

PACIFIC GREEN FERTILIZER PLANT

Project N: 10560 / AA010

NOISE STUDY REPORT

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Prepared:

Antonio Hidalgo Otamendi



Quality Check:

Alberto Hernández Martín



Approved:

Antonio Hidalgo Otamendi



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1. OBJECTIVE AND PURPOSE OF THE STUDY

The scope of this study is the elaboration of the Predictive Noise Study for PACIFIC GREEN FERTILIZER PLANT in the FEED phase.

This is a preliminary noise study without noise equipment vendor information.

The purposes of the Predictive Noise Study are:

- Ensure the Environmental Noise Limits.
- Conserve the hearing of personnel.
- Maintain working efficiency inside buildings.
- Proposed noise reduction/mitigation measures (if applicable).

This Noise Study Report has been developed by CECOR SL an independent HSE consultancy, as a CONSULTANT selected by TECNICAS REUNIDAS.

This report provides a preliminary picture of the noise levels generated by the Project and attempts to anticipate the noise abatement measures to be adopted where applicable. Guidelines and recommendations for the definition of the most suitable technical proposals from an acoustic point of view are provided, if required.

2. DESCRIPTION OF THE PROJECT AND SCOPE

ATLAS AGRO HOLDING AG is developing a Green Ammonia Fertilizer Plant Project in the North West of the United States, 9 kilometres north from Richland, a city in Benton County, Washington State. Facility will be realized on a grass root available area. Técnicas Reunidas S.A (CONTRACTOR) has been selected to FEED phase of the Project.

The scope is to meet strategic national objectives to reduce CO2 emission by means of Green Fertilizer production providing locally the product.

Main units which compose the Facility are:

- 100 Electrolyzers.
- 200 Ammonia Synloop Plant.
- 300 Nitric Acid Plant (60%w.).
- 400 Ammonium Nitrate Plant Solution.
- 410 Calcium Ammonium Nitrate Plant (27% N).
- 420 Calcium Nitrate.
- 500 Offsite and Utilities Water
- 570 Steam and power generation.
- 600 Air Separation Unit (ASU).
- 700 Plant and Instrument Air
- 750 Flare

Only noisy equipment has been included, with noise emission above 65 dB(A) at 1m because below that value it is considered that the noise will be negligible and will not increase the overall noise in plant or surroundings.

Main structures, buildings, big equipment, etc. of the Units has been included in the study for screening purposes.

This document covers the operation phase of PLANT, start-up and unplanned (emergency) are excluded. Other phases such as construction or commissioning are excluded from this document.

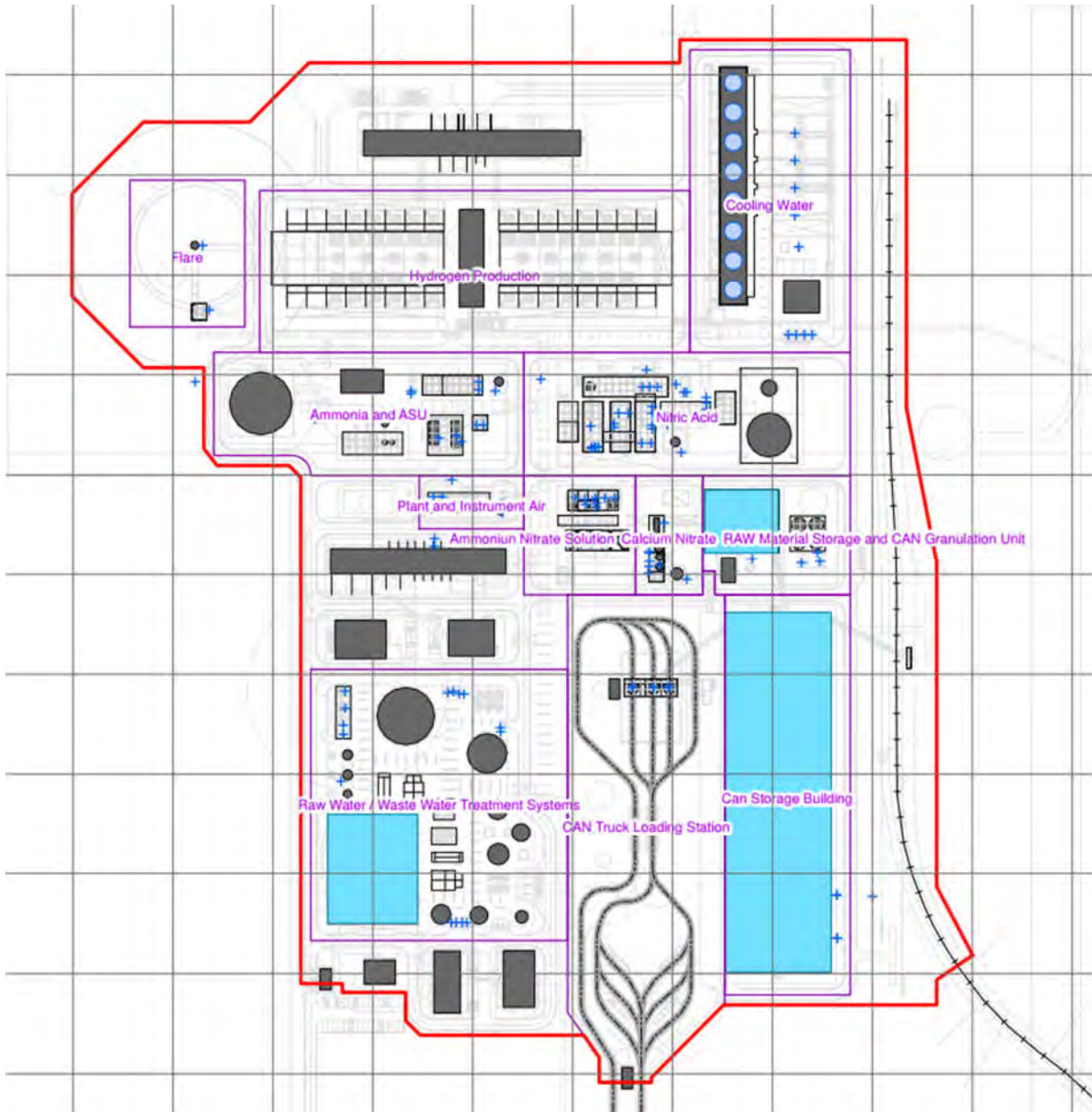


Figure 1. Scope unit's location

3. REFERENCE DOCUMENTS

The predictive Noise Study comply with:

REFERENCE	DOCUMENT	DOC TITLE
Project Documents		
[1]	1056002301/CA33-CP Rev 0	Noise Study Specifications
[2]	10560-000-HSE-SP-0001 Rev 1	Noise Control Specification
[3]	10560-000-PIP-PP-0001	Overall Plot Plan
[4]	10560-000-HSE-PD-0001	HSSE Eng. & Procurement Management Plan
[5]	10560-000-HSE-PD-0002	HSE Requirements for Vendors
International standards		
[6]	World Bank Group, Pollution Prevention and Abatement Handbook, General Environmental Guidelines, July, 1998	
[7]	International Finance Corporation, World Bank Group- Environmental, Health, and Safety (EHS) Guidelines	
[8]	ANSI S1.4	Specification for Sound Level Meters
[9]	ISO 9613-1:1993	Attenuation of sound during propagation outdoors - Part1: Calculation of the absorption of sound by the atmosphere
[10]	ISO 9613-2:1996	Attenuation of sound during propagation outdoors - Part2: General method of calculation
[11]	EEMUA PUB No 104	A Guide to Information Required from Equipment Vendors
[12]	EEMUA PUB No 140	Noise Procedure Specification
[13]	EEMUA PUB No 141	Guide to the Use of the Noise Procedure Specification

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REFERENCE	DOCUMENT	DOC TITLE
[14]	EEMUA PUB No 142	Acoustic Insulation of Pipe, Valves and Flanges
[15]	EEMUA PUB No 161	General Specification for Silencers and Acoustic Enclosures
[16]	ISO 15664	Acoustics. Noise Control Design Procedures for Open Plant
[17]	ISO 15665	Acoustic insulation for pipes, valves and flanges
Legislation and Regulations		
[18]	OSHA 29 CFR 1910.95	Occupational noise exposure
[19]	Washington Administrative Code 296-817-200	Hearing Loss Prevention Program
[20]	Washington Administrative Code WAC 173-60	Maximum Environmental Noise
[21]	Richland Municipal Code, Chapter 9.16	Public Nuisance Noise – Prohibited

4. DEFINITIONS

COMPANY:	ATLAS AGRO HOLDING AG
CONTRACTOR:	Técnicas Reunidas S.A. (TR)
PROJECT:	PACIFIC GREEN FERTILIZER PLANT
FEED	Front End Engineering and Design
TOR	Terms of Reference

PLANT	Means facilities for the PROJECT
VENDOR	The party that manufactures and/or supplies equipment, materials, goods and/or services to the Project
Absorption	Refers to a material absorbing sound energy when sound waves collide with it, as opposed to reflecting the energy
Ambient Noise	Total noise in the environment other than the noise produced by the sources of interest. This term is used interchangeably with background noise.
A-weighted	"A-weighted" means a specific weighting of the sound pressure level for the purpose of determining the human response to sound. The specific weighting characteristics and tolerances are those given in American National Standards Institute S1.4-1983, section 5.1.
Background Noise:	Total noise in the surrounding environment other than the noise produced by the sources of interest. This term is used interchangeably with ambient noise.
dB	Decibel, Standard unit of sound intensity measurement
dB (A)	Unit of sound level expressed in decibels (dB) and A-weighted. The A-weighted sound level is also called the noise level. Sound level meters have an A-weighting network for measuring A-weighted sound level.
Equipment Noise Limits	Noise levels set by CONTRACTOR or COMPANY to VENDORS for an individual equipment item.
Frequency	rate of oscillation or vibration; units are 1 cycle per second (cp) or 1 Hertz (Hz).
Fluctuating noise	noise whose level varies continuously and to an appreciable extent during the period of observation.
Grid Interpolation	is the distribution of sound receptors in order to make an acoustic map by interpolation.

Impulsive noise	noise consisting of one or more bursts of sound energy of duration less than 1s.
Intermittent noise	noise whose level abruptly drops to the level of background noise several times during the period of observation
L_{Aeq}	equivalent sound pressure level expressed in decibels (dB(A)) relative to a reference level ($p_0=2 \cdot 10^{-6}$ Pa). It is a measure of the effective value of L_p , integrated in a long time period.
L_p	Sound Pressure Level (see L _{Aeq})
L_w	Sound Power Level, A measure that identifies the total sound power emitted by a source in all directions, expressed in decibels, referred to a base value (10-12 W)
Noise	Unwanted sound; unwanted because it can cause annoyance, interfere with speech or communication, and/or cause hearing impairment
Noise Emission	Airborne sound radiated by well-defined noise source, such as a machine, equipment part of plant or entire plant.
Noise Exposure	All noises that arrive, over a specific time period, T, at a person's ear in the actual situation.
Noise Restrict	An acoustic stimulation of the ear which is likely to produce noise induced permanent hearing loss in some of the exposed population.
Noise Restrict Areas	Those work areas in the plant where, according to the state of the art, it is not reasonably practicable to reduce the noise level at or below the work area limit. The absolute limit remains valid in such areas.
Noise Inmission	Total amount of noise from all contributing sources at a given position.
Noise Limit	Noise levels not to be exceeded and given as a sound pressure level, sound power level or noise exposure level.

Occupational Noise	Noise arising from the workplace
R'_A	Is the airborne sound insulation of a partition, expressed in dB(A).
R_w	Is the airborne sound insulation of a partition, expressed in dB.
Receptor	Is a geometrical point where the sound pressure level has been calculated or measured.
Reflection	Is the change in direction of a wavefront at an interface between two different media so that the wavefront returns into the medium from which it was originated.
Sound	Vibrations that produce pressure variations transmitted through an elastic solid, liquid or gas medium with frequencies in the approximate range of between 20 and 20.000 Hz that are capable of being heard by the human ear.
Work Area	Any position not less than 1 m from equipment surfaces accessible to personnel and any position where a worker's ear may be exposed to noise in the normal course of his duty.

5. NOISE REQUIREMENT

Noise levels has been considered under the following headings:

- Environmental
- Hearing Conservation
- Speech Interference

All the Noise requirements are related in the Noise Control Specification [2], here there are a summary of the restrictions.

To reach these noise requirements, the noise emission for equipment has been limited for his noise pressure level limit (max 85 dB(A) at 1 meter), in relation to the equipment type.

5.1 ENVIRONMENTAL NOISE REQUIREMENTS

There are environmental noise limits applicable to normal operating conditions of the plant. In accordance with WAC Sec 173-60-40 [20] establishes the maximum allowable project-related noise limits at the receiving property line as defined in table 1. The area of the project is in EDNA Class C.

EDNA OF NOISE SOURCE	EDNA OF RECEIVING PROPERTY		
	Class A	Class B	Class C
CLASS A	55 dBA	57 dBA	60 dBA
CLASS B	57	60	65
CLASS C	60	65	70

Table 1. Environmental Noise Limits

Between the hours of 10:00 p.m. and 7:00 a.m. the noise limitations of the foregoing table shall be reduced by 10 dB(A) for receiver property within Class A EDNAs. Therefore, the Noise Study should be taking account the period of the daytime and nighttime.

It has been defined the land uses according to the EDNA classes in the surrounding of the plant. The ADNA classes are shown in the figure below.

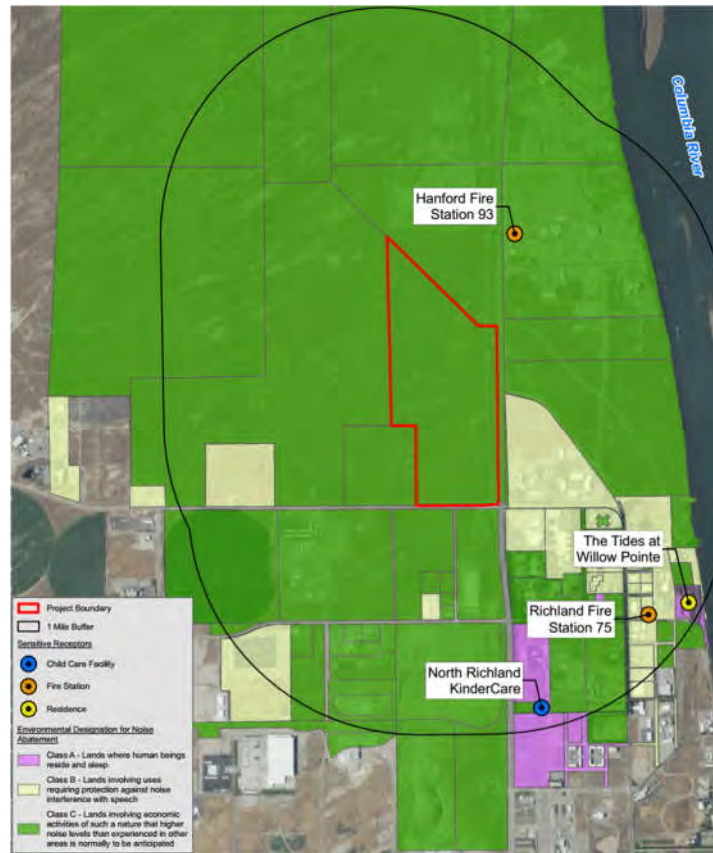


Figure 2. Noise sensitive receptors

5.2 HEARING CONSERVATION

For normal plant operation the noise levels in any Work Area shall not exceed the applicable noise limits given in the OSHA 29 CFR 1910.95 (Occupational Noise Exposure). The daily maximum noise exposures permitted for the Project are showed in Table 2

EEMUA-140 defines "Work Area" as any position not less than 1m from equipment surfaces accessible to personnel, or any position where an operator's ear may be exposed to noise in the normal course of his duty. It includes any platform, walkway or ladder.

Noise Exposure Limit	
Duration per Day (Hours)	Sound Level [slow response] (dBA)
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

Table 2. Noise exposure Limits

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

5.3 BUILDINGS NOISE LIMITS

The following noise limits shall apply in indoor locations in order to keep any disturbance of conversations and normal working, caused by equipment, within acceptable proportions:

Area description	Maximum allowable sound pressure level dB(A)
<ul style="list-style-type: none"> • Areas in workshops and machinery buildings where communication is required. 	70
<ul style="list-style-type: none"> • Workshops for light maintenance 	
<ul style="list-style-type: none"> • Workshop offices. 	
<ul style="list-style-type: none"> • Control rooms, not continuously manned 	60
<ul style="list-style-type: none"> • Computer rooms 	
<ul style="list-style-type: none"> • Control rooms, continuously manned. 	
<ul style="list-style-type: none"> • Open plan offices. 	50
<ul style="list-style-type: none"> • Social rooms, changing rooms, wash places and toilets 	
<ul style="list-style-type: none"> • Offices and conference rooms. 	45
<ul style="list-style-type: none"> • Personnel accommodation (bedrooms, private cabins, etc.). 	40

Table 3. Buildings Noise Limits

6. METHODOLOGY AND INPUT DATA

A noise model has been done to determine noise levels produced by noisy sources within the project area under the scope, and in the noise sensitive receptors.

The following criteria have been considered during modelling noise assessment, as stated in Noise Study Specifications [1].

6.1 SOFTWARE USED AND MODEL

Noise Mapping Study has been developed through computer analytical simulation using a program for noise prediction, CADNA-A (version 2023).

Noise propagation calculations have been carried out according to ISO 9613-2: "Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation".

CADNA-A is an efficient program used for expert purposes in the evaluation of noise prediction. This software allows to calculate, present, assess and predict industrial units noise levels according to national and international standards and regulations. CADNA-A is also suitable for detailed analysis of noise mapping in industrial units.

The noise indicator used in the elaboration of noise maps to evaluate the degree of nuisance in normal operation is the equivalent continuous noise level (L_{Aeq}). This noise indicator (L_{Aeq}) is the A-weighted long-term average sound level determined over a year as defined in ISO 1996-2: 2007. It has been defined two periods of calculus: Daytime (7:00 a.m.-10:00 p.m.) and nighttime (10 p.m.-7:00 a.m.).

The Project's equipment procurement specification limits the maximum equipment noise pressure emission level to 85 dBA at 1 meter for all equipment, and the noise model conservatively assumed that all equipment emits 85 dBA at 1 meter. CadnaA results are expressed as an Leq. However, CadnaA results are representative of the Lmax because the maximum equipment noise emission level is 85 dBA at 1 meter. Therefore, CadnaA results can be directly compared with the noise limits in WAC 173-60.

6.2 PARAMETERS AND ASSUMPTIONS

Once all input data have been collected and the 3D acoustic model has been defined, evaluation parameters have been specified. The accuracy of noise results will depend on the correct adjustment of these evaluation parameters. The main evaluation parameters defined in the Noise Mapping Study are described below:

- Grid Interpolation: An interpolation of 32.8 x 32.8 ft (10 x 10 meters) has been defined in general area (environmental), with a detailed recalculation of 6.56 x 6.56 ft (2 x 2 meters) at plant level.
- Topography: Topography of the environment has been considered as flat.
- Reflection Index: 1 reflection is defined for area of study for noise maps.
- Ground absorption
 - 0 for water (typical reflective area),
 - 0.2 for concrete areas (within the plant and in other constructed areas)
 - 0.5 for natural field (conservative, typical for an average reflective ground)
- Acoustic properties of the surfaces: all the surfaces without acoustic treatment were considered as totally reflecting elements by default, because they are surfaces of steel or concrete material.
- Acoustic screening: Buildings, tanks, vessels and any other big equipment will be considered as acoustic barriers / obstacles.
- Meteorological conditions: it is considered an environmental temperature of 51.8° F (11 °C) and a relative humidity of 79 %.
- Assessment height: noise maps are made for an assessment height of 4,9 ft (1.5 meters), from ground and receptors around the plant.

- Noise level range: noise maps are calculated using the noise indicator of L_{Aeq} , using sound pressure level ranges every 5 dB(A).

THEMATIC LEGEND	
Noise level (dB(A))	
40-45	70-75
45-50	75-80
50-55	80-85
55-60	85-90
60-65	90-95
65-70	95-100
	>100

Figure 3. Noise level range in noise maps

Equipment location:

- An acoustic model has been built using CADNA-A from available plot plans.
- Point noise sources have been located at their centre of gravity.
- Equipment located above ground level have been included at their corresponding height.

Background noise levels

- No external noise sources outside the project units limits have been considered. Therefore, background noise levels have not been considered in the noise study. There is a Background Noise Measurements doing by the owner (26th October 2023). The noise measurements were done in one single location in a 24-hour registration. The overall result of the measurements was 52,1 dB(A), 51,3 dB(A) for daytime and 53,6 dB(A) for nighttime. The L_{max} was 76,6 dB(A) for all day, 69,7 dB(A) for daytime and 76,6 dB(A) for nighttime.

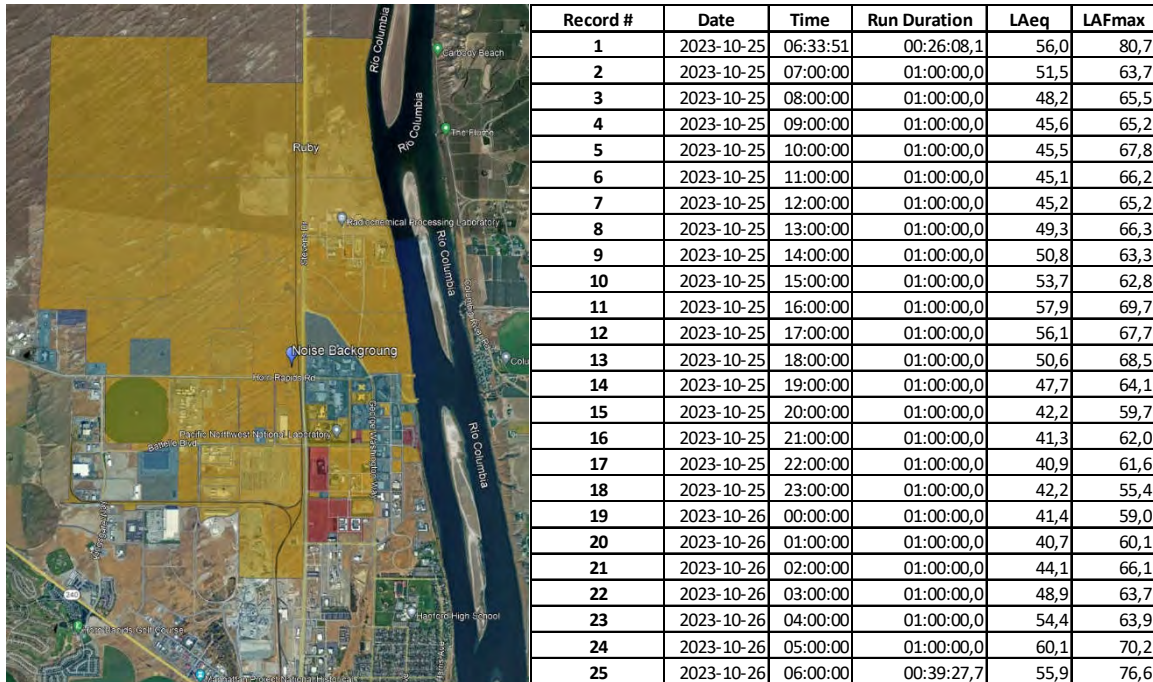


Figure 4. Background Noise Measurements (location and results table)

6.3 NOISE EMISSION FROM BUILDINGS

Closed shelters, containers and buildings as per 3D model has been considered in the final noise study. The emission from noisy equipment into buildings has been taken into consideration in other way than equipment in outdoor conditions. The noise level calculation inside the buildings is under the hypothesis of reverberant field, therefore the free field assumptions of the ISO 9613-2:1996 are not applicable in this case.

The next procedure has been adopted to calculate de noise emitted from these buildings:

- The reverberant noise level in the building interior is calculated from the noise power emission of the equipment inside the building and the reverberant condition of the buildings (reverberant time – TR). The calculation has been made from standard ISO 3743-2:2010 Acoustics - Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering methods for small, movable sources in reverberant fields - Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994):

$$L_W = \overline{L_p} - 10 \lg \frac{T_{nom}}{T_0} + 10 \lg \frac{V}{V_0} - 13 \text{ dB}$$

Where,

L_p: Pressure acoustic level indoor.

L_w : Power acoustic level from each source

T_{nom} : Reverberant time into building (calculated from Sabine formula by inside absorption coefficient)

T_0 : Reference reverberant time (1 second)

V : Interior Volume

V_0 : Reference volume ($1m^3$)

This calculus has been made for all the sources into buildings, in order to determine the acoustic level in the interior.

- To perform the calculation of the noise emitted to the outside of the building across the wall and roof it has made use of the international standard in calculating the noise level generated by the radiation of the facades, PN-EN 12354-4: 2017, Acoustics in building- Estimation of the acoustic characteristics of the buildings from the characteristics of their elements- Part 4: Transmission of interior noise outside. In this standard is indicated that the sound power level of a point source is given by the following expression:

$$L_{w'} = L_{p,int} + C_d - R'$$

Where,

$L_{p,int}$: Pressure acoustic level indoor.

$L_{w'}$: Power acoustic density level in the building outdoor surface ($dB(A)/m^2$)

C_d : Diffusivity term acoustic.

R' : Acoustic insulation

6.4 MANNED BUILDINGS

It has been selected the main manned or occupied buildings to be calculated his indoor noise. Noise level within manned buildings, has been calculated from the standard PN EN ISO 12354-3: 2017 Building acoustics -- Estimation of acoustic performance of buildings from the performance of elements -- Part 3: Airborne sound insulation against outdoor sound.

The noise difference between indoor and outdoor is defined by the next formula:

$$L_{2,n} = L_{1,2m} - D_{2m,n}$$

Where,

$L_{2,n}$: Pressure acoustic level indoor normalized to the Reverberant Time.

$L_{1,2m}$: Pressure acoustic level outdoor (2 meters from façade).

$D_{2m,n}$: Normalized level differences indoor/outdoor

Outdoor noise ($L_{1,2m}$) has been calculated by the acoustic CADNA-A model with point noise receptor. maximum value outside, has been calculated in octave frequency. The normalized level differences in each building have been calculated by the next formula:

$$D_{2m,nT} = R' + \Delta L_{fs} + 10 \lg \frac{V}{6T_0S} \text{ dB}$$

Where,

$D_{2m,nT}$: Normalized level differences indoor/outdoor

R' : Insulation acoustic

ΔL_{fs} : Level difference due to façade shape (dB)

T_0 : Reference reverberant time (1 second)

V : Interior Volume (m^3)

S : Reference surface (m^2)

The total insulation acoustic of the buildings has been calculated from the particular insulation of wall, roof and vents (windows and door) and their surface.

Noise Level coming from the exterior should be added to the indoor background noise. The indoor background noise (where no equipment is located) is typically produced by air conditioners, ventilation fans and exhaust fans, HVAC system for offices purposes Based on consultant experience, it has been used a typical noise spectrum in control room as indoor background noise to be added to the noise coming from the exterior. In the curve below is shown the background noise level indoor has been used ($L_{A,eq}=38,9 \text{ dB(A)}$). For equipment inside buildings, the equipment noise emission has been added to the noise coming from the outdoor.

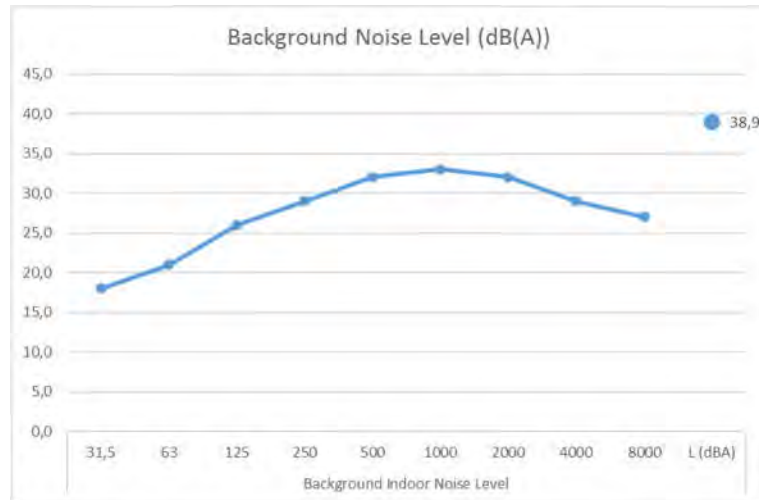


Figure.1. Estimated background Noise level indoor

6.5 NOISY EQUIPMENT LIST

In this preliminary study, the equipment generating noise are considered as maximum allowed noise level, noise pressure level of 85 dB(A) at meter from the equipment. The only piece of equipment which is presumably emitting at a different noise level than 85 dB(A) is the Flare (750-PU-001). Input value has been taken from a specific noise analysis of the different release cases performed by a third party-consultant..

There are point and volumetric noise sources, modelled as superficial noise source in each equipment side. It has been included all potentially noisy Equipment (>65 dBA @ 1m).

Equipment with static working conditions is not included in the modelling (just as noise propagation obstacles, i.e. tanks, vessels, etc). Volumetric static equipment is defined in the acoustic model as structural elements which act as acoustic barriers, introducing sound insulation and reflection, only in the acoustic model.

All equipment working in routine patterns as continuous or intermittent has been considered as continuous with an equivalent noise emission for intermittent noise sources, making a correction, according to the formula:

$$L_{p,eq} = L_p + 10 \cdot \log \frac{t}{8}$$

Where,

$L_{p,eq}$, is the equivalent Noise level as continuous.

L_p , is the Noise level @ 1m when equipment is running.

t , running time for shift (8 hours).

Intermittent pattern has been considered running 75% of total time by default but equipment with known specific time running by shift.

Spare equipment has not been included as noise sources.

Valves have not been considered within the study because in the current state of the project are not defined and located.

Major noise sources have been modelled as point but building containing noise sources has been considered as volumetric noise sources.

The pump train Pump + Pump motor is considered as whole noise source. Large rotating equipment are considered as volumetric noise sources. The model type for each source is included in the noisy equipment list (Attachment 2).

It has been included the noise traffic from trucks and railway in the plan, only for the day-time period. It has been estimated 6 trucks/hour and 1 railway (30 wagon) for day. It has been included idling trucks for each charging line and one idling railway for all day period time.

The list of potential noise sources has been used as a baseline to define model inputs. It has been included in the Attachment 2 Noisy equipment list, containing the following noise source information:

- Unit
- TAG
- Equipment description
- Overall Sound Pressure Level (Lp) and Sound Power Level, and Power spectra
- Working Regimen
- Position (ft)
- Remarks

7. ACOUSTIC MODEL

In the figure below the 3D model is showing, the represented elements (grey colour) are acoustical obstacles to the noise propagation. The surface noise sources have been represented too (blue colour) for the units.

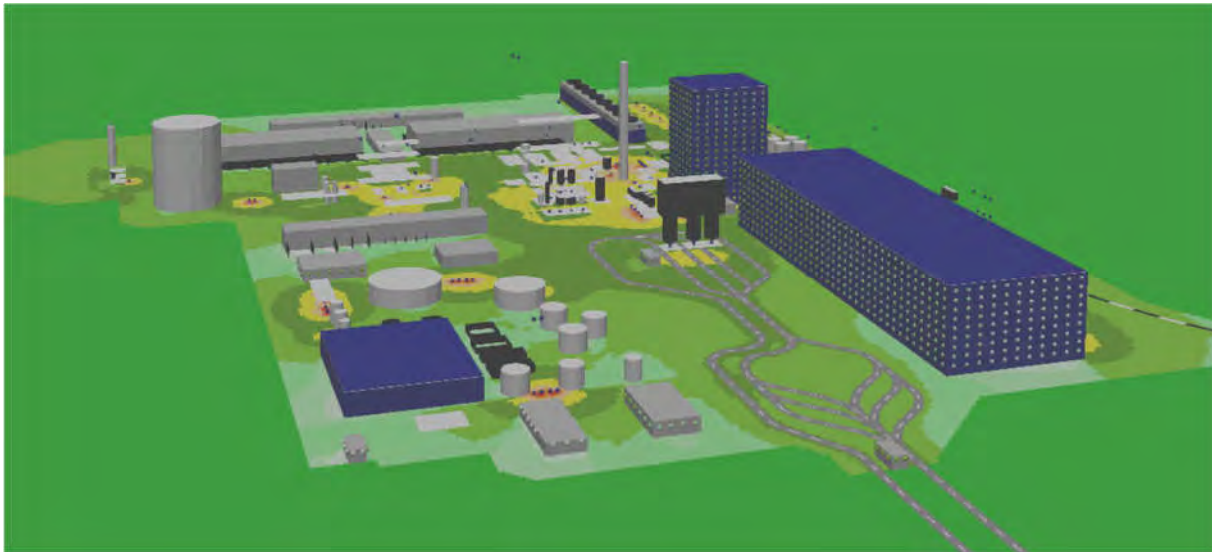


Figure.2. Acoustic model

8. NOISE STUDY RESULTS

8.1 ENVIRONMENTAL NOISE LIMITS

The noise emission from PACIFIC GREEN FERTILIZER PLANT equipment to the surrounding environmental locations around the plant has been calculated. Environmental Noise Maps has been performed for night and day period. The detailed maps have been included in Attachment 1, Serie 2.

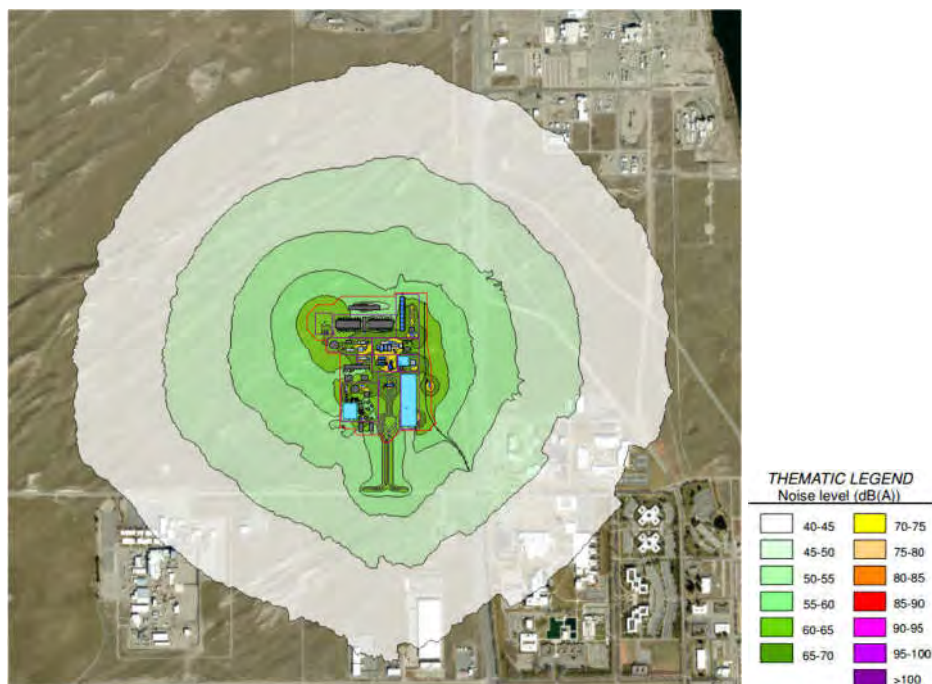


Figure 5. Environmental noise day-time

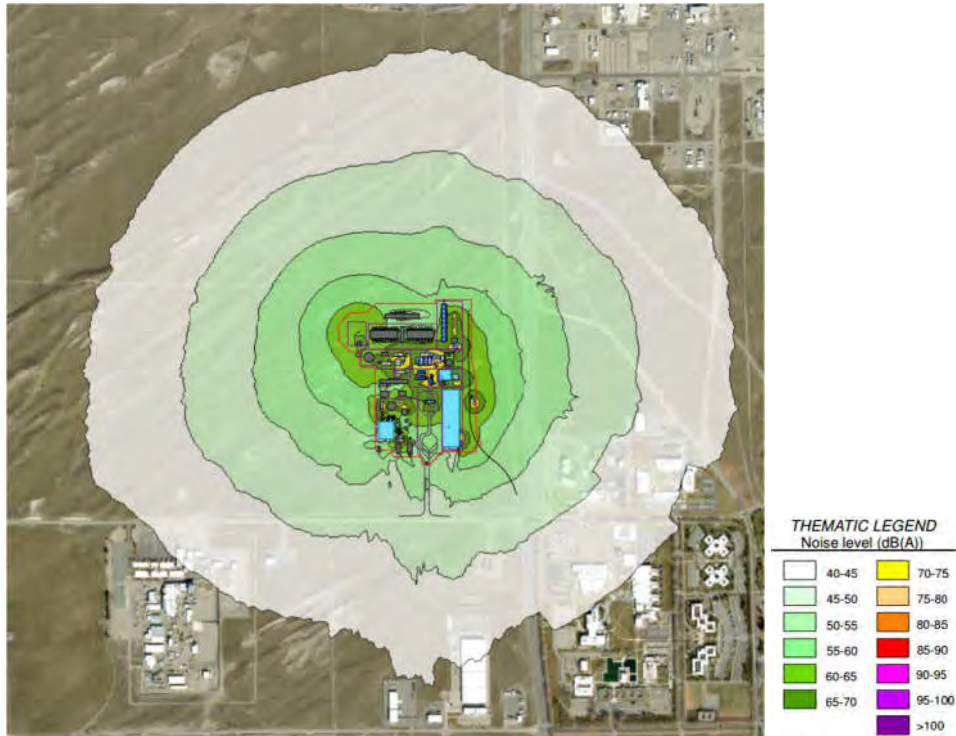


Figure 6. Environmental noise map night-time

It has been drawing the isophone limit EDNA Class A, B and D for each day-time and night-time period.

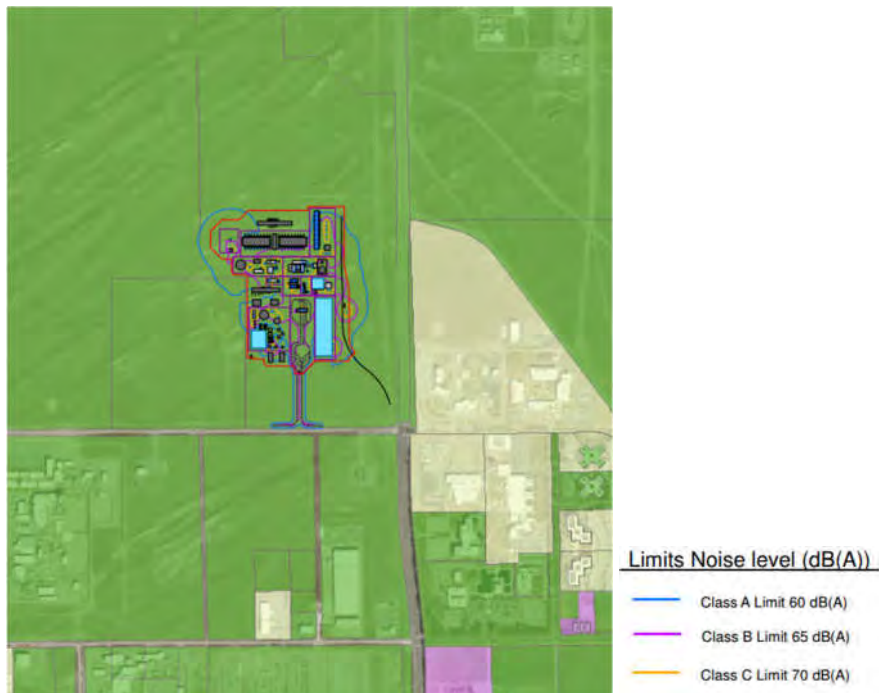


Figure 7. Environmental noise day-time (EDNA limits)

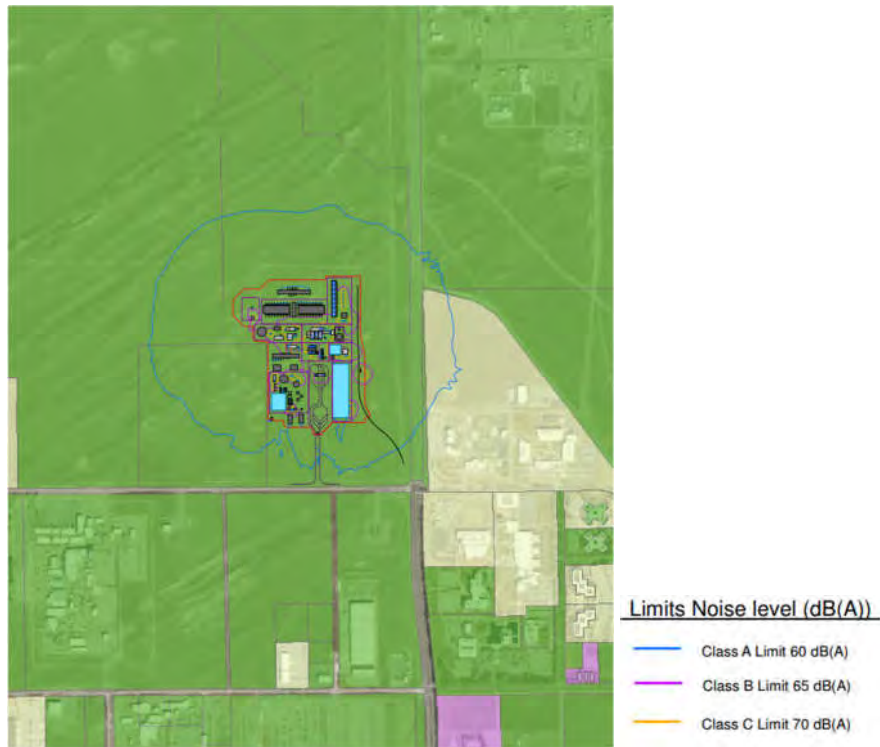


Figure 8. Environmental noise map night-time (EDNA limits)

Thus, in this stage of the FEED the noise emission from the PACIFIC GREEN FERTILIZER PLANT facilities complies with the noise environmental emission limits.

8.2 NOISE PLAN CONTOUR MAPS.

The figure below shows the noise levels during normal operational conditions of the plant in the ground level (4,9 ft, 1.5 meters). See map 3, Attachment 1 Noise Contour Maps.

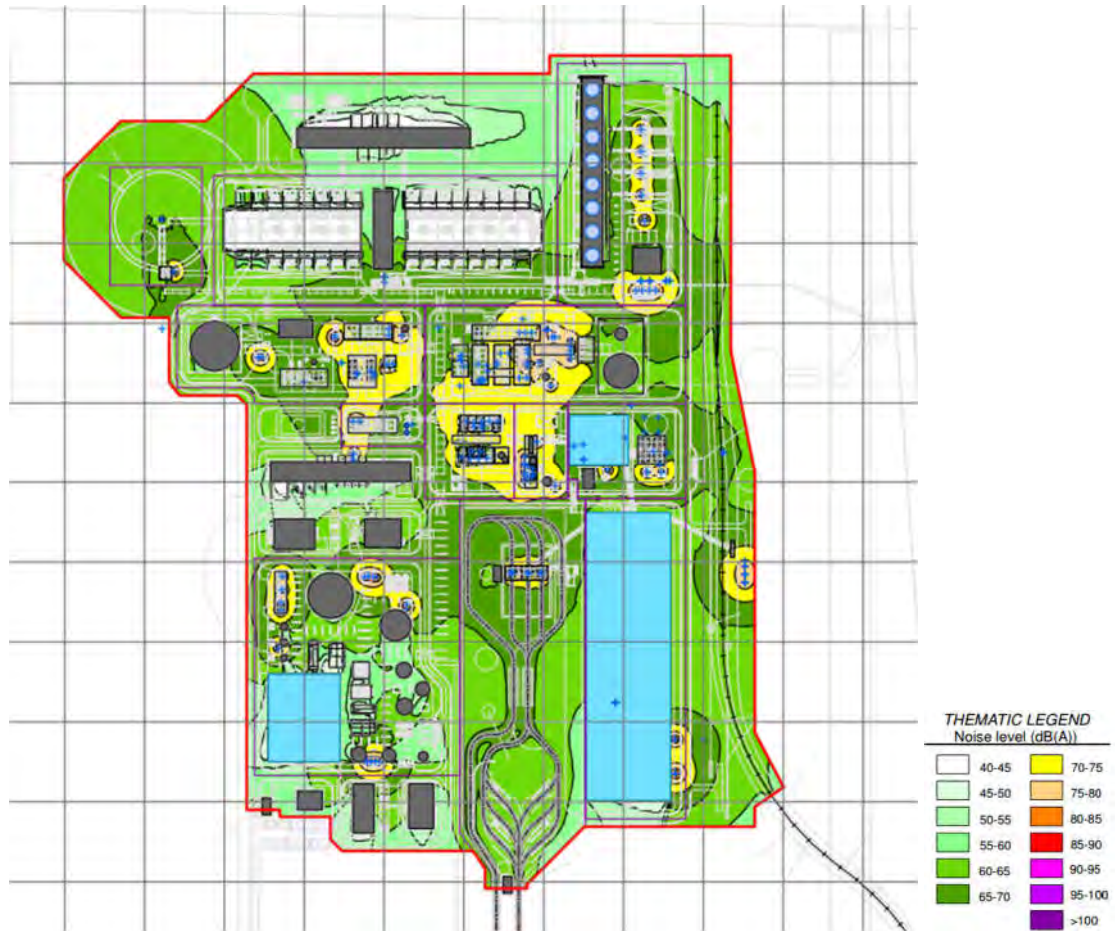


Figure 9. Overall plant noise normal operation, day-time.

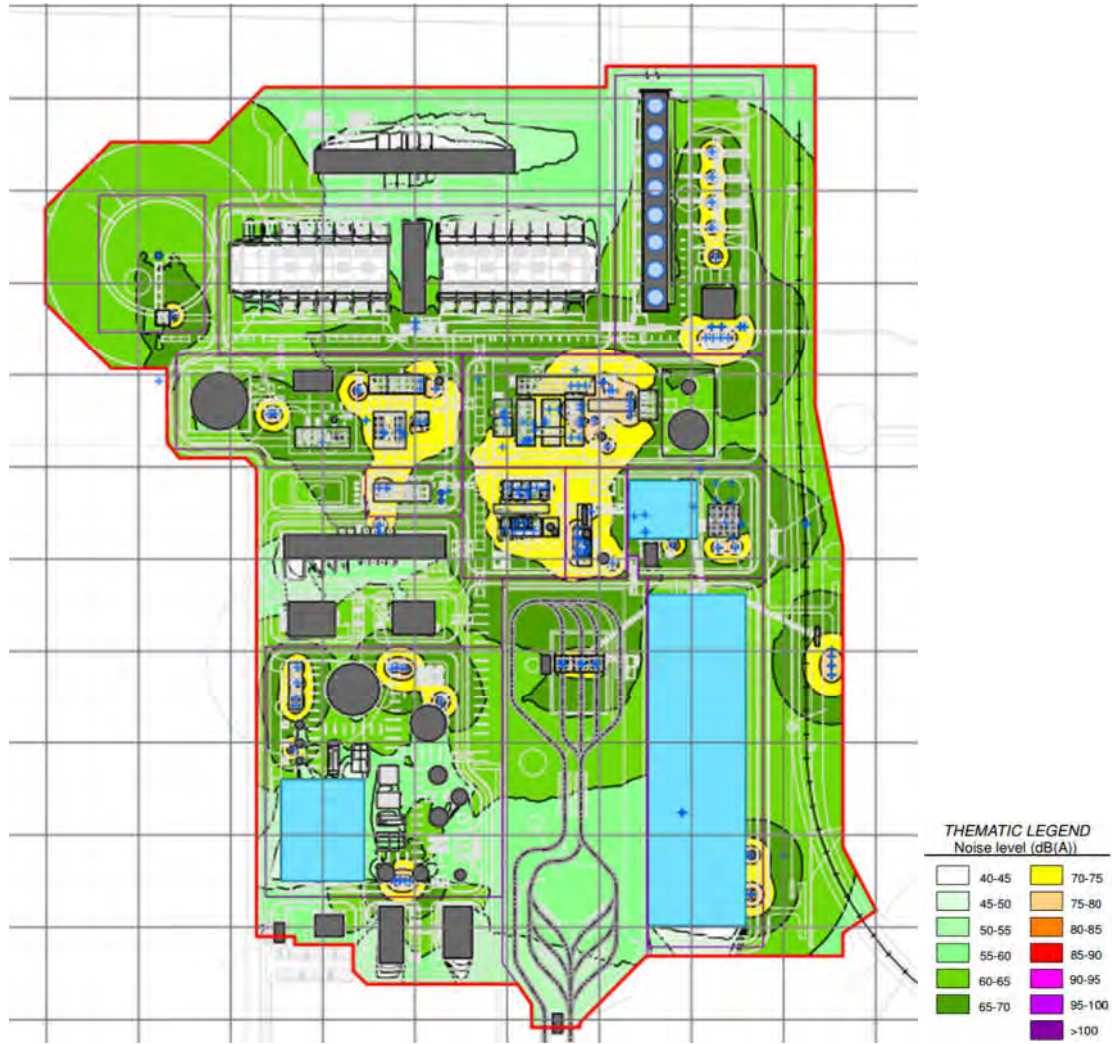


Figure 10. Overall plant noise normal operation, night-time.

No areas over 85 dB(A) have been identified for the plant.

8.3 INDOOR BUILDINGS NOISE

Outdoor noise ($L_{1,2m}$ 2 meters outdoor from the façade building) has been calculated with point noise receptor near each building. It has been calculated the maximum value in the building outside, in octave frequency.

Bldg No.	Building Name	Maximun Lp dB(A)	Outdoor Noise Level ($L_{1,2m}$) dB									
			31,5	63	125	250	500	1000	2000	4000	8000	Le (dBA)
843-BD-01	Check Point Entrance (Trucks)	50	27,4	34,1	43,1	51,8	54,7	58,3	59,6	54,1	42,1	62,0
843-BD-02	Check Point Entrance (Main Access)	50	35,1	48,6	46,4	50,9	58,4	62,0	64,5	62,4	58,1	54,2
432-BD-01	CAN Control Loading	50	45,3	56,2	59,4	64,8	64,2	63,7	62,1	55,9	37,9	70,5
841-BD-01	Administration Building	45	42,9	53,8	57	62,4	61,8	61,3	59,7	53,5	35,5	68,1
810-CR-01	Central Control Room & Laboratory Building	50	39,3	50,2	53,4	58,8	58,2	57,7	56,1	49,9	31,9	64,5
842-WH-01	Warehouse and Workshop Building	70	37,5	48,4	51,6	57	56,4	55,9	54,3	48,1	30,1	62,7
410-SH-02	Granulation Unit Shelter	70	47,1	58	61,2	66,6	66	65,5	63,9	57,7	39,7	72,3
431-ST-01	CAN Bulk storage Unit	70	50,5	61,4	64,6	70	69,4	68,9	67,3	61,1	43,1	75,7

Table.1. Maximum Outdoor Noise level ($L_{1,2m}$)

From the noise insulation of the building and the noise calculation procedure described above, it has been calculated the noise level inside the manned buildings.

Bldg No.	Building Name	Maximum Lp dB(A)	Indoor Noise Level (L _{2,n})									L _{2,n} (dBA)
			31,5	63	125	250	500	1000	2000	4000	8000	
843-BD-01	Check Point Entrance (Trucks)	50	18,1	21,2	26,2	30,1	32,1	33,0	32,1	29,0	27,0	39,1
843-BD-02	Check Point Entrance (Main Access)	50	18,7	24,3	26,4	29,9	32,3	33,1	32,3	29,1	27,1	39,3
432-BD-01	CAN Control Loading	50	22,4	30,0	31,1	37,5	33,0	33,1	32,2	29,0	27,0	41,8
841-BD-01	Administration Building	45	19,4	25,0	27,7	32,6	32,2	33,0	32,0	29,0	27,0	39,7
810-CR-01	Central Control Room & Laboratory Building	50	18,6	22,9	26,7	30,7	32,1	33,0	32,0	29,0	27,0	39,2
842-WH-01	Warehouse and Workshop Building	70	18,4	22,5	26,5	30,3	32,1	33,0	32,0	29,0	27,0	39,2
410-SH-02	Granulation Unit Shelter	70	19,9	25,9	28,2	33,6	32,3	33,0	32,1	29,0	27,0	40,0
431-ST-01	CAN Bulk storage Unit	70	19,7	25,7	28,1	33,3	32,3	33,0	32,0	29,0	27,0	39,9

Table.2. Indoor Noise level (L_{2,n})

The indoor noise level for manned buildings complies with the limits.

9. MITIGATION AND NOISE CONTROL MEASURES

The project includes several noise correction measures for the preliminary FEED phase.

The main noise correction measure is the limitation to the noise emission pressure level to 85 dB(A) at 1 meter for all the equipment in the plant, with the mentioned exception of the flare.

During design phase of the project, main noise equipment's (Compressors, Pumps, Motors, Blowers) were protected by buildings or enclosures with steels roof and facades.

Regarding to compressors, **there are different enclosures in the plant to reduce the noise outside**, such us Ammonia Unit Shelter (200-SH-01), Nitric Acid Shelter (300-SH-01), Plant and Instrument Air Shelter (700-SH-01), Air Separation Unit Shelter 600-SH-01 and Dolomite Bulk Silo Compressors Shelter (410-SH-03). The biggest compressors of the project are located in Ammonium Unit plant (Unit 200) and Nitric Acid Plant (Unit 300). Main ammonium unit compressors such as Synthesis Gas Compressor and Ammonia Refrigeration Compressor shall be elevated in platforms separated by central drop area between them and covered by a roof and facades (Ammonia Unit Shelter 200-SH-01), see image below:

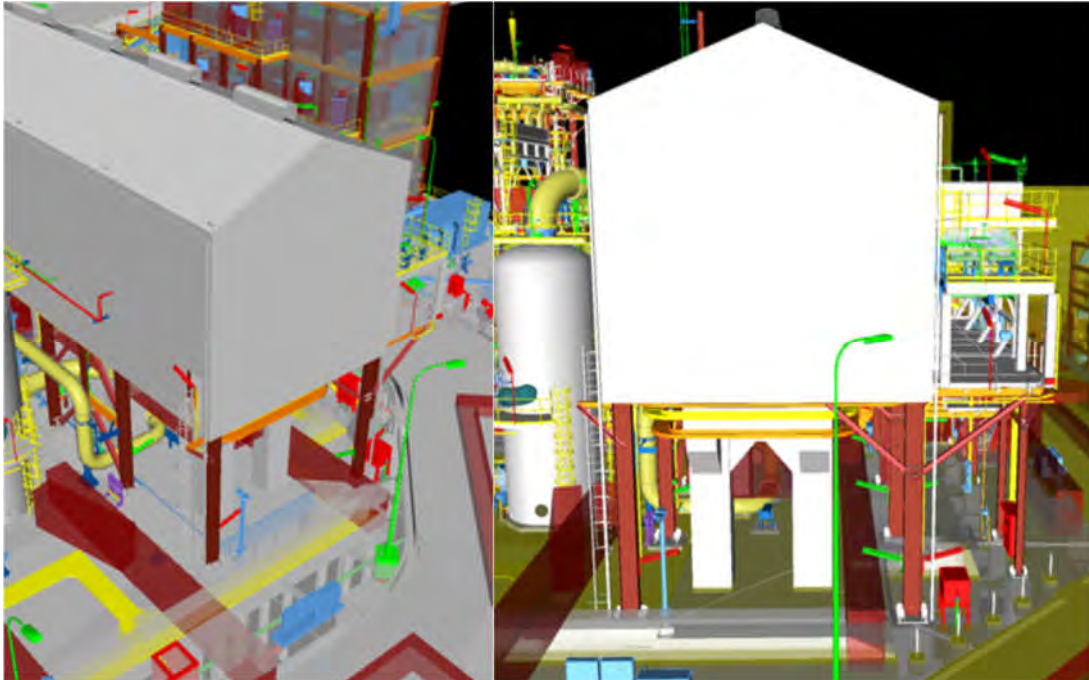


Figure.3. Shelter for Compressors for noise protection purposes

Main Nitric Acid Compressors and motors will be located in Nitric Acid Shelter (300-SH-01), a steel structure fully closed with a reinforced concrete slab at high level (around 15 feet) and Insulated roof and wall cladding to allocate main equipment such as Air Compressor, Process Gas Compressor, motor and Ammonia Oxidation Reactor. The area below this slab at ground level will allow piping distribution.



Figure.4. Example of shelter for Nitric acid indoor.



Figure.5. Example of shelter for Nitric acid outdoor.

Regarding to Pumps and motors, the main noisy sources will be protected also by buildings or enclosures, such as Fire Water Pump Shelter (510-SH-01) dedicated only to house fire water pumps, granulator Unit Shelter (410-SH-02), dedicated to production of calcium ammonium nitrate (CAN 27%) with different pumps, motors and the granulator, and finally the CAN storage shelter (431-ST-01) with different kind of motors will be one level at ground floor closed with steel cladding (roof and walls) and concrete floor slab, see pictures below:



Figure.6. Example of shelter for CAN storage indoor/outdoor.

10. CONCLUSION

The FEED predictive noise study has been developed for the PACIFIC GREEN FERTILIZER PLANT, according to the regulations and applicable normative.

The noise emission from the PACIFIC GREEN FERTILIZER PLANT facilities complies with the environmental noise emission limits at the noise sensitive receptors in the surroundings of the plant, in relation with his EDNA Class.

The noise emission from the PACIFIC GREEN FERTILIZER PLANT facilities complies with the work protection limits in the plant and in the indoor manned buildings.

11. ATTACHMENTS

Att01 Noise contour maps.

Att02 Noisy equipment list.



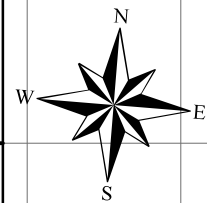
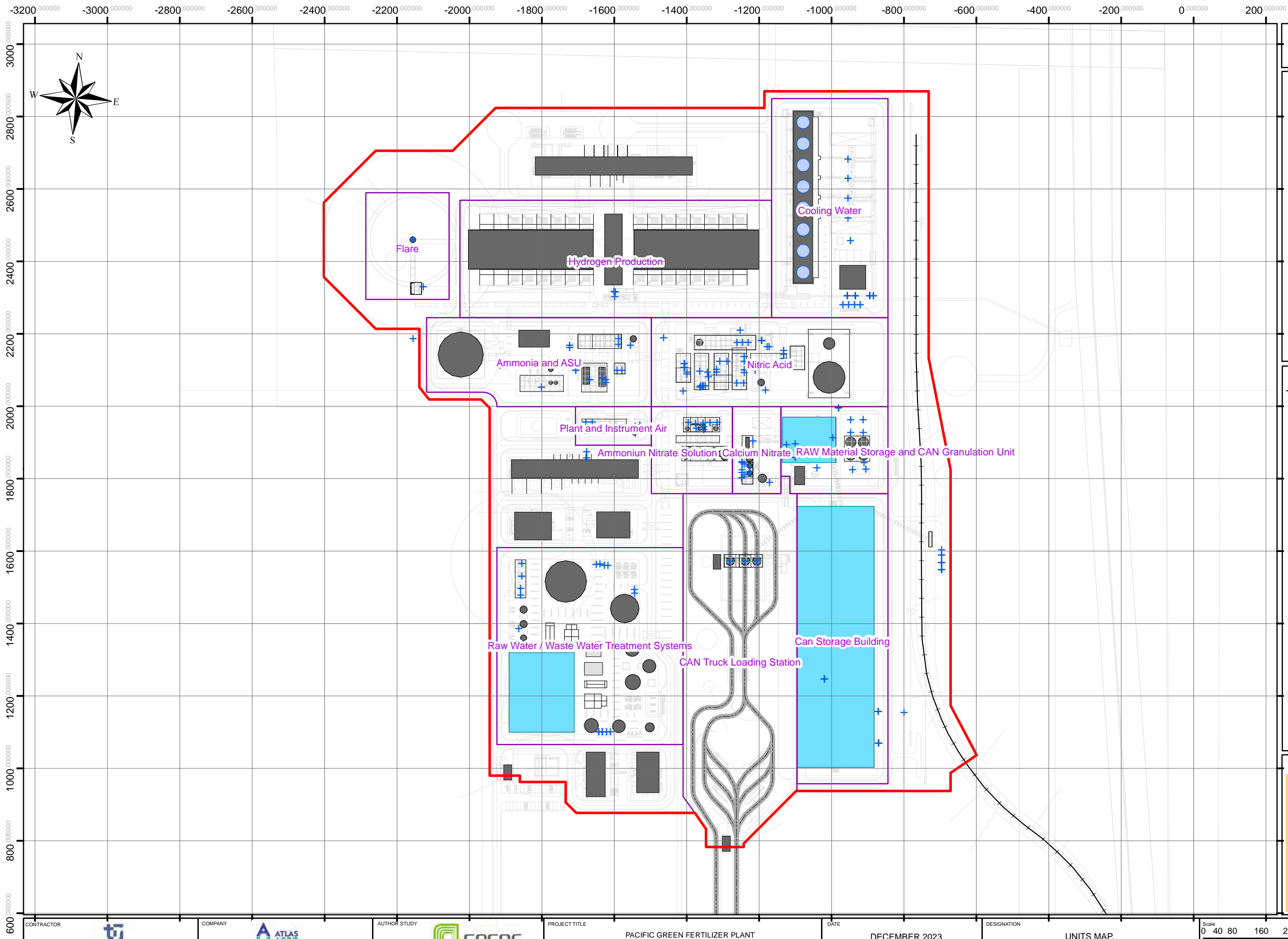
Code: T-23-436_10560

Rev: 01

Date: 28/12/23

Sheet 30 / 32

ATTACHMENT 1. NOISE CONTOUR MAPS.



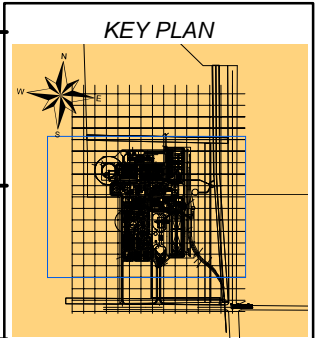
(WASHINGTON)

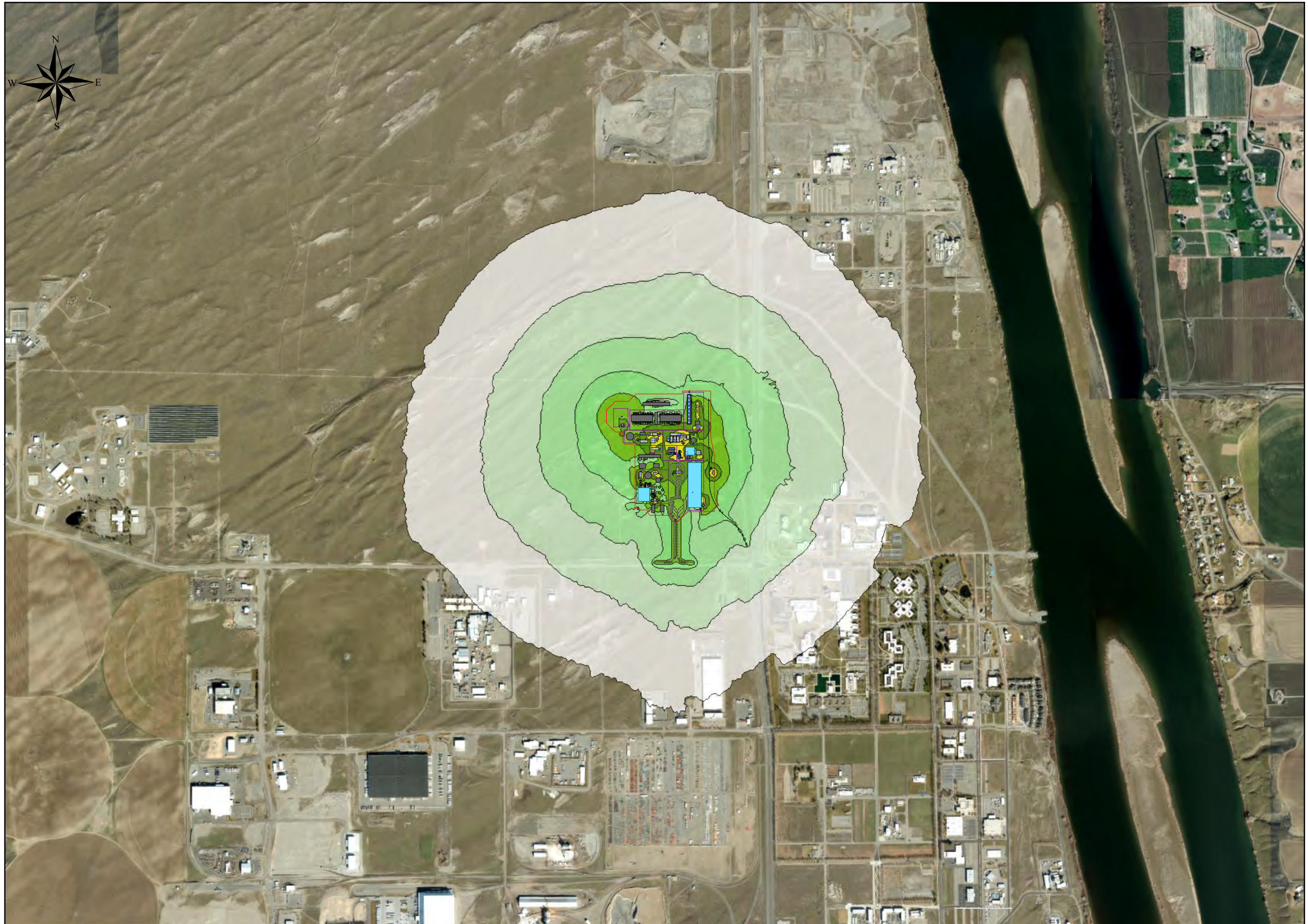
THEMATIC LEGEND
Noise level (dB(A))

40-45	70-75
45-50	75-80
50-55	80-85
55-60	85-90
60-65	90-95
65-70	95-100
	>100

Elements

[Red outline]	Perimeter of the study
[Purple outline]	Units
[Grey line]	Road Traffic
[Black line]	Railway Traffic
[Blue line]	Linear noise source
[Light blue square]	Surface noise source
[Dark blue square]	Volumetric noise source
[Blue plus sign]	Point noise source
[Black circle]	Receptor
[Grey rectangle]	Obstacles
[Grid pattern]	Platform





(WASHINGTON)

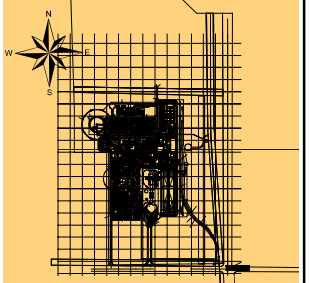
THEMATIC LEGEND
Noise level (dB(A))

40-45	70-75
45-50	75-80
50-55	80-85
55-60	85-90
60-65	90-95
65-70	95-100
	>100

Elements

	Perimeter of the study
	Units
	Road Traffic
	Railway Traffic
	Linear noise source
	Surface noise source
	Volumetric noise source
	Point noise source
	Receptor
	Obstacles
	Platform

KEY PLAN



CONTRACTOR

COMPANY

AUTHOR STUDY

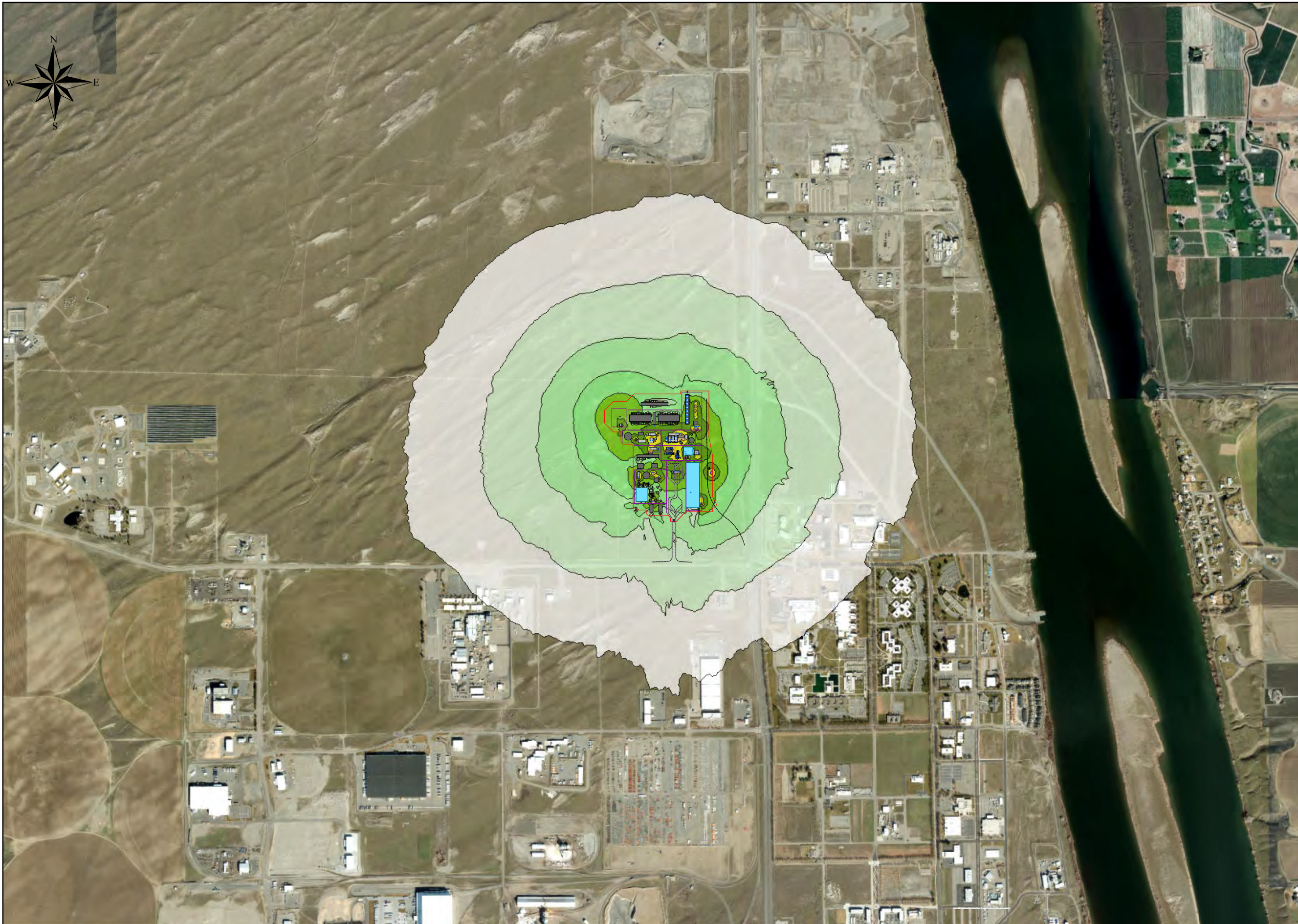
PROJECT TITLE
PACIFIC GREEN FERTILIZER PLANT

DATE
DECEMBER 2023

DESIGNATION
ENVIRONMENTAL NOISE MAP. LDAY

Scale
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ft
UTM Coordinates W.G.S. 84 1:18.054

Drawing number
2.1.1



(WASHINGTON)

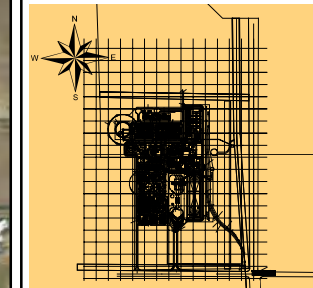
THEMATIC LEGEND
Noise level (dB(A))

40-45	70-75
45-50	75-80
50-55	80-85
55-60	85-90
60-65	90-95
65-70	95-100
	>100

Elements

	Perimeter of the study
	Units
	Road Traffic
	Railway Traffic
	Linear noise source
	Surface noise source
	Volumetric noise source
	Point noise source
	Receptor
	Obstacles
	Platform

KEY PLAN



CONTRACTOR

COMPANY

AUTHOR STUDY

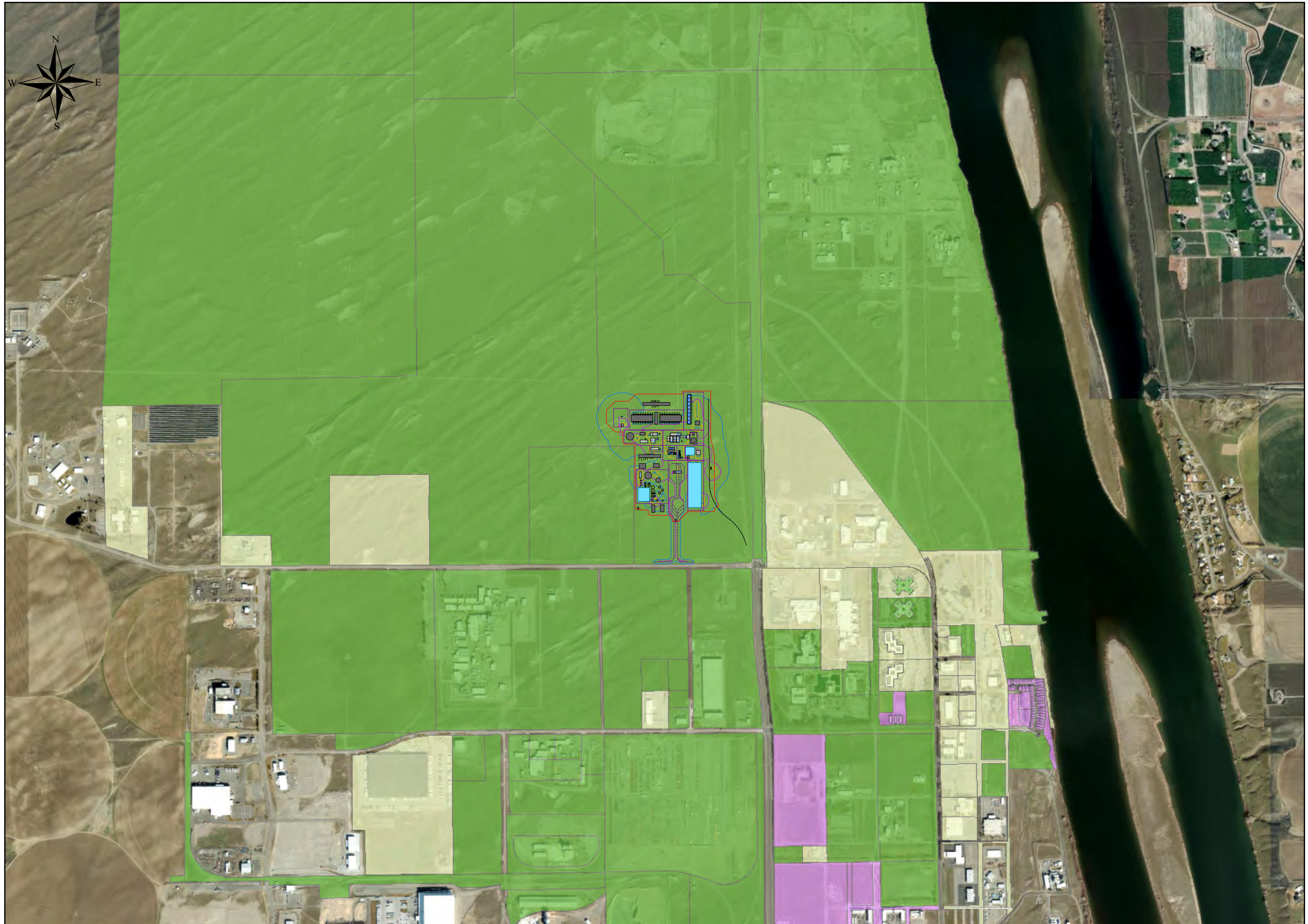
PROJECT TITLE
PACIFIC GREEN FERTILIZER PLANT

DATE
DECEMBER 2023

DESIGNATION
ENVIRONMENTAL NOISE MAP: LNIGHT

Scale
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ft
UTM Coordinates W.G.S. 84 1:18.054

Drawing number
2.1.2



(WASHINGTON)

THEMATIC LEGEND
Limits Noise level (dB(A))

- Class A Limit 60 dB(A)
- Class B Limit 65 dB(A)
- Class C Limit 70 dB(A)

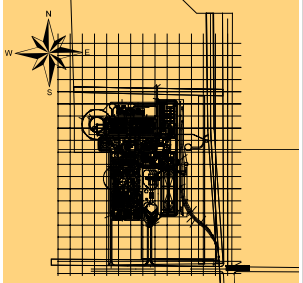
EDNA Parcels

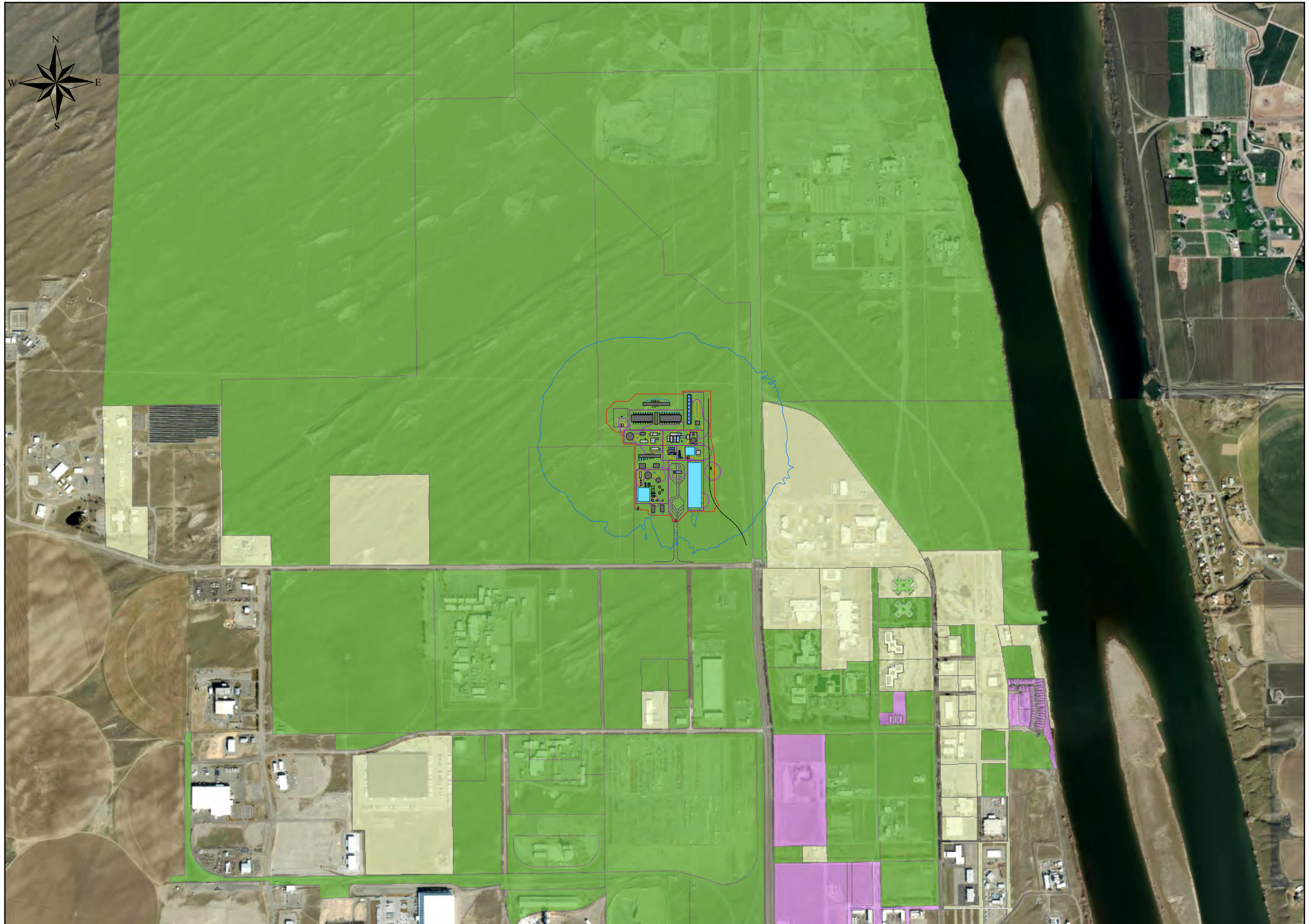
- Class A
- Class B
- Class C

Elements

- Perimeter of the study
- Units
- Road Traffic
- Railway Traffic
- Linear noise source
- Surface noise source
- Volumetric noise source
- + Point noise source
- Receptor
- Obstacles
- Platform

KEY PLAN





(WASHINGTON)

THEMATIC LEGEND
Limits Noise level (dB(A))

- Class A Limit 60 dB(A)
- Class B Limit 65 dB(A)
- Class C Limit 70 dB(A)

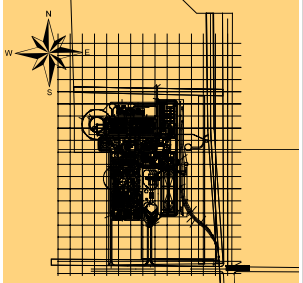
EDNA Parcels

- Class A
- Class B
- Class C

Elements

- Perimeter of the study
- Units
- Road Traffic
- Railway Traffic
- Linear noise source
- Surface noise source
- Volumetric noise source
- + Point noise source
- Receptor
- Obstacles
- Platform

KEY PLAN



CONTRACTOR

COMPANY

AUTHOR STUDY

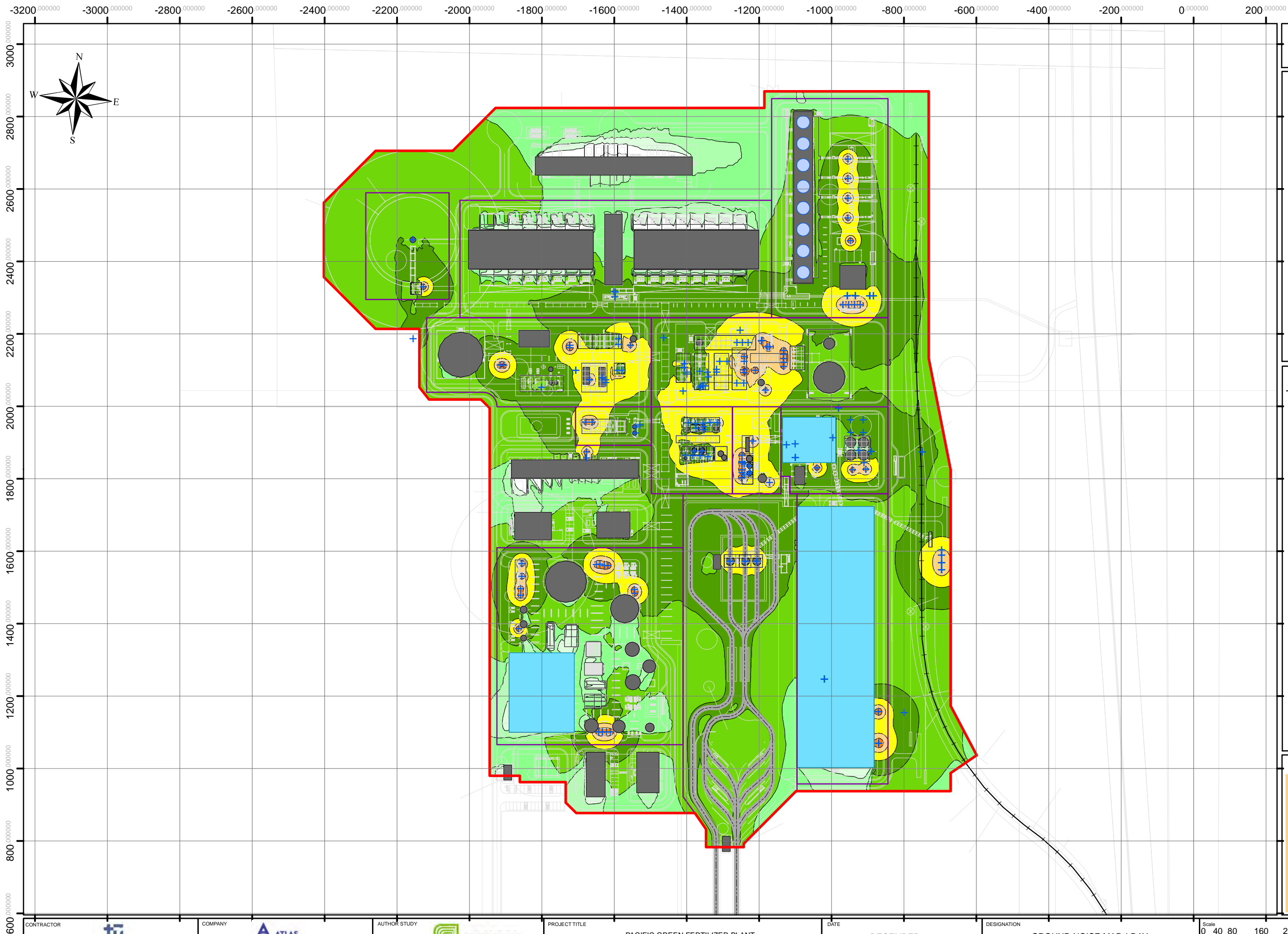
PROJECT TITLE PACIFIC GREEN FERTILIZER PLANT

DATE DECEMBER 2023

DESIGNATION ENVIRONMENTAL NOISE LIMITS MAP. LNIGHT

Scale 0 255510 1.020 1.530 2.040 ft
UTM Coordinates W.G.S. 84 1:18.054

Drawing number 2.2.2



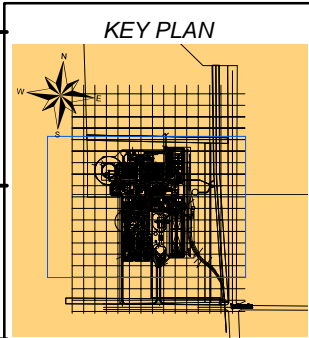
(WASHINGTON)

THEMATIC LEGEND
Noise level (dB(A))

40-45	70-75
45-50	75-80
50-55	80-85
55-60	85-90
60-65	90-95
65-70	95-100
	>100

Elements

	Perimeter of the study
	Units
	Road Traffic
	Railway Traffic
	Linear noise source
	Surface noise source
	Volumetric noise source
	Point noise source
	Receptor
	Obstacles
	Platform



CONTRACTOR

COMPANY

AUTHOR STUDY

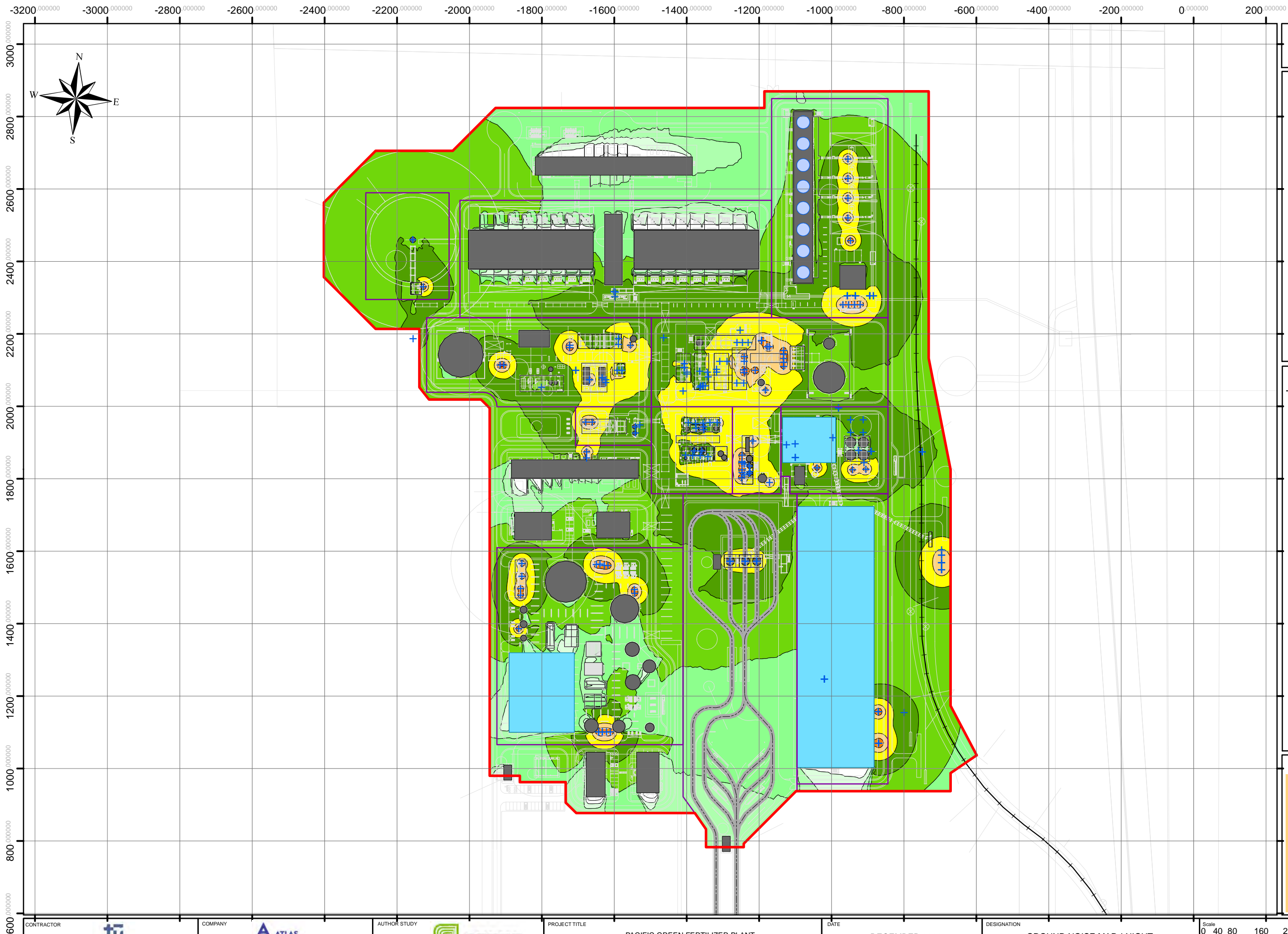
PROJECT TITLE PACIFIC GREEN FERTILIZER PLANT

DATE DECEMBER 2023

DESIGNATION GROUND NOISE MAP. LDAY

Scale 0 40 80 160 240 320 ft
UTM Coordinates W.G.S. 84 1:3,000

Drawing number 3.1



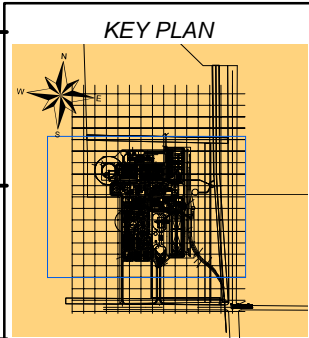
(WASHINGTON)

THEMATIC LEGEND
Noise level (dB(A))

40-45	70-75
45-50	75-80
50-55	80-85
55-60	85-90
60-65	90-95
65-70	95-100
	>100

Elements

	Perimeter of the study
	Units
	Road Traffic
	Railway Traffic
	Linear noise source
	Surface noise source
	Volumetric noise source
	Point noise source
	Receptor
	Obstacles
	Platform



CONTRACTOR

COMPANY

AUTHOR STUDY

PROJECT TITLE PACIFIC GREEN FERTILIZER PLANT

DATE DECEMBER 2023

DESIGNATION GROUND NOISE MAP. LNIGHT

Scale 0 40 80 160 240 320 ft
UTM Coordinates W.G.S. 84 1:3.000

Drawing number 3.2



Code: T-23-436_10560

Rev: 01

Date: 28/12/23

Sheet 31 / 32

ATTACHMENT 2. NOISY EQUIPMENT LIST.



**PACIFIC GREEN FERTILIZER PLANT
10560 - AA010**



GENERAL NOTES	
1	(1) Noise Equipment items are taken from formally issued Project Equipment List.
2	(2) This Template has been prepared in accordance with Annex G of ISO 15664.
6	(3) Noise Level:
7	- Lp (@1m) [dBA]: Total Sound Pressure level at 1 m in dB(A).
9	- Lw Overall [dBA]: Total Sound Power level in dB(A).
10	- Lw Spectrum [dB]: Linear spectrum of Sound Power Level, in dB.
11	(4) For those equipment package type, for example pumps/compressors/ Aircoolers, the specified Lp and Lw values shall be of the whole
12	package including the gear and the driver (motor, turbine, etc.).
13	(5) Working Regime: Continuous, Spare, Intermittent (Start-up), Emergency, etc.
14	(6) Location:
15	Z coordinate shall be considered at ground level. Height of equipment shall be noted in "Dimensions" column.
16	(7) Remarks, if applicable include:
17	- description of special acoustic designs, corrective measures, etc.
18	- description of the time of operation for intermittent equipment.
19	- if Noise level is allocated or from Vendor's data.
19	- Etc..
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PROJECT: PACIFIC GREEN FERTILIZER PLANT
 CLIENT: ATLAS AGRO
 DOC.: T-23-436_10560



NOISE EQUIPMENT LIST



REV.:	01		
DATE:	28-12-23		
PREP.:			
CHECK.:			
APPR.:			

Rev	Unit	Tag Nº (Note 1)	Equip. Description	Noise Level (Notes 3 & 4)								Working Regimen (Note 5)	Location (Note 6)			Remarks (Note 7)		
				Lp (@1m) [dBA]	Lw Overall [dBA]	Lw Spectrum [dB]							X (ft)	Y (ft)	Z (ft)			
						63 Hz	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz						4 KHz	8 KHz
10	100-GA-001A		DEMINEALIZED WATER PUMP A	85	96	85	86	87	89	89	92	89	85	By vendor	-1643 ft 8 in	1026 ft 2 in	102 ft 1 in	
10	100-GA-001B		DEMINEALIZED WATER PUMP B	85	96	85	86	87	89	89	92	89	85	By vendor	-1633 ft 8 in	1026 ft 2 in	102 ft 1 in	
10	100-GA-002A		ELECTROLYTE PUMP A	85	96	85	86	87	89	89	92	89	85	By vendor	903 ft 0 in	3081 ft 10 in	100 ft 0 in	
10	100-GA-002B		ELECTROLYTE PUMP B	85	96	85	86	87	89	89	92	89	85	By vendor	903 ft 0 in	3081 ft 10 in	100 ft 0 in	
10	100-PA-001		BRIDGE CRANE	85	96	85	86	87	89	89	92	89	85	By vendor	-1642 ft 4 in	1914 ft 6 in	454 ft 6 in	
10	100-PU-001		HYDROGEN PRODUCTION UNIT	85	96	85	86	87	89	89	92	89	85	-	903 ft 0 in	3081 ft 10 in	100 ft 0 in	
10	100-PU-002		PURIFICATION PACKAGE	85	96	85	86	87	89	89	92	89	85	-	-1601 ft 0 in	2242 ft 6 in	100 ft 0 in	
20	200-BJ-001		ELECTRIC STARTUP HEATER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1555 ft 8 in	2094 ft 3 in	101 ft 0 in	
20	200-CC-003		PHOSPHATE INJECTION SYSTEM	85	96	85	86	87	89	89	92	89	85	Continuous	-1020 ft 4 in	1172 ft 9 in	-4 ft 11 in	Inside
20	200-CD-001		SYNTHESIS GAS COMPRESSOR PACKAGE	85	96	85	86	87	89	89	92	89	85	Continuous	-1633,86	2004,44	15	
20	200-CD-002		AMMONIA REFRIGERATION COMPRESSOR PACKAGE	85	96	85	86	87	89	89	92	89	85	Continuous	-1668 ft 5 in	1998 ft 6 in	100 ft 0 in	
20	200-EA-001A		SYNGAS COMPRESSOR 1ST STAGE INTERCOOLER	85	96	85	86	87	89	89	92	89	85	Continuous	-870 ft 2 in	995 ft 9 in	20 ft 4 in	
20	200-EA-001B		SYNGAS COMPRESSOR 1ST STAGE INTERCOOLER	85	96	85	86	87	89	89	92	89	85	Continuous	-870 ft 2 in	995 ft 9 in	13 ft 3 in	
20	200-EA-002A		SYNGAS COMPRESSOR 2ND STAGE INTERCOOLER	85	96	85	86	87	89	89	92	89	85	Continuous	-871 ft 0 in	1082 ft 1 in	20 ft 3 in	
20	200-EA-002B		SYNGAS COMPRESSOR 2ND STAGE INTERCOOLER	85	96	85	86	87	89	89	92	89	85	Continuous	-871 ft 0 in	1082 ft 1 in	13 ft 3 in	
20	200-EA-004		MP STEAM SUPERHEATER	85	96	85	86	87	89	89	92	89	85	Continuous	-1588 ft 9 in	2096 ft 2 in	116 ft 1 in	
20	200-EA-005		MP STEAM GENERATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1588 ft 9 in	2111 ft 7 in	116 ft 1 in	
20	200-EA-010A		REFRIGERATION COMPRESSOR INTERCOOLER	85	96	85	86	87	89	89	92	89	85	Continuous	-1592,93	2024,53	10	
20	200-EA-010B		REFRIGERATION COMPRESSOR INTERCOOLER	85	96	85	86	87	89	89	92	89	85	Continuous	-1578,91	2024,53	10	
20	200-EA-011		REFRIGERANT CONDENSER	85	96	85	86	87	89	89	92	89	85	Continuous	-800 ft 1 in	1080 ft 2 in	168 ft 4 in	
20	200-GA-001A		SYNGAS COMPRESSOR LUBE OIL PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-870 ft 2 in	995 ft 9 in	+20 ft 4 in	
20	200-GA-001B		SYNGAS COMPRESSOR LUBE OIL PUMP B	85	96	85	86	87	89	89	92	89	85	Continuous	-870 ft 2 in	995 ft 9 in	+13 ft 3 in	
20	200-GA-002A		REFRIGERATION COMPRESSOR LUBE OIL PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1706 ft 11 in	2024 ft 11 in	111 ft 1 in	
20	200-GA-002B		REFRIGERATION COMPRESSOR LUBE OIL PUMP B	85	96	85	86	87	89	89	92	89	85	Continuous	-1706 ft 11 in	2024 ft 11 in	111 ft 1 in	
20	200-GA-003A		COLD AMMONIA PRODUCT PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1723 ft 8 in	2094 ft 3 in	102 ft 10 in	
20	200-GA-003B		COLD AMMONIA PRODUCT PUMP B	85	96	85	86	87	89	89	92	89	85	Continuous	-1723 ft 8 in	2087 ft 0 in	102 ft 10 in	
20	200-GA-005A		AMMONIA TRANSFER PUMP A (TO COMPLEX PLANTS)	85	96	85	86	87	89	89	92	89	85	Continuous	-1915,87	2038,53	5	
20	200-GA-005B		AMMONIA TRANSFER PUMP B (TO COMPLEX PLANTS)	85	96	85	86	87	89	89	92	89	85	Continuous	-1905,83	2038,53	5	
20	200-GA-006A		PHOSPHATE PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1020 ft 4 in	1172 ft 9 in	-4 ft 11 in	
20	200-GA-006B		PHOSPHATE PUMP B	85	96	85	86	87	89	89	92	89	85	Continuous	-1020 ft 4 in	1172 ft 9 in	-4 ft 11 in	
20	200-GB-001		SYNTHESIS GAS COMPRESSOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1624 ft 2 in	1998 ft 6 in	100 ft 0 in	
20	200-GB-002		AMMONIA REFRIGERATION COMPRESSOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1668 ft 5 in	1998 ft 6 in	100 ft 0 in	
20	200-GB-003		OIL MIST ELIMINATOR FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1193 ft 4 in	2107 ft 0 in	+103 ft 7 in	
20	200-GB-004		OIL MIST ELIMINATOR FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1193 ft 4 in	2107 ft 0 in	+103 ft 7 in	
20	200-GD-001		PHOSPHATE VESSEL AGITATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1020 ft 4 in	1172 ft 9 in	-4 ft 11 in	
20	200-PA-001		BRIDGE CRANE	85	96	85	86	87	89	89	92	89	85	Continuous	-1623 ft 10 in	1991 ft 2 in	125 ft 0 in	
20	200-PU-001		BOIL OFF GAS REFRIGERATION PACKAGE	85	96	85	86	87	89	89	92	89	85	Continuous	-1256 ft 0 in	2112 ft 5 in	147 ft 11 in	
30	300-CD-001		COMPRESSOR TRAIN PACKAGE	85	96	85	86	87	89	89	92	89	85	-	-1193 ft 4 in	2107 ft 0 in	103 ft 7 in	
30	300-FD-006		AIR FILTER PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1252 ft 11 in	2135 ft 0 in	121 ft 4 in	
30	300-GA-001A		LUBE OIL PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1178,19	2090,01	5	
30	300-GA-001B		LUBE OIL PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1172,28	2090,01	5	
30	300-GA-002		START-UP PUMP	85	96	85	86	87	89	89	92	89	85	Intermittent	-1132 ft 9 in	2079 ft 10 in	111 ft 1 in	
30	300-GA-003		LUBE OIL EMERGENCY PUMP	85	96	85	86	87	89	89	92	89	85	Intermittent	-1193 ft 4 in	2107 ft 0 in	+103 ft 7 in	
30	300-GA-004A		WEAK ACID PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1241 ft 8 in	2049 ft 1 in	109 ft 11 in	
30	300-GA-004B		WEAK ACID PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1241,45	2062,15	5	
30	300-GA-005A		BW RECIRCULATION PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1289 ft 2 in	2050 ft 0 in	110 ft 9 in	
30	300-GA-005B		BW RECIRCULATION PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1309 ft 2 in	2050 ft 0 in	110 ft 9 in	
30	300-GA-007		NITRIC ACID DRAINS PUMP	85	96	85	86	87	89	89	92	89	85	Intermittent	-1211,09	2024,76	5	
30	300-GA-009A		PHOSPHATE PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-2206 ft 0 in	870 ft 8 in	256 ft 7 in	
30	300-GA-009B		PHOSPHATE PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-2204 ft 7 in	886 ft 10 in	256 ft 4 in	
30	300-GA-010A		CHILLED WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1262 ft 0 in	1989 ft 7 in	110 ft 0 in	
30	300-GA-010B		CHILLED WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1242 ft 11 in	1989 ft 7 in	110 ft 0 in	
30	300-GA-019A		NITRIC ACID PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1132 ft 9 in	2068 ft 8 in	111 ft 0 in	
30	300-GA-019B		NITRIC ACID PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1132 ft 9 in	2057 ft 7 in	111 ft 0 in	
30	300-GA-020A		PROCESS CONDENSATE PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1241,61	2025,96	5	
30	300-GA-020B		PROCESS CONDENSATE PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1241,61	2017,8	5	
30	300-GA-022A		VENT WASHING PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1132 ft 9 in	2046 ft 5 in	111 ft 0 in	

30	300-GA-022B	VENT WASHING PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1132 ft 9 in	2035 ft 4 in	111 ft 0 in	
30	300-GB-001	AIR COMPRESSOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1261,54	2101,38	50	
30	300-GB-002	PROCESS GAS COMPRESSOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1246,04	2101,38	50	
30	300-GB-003	OIL MIST EXTRACTOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1193 ft 4 in	2107 ft 0 in	+103 ft 7 in	
30	300-GD-002	PHOSPHATE VESSEL AGITATOR	47	58	48	49	51	51	54	51	47	41	Intermittent	-1343 ft 1 in	2019 ft 2 in	+93 ft 8 in	
30	300-GF-002	TAIL GAS EXPANDER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1230,54	2101,38	50	
30	300-PA-001	BRIDGE CRANE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1463 ft 11 in	2115 ft 5 in	190 ft 0 in	
40	400-EE-001	STEAM EJECTOR	85	96	85	86	87	89	89	92	89	85	-	-1353 ft 0 in	1861 ft 0 in	148 ft 0 in	
40	400-EE-002	START UP STEAM EJECTOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1353 ft 0 in	1869 ft 0 in	148 ft 0 in	
40	400-GA-001A	PRESSURE SCRUBBER PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1403 ft 8 in	1791 ft 3 in	109 ft 10 in	
40	400-GA-002A	VACUUM SCRUBBER PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1342 ft 0 in	1786 ft 5 in	109 ft 10 in	
40	400-GA-003A	DILUTED AN SOLUTION PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1384 ft 0 in	1789 ft 3 in	109 ft 10 in	
40	400-GA-004A	CONCENTRATED AN SOLUTION PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1363 ft 0 in	1789 ft 3 in	109 ft 10 in	
40	400-GA-005A	REACTOR PROCESS CONDENSATE PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1316 ft 0 in	1879 ft 9 in	109 ft 10 in	
40	400-GA-005C	REACTOR PROCESS CONDENSATE PUMP C	85	96	85	86	87	89	89	92	89	85	Continuous	-1336 ft 0 in	1879 ft 9 in	109 ft 10 in	
40	400-GA-006A	VACUUM PROCESS CONDENSATE PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1376 ft 0 in	1877 ft 9 in	109 ft 10 in	
40	400-GA-010A	ANSOL 20% PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1396 ft 0 in	1879 ft 9 in	109 ft 10 in	
40	400-GB-001A	VAPOUR FAN A	85	96	85	86	87	89	89	92	89	85	Continuous	-1374 ft 6 in	1865 ft 6 in	167 ft 0 in	
40	400-GD-001	DILUTED AN SOLUTION AGITATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1355,07	1879,61	30	
40	400-GD-002	CONCENTRATED AN SOLUTION AGITATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1358,51	1803,04	40	
40	400-GD-004	ANSOL 20% AGITATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1379,63	1802,99	40	
41	410-CD-004	RAW MATERIAL PNEUMATIC TRANSPORT PACKAGE	85	96	85	86	87	89	89	92	89	85	Continuous	-926 ft 2 in	1803 ft 6 in	97 ft 2.75 in	
41	410-CD-005	SCREEN PACKAGE	85	96	85	86	87	89	89	92	89	85	Continuous	-1101 ft 5 in	1822 ft 6 in	225 ft 8 in	
41	410-CD-006	RAW MATERIAL UNLOADING PNEUMATIC SYSTEM	85	96	85	86	87	89	89	92	89	85	Intermittent	-750 ft	1800 ft	116 ft 6 in	
41	410-CI-001	DRYER	85	96	85	86	87	89	89	92	89	85	Continuous	-1130 ft 0 in	1873 ft 6 in	131 ft 2 in	Inside
41	410-CJ-001	GRANULATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1003 ft 6 in	1873 ft 6 in	147 ft 0 in	Inside
41	410-CJ-002	COATING DRUM	85	96	85	86	87	89	89	92	89	85	Continuous	-993 ft 1 in	1783 ft 6 in	174 ft 0 in	Inside
41	410-GA-002A	ADDITIVE PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1040 ft 8 in	1755 ft 7 in	101 ft 4 in	
41	410-GB-001	DRYER FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1009 ft 1 in	1890 ft 3 in	216 ft 0 in	Inside
41	410-GB-002	DEDUST FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1119 ft 0 in	1858 ft 3 in	206 ft 0 in	Inside
41	410-GB-003	FBC OUTLET FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1084 ft 5 in	1849 ft 1 in	206 ft 0 in	Inside
41	410-GB-004	FBC FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1072 ft 5 in	1790 ft 0 in	107 ft 0 in	Inside
41	410-GB-005	FBC RECIRCULATING FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1098 ft 4 in	1790 ft 0 in	107 ft 0 in	Inside
41	410-GB-006	GRANULATOR FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1112 ft 5 in	1890 ft 6 in	185 ft 0 in	Inside
41	410-GB-008	AIR HEATER FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1100 ft 2 in	1784 ft 6 in	245 ft 0 in	
41	410-GB-010A	PNEUMATIC TRANSPORT SYSTEM COMPRESSOR A	85	96	85	86	87	89	89	92	89	85	Continuous	-942 ft 5 in	1750 ft 0 in	101 ft 0 in	
41	410-GB-011	RAW MATERIAL FEEDING BAG FILTER FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-996 ft 8 in	1844 ft 4 in	211 ft 2 in	Inside
41	410-GB-012	RAW MATERIAL UNLOADING BLOWER	85	96	85	86	87	89	89	92	89	85	Intermittent	-750 ft	1800 ft	116 ft 6 in	
41	410-GI-001A	OVERSIZE MILL A	85	96	85	86	87	89	89	92	89	85	Continuous	-1100 ft 11 in	1833 ft 8 in	147 ft 0 in	Inside
41	410-GI-001B	OVERSIZE MILL B	85	96	85	86	87	89	89	92	89	85	Continuous	-1100 ft 11 in	1822 ft 11 in	147 ft 0 in	Inside
41	410-GI-002	EXDRYER LUMP BREAKER	85	96	85	86	87	89	89	92	89	85	Continuous	-1530 ft 0 in	1873 ft 6 in	131 ft 2 in	
41	410-GJ-001A	COARSE SCREEN A	85	96	85	86	87	89	89	92	89	85	Continuous	-1111 ft 0 in	1835 ft 10 in	245 ft 6 in	Inside
41	410-GJ-001B	COARSE SCREEN B	85	96	85	86	87	89	89	92	89	85	Continuous	-1111 ft 0 in	1826 ft 0 in	245 ft 6 in	Inside
41	410-GJ-002	POLISHING SCREEN	85	96	85	86	87	89	89	92	89	85	Continuous	-1017 ft 3 in	1790 ft 10 in	221 ft 4 in	Inside
41	410-GJ-003A	FINES SCREEN A	85	96	85	86	87	89	89	92	89	85	Continuous	-1101 ft 5 in	1832 ft 4 in	225 ft 8 in	Inside
41	410-GJ-003B	FINES SCREEN B	85	96	85	86	87	89	89	92	89	85	Continuous	-1101 ft 5 in	1822 ft 6 in	225 ft 8 in	Inside
41	410-GK-004A	RAW MATERIAL SILO ROTARY VALVE A	85	96	85	86	87	89	89	92	89	85	Intermittent	-890 ft 8 in	1800 ft 10 in	110 ft	
41	410-GK-004B	RAW MATERIAL SILO ROTARY VALVE B	85	96	85	86	87	89	89	92	89	85	Intermittent	-980 ft 11 in	1920 ft 10 in	110 ft	
41	410-GK-004C	RAW MATERIAL SILO ROTARY VALVE C	85	96	85	86	87	89	89	92	89	85	Intermittent	-980 ft 11 in	1920 ft 10 in	110 ft	
41	410-GK-004D	RAW MATERIAL SILO ROTARY VALVE D	85	96	85	86	87	89	89	92	89	85	Intermittent	-890 ft 8 in	1800 ft 10 in	110 ft	
41	410-GX-005	INTERNAL ADDITIVE HOPPER BIN ACTIVATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1124 ft 9 in	1819 ft 0 in	152 ft 6 in	
41	410-GX-006	GRANULATOR FEEDING HOPPER BIN ACTIVATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-996 ft 8 in	1838 ft 3 in	187 ft 2 in	
41	410-GX-007A	RAW MATERIAL STORAGE SILO BIN ACTIVATOR A	85	96	85	86	87	89	89	92	89	85	Intermittent	-912 ft 8 in	1853 ft 10 in	110 ft	
41	410-GX-007B	RAW MATERIAL STORAGE SILO BIN ACTIVATOR B	85	96	85	86	87	89	89	92	89	85	Intermittent	-947 ft 11 in	1853 ft 10 in	110 ft	
41	410-GX-007C	RAW MATERIAL STORAGE SILO BIN ACTIVATOR C	85	96	85	86	87	89	89	92	89	85	Intermittent	-947 ft 11 in	1888 ft 10 in	110 ft	
41	410-GX-007D	RAW MATERIAL STORAGE SILO BIN ACTIVATOR D	85	96	85	86	87	89	89	92	89	85	Intermittent	-912 ft 8 in	1888 ft 10 in	110 ft	
41	410-MA-002	AIR SILENCER II	85	96	85	86	87	89	89	92	89	85	Continuous	-905 ft 8 in	1751 ft 4 in	101 ft 0 in	
41	410-MA-003	AIR SILENCER III	85	96	85	86	87	89	89	92	89	85	Continuous	-1100 ft 2 in	1784 ft 6 in	245 ft 0 in	
41	410-MA-004	RAW MATERIAL UNLOADING SILENCER	85	96	85	86	87	89	89	92	89	85	Intermittent	-750 ft	1800 ft	116 ft 6 in	
41	410-PC-003	GRANULATOR FEEDING SCREW CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-996 ft 8 in	1835 ft 7 in	187 ft 2 in	Inside building 15
41	410-PC-004	RECYCLE BELT CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1096 ft 9 in	1828 ft 11 in	121 ft 0 in	Inside building 15

41	410-PC-005	DRYER BUCKET ELEVATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1110 ft 6 in	1848 ft 8 in	107 ft 0 in	Inside building 15
41	410-PC-006	PRODUCT BUCKET ELEVATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1042 ft 0 in	1789 ft 10 in	128 ft 0 in	Inside building 15
41	410-PC-007	FINAL PRODUCT BELT CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-910 ft 10 in	1770 ft 6 in	126 ft 3 in	
41	410-PC-009	EXDRYER BELT CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1111 ft 8 in	1849 ft 10 in	109 ft 11 in	Inside building 15
41	410-PC-010	RECYCLE BUCKET ELEVATOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1012 ft 6 in	1828 ft 11 in	119 ft 0 in	Inside building 15
41	410-PC-011	FBC BELT CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1095 ft 0 in	1829 ft 5 in	198 ft 11 in	Inside building 15
41	410-PC-012	FBC CYCLONE SCREW CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1069 ft 3 in	1810 ft 5 in	184 ft 2 in	Inside building 15
41	410-PC-013	DEDUST CYCLONE SCREW CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1099 ft 2 in	1839 ft 6 in	182 ft 0 in	Inside building 15
41	410-PC-014	DRYER CYCLONE SCREW CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1072 ft 4 in	1860 ft 3 in	204 ft 6 in	Inside building 15
41	410-PC-015	BAG FILTER SCREW CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1010 ft 1 in	1831 ft 6 in	218 ft 0 in	Inside building 15
41	410-PC-018	INTERNAL ADDITIVE SCREW CONVEYOR	85	96	85	86	87	89	89	92	89	85	Continuous	-1124 ft 9 in	1819 ft 0 in	152 ft 6 in	Inside building 15
41	410-PZ-001A	SCREEN FEEDER A	85	96	85	86	87	89	89	92	89	85	Continuous	-1101 ft 5 in	1835 ft 10 in	257 ft 5 in	Inside building 15
41	410-PZ-001B	SCREEN FEEDER B	85	96	85	86	87	89	89	92	89	85	Continuous	-1101 ft 5 in	1826 ft 0 in	257 ft 5 in	Inside building 15
42	420-GA-001A	CN REACTOR PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1247 ft 8 in	1770 ft 6 in	107 ft 0 in	
42	420-GA-001C	CN REACTOR PUMP C	85	96	85	86	87	89	89	92	89	85	Continuous	-1247 ft 8 in	1750 ft 6 in	107 ft 0 in	
42	420-GA-002A	NEUTRALIZED CN SOLUTION PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1247 ft 8 in	1790 ft 6 in	107 ft 0 in	
42	420-GA-003A	LOADING ARM PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1171 ft 8 in	1715 ft 6 in	100 ft 0 in	
42	420-GA-004A	SCRUBBER PUMP A	85	96	85	86	87	89	89	92	89	85	Continuous	-1249 ft 2 in	1728 ft 6 in	107 ft 0 in	
42	420-GB-001	REACTOR SCRUBBER FAN	85	96	85	86	87	89	89	92	89	85	Continuous	-1225 ft 8 in	1745 ft 1 in	170 ft 6 in	
42	420-GD-001A	REACTOR AGITATOR A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1227 ft 8 in	1760 ft 6 in	113 ft	
42	420-GD-001B	REACTOR AGITATOR B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1227 ft 8 in	1740 ft 6 in	113 ft	
42	420-GX-001A	LIMESTONE HOPPER A ACTIVATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1241 ft 8 in	1765 ft 6 in	161 ft 8 in	
42	420-GX-001B	LIMESTONE HOPPER B ACTIVATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1241 ft 8 in	1735 ft 6 in	161 ft 8 in	
42	420-PC-001A	LIMESTONE SCREW CONVEYOR A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1247 ft 8 in	1772 ft 6 in	157 ft 0 in	
42	420-PC-001B	LIMESTONE SCREW CONVEYOR B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1247 ft 8 in	1742 ft 6 in	157 ft 0 in	
42	420-PC-002	CN FILTER CAKE BELT CONVEYOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1217 ft 8 in	1828 ft 11 in	100 ft 0 in	
43	431-GB-001-M	PRODUCT BAG FILTER FAN MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1088	1617,28	5	Inside building 16
43	431-GJ-001-M	PRODUCT SCREEN MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1062,95	1642,33	5	Inside building 16

43	431-PC-001-M	RECLAIMER CONVEYOR MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1062,95	1622,24	5	Inside building 16
43	431-PC-002-M	STORAGE BUCKET ELEVATOR MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1062,95	1616,78	5	Inside building 16
43	431-PC-003-M	DISPATCH CONVEYOR I MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1088,5	1623,98	5	Inside building 16
43	431-PC-004-M	DISPATCH CONVEYOR II MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1637,62	5	Inside building 16
43	431-PE-001-M	PRODUCT DIVERTER MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1626,99	5	Inside building 16
43	431-PZ-001-M1	STORAGE TRIPPER MOTOR 1 (CAR)	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1617,93	5	Inside building 16
43	431-PZ-001-M2	STORAGE TRIPPER MOTOR 2 (BELT)	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1616,93	5	Inside building 16
43	431-PZ-001-M3	STORAGE TRIPPER MOTOR 3 (BELT)	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1615,93	5	Inside building 16
43	431-PZ-001-M4	STORAGE TRIPPER MOTOR 4 (TELESCOPIC PIPE)	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1614,93	5	Inside building 16
43	431-PZ-001-M5	STORAGE TRIPPER MOTOR 5 (TELESCOPIC PIPE)	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1613,93	5	Inside building 16
43	431-PZ-002-M	PRODUCT RECLAIMER MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-906,92	1612,93	5	Inside building 16
43	432-GB-001A-M	CAN HOPPER BAG FILTER FAN A MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1280,79	1497,92	82	
43	432-GB-001B-M	CAN HOPPER BAG FILTER FAN B MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1238,85	1497,92	82	
43	432-GB-001C-M	CAN HOPPER BAG FILTER FAN C MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1207,15	1497,92	82	
43	432-GX-001A-M	CAN HOPPER BIN ACTIVATOR A MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1281 ft	1498 ft	27,5 ft	
43	432-GX-001B-M	CAN HOPPER BIN ACTIVATOR B MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1239 ft	1498 ft	27,5 ft	
43	432-GX-001C-M	CAN HOPPER BIN ACTIVATOR C MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1207 ft	1498 ft	27,5 ft	
43	432-PC-001A-M	PRODUCT CONVEYOR A MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1280,79	1497,92	93	
43	432-PC-001B-M	PRODUCT CONVEYOR B MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1207,15	1497,92	93	
43	432-PX-001A-M	TRUCK LOADING SPOUT A MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1280,79	1497,92	22	
43	432-PX-001B-M	TRUCK LOADING SPOUT B MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1238,85	1497,92	22	
43	432-PX-001C-M	TRUCK LOADING SPOUT C MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-1207,15	1497,92	22	
43	433-GB-001	CAN TRAIN HOPPER BAG FILTER FAN	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1474 ft	61 ft	
43	433-GX-001A-M	CAN TRAIN HOPPER BIN ACTIVATOR A MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1514 ft	30 ft	
43	433-GX-001B-M	CAN TRAIN HOPPER BIN ACTIVATOR B MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1494 ft	30 ft	
43	433-GX-001C-M	CAN TRAIN HOPPER BIN ACTIVATOR C MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1474 ft	30 ft	
43	433-PC-001-M	CAN TRAIN BELT CONVEYOR I MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1494 ft	61 ft	
43	433-PC-002-M	CAN TRAIN BELT CONVEYOR II MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1529 ft TO 1459	61 FT	
43	433-PX-001A-M	CAN TRAIN LOADING SPOUT A MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1514 ft	20 ft	
43	433-PX-001B-M	CAN TRAIN LOADING SPOUT B MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1494 ft	20 ft	
43	433-PX-001C-M	CAN TRAIN LOADING SPOUT C MOTOR	85	96	85	86	87	89	89	92	89	85	HOLD	-696,5 ft	1474 ft	20 ft	
50	510-EA-001	RAW WATER HEATER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1864 ft 5 in	1311 ft 3 in	104 ft 10 in	
50	510-GA-001A	RAW WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1544 ft 9 in	1419 ft 3 in	101 ft 3 in	
50	510-GA-001B	RAW WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1543 ft 10 in	1409 ft 3 in	101 ft 3 in	
50	510-GA-002A	MAKE UP COOLING WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1649 ft 9 in	1488 ft 10 in	101 ft 3 in	

50	510-GA-002B	MAKE UP COOLING WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1639 ft 9 in	1489 ft 9 in	101 ft 3 in	
50	510-GA-003A	SERVICE WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1627 ft 9 in	1485 ft 9 in	101 ft 3 in	
50	510-GA-003B	SERVICE WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1617 ft 9 in	1485 ft 9 in	101 ft 3 in	
50	510-GA-004A	FIRE WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1855 ft 6 in	1491 ft 6 in	105 ft 0 in	
50	510-GA-004B	FIRE WATER PUMP B (DIESEL)	85	96	85	86	87	89	89	92	89	85	Intermittent	-1855 ft 6 in	1456 ft 6 in	105 ft 0 in	
50	510-GA-005A	FIRE WATER JOCKEY PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1859 ft 1 in	1423 ft 0 in	103 ft 0 in	
50	510-GA-005B	FIRE WATER JOCKEY PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1859 ft 1 in	1404 ft 0 in	103 ft 0 in	
50	510-GA-006A	LP DEMINERALIZED WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1643 ft 8 in	1026 ft 2 in	102 ft 1 in	
50	510-GA-006B	LP DEMINERALIZED WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1633 ft 8 in	1026 ft 2 in	102 ft 1 in	
50	510-GA-007A	HP DEMINERALIZED WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1621 ft 8 in	1026 ft 2 in	102 ft 1 in	
50	510-GA-007B	HP DEMINERALIZED WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1611 ft 8 in	1026 ft 2 in	102 ft 1 in	
50	510-PU-001	RAW WATER TREATMENT PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1801,24	1125,17	5	Inside building 11
50	560-CC-001	CORROSION INHIBITOR DOSING PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-667 ft 0 in	2762 ft 6 in	100 ft 0 in	
50	560-CC-002	HYPOCHLORITE DOSING PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-645 ft 3 in	2762 ft 6 in	100 ft 0 in	
50	560-CC-003	ANTISCALANT DOSING PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-605 ft 3 in	2762 ft 6 in	100 ft 0 in	
50	560-CC-004	DISPERSANT DOSING PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-921,09	2206,33	5	
50	560-GA-001A	COOLING WATER CIRCULATION PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-955 ft 3 in	2445 ft 9 in	107 ft 0 in	
50	560-GA-001B	COOLING WATER CIRCULATION PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-955 ft 3 in	2500 ft 2 in	107 ft 0 in	
50	560-GA-001C	COOLING WATER CIRCULATION PUMP C	85	96	85	86	87	89	89	92	89	85	Intermittent	-955 ft 3 in	2554 ft 6 in	107 ft 0 in	
50	560-GA-001D	COOLING WATER CIRCULATION PUMP D	85	96	85	86	87	89	89	92	89	85	Intermittent	-955 ft 3 in	2608 ft 11 in	107 ft 0 in	
50	560-GA-002	BACKWASH BASIN PUMP	85	96	85	86	87	89	89	92	89	85	Intermittent	-948,02	2382,28	5	
50	560-GA-003A	CORROSION INHIBITOR PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-957 ft 1 in	2230 ft	100 ft	
50	560-GA-003B	CORROSION INHIBITOR PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-957 ft 1 in	2230 ft	100 ft	
50	560-GA-004A	HYPOCHLORITE PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-935 ft	2230 ft	100 ft	
50	560-GA-004B	HYPOCHLORITE PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-935 ft	2230 ft	100 ft	
50	560-GA-005A	ANTISCALANT PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-895 ft	2230 ft	100 ft	
50	560-GA-005B	ANTISCALANT PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-895 ft	2230 ft	100 ft	
50	560-GA-007A	DISPERSANT PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-885 ft	2230 ft	100 ft	
50	560-GA-007B	DISPERSANT PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-885 ft	2230 ft	100 ft	
50	560-GD-001	CORROSION INHIBITOR TANK AGITATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-957 ft 1 in	2230 ft	100 ft	
50	560-GD-002	HYPOCHLORITE TANK AGITATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-935 ft	2230 ft	100 ft	
50	560-GD-003	ANTISCALANT TANK AGITATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-895 ft	2230 ft	100 ft	
50	560-GD-004	DISPERSANT TANK AGITATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-885 ft	2230 ft	100 ft	
50	560-PU-001	COOLING WATER TOWER PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1079 ft 0 in	2502 ft 3 in	116 ft 10 in	
57	570-CC-001	OXYGEN SCAVENGER PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2043 ft 9 in	111 ft 4 in	
57	570-CC-002	PH CONTROL PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2033 ft 9 in	111 ft 4 in	
57	570-CC-003	PHOSPHATE DOSAGE PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	79 -1341 ft 2.15 lb	1976 ft 10 in	111 ft 4 in	
57	570-EA-001	BLOWDOWN COOLER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1364 ft 4 in	2022 ft 6 in	110 ft 0 in	
57	570-EA-003	FLASHED STEAM CONDENSER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1182 ft 9 in	1970 ft 1 in	0 ft 0 in	
57	570-EG-001	DEAERATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1363 ft 10 in	1977 ft 8 in	153 ft 8 in	
57	570-GA-001A	CONDENSATE FLASH DRUM PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1357 ft 1 in	1981 ft 10 in	108 ft 4 in	
57	570-GA-001B	CONDENSATE FLASH DRUM PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1349 ft 1 in	1981 ft 10 in	108 ft 4 in	
57	570-GA-003A	BOILER FEED WATER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1362 ft 0 in	1981 ft 10 in	108 ft 4 in	
57	570-GA-003B	BOILER FEED WATER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1354 ft 0 in	1981 ft 10 in	108 ft 4 in	
57	570-GA-005	OXYGEN SCAVENGER UNLOADING PUMP	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2043 ft 9 in	111 ft 4 in	
57	570-GA-006A	OXYGEN SCAVENGER PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2043 ft 9 in	111 ft 4 in	
57	570-GA-006B	OXYGEN SCAVENGER PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2043 ft 9 in	111 ft 4 in	
57	570-GA-007	PH CONTROL UNLOADING PUMP	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2033 ft 9 in	111 ft 4 in	
57	570-GA-008A	PH CONTROL PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2033 ft 9 in	111 ft 4 in	
57	570-GA-008B	PH CONTROL PUMP B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2033 ft 9 in	111 ft 4 in	
57	570-GD-001	OXYGEN SCAVENGER TANK AGITATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2043 ft 9 in	111 ft 4 in	
57	570-GD-002	PH CONTROL TANK AGITATOR	85	96	85	86	87	89	89	92	89	85	Intermittent	-1407 ft 0.9 in	2033 ft 9 in	111 ft 4 in	
57	570-PA-001	BRIDGE CRANE	85	96	85	86	87	89	89	92	89	85	Intermittent	0	0	0	

57	570-PU-001	AUXILIARY BOILER PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1410 ft 1 in	1967 ft 8 in	1967 ft 8 in	
50	580-PU-001	WASTE WATER TREATMENT PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1801,24	1126,17	5	Inside building 11
50	580-PU-002	WASTE WATER TREATMENT PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1801,24	1127,17	5	Inside building 11
50	580-PU-003	WASTE WATER TREATMENT PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1801,24	1128,17	5	Inside building 11
60	600-CA-001	AIR SEPARATION UNIT	85	96	85	86	87	89	89	92	89	85		-1801 ft 5.57 in	1977 ft 3.21 in	97 ft 3.63 in	
60	600-PA-001	BRIDGE CRANE	85	96	85	86	87	89	89	92	89	85	Intermittent	0	0	0	
70	700-FA-001	COMPRESSED AIR RECEIVER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1542 ft 1 in	1851 ft 2 in	102 ft 0 in	
70	700-FA-002	HP INSTRUMENT AIR BUFFER	85	96	85	86	87	89	89	92	89	85	Intermittent	-1542 ft 1 in	1869 ft 2 in	102 ft 0 in	
70	700-PU-001A	AIR COMPRESSOR PACKAGE A	85	96	85	86	87	89	89	92	89	85	Intermittent	-1678 ft 10 in	1881 ft 3 in	101 ft 0 in	
70	700-PU-001B	AIR COMPRESSOR PACKAGE B	85	96	85	86	87	89	89	92	89	85	Intermittent	-1661 ft 3 in	1881 ft 3 in	101 ft 0 in	
70	700-PU-002	AIR DRYER PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1677 ft 0 in	1783 ft 0 in	102 ft 0 in	
70	700-PU-003	HP INSTRUMENT AIR BUFFER COMPRESSOR PACKAGE	85	96	85	86	87	89	89	92	89	85	Intermittent	-1677 ft 0 in	1799 ft 0 in	102 ft 0 in	
75	750-GA-001A	FLARE K.O. DRUM PUMP A	85	96	85	86	87	89	89	92	89	85	Intermittent	-2127 ft 9 in	2255 ft 8 in	102 ft 10 in	
75	750-PU-001	FLARE PACKAGE	107,8	118,8	109	110	112	112	115	112	108	102	Continuous	-2141 ft 0 in	2385 ft 0 in	100 ft 0 in	



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