Appendix E
Noise Study, Ebisu & Associates, January 2015

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AECOM
1001 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Attention: Mr. Lambert Yamashita, P.E.

Subject: Final Results of Noise Study for the Proposed Honouliuli Wastewater Treatment Plant (WWTP) Development

Dear Mr. Yamashita:

I am providing this letter report to present our findings regarding potential noise impacts associated with the proposed Honouliuli Wastewater Treatment Plant (WWTP) Development. We have reviewed the draft Traffic Impact Assessment Report (TIAR dated 10/27/14) and the Phase II development plan of future facilities at the Honouliuli WWTP, and have completed our noise measurements of existing conditions at the plant. We have also completed our modeling of existing and future traffic noise levels, and have completed our noise modeling of future plant facilities.

Existing Background Noise Levels. Daytime and nighttime noise measurements were obtained at or near the boundary lines of the Honouliuli WWTP to determine if the facility is in compliance with State Department of Health (DOH) noise limits. Because the facility is located on lands which are zoned I-2 and AG-1, the applicable DOH noise limit for noise emissions from WWTP equipment at or beyond the WWTP property boundaries is 70 dBA, for both daytime and nighttime periods.

Figure 1 and Table 1 depict the noise measurements at or near the property boundary lines which were obtained on October 22 and 23, 2014. The measured sound levels at the various locations during the daytime and nighttime are also shown in the figure and table. In Figure 1, the measured L10 values (or levels exceeded 10 percent of the time) are shown, since this is the metric used by the State DOH. The nighttime measurements were used to determine if the steady noise levels from the facility exceeded the 70 dBA DOH noise limit, and it was clear that the facility is in full compliance with the 70 dBA DOH noise limit. The daytime noise measurement results were typically controlled by non-plant noise sources, such as motor vehicle traffic and aircraft. The daytime noise measurement results also confirmed the conclusion that the Honouliuli WWTP is currently in compliance with the 70 dBA DOH noise limit.

At measurement Locations B and C, the dominant noise source during the night was an audible low frequency source which appeared to be originating from beyond the

WWTP toward the east. At all other measurement locations, the steady (L50) nighttime background noise levels were less than 50 dBA, indicating that the Honouliuli WWTP noise sources were well below the 70 dBA limit along the property lines of the WWTP. At Locations F and G, where the closest residences are located, measured steady (L50) background noise levels at night were less than 41 dBA.

During the daytime, motor vehicle traffic and aircraft noise become the dominant noise sources along the Honouliuli WWTP's property lines. Measured daytime background noise levels (L10) along the Honouliuli WWTP's property lines ranged from 52 to 71 dBA, and were influenced by off-site noise sources rather than by WWTP noise sources.

Close-in noise measurements of five of the louder noise sources at the existing Honouliuli WWTP were also obtained to confirm that their noise levels could not exceed the 70 dBA DOH limit at the facility's property boundaries when operating singly or together. These noise sources are shown in Figure 2, and were the: Dewatering Building Centrifuge; Influent Pump Station; Blower Building #1 (Primary); BioTower Pump Station Booster Fan; and Caustic Scrubber Odor Control Blower. These five noise sources should remain at their present general locations through 2030, but may increase in noise levels due to increases in their future capacity. The measured existing noise levels of these five sources were: 63 dBA at 50 feet from the Centrifuge; 73 dBA at 25 feet from the Influent Pump Station; 65 dBA at 50 feet from the Blower Building #1; 67 dBA at 25 feet from the Booster Fan; and 75 dBA at 25 feet from the Odor Control Blower. Using these measured noise levels, the calculated combined noise levels from these five noise sources ranged from 31 to 48 dBA along the facility's property boundaries. The results of these calculations at the various noise measurement locations at or near the facility's boundaries are shown in Table 2. The calculated noise levels shown in Table 2 for the existing WWTP's noise sources are very low, and consistent with the conclusion that the noise levels from existing plant sources do not exceed the 70 dBA DOH noise limit. At the closest residences (Locations F and G), calculated noise levels from existing plant equipment were less than 35 dBA, and well below the nighttime average (or Leq) noise levels of 39 to 47 dBA measured at those two locations.

Existing Road Traffic Noise Levels. Table 3 and Figure 3 present the results and locations of traffic noise level measurements which were performed on December 2, 2014. We have reviewed the existing and forecasted traffic volumes from the project's draft TIAR and utilized that data and the results of the traffic noise measurements to develop our conclusions regarding potential traffic noise impacts associated with the project. Table 4 presents the calculated hourly average [or Leq(h)] traffic noise levels at 50, 75, and 100 feet setback distances from the roadways' centerlines in the immediate environs of the project during the pm peak traffic hour. The Federal Highway

Administration Traffic Noise Model (TNM Version 2.5) was used to calculate existing and future traffic noise levels using the Loose Soil ground feature. The Hawaii State Department of Transportation considers traffic noise levels less than 66 Leq to be acceptable for noise sensitive land uses. This criteria level was exceeded at 50 feet from the centerlines of Geiger Road and Roosevelt Avenue.

The U.S. Department of Housing and Urban Development (HUD) uses the Day-Night Average Sound Level (or DNL) descriptor in evaluating acceptable noise levels at noise sensitive locations. The DNL descriptor incorporates a 24-hour average of daytime and nighttime noise levels, with the nighttime noise levels increased by 10 decibels (or dB) prior to computing the 24-hour average. A noise level of 65 DNL is considered to be acceptable for noise sensitive uses by HUD. For the Honouliuli WWTP project, the traffic noise levels in DNL may be estimated by adding 1 unit to the peak hour Leq, so a traffic noise level of 66 Leq during the pm peak hour will result in a 67 DNL value, or 2 DNL units above the HUD noise standard. For the roadways evaluated in this noise study, traffic volumes and hourly traffic noise levels were highest during the pm peak hour.

Table 5 presents the existing setback distances to the 65, 70, and 75 DNL traffic noise contour lines for unobstructed line-of-sight conditions along the roadways in the immediate environs of the project. As indicated in Table 5, setback distances in the order of 68 to 70 feet from the centerlines of Geiger Road and Roosevelt Avenue are required to not exceed the HUD 65 DNL noise standard.

Future Road Traffic Noise Levels. Table 6 presents the calculated hourly average [or Leq(h)] traffic noise levels at 50, 75, and 100 feet setback distances from the roadways' centerlines in the immediate environs of the project by year 2030 with the implementation of the proposed project. Table 5 depicts the forecasted setback distances to the 65, 70, and 75 DNL traffic noise contours by 2030 with the implementation of the project. Exceedances of the 66 Leq and 65 DNL acceptability thresholds are expected to continue along Geiger Road and Roosevelt Avenue.

Table 7 presents the calculated increases in traffic noise by year 2030 due to both non-project and project related roadway traffic. By 2030, traffic noise level increases attributable to project traffic should be less than 1.0 dB at all roadways in the project environs, except along the section of Renton Road between Kapolei Parkway and proposed WWTP entrance road, hereinafter referred to as "Honouliuli Driveway 5 (DW5)". The estimated increases in future traffic noise levels along this section of Renton Road are 0.9 dB due to non-project traffic and 2.0 dB due to project traffic. Because existing traffic volumes along this section of roadway are relatively low (approximately 343 vehicles per hour), and because this area is currently undeveloped within 50 feet of the roadway's centerline, these increases in future traffic noise levels

are not expected to result in exceedances of traffic noise level criteria along this roadway section.

Along Renton Road west of project entrance road DW5 where existing residences are located, future traffic noise level increases associated with the project are not expected to occur. Also, along Roosevelt Avenue in the vicinity of Philippine Sea, future traffic noise level increases associated with project traffic are anticipated to be less than 0.2 dB by year 2030.

Along Geiger Road and Roosevelt Avenue where existing traffic noise levels currently exceed the 66 Leq and 65 DNL noise impact thresholds, future increases in traffic noise levels due to project traffic are lower than the increases associated with non-project traffic, and are predicted to be less than 0.8 Leq or DNL. These increases are not considered to be significant, and will probably not be perceivable over the 16 year period between 2014 and 2030.

Future Plant Noise Sources. Estimates of future plant noise levels for the Phase II Development were made by modeling the source levels of the plant equipment expected to be operating through the Phase II Development as described in the Honouliuli WWTP Conceptual Design Report Item 12.0 dated November 2014. Figure 4 depicts the locations of the future noise sources which were included in the noise modeling, and Table 8 presents the assumed noise levels of these sources at 50 feet distance. Special sound attenuation measures such as enclosures, the addition of silencers or mufflers or acoustical louvers, the use of sound absorptive interior finishes, or the use of sound rated doors were not included in the noise modeling assumptions. Although outdoor air conditioning units were not included in the November 2014 Conceptual Design Report, 30 ton air cooled air conditioning units were arbitrarily located at the administration, lab, and maintenance buildings as shown in Table 8 and Figure 4. The large emergency generators in the Main Electrical Building were not included in the noise modeling because of their intermittent operation during testing or emergencies, and because they will probably be sound attenuated separately so as to not exceed the DOH noise limit of 70 dBA at the property boundaries of the WWTP during their operation. The noise levels of other WWTP noise sources should not affect the generators' allowable noise limit along the mauka property line.

Table 9 presents the results of the calculations of predicted plant noise levels at the perimeter Locations A through J of the WWTP without special sound attenuation treatments applied to the various noise sources. The results in Table 9 were controlled by the dominant noise sources located in Building #033I, the Blower Building, and Building #201F. The utilization of special sound attenuation treatments to all noise sources (except for the emergency generators) will probably not be required to comply with the 70 dBA DOH noise limit along the property boundaries of the WWTP.

Construction Noise Impacts. Audible construction noise will probably be unavoidable during the entire project construction period. The total time period for construction of the project is not known. It is expected that actual construction work will performed in phases and be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Figure 5 depicts the range of noise levels of various types of construction equipment when measured at 50 feet distance from the equipment.

Typical levels of exterior noise from construction activity (excluding pile driving activity) at various distances from the job sites are shown in Figure 6. Figure 6 is useful for predicting exterior noise levels at short distances from the work when visual line of sight exists between the construction equipment and the receptor. Direct line-of-sight distances from the construction equipment to existing residential buildings will range from 250 feet to 500+ feet, with corresponding average noise levels of 71 to 64 dBA (plus or minus 5 dBA). For receptors along a cross-street, the construction noise level vs. distance curve of Figure 6 should be reduced by approximately 8 dBA when the work is occurring at the intersection with the cross street, and should be reduced by 15 dBA when work is occurring at least 100 feet from the intersection (and the visual line-of-sight is blocked by intervening buildings). Typical levels of construction noise inside naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the levels shown in Figure 6.

Noise sensitive residences who are predicted to experience the highest noise levels during construction activities are located along Philippine Sea and along Renton Road near Philippine Sea when work occurs at the northwest corner of the WWTP. Predicted construction noise levels at these residences during the site preparation phase of the work in this area ranged from 71 to 62 dBA (plus or minus 5 dBA). The highest noise levels during construction are expected to occur at the Coral Creek Golf Course during infrastructure improvements along the east boundary of the WWTP. Across the golf course to the east, the closest residences should experience construction noise levels of 65 dBA or less (plus or minus 5 dBA). Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work, and due to the administrative controls available for regulation of construction noise. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

The State DOH, regulates noise associated with construction activities so as to minimize risks of adverse impacts to public health and welfare. The DOH would utilize a construction noise permit system for all construction activities on the project site. Typically, noise from construction activities can be expected to exceed the allowable

noise limits for stationary equipment which are not associated with construction activities. Therefore, the DOH's administrative rules for construction activities include nighttime, Sunday, and holiday curfews, so as to limit noisy construction activities to the normal workday periods. Additional curfew periods are typically used for pile driving or other rock or pavement breaking equipment.

Mitigation of construction noise to inaudible levels will not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 feet distance), and due to the exterior nature of the work (excavation, grading, trenching, concrete pouring, hammering, etc.). The use of properly muffled construction equipment should be required at the various job sites. The incorporation of State DOH construction noise limits and curfew times, which are applicable throughout the State of Hawaii, is another noise mitigation measure which is normally applied to construction activities. Figure 7 depicts the normally permitted hours of construction. Noisy construction activities are not allowed on Sundays and holidays, during the early morning, and during the late evening and nighttime periods under the DOH permit procedures.

The project's draft TIAR investigated the potential traffic during year 2021, which is expected to be the peak year of construction. The predicted increases in traffic noise levels attributable to project related traffic during 2021 were also evaluated, and it was concluded that these increases would not exceed 1 dB along Renton Road between Kapolei Parkway and the proposed WWTP site entrance road DW5. Along all other roadways in the immediate environs of the project, increases in traffic noise levels associated with project traffic were expected to be less than 0.5 dB. Risks of adverse traffic noise impacts during the peak year of project construction were considered to be very low.

Summary and Recommendations. Traffic noise impacts resulting from the proposed development of the Honouliuli WWTP are not expected at noise sensitive receptors within the immediate environs of the facility. Increases in project related traffic noise levels of less than 1 dB between 2014 and 2030 will be difficult to perceive or accurately measure. At locations well beyond the immediate project environs, these project related traffic noise level increases should be even smaller due to the greater percentage contribution of non-project traffic to total traffic noise levels as distances from the WWTP increase.

The noise levels from existing and future WWTP noise sources should not cause compliance problems with the 70 dBA DOH limit during the daytime or nighttime periods. However, there are existing residences who are relatively close to the WWTP property lines at the west end of the WWTP, and a continuous sound level of 70 dBA (which is equivalent to 76 DNL) at these residences would not be compatible with

residential or other noise sensitive uses. The proposed development plan appears to be cognizant of this, and has located the quieter administrative and non-processing facilities at the west end of the WWTP. Risks of complaints from neighboring residents have been minimized by the proposed future configuration of the WWTP.

As the new facilities and equipment are added to the WWTP, it is recommended that sound attenuation treatments be considered for the louder noise sources listed in Table 8. These sound attenuation treatments will probably involve containment of the noise emissions using enclosures or the building envelope, the addition of absorptive interior ceiling and wall panels, the addition of duct silencers or mufflers, or the addition of mechanical ventilation or acoustical louvers. Acoustical treatments of these louder noise sources will reduce their contributions to the total plant noise levels at the various plant boundary locations listed in Table 9, and will minimize the areas where risks of hearing loss to WWTP employees need to considered in hearing conservation programs. Near existing and any future residences to the WWTP, whenever feasible, attempts should be made to minimize the increases in preexisting background noise levels when new facilities and equipment are added to the WWTP. Doing so should minimize risks of noise complaints from neighboring residents or any other noise sensitive uses near the WWTP.

Sound attenuation treatment to the emergency generators in Building #201E will probably be mandatory to comply with the 70 dBA DOH limit along the mauka boundary of the WWTP. The use of a concrete and/or masonry building envelope, the addition of interior acoustical ceiling and wall panels, the inclusion of radiator discharge and fresh air duct silencers, the use of sound rated exterior doors, and the use of high attenuation exhaust silencers will all be required at this building. These methods of quieting emergency generator facilities have been used in the past and are not considered to be extraordinary.

Based on the above evaluations, it was concluded that risks of adverse noise impacts from the proposed Honouliuli WWTP development are very low, and that sound attenuation measures are not required but may be applied as deemed feasible as the improvements and additions occur at the WWTP.

Sincerely,

Yoichi Ebisu, P.E.

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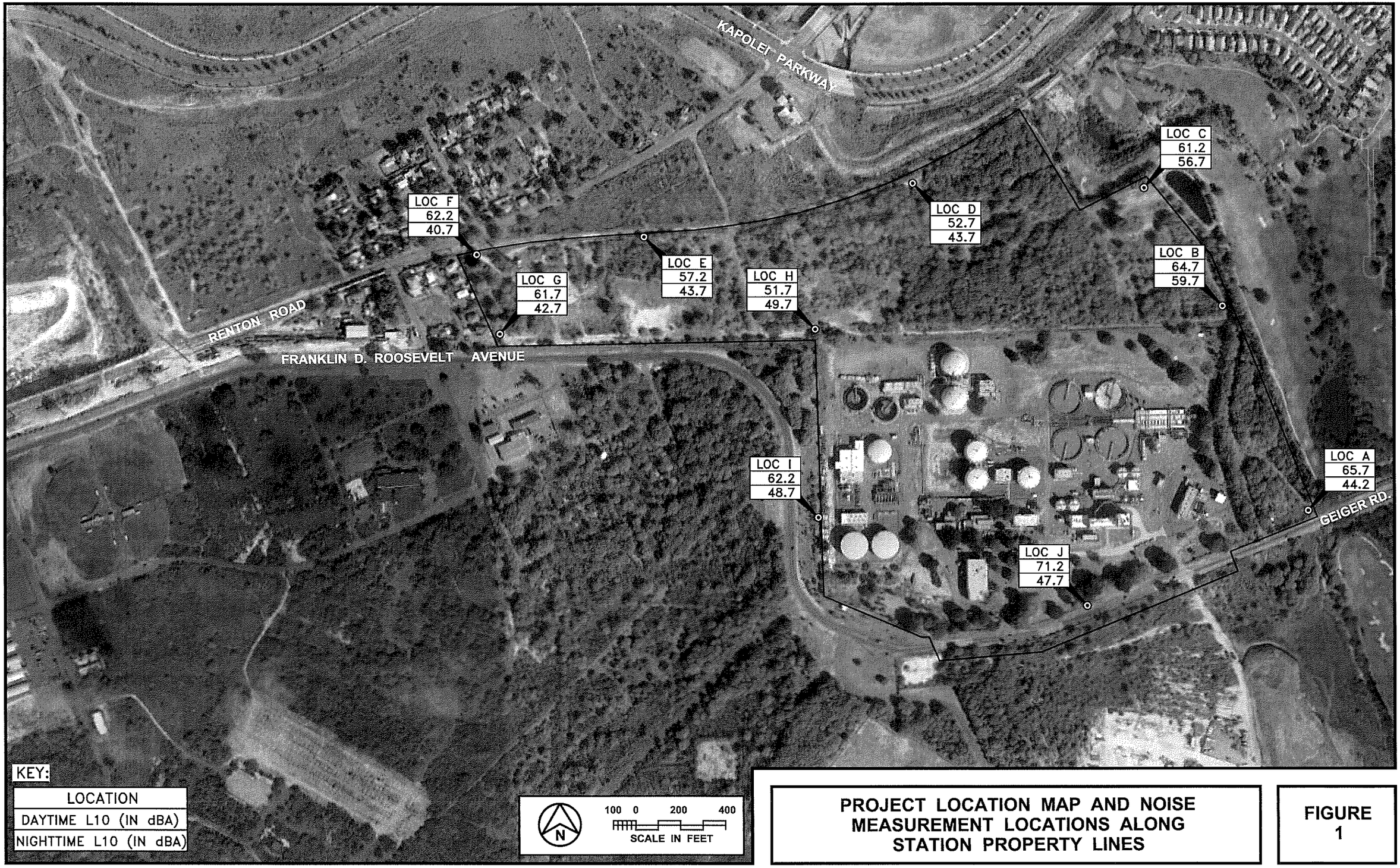
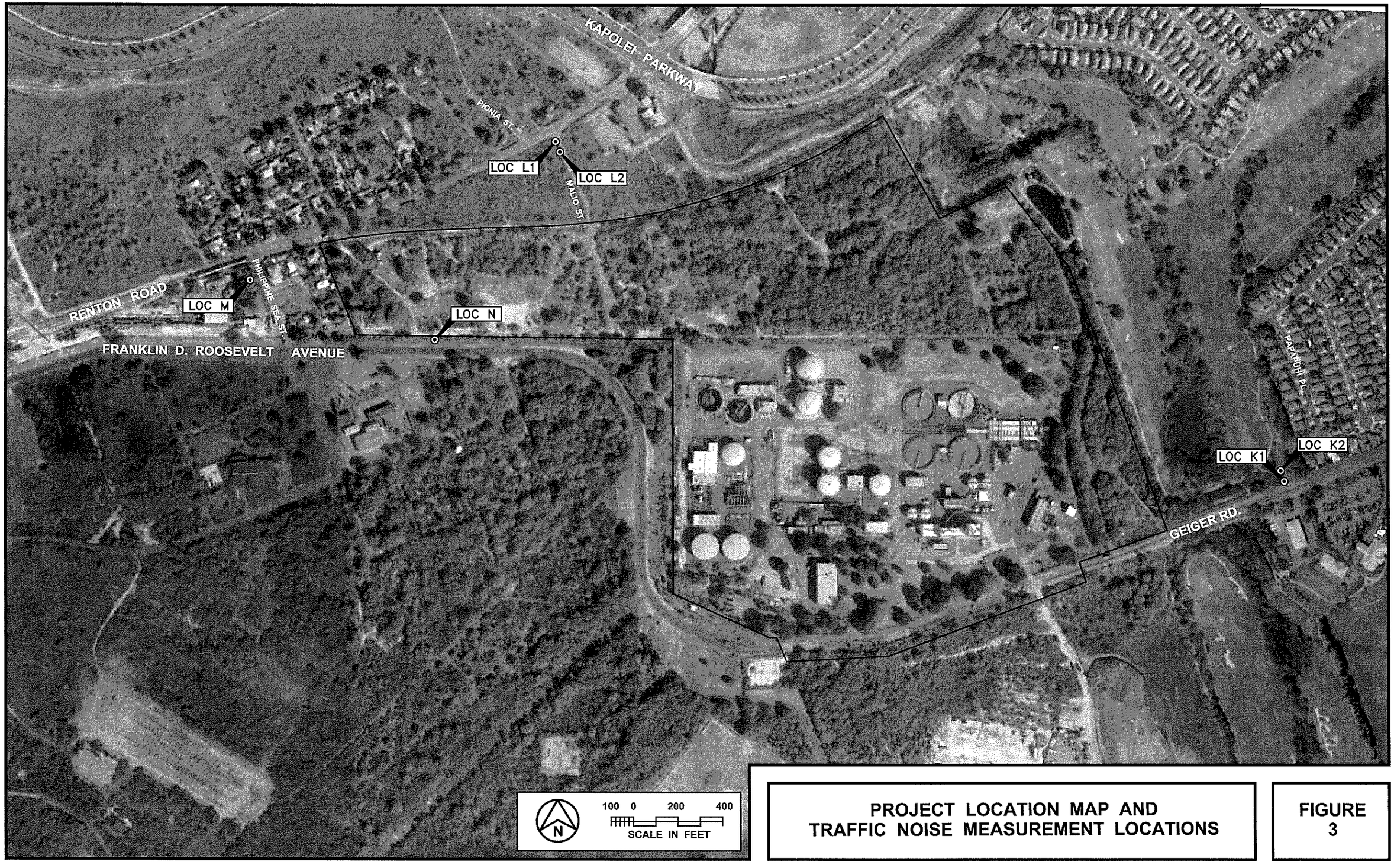


PROJECT LOCATION MAP AND NOISE MEASUREMENT LOCATIONS ALONG STATION PROPERTY LINES

FIGURE 1

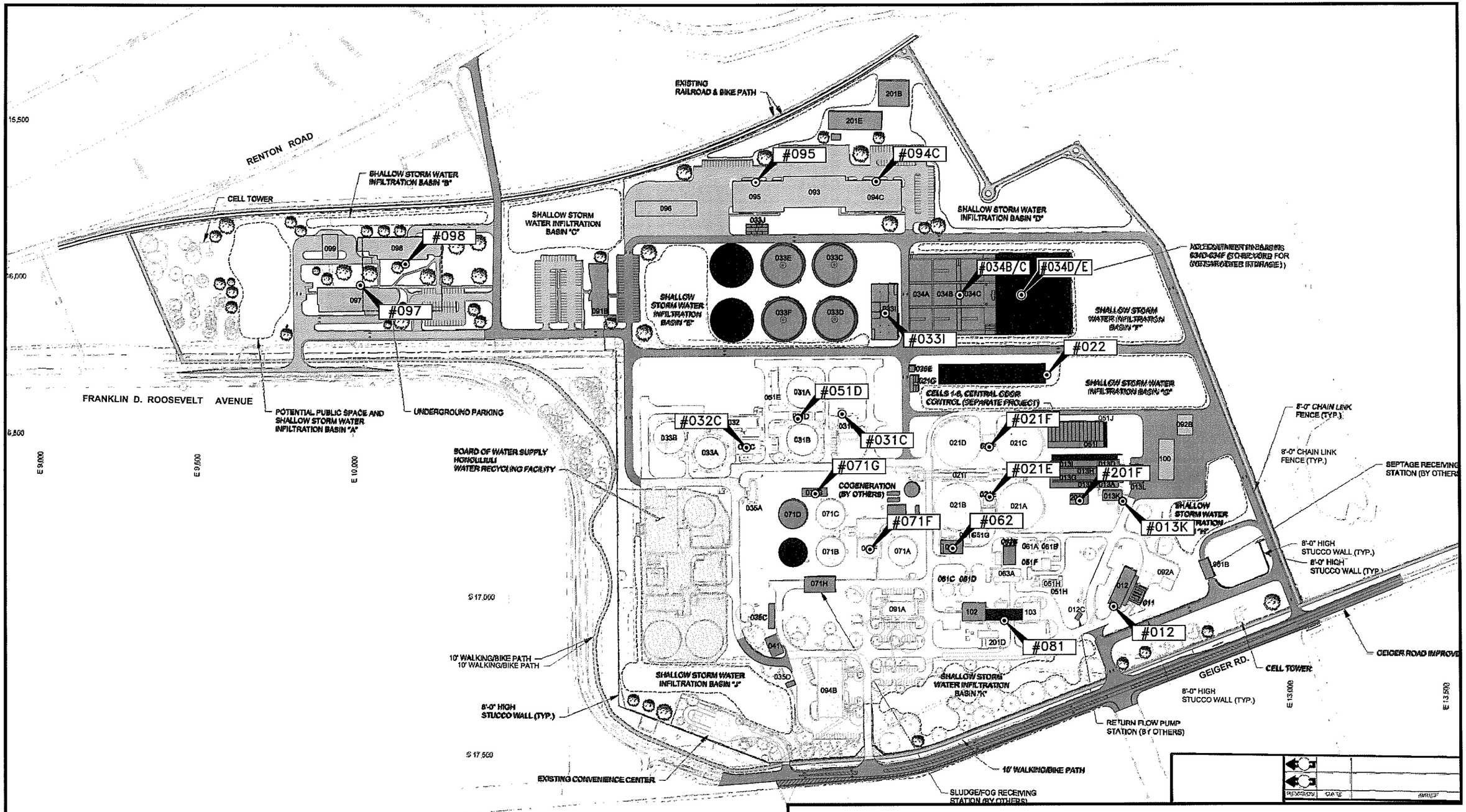
CALCULATED SOUND LEVELS OF FIVE DOMINANT EXISTING NOISE SOURCES AT HONOULIULI WWTP

FIGURE 2



PROJECT LOCATION MAP AND TRAFFIC NOISE MEASUREMENT LOCATIONS

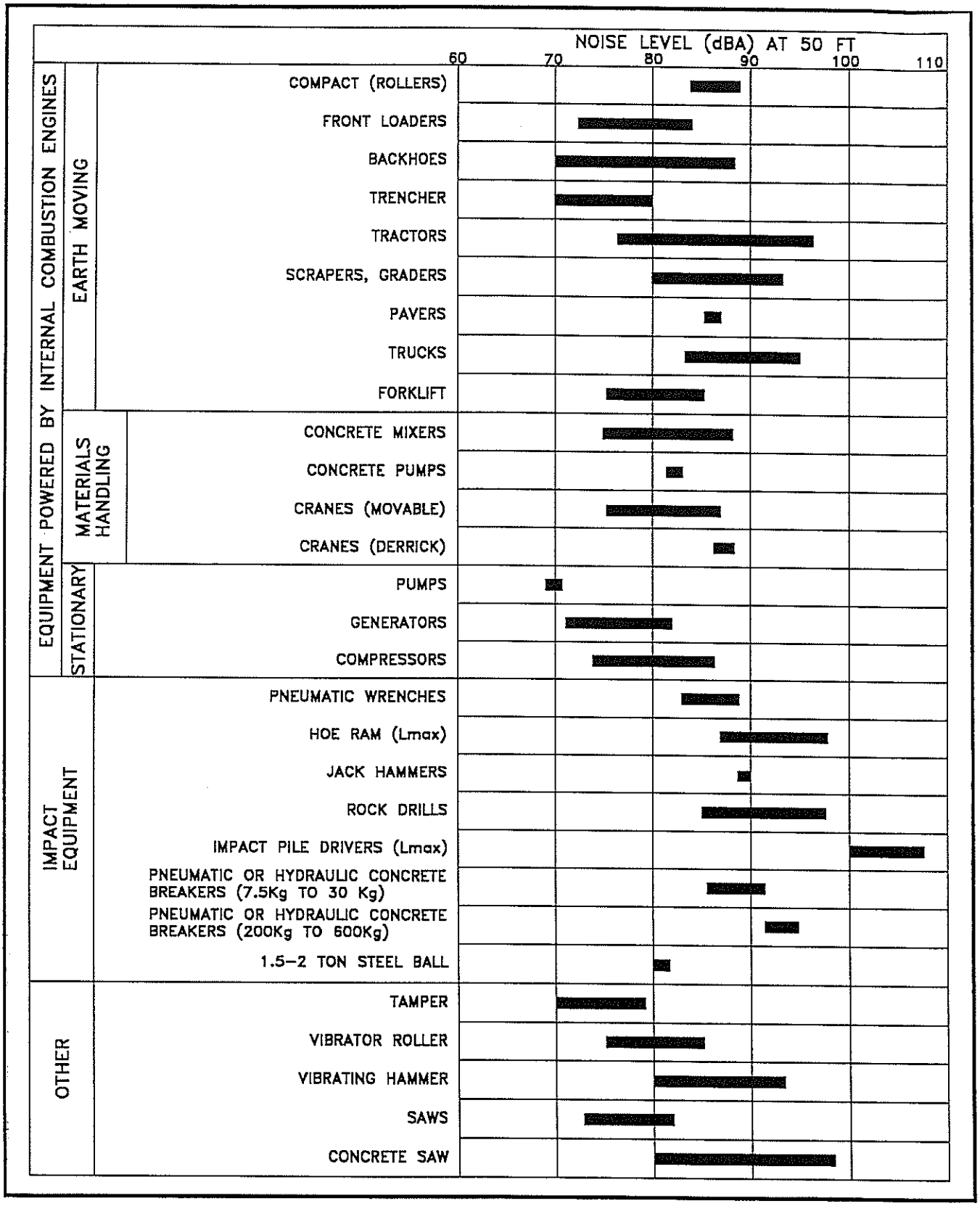
FIGURE 3



75 0 150 300
SCALE IN FEET

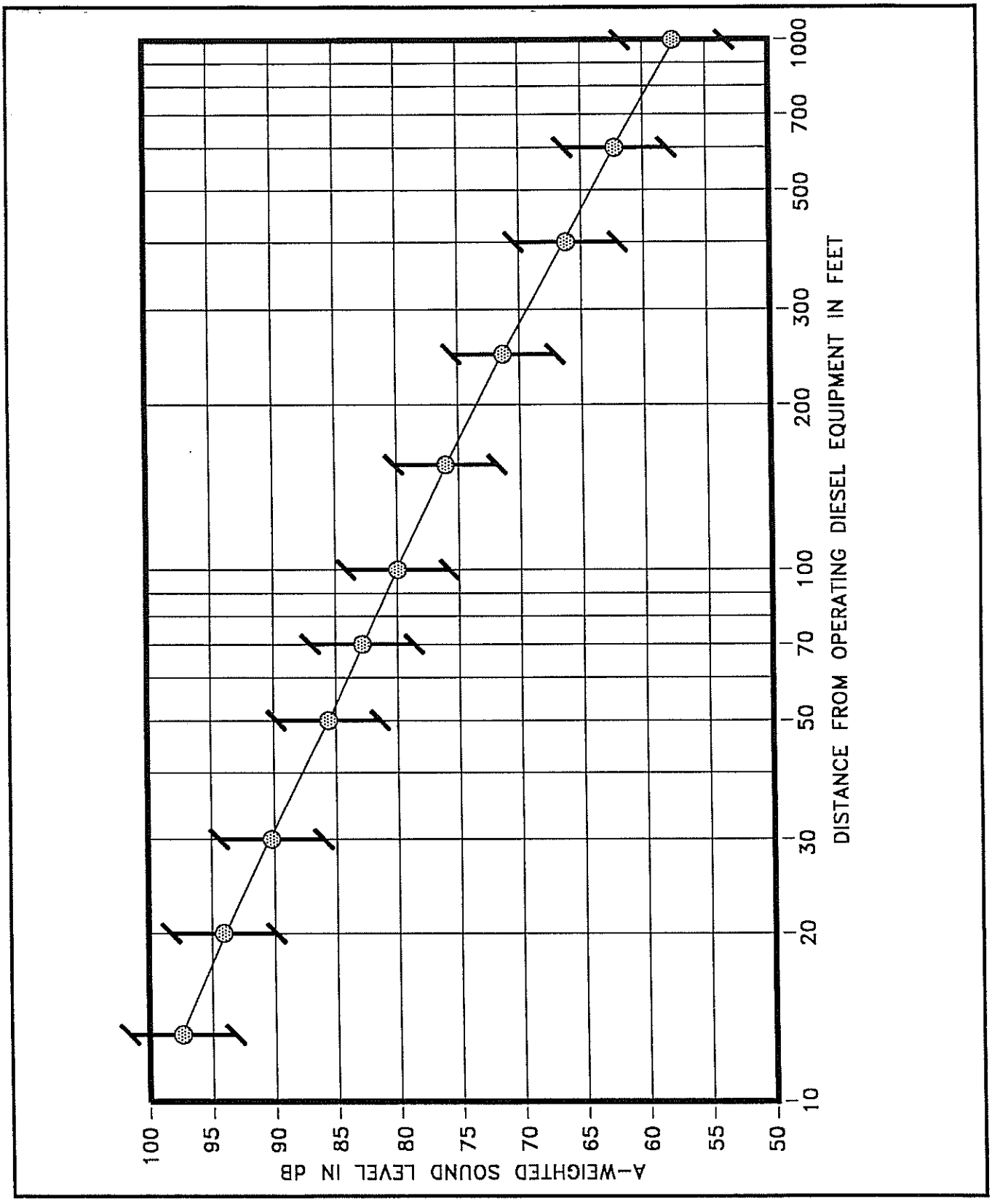
LOCATIONS OF FUTURE (PHASE 2) MODELED NOISE SOURCES

FIGURE 4



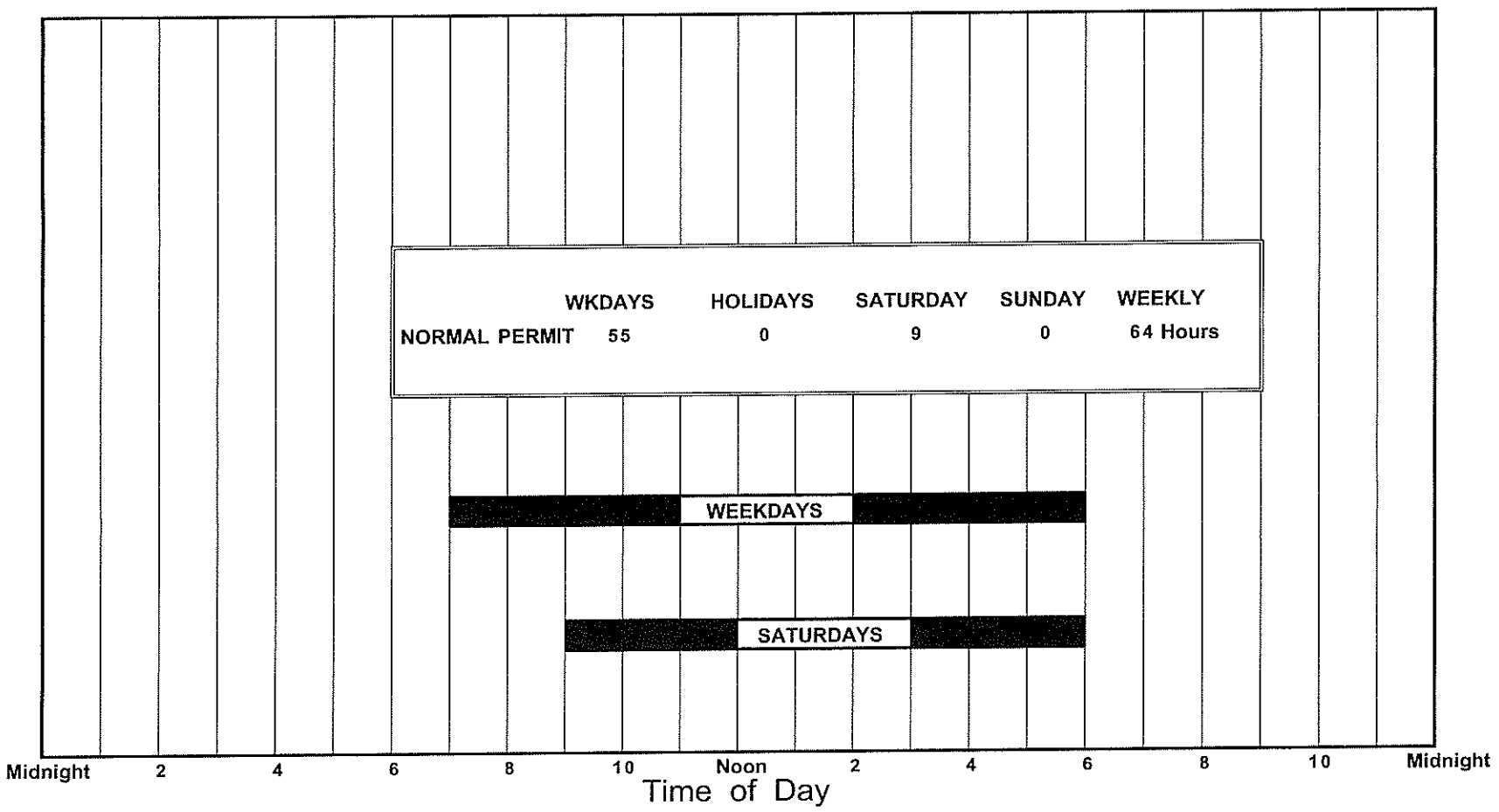
RANGES OF CONSTRUCTION EQUIPMENT NOISE LEVELS

FIGURE 5



ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 6



AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

FIGURE 7

TABLE 1
SUMMARY OF MEASURED BACKGROUND NOISE LEVELS AT VARIOUS LOCATIONS

PROJECT: HONOULIULI WWTP FUTURE DEVELOPMENT
DATE: October 22-23, 2014

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L50	L90	L99	Event Description
Location	"A"										
Oct 22	1343	1358	61.7	76.9	42.3	70.2	65.7	58.2	45.7	43.2	
Oct 23	0243	0303	43.1	50.7	40.7	45.7	44.2	43.2	42.2	41.2	
Location	"B"										
Oct 22	1014	1029	62.5	81.6	44.4	75.7	64.7	48.7	45.7	45.2	50 dBA Transformer Hum.
Oct 22	2242	2257	56.6	68.9	42.7	60.7	59.7	57.2	44.2	43.2	57 dBA Low Freq. Noise
Location	"C"										
Oct 22	1040	1055	56.1	73.2	42.6	66.7	61.2	47.2	44.2	43.2	
Oct 22	2306	2321	52.0	57.3	36.4	57.2	56.7	48.7	40.7	37.2	Intermittent Low Freq. Noise
Location	"D"										
Oct 22	1108	1123	53.1	72.5	42.4	66.2	52.7	46.7	44.7	43.7	
Oct 22	2341	2356	40.8	50.5	35.6	46.7	43.7	39.2	37.2	36.2	
Location	"E"										
Oct 22	1136	1151	53.4	68.4	41.6	64.2	57.2	47.2	44.2	42.7	
Oct 23	0015	0030	42.3	50.8	39.6	46.2	43.7	41.7	40.7	40.2	
Location	"F"										
Oct 22	1200	1215	58.0	71.4	42.5	67.2	62.2	53.2	47.7	44.2	
Oct 23	0043	0100	39.3	55.3	34.7	44.7	40.7	39.2	36.2	35.2	
Location	"G"										
Oct 22	1224	1239	59.5	74.9	40.6	71.7	61.7	53.7	47.2	42.7	
Oct 23	0109	0128	47.3	77.1	37.9	54.2	42.7	40.7	39.2	38.7	
Location	"H"										
Oct 22	1259	1315	50.7	68.5	44.3	63.2	51.7	47.2	45.7	45.2	
Oct 23	0138	0153	49.0	54.0	46.9	50.7	49.7	49.2	48.2	47.7	
Location	"I"										
Oct 22	1417	1432	60.5	83.3	47.2	71.7	62.2	56.2	50.7	48.2	
Oct 23	0330	0352	47.8	51.9	46.1	49.7	48.7	47.7	47.2	46.7	
Location	"J"										
Oct 22	1444	1559	67.6	81.8	46.1	76.7	71.2	64.7	52.7	47.2	
Oct 23	0206	0223	46.5	53.5	44.2	48.7	47.7	46.2	45.2	44.7	

Notes:

a. Leq = Average A-Weighted Sound Level (in dBA)
b. Lmax = Maximum A-Weighted Sound Level (in dBA)
c. Lmin = Minimum A-Weighted Sound Level (in dBA)
d. L50 = A-Weighted Sound Level (in dBA) which was exceeded 50 percent of the time.

TABLE 2
PREDICTED VS. MEASURED EXISTING PLANT NOISE LEVELS

PERIMETER LOCATION	MEASURED EXISTING DAYTIME LAEQ (dBA)	MEASURED EXISTING NIGHTTIME LAEQ (dBA)	CALCULATED PLANT NOISE LAEQ (dBA)
A	61.7	43.1	46.0
B	62.5	56.6	45.0
C	56.1	52.0	41.4
D	53.1	40.8	42.9
E	53.4	42.3	36.8
F	58.0	39.3	30.8
G	59.5	47.3	33.3
H	50.7	49.0	46.2
I	60.5	47.8	43.8
J	67.6	46.5	48.4

TABLE 3

TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	Hourly Traffic Volume AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
K1. 50 FT from the center-line of Geiger Rd. (12/2/14)	0720 TO 0820	38	707	15	38	67.1	65.5
K2. 100 FT from the center-line of Geiger Rd. (12/2/14)	0720 TO 0820	38	707	15	38	58.9	60.3
K1. 50 FT from the center-line of Geiger Rd. (12/2/14)	1440 TO 1540	35	750	15	30	66.7	64.4
K2. 100 FT from the center line of Geiger Rd. (12/2/14)	1440 TO 1540	35	750	15	30	57.2	59.4
L1. 50 FT from the center-line of Renton Rd. (12/2/14)	0845 TO 0945	36	101	6	8	57.6	57.5
L2. 100 FT from the center-line of Renton Rd. (12/2/14)	0845 TO 0945	36	101	6	8	54.3	52.8

TABLE 3 (CONTINUED)

TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	Hourly Traffic Volume -------- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
L1. 50 FT from the center-line of Renton Rd. (12/2/14)	1600 TO 1700	34	290	6	4	58.8	58.8
L2. 100 FT from the center-line of Renton Rd. (12/2/14)	1600 TO 1700	34	290	6	4	54.1	53.5
M. 50 FT from the center-line of Philippine Sea St (12/2/14)	1046 TO 1146	25	118	3	12	58.1	56.7
N. 50 FT from the center-line of Franklin D Roosevelt Ave. (12/2/14	1207 TO 1307	35	507	7	26	63.1	63.0

TABLE 4

EXISTING (CY 2014) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (PM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	****** VOLUMES (VPH) ******** AUTOS	M TRUCKS	H TRUCKS	50' Leq	75' Leq	100' Leq
Geiger Rd. Between Kapolei Pkwy. and DW3	38	1,031	965	21	45	66.6	63.5	61.5
Geiger Rd. Between DW3 and DW2	38	1,002	938	20	44	66.4	63.4	61.3
Geiger Rd. Between DW2 and DW1	38	998	934	20	44	66.4	63.3	61.3
Geiger Rd. Between DW1 and ECRC	38	985	922	20	43	66.3	63.3	61.3
Geiger Rd. Between ECRC and Essex	38	985	922	20	43	66.3	63.3	61.3
Roosevelt Ave. Between Essex and DW4	35	968	909	15	44	65.5	62.5	60.5
Roosevelt Ave. Between DW4 and Philippine Sea	35	968	909	15	44	65.5	62.5	60.5
Roosevelt Ave. W. of Philippine Sea	35	1,209	1,137	18	54	66.4	63.4	61.4
Philippine Sea N. of Roosevelt Ave.	25	326	290	7	29	60.5	57.5	55.4
Philippine Sea S. of Renton Rd.	25	337	299	8	30	60.6	57.6	55.6
Renton Rd. Between Kapolei Pkwy. and DW5	34	343	317	12	14	61.1	58.1	56.0
Renton Rd. Between DW5 and Philippine Sea	34	343	317	12	14	61.1	58.1	56.0
Renton Rd. W. of Philippine Sea	34	13	12	0	1	46.9	44.2	42.6

TABLE 5

EXISTING AND CY 2030 DISTANCES TO 65, 70, AND 75 DNL CONTOURS

STREET SECTION	65 DNL SETBACK (FT)		70 DNL SETBACK (FT)		75 DNL SETBACK (FT)	
	EXISTING	CY 2030	EXISTING	CY 2030	EXISTING	CY 2030
Geiger Rd. Between Kapolei Pkwy. and DW3	70	87	37	44	19	23
Geiger Rd. Between DW3 and DW2	69	83	35	43	18	23
Geiger Rd. Between DW2 and DW1	68	81	36	42	19	22
Geiger Rd. Between DW1 and ECRC	68	79	35	41	18	21
Geiger Rd. Between ECRC and Essex	68	79	35	41	18	21
Roosevelt Ave. Between Essex and DW4	61	71	31	36	16	18
Roosevelt Ave. Between DW4 and Philippine Sea	61	69	31	35	16	18
Roosevelt Ave. W. of Philippine Sea	69	79	35	40	18	20
Philippine Sea N. of Roosevelt Ave.	31	35	16	18	< 12	< 12
Philippine Sea S. of Renton Rd.	32	35	16	18	< 12	< 12
Renton Rd. Between Kapolei Pkwy. and DW5	34	50	17	25	< 12	13
Renton Rd. Between DW5 and Philippine Sea	34	35	17	18	< 12	< 12
Renton Rd. W. of Philippine Sea	< 12	< 12	< 12	< 12	< 12	< 12

Notes:

(1) All setback distances are from the roadways' centerlines.
(2) See Tables 4 and 6 for traffic volume, speed, and mix assumptions.
(3) Setback distances are for ground level receptors.
(4) "Loose Soil" conditions assumed along all roadways.

TABLE 6

FUTURE (CY 2030) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (AM OR PM PEAK HOUR, BUILD)

LOCATION	SPEED (MPH)	TOTAL VPH	****** VOLUMES (VPH) ******** AUTOS	M TRUCKS	H TRUCKS	50' Leq	75' Leq	100' Leq
Geiger Rd. Between Kapolei Pkwy. and DW3	38	1,485	1,390	30	65	68.1	65.1	63.0
Geiger Rd. Between DW3 and DW2	38	1,398	1,309	28	61	67.9	64.8	62.8
Geiger Rd. Between DW2 and DW1	38	1,330	1,244	27	59	67.7	64.6	62.6
Geiger Rd. Between DW1 and ECRC	38	1,280	1,198	26	56	67.5	64.4	62.4
Geiger Rd. Between ECRC and Essex	38	1,280	1,198	26	56	67.5	64.4	62.4
Roosevelt Ave. Between Essex and DW4	35	1,263	1,187	19	57	66.6	63.6	61.6
Roosevelt Ave. Between DW4 and Philippine Sea	35	1,213	1,140	18	55	66.4	63.4	61.4
Roosevelt Ave. W. of Philippine Sea	35	1,520	1,429	23	68	67.4	64.4	62.4
Philippine Sea N. of Roosevelt Ave.	25	390	346	9	35	61.3	58.3	56.3
Philippine Sea S. of Renton Rd.	25	405	360	9	36	61.4	58.4	56.4
Renton Rd. Between Kapolei Pkwy. and DW5	34	715	660	26	29	64.0	61.0	59.0
Renton Rd. Between DW5 and Philippine Sea	34	398	368	14	16	61.4	58.4	56.4
Renton Rd. W. of Philippine Sea	34	25	23	1	1	49.1	46.3	44.5

TABLE 7

CALCULATIONS OF PROJECT AND NON-PROJECT TRAFFIC NOISE CONTRIBUTIONS (CY 2030) (PEAK HOUR LEQ OR DNL)

STREET SECTION	NOISE LEVEL INCREASE DUE TO: NON-PROJECT TRAFFIC	PROJECT TRAFFIC
Geiger Rd. Between Kapolei Pkwy. and DW3	0.9	0.7
Geiger Rd. Between DW3 and DW2	0.8	0.6
Geiger Rd. Between DW2 and DW1	0.9	0.4
Geiger Rd. Between DW1 and ECRC	0.9	0.2
Geiger Rd. Between ECRC and Essex	0.9	0.2
Roosevelt Ave. Between Essex and DW4	0.8	0.3
Roosevelt Ave. Between DW4 and Philippine Sea	0.8	0.1
Roosevelt Ave. W. of Philippine Sea	0.9	0.1
Philippine Sea N. of Roosevelt Ave.	0.8	0.0
Philippine Sea S. of Renton Rd.	0.8	0.0
Renton Rd. Between Kapolei Pkwy. and DW5	0.9	2.0
Renton Rd. Between DW5 and Philippine Sea	0.9	-0.6
Renton Rd. W. of Philippine Sea	2.1	0.0

TABLE 8
ASSUMED FUTURE SOURCE NOISE LEVELS

FUTURE NOISE SOURCE	BLDG. LOCATION	SOUND LEVEL AT 50' (dBA)
Solids Dewatering	#081	69.6
Influent Pump Station	#012	61.5
Blower Building No. 1	#013K	79.3
BioTower Pump Station	#031C	62.0
Caustic Scrubbers (Sec.)	#051D	64.5
Grit Building	#201F	74.5
Primary Sludge Pump Station 1	#021E	63.8
Primary Sludge Pump Station 2	#021F	63.8
Mixed Liquor Recirculation Pump 1	#034 B/C	65.8
Mixed Liquor Recirculation Pump 2	#034 D/E	65.8
Aeration Blowers	#033I	89.4
RAS Pumps	#033I	70.6
WAS Pumps	#033I	60.6
Digester Control Building 1	#071F	62.8
Digester Control Building 2	#071G	62.8
Admin. Building 30T AC Unit	#097	59.2
Lab. Building 30T AC Unit	#098	59.2
Central Shops 30T AC Unit	#095	59.2
Maintenance Building 30T AC Unit	#094C	59.2
4 Roof Exhaust Fans (BPS)	#031C	40.7
Roof Exhaust Fan (BLW Bldg. 2)	#032C	37.0
Roof Exhaust Fan (BLW Bldg. 3)	#032C	37.0
Roof Exhaust Fan (BLW Bldg. 4)	#032C	37.0
Roof Exhaust Fan (BLW Bdlg. 5)	#032C	37.0
4 Roof Exhaust Fans (Sec. Thick.)	#062	40.0
Wet Weather Pumps	#022	64.8

TABLE 9
EXISTING AND FUTURE PLANT NOISE LEVELS

PERIMETER LOCATION	MEASURED EXISTING NIGHTTIME LAEQ (dBA) *	CALCULATED EXISTING PLANT NOISE LAEQ (dBA) *	CALCULATED FUTURE PLANT NOISE LAEQ (dBA) *
A	43.1	46.0	59.6
B	56.6	45.0	63.6
C	52.0	41.0	64.3
D	40.8	43.0	65.8
E	42.3	37.0	57.2
F	39.3	31.0	51.4
G	47.3	33.0	53.0
H	49.0	46.0	63.4
I	47.8	44.0	59.7
J	46.5	49.0	60.4

Note:

* Existing Noise Levels are from Table 2.