



# ACUSTICUS

## USER MANUAL

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# 1 Basic terms

## 1.1 Acoustic project

The acoustic project defines the arrangement of horns or generally the acoustic elements of warning system (electronic horns, loudspeakers, etc.) in the endangered territory. It is the first step for the design of warning system. In the deployment of horns, following are taken into account particularly:

- Sufficient acoustic output in the whole endangered territory,
- Physical options for placement,
- Availability of electric power,
- Options of control (radio range, availability of lines, etc.),
- Availability of prophylactic and servicing activities.

## 1.2 Endangered area

Endangered territory is the area where at the origination of extraordinary event can incur the endangerment of health or life. This area, from the point of the creation of acoustic project, should be covered by a warning signal.

## 1.3 Noisiness of background

There is always some noise in the endangered territory under common conditions. This noise is described as the noisiness of background and is indicated in decibels. It has direct effect on the audibility of horn or acoustic elements of warning system. The noisiness of background can be variable in the course of day. Commonly it is influenced mainly by traffic, industry and various local sources of noise. Its measurement should be made in the most noisy time section of working day, in means for example in the time of peak time in traffic or similar time.

## 1.4 The altitude of built up area

The altitude of built up areas is another significant parameter that influences the acoustic reach of horns. It is almost impossible to determine its exact effect and therefore is regarded based on statistical measurements and empiric experiences. ACUSTICUS Professional enables to determine the ranges of horns based on the adjustment of parameter "*The altitude of built up area*" on five levels:

- 0 - 5 m
- 5 - 10 m
- 10 – 15 m
- 15 – 25 m
- over 25 m

## 1.5 The required level of the acoustic pressure of warning signal

The relation between the required level of the acoustic pressure of warning signal and the noise background can be regulated directly by legislature in case of warning systems in individual countries. Generally is recommended the following relation between noise background and minimum required acoustic pressure of horn's warning signal:

<b>noisiness of background</b>	<b>minimum acoustic pressure</b>
<b>&lt; 60 dB</b>	<b>55 dB</b>
<b>60 - 75 dB</b>	<b>the same as background</b>
<b>&gt; 75 dB</b>	<b>by 5 dB higher than background</b>

The limit where the acoustic pressure of horn's warning signal would drop to this level, is considered the limit of horn's reach. The software is depicting it as the range of horn.

## 1.6 The emission diagram of horn

The horn does not distribute acoustic signal of the same intensity to all directions. The emission diagram illustrates graphically the size of acoustic pressure in individual directions. By different arrangement of baffle boards can be reached various emitting diagrams. The most frequently used ones are as follows:

O – almost circular diagram

F – diagram with preferred routing (front)

8 – very similar to „O“, slightly prolonged in the shape of numeral 8

By appropriate utilization of the emission diagrams can be optimized the number of used horns in the project.

## 1.7 Routing (azimuth) of horn

Horn can be turned to various directions. In combination with their arrangement, i.e. emission diagram, can be again optimized the layout and the number of horns.

## 1.8 Output of horn

The output of horn is stated as the summary electric output power of all amplifiers in the horns. There are stated various types of powers measured according to various standards for various purposes:

- Sinusoidal (DIN)
- Music
- Peak
- Nominal
- P.M.O.O.

These data are rather informative for horns because the substantial parameter of horns is their acoustic pressure.

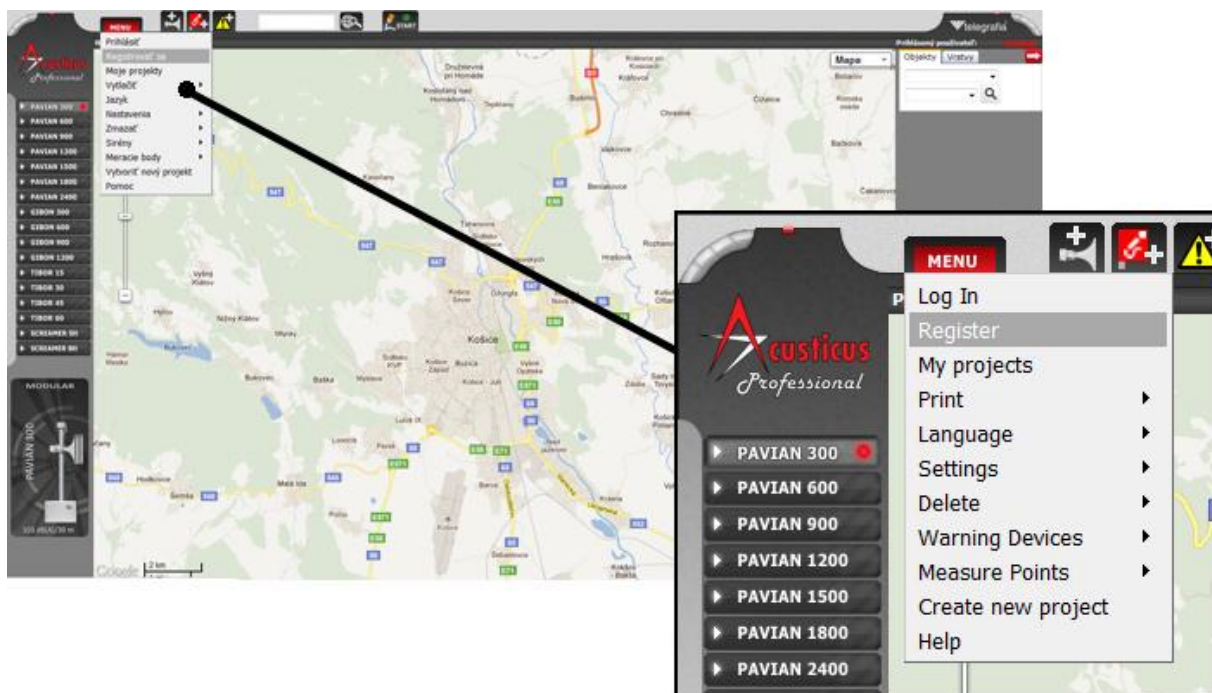
## 1.9 Acoustic pressure of the warning signal of horn

The output of horn has direct effect on the basic acoustic parameter of horn, i.e. the acoustic pressure of horn's warning signal. The acoustic pressure of horn's warning signal expresses the level of sound signal they generate. Besides the output of amplifiers it is influenced also by other parameters, particularly the design of electro-acoustic transducers and of baffle boards. The acoustic pressure depends also on the adaptation of the spectrum of warning signal in acoustic system (electro-acoustic transducer and baffle boards). Most of manufacturers indicate it for signal simulating hooting of typical motor horns at so called fluctuating tone. By means of special modification of this signal the acoustic pressure of electronic horns can be increased artificially. However, this procedure is generally considered unsuitable because it increases the acoustic pressure only for such modified signal and the range for spoken words is significantly lower. The acoustic pressure of effective horns is usually indicated in the distance 30 m from the horn. The acoustic pressure of the equipments with lower output is indicated in the distance 1 m.

## 2 Elaboration of the project

### 2.1 Log in / Registration of user

In case when we want to save or change the standard adjustments of the software of created project, it is necessary first to log in or to register for not registered users:



## Log In

Please enter your username and password. [Register](#) if you don't have an account.

### Account Information

User Name:

Password:

Log In

## 2.2 Elaboration of the project

Following the pressing of push button “Create new project” will open a window with the configuration parameters of the project. It is possible to adjust different value for each project. For common minor projects, it is usually sufficient to leave the pre-selected ones. Following the pressing of push button „Create project” a project will be created.

### Create new project

Project name:

Background noise:   
60 - 75 dB  
> 75 dB

Minimum acoustic pressure:   
+ 0  
+ 5

Default characteristics:

Default azimuth:

Default builtup area:

Default background noise level:

The selected adjustments of the project will be then taken over into the configuration of individual horns as the initial values for the acceleration of work. They can be changed in the configuration of horns and thus to optimize the project. The adjustment of project parameters should be made in a way to comply the greatest possible number of horns and thus to accelerate the configuration of individual horns and intensify this way the works on the optimization of the project.

### **2.2.1 Name of the project**

The name under which the project will be saved and which is used in printouts.

### **2.2.2 The adjustment of the level of noise background and their assigned required minimum values of the acoustic pressure of warning signal**

The audibility of warning signal in the endangered territory is first of all influenced, among other factors, by the background. The relation between the noisiness of background and required minimum acoustic pressure of warning systems is often determined directly by national legislature. If it is not the case, then it is possible to apply standard recommended values (these values are taken over also into the legislative system of Slovak Republic) that are pre-selected also in the software ACUSTICUS Professional. These values can be modified in the adjustments of the project according to needs. It is possible to add other intervals for noise background and assign the required minimum value of acoustic pressure of the warning signal to them. The required minimum value of acoustic pressure of the warning signal of horn is entered for the selected interval as a deviation from values of noise background in the given interval (see table in Chapter 1.5).

### **2.2.3 Pre-selected emission diagram**

We can adjust here the pre-selected value of emission diagram that will be used for the adding of new horn. It is advisable to use a diagram of which we suppose that will be used most frequently in the project. The usual pre-selected value is „O“.

### **2.2.4 Pre-selected azimuth**

It can be also adjusted here the pre-selected value of azimuth that will be used for the adding of new horn. It is advisable to use a value of which we suppose that will be used most frequently in the project. The usual pre-selected value is „0“.

### **2.2.5 Pre-selected altitude of built-up area**

The altitude of built up area is another parameter that will influence the reach of horn. It is adjusted here its pre-selected value that will be used in the adding of new horn. It is advisable to use a value of which we suppose that will be used most frequently in the project. The usual pre-selected value is „0 – 5 m“.

### **2.2.6 Pre-selected level of noise background**

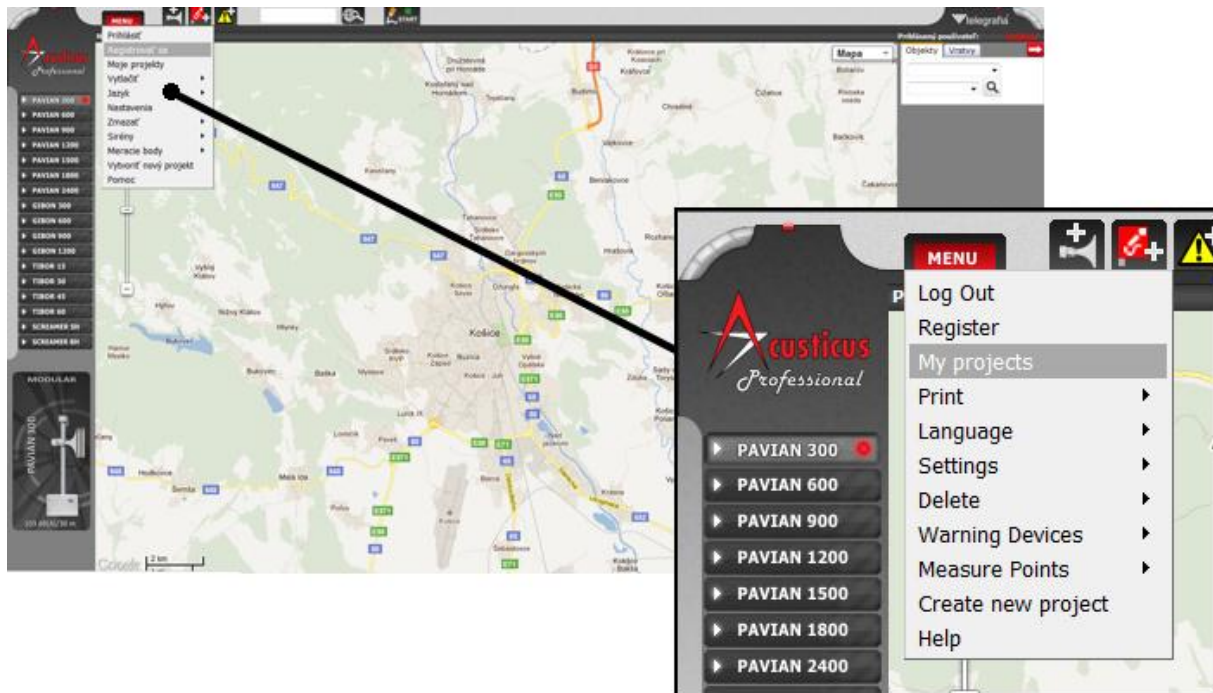
It is adjusted the pre-selected value of the interval of noise level noise background that will be used for adding of new horn. The usual pre-selected value is „40 – 60 dB“. The intervals can be selected from the list that will be created according to point 2.2.2.

## 2.2.7 Optional additional modules

The horn is equipped with complementary modules that influence the need to complete further configuration parameters. It concerns mainly the communication modules, requiring parameters related to addressing and range. The use of complementary module in the version ACUSTICUS Professional 1.0 is without functional link-up and this functionality will be added at next updates.

## 2.3 Administration of projects

During the creation, the project is continuously saved at each performed step. The changes made during activated drawing mode will be saved only after its termination. The list of projects, we already created, can be accessed via Menu – My projects.



On the page containing the list of existing projects a new one can be created, the existing one can be opened, a copy can be made from the existing one (e.g. for alternative arrangement of horns at the same noise background and area of endangerment) or a project can be deleted. The push button Adjust serves for the change of project's name. You can go back to software ACUSTICUS Professional via push button Back.

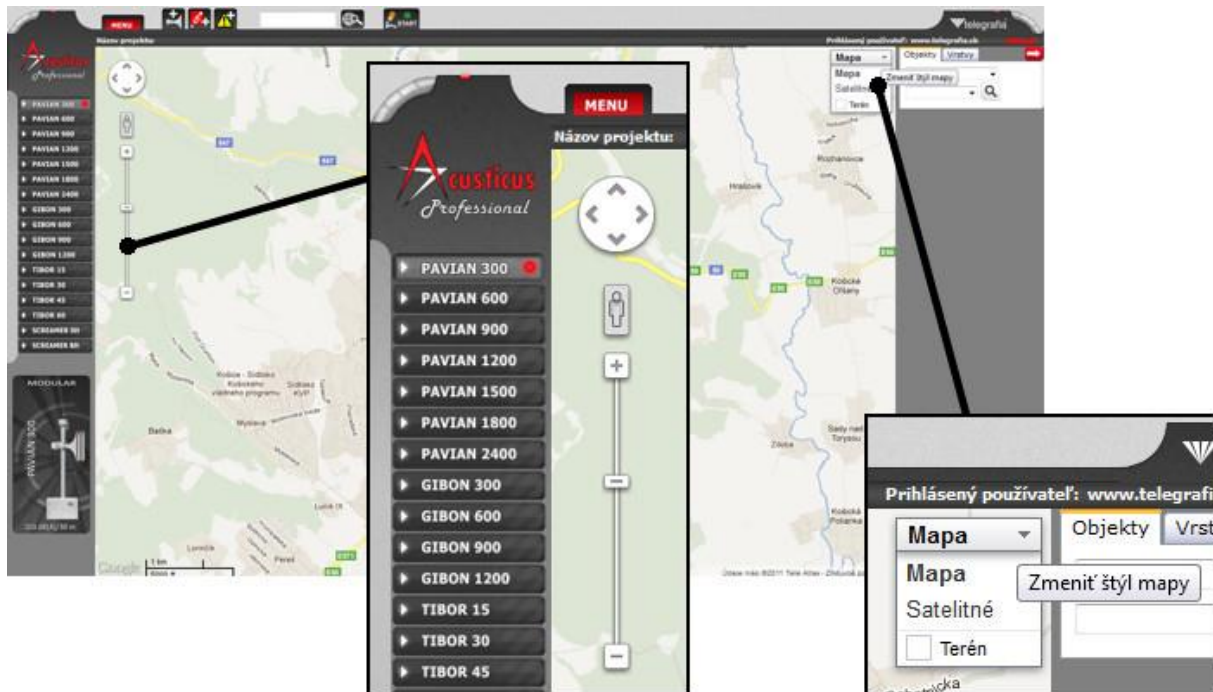
Choose one of your projects from the table.

	<u>User Name</u>	<u>Project name</u>	<u>Last change</u>
<input type="checkbox"/>	www.telegrafia.sk	Demo projekt 1	11/13/2011 1:17:58 PM
<input type="checkbox"/>	www.telegrafia.sk	Demo projekt 2	11/13/2011 1:18:18 PM


### 3 Work on the project

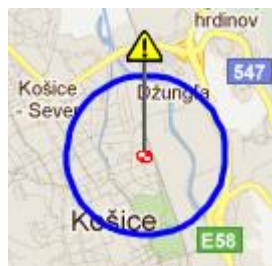
#### 3.1 Work with map background

ACUSTICUS Professional is utilizing as map background Google Maps. For moving in the map and its enlargement / reduction can be used standard control elements of Google Maps, placed in the left upper corner of the map or clicking and holding of left push button of the mouse and subsequent movement of map, or wheel of mouse for enlargement / reduction of map.

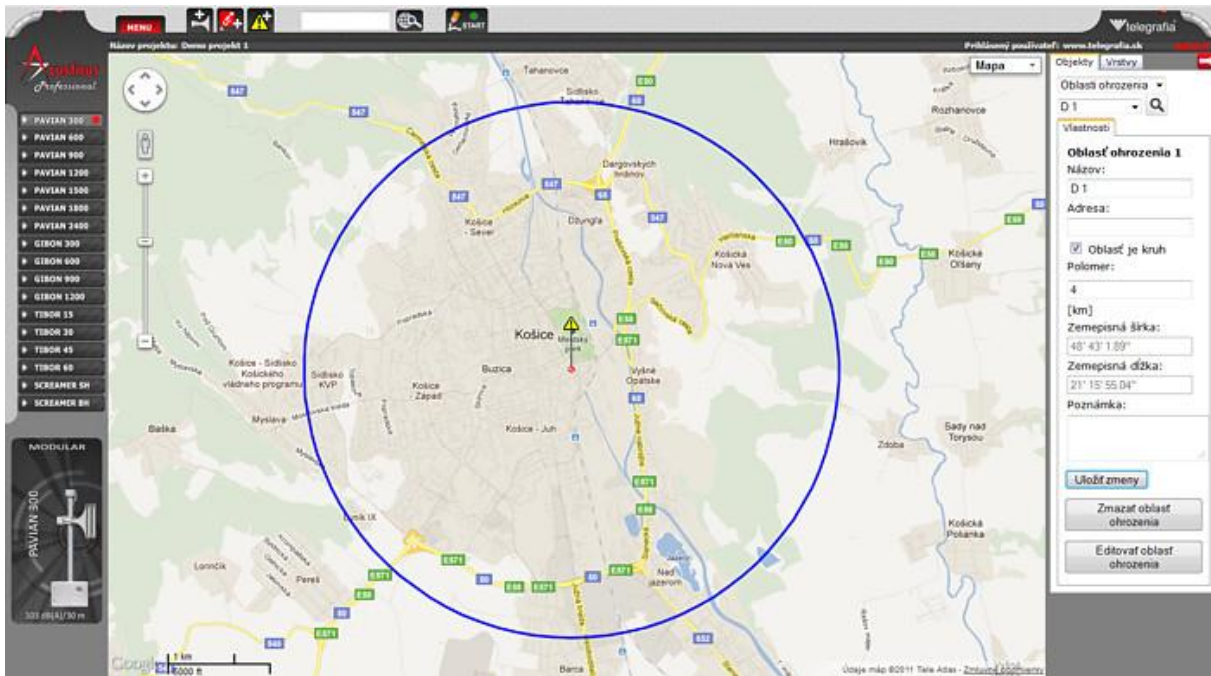


#### 3.2 Creation of endangered areas

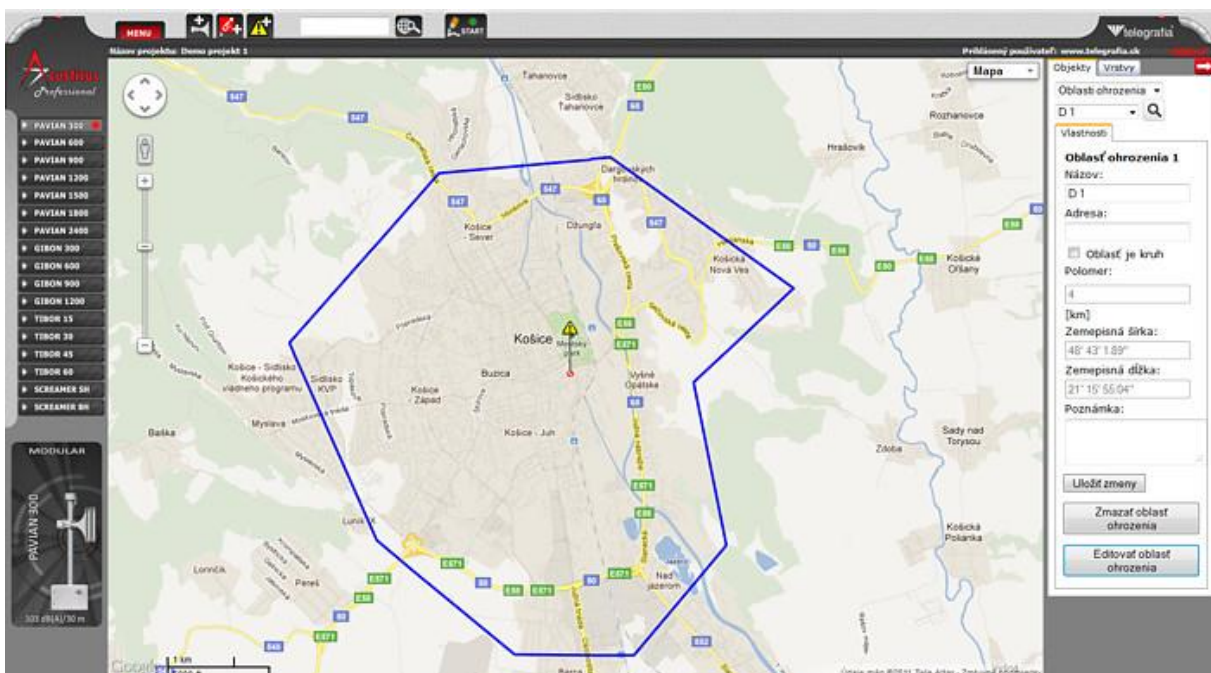
We can make an endangered area by means of push button  *Add endangered area*. Usually an endangered area will be created as a circle. We can move it with the help of mouse – by setting the cursor to the bottom part of central mark, by pressing the left push button of mouse and its movement.




The size of the area and its name can be changed in the configuration parameters in the right side of screen.



If we turn off in the configuration parameters the indication that the area of endangerment is a circle and we save the changes, the circle will disappear and will remain only the sign of endangerment's source. Only the sign of endangerment's source will remain following the pressing of push button "Edit the area" of endangerment in the configuration parameters. The main window will be switched over to the drawing mode where we can create an area of endangerment as a polygon. The apexes of the polygon are created in the drawing mode by a simple pressing of the left push button of mouse. The apex will be deleted by pressing the right push button.

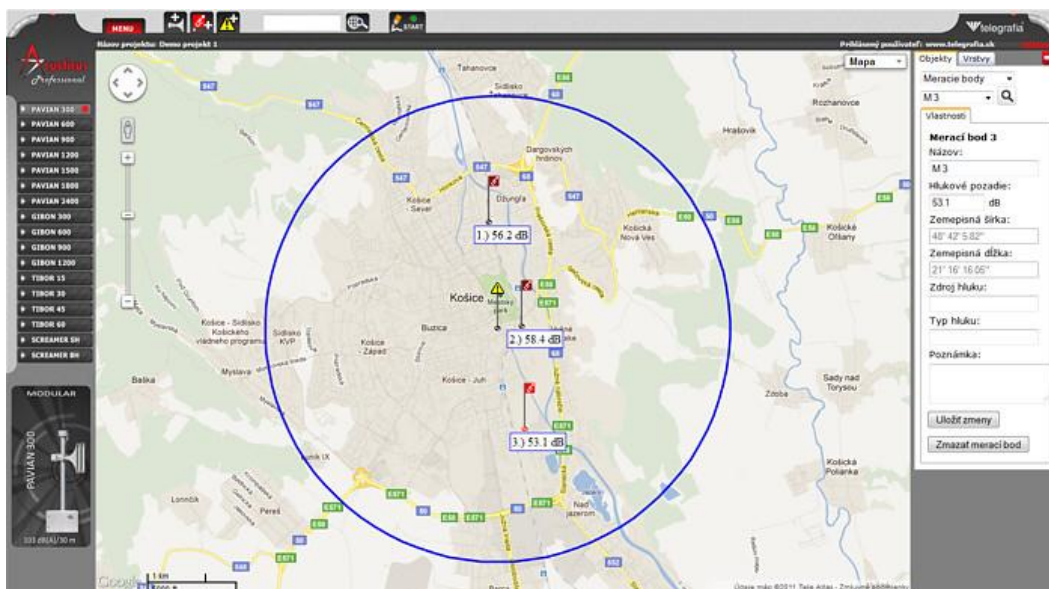


### 3.3 Adding of measuring points

Based on measurements of noise background in the terrain, we gain information on noise at specific sites. These places can be marked on the map as measuring points. We can add the measuring point by clicking the push button  Add measuring point. It will appear an auxiliary window where you can enter the measured value of acoustic pressure:



Following the pushing of button OK the measuring point in the map will be displayed. We will move it to the required coordinates in a standard way with the help of mouse.



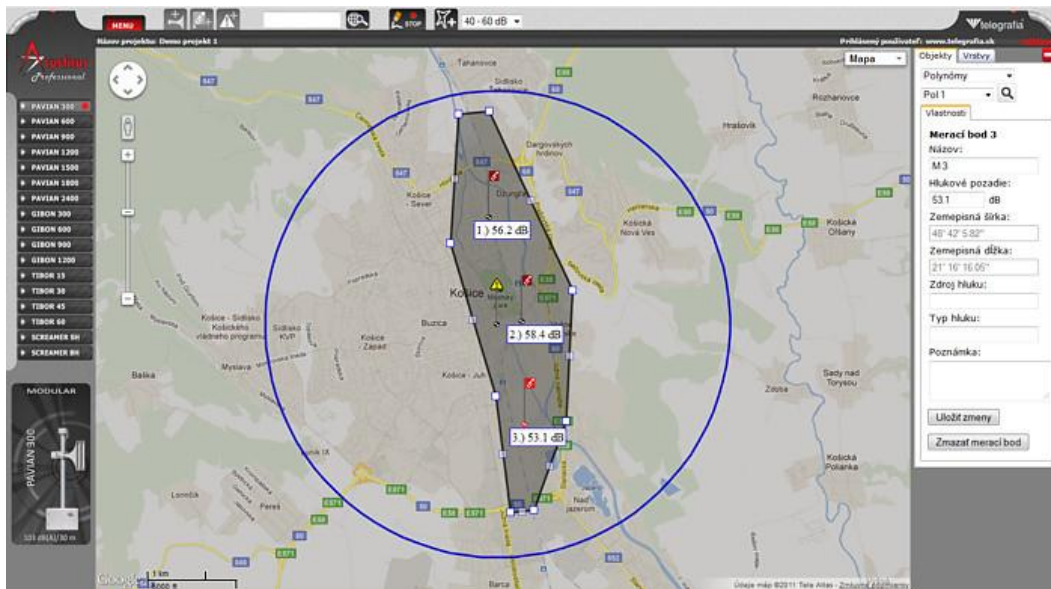
### 3.4 Drawing in of noise background

Based on drawn measuring points we can assess the noise background at individual parts of the area and to draw them in the map as areas – polygons. After pushing the button

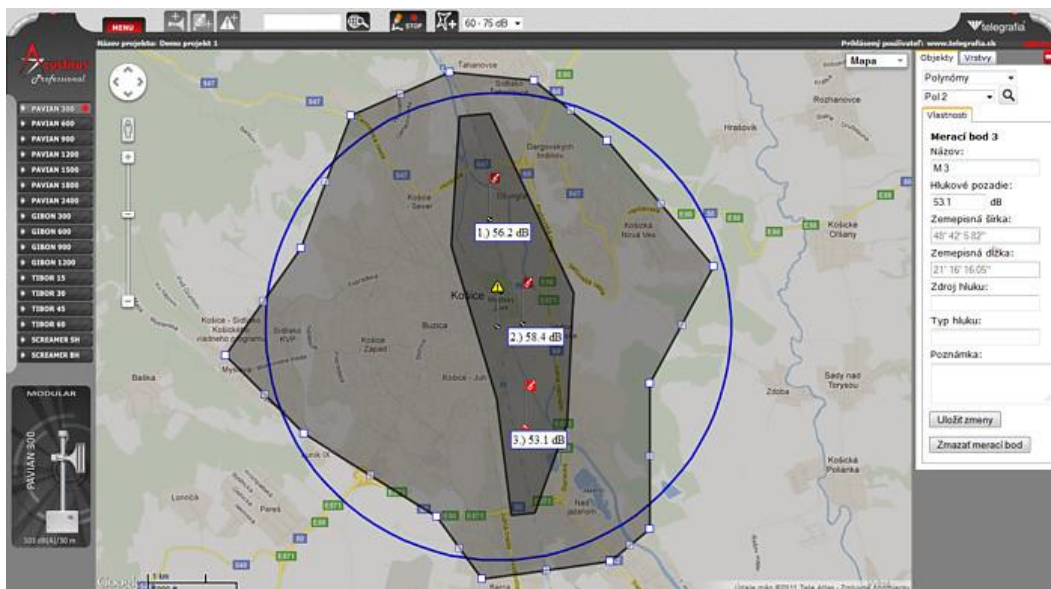



*Turn on drawing* – the software will be switched over into the drawing mode. On the upper control panel will appear new push buttons – Add another area and Lists with contingent noisiness backgrounds (they are taken over from the adjustment of the project). Following the pushing of button Add another area will be created a new area with selected noise background. By pushing the right push button we will add the point of polygon and by pushing the left one we will delete it. By gradual pushing of the right push button we created

the required area. We can change the Name of the area and the value of its noise background in the configuration window.




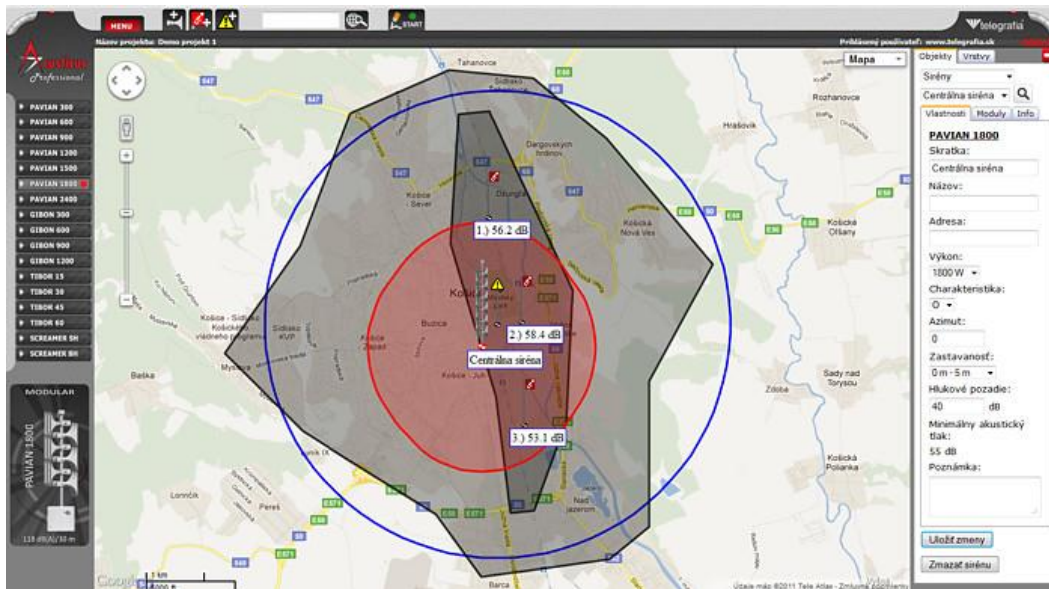
We can add in the same way another area with some other noise background:



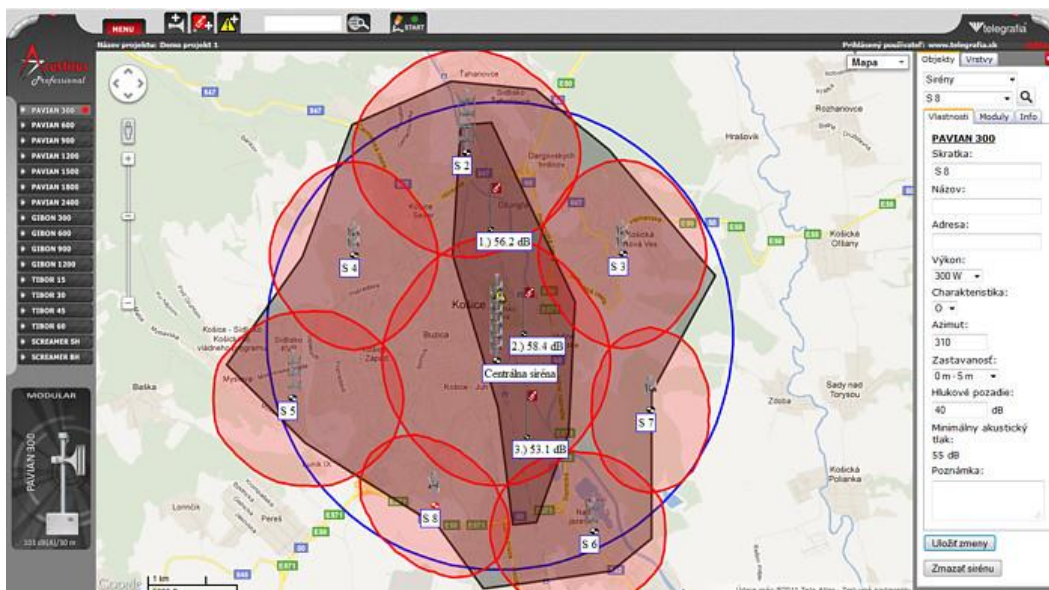
The drawing mode should be terminated by pressing of push button  *Terminate drawing*. The drawn areas will be saved only after pushing of this push button.

### 3.5 Adding of horn / other objects

We choose in the list of horns/equipments the required type and push the button  *Add horn*. We move the horn by the mouse to the required locality and in the configuration of parameters we adjust the most suitable emission diagram and azimuth so that we would cover gradually most effectively the endangered area.



We will add gradually other horns:



In most cases it is necessary to cover by warning signal only the inhabited parts of the endangered area. However, in some cases (depending on national legislature) may be required to cover also permanently uninhabited areas like for example recreational areas, etc.

### 3.6 Configuration of horn / other objects

The configuration parameters will be displayed in the right part of screen following the adding of horn/equipment. By their adjustment we optimize the acoustic project. The optimization of the acoustic project represents a gradual iteration when individual parameters will be changed repeatedly with an aim to achieve the most effective coverage of area by warning signal. Iteration is inevitable also due to the fact that the horn cannot be placed anywhere – it is necessary to have the approval of the proprietor of building or land, availability of electric power (in case no solar supply is used), availability for control

(coverage by a radio signal or availability of lines), etc. The configurations parameters are as follows:

- Acronym – an abbreviation of the name used for displaying purposes in the map and it is also taken over into the software to control warning system (VEKTRA),
- Name – the whole Name of horn used for displaying purposes in printouts,
- Address – address of horn's location, used in printouts,
- Output – after adding a horn the taken over output is according to added type,
- The emission diagram – the emission diagram of horn, after adding the pre-selected type is „O“ and it can be changed also to "F" or "8",
- Azimuth – it defines the routing of baffle boards, following the adding of horn it is set to „0“,
- Altitude of built up area – the average altitude of the built up area within the reach of horn, it is a case of qualified estimate,
- Noise background – noise background within the reach of horn, it is necessary to adjust it according to the area where the horn is located, in case the horn is interfering several areas with different noise background, then it is necessary to set the highest value or to make individual considerations,
- Minimum acoustic pressure – this value is calculated by the software following the entry of values for noise background based on requirements on minimum acoustic pressure defined in the adjustments of the project ,
- Note – notes that will be displayed in some printouts.

In case of made changes it is **necessary to save them** by pushing of push button „**Save changes**“. By pushing down the push button „Delete horn“, the horn will be deleted from the map and also from all lists.

### 3.7 Creation and optimization of the project

Creation of the project consists of the following steps:

- **Preparation :**
  - reading of map,
  - drawing of endangered areas,
  - selection and adding of most suitable sites for the measurements of noise background,
  - in case of gained experience or intermediated information on the noisiness of background, we can create also preliminary maps of noise background,
  - selection of the placement of horns, their adding in the map and preliminary configuration.
- **Inspection and measurement at the site (field) :**
  - real measurements of noise background in the field,

- inspection of the sites selected for the placement of horns and assessment of their suitability,
- talks with the proprietors of land properties on the options for their location.
- **Optimization:**
  - we enter into the project the actually measured values of noise background,
  - we modify them according to actual values on the map of noise background,
  - we modify the placement of horns according to actual possibilities ,
  - we optimize the coverage by adjusting configuration parameters.

The whole process particularly the case of vaster projects, represents a gradual iteration until the time when are taken into account the requirements of the customer in the best possible way, physical options of horns' location, ways of their control and further specific requirements of a concrete project .

### 3.8 Output from the project

For the application of finished acoustic project also outside of software ACUSTICUS Professional, it is possible to utilize one of two printing sets. We can get them via Menu – Print – Printing set 1 or 2. The first printing set will be displayed in a size A4 on height, and besides the map it also contains the list of individual horns with their characteristics and position. The second printing set will be displayed in a size A4 on width and its purpose is to maximize the printed area of map.

