APPENDIX K-3

Cumulative Environmental Noise Impact Assessment of the Proposed Orcem and VMT Developments

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CUMULATIVE ENVIRONMENTAL NOISE IMPACT ASSESSMENT OF THE PROPOSED ORCEM AND VMT DEVELOPMENTS, VALLEJO, CALIFORNIA

Technical Report Prepared For

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EXECUTIVE SUMMARY

AWN Consulting Limited (AWN) has been commissioned to by Orcem & VMT to conduct an environmental noise and vibration impact assessment of the planned developments at the former General Mills site, Vallejo, California. The site is currently not in operation and there are proposals to construct the following developments at this location:

- Orcem plan to locate a Ground Granulated Blastfurnace Slag (GGBS) manufacturing facility on the site, and;
- Vallejo Marine Terminal (VMT) is planning to develop a new dry bulk cargo import facility at the site. The terminal will act as a dry bulk aggregate receiving, storage and transfer facility, to operate as a distribution hub servicing local and regional markets.

This document presents the results and conclusions of the cumulative noise and vibration impact assessment of the proposed developments.

The construction phase of the project has been assessed using the calculation methodology detailed in the *Roadway Construction Noise Model* (RCNM) developed by the Federal Highway Administration (FHWA). It has been found that the construction activity has the potential to generate a substantial temporary increase in ambient noise levels in the vicinity of the project. However, implementation of the following multi-part mitigation measures would reduce potential construction period noise impacts:

- All construction equipment must have appropriate sound muffling devices, which shall be properly maintained and used at all times such equipment is in operation.
- Where feasible, the project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- The construction contractor shall locate on-site equipment staging areas so as to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site.
- Except as otherwise permitted, construction activities shall be restricted to the hours of 7:00 a.m. to 9:00 p.m. daily.

Construction vibration is not expected to generate any significant impact due to the distance between the construction activities and the nearest sensitive properties.

The results of the operational phase assessment have found that there will be scenarios where the with project noise level exceeds the threshold of significance by a small margin of ≤1dB. This small exceedance is below the subjective limen if the human ear and therefore it is proposed that additional mitigation is not required.

No source of vibration is expected during the operational phase.

In conclusion, with appropriate noise mitigation measures the proposed VMT facility can operate without generating a significant and permanent noise impact on the surrounding environment.

CONTENTS

1.0 INTRODUCTION

This report addresses the potential cumulative noise and vibration impacts of the proposed developments at the site of the former General Mills facility, Vallejo, California. The site is currently not in operation and there are proposals to construct the following developments at this location:

- Orcem plan to locate a Ground Granulated Blastfurnace Slag (GGBS) manufacturing facility on the site, and;
- Vallejo Marine Terminal (VMT) is planning to develop a new dry bulk cargo import facility at the site. The terminal will act as a dry bulk aggregate receiving, storage and transfer facility, to operate as a distribution hub servicing local and regional markets.

The site in question is illustrated in Figure 1 below. The site is located adjacent to the Napa River and is bounded to the east by a steep incline with thick vegetation, to the west by the Napa River, to the south by undeveloped land and Sandy Beach residential development beyond and to the North by other industrial lands.

The nearest residential noise sensitive locations to the site are located to the south-east within the condominiums on Seawitch Lane overlooking the site at a distance of approximately 295' from the nearest site boundary.

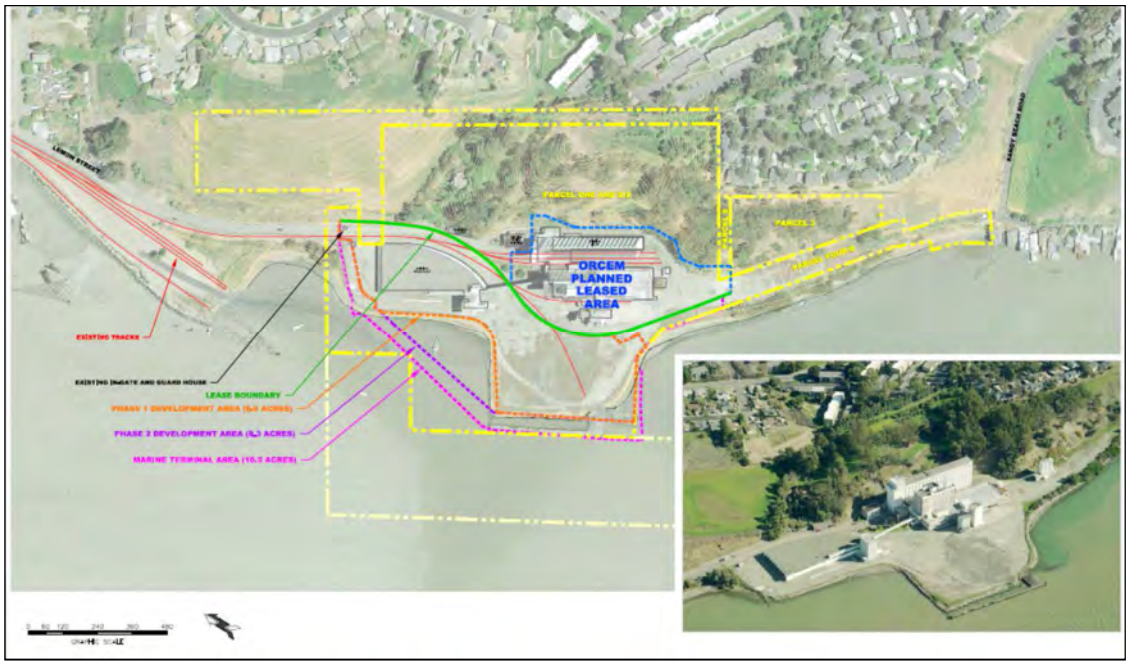

Figure 1 Site Location

As part of the overall development of the site there will be new noise sources introduced. The potential noise impact of both proposed developments has been assessed separately and full details can be found in AWN Technical Report References SS/13/6740NR01 and SS/13/6740NR02.

This report discusses the potential cumulative noise and vibration impact of both developments.

2.0 SUMMARY OF ADOPTED GUIDANCE

The following section summarizes the thresholds of significance adopted for this assessment. Appendix A defines the noise parameters referenced throughout this report.

The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. CEQA asks the following applicable questions. Would the project:

a. Expose people to or generate noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies;

b. Expose people to or generate excessive groundborne vibration or groundborne noise levels;

c. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

d. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

e. For projects within an area covered by an airport land use plan or within two miles of a public airport or public use airport when such an airport land use plan has not been adopted, or within the vicinity of a private airstrip, expose people residing or working in the project area to excessive aircraft noise levels;

f. For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels?

CEQA does not define the noise level increase that is considered substantial. However, following the guidance contained within the Vallejo General Plan the following definitions have been adopted:

Residential Areas

An increase in the day-night average noise level greater than 3 dB L_{dn} at noise-sensitive receptors would be considered significant when projected noise levels would exceed those considered satisfactory for the affected land use.

An increase greater than 5 dB L_{dn} would be considered significant when projected noise levels would continue to meet those considered satisfactory for the affected land use.

No discernible vibration shall be permitted.

Non-residential Areas

An increase greater than 10 dB L_{dn} would be considered significant when projected noise levels would continue to meet those considered satisfactory for the affected land use, i.e. 70dB L_{dn}.

3.0 NOISE SENSITIVE LOCATIONS

For the purposes of the noise impact assessment the closest residential properties have been included in the noise modeling procedure in order to present the worst-case. Figure 2 indicates the location of the nearest noise sensitive locations assessed.

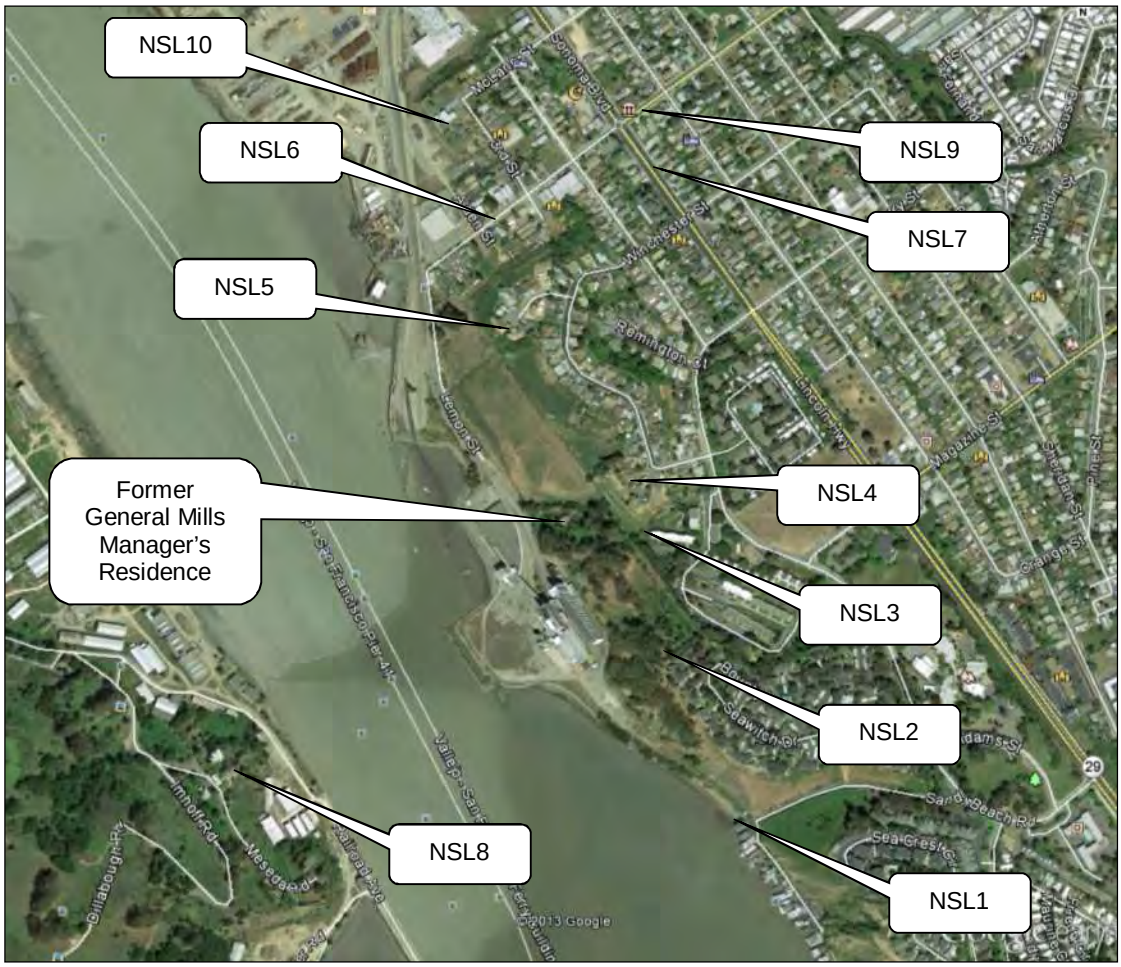

Figure 2 Noise Sensitive Locations

Table 1 describes each location in more detail.

Location	Description
NSL1	Sandy Beach Road Residences
NSL2	Seawitch Lane Residences
NSL3	Harbor Park Apartments
NSL4	Browning Way Residences
NSL5	Colt Ct Residences
NSL6	Lemon Street Residences West of Sonoma Blvd
NSL7	Sonoma Boulevard Residences
NSL8	Mare Island
NSL9	Lemon Street Residences East of Sonoma Blvd
NSL10	Residential Property near Rail Tracks on 3rd Street

Table 1 Noise Sensitive Locations

Please note that the former General Mills manager's residence located within the site boundary is no longer a habitable residence. Table 2 lists the land use of each noise sensitive location and the adopted significance threshold for noise impacts.

Location	Land Use Zoning	Significance Threshold
NSL1	High Density Residential	+5
NSL2	High Density Residential	+5
NSL3	High Density Residential	+5
NSL4	Low Density Residential	+5
NSL5	Low Density Residential	+5
NSL6	Intensive Use	+10
NSL7	Low Density Residential	+3
NSL8	Low Density Residential	+5
NSL9	Low Density Residential / Intensive Use	+3
NSL10	Low Density Residential	+5

Table 2 Summary of Significance Thresholds

4.0 CONSTRUCTION PHASE CUMULATIVE ASSESSMENT

4.1 Construction Noise

Short-term noise impacts will occur during the site preparation and construction phases of the project. To assess the construction noise levels the Roadway Construction Noise Model (RCNM) developed by the Federal Highway Administration (FHWA) has been used. Each phase of the construction activity has been assessed separately for each development examining the three closest noise sensitive locations to the development site, i.e. NSL1, NSL2 and NSL3. For a detailed discussion on the individual construction noise assessments please refer to the noise impact assessments prepared for each site.

Two types of short-term noise impacts would occur during site preparation and project construction. The impacts will include:

- Increase in traffic flow on local streets associated with the transport of workers, equipment and materials to and from the project site, and;
- Heavy construction equipment operating on the project site.

The first type would result from the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from slow moving passing trucks (75 dBA L_{max} at 50 feet) would be similar to existing vehicle- generated noise. For this reason, short-term intermittent noise from trucks would be minor when averaged over a longer time period. In addition, according to the City's noise ordinance, noise from temporary transportation of goods or people to and from a given premises is exempt from the City's noise standards. It should also be noted that noise emission levels from vehicles themselves (such as muffler requirements) are regulated by federal and State governments and are exempt from local government regulations. Therefore, short-term construction-related noise associated with worker and equipment transport to the proposed project site would result in a less-than-significant impact on receptors along the access routes leading to the proposed project site.

The second type of short-term noise impact is related to the noise generated by heavy construction equipment operating on the project site. Noise generated during demolition, excavation, grading, site preparation, and building erection on the project site would result in potential noise impacts on offsite uses. Existing receptors in the vicinity, as discussed in Section 3.0, would be subject to short-term noise generated by construction equipment and activities on the project site when construction occurs.

Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. While it is envisaged that both developments would be constructed simultaneously it is difficult to know in advance exactly how each phase of construction would overlap on both sites. Therefore, Table 3 presents the predicted maximum noise levels at these nearest noise sensitive locations for a range of expected construction activities for both developments. The predicted construction noise levels from each development are not dissimilar at each location. The major difference between the two developments in terms of construction is the requirement for piling on the VMT site.

Construction Activity	Type of Equipment	Predicted dBA L_{max} Levels					
		VMT Construction			Orcem Construction		
		NSL1	NSL2	NLS3	NSL1	NSL2	NLS3
Demolition	Front End Loader	47	52	56	52	61	57
	Excavator (x2)	52	57	61	57	66	62
	Crane	49	54	57	53	63	59
	Mounted Impact Hammer (hoe ram)	58	64	67	63	72	69
	Grapple (on backhoe)	55	60	64	60	69	65
	Dump Truck	45	50	53	49	58	55
Ground Works & Excavation	Backhoe	56	60	55	50	60	56
	Excavator (x2)	62	67	61	57	66	62
	Front End Loader	57	62	56	52	61	57
	Roller	57	63	57	53	63	59
	Tractor	62	67	61	57	66	62
	Vacuum Street Sweeper	60	64	59	54	64	60
Piling	Impact Pile Driver	72	75	74	No piling required		
Concrete & Steel Works	Concrete Mixer Truck	57	61	56	52	61	52
	Concrete Pump Truck	60	64	59	55	64	54
	Concrete Saw	68	72	67	63	72	62
	Crane	59	63	58	54	63	53
	Drum Mixer	59	62	57	53	63	53
	Flat Bed Truck	53	56	51	48	57	47
	Pneumatic Tools	64	67	62	59	68	58
	Welder/Torch	53	56	51	47	57	47

Table 3 Typical Construction Noise Levels

The closest noise sensitive land uses to the project construction areas are NSL1, NSL2 and NSL3 which overlook the project site. These properties are located between 360 and 1427 feet from the construction activity. At these distances, maximum noise levels from construction activities at the building site could range from 45dBA up to 75dBA L_{max} at the property line of the nearest sensitive locations.

It should be noted that the Vallejo Noise Ordinance does not specify limit values for construction noise. Instead the City proposes allowable hours for construction activity within the Noise Element in Policy 2b. The recommended allowable hours are 7:00am to 09:00pm.

Furthermore, Section 16.72.050 if the Vallejo Code of Ordinances states that in relation to the maximum permissible sound levels within the Performance Standard Regulations, sounds from temporary construction or demolition work may exceed these maximum sound pressure levels upon compliance with state conditions.

In summary the construction phase has the potential to generate a substantial temporary increase in ambient noise levels in the vicinity of the project. However, implementation of the following multi-part mitigation measure would reduce potential construction period noise impacts.

- All construction equipment must have appropriate sound muffling devices, which shall be properly maintained and used at all times such equipment is in operation.

- Where feasible, the project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- The construction contractor shall locate on-site equipment staging areas so as to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site.
- Except as otherwise permitted, construction activities shall be restricted to the hours of 7:00 a.m. to 9:00 p.m. daily. (LTS)
- The following mitigation measures are specific to pile driving:

    - Enclosing the hammer head and top of pile in an acoustic screen;
    - Use a resilient pad between the pile and hammer head to reduce impact noise;
    - Correct alignment of pile and rig to reduce noise from pile guides and attachments, and;
    - Use acoustic screens or efficient sound reducing exhausts to power units.

4.2 Construction Vibration

Construction activities associated with implementation of the proposed project could temporarily expose persons in the vicinity of the project site to excessive groundborne vibration or groundborne noise levels. Typical vibration source levels for construction equipment are shown in Table 4.

Type of Equipment		V_{dB} @ 25 feet
Pile Driver (impact)	Upper Range	112
	Typical	104
Pile Driver (sonic)	Upper Range	105
	Typical	93
Clam shovel drop (slurry wall)		94
Hydromill (slurry wall)	In Soil	66
	In Rock	75
Vibratory roller		94
Hoe ram		87
Large bulldozer		87
Caisson drilling		87
Loaded trucks		86
Jackhammer		79
Small bulldozer		58

Table 4 Typical Construction Ground Vibration Levels (Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.* May.)

Typical groundborne vibration levels measured at a distance of 25 feet from heavy construction equipment in full operation, such as impact pile drivers, range up to approximately 112 VdB. The proposed piling activity required during the construction of the VMT facility is located at the water's edge at the position of the new concrete pile supported wharf. This is located at a distance of over 900 feet from the nearest noise sensitive residence.

The Vallejo City Performance Standards (Chapter 16.72 of the Code of Ordinances) restrict any land use from producing vibration levels that are discernible without instruments at any point on the property line on which the use is located. Groundborne vibration levels from the operation of heavy construction equipment that will be used in demolition or construction of the proposed project would not be

expected to cause damage to residential buildings of normal northern California construction.

In this instance given the location of the nearest sensitive receptors to the site and the distance between them and the construction activity, in particular piling activity on the dock at the waters' edge, it is not considered likely that there will be any perceptible vibration during construction activity.

5.0 OPERATIONAL PHASE ASSESSMENT

The operational phase of both developments has been assessed separately in previously prepared technical reports and in both instances a series of mitigation measures have been proposed to control the individual noise impact of each development. This section examines the cumulative noise impact of both sites operating together and includes the benefit of the mitigation measures proposed separately for each development.

By way of summary the following discussion describes the planned operation and phasing of each development.

Orcem

The Orcem Plant production process involves four key elements with regard to noise generation as follows:

1. Transport to and storage of raw materials on the Site, including Granulated Blast Furnace Slag (GBFS), cement and other additives;
2. Transport of raw material from storage to the Process Plant;
3. Drying, grinding and blending GBFS granulate and other raw materials and additives, and;
4. Transport of finished GGBS and cements to markets.

The development is proposed to be implemented on a scaled basis over two phases. The phases are:

Phase 1: Up to a production of 500,000 tons per year.
Phase 2: Above 500,000 tons per year.

In addition, the facility will be capable of operating in several modes as follows:

1. GGBS production only.
2. Cement Production only.
3. Both GGBS & Cement Production together but in independent production runs.

The mode of operation has an impact on the volume of vehicular movements on the local road network as certain modes require the importation of raw material via the road network in addition to the importation of material by ship. In addition, Modes 2 and 3 require a Clinker Storage building and associated mechanical plant to be constructed. This building is not required for Mode 1 operation. This will be discussed in more detail in the following sections.

VMT

VMT is proposing to construct a multi-phased bulk aggregate import and distribution facility on the existing terminal footprint. The general transportation method is to

unload dry bulk cargo from vessels, temporarily store, and reclaim from storage to cargo trucks and railcars for local and regional distribution. In addition, the terminal design allows re-loading cargo to barges to enable VMT to engage in short-sea shipping initiatives with other California ports and terminals.

The development is proposed to be implemented on a scaled basis over two phases. The phases are identified as:

Phase 1: Wharf 1 only with rail and truck transport options.
Phase 2: Wharf 2 constructed allowing rail, truck and barge transport options.

In order to present a realistic assessment of the potential cumulative noise impacts of both sites operating simultaneously the following scenarios have been presented:

A. Noise impact of Orcem production and truck movements on the local road network plus noise impact of VMT unloading a vessel and transporting material by truck only;
B. Noise impact of Orcem production and truck movements on the local road network plus noise impact of VMT unloading a vessel and transporting material by truck and rail;
C. Noise impact of Orcem production, truck movements on the local road network and rail shipment occurring plus noise impact of VMT unloading a vessel and transporting material by truck only;
D. Noise impact of Orcem production and truck movements on the local road network plus noise impact of VMT unloading a vessel and transporting material by truck, rail and barge. This is considered to be the worst-case scenario;

Each scenario is presented for each noise sensitive location in the following sections.

5.1 Scenario A

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB L_{dn}	Existing Baseline dB L_{dn}	Total Noise Level dB L_{dn}	Increase in Noise Level, dB L_{dn}
1	1	1	45	45	48	55	56	1
		2	46	45	49		56	1
		3	46	45	49		56	1
	2	1	46	45	49		56	1
		2	45	45	48		56	1
		3	45	45	48		56	1
2	1	1	55	49	56	53	58	5
		2	55	49	56		58	5
		3	55	49	56		58	5
	2	1	55	49	56		58	5
		2	56	49	57		58	5
		3	56	49	57		58	5
3	1	1	51	42	52	52	55	3
		2	52	42	52		55	3
		3	52	42	52		55	3
	2	1	52	42	52		55	3
		2	52	42	53		55	3
		3	52	42	53		55	3

Table 5 Cumulative Noise Levels due to Orcem & VMT Activity – Scenario A

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB Ldn	Existing Baseline dB Ldn	Total Noise Level dB Ldn	Increase in Noise Level, dB Ldn
4	1	1	52	45	53	52	55	3
		2	53	45	54		56	4
		3	53	45	54		56	4
	2	1	53	45	54		56	4
		2	53	45	54		56	4
		3	53	45	54		56	4
5	1	1	50	49	53	52	56	4
		2	52	49	54		56	4
		3	51	49	53		56	4
	2	1	52	49	54		56	4
		2	53	49	55		57	5
		3	52	49	54		56	4
6	1	1	62	61	65	57	65	8
		2	64	61	66		66	9
		3	62	61	67		67	10
	2	1	64	61	66		66	9
		2	66	61	67		67	10
		3	64	61	66		66	9
7	1	1	57	61	62	63	66	3
		2	59	61	63		66	3
		3	58	61	63		66	3
	2	1	59	61	63		66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
8	1	1	48	48	51	54*	56	2
		2	48	48	51		56	2
		3	48	48	51		56	2
	2	1	48	48	51		56	2
		2	49	48	51		56	2
		3	49	48	51		56	2
9	1	1	60	61	64	63	66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
	2	1	61	61	64		67	4
		2	63	61	65		67	4
		3	61	61	64		67	4
10	1	1	38	35	40	52*	52	0
		2	40	35	41		52	0
		3	40	35	41		52	0
	2	1	40	35	41		52	0
		2	40	35	41		52	0
		3	40	35	41		52	0

Table 5 cont.. Cumulative Noise Levels due to Orcem & VMT Activity – Scenario A

Note * The L_{dn} levels at these properties have been estimated based on the short term measurements taken. The estimate was arrived at by assuming a 7dB difference in L_{Aeq} level between day and night-time periods. This was derived from an analysis of the long-term unattended monitors used during the survey period.

Table 6 summarizes the noise impacts and identifies those locations where a significant increase in the existing ambient noise level may occur.

NSL	Predicted Increase in Noise	Comment	Mitigation Required
1	1dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
2	5dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
3	3dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
4	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
5	4 – 5dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
6	8 – 10dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist. Note this property is located in an area zoned for industry.	No
7	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
8	2dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
9	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
10	0dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No

Table 6 Comparison of Noise Levels to CEQA Thresholds of Significance – Scenario A

At NSL7 and NSL9 there is a very slight increase above the allowable increase of 1dB. When this is examined in more detail it is apparent that the actual exceedance is of the order of 0.5dB and due to a rounding exercise a slight exceedance is identified. An exceedance of this magnitude is imperceptible and it is considered impractical to provide mitigation for such a small amount.

Therefore, it is considered that all locations assessed are below the threshold of significance for a permanent and significant noise impact to occur and no further mitigation is required.

5.2 Scenario B

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB L_{dn}	Existing Baseline dB L_{dn}	Total Noise Level dB L_{dn}	Increase in Noise Level, dB L_{dn}
1	1	1	45	46	49	55	56	1
		2	46	46	49		56	1
		3	46	46	49		56	1
	2	1	46	47	50		56	1
		2	45	47	49		56	1
		3	45	47	49		56	1
2	1	1	55	51	56	53	58	5
		2	55	51	56		58	5
		3	55	51	56		58	5
	2	1	55	51	56		58	5
		2	56	51	57		59	6
		3	56	51	57		59	6

Table 7 Cumulative Noise Levels due to Orcem & VMT Activity – Scenario B

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB L_{dn}	Existing Baseline dB L_{dn}	Total Noise Level dB L_{dn}	Increase in Noise Level, dB L_{dn}
3	1	1	51	48	53	52	55	3
		2	52	48	53		56	4
		3	52	48	53		56	4
	2	1	52	49	53		56	4
		2	52	49	54		56	4
		3	52	49	54		56	4
4	1	1	52	50	54	52	56	4
		2	53	50	55		56	4
		3	53	50	55		56	4
	2	1	53	51	55		57	5
		2	53	51	55		57	5
		3	53	51	55		57	5
5	1	1	50	55	56	52	58	6
		2	52	55	57		58	6
		3	51	55	56		58	6
	2	1	52	55	57		58	6
		2	53	55	57		58	6
		3	52	55	57		58	6
6	1	1	62	62	65	57	65	8
		2	64	62	66		66	9
		3	62	62	67		67	10
	2	1	64	62	66		66	9
		2	66	62	67		67	10
		3	64	62	66		66	9
7	1	1	57	61	63	63	66	3
		2	59	61	63		66	3
		3	58	61	63		66	3
	2	1	59	61	63		66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
8	1	1	48	50	52	54*	56	2
		2	48	50	52		56	2
		3	48	50	52		56	2
	2	1	48	51	53		57	3
		2	49	51	53		57	3
		3	49	51	53		57	3
9	1	1	60	61	64	63	66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
	2	1	61	61	64		67	4
		2	63	61	65		67	4
		3	61	61	64		67	4
10	1	1	38	53	53	52*	55	3
		2	40	53	53		55	3
		3	40	53	53		55	3
	2	1	40	53	53		55	3
		2	40	53	53		56	4
		3	40	53	53		56	4

Table 7 cont.. Cumulative Noise Levels due to Orcem & VMT Activity – Scenario B

Note * The L_{dn} levels at these properties have been estimated based on the short term measurements taken. The estimate was arrived at by assuming a 7dB difference in L_{Aeq} level between day and night-time periods. This was derived from an analysis of the long-term unattended monitors used during the survey period.

Table 8 summarizes the noise impacts and identifies those locations where a significant increase in the existing ambient noise level may occur.

NSL	Predicted Increase in Noise	Comment	Mitigation Required
1	1dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
2	5 – 6dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
3	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
4	4 – 5dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
5	6dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
6	8 – 10dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist. Note this property is located in an area zoned for industry.	No
7	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
8	2 – 3dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
9	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
10	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No

Table 8 Comparison of Noise Levels to CEQA Thresholds of Significance – Scenario B

At NSL2, NSL5, NSL7 and NSL9 there is a very slight increase above the allowable increase of 1dB. When this is examined in more detail it is apparent that the actual exceedance is of the order of 0.5dB and due to a rounding exercise a slight exceedance is identified. An exceedance of this magnitude is imperceptible and it is considered impractical to provide mitigation for such a predicted exceedance.

All other locations assessed are below the threshold of significance for a permanent and significant noise impact to occur and no further mitigation is required.

5.3 Scenario C

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB L_{dn}	Existing Baseline dB L_{dn}	Total Noise Level dB L_{dn}	Increase in Noise Level, dB L_{dn}
1	1	1	46	45	49	55	56	1
		2	46	45	49		56	1
		3	47	45	49		56	1
	2	1	47	45	49		56	1
		2	45	45	48		56	1
		3	46	45	49		56	1

Table 9 Cumulative Noise Levels due to Orcem & VMT Activity – Scenario C

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB L_{dn}	Existing Baseline dB L_{dn}	Total Noise Level dB L_{dn}	Increase in Noise Level, dB L_{dn}
2	1	1	55	49	56	53	58	5
		2	55	49	56		58	5
		3	55	49	56		58	5
	2	1	55	49	56		58	5
		2	56	49	57		58	5
		3	56	49	57		58	5
3	1	1	52	42	53	52	55	3
		2	52	42	52		55	3
		3	53	42	53		56	4
	2	1	53	42	53		56	4
		2	52	42	53		55	3
		3	53	42	54		56	4
4	1	1	53	45	54	52	56	4
		2	53	45	54		56	4
		3	54	45	54		56	4
	2	1	54	45	54		56	4
		2	53	45	54		56	4
		3	54	45	55		56	4
5	1	1	53	49	54	52	56	4
		2	52	49	54		56	4
		3	53	49	55		56	4
	2	1	53	49	55		57	5
		2	53	49	55		57	5
		3	54	49	55		57	5
6	1	1	62	61	65	57	65	8
		2	64	61	66		66	9
		3	62	61	67		67	10
	2	1	64	61	66		66	9
		2	66	61	67		67	10
		3	64	61	66		66	9
7	1	1	57	61	63	63	66	3
		2	59	61	63		66	3
		3	58	61	63		66	3
	2	1	59	61	63		66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
8	1	1	48	48	51	54*	56	2
		2	48	48	51		56	2
		3	49	48	51		56	2
	2	1	49	48	51		56	2
		2	49	48	51		56	2
		3	49	48	52		56	2
9	1	1	60	61	64	63	66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
	2	1	61	61	64		67	4
		2	63	61	65		67	4
		3	61	61	64		67	4

Table 9 cont.. Cumulative Noise Levels due to Orcem & VMT Activity – Scenario C

NSL	Phase	Mode	Orcem, dB Ldn	VMT, dB Ldn	Project Noise, dB Ldn	Existing Baseline dB Ldn	Total Noise Level dB Ldn	Increase in Noise Level, dB Ldn
10	1	1	48	35	48	52*	54	2
		2	40	35	41		52	0
		3	48	35	48		54	2
	2	1	48	35	48		54	2
		2	40	35	41		52	0
		3	48	35	48		54	2

Table 9 cont.. Cumulative Noise Levels due to Orcem & VMT Activity – Scenario C

Note * The L_{dn} levels at these properties have been estimated based on the short term measurements taken. The estimate was arrived at by assuming a 7dB difference in L_{Aeq} level between day and night-time periods. This was derived from an analysis of the long-term unattended monitors used during the survey period.

Table 10 summarizes the noise impacts and identifies those locations where a significant increase in the existing ambient noise level may occur.

NSL	Predicted Increase in Noise	Comment	Mitigation Required
1	1dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
2	5dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
3	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
4	4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
5	4 – 5dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
6	8 – 10dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist. Note this property is located in an area zoned for industry.	No
7	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
8	2dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
9	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
10	0 – 2dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No

Table 10 Comparison of Noise Levels to CEQA Thresholds of Significance – Scenario C

At NSL7 and NSL9 there is a very slight increase above the allowable increase of 1dB. When this is examined in more detail it is apparent that the actual exceedance is of the order of 0.5dB and due to a rounding exercise a slight exceedance is identified. An exceedance of this magnitude is imperceptible and it is considered impractical to provide mitigation for such a small exceedance.

All other locations assessed are below the threshold of significance for a permanent and significant noise impact to occur and no further mitigation is required.

5.4 Scenario D

NSL	Phase	Mode	Orcem, dB L_{dn}	VMT, dB L_{dn}	Project Noise, dB L_{dn}	Existing Baseline dB L_{dn}	Total Noise Level dB L_{dn}	Increase in Noise Level, dB L_{dn}
1	1	1	45	47	49	55	56	1
		2	46	47	50		56	1
		3	46	47	50		56	1
	2	1	46	47	50		56	1
		2	45	47	49		56	1
		3	45	47	49		56	1
2	1	1	55	51	56	53	58	5
		2	55	51	56		58	5
		3	55	51	56		58	5
	2	1	55	51	56		58	5
		2	56	51	57		59	6
		3	56	51	57		59	6
3	1	1	51	49	53	52	56	4
		2	52	49	53		56	4
		3	52	49	53		56	4
	2	1	52	49	53		56	4
		2	52	49	54		56	4
		3	52	49	54		56	4
4	1	1	52	51	54	52	56	4
		2	53	51	55		57	5
		3	53	51	55		57	5
	2	1	53	51	55		57	5
		2	53	51	55		57	5
		3	53	51	55		57	5
5	1	1	50	55	56	52	58	6
		2	52	55	57		58	6
		3	51	55	56		58	6
	2	1	52	55	57		58	6
		2	53	55	57		58	6
		3	52	55	57		58	6
6	1	1	62	62	65	57	65	8
		2	64	62	66		66	9
		3	62	62	67		67	10
	2	1	64	62	66		66	9
		2	66	62	67		67	10
		3	64	62	66		66	9

Table 11 Cumulative Noise Levels due to Orcem & VMT Activity – Scenario D

NSL	Phase	Mode	Orcem, dB Ldn	VMT, dB Ldn	Project Noise, dB Ldn	Existing Baseline dB Ldn	Total Noise Level dB Ldn	Increase in Noise Level, dB Ldn
7	1	1	57	61	63	63	66	3
		2	59	61	63		66	3
		3	58	61	63		66	3
	2	1	59	61	63		66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
8	1	1	48	51	53	54*	57	3
		2	48	51	53		57	3
		3	48	51	53		57	3
	2	1	48	51	53		57	3
		2	49	51	53		57	3
		3	49	51	53		57	3
9	1	1	60	61	64	63	66	3
		2	61	61	64		67	4
		3	60	61	64		66	3
	2	1	61	61	64		67	4
		2	63	61	65		67	4
		3	61	61	64		67	4
10	1	1	38	53	53	52*	55	3
		2	40	53	53		55	3
		3	40	53	53		55	3
	2	1	40	53	53		55	3
		2	40	53	53		56	4
		3	40	53	53		56	4

Table 11 cont.. Cumulative Noise Levels due to Orcem & VMT Activity – Scenario D

Note * The L_{dn} levels at these properties have been estimated based on the short term measurements taken. The estimate was arrived at by assuming a 7dB difference in L_{Aeq} level between day and night-time periods. This was derived from an analysis of the long-term unattended monitors used during the survey period.

Table 12 summarizes the noise impacts and identifies those locations where a significant increase in the existing ambient noise level may occur.

NSL	Predicted Increase in Noise	Comment	Mitigation Required
1	1dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
2	5 – 6dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
3	4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
4	4 – 5dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No
5	6dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
6	8 – 10dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist. Note this property is located in an area zoned for industry.	No
7	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
8	3dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No

Table 12 Comparison of Noise Levels to CEQA Thresholds of Significance – Scenario D

NSL	Predicted Increase in Noise	Comment	Mitigation Required
9	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	See Discussion
10	3 – 4dB	This is not considered to be a significant permanent increase in the noise level according to the CEQA checklist	No

Table 12 cont.. Comparison of Noise Levels to CEQA Thresholds of Significance – Scenario D

At NSL2, NSL5, NSL7 and NSL9 there is a very slight increase above the allowable increase of 1dB. When this is examined in more detail it is apparent that the actual exceedance is of the order of 0.5dB and due to a rounding exercise a slight exceedance is identified. An exceedance of this magnitude is imperceptible and it is considered impractical to provide mitigation for such a small exceedance.

All other locations assessed are below the threshold of significance for a permanent and significant noise impact to occur and no further mitigation is required.

5.5 Operational Vibration

Unlike sound, which can travel over distance, vibrations from transportation sources have a localized effect. When assessing vibration Chapter 16 of the City of Vallejo's Municipal Code specifies that,

> *"No use shall be operated in a manner which produces vibrations discernible without instruments at any point on the property line of the lot on which the use is located."*

The major source of operational vibration will be as a result of rail and truck movements to and from the site. In relation to rail movements there is no cumulative impact as a result of both sites operating due to the fact that both sites cannot receive trains simultaneously. Therefore the conclusion of the individual assessments that there will be no perceptible vibration as a result of train activity is correct for this cumulative assessment also.

In relation to truck movements on the local road network there is potential for some groundborne vibrations to be generated by discontinuities in the road surface. However, by ensuring that the road surface is smooth and well maintained the potential for these vibrations is significantly reduced. This conclusion is not affected by the cumulative assessment conducted here.

In summary, there is not expected to be any significant groundborne vibration generated as a result of the operation of the Orcem and VMT facilities.

6.0 CONCLUSION

The potential cumulative noise and vibration impact of the proposed Orcem and VMT facilities has been assessed. The impact assessment has been carried out for both the construction and operational phases of the developments.

For the operational phase the noise impact has been determined for a variety of possible operating scenarios through a comparison of the predicted cumulative project noise levels against the existing ambient noise levels determined through a baseline survey. For residentially zoned lands in the vicinity a significant noise impact has been identified for areas where the project related noise causes a greater than 5dB increase above the existing ambient or a greater than 3dB increase in areas where the with project noise level exceeds the normally acceptable noise level proposed in the Vallejo General Plan. In addition, for locations within non-residentially zoned lands a significant noise impact is defined as a greater than 10dB increase above the existing ambient.

The construction phase of the project has been assessed using the calculation methodology detailed in the Roadway Construction Noise Model (RCNM) developed by the Federal Highway Administration (FHWA). It has been found that the construction activity has the potential to generate a substantial temporary increase in ambient noise levels in the vicinity of the project. However, implementation of the following multi-part mitigation measure would reduce potential construction period noise impacts.

- All construction equipment must have appropriate sound muffling devices, which shall be properly maintained and used at all times such equipment is in operation.
- Where feasible, the project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- The construction contractor shall locate on-site equipment staging areas so as to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site.
- Except as otherwise permitted, construction activities shall be restricted to the hours of 7:00 a.m. to 9:00 p.m. daily.

Construction vibration is not expected to generate any significant impact due to the distance between the construction activity and the nearest properties.

The results of the operational phase assessment have found that there will be scenarios where the with project noise level exceeds the threshold of significance by a small margin of ≤1dB. This small exceedance is below the subjective limen if the human ear and therefore it is proposed that additional mitigation is not required.

No source of vibration is expected during the operational phase.

In conclusion, with appropriate noise mitigation measures the proposed VMT facility can operate without generating a significant and permanent noise impact on the surrounding environment.

APPENDIX A

Glossary of Acoustic Terminology

Term	Description
dB	'Decibel' – Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	'A-Weighted Decibel' – The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
$L_{Aeq,T}$	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period. This parameter is indicative of the "average" noise level occurring over the sample period (T).
$L_{A1,T}$	This is the sound level that is exceeded for 1% of the sample period. It is typically used as a descriptor for infrequent loud noise events of short duration, e.g. truck pass-bys.
$L_{A10,T}$	This is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
$L_{A50,T}$	This is the sound level that is exceeded for 50% of the sample period.
$L_{A90,T}$	This is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
L_{AMax}	This is the maximum sound level that is exceeded during the sample period.
L_{WA}	The A-weighted sound power level. Unlike sound pressure, sound power is neither room dependent nor distance dependent. Sound power belongs strictly to the sound source. Sound pressure is a measurement at a point in space near the source, while sound power is the total power produced by the source in all directions.
$L_{eq(24hr)}$	The average noise level over 24hours based on the A-weighted L_{eq} noise levels
L_{dn}	The day-night average noise level is a weighted average based on the A-weighted noise levels during the daytime (07:00hrs to 22:00hrs) and night-time (22:00hrs to 07:00hrs) with a 10dB weighting applied during the night-time period.
CNEL	The Community Noise Equivalent Level is a weighted average based on the A-weighted noise levels during the daytime (07:00hrs to 19:00hrs), evening time (19:00hrs and 22:00hrs) and night-time (22:00hrs to 07:00hrs) with a 5dB weighting applied during the evening time and a 10dB weighting applied during the night-time period.