LB, M	-	-	-	-
A	374 PACIFIC HWY, CROWS NEST NSW 2065	456	COM and Heritage	17	LB, M	-	-	Human Annoyance	LB, M, RO
A	360 PACIFIC HWY, CROWS NEST NSW 2065	693	COM	19	LB, M	-	-	-	-
A	402-420 PACIFIC HWY, CROWS NEST NSW 2065	232	RES	9	-	-	-	Human Annoyance	LB, M, RO
B	460 PACIFIC HWY, ST LEONARDS NSW 2065	502	EDU	12	LB, M	-	-	-	-
B	454-456 PACIFIC HWY, ST LEONARDS NSW 2065	1000	COM	12	LB, M	-	-	-	-
C	20 CLARKE ST, CROWS NEST NSW 2065	1002	Recording Studio	12	LB, M	<10	LB	Human Annoyance	LB, M, RO
C	28-34 CLARKE ST, CROWS NEST NSW 2065	690	MED and Heritage	12	LB, M	-	-	Human Annoyance	LB, M, RO
C	22-26 CLARKE ST, CROWS NEST NSW 2065	464	MED and Recording Studio	14	LB, M	<10	LB	Human Annoyance, Sensitive Equipment	LB, M, RO
D	10-12 CLARKE ST, CROWS NEST NSW 2065	282	MED and Recording Studio	11	LB, M	<10	LB	Human Annoyance	LB, M, RO
D	6-8 CLARKE ST, CROWS NEST NSW 2065	610	Recording Studio	12	LB, M	<10	LB	Human Annoyance	LB, M, RO
E	469 PACIFIC HWY, CROWS NEST NSW 2065	35	RES	14	LB, M	-	-	Human Annoyance	LB, M, RO

Receiver NCA	Receiver Address	ID	Receiver Type	ANML Exceedance (dB) / Mitigation		GNML Exceedance (dB) / Mitigation		VNML Exceedance / Mitigation	
E	473 PACIFIC HWY, CROWS NEST NSW 2065	541	RES	22	LB, M	<10	LB	Human Annoyance	LB, M, RO
E	463 PACIFIC HWY, CROWS NEST NSW 2065	514	RES	12	LB, M	-	-	-	-
E	471 PACIFIC HWY, CROWS NEST NSW 2065	719	RES	18	LB, M	-	-	Human Annoyance	LB, M, RO

(1) Note 1: Noise and vibration monitoring would be conducted at the nearest most potentially affected receivers first and the outset of the high noise and vibration generating construction work. Subject to the results of the initial monitoring it may not be necessary to monitor at all identified receivers.

(2) LB: Letterbox Drops

(3) M: Attended Noise or Vibration Monitoring.

(4) RO: Respite Offers: It should be that consultation is already underway with directly potentially impacted receivers in accordance with Conditions E37 / E38.

(5) ANML: Airborne NML

(6) GNML: Ground-borne NML

(7) VNML: Vibration NML

Please let me know if you have any queries or wish to discuss the above.

Yours sincerely,

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