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Ground effect

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The object type "Ground absorption" in the GeoDataBase is used to define the absorption characteristics (or the "porosity" G) of the terrain. The input dialog box asks for the Ground factor and – if you have selected NORD2000 as calculation standard for one of the noise types – Effective Flow Resistivity and Roughness class, see Fig 1

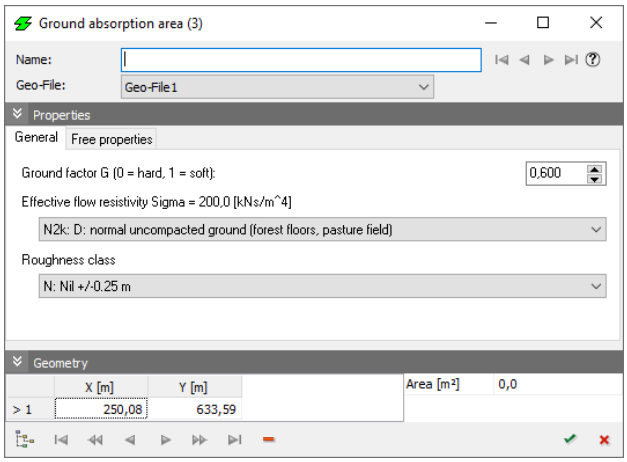

Fig 1 Input mask for ground absorption

Default SoundPLAN assumes that the ground is acoustically porous. This is worth to remember: areas not assigned with any ground absorption will be taken for grass land/'soft'.

The first time you create a ground absorption area manually in GeoDatabase, the input mask will show a ground factor G = 0,6, a flow resistivity equal to class D and Roughness class Nil. The next area you digitize will default adopt the value from the former object.

The old Nordic standards assume the ground is either hard (G = 0) or soft (G = 1). However, GPM and NMT96 accept values in between 0 and 1 set equal to the fraction of porous ground and it is implemented that way in SoundPLAN. With RTN96 as calculation standard any value between 0 and 1 will be rounded to either 0 or 1 during the calculations.

NORD2000 needs the effective flow resistivity and roughness class. In Fig 2 are shown the 8 classes for the resistivity that are usually used in calculations.

Impedance class	Representative flow resistivity σ [kPas/m^2]	Description
A	12.5	Very soft (snow or moss-like)
B	31.5	Soft forest floor (short, dense heather-like or thick moss)
C	80	Uncompacted, loose ground (turf, grass, loose soil)
D	200	Normal uncompacted ground (forest floors, pasture field)
E	500	Compacted field and gravel (compacted lawns, park area)
F	2,000	Compacted dense ground (gravel road, parking lot, ISO 10844 asphalt)
G	20,000	Hard surface (most normal asphalt)
H	200,000	Very hard and dense surface (dense asphalt, concrete, water)

Fig 2 Standardized impedance classes to be used with NORD2000

Impedance class D is normally said to match ground factor G = 1 and class G to ground factor G = 0.

As for the Roughness Class very little relevant data are available at the moment. It is defined as the RMS value of the deviations from a plane terrain within each DGM triangle/segment/between elevation lines. It is recommended to use class N unless accuracy is known to be improved by using one of the other classes.

If you do calculations according to one of the old standards, but NORD2000 is selected for a noise type that is not present in your model, the input mask will still look like shown in Fig 1. In that case you don't need to deal with the impedance and roughness classes.

Ground absorption objects must never cross each other! If any two areas cross the calculation will abort and the logbook state the relevant objects and coordinates. The Preflight function under Tools will detect the issue. Use 'Clean up overlapping areas' under Geo–Tools to eliminate the problem. On the other hand, ground absorption areas are allowed to be totally inside another ground absorption area. In this way SoundPLAN can handle a lake (G = 0) in a park (G = 1) in a city (G = 0) if the edges of the areas don't intersect.

Two ground absorption objects can be 'neighbours' ´with identical borders segments; also, a 'child' area can have identical coordinates with the 'container'. Both situations are illustrated in Fig 3.

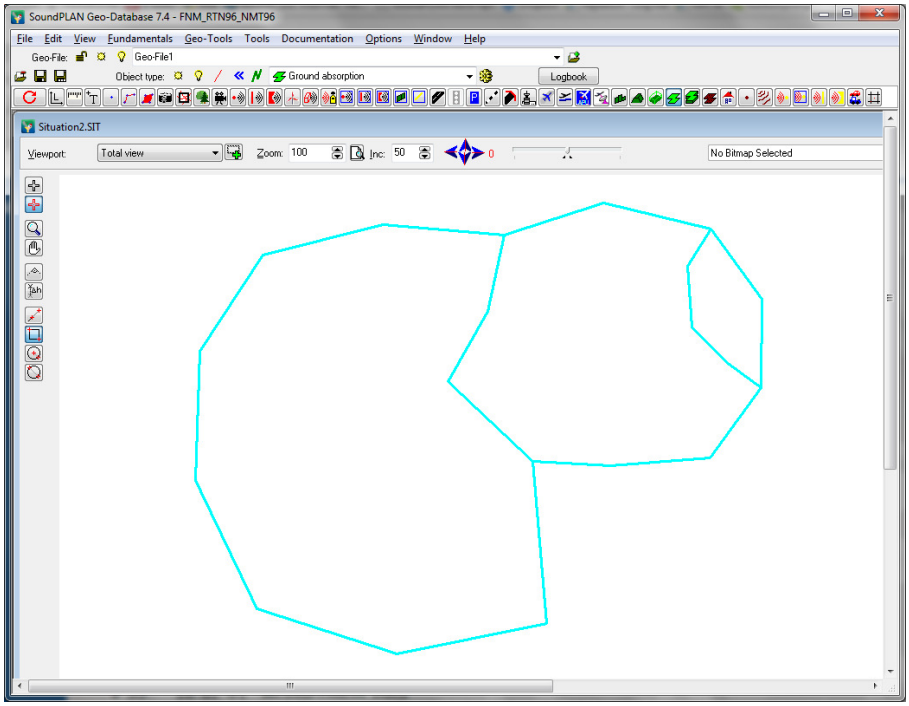

Fig 3 Allowed coordinates of ground absorption objects

Hint: If you encircle the entire project area by the dominating ground type all you need to do is to specify areas of deviating types.

Ground absorption objects do not have any elevation (only (x,y)), and the fact that you put certain objects, e. g. buildings, on top of the ground does not change the ground absorption properties for the area covered by these objects. In this part of the world almost all buildings have hard roof tops, but the area covered by buildings will default inherit the ground absorption properties of the surrounding ground, even if this is soft. Strictly speaking you should therefor copy all buildings and convert the copy to hard ground. This extra work will normally not change the result significant WITH ONE EXCEPTION: in industry noise projects according to GPM where there are sources above roof tops and the buildings are surrounded by soft ground. In these cases, it is important to create hard ground under the buildings (to obtain correct G-factor for the source part of the terrain).

In road noise projects you can tick 'Create hard ground from road surfaces' in the run set up in order to put hard ground (ground factor G = 0 and impedance class G) under the asphalt bands.