

## **Noise Level Assessment Study and Noise Propagation Maps at 'Oltenița Waste Oil Recycling Plant'**

Objective: Oltenița Waste Oil Recycling Plant

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## Noise Level Assessment Study and Noise Propagation Maps at 'Oltenița Waste Oil Recycling Plant'

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## Summary

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Sound pressure levels produced by equipment from 'Oltenița Waste Oil Recycling Plant' were assessed. The values obtained were processed and entered into Predictor-LimA software version 2020.

Noise sources within the Plant were identified and a noise distribution map was drawn up for the current situation.

The first part of the official input data was received on January 9, 2020 and incorporated in the Report on January 10, 2020.

## Document Versions

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Edition	Date	Prepared by	Revised by	Approved by	Amendments
1.0	January 10, 2020	BL	GM	GT	Initial release document sent to Customer for analysis
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## 1. GENERAL INFORMATION

Enviro Consult was contracted by Green Oil and Lubes s.r.l. to conduct a noise level assessment study and develop noise propagation maps at 'Oltenița Waste Oil Recycling Plant', in accordance with the Customer's objectives and the exact requests of the Romanian and Bulgarian authorities, pursuant to the UE legislation in the field. Contract no. 1401/2019 was concluded for this purpose.

The following steps were carried out in this respect:

- Identifying the noise-generating sources, to clarify the periods of maximum decibel, both in the premises and at the reception position of the owners of the neighboring buildings.
- Developing an acoustic zoning calculation model (sound wave emission and dispersion)

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## 2. DESCRIPTION OF LOCATION

The investment objective is located in the defined urban area of the town of Oltenița, Călărași County. The address of the building is strip 89, plot A5774, batch 1. The area of the relevant real estate (real estate under survey) is 17.88 ha.

The location of the investment is 1,000 m from the State Border between Romania and Bulgaria. The distance from the Danube River is 650 meters, and the distance from the Argeș River is more than 300 meters.

From an altimetric point of view, in the 1975 Black Sea quota national system, the average elevation of the land that is subject to the investment is about 16.50 meters.

Moreover, an archaeological site is located near the land, at a distance of 24 m, and the Natura 2000 Site is located at a distance of 7 m - ROSPA0038 Danube-Oltenița.

The list of noise sources can be found in Chapter 4.1.2.



Figure 1. Oltenița Waste Oil Recycling Plant Location

### 3. LOCAL AND ENVIRONMENTAL CONDITIONS

#### 3.1. Climate features of the site

The climate is continental with significant variations, with warm and dry summers and cold winters, dominated by the frequent presence of continental cold air masses from the East, or arctic air masses from the North and strong snow storming winds.

The average multiannual temperature varies relatively slightly between 10.8 and 11.2 degrees Celsius. The average temperature in January is about -3 degrees Celsius. The average temperature in July is about 30 degrees Celsius.

The first day of frost occurs around November 1st, and the last is recorded around April 11. It can be concluded from this point of view that the vegetation period is quite long and the thermal regime fosters the evolution of vegetation.

Average annual rainfall is around 560 mm. Rainfall is distributed throughout the year, with some emphasis at the beginning of summer. The seasonal distribution of rainfall is as follows: winter 76 to 100 mm, spring 125 to 150 mm, summer 150 to 175 mm, autumn 100 to 125 mm. The annual aridity index is 24 to 28.

The average annual relative humidity is 72%. The lowest value is recorded in July (61%) and the highest in December (80%). During the growing season, the relative humidity is 64%.

The area is fully exposed to the action of the winds. The prevailing winds are those from the northeast and southwest, with the highest intensity in the winter period, reaching speeds of 27 to 54 km/h.

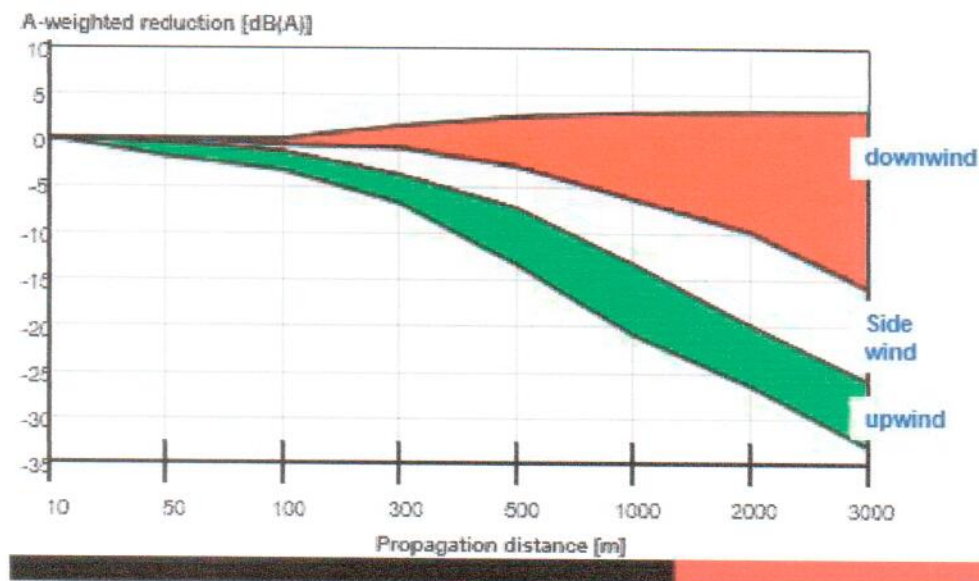
The maximum intensity of the movement of air masses occurs for an average duration of 10 days annually, the rest of the time being lower.

#### 3.2. Influence of atmospheric conditions on noise level

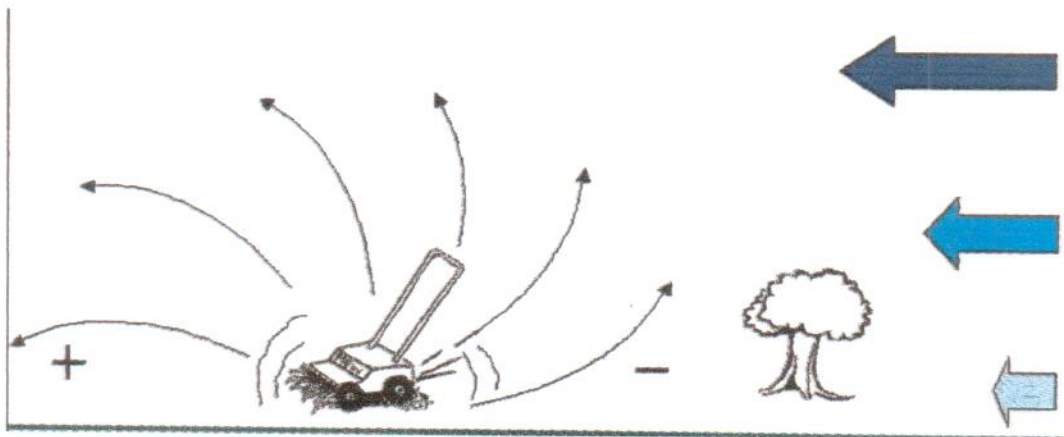
Sound pressure levels vary depending on weather conditions: wind speed, wind direction, relative humidity and temperature.

Wind speed and temperature, depending on altitude, may influence the propagation of sound waves.



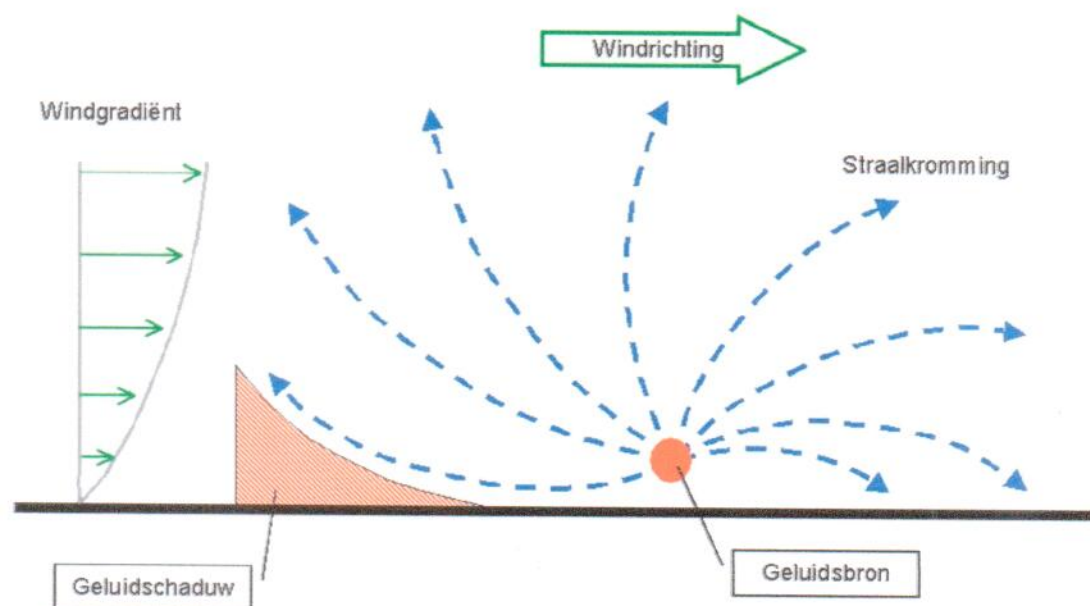


Constantly weak or moderate wind tends to amplify the level of noise in the direction in which it blows and diminish it in the opposite direction. A light, steady breeze has been observed to increase noise levels. To another extent, higher winds tend to amplify the background level, for example, due to turbulence or the movement of trees and/or shrubs, and may cover other noises.

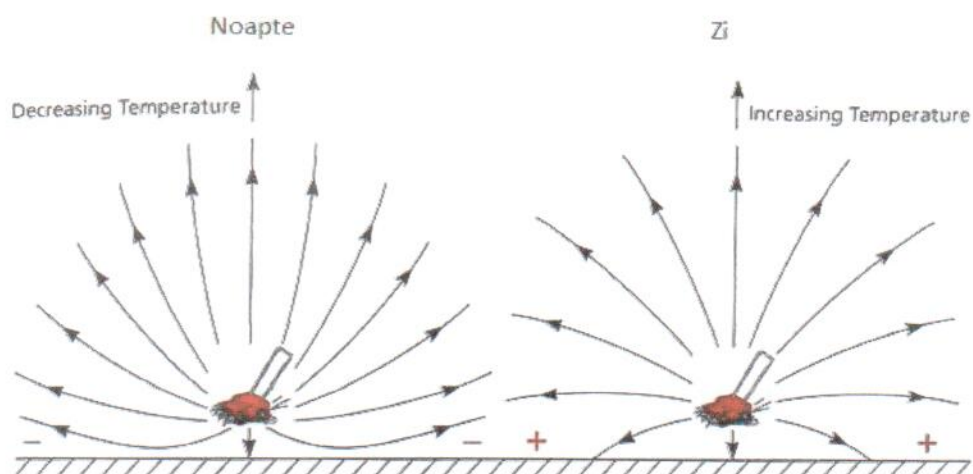


Low wind speeds intensify the level of noise against the calm conditions, assuming a relatively flat topography between the sources and the receptor. Noise level in the wind direction may decrease with similar intensity.





Thermal inversion intensifies the level of noise at some distance from the source; at night, noise tends to ascend and during the day to descend.



Humidity and temperature have little influence on the accuracy of noise level curves compared to other data such as: wind, temperature inversion phenomenon or data quality from the noise source.

### Noise propagation conditions:

#### 1. Favorable noise propagation conditions

- The wind direction makes an angle of  $\pm 45^\circ$  with the direction joining the center of the dominant source of noise with the center of the specific region of the receptor;

- The wind is blowing from the source to the receptor;
- Calm or alternative wind;
- Moderate, well-defined ground temperature inversion, as usually happens on calm and clear nights.

## 2. Less favorable noise propagation conditions (cross wind)

- The wind blows either from a sector between  $45^{\circ}$  and  $135^{\circ}$  or from a sector between  $225^{\circ}$  and  $315^{\circ}$  measured in relation to the direction joining the center of the dominant source of noise with the center of the specified receptor;

## 3. Unfavorable noise propagation conditions

- The wind direction makes an angle of  $\pm 45^{\circ}$  with the direction joining the center of the dominant source of noise with the center of the specific region of the receptor;
- The wind is blowing from the receptor to the source;

## 4. WORKING METHODOLOGY

The stages of carrying out such a project are:

- Requesting the necessary input data (area site plan, technical data for sources of noise, area topography) from the Beneficiary.
- Conducting an acoustic mapping covering both noise sources and affected receptors.
- Preparing an acoustic map of the site, to include the potential affected receptors.
- Identifying areas with exceedances of the maximum permissible noise level and proposing noise abatement measures.

In order to carry out this Study, the worst-case scenarios were taken into account, when the atmospheric conditions influence the propagation of noise to the receptors and the noise generated by the equipment reaches the maximum permissible design value, i.e. 85 dB (A).

The site studied is assimilated to an industrial area in terms of the legislation in force and the General Urban Plan of the town of Oltenița.

Specialized noise mapping software, Predictor - LimA v. 2020, was used for acoustic mapping. The input data was received from the Beneficiary.

## 4.1 Sources of noise

### 4.1.1. APPLICABLE LAW

Maximum permissible ambient noise values are set out in several technical standards and in regulations or ordinances of different ministries.

#### Ministry of Health

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Romanian legislation, Ordinance of the ministry of Health no. 119/2014, as amended by Ordinance of the Ministry of Health No. 994/2018, establishes that:

'ART. 16

*(1) The sizing of health protection zones shall be in such a way that the limit values for noise indicators are ensured and observed in the protected territories, as follows:*

- a) during the day, between 7.00 a.m. to 11.00 p.m., the A-weighted equivalent continuous sound pressure level (LAeqT) must not exceed 55 dB outside the dwelling;*
- b) during the night, between 11.00 p.m. to 7.00 a.m., the A-weighted equivalent continuous sound pressure level (LAeqT) must not exceed 45 dB outside the dwelling;*
- c) 50 dB for the peak level, in the case of acoustic measurement performed outside the dwelling during the night in order to compare the result of this measurement with the limit value laid down in section b).*

*(2) Where an objective is located in an area in the vicinity of a protected territory where the external background noise prior to the location of the objective does not exceed 50 dB (A) during the day and 40 dB (A) during the night, then the sizing of health protection zones shall be in such a way that the limit values for noise indicators are ensured and observed in the protected territories, as follows:*

- a) during the day, between 7.00 a.m. to 11.00 p.m., the A-weighted equivalent continuous sound pressure level (LAeqT) must not exceed 50 dB outside the dwelling;*
- b) during the night, between 11.00 p.m. to 7.00 a.m., the A-weighted equivalent continuous sound pressure level (LAeqT) must not exceed 40 dB outside the dwelling;*



*c) 45 dB for the peak level, in the case of acoustic measurement performed outside the dwelling during the night in order to compare the result of this measurement with the limit value laid down in section b).*

*(3) The location and operation of units with low production, commercial and service capacity laid down in Art. 5 paragraph (1) within the protected territories is forbidden, with the exception of residential areas.*

*(4) The location and operation of units with low production, commercial and service capacity laid down in Art. 5 paragraph (1), within the residential areas, shall be made in such a way that noise from their activity does not lead to the following limit values being exceeded:*

*a) 55 dB for A-weighted equivalent continuous sound pressure level (LAeqT), outside the dwelling, during the day, between 7.00 a.m. to 11.00 p.m.;*

*b) 45 dB for A-weighted equivalent continuous sound pressure level (LAeqT), outside the dwelling, during the night, between 11.00 p.m. to 7.00 a.m.;*

*c) 50 dB for the peak level, in the case of acoustic measurement performed outside the dwelling during the night in order to compare the result of this measurement with the limit value laid down in section b).*

*(5) By way of exception to the provisions of paragraph (3), the location and operation of commercial units with restaurant activity in parks, with operating hours during the day, between 7.00 a.m. to 11.00 p.m., are allowed, if noise from their activity does not lead to the following limit values being exceeded:*

*a) 55 dB (A) for A-weighted equivalent continuous sound pressure level (LAeqT), at a distance of 15 meters from the unit perimeter;*

*b) 60 dB (A) for the peak level, in the case of acoustic measurement performed at a distance of 15 meters from the perimeter of the unit, in order to compare the result of this measurement with the limit value laid down in section a).*

*(6) In case of different types of units with low production capacity and provision of services, as well as commercial units, especially those such as restaurants, bars, clubs, discotheques, etc., which, at the effective date of these rules, carry out their activity at the ground floor/basement of residential buildings, the operation of these units is carried out in such a*

way that noise from their activity does not lead to the following limit values being exceeded, for any of the dwellings located both in the building at the ground floor/basement where that unit operates, and in neighboring residential buildings:

- a) 55 dB for A-weighted equivalent continuous sound pressure level ( $L_{AeqT}$ ), outside the dwelling, during the day, between 7.00 a.m. to 11.00 p.m.;
- b) 45 dB for A-weighted equivalent continuous sound pressure level ( $L_{AeqT}$ ), outside the dwelling, during the night, between 11.00 p.m. to 7.00 a.m.;
- c) 35 dB for A-weighted equivalent continuous sound pressure level ( $L_{AeqT}$ ), inside the dwelling, during the day, between 7.00 a.m. to 11.00 p.m.;
- d) 30 dB for A-weighted equivalent continuous sound pressure level ( $L_{AeqT}$ ), inside the dwelling, during the night, between 11.00 p.m. to 7.00 a.m.;
- c) 35 dB for the peak level, in the case of acoustic measurement performed inside the dwelling during the night in order to compare the result of this measurement with the limit value laid down in section d).

(7) Public authorities which have in their structures noise laboratories or which are responsible for carrying out acoustic measurements outside and/or inside dwellings are required to develop noise measurement procedures that comply with the provisions of SR ISO 1996/1-08 and SR ISO 1996/2-08.

(8) The Ministry of Health and the central public authority for environmental protection shall provide for in the regulatory acts to be issued the necessary technical and/or administrative measures so that the location and operation of units with low production, commercial and service capacity, as well as the sizing of health protection areas shall be carried out in compliance with paragraphs (1) to (6), as appropriate.

### Ministry of Environment

Standard SR 10009-2017 provides that the permissible noise level limit at the functional space limit 'Industrial premises and spaces with activities assimilated to industrial activities' is 65 dB(A).

At the same time, the permissible external noise level limit at the property line in the case of buildings with fenced land (yard) and residential use with a structure of two levels or less is 60 dB(A). The property line means the boundary given by the property cadastral plan, which includes the building and the land.



Therefore, without laying down a health protection zone around the Oltenița Waste Oil Recycling Plant objective, the only applicable regulation is SR 10009-2017 and the maximum permissible values are set out below.

Functional space	Maximum permissible value (dBA)	
	Daytime	Nighttime
Industry	65	65
Residential buildings with yard and structure of two levels or less	60	60

Table 1. Maximum permissible limits according to SR 10009-2017

In Bulgaria, Ordinance No.6/2006 is applied. The lowest value, of the maximum permissible limits for industrial noise, is 30 dB(A) in the case of residential buildings.

#### 4.1.2. SOURCES OF NOISE ON SITE

The values below have been used to calculate the dispersion of noise.

Position No.	Description	Operating Hours	Elevation	Noise Level
<b>Oltenița Waste Oil Recycling Plant</b>				
<b>z1001</b>	De-Hydration Section Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1002</b>	Light Oil Section Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1003</b>	MD Section Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1004</b>	MD Section Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1005</b>	WFE-1001/1002/1003 Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1006</b>	WFE-1001/1002/1003 Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1007</b>	WFE-1001/1002/1003 Vacuum Package Unit	continuous	EL + 0.50	85 dB(A)
<b>z1012</b>	Oily Water separation System (OWS)	continuous	EL + 0.50	85 dB(A)
<b>z1013</b>	Waste Water Treatment Plant Package	continuous	EL + 0.50	85 dB(A)
<b>z1018</b>	SO2 Removal System	continuous	EL + 0.50	85 dB(A)
<b>p1001 A</b>	ULO Road Tanker Unloading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1001 B</b>	ULO Road Tanker Unloading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1002 A</b>	Middle Distillate Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1002 B</b>	Middle Distillate Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)



Position No.	Description	Operating Hours	Elevation	Noise Level
<b>Oltenița Waste Oil Recycling Plant</b>				
<b>p1003 A</b>	Heavy Distillate Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1003 B</b>	Heavy Distillate Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1004</b>	Light Oil (Distillation) Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1005</b>	Heavy Lubricating Oil Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1006</b>	Light Distillate (HDT) Road Tanker Loading Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1007</b>	Middle Distillate (Hydrotreater) Feed Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1008</b>	Heavy Distillate (Hydrotreater) Feed Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1009</b>	ULO Day Tank Transfer Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1010</b>	Caustic Unloading & Day Tank Transfer Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1015</b>	ULO Feed Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1016</b>	Dehydrated ULO Transfer Pump	continuous	EL + 0.50	85 dB(A)
<b>p1018</b>	Middle Distillate Feed Pump	continuous	EL + 0.50	85 dB(A)
<b>p8201 A</b>	Cooling Water Pump	continuous	EL + 0.50	85 dB(A)
<b>p8201 B</b>	Cooling Water Pump	continuous	EL + 0.50	85 dB(A)
<b>p1039</b>	Waste Water Transfer Pump	intermittent	EL + 0.50	85 dB(A)
<b>p1041</b>	Treated Water Collection Transfer Pump	intermittent	EL + 0.50	85 dB(A)
<b>P2501</b>	HIGH PRESSURE FEED PUMPS	continuous	EL + 0.50	85 dB(A)
<b>P2502</b>	FRACTIONATOR BOTTOM PUMPS	continuous	EL + 0.50	85 dB(A)
<b>P2503</b>	Recontacting Pumps	continuous	EL + 0.50	85 dB(A)
<b>P2505</b>	LIGHT DISTILLATE PUMPS	continuous	EL + 0.50	85 dB(A)
<b>P2506</b>	Fractionator VACUUM PUMPS	continuous	EL + 0.50	85 dB(A)
<b>P2507</b>	FEED CIRCULATION PUMPS	continuous	EL + 0.50	85 dB(A)
<b>P2508</b>	WATER INJECTION PUMP	continuous	EL + 0.50	85 dB(A)
<b>P2701</b>	FLARE PUMP	intermittent	EL + 0.50	85 dB(A)

Table 2. Noise Sources located in Oltenița Waste Oil Recycling Plant

## 4.2 Acoustic modeling

Sources of noise in Table 2 have been added to the Predictor – LimA model. The heights of the halls were considered 6 meters. Pumps and compressors were considered at a height of 0.5 meters. Equipment in buildings was modeled as surface acoustic sources.

The residences were considered to be 4 meters high. Assessment points have been placed at the property line to calibrate the existing model.

Specialized noise mapping software, Predictor - LimA, recognized European Union-wide for accuracy and speed of calculation, was used for noise mapping.

The standard for which the Industrial Source Noise Map has been developed is the ISO 9613-2 standard for the assessment of industrial noise, set out in the European Directive 49/2002/END on the acoustic mapping of industrial sources.

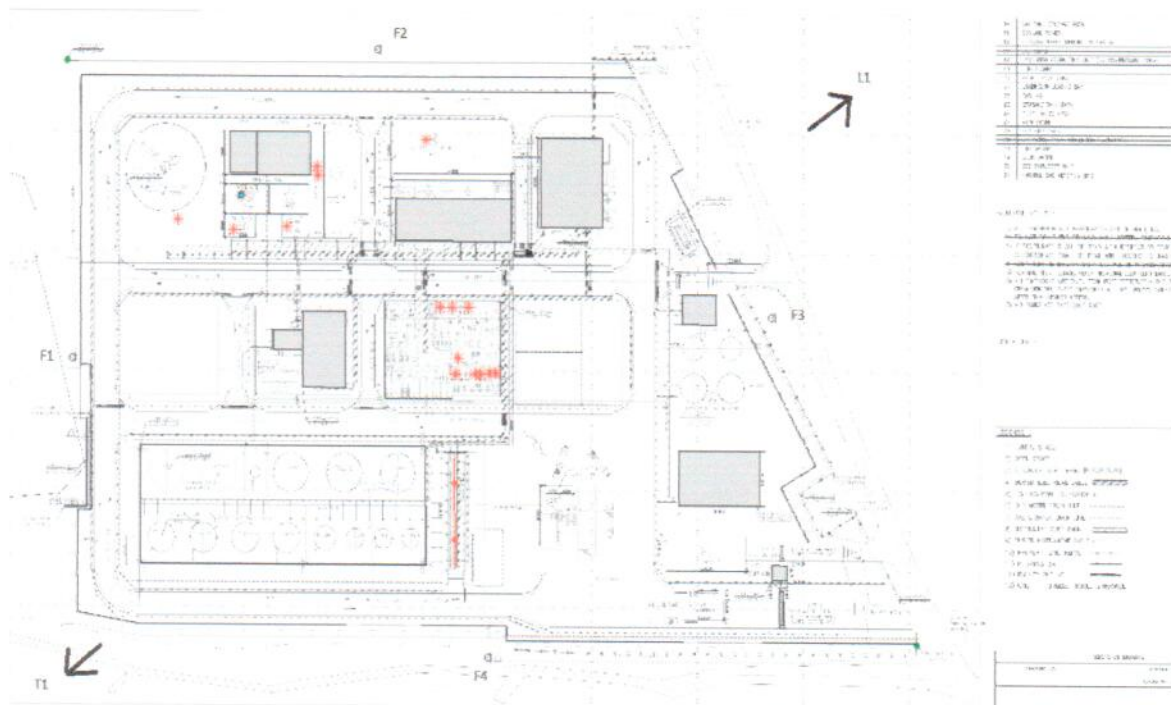


Figure 2. Identification of noise sources and sensitive points



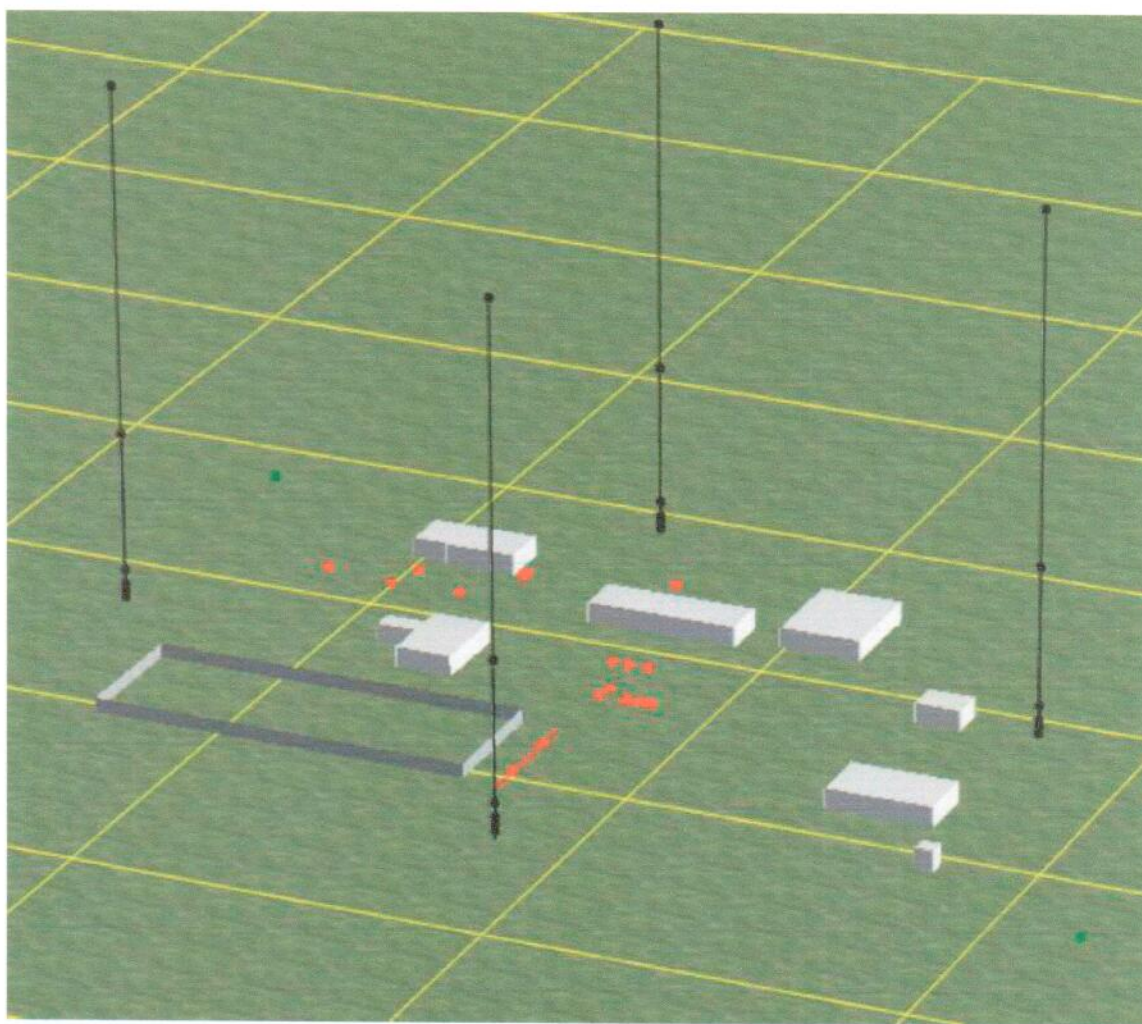


Figure 3. 3D modelling of noise sources and sensitive points



## 5. MODELLING RESULTS

### 5.1 Normal Operation

Noise level calculations have been made at the property line and at the nearest sensitive receivers considering the normal operation of the plants.

The distance between the property limit of the site and the L1 receptor (the nearest residential buildings of Oltenița settlement) is over 770 m, and the distance between the property line of the site and the T1 receptor (the nearest residential buildings in Tutrakan settlement) is 1.27 km.

Assessment point	Sound Pressure Level Calculated (at 2 m height)	Maximum permissible value (dBA)
<b>Oltenița Waste Oil Recycling Plant</b>		
Property Line		
F1	39.80	65 <sup>1</sup>
F2	50.02	65
F3	53.08	65
F4	61.84	65
Oltenița		
L1	34.15	35 <sup>2</sup>
Tutrakan		
T1	24.87	30 <sup>3</sup>

Table 3. Estimated values for assessment points

The equipment in Table 2 that operates continuously has been accounted for with full acoustic power and the equipment with intermittent operation has been considered to be operating 50% of the working time.

The constructions on the Plant site were considered to be 6 meters high.

<sup>1</sup> According to SR 10009-2017

<sup>2</sup> According to Order of the Ministry of Health No. 994/2018

<sup>3</sup> According to Bulgarian Ordinance No. 6/2006.

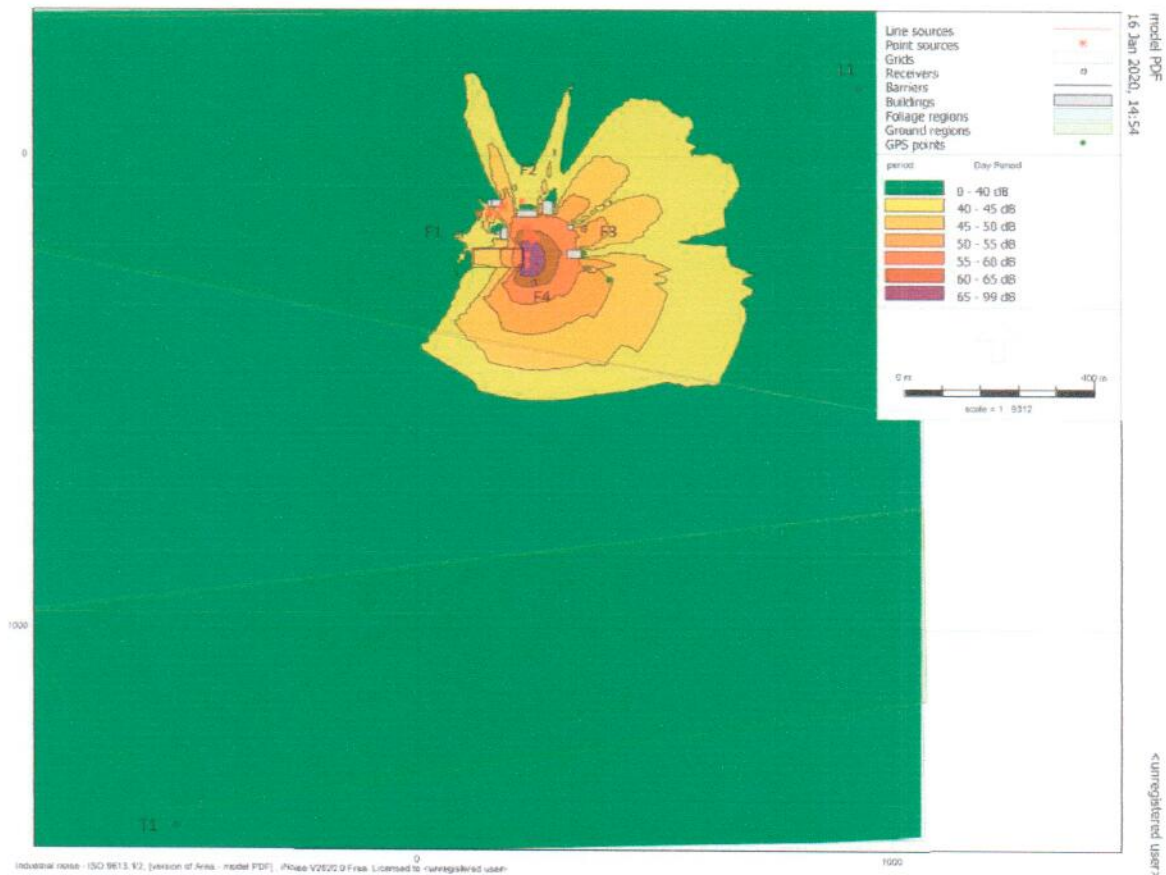


Figure 4. Noise map for normal operation at a height of 2 meters against the ground.

## 6. CONCLUSIONS

- (1) Enviro Consult has been contracted by Green Oil and Lubes s.r.l. to conduct a noise level assessment study and develop noise propagation maps at 'Oltenița Waste Oil Recycling Plant', in accordance with the Customer's objectives and the exact requests of the Romanian and Bulgarian authorities, under the relevant EU legislation in the field.
- (2) Noise level assessments defining Laeq values have been performed at the level of the nearest receptors.
- (3) Noise map was drawn up for the initial situation.
- (4) Under the normal operation of the 'Oltenița Waste Oil Recycling Plant' objective, the nearest receptors are exposed to noise levels of 34.15 dBA for Oltenița and 24.87 dBA for Tutrakan, respectively.
- (5) Under the normal operation of the 'Oltenița Waste Oil Recycling Plant' objective, no exceedances of the maximum permissible value for industry are identified at the property line.