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ACTIVITY FOR THE SOUND MAP IN BISTRIȚA MUNICIPALITTY

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***Abstract*:** *This paper presents a study of sound pollution in Bistrița municipality made for the sound map preparation. This paper is the second part in the noise pollution study necessary for the "sound map" and contains the steps made under the SoundPLAN program conductor .There are a lot of knowledge necessary for a good interpretation and for a good solution under the action of the SoundPLAN program application inside a town. This paper prepares the data on the road in the Bistrița municipality.*
Keywords: *Sound Map, Bistrița municipality, Application of SoundPLAN program*

1. INTRODUCTION

The paper proposes a study with a view to drawing up the noise map in the center of an extinct Bistrița city, complying with the provisions European Directive 2002/49 EC transposed by HG 321/2005. The noise took into account is the one due to road traffic and the input data on the basis of which it is performed map are measurements of noise from the strictest studied, as well as data about the traffic auto in the area [2].

This paper is natural continuation of the work named: "**SOUND POLLUTION STUDY IN BISTRIȚA MUNICIPALITTY",** that follows the steps for obtaining the data bases need to the "sound map" construction. They were:

1. SoundPLAN SETTINGS in which were made: Setting standards in Sound PLAN; Define of Bistrița project; Drown the Level curves; Create object of type "streets": Street Railway Station; Profile object "street": Street Station 2 strips of 3.25m; Direct setting of acoustic emissions "street";
2. METHODS OF SOUND EMISSION CALCULATION with the five methods as: Method (0) - calculation of acoustic emissions "street"; Method (1) - calculation of acoustic emissions "street"; Method (2) - calculation of acoustic emissions "street "; Defining percentage for parkings; Method (3) - calculation of acoustic emissions "street "; Method (4) calculation acoustic emissions "street"- menu road Library day histograms +ADT + %heavy vehicles/ 24h (4); The histogram for " major road small ";
3. BUILDINGS with the contains Button for deployment object type "building".

2. THE STEP MANED "BUILDINGS"

Object of type "Alignment Street" means the instrument for shaping road in SoundPLAN [3]. It is defined as linear source of noise pollution.

The alignment of road is defined by co-ordinates X,Y, elevation object and elevation field. Elevation of road is set after elevation

land use (DGM). In "street" editing "points" along route. Subject "street" edited can be selected, deselected, copied, inserted new points, edited properties.

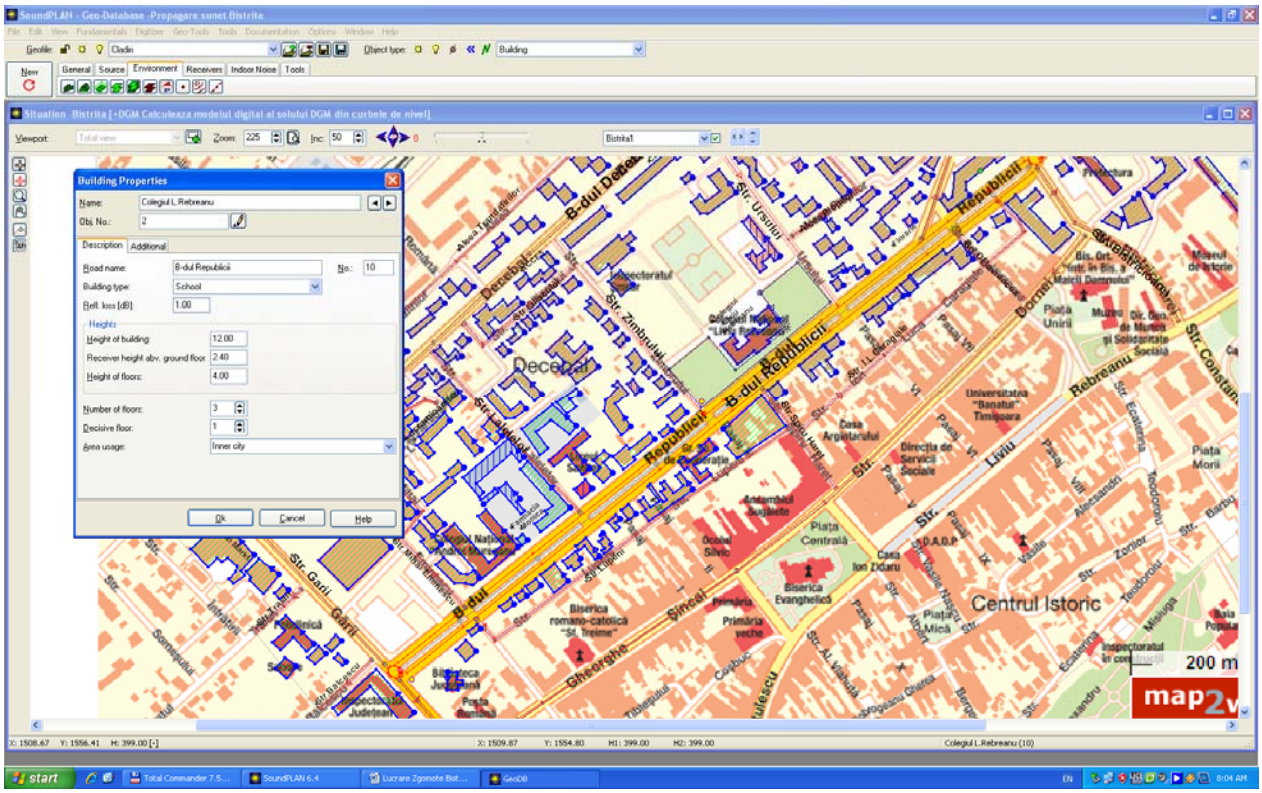

Fig. 1. Defining owners "building"

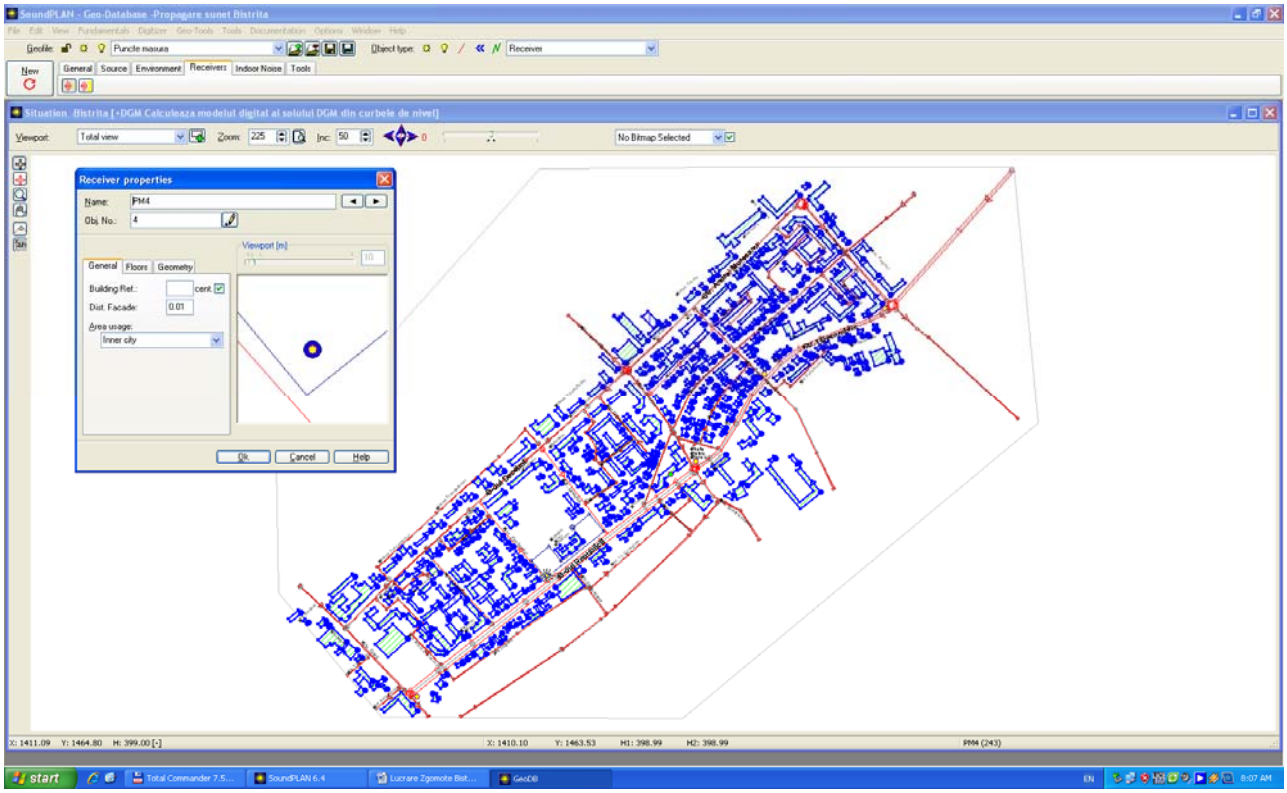

Fig. 2. Defining, locating and properties "receiver punctual"

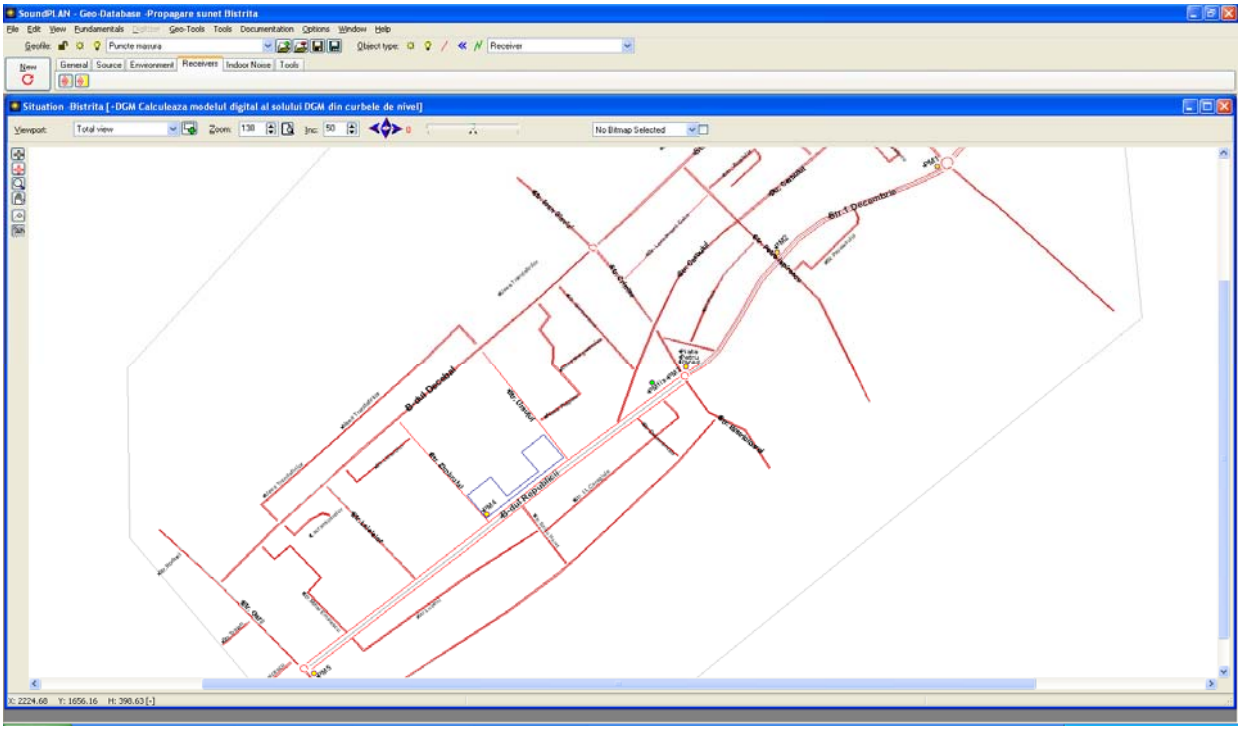

Fig. 3. The position of the 6 " punctual receptors ": PM1, PM5 and PF

It may be possible to make calculations for maintaining high primary surpluses receptors and receptors of grid type (map of the noise). For grid, we get a better representation of the distribution noise, for points get charts acoustic point of intensity, very good for the confrontation with measurements.

Once placed on the model objects, with the specification properties, it may be possible to make calculations the distribution and propagation of the noise for receivers defined. The calculation shall be made for each receiver separately, for which they are calculated the effect each source independently, and then it accumulates influences.

For each point of reception total result is obtained by summation of contributions from each individual source of the noise. Most of time consumption calculations take a noise distribution of sound propagation. For each receiver is consider the intersection between the various where direct from a variety of sources, plus possible where reflected by entities such as buildings, and natural barriers [1]. In general in calculations shall be taken into account only reflections of the degree one. Determine the attenuation, corrections and diffractions (detours).

Formulas used for the calculation are based on the method Harmonoise, which calculates the level of equivalent pressure $L_{eq,1h,i,n}$ caused by a source n, the L_W, by means of the formula:

$$L_{eq,1h,i,n} = L_{W,i} - A_{div} - A_{atm,j} - A_{excess,i} - A_{refl,i} - A_{scat,i} \quad (1)$$

where:

$$L_{W,i} = L'_{W,i} + 10 \lg(segment) \quad (2)$$

and

$L'_{W,I}$ - The level of sound power of a unit source of length "segment";

segment - Segment length source [m];

A_{div} - Attenuation due to geometric dissipation [dB];

$A_{atm,j}$ - Attenuation due to atmospheric absorption [dB];

$A_{excess,I}$ - Excessive attenuation due to effects of reflection and diffraction of the soil [dB];

$A_{refl,I}$ - Atenuarea datorată pierderii de energie în reflexii [dB];

$A_{scat,I}$ - Attenuation due to the scattering areas [dB].

After saving map modeled in SoundPLAN GeoDatabase, selects the module SoundPLAN calculation. The SoundPLAN Calculation is loaded the situation resulting "Bistrita.site" and the model of relief resulting from the level curves of the area contained in the file RDGM9999.dgm. For receptors point type, are made setting as shown in Figure 4.

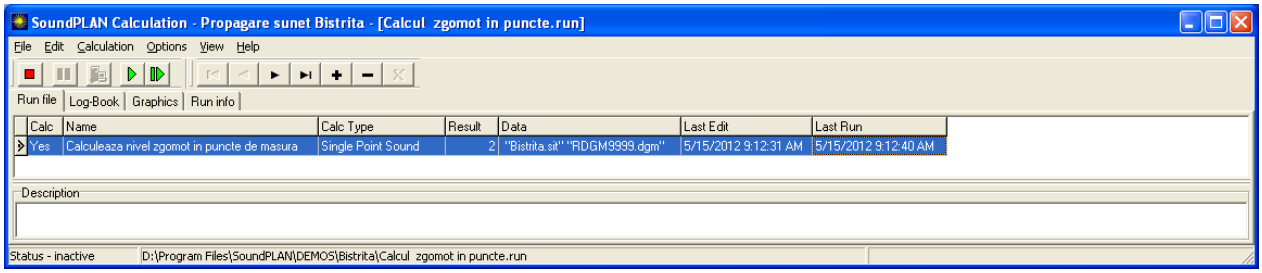

Fig. 4. Launch of the noise calculation at the points of individual reception

Indicators will be the result of noise calculated by the program on the basis of the data traffic, in the 6 points in which they were carried out measurements of intensity noise-level meter.

Those 5 points of the extent elements:

•PM1 - situated at the intersection with Năsăudului street December 1;

•PM2 - located at the intersection with Theodor Petre street December 1;

•PM3 - situated in the market by Petru Rares;

•PM4 - situated at the intersection with street Zimbrului avenue of Republic;

•PM5- situated at the intersection with street Station and the point of measurement avenueRepublic;

•PFix located on the second floor 4 of the block in the market by Petru Rares.

In accordance with the provisions of HG 321/2005 [3] noise indicators use for carrying out strategic noise maps are indicators L_{den} and L_{night} as specified and, where appropriate L_{day} and $L_{evening}$.

The indicator L_{den} is defined with the aid of the following relations:

$$L_{den} = 10 * \lg \frac{1}{24} * \left(12 * 10^{\frac{L_{day}}{10}} + 4 * 10^{\frac{L_{evening}+5}{10}} + 8 * 10^{\frac{L_{night}+10}{10}} \right) \quad (3)$$

Where:

a) L_{day} - It is mid-level of sound pressure, weighted A, long time, determined on the amount periods of day in a year;

b) $L_{evening}$ - It is mid-level of sound pressure, weighted A, long time, determined on the amount periods of evening in a year;

c) L_{night} - It is mid-level of sound pressure, weighted A, long time, determined on the amount periods of night in a year.

From the measurements carried out with the sound-meter RION NL32 - the program of discharge-processing NL22-PB1 provides the calculation of these noise indicators in the 6 points of the assessment.

Calculate the values of a noise of SoundPlan program, on the basis of the information related to the road traffic, must be equal to the values obtained by measurement. To do this driving repeated the calculation of the noise for each individual point of reception until, by repeated adjustments of the parameters of the road traffic (average number vehicles/hour on various streets), calculated value of indicators of the noise is equal to the values measured, in the case of each point of the assessment. This is achieved through validation parameters of traffic for the entire map of field analyzed.

Table 1. Code of the Measurement Points in the Bistrița Municipality.

Code of Measurement Point	Point Position	L_{day} [dB]	$L_{evening}$ [dB]	L_{night} [dB]	L_{den} [dB]
		Time 7…19	Time 19...23	Time 23…7	
PM1	Năsăudului – 1 Decembrie	69.2	73.2	61.4	**73.0**
PM2	Petre Ispirescu - 1Decembrie	69.4	72.9	67.1	**75.0**
PM3	Piața Petru Rareș	70.0	70.7	61.1	**71.9**
PM4	Zimbrului - Republicii	67.6	77.3	67.0	**76.8**
PM5	Gării - Republicii	67.6	72.1	62.0	**72.2**
PF	Piața Petru Rareș	68.8	67.7	59.1	**69.8**

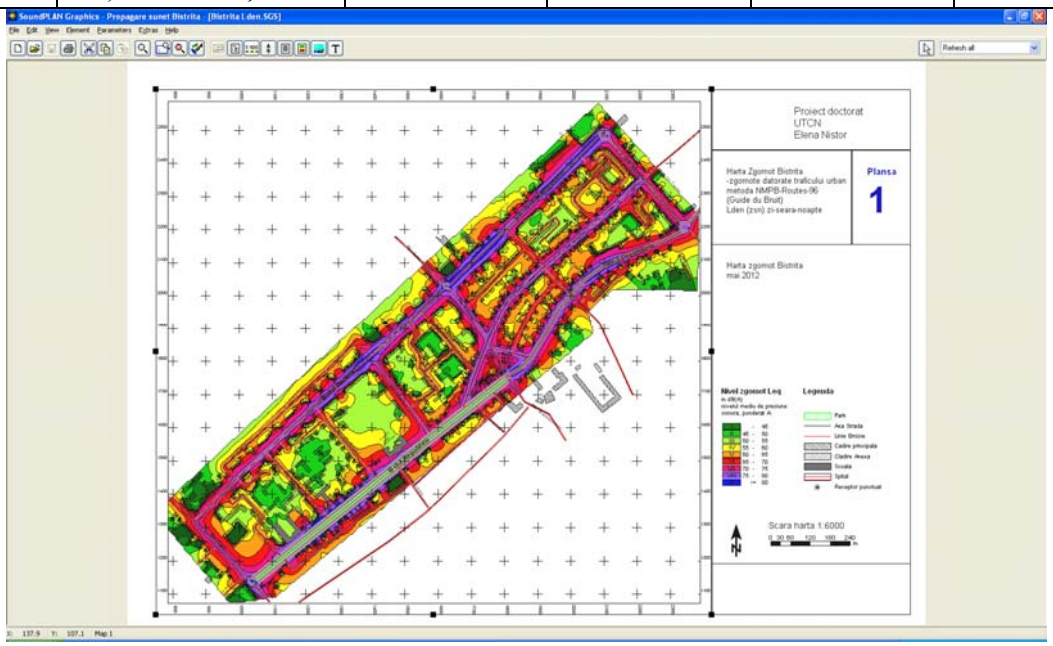

Fig. 6. Map of the noise of studied field in Bistrița with the indicator noise indicators L_{den}

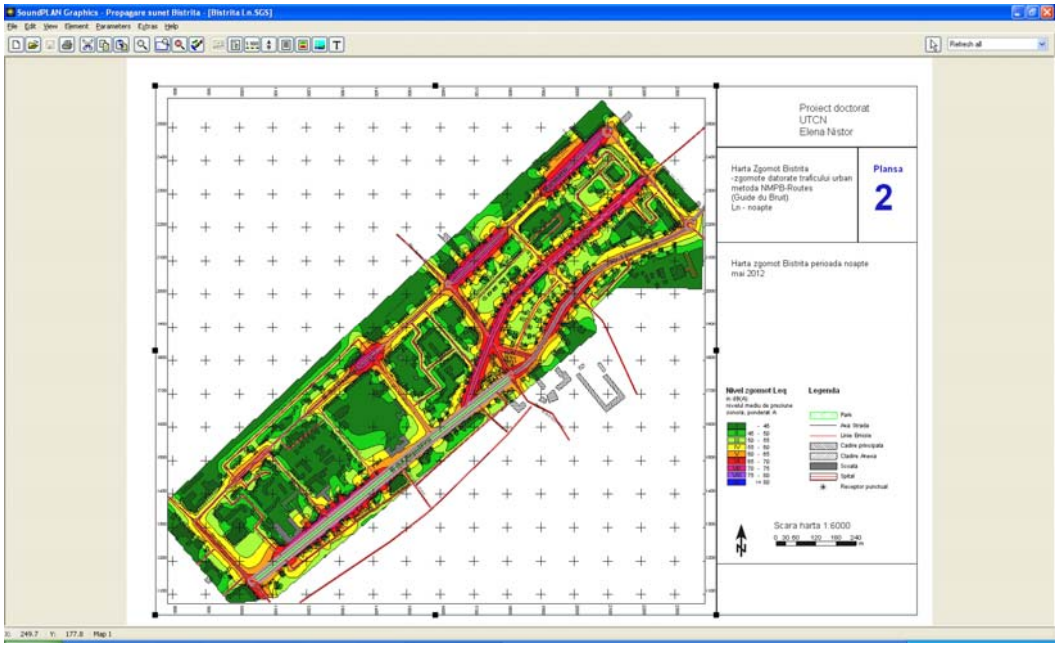

Fig. 7. Map of the noise of studied field in Bistrița with the indicator noise indicators L_{night}

For the purpose of calculating the noise map complete (with receivers grid type), the type of calculation is in **Calculation** menu is "Grid Noise Map". Processing takes a few hours, depending on the size of the grid computing.

Graphic maps (**Graphics**) of SoundPLAN program allows you to display in the form of dashboards of strategic noise maps and obtained by the program.

3. CONCLUSIONS

Map of the distribution of both parameters noise indicators L_{den} and L_{night} as specified, it is clear that the areas most affected by the traffic road noise studied are:

•Buildings located in the Republic of located between Boulevard intersection with Mihai Eminescu street to its intersection with street Zimbrului;

•Buildings situated at the intersection with finance minister Decebal Boulevard street residents;

•Buildings on srada Andrei Mureşanu located between the intersection with Crinilor street to its intersection with street Petre Theodor;

•Buildings on the street Andrei Mureşanu situated on the intersection of street Năsăudului Petre Theodor into the street, in a right block blade.

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ACTIVITATEA PENTRU HARTA DE ZGOMOT ÎN MUNICIPIUL BISTRIȚA

Rezumat : Lucrarea prezintă un studiu al poluării sonore în municipiul Bistrița în vederea realizării "hărții de zgomot". Lucrarea de față constituie partea a doua în realizarea "hărții de zgomot" şi conține paşi necesarii pentru aplicarea pachetului de programe Sound PLAN. Sunt necesare cunoştințe adaptate utilizârii programului de mare complexitate, cu care se pot realiza hărțile de zgomot în aglomerările urbane.

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