

Appendix D

Noise Modeling Data

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per City of Los Angeles = **75**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **0.25**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 0.25-hour Leq
Demolition	Concrete Saw	1	20	90		50	90.0	0.25	15	83
	Dozer	1	40	82		50	82.0	0.25	15	78
	Backhoe	3	40	78		50	78.0	0.25	15	79
Total for Demolition Phase:										85.3
Site Preparation and Grading	Grader	1	40	85		50	85.0	0.25	15	81
	Dozer	1	40	82		50	82.0	0.25	15	78
	Backhoe	2	40	78		50	78.0	0.25	15	77
Total for Site Preparation and Grading Phase:										83.8
Bldg. Construction 1	Man Lift	1	20	75	forklift	50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Generator (<25KVA, VMS signs)	1	50	70		50	70.0	0.25	15	67
	Backhoe	1	40	78		50	78.0	0.25	15	74
Total for Bldg. Construction 1 Phase:										77.5
Bldg. Construction 2	Man Lift	1	20	75		50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	83	*rough terrain forklift	50	83.0	0.25	15	79
Total for Bldg. Construction 2 Phase:										80.3
Bldg. Construction 3	Generator (<25KVA, VMS signs)	1	50	70		50	70.0	0.25	15	67
	Backhoe	1	40	78		50	78.0	0.25	15	74
Total for Bldg. Construction 3 Phase:										74.8
Bldg. Construction 4	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	83	*rough terrain forklift	50	83.0	0.25	15	79
Total for Bldg. Construction 4 Phase:										80.0
Bldg. Construction 5	Gradall	1	40	83	*rough terrain forklift	50	83.0	0.25	15	79
Total for Bldg. Construction 5 Phase:										79.0
Bldg. Construction 6	Man Lift	1	20	75		50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	83	*rough terrain forklift	50	83.0	0.25	15	79
	Excavator	1	40	81		50	81.0	0.25	15	77
	Drill Rig Truck	1	20	79	*bore/drill rig	50	79.0	0.25	15	72
Total for Bldg. Construction 6 Phase:										82.4
Bldg. Construction 7	Man Lift	1	20	75		50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	83	*rough terrain forklift	50	83.0	0.25	15	79
Total for Bldg. Construction 7 Phase:										80.3
Architectural Coating	Compressor (air)	1	40	78		50	78.0	0.25	15	74
Total for Architectural Coating Phase:										74.0
Paving	Paver	1	50	77		50	77.0	0.25	15	74
	Roller	1	20	80		50	80.0	0.25	15	73
Total for Paving Phase:										76.5

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Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 0.25-hour Leq
Demolition	Concrete Saw	1	20	82		50	81.9	0.25	15	75
	Dozer	1	40	79		50	78.9	0.25	15	75
	Backhoe	1	40	78		50	78.0	0.25	15	74
	Total for Demolition Phase:									79.4
Site Preparation and Grading	Grader	1	40	79		50	78.9	0.25	15	75
	Dozer	1	40	79		50	78.9	0.25	15	75
	Backhoe	1	40	78		50	78.0	0.25	15	74
	Total for Site Preparation and Grading Phase:									79.4
Bldg. Construction 1	Man Lift	1	20	75	forklift	50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Generator (<25KVA, VMS signs)	1	50	70		50	70.0	0.25	15	67
	Backhoe	1	40	78		50	78.0	0.25	15	74
Bldg. Construction 2	Total for Bldg. Construction 1 Phase:									77.5
	Man Lift	1	20	75		50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	79	*rough terrain forklift	50	78.9	0.25	15	75
Bldg. Construction 3	Total for Bldg. Construction 2 Phase:									77.6
	Generator (<25KVA, VMS signs)	1	50	70		50	70.0	0.25	15	67
	Backhoe	1	40	78		50	78.0	0.25	15	74
	Total for Bldg. Construction 3 Phase:									74.8
Bldg. Construction 4	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	79	*rough terrain forklift	50	78.9	0.25	15	75
	Total for Bldg. Construction 4 Phase:									77.1
	Gradall	1	40	79	*rough terrain forklift	50	78.9	0.25	15	75
Bldg. Construction 5	Total for Bldg. Construction 5 Phase:									74.9
	Gradall	1	40	79	*rough terrain forklift	50	78.9	0.25	15	75
	Total for Bldg. Construction 6 Phase:									80.2
	Man Lift	1	20	75		50	75.0	0.25	15	68
Bldg. Construction 6	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	79	*rough terrain forklift	50	78.9	0.25	15	75
	Excavator	1	40	79		50	78.9	0.25	15	75
	Drill Rig Truck	1	20	79	*bore/drill rig	50	79.0	0.25	15	72
Bldg. Construction 7	Total for Bldg. Construction 7 Phase:									77.6
	Man Lift	1	20	75		50	75.0	0.25	15	68
	Crane	1	16	81		50	81.0	0.25	15	73
	Gradall	1	40	79	*rough terrain forklift	50	78.9	0.25	15	75
Architectural Coating	Total for Architectural Coating Phase:									74.0
	Compressor (air)	1	40	78		50	78.0	0.25	15	74
	Total for Paving Phase:									76.5
	Paver	1	50	77		50	77.0	0.25	15	74
Paving	Roller	1	20	80		50	80.0	0.25	15	73

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noise level limit for construction phase, per City of Los Angeles = **75**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **0.25**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 0.25-hour Leq
Site Preparation	Paver	1	50	77		50	77.0	0.25	15	74
Total for Site Preparation Phase:										74.0
Grading - Installation	Excavator	1	40	81		50	81.0	0.25	15	77
	Dump Truck	1	40	76		50	76.0	0.25	15	72
	Roller	1	20	80		50	80.0	0.25	15	73
Total for Grading - Installation Phase:										79.4
Grading - Slurry Backfill	Concrete Mixer Truck	1	40	79		50	79.0	0.25	15	75
Total for Grading - Slurry Backfill Phase:										75.0
Continual Paving	Paver	1	50	77		50	77.0	0.25	15	74
	Roller	1	20	80		50	80.0	0.25	15	73
Total for Continual Paving Phase:										76.5
Continual Pavement Striping	Flat Bed Truck	1	40	74	striper truck	50	74.0	0.25	15	70
Total for Continual Pavement Striping Phase:										70.0
Final Paving	Paver	1	50	77		50	77.0	0.25	15	74
	Roller	1	20	80		50	80.0	0.25	15	73
	Pavement Scarifier	1	20	85	"milling machine"	50	85.0	0.25	15	78
Total for Final Paving Phase:										80.3

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noise level limit for construction phase, per City of Los Angeles = **75**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **0.25**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 0.25-hour Leq
Site Preparation	Paver	1	50	77		50	77.0	0.25	15	74
Total for Site Preparation Phase:										74.0
Grading - Installation	Excavator	1	40	79		50	78.9	0.25	15	75
	Dump Truck	1	40	76		50	76.0	0.25	15	72
	Roller	1	20	80		50	80.0	0.25	15	73
Total for Grading - Installation Phase:										78.3
Grading - Slurry Backfill	Concrete Mixer Truck	1	40	79		50	78.9	0.25	15	75
Total for Grading - Slurry Backfill Phase:										74.9
Continual Paving	Paver	1	50	77		50	77.0	0.25	15	74
	Roller	1	20	80		50	80.0	0.25	15	73
Total for Continual Paving Phase:										76.5
Continual Pavement Striping	Flat Bed Truck	1	40	74	striper truck	50	74.0	0.25	15	70
Total for Continual Pavement Striping Phase:										70.0
Final Paving	Paver	1	50	77		50	77.0	0.25	15	74
	Roller	1	20	80		50	80.0	0.25	15	73
	Pavement Scarifier	1	20	79	"milling machine"	50	78.9	0.25	15	72
Total for Final Paving Phase:										77.8

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noise level limit for construction phase, per City of Santa Monica = **80**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **1**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Site Preparation	Paver	1	50	77		50	77.0	1	60	74
Total for Site Preparation Phase:										74.0
Grading - Installation	Excavator	1	40	81		50	81.0	1	60	77
	Dump Truck	1	40	76		50	76.0	1	60	72
	Roller	1	20	80		50	80.0	1	60	73
Total for Grading - Installation Phase:										79.4
Grading - Slurry Backfill	Concrete Mixer Truck	1	40	79		50	79.0	1	60	75
Total for Grading - Slurry Backfill Phase:										75.0
Continual Paving	Paver	1	50	77		50	77.0	1	60	74
	Roller	1	20	80		50	80.0	1	60	73
Total for Continual Paving Phase:										76.5
Continual Pavement Striping	Flat Bed Truck	1	40	74	striper truck	50	74.0	1	60	70
Total for Continual Pavement Striping Phase:										70.0
Final Paving	Paver	1	50	77		50	77.0	1	60	74
	Roller	1	20	80		50	80.0	1	60	73
	Pavement Scarifier	1	20	85	"milling machine"	50	85.0	1	60	78
Total for Final Paving Phase:										80.3

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noise level limit for construction phase, per City of Santa Monica = **80**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **1**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Site Preparation	Paver	1	50	77		50	77.0	1	60	74
Total for Site Preparation Phase:										74.0
Grading - Installation	Excavator	2	25	81		50	81.0	1	60	78
	Roller	1	20	80		50	80.0	1	60	73
Total for Grading - Installation Phase:										79.2
Grading - Slurry Backfill	Concrete Mixer Truck	1	40	79		50	79.0	1	60	75
Total for Grading - Slurry Backfill Phase:										75.0
Continual Paving	Paver	1	50	77		50	77.0	1	60	74
	Roller	1	20	80		50	80.0	1	60	73
Total for Continual Paving Phase:										76.5
Continual Pavement Striping	Flat Bed Truck	0	40	74	striper truck	50	74.0	1	60	0
Total for Continual Pavement Striping Phase:										0.0
Final Paving	Paver	1	50	77		50	77.0	1	60	74
	Roller	1	20	80		50	80.0	1	60	73
	Pavement Scarafier	1	20	85	"milling machine"	50	85.0	1	60	78
Total for Final Paving Phase:										80.3

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noise level limit for construction phase, per City of Santa Monica = **85**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **1**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Grading - Well Pads	Dump Truck	1	40	76		50	76.0	1	60	72
	Excavator	1	40	81		50	81.0	1	60	77
	Concrete Mixer Truck	1	40	79		50	79.0	1	60	75
Total for Grading - Well Pads Phase:										79.9
Well Equipping	Excavator	1	40	81		50	81.0	1	60	77
	Drill Rig Truck	1	20	79		50	79.0	1	60	72
	Generator	1	50	72		50	72.0	1	60	69
	Welder / Torch	1	40	73		50	73.0	1	60	69
Total for Well Equipping Phase:										79.1
Artistic Fencing	Excavator	1	40	81		50	81.0	1	60	77
Total for Artistic Fencing Phase:										77.0

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noise level limit for construction phase, per City of Santa Monica = **80**
allowable hours over which Leq is to be averaged (example: 8 for per FTA guidance) = **1**

Construction Phase or Feature	Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) User's Guide Equipment Type	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Project Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq
Grading - Well Pads	Dump Truck	1	40	76		50	76.0	1	60	72
	Excavator	1	40	81		50	81.0	1	60	77
	Concrete Mixer Truck	1	40	79		50	79.0	1	60	75
Total for Grading - Well Pads Phase:										79.9
Well Equipping	Excavator	1	40	81		50	81.0	1	60	77
	Drill Rig Truck	1	20	79		50	79.0	1	60	72
	Generator	1	50	72		50	72.0	1	60	69
	Welder / Torch	1	40	73		50	73.0	1	60	69
Total for Well Equipping Phase:										79.1
Artistic Fencing	Excavator	1	40	81		50	81.0	1	60	77
Total for Artistic Fencing Phase:										77.0

**OLYMPIC WELL FIELD RESTORATION AND ARCADIA WATER TREATMENT PLANT
EXPANSION PROJECT
MITIGATED NEGATIVE DECLARATION – SECTION 3.11 – APPENDIX D-2**

Prepared by: Mark Storm, INCE Bd. Cert. (Dudek Acoustic Services Manager)
Date: February 18, 2020

The information provided below is intended to provide supporting detail for the operational noise impact assessment for the Olympic Wellfield Restoration and Arcadia Water Treatment Plant (WTP) Expansion (Project).

Methodology

Arcadia Water Treatment Plant Expansion

Prediction of post-construction operation noise attributed to Project features (either added to the WTP or resulting in renovation or replacement of WTP systems and components) involved creation of a sound propagation model using the CadnaA (Computer Aided Noise Abatement) software program. CadnaA is a commercially available computer-modeling program for calculation, presentation, assessment, and prediction of environmental noise. Estimated sound emissions from pumps, blowers, and other major noise-producing equipment was input into CadnaA, along with site plan information. The outdoor noise propagation formulas follow ISO Standard 9613-2, Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation.

For purposes of this analysis, Figure 1 shows the planned locations of the proposed new noise-producing features associated with the Project.

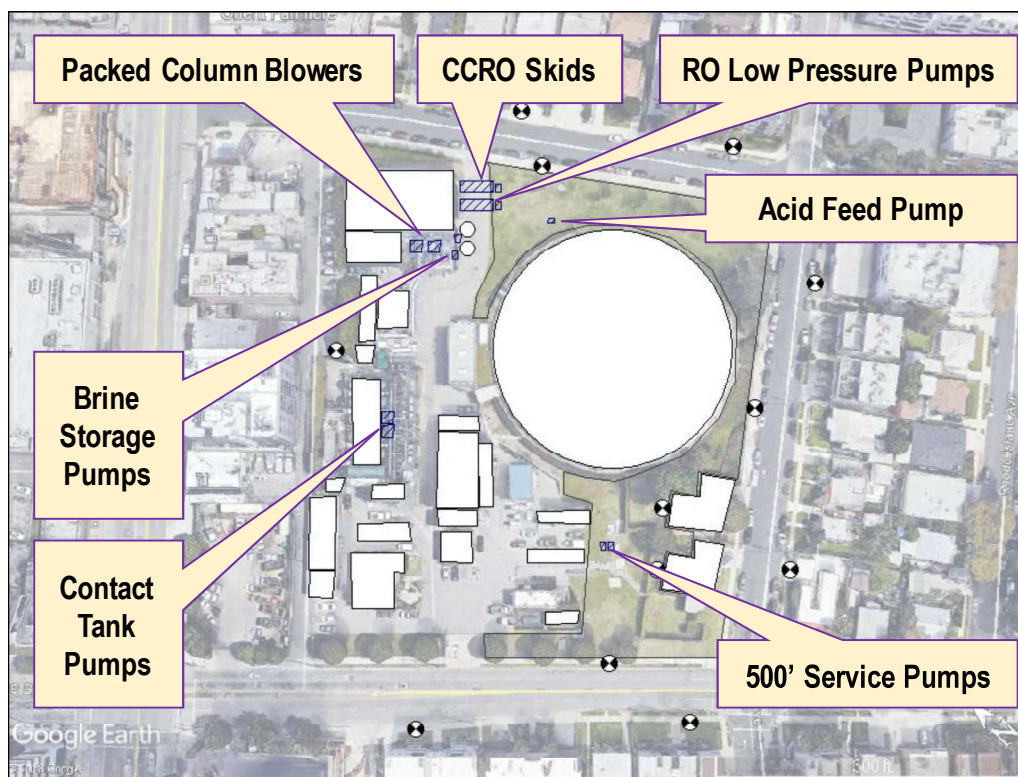


Figure 1. Planned Locations of New Major Noise-Producing Features of Arcadia WTP Expansion

The Project features shown in Figure 1 were input sound sources in the CadnaA 3-D model space and were defined with the following assumptions and available Project design information:

- Two new closed-circuit reverse osmosis (CCRO) pumps (220 horsepower [hp] each) on skids, each having an estimated sound power level (PWL) of 102 A-weighted decibels (dBA), within a new building or enclosure that provides a minimum of 25 decibels (dB) of interior-to-exterior noise reduction.
- One new acid feed pump (30 hp), having an estimated PWL of 94 dBA within an enclosure that provides at least 10 dB of interior-to-exterior noise reduction.
- Two replacement packed column air stripping tower blowers (15,000 standard cubic feet per minute and 14 inches water gauge each), each having an estimated casing radiated PWL of 91 dBA and exposed to the outdoors but with ducted inlet and outlet.
- Two new contact tank pumps (125 hp each), each having an estimated PWL of 101 dBA, within a new enclosure that provides a minimum of 10 dB of interior-to-exterior noise reduction.
- Two new reverse osmosis low-pressure feed pumps (200 hp each), each having an estimated PWL of 102 dBA, within a new enclosure that provides a minimum of 20 dB of interior-to-exterior noise reduction.
- Two new pumps (up to 150 hp each) for the 500-foot service pump station, each having an estimated PWL of 101 dBA, within a new enclosure or building that provides a minimum of 25 dB of interior-to-exterior noise reduction.

- Two new brine storage tank pumps (up to 30 hp each), each having an estimated PWL of 94 dBA, within a new enclosure that provides a minimum of 15 dB of interior-to-exterior noise reduction.

Other noise-producing WTP equipment that are anticipated to remain as-is and not affected by the Project are not included in this outdoor noise prediction model. Such pre-existing WTP noise-emitting sources are, like the background sound from nearby and distant roadway traffic, already represented by the samples of measured outdoor ambient sound pressure levels collected during the field survey on October 1, 2019.

Calculation parameters that establish how the CadnaA model predicts combined noise levels from the above-listed Project sources are as follows:

- Sound propagation per ISO 9613-2 (ISO 1996)
- Default ground absorption coefficient = 0.2 (on a scale of 0 = reflective, 1 = absorptive) for paved and concrete areas, and 0.75 for on-site grassy areas
- Single order of reflection
- 68°F, 50% relative humidity

Olympic Well Field Restoration

Prediction of post-construction operation noise attributed to the four added wells used an Excel-based tool that emulates CadnaA sound propagation functionality and presentation of output as a visual “grid” of colored isopleths. Like the CadnaA software, this tool incorporates relevant algorithms and reference data found in ISO 9613-2.

From the baseline conditions field survey, 15-minute outdoor sound pressure level measurements were performed during daytime hours at two positions (New Roads School and SM-4; see Figure 2) on the Olympic Boulevard roadway median in the vicinity of the existing Olympic Well Field. Sound levels averaged 77 dBA L_{eq} and 63.6 dBA L_{90} . At the SM-4 survey location, the field investigator noted a “constant hum from the underground vault,” suggesting that the L_{90} measured value of 64.3 dBA at a distance of approximately 12 feet would likely represent the above-ground sound emission for this existing Olympic Well Field pump infrastructure.

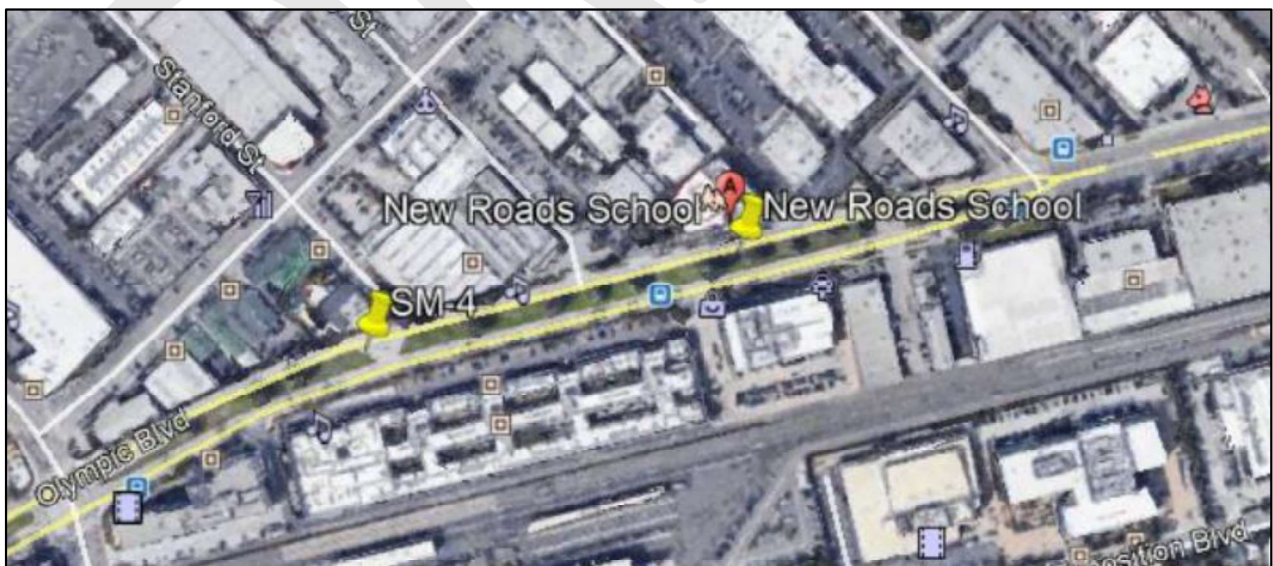


Figure 2. Locations of Baseline Sound Level Measurements in Olympic Well Field Vicinity

On the basis of comparable operating equipment and enclosure infrastructure, this predictive analysis assumed that the measured sound pressure level for SM-4 serves as the reference source sound pressure level for each of the newly added Olympic Well Field features: Injection Well, SM-8, SM-9, and SM-11i.

Predicted Results

Arcadia Water Treatment Plant Expansion

Figure 3 shows, by way of a horizontal plane (1.5 meters [approximately 5 feet] above grade) of colored isopleths (i.e., comparable sound level within a 5 dB range), the predicted operation noise levels due to the Project.

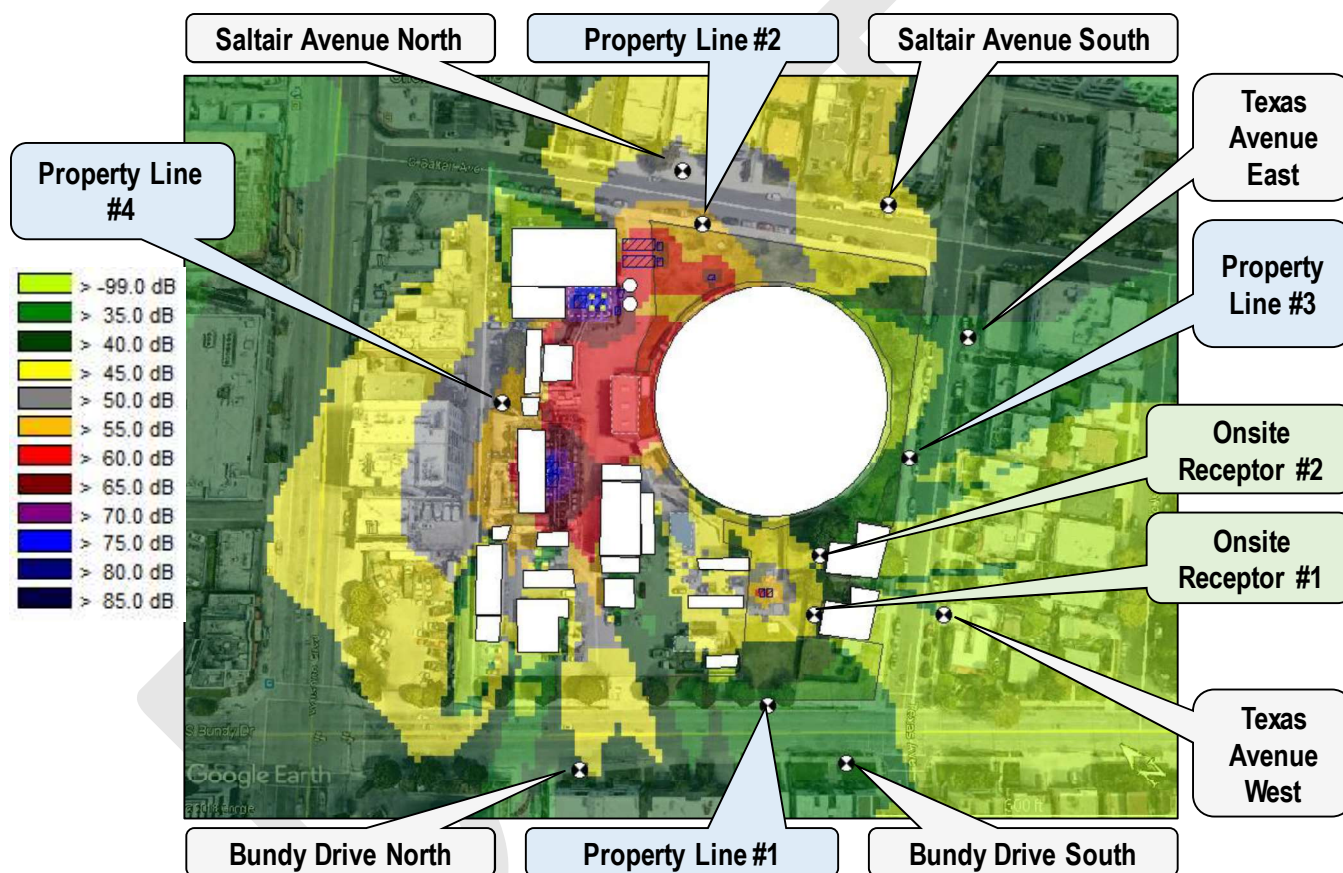


Figure 3. Predicted Aggregate Sound Propagation (dBA) from Newly Added Noise-Producing Operating Equipment Sources Associated with Arcadia WTP Expansion

Olympic Well Field Restoration

Predicted sound propagation from operation of each of the newly installed pumps (SM-10i, SM-8, SM-9, and SM-11i) are shown in Figures 4, 5, 6, 7, and 8. Predicted sound levels are at or below 60 dBA L_{eq} where the Olympic Boulevard extent abuts the commercial properties, and thus, would be compliant with the Santa Monica nighttime sound level threshold. For SM-11i operation in proximity to the nearest residences along Exposition Boulevard, predicted noise levels are less than 50 dBA L_{eq} , and would thus be compliant with the Santa Monica nighttime sound level threshold for those low-density-housing zoned parcels.

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Figure 4. Predicted Aggregate Sound Propagation (dBA) from Olympic Well Field Newly Added Noise-Producing Operating Injection Well (SM-10i) Pump Near Olympic Boulevard and 26th Street

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Figure 5. Predicted Aggregate Sound Propagation (dBA) from Olympic Well Field Newly Added Noise-Producing Operating Well (SM-8) Pump Near Olympic Boulevard and Stewart Street

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Figure 6. Predicted Aggregate Sound Propagation (dBA) from Olympic Well Field Newly Added Noise-Producing Operating Well (SM-9) Pump Near the New Roads School at Olympic Boulevard and Franklin Street

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Figure 7. Predicted Aggregate Sound Propagation (dBA) from Olympic Well Field Newly Added Noise-Producing Operating Injection Well (SM-11i) Pump, at Alternative Location #1, Near Exposition Boulevard

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MITIGATED NEGATIVE DECLARATION – SECTION 3.11



Figure 8. Predicted Aggregate Sound Propagation (dBA) from Olympic Well Field Newly Added Noise-Producing Operating Injection Well (SM-11i) Pump, at Alternative Location #2, Near Exposition Boulevard