Update Letter 8.2
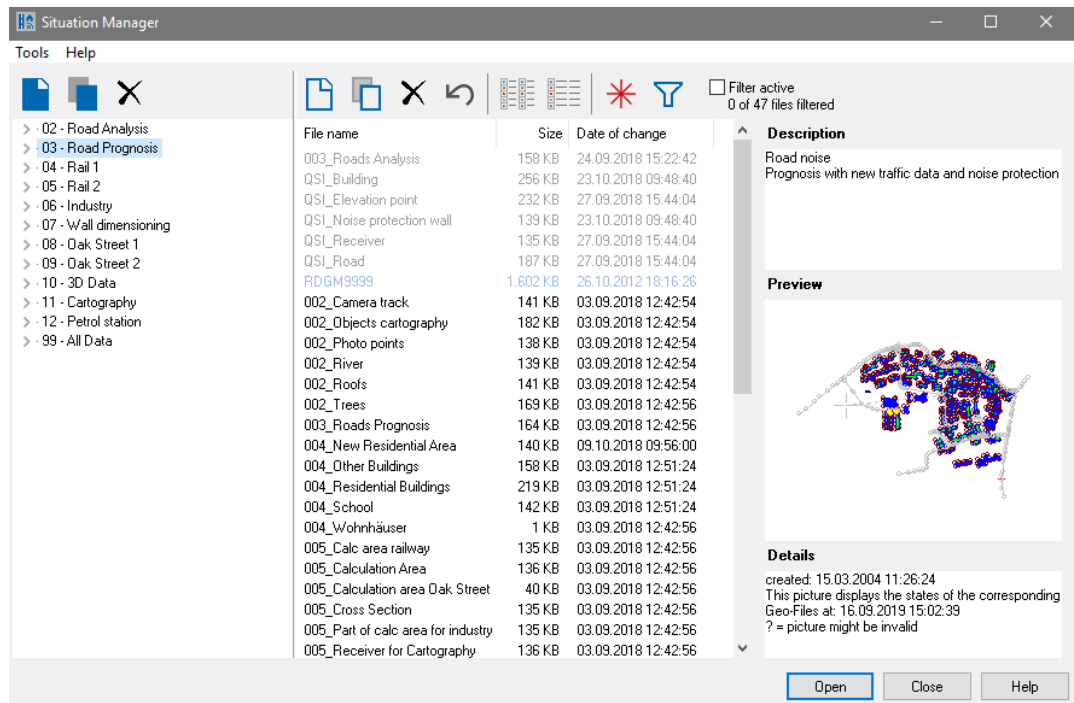
New in SoundPLANnoise 8.2

Highlights

- Revised Situation Manager with additional functions
- Improvements for the import (e.g. splitting objects into areas)
- Variants and object groups for industrial building / room
- BA Facade (ISO 12354-3:2017) completely revised
- Sources with a default distance from the facade and assistance for the input of sources above roof level
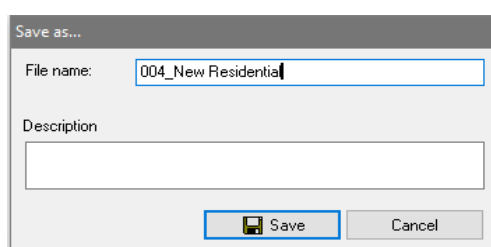
Overview of all new features

An info icon has been added to the SoundPLAN Manager to have quick access to the "About" dialog and your license number.

- **General**

  o New project dialog for open, save and project info - now also the paths arranged under quick access (e.g. documents, downloads) are directly accessible.

  o In the SoundPLAN Manager via OPTIONS -> SETTINGS you can now enter a **default distance** for the **assignment of sources to buildings** globally and for the current project.
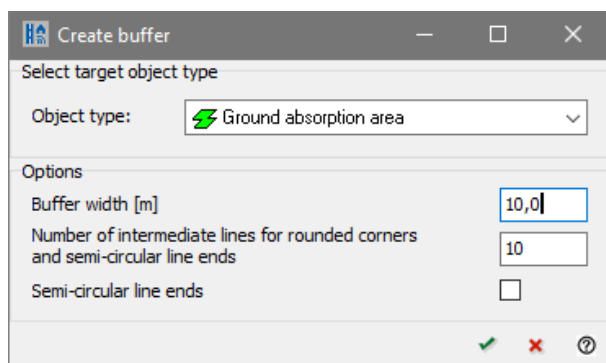
- **Geo-Database**

  o Revised **Situation Manager** in new design and with additional functions (filtering Geo-Files, highlighting Situations in which a selected Geo-File is contained), see page 9.

  o SAVE GEO-FILE AS has got the possibility to enter a description.

  o **Modified Geo-Files** are marked with a * in the Geo-File selection list.

  o New view mode: **Current object type in the current Geo-File (*Ctrl+F5)*.**

  o Depending on the view mode, the current object type, the current Geo-File or both are highlighted in bold in the Geo-File or object selection list.

  o **"Undo"** has been completely reworked.

  o Press and hold the *Ctrl key* to temporarily switch off the right-angle mode.

  o The hatching color for the building type "Unknown" has been changed to a dark red, for example to visualize buildings that have not yet been processed.

  o With the object option "highlighted", ground effect areas are now filled in a bright turquoise.

  o The elevations of line objects can now also be interpolated in the coordinates list. Activate the first coordinate and the last coordinate between which you want to interpolate (with *Shift* key and mouse or the arrow keys) in the Habs or Hrel column, and press *Ctrl+H*.

  o Geo-Tool **Clean up overlapping areas**: Objects with variable heights (e.g. area sources) can be processed again. If the z-coordinates are different, the heights of the inserted points may be wrong. Please check the result. Furthermore, you can now define the size of the overlap area above which a new object is created from the overlapping area.

  o Geo-Tool **Create buffer**: All area-type objects can now be selected as target object type. If the original and target object types are the same, already defined properties are kept.

o Geo-Tool **Prepare buildings**: New function to select all buildings selected for the Facade noise map.

o The Geo-Tool **Combine building areas** [module "Noise Mapping Toolbox"] is available again.

o Geo-Tool **Assign (reassign) receivers to buildings**: With this Geo-Tool, you can now also assign receivers to buildings that were not previously assigned, for example, for imported receivers. Select the distance from the façade up to which receivers should be assigned to buildings. In this way, you can control that free-field points are not assigned. With the option SET DISTANCE FROM FACADE, the position of the receiver to be assigned is changed accordingly. The information about the building (number of floors, floor heights) is taken from the building.

o When rotating via coordinate transformation, the coordinates of the pink diamond are now preset as the pivot point instead of 0/0.

o The measuring tape is now only deleted when you trigger a screen rebuilt with *Ctrl+R.*

o The **import for ASCII tables, ESRI Shapefiles and CityGML** was completely revised and extended by a tab index card with import settings for the import in tiles or within areas, see page 11.

o During the import, special characters were sometimes not interpreted correctly. Now you can check the box ALTERNATIVE EVALUATION OF SPECIAL CHARACTERS (UTF-8 ENCODING) in the import dialogs. For ASCII tables, the check mark is in the format definition. In the preview below you can immediately see the effect of the encoding. For Shape and dbf the check mark is located in the assignment table; for DXF import in the "Text" object. In most cases, you can see whether the conversion is correct in the default properties. If the special characters are replaced by not-readable characters, cancel the dialog with the red cross and start the import again with the check mark activated. With CityGML, the coding is evaluated automatically.

o When importing CityGML from multiple files, the properties offered in the assignment table (e.g. function ID, road name, ...) are now only read from the first file by default, since reading is time critical. If you know that there should be additional properties, you can use the READ ALL FILES button to initiate all files to be evaluated. However, this may take some time depending on the number of files and the number of objects contained.

o Elevation points are now only imported via IMPORT -> ELEVATION POINTS (formerly "Filter and import elevation points"), because it makes sense to filter the elevation points in any case.

o The elevation filter for large amounts of data (IMPORT -> PREPARE ELEVATION POINTS FOR THE CALCULATION CORE) now runs as a separate program, so that the Geo-Database is no longer blocked.

- o Elevation filter: New ESRI binary grid format

- o For online map services, you can now take over a Google Maps or OSM bitmap directly via the right mouse button -> CURRENT VIEWPORT AS GOOGLE MAPS / OSM BITMAP or the menu FUNDAMENTALS.

- o The **free properties** of the objects (formerly additional properties) have been completely revised. They are now saved in the project separately for each object type with a name that you assign individually. In addition, the free properties are also available in the property dialogs as a separate tab index card, see page 12.

- **Objects**

  - o The **length of object names is** no longer limited to 40 characters.

  - o Use the *Pos 1*, *End*, *Page up* and *Page down* keys to go to the first / last or next / previous object in the property dialogs. These keys work in addition to the navigation arrows at the top right.

  - o The assignment of sources to buildings was already revised in the course of version 8.1, see page 13.

  - o When assigning a source to a building, the default distance entered in the SoundPLAN Manager settings is used.

  - o **Sources on the roof**: If a source is entered within the outline of a building, the building height is now evaluated for the source height over terrain. Specify the height above the roof. For area sources, the check mark FOR THE COMPLETE ROOF adjusts the source geometry to the building geometry.

  - o For line sources to which a spectrum with directivity has been assigned, there is now the option DIRECTIVITY FOLLOWS / ROTATES WITH LINE in the tab index card *Additional*. The radiation direction of the directivity is determined with respect to the first segment of the line source and rotates 3-dimensionally with the direction change of other segments.

  - o Noise protection wall: Total dX, dY for several cantilevered elements in one additional element. The tilt and the segment size are calculated from the number of elements and dX and dY.

  - o An area-type object can be created from the DGM hull under FUNDAMENTALS -> DGM -> CREATE AREA FROM DGM HULL. Specify the required object type and, if necessary, a buffer and the number of intermediate points. This object can be used, for example, to exchange elevation information within a DGM.

Industrial building / room

- o Now the pocket calculator can also be used for indoor sources to calculate the length-related sound power level per meter from a sound power level and the speed (see "Moving point source" in the manual).

- o Several variants can now be managed in one room, for example to compare different planned sound insulation concepts in an office or the acoustic improvement by enclosing loud machines in a working space, see page 15.

- o To better structure the objects in a room, you can combine the objects into object groups, see page 14.

- o Embedded objects (for example a window in a door) are no longer managed in nested layers. Now the object listed first in the tree overlays the objects listed below. In the tree you can change the order of the objects and object groups via the right mouse

button popup menu with MOVE UP / MOVE DOWN or the key combinations CTRL+ PAGE UP / CTRL + PAGE DOWN.

- o Property table:
  - Filter: Select one of the displayed columns as the FILTER COLUMN and enter the desired value as the FILTER VALUE. This allows you to quickly filter to "undefined" to find objects with undefined properties.
  - The object number is now also displayed.
  - Click on the column header to sort in ascending or descending order.

- o If a bitmap has already been georeferenced in the Geo-Database, the referencing is also used within the editor. In the inside view the bitmap is assigned to the floor, in the outside view to the roof if it is a flat roof with a roof area.

- o In addition to the previous method of fitting bitmaps, you can hold down the *Shift key* and click the left and right corners of the first edge in the bitmap. This method can also be used to fit rotated bitmaps. A readjustment of bitmaps with a rotation is not possible, please delete the referencing and assign it again.

- o Emission, absorption and transmission spectra can be assigned colors in the project library (tab index card *values*) for the representation in the 2D and 3D editor as well as in the Graphics. For example, different absorption materials can be better distinguished visually, see page 16.

- o The receivers can be loaded in the Graphics as data type RECEIVER REPRESENTATION and colored using a scale. In addition, the values, the serial number or the object number can be output as text. These settings and the appearance of the receivers is controlled using the object type "Indoor receivers " in the "Results" node.

- o Indoor receivers can be displayed as table flags in the Graphic. The basis for the table flags is a Spreadsheet. For detailed description of the handling please refer to the manual.

- o In future, the industrial building/room name will be displayed as a prefix before the source name in the Result Tables. If this is not desired, leave the object name empty.

- **Library**

  - o You can change the maximum length of the element name for each library under EDIT -> MAXIMUM LENGTH FOR ELEMENT NAMES. By default, the maximum length is 80 characters.

- In the project library, the emission, absorption and transmission spectra can be assigned colors which can be output in the industrial building editor and in the Graphics instead of the colors defined in the object types.

- In the *Characteristics* tab index card in the emission, absorption, transmission and attenuation library, the characteristic values are now entered via a value table. The costs deposited in the attenuation library will be converted. The background for the change is that we added the characteristics of the components for flank transmission according to ISO 12354-3:2017.

- **Calculation core**

  - The calculation run graphic has been revised for the display of grid calculations. On the right side, the results stored in a grid map, such as time slices, ground height or room acoustic parameters are displayed. Click on the individual results to toggle the display. If a calculation has already been completed, first click on LOAD GRID MAP in the upper right corner.

    Results
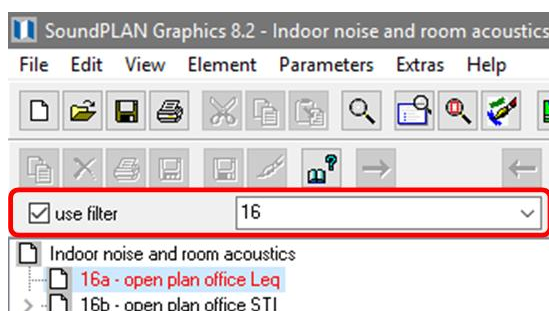   - ○ Grid point type
    - ○ Ground elevation [m]
    - ◉ LrD [dB(A)]
    - ○ LrN [dB(A)]

  - Due to a resolution in the DIN/VDI standards committee NA 001 BR-02 SO, the calculation of the condition on the minimal size of a reflector of ISO 9613-2 / ISO 17534 was changed. This can lead to minor changes in the results.

  - Facade noise map of receivers according to CNOSSOS-EU / BEB - change compared to VBEB: Each receiver is 4 m above ground level; the height is no longer interpolated via the height of the corner points of the facade.

  - When selecting receivers according to CNOSSOS-EU, the option RECEIVERS IN 4 M ABOVE GROUND is set by default.

  - The standard Nord2000 has been revised, see page 23.

  - Correction for STI calculations: Changes of the results are usually within the general uncertainties, situations with longer reverberation times and/or low background noise levels are more affected.

  - If the value for 8000 Hz of an absorber is missing in STI calculations, this value is extrapolated. Previously the calculation was aborted.

  - Indoor calculations: Instead of the lower third octave band (worst case view), the octave center is now evaluated for the air absorption. This can lead to changes in results.

  - Indoor calculations (only Leq, reverberation time and STI) can in future be performed on the graphics card or other hardware components (OpenCL), see page 18. (Supplied with an update).

  - Calculate objects into DGM / DGM calculation: Relative objects are ignored.

- **Distributed computing**

  - If there are not enough jobs left for the number of threads at the end of a calculation run or at the end of a tile, the jobs are only assigned to one PC at a time. This leads to an acceleration of the calculation.

- **Spreadsheet**

  o When selecting individual cells, the whole row is now highlighted in light blue so that you can see whether you have selected the correct receiver.

  o With TOOLS -> RENUMBER RECEIVERS, the serial number of the receivers is numbered consecutively from 1 according to the current sorting. Formerly this used to be an option in the settings.

  o EQUAL COLUMN WIDTHS sums the widths of the selected columns and distributes the total evenly among these columns.

  o Tabular wall/berm documentation, see page 12.

  o Tables with group results can now also be used as templates for new tables. The group columns created are also displayed in the table contents for assigning the data. Assign the data as usual with a double click or the right arrow. If the group names in the template differ from those in the result file, a window for selecting the current group opens.

  o When calculating formulas, the system checks for circular references and the use of the "own" column. The formula interpreter tries to calculate all formulas correctly by rearranging them, if necessary. If this is not possible, the calculation is aborted and a description on the problem is added to the logbook. You can invoke the check manually using the DATA CHECK icon.

- **Graphics**

  o If you have activated one or more limit lines in the map object types, the export of the limit lines is offered in edit map. Call EDIT -> EXPORT LIMIT LINES, select the file format and define the export settings as for the contour line export.

  o If you load a result as a data type in the file selection, you can automatically load the geometry data assigned to this result. To do this, check mark GEOMETRY FROM FIRST RESULT FILE and load the desired result. In this case, no query for legend and properties as text is opened for the geometry data.

  o There is now a filter in the sheet tree to control the sheets offered for selection.

  The filter evaluates the file name and displays only the sheets matching to the filter. Each project stores the filters already used, which you can then select from the selection list.
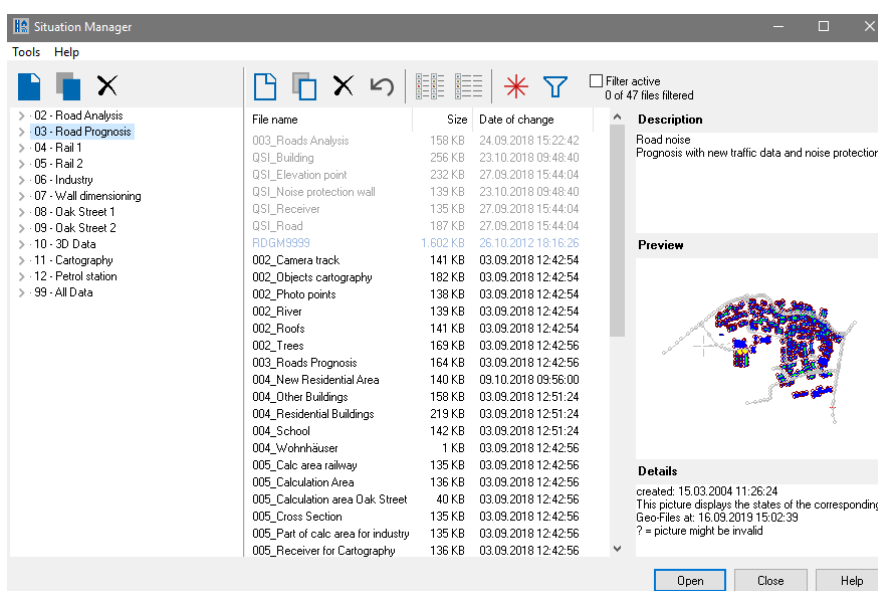
  o For the mid and additional intervals of Grid Noise Map / grid operations, the scale colors are interpolated between the two edge colors. This is now more clearly described by the text in the object type: FILL CONTOUR AREAS WITH INTERPOLATED SCALE COLORS.

  o If additional single point receivers are in the data for a Façade Noise Map calculation, the floor information is now used for the receivers. This means that additional receivers can be placed so that there are no moiré effects by overlaying them with FNM points.

Example: In an FNM calculation with two floors (ground floor and 1st floor), an additional point receiver on the 2nd floor is to be calculated for the gable facade. The calculation height for the additional receiver is 8 m (height above ground level = 2.4 m + 1st floor 2.8 m + 2nd floor 2.8 m), the number of floors is 1, starting with 2nd floor.

- **Wall Design**

  o If the pre-calculation is recalculated while the Wall Design is open, the program asks whether the result should be reloaded.

- **BA Facade**

  o Complete revision (face lift) of the interface.

  o New guidelines DIN 4109:2016 / DIN 4109:2018 and ISO 12354-3:2017 with flank transmission, see page 20.

  o New possibility to check whether the required sound reduction level is kept in all rooms (currently only DIN 4109:2016/2018): Click on the icon with the orange tick; as soon as the check is completed, the logbook opens and lists in red all rooms where the sound reduction level is not kept. If you click on one of these lines in the logbook, the corresponding room is displayed on the screen.

- **Noise Allotment / Graphics**

  o The table of sectors with additional allotments can now also be displayed in the Graphics. To do this, check mark INSERT BOX WITH ADDITIONAL ALLOTMENTS when selecting the allotment file. If you change the additional allotments later, the box in the Graphics is also updated.

- **Aircraft noise / Graphics**

  o Own data type for protection zones according to AzB, see page 22.

- **New guidelines**

  o SonROAD18 (Switzerland), CNOSSOS-EU, BUB, RVS, RVE, GPM2019 (Scandinavia).

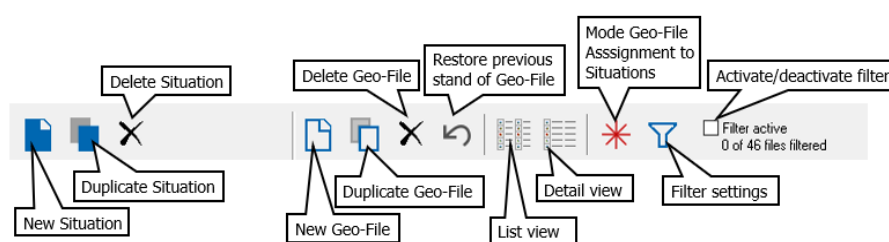# Detailed description of more extensive changes

Situation Manager

The strict separation between Situation view and Geo-File view has been dropped. The Geo-Files contained in the project are always displayed. If you click on a Situation, description, preview and details of the Situation are displayed, if you click on a Geo-File, it is the information about this Geo-File.

The details of the data are now always displayed - for example, creation date, whether the file is a copy of another Geo-File, imported from which project.

Several Geo-Files can be removed from a Situation at the same time. Select the Geo-Files using the *Ctrl* or *Shift key* and drag & drop them into the Geo-Files section or press *Del.*

The DGMs contained in the project are displayed in the Geo-File section and can be assigned to a Situation or exchanged if a DGM has already been assigned. The DGM contained in the Situation is displayed in light blue below the contained Geo-Files, further DGMs in dark blue at the end of the Geo-File list.

New design:

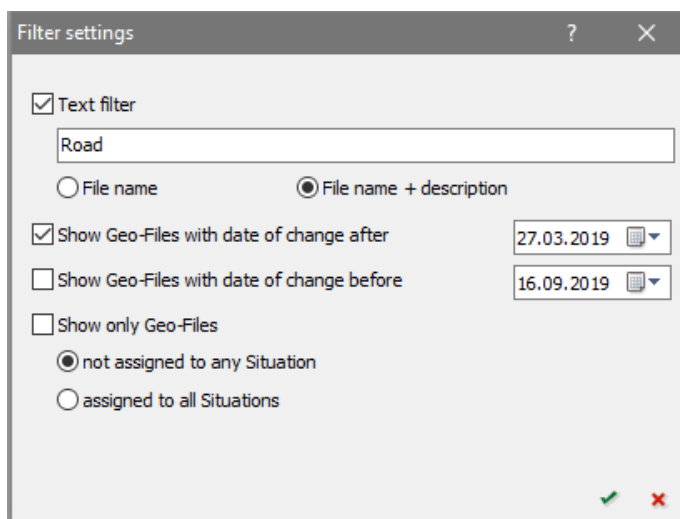## *Visualize the Geo-File assignment*

Click on the red asterisk to activate the visualization of the Geo-File assignment. If you then click on a Geo-File in the Geo-File list, the Situations in which this Geo-File is contained are highlighted in red.

View filter for Geo-Files

In the filter settings you can filter Geo-Files according to various criteria. These are a text filter, filter by modification date and the assignment to Situations. Multiple selection of filter criteria allows you to combine them, for example, to display only those Geo-Files that have been changed in a certain period of time.

In addition, you can only display Geo-Files that are not assigned to any Situation. Please note that these Geo-Files could still be used in the Calculation Core or in the Graphics.
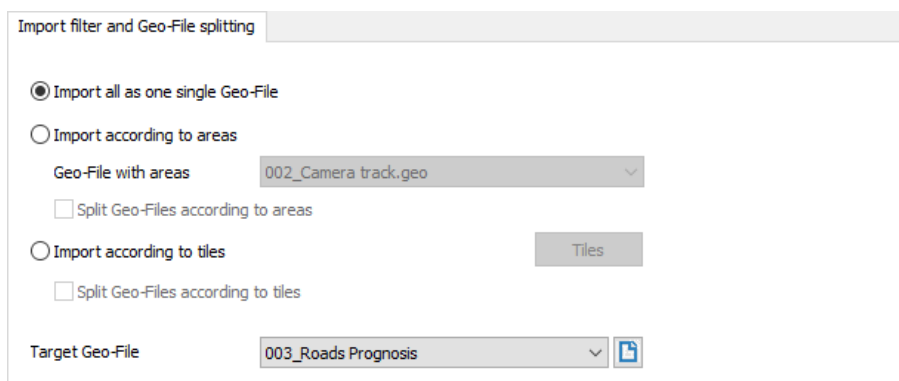
For the **TEXT FILTER**, enter a keyword that is contained either in the **FILE NAME** or in the **FILE NAME AND DESCRIPTION**.

As soon as you leave the filter settings, only the Geo-Files corresponding to the filter criteria are displayed, and the number of Geo-Files filtered out is displayed. You can activate or deactivate the filter with the current settings via the check mark **FILTER ACTIVE**.

Import settings

In addition to the import of all data into one Geo-File you can now import ASCII tables, ESRI Shapefiles and CityGML within arbitrarily shaped areas or in tiles [module Noise Mapping Toolbox].

THE IMPORT ALL DATA INTO A GEO-FILE option imports all data contained in the import file(s) into the Geo-File selected as the **TARGET GEO-FILE**. This Geo-File does not have to be included in the loaded Situation. Use the **NEW GEO-FILE** button to create a new target Geo-File.

For the **IMPORT ACCORDING TO AREAS** option, you need a Geo-File that already contains the areas, such as the investigation area or counties. The areas may be available as object type area, area usage or map sections.

Only the data lying within the areas is imported. Select the **TARGET GEO-FILE** or create a new Geo-File using the **NEW GEO-FILE** button, in which the imported data is saved. The **CREATE INDIVIDUAL GEO-FILES FROM AREAS AND SPLIT OBJECTS** checkbox allows you to split the import data between the areas contained in the **GEO-FILE WITH AREAS**. The Geo-Files are given a name consisting of the names of the individual areas and a **TARGET GEO-FILE PREFIX** you specify.

To use the **IMPORT ACCORDING TO TILES** option, you need a tile system. If no tile project has been defined yet, first select the geo-referenced bitmap, otherwise the tile manager will be opened so that you can enter the area for which you want to import the data. If all data is to

be imported into one Geo-File, enter the target Geo-File or create a new target Geo-File using the NEW GEO-FILE button. You can divide the import data into the tiles defined in the tile system by checking the CREATE INDIVIDUAL GEO-FILES FROM TILES AND SPLIT OBJECTS checkbox. Each tile is saved as its own Geo-File, where the name is composed of a TARGET GEO-FILE PREFIX specified by you and the X and Y coordinates truncated to kilometers.
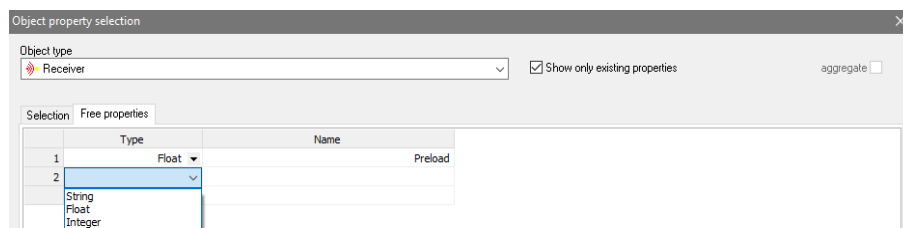
If you import the data into individual Geo-Files, they are not automatically assigned to the Situation and displayed, since the data volumes might be too large. Load the Geo-Files you need via ADD GEO-FILES into the Situation.
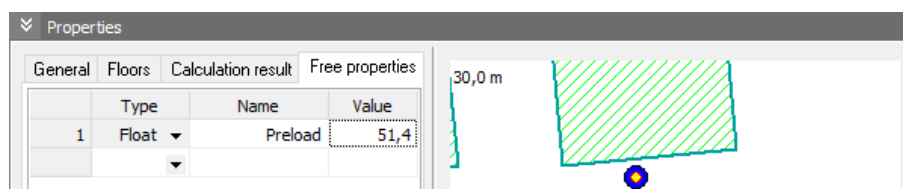
Free properties

Any free properties can be specified for the individual object types, which can be defined in different places in the Geo-Database.

- Directly when importing data via the "Settings" wheel in the assignment table
- In the property dialogs
- Via OPTIONS -> OBJECT PROPERTIES SELECTION
- Right mouse button on the object symbol
- In the Property Explorer, click on the "Settings" wheel.

Go to the *Free Properties* tab index card and select from the TYPE drop-down list whether the property is a text, an integer or a float value and enter a name.
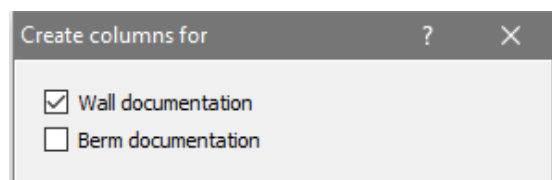

You can then assign the values for the free properties during import, for example, and evaluate them in the Property Explorer. In addition, the free properties are displayed in the property dialogs.

Wall/berm documentation

Coordinates, heights, segment lengths, volumes and kilometer posts of walls and berms can be documented in the Spreadsheet.

Call the Spreadsheet, select the table type WALL TABLE and check whether you have walls and/or berms in the data. The required columns are automatically created according to your selection.

Confirm your selection and then select the Situation or the Geo-File with the noise protection measures to be documented. The DGM assigned to a Situation in the Geo-Database is automatically loaded and displayed in the title bar for information.

If the Situation contains the road or railway that was declared as the reference axis, the distance and height to the next axis for the walls and berms is calculated and filled in in the table.

Coordinates				Distance from	Height above	Element	Noise protection wall		Canti-	Wall
X	Y	Z	Station	next axis	next axis	Length	Wall height		lever	surface
							Beginning	End		
[m]			[km]	[m]	[m]	[m]	[m]	[m]	[m]	[m²]
03b - Noise barrier 3,0 m on berm										
36349,654	29323,573	266,00	25+896	7,69	1,65	28,88	3,00	3,00	-	86,65
36324,462	29337,703	266,00	25+926	7,32	1,65	10,28	3,00	3,00	-	30,84
36315,724	29343,117	266,00	25+936	7,55	1,65	10,31	3,00	3,00	-	30,92
36306,478	29347,672	266,00	25+945	7,28	1,65	10,05	3,00	3,00	-	30,16
36297,258	29351,680	266,00	25+955	7,09	1,65	9,94	3,00	3,00	-	29,82
36288,240	29355,858	266,00	25+965	7,26	1,65	10,13	3,00	3,00	-	30,38
36279,074	29360,163	266,00	25+975	7,43	1,65	10,42	3,00	3,00	-	31,26
36269,383	29363,987	266,00	25+985	7,47	1,65	10,62	3,00	3,00	-	31,87
36259,064	29366,514	266,00	25+994	7,35	1,65	10,60	3,00	3,00	-	31,80
36248,500	29367,370	266,00	26+004	7,24	1,65	10,46	3,00	3,00	-	31,37
36238,054	29366,928	266,00	26+013	7,24	1,65	10,33	3,00	3,00	-	30,98

Using **TABLE -> TABLE SETTINGS**, you can hide columns that are not required and change the table according to your requirements.

If the DGM has been loaded, the rear line of berms is intersected with the DGM so that the volume is calculated from the terrain. If another DGM is to be used or if you want to perform the volume calculation without DGM, call **FILE -> TABLE CONTENTS** and assign another DGM or unassign it by clicking on the arrow to the left.
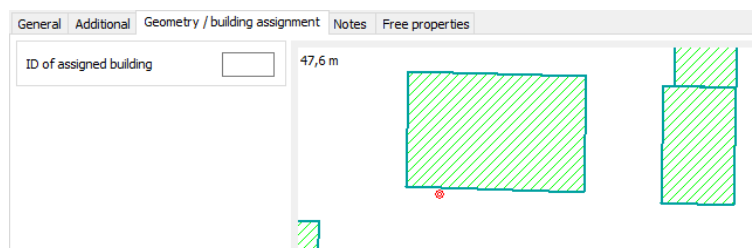
Use the table structure (**TABLE -> TABLE STRUCTURE -> DEFINE BLOCK HEADER**) **TO** document, for example, the wall length and the visible area of the entire wall or the volume of the entire wall.

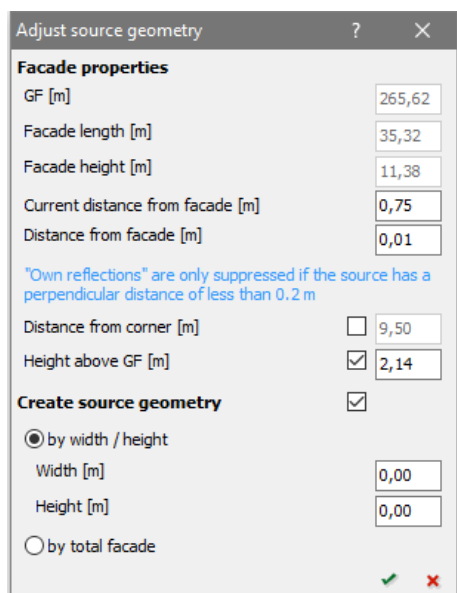| Coordinates | | | | Distance from | Height above | Element | Wall height | | Wall |
X	Y	Z	Station	next axis	next axis	Length	Beginning	End	surface
[m]			[km]	[m]	[m]	[m]	[m]	[m]	[m²]
03b - Noise barrier 3,0 m on berm									
Length: 488,61 m		Wall surface: 1465,82 m²							
36349,654	29323,573	266,00	25+896	7,69	1,65	28,88	3,00	3,00	86,65
36324,462	29337,703	266,00	25+926	7,32	1,65	10,28	3,00	3,00	30,84
36315,724	29343,117	266,00	25+936	7,55	1,65	10,31	3,00	3,00	30,92
36306,478	29347,672	266,00	25+945	7,28	1,65	10,05	3,00	3,00	30,16
36297,258	29351,680	266,00	25+955	7,09	1,65	9,94	3,00	3,00	29,82
36288,240	29355,858	266,00	25+965	7,26	1,65	10,13	3,00	3,00	30,38
36279,074	29360,163	266,00	25+975	7,43	1,65	10,42	3,00	3,00	31,26
36269,383	29363,987	266,00	25+985	7,47	1,65	10,62	3,00	3,00	31,87

You can save the table as a template for further projects as usual.

Assignment of sound sources to buildings

Set the **first coordinate** of the source near the building. If the object dialog does not open automatically, click on the coordinate you just entered again. In the *Geometry/Building Assignment* tab index card you see a preview image with the section of your site plan.

In the preview image, click on the facade to which you want to assign the source. A dialog for entering the source geometry opens.

In the upper section, the facade length and façade height as well as the distance at which you set the source coordinate in front of the facade are displayed informatively.

For THE DISTANCE FROM FACADE [M] the value specified in the SoundPLAN Manager under OPTIONS -> SETTINGS is preset. You can change this value if necessary. You can optionally define the DISTANCE FROM THE CORNER of the wall and the HEIGHT ABOVE GROUND FLOOR. The first point of the source is set to the position where you click on the facade, unless the check mark DISTANCE FROM THE CORNER is set.

For line and area sources, you can also have the source geometry generated. Enter the geometry via LENGTH or WIDTH and HEIGHT, or for area sources for the TOTAL FACADE if the entire facade is to radiate.

If a line source does not run parallel to the ground floor of the building, you can enter the height of the second coordinate in the HEIGHT field when creating the source geometry.

If a spectrum with a 2-dimensional directivity was assigned to the source before the assignment, the rotation angle is set so that the 0° axis of the directivity diagram points perpendicular to the facade.

DΩ wall is automatically set to 3 dB and the first reflection (seen from the source) from all reflecting surfaces whose perpendicular distances are less than 20 cm is suppressed.

Object groups in the industrial building / room

In the tree, select the objects you want to group by holding down the *Shift* or *Ctrl key* and right-click to call GROUP OBJECTS. The objects are now listed within the corresponding group and the object group is marked with the group symbol.

If you want to assign further objects to an existing object group, select the desired objects in the tree (several objects with **Shift** or **Ctrl key**) and select THE corresponding object group with the right mouse button -> ADD to OBJECT GROUP.

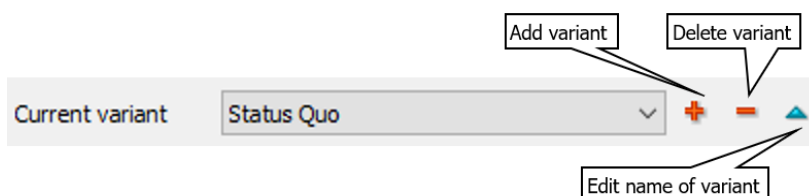Accordingly, the group assignment of objects is cancelled with the right mouse button -> REMOVE FROM OBJECT GROUP.

Select the object groups in the tree. Using the functions in the 2D editor, the object groups can then be moved, duplicated or rotated together.

Variant concept in the industrial building / room

Several variants can be managed in an industrial building / a room, for example to compare different planned sound insulation concepts in an office or the acoustic improvement by enclosing loud machines in a factory hall.

All objects and components of facades (except transmissive areas and facades) can be assigned to different variants.

When you open the industrial building, a basic variant 0 is always created, to which all objects and components of facades (except transmissive areas) are first assigned. The variant is displayed above the tree view.

You can use the symbols to change the variant name, add variants, and delete variants.

Add variant

Enter the name of the new variant and the variant on which it is based. This means that all objects and parts contained in this variant are also contained in the newly created variant.
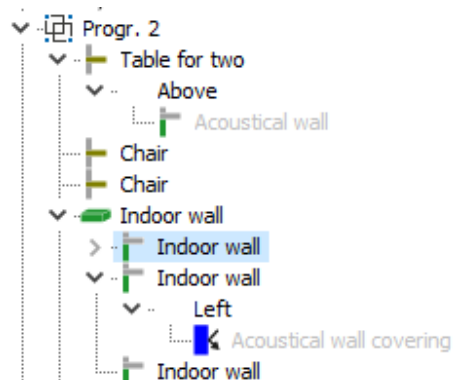
You can assign the individual indoor objects and facade components to another or additional variant at any time in the *General* card. It should only be noted that objects in object groups can only be contained in the variants assigned to the object group. However, not all objects in an object group must be contained in all assigned variants.

On the right the existing variants are listed, on the left the checkmarks which variant they are assigned to. If an object cannot be assigned to a variant because the object group is not assigned to this variant, the row is deactivated (right picture).

Example: An object group contains all objects of a workplace: chair, desk, roll container ..., but also planned measures. The object group is assigned to all variants, as are chair, table and roll container. The acoustic partition wall and the wall cladding are only assigned to the "improvement" variant.
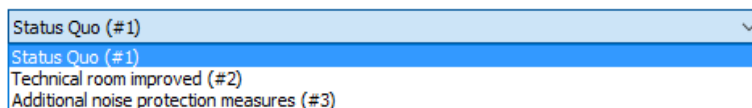
Use the right mouse button to select whether only the objects of the current variant or all objects should be displayed. In the latter case, the objects that are not assigned to the current variant are displayed in gray (default setting).

If you select the ONLY THE OBJECTS OF THE CURRENT VARIANT option, the objects not assigned to the current variant are not displayed in the tree, in 2D and 3D.

In the calculation kernel, you select the variant to be calculated in addition to the data and the hall in the *General* card for internal calculations.

In the Graphics, you select in the object type "industrial building" which variant is to be displayed. If the check mark GEOMETRY FROM FIRST RESULT IS active in the file selection, the variant is automatically evaluated.
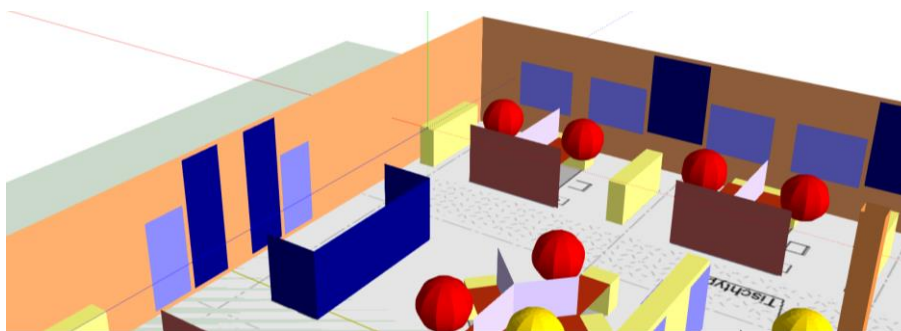
Assign colors from the library

Instead of the object color (blue for absorption area, red for source) you can assign different colors to the different absorption, emission and transmission spectra in the project library in the tab index card *values.* This serves the better visualization of different materials in the 2D and 3D editor as well as in the graphic sheets.

 In the editor you then select in the settings whether and for which spectra the library colors are to be displayed.

In the Graphics, use the selection list in the object type INDUSTRIAL BUILDING / ROOM to select whether the objects should be output in the color defined in the object type or in the color of the spectra.

The absorption spectra of windows and wall cladding are displayed differently here.

News for indoor calculations - SPD

Room acoustic calculation methods

There are now four possibilities for room acoustic calculation methods, which are described below. The differences relate primarily to reverberation times. For all other room acoustic parameters the differences are small, except that the time estimation when the sound first arrives at a receiver is dynamically refined in the course of the calculation in the case of single particle analysis.

Single particle analysis

In this method, all room acoustic parameters are calculated by analyzing individual sound particles - in contrast to the echogram. This method has the advantage that it requires much less memory and is therefore suitable for the calculation of grid maps. Furthermore, the method places more emphasis on the early part of the sound field and less on the late sound when calculating the reverberation times. This can be advantageous as there are sometimes problems obtaining accurate information for the late sound field, which can affect the results. The late sound field may be below the natural noise floor and can therefore be of limited importance when comparing with reality.

Low resolution impulse response

In this case, reverberation times are calculated using an energy impulse response (echogram), sampling the sound field at a relatively small number of time points (the time slots actually increase in size for later times, allowing for more accurate estimates of the late sound, where high time resolution is less important). Other parameters are calculated using the single particle analysis. This allows for a Schroeder-style analysis with much lower memory requirements than the full echogram, which may allow for grid calculations to be done this way too. The impulse response will be output to the results tables. In addition to the calculation, a text file with the individual results is also saved in the results folder, which you can import into Excel, for example, for further analyses.

For calculations with OpenCL support (see "OpenCL support for indoor calculations with SPD", page 18), the reverberation times are always calculated with the low-resolution impulse response.

High-resolution impulse response, weighted

Here, echograms are calculated with sufficient resolution to pick out individual reflections. All room acoustic parameters are calculated using these echograms, which again are output to the results tables and as a data file. Reverberation times are calculated using the usual Schroeder analysis. The linear regression is performed with weighted errors for the time slots which typically means the earlier, more accurate part of the sound field is given greater weight. The heavy memory requirements of this method mean it is typically unsuitable for grid calculations. Users are encouraged to inspect echograms in case there

are anomalies or non-linear elements. In such cases, longer run times and/or a custom analysis may be appropriate.

<u>High-resolution impulse response, unweighted</u>

Same as in the previous case, however, the reverberation times are calculated without error weighting for the time slots.

New room acoustic parameter

In addition to the LF lateral fraction according to Barron, the LFC lateral fraction coefficient according to Kleiner is now also available.

New Settings

Specify a MINIMUM RUNTIME if higher accuracy is required. This may be necessary if, for example, an interesting receiver was ignored due to a very low signal or improved accuracy is required for the late sound field of an echogram.

For more advanced users, there are now options to change the MINIMUM PARTICLE FLIGHT TIME and the MAXIMUM NUMBER OF DEFLECTIONS. Increasing the particle flight time can sometimes be useful when there are long-lived modes in a situation (increased memory requirements). A possible influence of this setting can be seen in the echogram.

Increasing the maximum number of deflections makes sense if some deflections in a situation are due to diffraction events. This setting can lead to longer running times. However, since particle flights are automatically terminated when the particle falls below a certain energy threshold, the extension of the computing time is put into perspective.

Saving and loading of processed geometries

Since the processing of SPD geometries can be time-consuming in complicated situations, we now save processed geometries. If, during a repeat run with the same situation, the program detects that the geometry has not been modified and saved since the last time, it loads the existing saved geometry from the file removing the need to repeat the processing.

OpenCL support for indoor calculations with SPD

***OpenCL** (Open Computing Language) is an interface for non-uniform parallel computers that are equipped, for example, with main, graphics or digital signal processors. This includes the programming language "OpenCL C". OpenCL was originally developed by Apple to harness the power of today's GPUs for non-graphical applications. Source Wikipedia*

Most graphics cards today support OpenCL, so that the GPU of the graphics card can be used for the calculation. OpenCL-enabled processors are also available, but their drivers are not (yet) mature and can lead to aborted calculations, which is why caution is required when using CPUs.

When using OpenCL, individual calculation steps can be outsourced so that calculations can be performed in parallel. The better utilization of the hardware resources shortens the calculation time considerably in some cases. For indoor calculations with SPD, this has a particularly positive effect on the calculation of sound levels, reverberation times and speech intelligibility, so that so far only these parameters are available for the calculation with OpenCL.
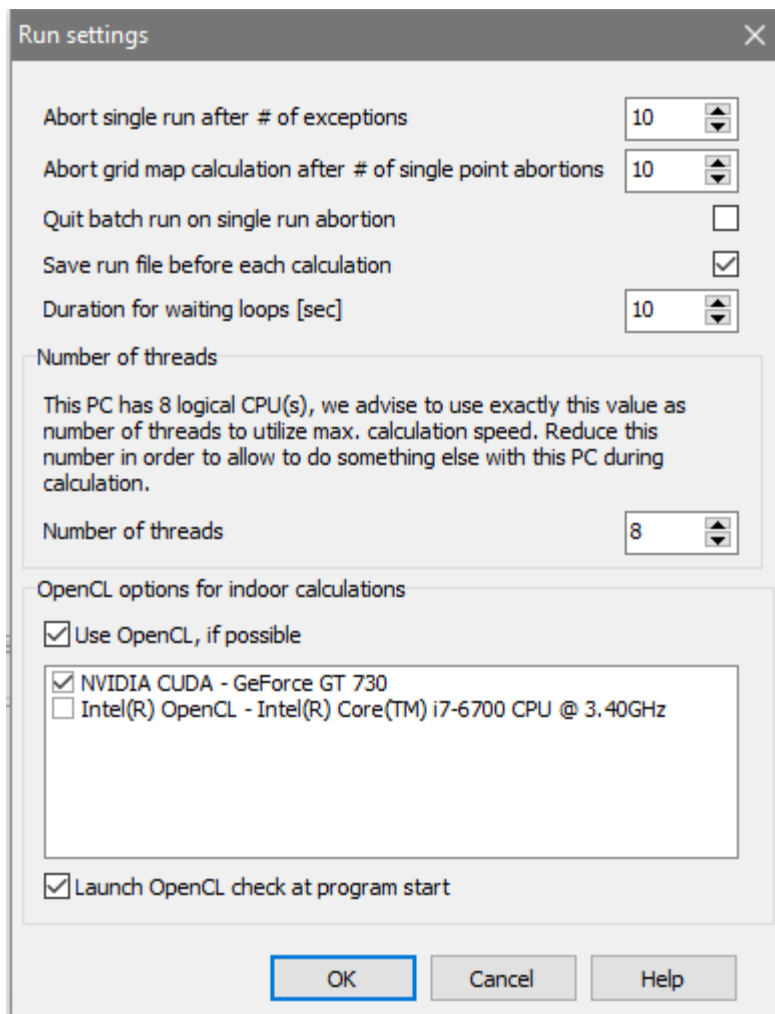
The calculation of imported free-field situations or situations with very high absorption is not efficient with OpenCL.

In order to be able to continue working sensibly during an SPD calculation, the computer should be equipped with two graphics cards, for example an on-board graphics card (which is not included in the calculation) and an external graphics card. This is the case with most

computers today. The external graphics card should be equipped with sufficient video memory (recommended 4 GB or more).

Configuration of the OpenCL calculation

You define the OpenCL settings in the run settings of the calculation core (OPTIONS -> RUN SETTINGS).

Check mark USE OPENCL IF POSSIBLE, to use the OpenCL-enabled devices for the calculation of Leq, reverberation time and STI for every calculation with SPD, regardless of the type of calculation.

The list below lists all OpenCL-enabled devices available on the computer. Tick the components that are to be used for OpenCL in the calculation. If your computer is equipped with an external and an on-board graphics card, it makes sense not to use the on-board graphics card, so that the computer can perform other tasks during an SPD calculation without or with only a slight delay.

The check mark LAUNCH OPENCL CHECK ON PROGRAM START is normally activated and is automatically deactivated by the program if errors are detected during the check of the OpenCL functionality that is executed when the calculation core is started. See the troubleshooting section.

Troubleshooting

If an error of the OpenCL functionality is detected when starting the calculation core, an error message is issued, and the calculation core closes again. OpenCL is deactivated in the run settings. Such a critical error can have various causes, sometimes even only temporary
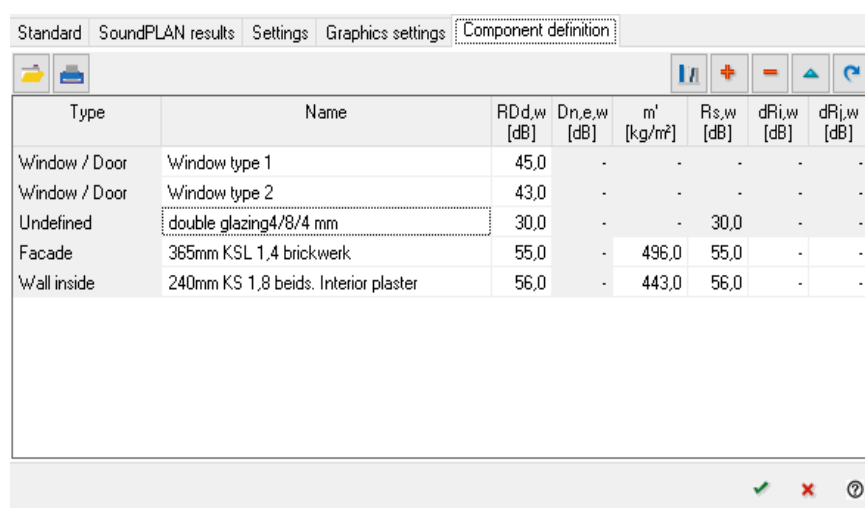
missing communication, which can be fixed by restarting SoundPLAN or restarting the computer (in the run settings, the check of the OpenCL functionality must be activated manually). However, a critical error often occurs if the OpenCL drivers are missing or outdated. In this case, update/install new current drivers and try again. Even after a driver update, you must manually reactivate OpenCL.

If one or all components fail during an OpenCL calculation, the calculation is performed with the remaining components or, if possible, automatically with the conventional method. If this is not possible, the calculation is aborted.

Changes in BA Facade – ISO 12354-3:2017 and DIN 4109:2016 / 2018

Definition of components for calculations ISO 12354-3:2017

When you create a new room book and select the standard ISO 12354-3:2017, you get into the tab index card *component list*.

The component list in the **SETTINGS** dialog is initially empty. Create the required components when you create the room book or later using the gearwheel. The component list is filled by either defining free components via the red "Plus" button or transferring components from the transmission library via the library button. If no suitable component is available in the system library, you can also create your own components in the project library or the global library, which you can then transfer to the component list.

Components from the component list can be assigned to several different rooms, allowing central changes to individual components.

You can use the **OPEN** button to transfer a component list from another room book to the current room book, for example, if the same components are used for another order.

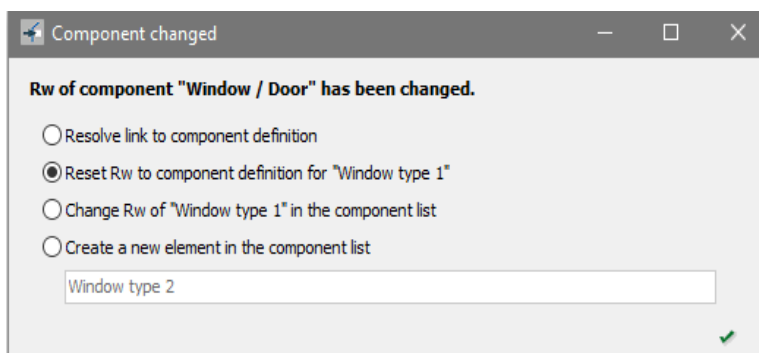*Excursus: Creating an element in the transmission library for use in BA Outside:*

In the transmission library, the tab "Characteristic values" is particularly important in addition to the input of the evaluated sound insulation value Rw or the evaluated standard sound level difference Dn,e,w. Each element to be used in BA Outside must be assigned an element type (façade / wall inside / window, etc.). For solid components, the area-related mass and, if applicable, the improvement of the sound insulation coefficient for facing shells must also be specified.

Press the "Accept" button to transfer all marked elements of the transmission library to the component list. If you want to edit an entry again, use the blue arrow to return to the library entry.

Components entered directly in the component list without library reference can be recognized by the grayed-out library symbol.

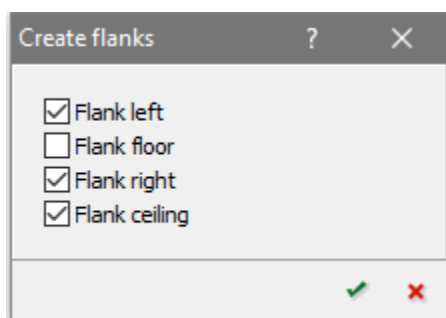Via the PRINT button the component list can be printed out or copied to the clipboard.

If the characteristic value of a component is changed during facade processing by scrolling with the mouse wheel or direct input, a query is made as to how the changed characteristic value is to be handled.

Flank transmission for calculations according to ISO 12354-3:2017

ISO 12354-3:2017 allows a generalized addition of 2 dB for flank transmission. For some noise and component situations, it may be necessary to take a detailed flank transmission into account.

Once you have defined all the components, you can create the flanks using the "wall inside" symbol. The flanks to be considered always refer to the loudest facade. In principle 4 flanks are available for selection (left flank, bottom flank, right flank, ceiling flank), whereby the direction designations refer to the direction of view from the outside to the loudest facade.

By deactivating the checkmarks, individual flanks can be switched off. This can be relevant, for example, if a flank is already an external facade or if a flank can be neglected.

A separate flank tab index card is created for each flank next to the facade tab index cards. The flanks refer to the loudest façade, the title of which is written in **bold.** The headings of the flank tab index cards are in *italics*.

On the left and right flank, the plan view and on the ceiling and floor flank, it is the side view explains the position of the considered components and the individual flank paths.

The component definition, the geometry, the area-related mass m' of the flank components, the sound insulation dimensions of the solid flank components Rs,w as well as the improvement of the flank sound insulation dimensions due to room-side attachment constructions dRw are listed here.

In the comment field on the right there is enough space for the documentation of expert adjustments.

If facade and flank outside form a corner, the check mark FACADE AND FLANK OUTSIDE FORM A CORNER must be activated under the component list of the flank. This results in a different calculation of the joints.

The COUPLING LENGTH is determined by default from the room geometry but can be adjusted if necessary.
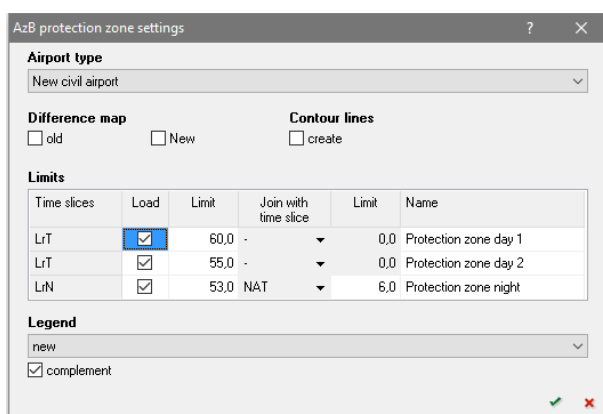
Printout

The printout was adapted accordingly. If flank transmission is calculated, the loudest façade is documented first, including the associated flanks and further façades below. Please activate the check box WITH FLANK ROUTES.

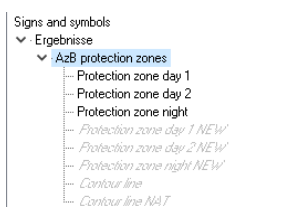To document the components used, open the component list and click on the PRINT button.

Presentation of protection zones according to AzB:2008

For the representation of the protection zones according to AzB:2008 (protection zones, structural noise protection, examination of existing noise protection zones) there is now a separate data type in the file selection of the Graphics.

Depending on the AIRPORT TYPE, the corresponding limit values are entered for the protection zones. Depending on the map type (protection zones, structural sound insulation), select the time slices to be displayed according to AzB. The type of representation (contour areas, 1-dB contour lines), the descriptions and the colors or line widths are preset to conform to AzB. Switch on the desired objects in the map object types in the object type AzB protection zones.

For the verification of existing protection zones, the difference must be formed from OLD/NEW. First load the result for OLD and check the desired time ranges. Second, load the result for NEW with the same time ranges. Since the representation of the isolines or areas is different for OLD and NEW, the program must know whether the result is OLD or NEW. Therefore, tick OLD or NEW for the difference maps.

Nord2000 revision 2019

The method for calculating screening effects according to Nord2000 has been changed/optimized in SoundPLAN version 8.2.

The primary goal for revising the sound propagation model in Nord2000 has been to improve the calculation of screening effect in cases where the screens are porous and slightly sloping or directly horizontal, without changing the calculation result for screens with vertical or almost vertical walls.

In the old Nord2000 version unexpectedly low noise levels have been observed in receiver points at relatively short distances from the road when the receiver is placed lower in the terrain than the line source; this can be related to the screening method.

The revised screening method not only improves the calculation results in the cases with a road placed higher in the terrain than the receiver, but also related issues with roads placed in an excavation and cases with wide noise screens is optimized with this revision.

In practice, this means that the revision is mainly relevant to "natural" terrain screens or man-made terrain forms such as berms, or sources placed higher or lower than the receivers.

The sound propagation method of Nord2000 is common to all source types, so the revision is relevant for all Nord2000-based calculation methods, including calculation of noise from road and railway traffic.

The revision is described in more detail in: Nord2000 – Prediction of Outdoor Sound Propagation. Amendments to Report AV 1106/07 revised 2014, DELTA – a part of FORCE Technology, Report TC-101327.