



What's New in IMMI 2023

As of: July 7, 2023

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Preliminary Remark

The 2023 version of IMMI was created and tested with great care.

It meets the official test requirements according to RLS-90, Schall 03, RVS 04.02.11, ISO TR 17534-3 and -4, Directive (EU) 2015/996 (BUB, BUF and BEB), DELEGATED DIRECTIVE (EU) 2021/1226 and other regulations.

The software has been successfully quality assured and certified by the A-QNS, Verband zur Förderung der Qualitätssicherung von Software zur Lärmberechnung e.V. (Association for promoting the quality assurance of software for calculating sound), via an independent auditor. Detailed information about the association can be found at <https://a-qns.de/>.

Nevertheless, the following must be pointed out: Regulations such as those mentioned above are never so strictly formulated that there is no room for interpretation. The further development of a program such as IMMI cannot take place without the possibility of changing calculation results in certain situations and combinations of parameters within this scope.

We therefore recommend following the principle: One project – one program version. We cannot guarantee that exactly the same calculation results will be reproduced in a later recalculation of the project with a newer program version.

Therefore, archiving a project includes archiving the program version of IMMI with which the project was calculated.

1 What's New with IMMI in 2023

1.1 Level Tables

A new automated display of calculation results at immission points has been implemented in the site plan. The new **level tables** can conveniently display all result layers of one or more immission points in the site plan.

1.1.1 Main functions

The new features include these main functions:

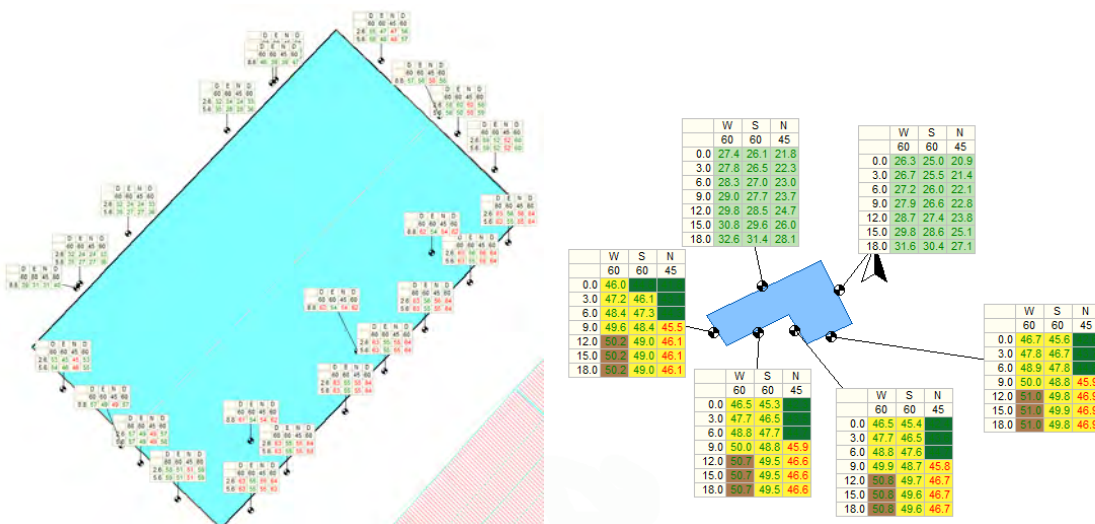
- Display of one or more result layers (e.g. day, night, evening, etc.)
- Grouping in a common table of superimposed immission points (e.g. on several floors)
- Display of z-coordinates or floor number (e.g. ground floor, 1st floor) of superimposed immission points
- Labeling according to an assessment period
- Display of guide values at immission points (if available)
- Colored marking of the level values depending on the level or the guide value.
- The table can be displayed with a fixed or variable font size – as is usual for elements
- Additional graphic design options

In addition, further functionalities have been added to the local menu of the site plan to facilitate the display and positioning of the level tables:

- Enlarge or reduce the size of the tables
- Move tables "apart" or to the default position
- Graphical and numerical export

Each immission point element has the option to choose whether or not it should be displayed in the level table, regardless of whether results are available at that point. This allows for greater flexibility in designing a clear site plan by selectively switching off the display at certain IPs.

Display the options in the site plan

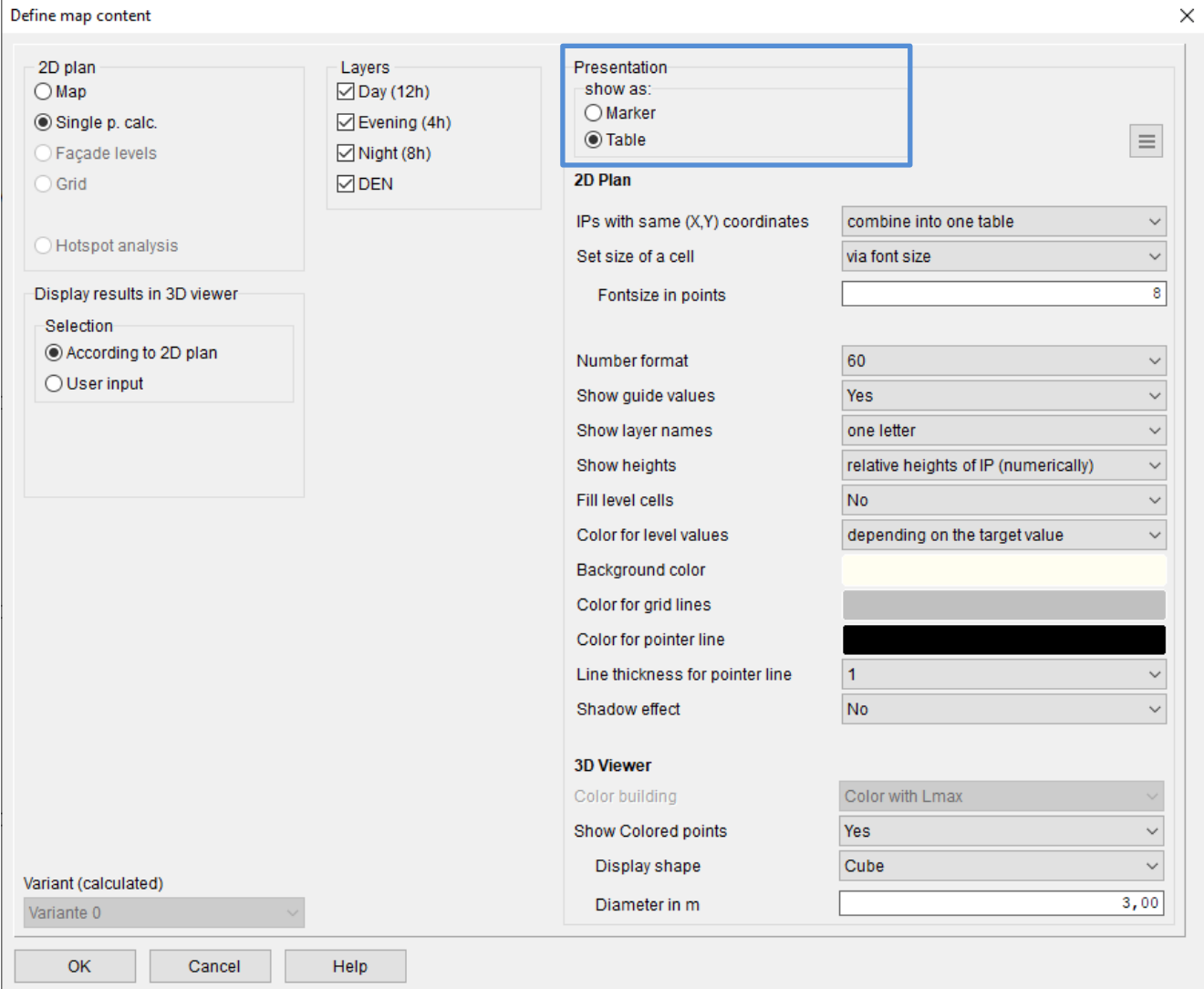


1.1.2 Description of functions in detail

1.1.2.1 Set parameters for display in the Plan Contents menu

Prerequisite for the display of the level tables is an immission point calculation (no façade level calculations!) and the display of the immission point results in the site plan.

The settings are made in the toolbox via the icon  **Define map content**. Below the header *Presentation* select **Table**.



Define map content

2D plan

Map

Single p. calc.

Façade levels

Grid

Hotspot analysis

Layers

Day (12h)

Evening (4h)

Night (8h)

DEN

Presentation

show as:

Marker

Table

2D Plan

IPs with same (X,Y) coordinates: combine into one table

Set size of a cell: via font size

Fontsize in points: 8

Number format: 60

Show guide values: Yes

Show layer names: one letter

Show heights: relative heights of IP (numerically)

Fill level cells: No

Color for level values: depending on the target value

Background color: [Yellow swatch]

Color for grid lines: [Grey swatch]

Color for pointer line: [Black swatch]

Line thickness for pointer line: 1

Shadow effect: No

3D Viewer

Color building: Color with Lmax

Show Colored points: Yes

Display shape: Cube

Diameter in m: 3,00

Variant (calculated): Variante 0

OK Cancel Help

Please note: the level tables have a significant advantage over the previously available level marks. They allow for multiple result layers to be displayed **simultaneously**, which can be selected below the header **Layers**.

Next, the options below the header **2D Plan** allow for an additional customization of the tables. See the descriptions below for further details.

- **IPs with the same (X, Y) coordinates:**
- In order to determine the immission levels on different floors of buildings, multiple immission points are usually positioned above each other. The data collected from each IP can then be **compiled into one table**. To be grouped together, the x- and y-coordinates must be below the maximum difference of 0.1 m.

If this summary is not desired, you can choose to create **an individual table** for each IP.

- **Specify the size of a cell:**
 - **Via font size:** Since the size of a table can change depending on what is to be displayed, it is easiest to specify the size of a **cell**. The width and height of the table are then determined by the number of rows and columns that are displayed.

When the **font size** is used to determine cell size, the cell dimensions are adjusted to accommodate the numerical data to be shown, taking into account the **number format** and desired **font size in points**.

It is important to note that in this mode the table is the same size at each zoom level of the site plan. Thus, the table also covers different areas of the site plan at different zoom levels.

- **In meters:** Here the **width** and **height** of a table cell can be specified directly in meters. The font size is now selected so that the numbers and texts fit into the cell.

With this representation, the table covers the **same area** in **each zoom level** of the site plan. In the printouts, the same area is covered as on the screen. As the zoom level increases, the table becomes larger and larger. So it behaves like an ordinary element (e.g. house or area source).

However, it is not always easy to find a suitable size for the table right at the beginning. (see also: Additional functions)

- **Number format:** Defines in which format the level values are output (essentially the number of decimal places). Guide values (see below) are always output without decimal places.
- **Display guide values:** The guide values of the immission point can be displayed above the level values. If several points are above each other, the guide values of the lowest point are displayed.

In general, it does not make sense to indicate different guide values for points that are directly above each other, since the position of the points in the floor plan ((X, Y) coordinates) determines the classification of the point.

- **Show layer names:** The name of the result layer (day, night evening, rest, etc.) can also be set as a heading over the individual columns. These texts written out in full would unnecessarily widen the table. Therefore, only the first or the first two letters of the layer name can be displayed. Alternatively, the entire name can be displayed vertically.

	55	55	40	55				
5.0	52	52	43	52		Day (12h)	Evening (4h)	Night (8h)
10.0	54	54	47	55				DEN
15.0	57	50	52	59		60	60	45
20.0	62	55	57	64		2.6	59	52
23.0	67	56	58	69		5.6	59	52
26.0	72	55	58	74			59	52

- **Display heights:** The level table can also contain a column "Height". In this column, depending on the setting, the **absolute** or **relative** height of the immission point is indicated.

Alternatively, the **floor number** can be calculated and displayed from the relative height.

For this the average floor height from the calculation parameters is used. The relative height is divided by the floor height and then rounded. If the rounded result is zero, "EG" is displayed for the first floor. If the result yields a number $N > 0$, "N.OG" is displayed.

- **Fill level cells:** The background of cells containing level values can be filled in color. The color of the **color scale** is used as fill color. If the cell is not to be filled with the level color, the **background color** of the cell is used.
- **Color for level values:** The numbers that appear in the cells can be output with different colors
 - Black
 - White
 - Best contrast: The font color depends on the cell fill color, white or black, whichever gives the better contrast.
 - Depending on the guide value: If guide values are displayed in the table, the level value is displayed in green if the level value is below the guide value, in red if the level is above.

- **Background color:** This color is used to fill all cells that do not contain a level value. In addition, this color is used for the level cells if they are not to be filled with the color scale color.
- **Color of grid lines:** This color is used to draw the dividing lines between cells.
- **Color of pointer line:** A line is drawn from the center of the table to the immission point. The color of this line can be selected here.
- **Thickness of pointer line:** Sets the thickness of the line (see above).
- **Schadow effect:** Draws a shadow to the right and below the table.

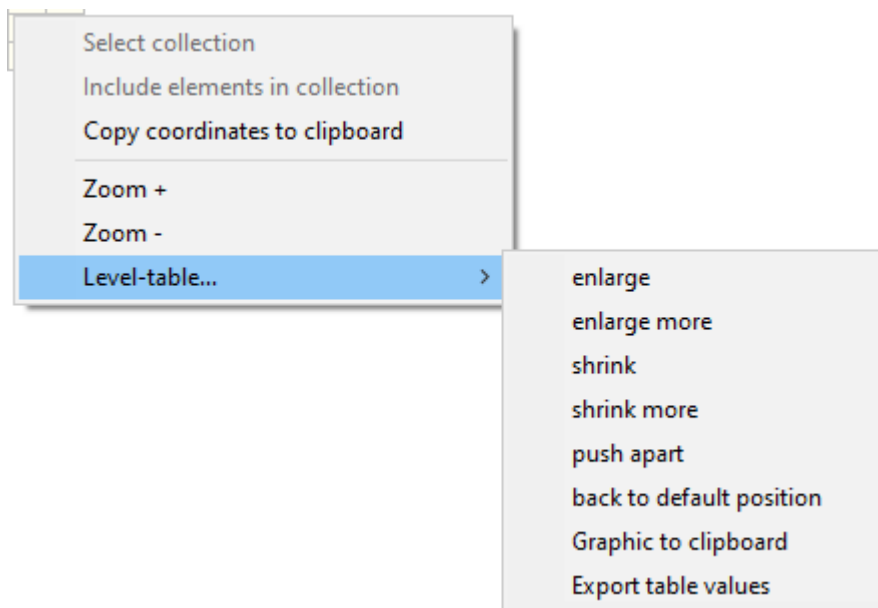
1.1.3 Level tables in the site plan: Useful functions

After the calculation, the level tables can be displayed in the site plan. When drawing for the first time, the level tables are drawn directly above the corresponding immission point.

The tables can be **moved** by clicking on the table with the **left** mouse button and moving it while keeping the mouse button **pressed**. The table is redrawn after releasing the mouse button as well as the connecting line from the table to the corresponding IP.

If several tables lie completely or partially on top of each other, all tables that lie under the mouse position are moved.

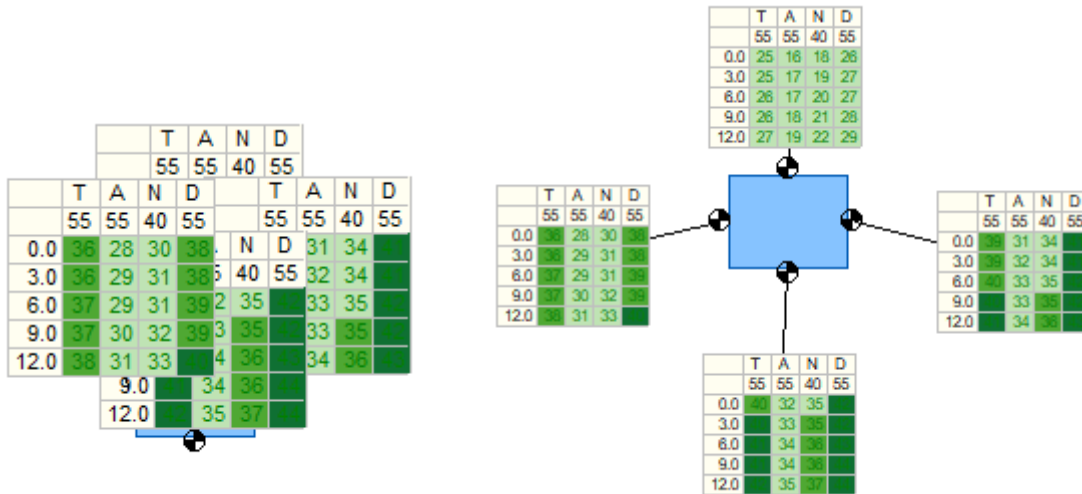
If you click with the right mouse button on a table, a local menu with further table functions appears:



The (strongly) zoom in and (strongly) zoom out functions are applied to **all** displayed tables.

- **Enlarge:** If the tables are drawn in meters, they will be enlarged by a factor of 1.1. In Font Size mode, the font is increased by one.
- **Enlarge more:** If the table is drawn in meters, it will be enlarged by a factor of 1.5. In Font Size mode, the font is increased by two.
- **Shrink:** If the table is drawn in meters, it will be reduced by a factor of 1/1.1. In the Font size mode, the font is decreased by one.
- **Shrink more:** If the tables are drawn in meters, they will be reduced by a factor of 1/1.5. In Font Size mode the font is reduced by two.
- **Push apart:** If the immission points are close together (e.g. around a smaller building), the corresponding tables are also very close together. If you click between the tables and select this function, the tables are

pushed apart in a star shape when viewed from the mouse position. You can specify in a dialog, in which radius IP's and their tables should be searched and how far the tables should be moved.



Left: Arrangement right after the calculation.
 Right: Immission points pushed apart in one step.

- **Back to default position:** Sets the level tables back to the center over the immission point.
- **Graphic to clipboard:** Copies the image of the table as a graphic to the clipboard. The copied image has the same size and resolution as displayed on the screen.

	T	A	N	D
	55	55	40	55
5.0	52	50	43	52
10.0	54	50	47	55
15.0	57	50	52	59
20.0	59	55	57	61
23.0	61	56	58	63
26.0	62	55	58	64

A table copied as an graphic.

- **Export table values:** Creates a table in the form of a list. This list can be exported or printed as usual in IMMI to WORD, EXCEL and others.

		Day (12h)	Evening (4h)	Night (8h)	DEN
		55.00	55.00	40.00	55.00
	IPkt 1	51.99	40.44	42.89	51.76
	IPkt 2	53.68	44.58	46.88	54.69
	IPkt 3	57.40	49.77	52.01	59.32
	IPkt 3	61.91	54.74	56.96	64.13
	IPkt 4	62.75	55.61	57.84	64.99
	IPkt 5	62.47	55.30	57.53	64.69

Table exported as values and imported here.

Note: The last two functions are only available when the mouse pointer is inside a table. This table will then be exported.

1.1.4 Properties of the element immission point

If there are many tables in the site plan, the situation can easily become confusing. In order not to overload the display in the site plan too much, it can be decided for each IP whether its results should be displayed in a level table.

Select land-use type

Use:

Limiting val. [dB(A)]

Day (12h)

Evening (4h)

Night (8h)

DEN

Display results in level table

If the option **Display Results in level table** is displayed, the IP calculation results are displayed in the form of a level table. Also, within a group (same (X, Y)-coordinate) the display of single IP's can be controlled with this.

This parameter is also available for block editing.

1.2 New file format for importing terrain data: GeoTiff with height information

A new format has been implemented: GeoTIFF with terrain data. These are image files in .Tif format with georeferencing and elevation data (rasterised as point information). It does not contain coloured pixels, but elevation data in floating point format. The data is always rasterised. In addition, the files contain georeferencing data. For example: The federal state of Bavaria provides its DTM-1 in such a format. <https://geodaten.bayern.de/opengeodata/OpenDataDetail.html?pn=dgm1>

1.3 Create Terrain Model fast and efficient

1.3.1 New features of the terrain model

These 2 new features are available for creating terrain models:

- Preview of the terrain data and the possibility to import a selected area
- Clearly structured and user-friendly dialog with all functionalities

The creation of terrain models is an essential part of building 3D models with IMMI. The operation has been restructured and organized to simplify the building of terrain models and make it more user-friendly. This includes the import of terrain data of different formats as well as the optimization of terrain models.

The scope of services has also been extended. A preview shows the entirety of the terrain information in advance, from which the required area can then be selected. The data from this area is then imported.

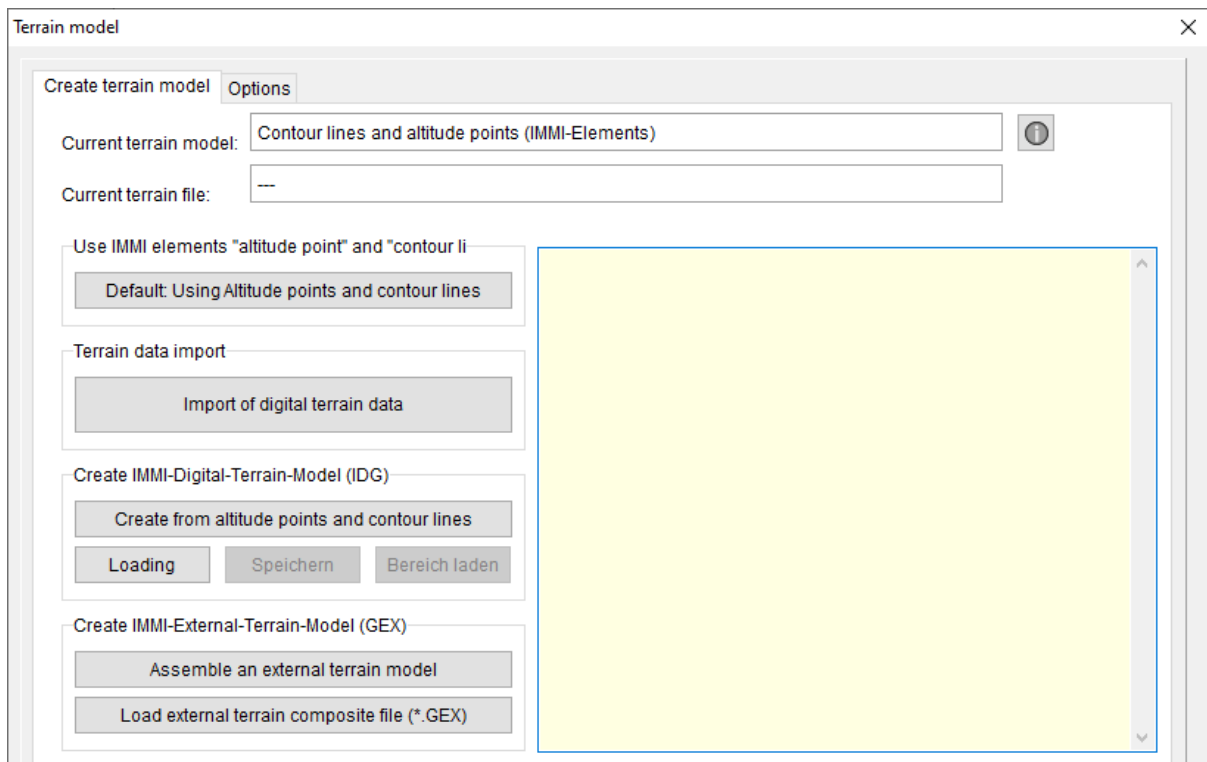
1.3.2 Dialog box for creating terrain models completely revised and extended

All functions can be reached as before via the icon  **Terrain Model** or via the menu **Project | Terrain Model**.

The newly designed terrain model dialog is divided into 4 groups:

- **Use IMMI elements allitude points and contour line:** Default: Use IMMI elements allitude point or contour line.
- **Terrain data import:** Opens the dialog for importing terrain data of different data formats.
- **Create IMMI-Digital-Terrain-Model (IDG):** IMMI's own format for terrain data based on a regular grid, as an external file.

- **Create IMMI-External-Terrain-Model (GEX):** IMMI's own format for accessing external files with terrain data in grid file format (ArcGIS ASCII, ArcGIS FLT), included from IMMI Premium on.



The scope of services of the import of digital terrain data has been significantly extended and made more comfortable and is described in the following section.

Explanations of the individual functions can also be found in the IMMI online help.

1.3.3 Import of digital terrain data

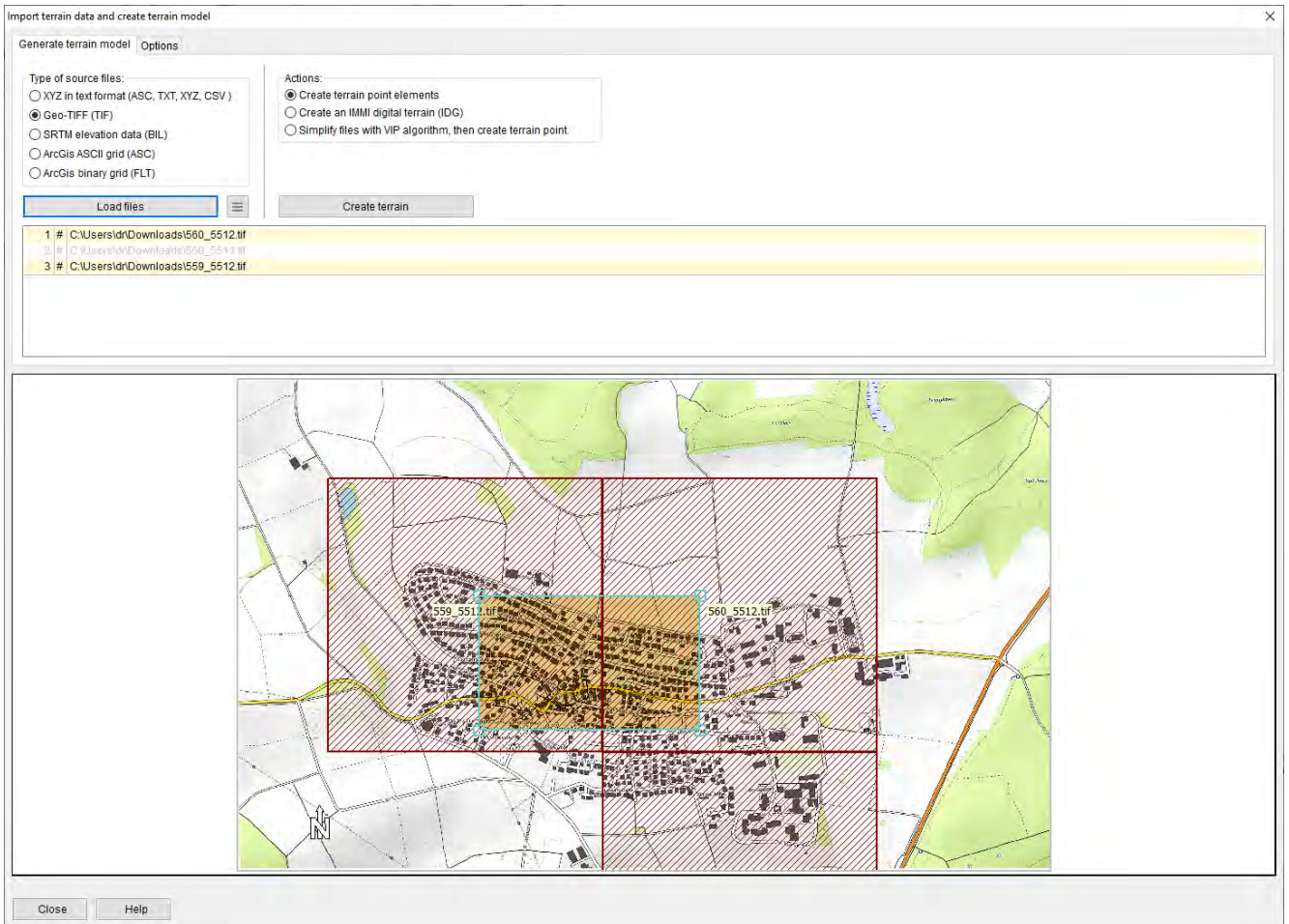
IMMI supports the following formats:

- [ASCII \(text format\)](#)
- [GeoTIFF: Image files in .Tif format with geo referencing and elevation data \(gridded as point information\)](#)
- [SRTM elevation data \(BIL\)](#)
- [ArcGIS ASCII and ArcGIS binary](#)
- ArcGIS shape as line or point
- DXF as line or point
- QSI files as line or point

Note: In the redesigned dialog, only gridded terrain data is imported (written in blue). Files containing contour lines, such as DXF, ArcGIS shape or QSI, are imported as usual via the File | Import menu.

The dialog box is divided into 3 areas. The upper part of the dialog box has 2 columns:

- Left column: Select and load format of source data – Right column: Functionalities to import the data.
- The lower part shows the preview of the workspace (here: with background map) and the selected terrain data (brown hatched) as well as the import area (light green rectangle)



Tip: To geo reference the project, it is recommended to import an online map. To do this, the empty project must be saved in a folder. Afterwards, it is recommended to import a freely available map via the button



- **Import background map from online map service** (Menu: File | Import | Background map from online map service).

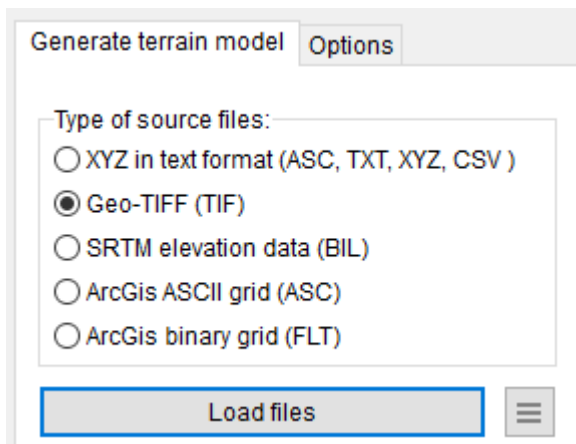
1.3.4 Selecting the data format and loading files

The procedure is as follows:

1. Selection of data format
2. Load files
3. Select import area via the light green rectangle
4. Select action for import
5. Button: Press create terrain

Below the formats and functionalities are described in detail.

1. Selection of the data format



Below is a brief description of the individual formats:

- **XYZ in text format:** Often terrain data in this format is provided by state or environmental agencies on their portals as a Digital Terrain Model (DTM). These files contain the Z elevation coordinates in text format in addition to the X-Y coordinates. The data in such files can form a complete grid (e.g. DTM 1m, DM 2m or DTM 5m) However, it is also possible that such files do not form a complete grid. This is e.g. often the case in border regions between single federal states.

IMMI reads such files automatically and interprets the content:

- Column separator is determined automatically
- Leading text lines that do not contain X, Y, Z data are ignored.
- Decimal separator (point or comma) is automatically detected.
- It is determined whether the data is a largely complete grid or an unstructured collection of XYZ coordinates. Depending on the content, different further actions are then available.

- **Geo-TIFF:** This format is an extension of the TIF image format. It does not contain colored pixels, but elevation data in floating point format. The data is always gridded. In addition, the files contain geo-referencing data. However, this metadata is not completely standardized, but IMMI tries as far as possible to locate the data correctly.

The state of Bavaria provides its DTM-1 in such a format.

<https://geodaten.bayern.de/opengeodata/OpenDataDetail.html?pn=dgm1>

- **SRTM elevation data:** This is elevation data provided by NASA. SRTM data are also grid data sets. They are available for large parts of the earth but in a relatively coarse resolution with about 20 to 30-meter increments.

Further information also on accuracy e.g.:

https://en.wikipedia.org/wiki/Shuttle_Radar_Topography_Mission

ArcGIS ASCII grid and ArcGIS binary grid: Both file formats contain elevation data information in grid format. Through the associated header file (in ASCII format the data file contains the header) the data is geo referenced. All necessary metadata is included in the header.

2. Load files

One or more files of the same type can be loaded. By pressing the **Load Files** button, IMMI loads the data, interprets the contents, and attempts to geo reference the data.

Note: To load multiple files:

- Files must be of the same type
- For grid files, dx and dy must be the same size for all files.
- Grid files can cover areas of different size

It is important here that the project and the terrain data to be imported are represented in the same coordinate system.

When the files have been selected, they are drawn into the site plan in the dialog and listed in the list of files.

1	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\557_5516.tif
2	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\557_5517.tif
3	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\558_5516.tif
4	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\558_5517.tif
5	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\559_5516.tif
6	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\559_5517.tif
7	#	C:\Delphi32\WIN32_XE__Testprojekte\TP_2023\009 DGM Hettstadt für TIFF\GeoTIFF\682_5513.tif

The list of file names provides information about the status of each file:

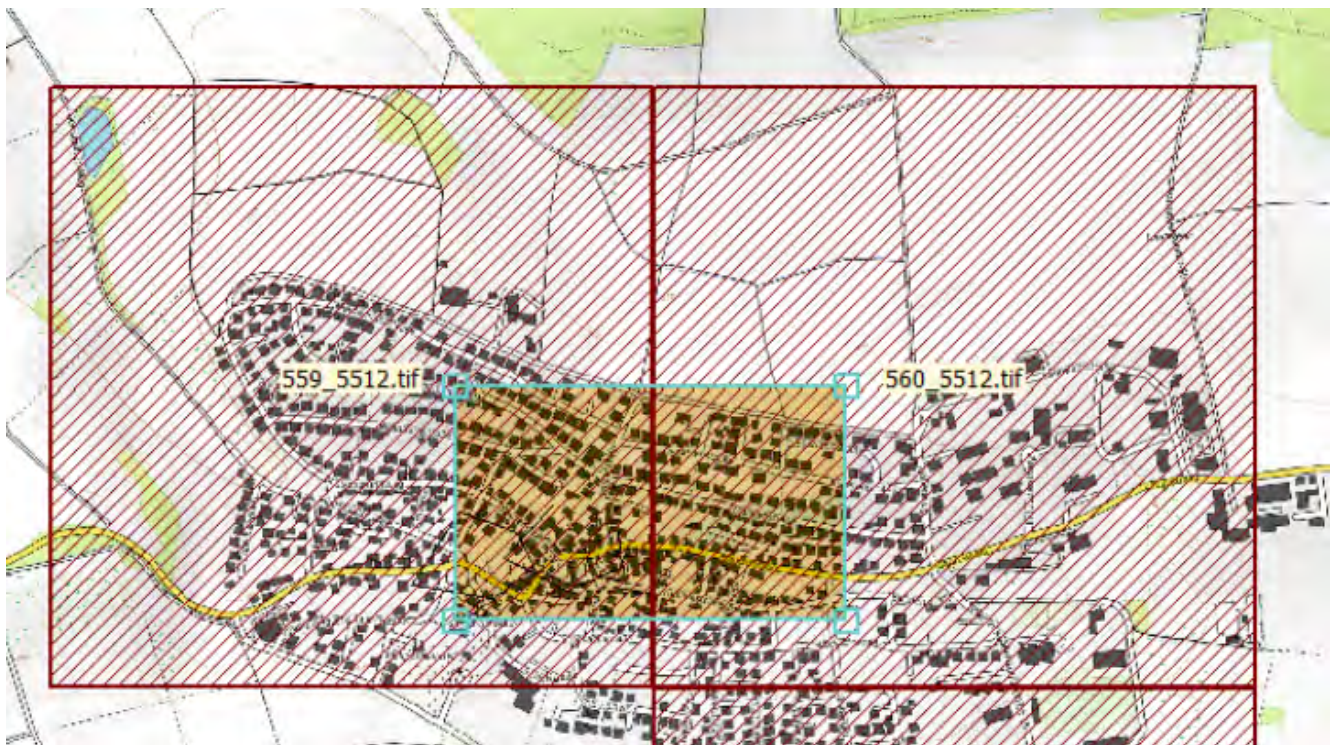
- **Light gray:** the file's data is in the workspace, but not in the area marked by the user for which the terrain is to be created.
- **Black:** the data of the file are completely or partially in the area set by the user.
- **Red:** the data of the file are outside the working area. The reason for this may be incorrect geo referencing of the file. (see also Additional functions)

If the file name is preceded by the character "#", the file contains data for a complete grid. If this is not the case, the file is marked with "_".

If files have been loaded, additional files can be added. To do this, click on **Load file** again and additional files can be loaded. Double loading is prevented.

3. Select import area

The user can now use the mouse to move, enlarge or reduce the frame drawn in light green. Within this frame, the terrain from the loaded files is provided and shown hatched in brown.



Button:  - additional functions

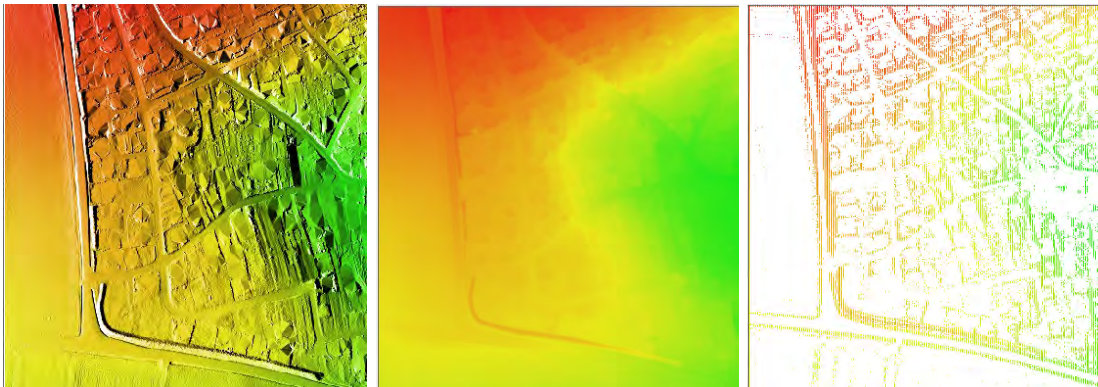
This button includes the following functions:

- **Show coverage:** Displays the percentage of the terrain area set by the user that is covered by the data in each file. The information in the last line is important. The files should cover 100% of the terrain area. In this case the desired terrain can be generated completely.

- **Show total info:** Here the info of all files that have been loaded are displayed. For GeoTIFF files some additional geo-tags are shown. (But this information is more important for the developers and less for the user).

The most important information here are the values for XMin, XMax and YMin and YMax. From this the user can see (together with the information about the overlap) whether a file is in the workspace or not. The most common reason for problems here are coordinate systems that do not match. For example, in the GeoTIFFs from Bavaria, the strip zone is missing in the X coordinate.

- **Show single file info:** Displays the information of a single file. The file that is marked in the list with the cursor line is displayed here. (The name of the marked file is highlighted green in the site plan).
- **Show terrain shading:** Shows the elevation data as terrain shading:
 - the elevations are marked in color
 - the elevation changes are displayed light/dark. A fictitious light source is assumed in the left part of the image and a kind of shadow is cast to the right.
- **Show point cloud:** Displays the elevation data in color only, without shadowing.



A terrain cross section: (left) terrain shading, (center) point cloud, (right) point cloud but file does **not** contain a complete grid.

- **Show file partially:** This function is only useful if the terrain file is a text file. Then a small number of lines of the beginning of the file will be displayed here. This function is basically only used to check the coordinates:

Extract from an XYZ file. "Dot" is a decimal separator, "space" is a column separator. The X-coordinate here contains the strip zone 32.

```
32557000.000 5516999.000 272.589
32557001.000 5516999.000 272.543
32557002.000 5516999.000 272.500
32557003.000 5516999.000 272.480
32557004.000 5516999.000 272.497
32557005.000 5516999.000 272.448
```

- **Mark areas as guides:** Creates a guide line rectangle for each of the loaded files to mark the perimeter of the file. Also, for the terrain area set by the user, a rectangular guide line is generated to mark the area.

Attention: such rectangles are also generated for files outside the workspace. (for control purposes).

- **Set terrain area to the entire work area:** This function extends the area for which the terrain is to be created to the entire workspace.

4. Create terrain model

After the data has been loaded, it can now be decided whether the data should be thinned beforehand or imported directly.

Actions:

- Create terrain point elements
- Create an IMMI digital terrain (IDG)
- Simplify files with VIP algorithm, then create terrain point

Create terrain

Depending on whether the data files contain complete grids or not, the terrain can be created with these data in different ways.

Function	Data form a grid	Data don't form a grid
Coarsen data before generating the model.	yes (not with SRTM)	no
Generate elevation points	yes	yes
Create IMMI digital terrain grid (.IDG)	yes	yes
Simplify data with VIP (=very important points) first, then generate elevation points.	yes (not with SRTM)	no

Note: For SRTM files, a coarsening or a point reduction by the VIP algorithm is not offered, these files have per se a very coarse resolution.

Possible actions:

- **Create elevation points:** an elevation point element is created from each point in the loaded files. To save memory, the elevation points can be stored "compactly". (see options)
- **Create an IMMI-Digital-Terrain (IDG):** When creating a terrain grid, a distinction is made between whether the source data is already grid data or not.

If the loaded files are grid files, the terrain grid is composed directly from these files. The files must have a common geo referencing, which means that adjacent files are also directly connected to each other. The step size corresponds to that of the terrain files or the coarsened terrain files.

In the case of non-grid files, a complete triangulation of the desired terrain area is first generated from the values of the files, and then a terrain grid is calculated with the step size desired by the user.

The result (in both cases) is saved in a separate file with the extension .IDG.

Note: The name of this file is saved with the IMMI project file. Therefore, after saving the IDG file, the project should also be saved so that the name of the terrain file is not lost. If this should not happen, the .IDG file can be loaded again in the terrain dialog box at any time.

- **Apply VIP algorithm and then generate elevation points:** Grid files can not only be coarsened with a fixed coarsening factor, but additionally further thinned with the VIP (=very important point) method. This method is useful in areas with many elevation points that have similar elevations. In such cases, a smaller number of elevation points are approximated to replace them. The degree of thinning can be specified (see query).

5. Create terrain model

When the desired terrain model and the desired action are selected, the **Create Terrain** button is used to create the terrain model.

The dialog box is closed and the elevation points are displayed in the site plan.

1.3.5 Tab: Options

The creation of the terrain model can be additionally controlled with some options.

- **Store allitude points compactly:** "Normal" allitude points contain only one coordinate triplet per element, but the whole administrative effort for one element. Compact storage assigns 500 coordinate triplets to each allitude point element, but the administrative overhead for an element is needed only once.
It is recommended to store allitude points compactly.
- **When importing allitude points: keep existing allitude points:** If this option is set, imported allitude points are loaded in addition to the allitude points already present in the project. If this option is not set, existing allitude points will be deleted before importing allitude points.
- **When importing allitude points: keep existing contour lines:** Behaves like the previous option. Deletes or retains contour lines.
- **VIP reduction to x% of input points:** This option specifies how much the data of a file should be reduced with the VIP procedure. The percentage of data that should remain can be specified.

Note: If more than one tile has been loaded, both the coarsening of the step size and the VIP reduction are performed for each tile individually. Therefore, since the VIP algorithm does not change the edge of a grid file, two rows or columns of elevation points directly abut each other.

- **Acceptable deviation when determining a grid:** For some XYZ.ASCII files, the file contents describe almost a complete grid. The data of the file form a grid, but (often in the border area) not all data are present in the file.
IMMI tries to determine the grid structure and thus the necessary number of coordinate triplets to completely fill the grid from the number of coordinate triplets and the minimum distances between two neighboring points. If fewer points are missing than the value specified here, the file is still considered a grid file. If more points are missing, the file is **not** treated as a grid file.
- **Directory for saving the SRTM files:** When importing SRTM files, the user does not have to explicitly select the required files. IMMI can determine the names of the required files from the boundaries of the terrain area. These files must then be located in the directory that can be set here.
The default directory is C:\Users\all users\IMMI. However, since not all users can access this directory, the SRTM directory can be entered arbitrarily.
- **Element group for allitude point elements:** Here you can specify which element group should be used for the imported allitude points.
- **Hatch area of the terrain file in the graphic:** If this option is enabled, the area covered by a single tile will be hatched.

Note for SRTM data: The area covered by an SRTM file can be so large that none of the corners or sides of a file are within the workspace. In that case, hatching is helpful to see if the SRTM file overlaps the terrain area.

- **Convert GeoTIFF:** Since GeoTIFF is not very easy to read, this function gives the possibility to convert a GeoTIFF file to a more familiar, simpler format. It is also possible to create a black and white image file that can be used as a background bitmap.

As an additional feature, the strip zone can be inserted into the X coordinate when converting to another terrain file. For example, the GeoTIFFs from Bavaria can be converted to ArcGIS FLT files with the correct strip zone.

- **Thin/coarsen terrain files before model generation:** grid files e.g., DGM-1 or DGM-2 can be coarsened before generating the terrain model. Possible coarsening steps are 2, 4, 5 and 10. The new step size of the file is obtained by multiplying the old step size by the coarsening step.

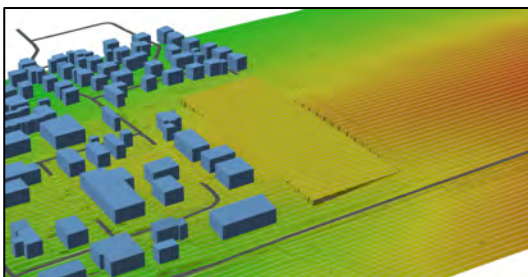
Example: DTM-1 has a step size of 2m. Coarsening factor 4 results in a new step size of $2 \cdot 4 = 8$ m.

1.3.6 Helpful functions in the site plan when using an .IDG

When using an IMMI digital terrain (.IDG) and a closed guide line, various functions for editing the terrain model are available via the right mouse button.

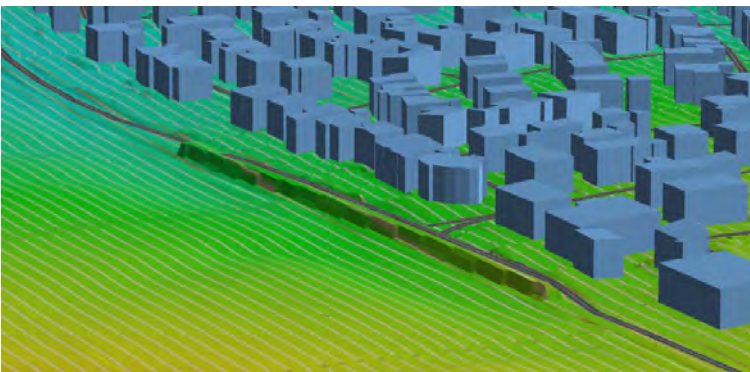
Right mouse button | **Macros | Digital terrain model ...**

- **Level area:** An area marked by a closed help line can be set to a constant height and thus leveled. An elevation can be specified, which is then adopted for all grid points of the marked area. The suggested elevation is the average height of the marked area before leveling.



Leveled area in the Digital Terrain Model

- **Create Embankment | Incision:** All points of the Digital Terrain that lie within a closed guide line can be increased by a constant value (results in an "embankment") or decreased (results in an incision).



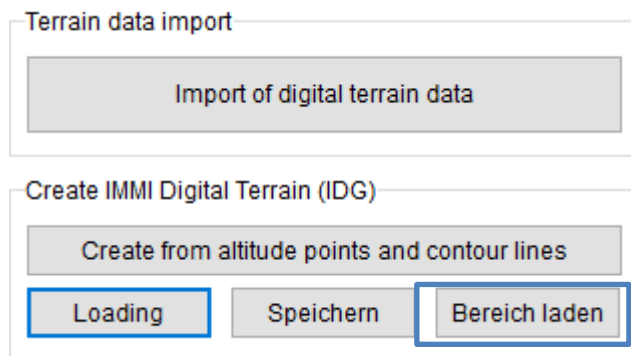
Road partially placed on an embankment.

- **Save area:** An area of a digital terrain can be saved in a separate file. To do this, first select a closed guide line that marks the area to be saved. The area can then be saved using the popup menu item: **Macros | Digital terrain model ... | Save area.**

The purpose of saving is that any manipulation of the terrain model, as is possible in the two functions described below, can be undone by reloading a saved area and inserting it into the digital terrain.

Note: After manipulating the Digital Terrain, the changed terrain model should be saved in a new file. As soon as this happens, IMMI takes over the new name of this file into the project. To make this change permanent as well, the project should then be saved as well.

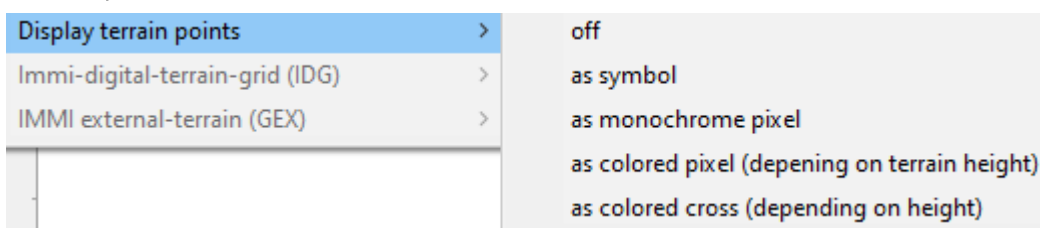
- **Load area:** In order to reload a terrain area saved with **Save Area**, the area must be unmarked. Also, the marking guide line does not have to be present any more. The area is loaded in the dialog box of the digital terrain model:



1.3.7 Functions on the site plan axis

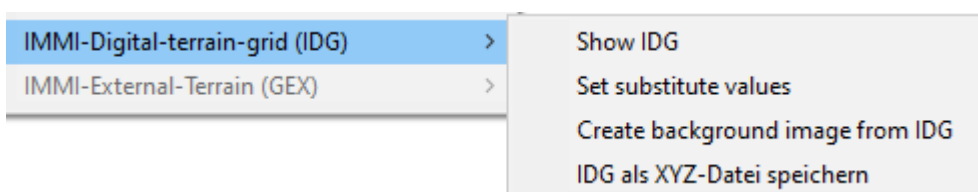
On the site plan axis Y some menu items are available to control the display of the terrain data.

Altitude points

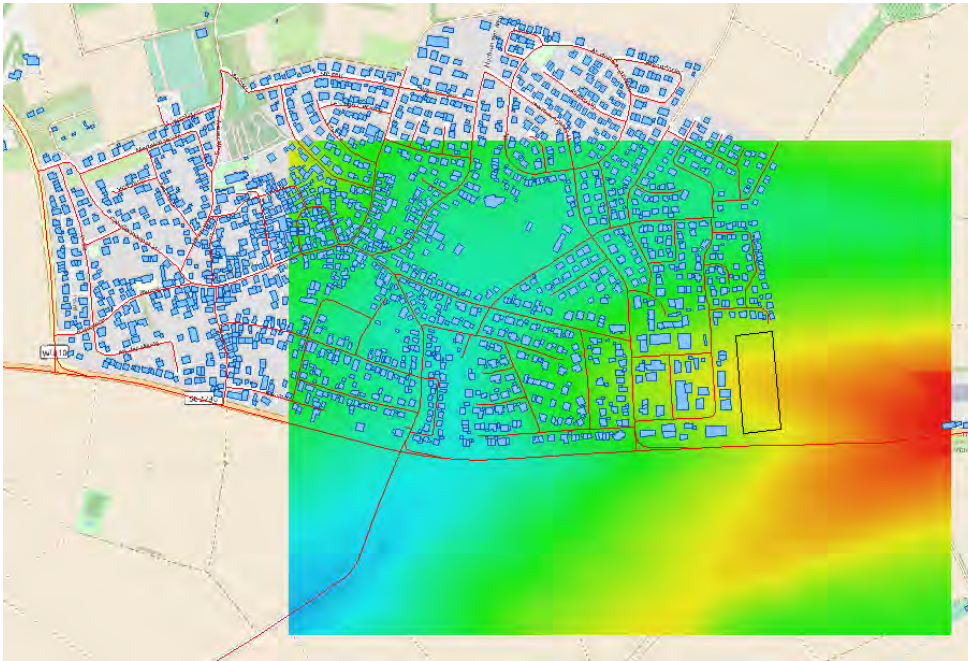


- The display of the terrain points can be switched off completely.
- The terrain points can be drawn as a pentagonal symbol. (Drawing takes a relatively long time)
- Each terrain point can be displayed as a colored pixel. The color depends on the height of the terrain. If there are only a few terrain points in the project, the points are difficult to see in this representation.
- Each terrain point can be represented as a small colored "x". If the terrain point density is low, the terrain points are easier to see in this representation.

IMMI-Digital-Terrain-grid (.IDG)



- The digital terrain (IDG) can now be displayed if desired or the display can be switched off.



Display of the IDG, which here covers only a part of the working area.

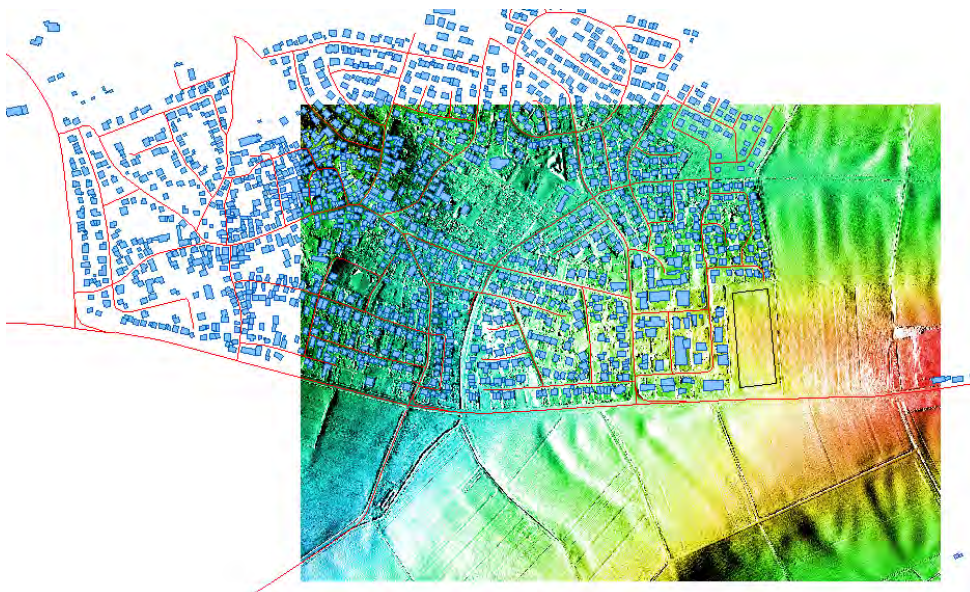
- Within a digital terrain, values that are below a limit can be set to a substitute value. For example, the values for NOData (often -99 or -9999) can be set to a meaningful value, e.g. the smallest elevation value occurring in the grid.

Replace invalid grid values ✕

Values that are smaller than:

Replace with

- Terrain shading can be calculated from the Digital Terrain Model and displayed as a background image in the site plan.



Display of the IDG as terrain shading (background image)

1.4 No more restrictions when importing house elements

Depending on the level of detail, only a limited number of houses could be imported so far. Due to the provision of building data of a high level of detail, among other things in the OSM format, a large number of buildings are imported, which, however, are not required for the project to be processed or the calculation. This restriction on **importing** is now completely removed. Any number of buildings can be imported in each expansion stage.

For the immission point, façade level and grid calculation, however, the restrictions of the individual expansion stages still apply.

A further simplification is that not the total number of buildings in the calculation is limited, but only the number that may be present in a variant to be calculated.

However, as before, the maximum numbers of houses now apply per variant when **performing a calculation**:

Expansion stage	Max number of buildings per variant
Basic	200
Standard	1000
Plus	3000
Premium	unlimited

1.5 Element library sonROAD18: Implementation of the updated report of EMPA

Empa has updated the report "sonROAD18, further developments and additions" and can be found on the website (version 2.0, dated 07.02.2023):

https://www.bafu.admin.ch/dam/bafu/de/dokumente/laerm/fachinfo-daten/sonroad18_weiterentwicklungen_ergaenzungen.pdf.download.pdf/sonROAD18,%20Weiterentwicklungen%20und%20Erg%C3%A4nzungen.pdf.

(The old report version 1.0 is no longer available on the website <https://www.bafu.admin.ch/sonroad18>).

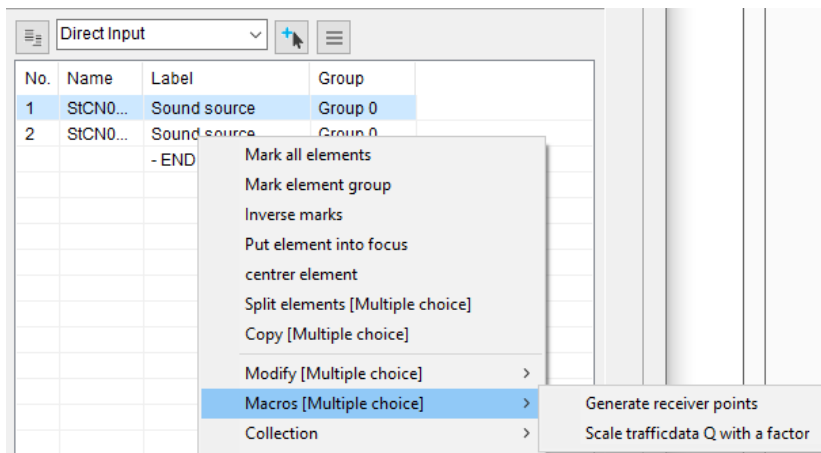
The report version 2.0 is amended/changed in the following points (see also list of amendments on page 2):

- Par. 3.3 Addition of the emission coefficients for the tram type "Flexity Zürich" of Verkehrsbetriebe Zürich VBZ and for the Forchbahn Be 4/6 (Tab. 3.11, p. 15, and Tab. 3.12, p. 16).
- Par. 4.3: Extension of the DTV and N1/N2-SWISS10 converter to include the traffic situation on a six-lane motorway (Tab. 4.2, p. 30, and Tab. 4.3, p. 31)
- Par. 4.3: Correction in the DTV-SWISS10 converter, value for vehicle category cat8 in line SS-50 at night: correct 0.00647, wrong 0.03416 (Tab. 4.2, p. 30)

All 3 changes have been implemented in this update.

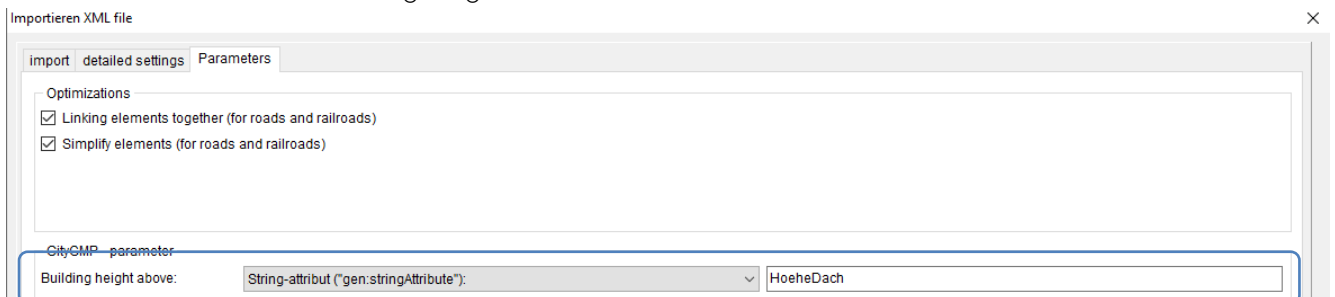
1.6 Whats new since IMMI30 (release from 2022)

- More than one file can now be added to the favorites list at the same time and can also be deleted.
- Several entries can now be deleted from the history list at the same time.
- The traffic volumes Q of CNOSSOS street elements can now be scaled using a factor. To do this, the elements that are to be changed are selected in the element dialog. Now the desired function is called up with the pop-up menu **Macro [drop-down menu]**. All Q-values of the selected elements are multiplied by the then-entered value.



- After the calculation with Schall 03 elements, the log of the section control was displayed. This log can now be suppressed if desired. The button **Show full protocol** controls this display.
- Shape import/export of sonROAD-18 roads: The parameter V_ALL can now be set here. This applies **one** speed value to **all** vehicle classes.
- City-GML-File (XML) Import - Selection of the building height to be imported: By default, the building heights of CityGML buildings are read in via the so-called measured height ("bldg:measuredHeight") property. Some CityGML files contain additional information in the building data, which is provided via the properties of string attributes ("gen:stringAttribute"). These additional individual attributes can now optionally be used for the building heights.

Via the Parameters page, in the CityGML - Parameters area, the selection field "Building height above:" can now, in addition to the standard selection "Measured height ("bldg:measuredHeight")" now also "String attributes ("gen:stringAttribute)". can be selected. In addition, the ID of the desired string attribute must then be specified (e.g.: "HeightRoof"). The file is then searched for these string IDs and the property of this is then used for the building height.



- sonROAD18 - Road Noise Calculation in Switzerland: Display of the Q-values either for the entire road or per lane

The columns of the Q-values were always displayed for the entire road. Now the user can optionally switch to per lane. The change takes place via the button Display: Q per lane or Display: Q for entire road. The Q columns are then labelled accordingly via a second heading line.

- sonROAD18 - Free input of K1 by the user: In addition to the automatic determination of the K1 value according to the Noise Abatement Ordinance (LSV), a free input by the user can now be made alternatively. For this purpose, the type of K1 determination must be set to "Free input". Individual K1 values can then be defined via this. Furthermore, the K1 value can be disregarded ("None") or automatically determined according to the LSV ("According to LSV") via the type of K1 determination.
- sonROAD18 - Free entry of a surcharge by the user: In addition, it is now possible to define a user-defined surcharge ("Surcharge /dB (user-defined)").
- Generate high-voltage lines - Generate delivery offset with the mast as auxiliary lines: The delivery offset (suspension) of the individual suspension points of each level of a mast is now also drawn in as an auxiliary line with the mast (button: "Generate masts as auxiliary lines").

- Element library Schall 03: "Display emission spectra" now also shows the selected line surcharge: In the tabular display of the emission in this menu item, the distance surcharge is now also displayed.

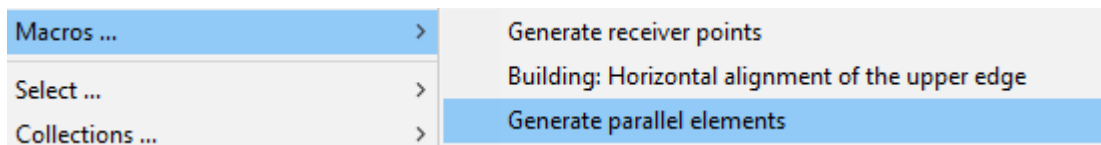
2 Optimizations in IMMI 2023

2.1 Element Library Photovoltaics

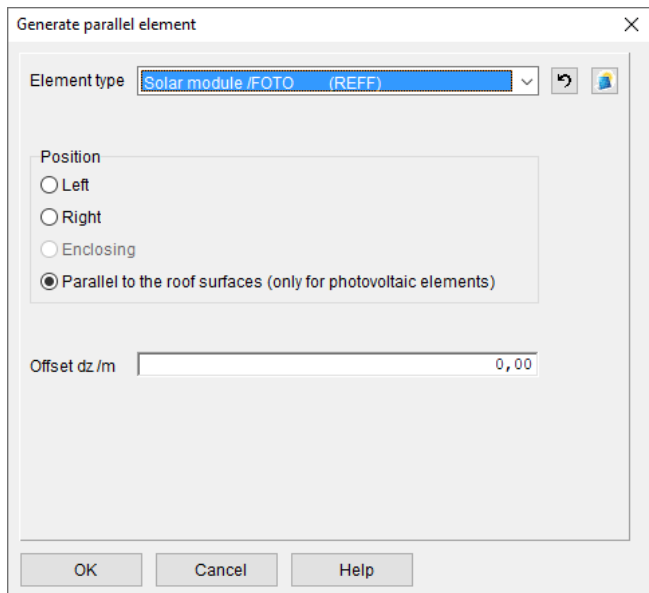
2.1.1 Place solar modules on sloped roof

The macro **Create parallel element** has been extended. Photovoltaic elements can be placed automatically on the roof of a house. Prerequisite for this are:

- A building is selected in the site plan.
- This building has a roof.
- The library **Photovoltaics** is available.



The popup menu item **Macros... | Generate parallel elements** leads to the dialog box:



If **Solar module | Foto** is selected for the element type (the **Photovoltaic** library must be included in the license for this), then **Parallel to the roof areas** can be selected for the position.

The offset dZ indicates the distance between the solar modules and the roof surfaces.

Note: Photovoltaic elements are only created for the sloping roof areas. No elements are created for the vertical gable surfaces on gable roofs or the vertical side and back parts on shed roofs. However, if both sides of a shed roof are inclined, then both sides are provided with elements.

 This button selects **Solar module** as the element type and sets the position to **Parallel to the roof surfaces**.

2.1.2 Optimized display of the parameters for photovoltaics

Edit parameters of element libraries for calculation

Label:

Global **Fotovoltaik**

Glare calculation

Calculation for entire year 2023 all-day

Month June

Day 21

Geogr. width/length of the facility /° 50,00000 10,00000

Difference between zone time and UTC /h 1,00

Assign global values to module normal

Min. sun height /° 0,00

Max. sun height /° 40,00

Min. angle of refl. beam - sun /° 10,00

Max. angle of refl. beam - sun /° 60,00

Consider multiple glare within one minute

Display

for graphical representation of sun positions and sun rays:

Sun ray: Draw ray from sun to module too

Solar sphere radius /m 1000,00

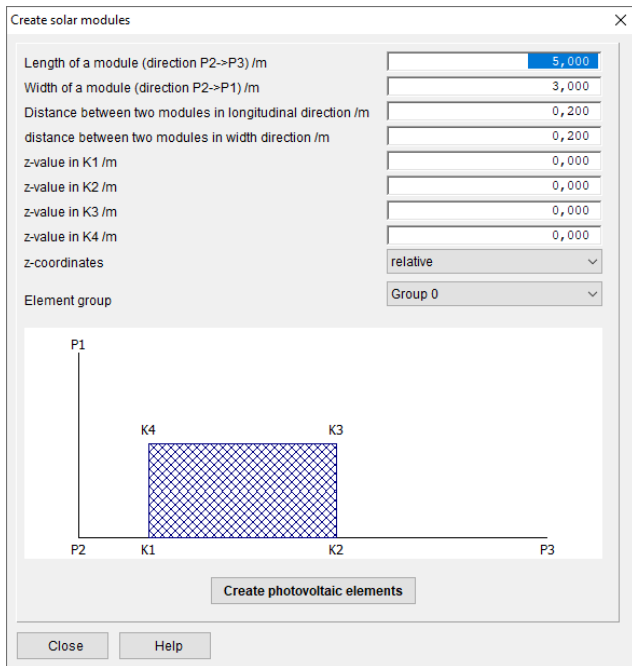
OK Cancel Help

- The display of the solar beam that leads to glare is initially limited to the beam path "photo module to immission point". Basically, only this path is of interest, as this part of the path can be changed by changing the module.
With the button **Sun ray: Draw ray from sun to module too** the complete beam can be displayed, i.e. also the partial beam sun to photo module
- The **Show sunrays** option was removed, this is now done in the computer control center.
- The default for the day calculation is June 21, 2023. This is the day of the summer solstice, on this day the sun is in the sky the longest.
- The input of the coordinates of the point of intersection has been removed. IMMI now determines this point itself, as it is needed for the representation of the sun's position.

2.1.3 Macro: Create solar field

This function makes it easy to create a larger number of evenly arranged photovoltaic modules. To create such a solar field, the boundary of the solar field is first marked with an help line consisting of exactly three nodes. The nodes are labelled P1, P2 and P3. (the first node constructed is P1, the second node P2, the final node P3).

If you click on such an help line, you will find the menu item *Macros* in the local menu: **Create solar field**. This menu item takes you to the dialogue that defines the solar modules and their arrangement:



In the lower part, the help line with the node numbering is shown in a principle sketch. The angle at P2 is drawn here as a right angle, but this does not necessarily have to be the case. The function can also be used if the angle at P2 deviates from 90° .

The direction from P2 to P3 gives the direction that defines the **length of a module**, the direction P2 to P1 gives the direction that defines the **width of a module**.

Enter the length and the width as well as the distances of the modules in length and width direction.

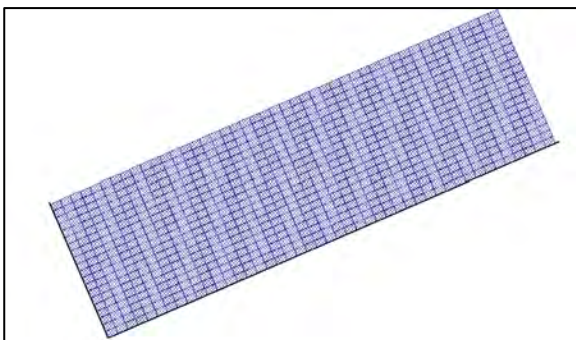
The **element group** to which the modules are assigned can also be specified.

The modules can of course also be inclined. For this purpose, the z-coordinates of the four module corners can be entered. It should be noted that the z-coordinates must be chosen so that all four nodes lie in one plane.

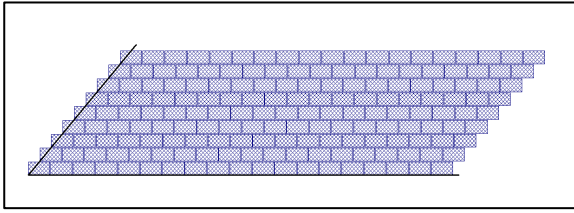
The z-coordinates can be relative to the terrain or absolute.

Note: The corners of the modules are numbered K1 to K4 and their position is based on the points P1, P2 and P3. (see sketch)

With the button **Create photovoltaic elements** the elements are finally created.



A solar field of approx. 70m x 300m with almost 1000 modules can be easily created with a few mouse clicks.



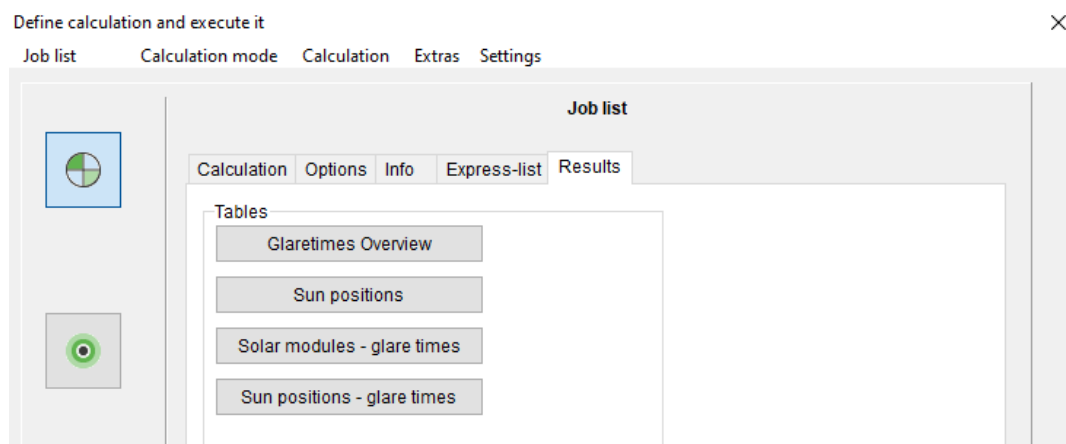
Solar field with angle at P2 that is not a right angle.

2.1.4 Further optimizations in the photovoltaic element library

- Improved display of the **solar module** element: Instead of a simple black frame, the element is now displayed in dark blue and the area is hatched in blue.
- Improved **display of the sun positions**: A sun symbol is now used for the sun positions. For projects that were saved before this change, this icon only appears after the "Standard Attributes" button has been pressed in the list of drawing attributes.
- New representation of the **sunray paths**: If the **Show sunrays** option is activated, the rays are now drawn from the sun elements via the solar panels to the IP. This means that exactly as many rays go away from each position of the sun (solar element) as the sun shows glare.
- After the calculations have been completed, each photovoltaic module contains the information about the number of glare minutes. Now the foto modules can be coloured in the site plan depending on the glare duration
- When converting sun rays (internal elements) to other elements (e.g. guides), the default display attribute of this element is now used.
- To the calculation results of the immission points, the glare times of the modules and the sun positions are now also saved. When loading a result file, these values are then assigned to the modules and sun positions again. In this way, this information of the elements is always updated to match the calculation results.

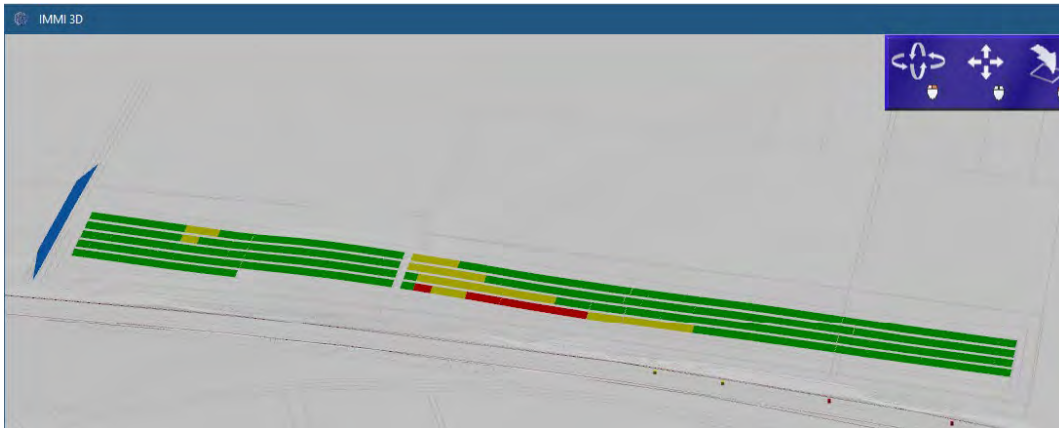
If a photovoltaic project is loaded, the glare numbers of all elements are reset to 0. Only when a result file is loaded are these values reset to match the calculation.

- The results of a photovoltaic calculation can be displayed in four tables.



- **Glare times overview**: This table gives results on glare times and glare days for each IP.
- **Sun positions**: For each immission point, the sun positions that lead to glare at this IP are listed here. In addition, the modules over which the glare beam is reflected to the IP are listed. If glare rays from one sun position lead to the IP via several different modules, all these modules are listed.
- **Solar modules - glare times**: This table lists all solar modules of the project sorted by their glare time:

- **Sun positions - glare times:** This table lists all sun positions that cause glare sorted by their glare time.
- If a calculation result is in the memory (by calculation or by loading a saved result), the photovoltaic modules are now also coloured in the 3D Viewer according to the glare time and the colour scale used.



- The colour scale can be found under Scaling solar module, in 3 colour levels:
 - green: no glare
 - yellow: glare duration up to 30 min
 - red: glare duration more than 30 min
 The colour scale can be adjusted - as usual - according to individual specifications.

2.2 Element library pollutants: AUSTAL

2.2.1 Terrain Slope

In the course of the immission calculation, the terrain steepness is also calculated and stored in the file "zg00_s.dmna". The terrain steepness could be displayed via the single grid import in the computer control centre. Now the display of the terrain slope can be called up directly via the menu item Extras | Display Terrain Slope.

2.2.2 Anemometer Height

Up to now, the anemometer height was set directly in the calculation parameters.

However, newer time-dependent meteorology files (AKTerm) themselves contain the anemometer height. This can now be used in IMMI. Provided that the anemometer height was taken over during the meteorology import, it can be activated via a checkbox in the element library parameters.

If this checkbox is invisible for a selected meteorological situation, this meteorology does not contain any height information of the anemometer.

2.2.3 Manual vertical grid stratification

AUSTAL performs - depending on the maximum height of the of the modelled immission points - an automatic vertical raster stratification. Depending on the maximum height of the modelled immission points. This is described in the manual:

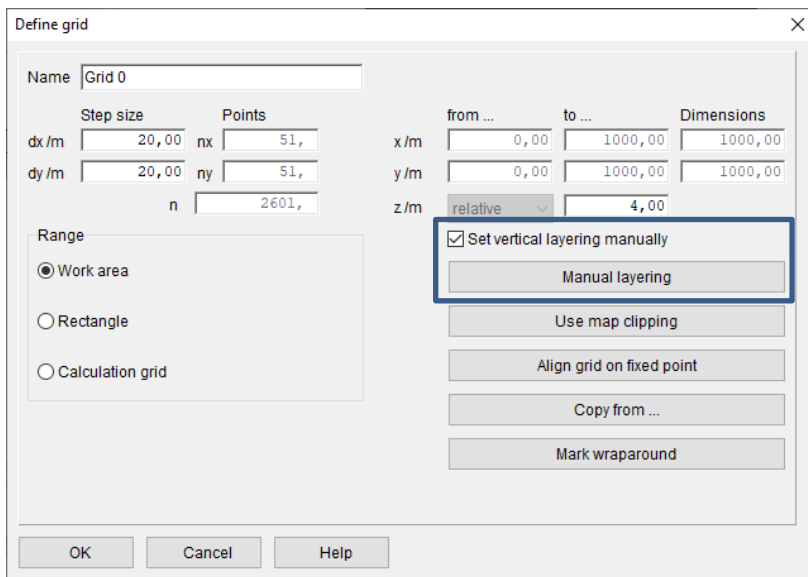
hh ($n_z + 1$) Vertikales Raster, angegeben durch die z -Koordinaten der Randpunkte der Schichten als Höhe über Grund. Die Standardsetzung bei Rechnungen ohne Gebäude ist

hh 0 3 6 10 16 25 40 65 100 150 200 300 400 500 600 700 800 1000 1200 1500

Bei Rechnungen mit Gebäuden siehe **qb**. Ein Setzen dieses Parameters ist nur wirksam, wenn gleichzeitig die Option **NOSTANDARD** angegeben ist, siehe **os**.

If one wants to perform this raster stratification in a user-defined way, this is possible via the control parameter "hh" (using the option "NOSTANDARD").

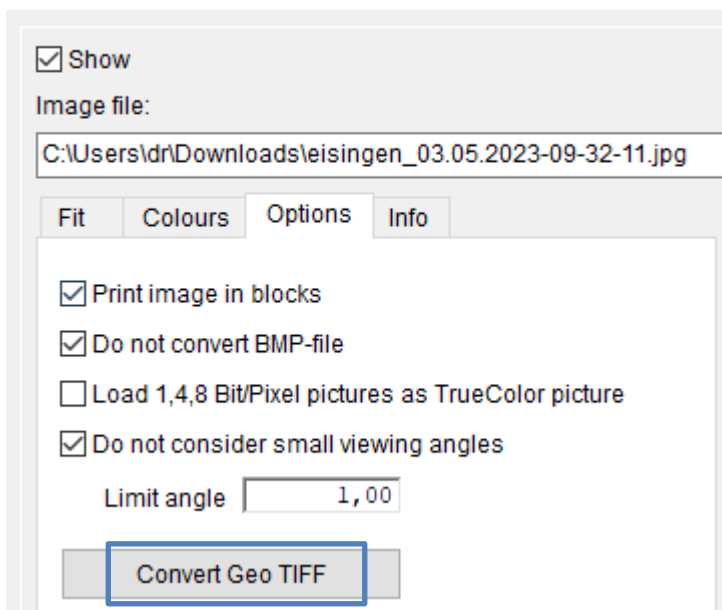
IMMI now supports manual vertical raster layering. For this purpose, an option for the calculation has been extended, menu Raster | Definition:



2.3 GeoTIFF with terrain data convert to bitmap

By default, IMMI cannot use GeoTIFFs with terrain information as background images. Should this be desired, the GeoTIFF files can be converted. In the dialog box **Load Background Images | Options GeoTIFF** can be converted to Bitmap.

Open background image



2.4 Export GeoTIFF with terrain data

Under the menu item **Project | Input help | Convert GeoTIFF Terrain Data** GeoTIFF files containing terrain data can be converted to other terrain data.

Possible formats for terrain data are:

- ArcGIS binary
- XYZ- (ASCII) files

In both cases, if necessary, the x-coordinate can be supplemented with the stripe zone. In this case, the value 32000000 is added to the x-coordinate.

In addition, the terrain information can also be output as a BMP graphic file. This function is also available in the dialog box **Load Background Bitmap | Options**.

2.5 Extension in the calculation of the MALP according to DIN 4109

This extension allows road noise and industrial noise, both calculated with different ratings, to be used together to calculate the relevant external noise level.

The layers used to calculate the day and night values according to DIN 4109 can now be set separately for all noise types that are **not industrial noise** as well as for the noise type **industry**.

Parameter	non-industrial noise	Industrial noise
Layer Day:	<input type="text"/>	<input type="text"/>
Layer Night:	<input type="text"/>	<input type="text"/>

However, it is still necessary that all calculations carried out contain the same number of immission points.


2.6 Other Optimizations

- **Input of assessment parameters:** Some fields have been enlarged and the possible input range expanded. Values with 3 digits before the decimal point are now also possible here.

Emission variant	Lw /dB(A)	n - times	Impact time /h	dLi /dB	Lwr /dB(A)
Day	65,000000	1,000000	1,000000	10,791812	54,21
Evening	55,000000	1,000000	2,000000	-3,010300	51,99
Night	55,000000	1,000000	1,000000	-9,030900	45,97

- **CNOSSOSEU Street: Makro Q-Werte skalieren: Scale macro Q-values:** The traffic numbers Q of CNOSSOS-Streets can be scaled in a macro with any factor. The factor has the same effect on all time periods.

Macros [Multiple choice]	>	Generate receiver points
Collection	>	Scale trafficdata Q with a factor

- **Clearer display of the library selection:** The selection of the sound source libraries is now in two colors. This display can be switched between one and two colors. The switch for this is under **Settings | Environment | Program interface**:
- **Display of non-calculated values:** Previously, the value "-99" was displayed in the level markers for "non-calculated". This was partly not desired. A non-calculated level is now marked with "-". The old behavior can be restored in the compatibility settings.
- **Settings: Environment: New parameters page:** Under **Settings | Environment** now there is a new **Maps and Coordinates** page for parameters which are needed to generate background maps. These parameters have been re-summarized here from other pages of the dialog.
- **CNOSSOS-EU: List of road surfaces:** This list can now contain up to 30,000 entries. However, this unusually high number should only be used in exceptional cases.
- **Terrain triangulation – Cancellation of the calculation:** The triangulation of terrain data can sometimes take a very long time and so far, it has not been possible to cancel it. Now a progress bar is displayed above all dialogs, containing a cancel button. If the triangulation is aborted, the terrain model is invalid.
- **SRTM Directory:** The directory in which the SRTM files must be located in order to be found during import can now be selected by the user. (See also terrain model/options). In particular, the directory C:\ProgramData\IMMI\ no longer has to be used, since many users do not see this directory or cannot / are not allowed to access it.
- **Base URL for OSM import:** This URL can now be changed if required. Currently (as of 4/2023) this is not yet necessary. For future changes, however, the URL from which the OSM data can be downloaded can be changed here. See **Settings | Environment | Miscellaneous**.
- **Dialogue for diurnal cycles has been revised:** The reference value can now be changed in one step and reset to default values. With the button , a constant value can be assigned to all hours together.
- **Default colour scales:** If the forecast type is changed (Project/Properties dialogue), a suitable colour scale is now set:
 - Forecast type noise: Scale DIN18005
 - Forecast type photovoltaics: Colour scale for glare effect
- **New import of line elements:** Line geometries can be imported easily with the new function: File/Import/Text file: Import of line elements in Start/End format in a simple way.

The structure of the file format is very simple:

```
Start
251569.33 571208.99 269.31
251571.38 571214.87 269.54
251576.38 571234.47 270.53
251580.50 571255.16 271.17
End
```

1. Between the words Start and End are the X,Y and Z coordinates of the line elements separated by a space. Decimal separator is the decimal point.
 2. any number of start/end blocks are possible.
 3. For import, first select the file that contains the data.
 4. Then the element type.
 5. If contour lines are imported, the Z-coordinate is interpreted as absolute height.
 6. For all other line elements, you can choose whether the Z-coordinate is to be understood as an absolute or a relative coordinate.
- Schall03: KMet for lateral detours: In the original version of the Schall03 there is no special treatment of the parameter KMet for lateral detours. This was also used in IMMI. In a more recent publication, however, it is implicitly pointed out to set KMeT=1 for lateral detours.

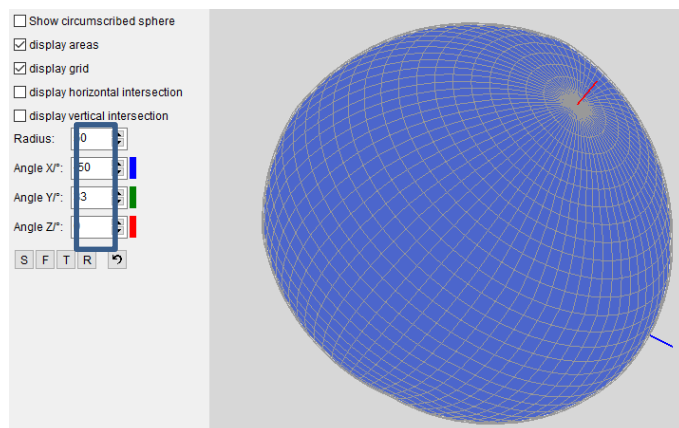
It can now be set on the Schall03 library page how the IMMI program should behave in the event of lateral detours.

Rail bonus for trains

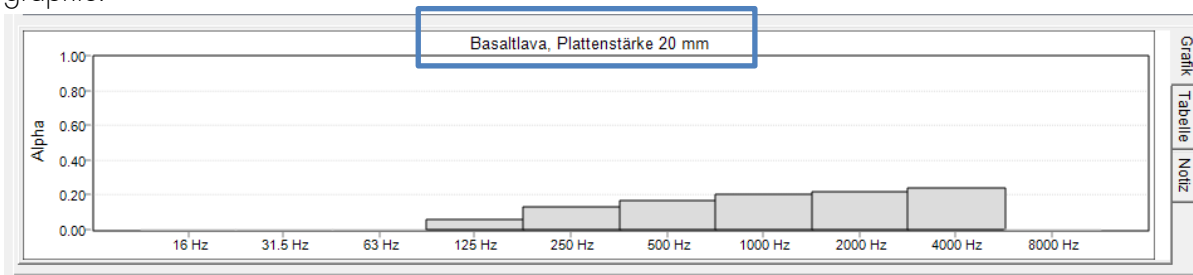
Rail bonus for streetcars

Set KMet lateral always to 1

- Directivity: Colored marking of the angle fields: In order to be able to better assign the input fields for the directions of rotation to the axes, the input fields have been marked with the color of the axis.



- Extended names in the spectra databases: In the spectra databases, the names of the spectra can now be longer than 40 characters. In addition, the name of the selected spectrum is displayed above the graphic.



- Sound sources on the house: Copy assessment to other elements:** When constructing sound sources on houses, the emission of a selected source can be copied to the other sources in the house using a help function. If an assessment was set, the assessment parameters were not copied. An additional option now allows the parameters of the assessment to be copied to the target sources if desired.

2.7 Hint: Convenient 3D viewer and new notebooks/PCs

The convenient 3D viewer cannot be run in the current configuration on new notebooks or computers. After starting the viewer, the application closes without a message. There is a solution to this.

The directory C:\Users\dr\Documents\IMMI 3D contains the engine.dsc, which can be opened with the editor. Set the parameter // disable T&L vertex buffer pipeline, force software processing (framed in red) from =0 to =1. Save this setting. Then the 3D viewer should run.

```
// DS3DALG_NO_VIRTUALIZATION or DS3DALG_HRTF_FULL or DS3DALG_HRTF_LIGHT
guid3DAlgorithm=DS3DALG_HRTF_LIGHT

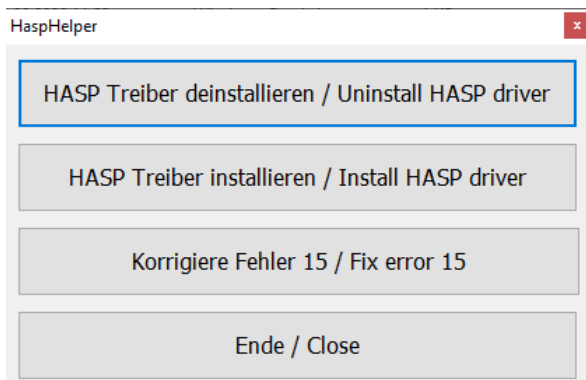
// disable T&L vertex buffer pipeline, force software processing
disableTL=1

// Accept only elements close to Hoehenraster
restrictToHoehenraster=0

// Auto set by engine
```

2.8 Note: Error 14 when starting IMMI

When starting IMMI using newer operating systems and the old generation of hardkeys (colour of the hardkey blue or green) and new hardware, the message "Error 14" appears frequently. This error can usually be corrected by uninstalling and reinstalling the driver for the hardkey. In order to carry out the process quickly and easily, there is a small help programme **HaspHelper.exe**, which can be found in the IMMI installation directory in the subfolder Hardkey (C:\Program Files (x86)\IMMI 2023\Hardkey). The application is started by double-clicking on it.



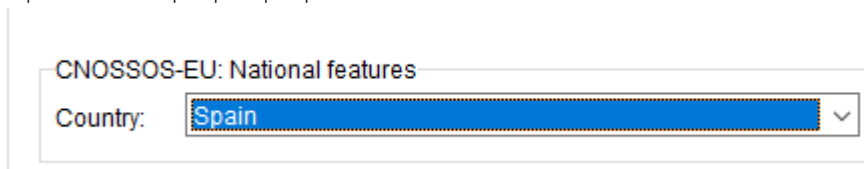
Procedure:

1. Press Uninstall HASP driver. Confirm the appearing dialogue with Yes. Wait until the uninstallation is completed: Operation successfully!
2. Press Install HASP. Confirm the appearing dialogue with Yes. Wait until the installation is complete.
3. Press End.
4. Start IMMI.

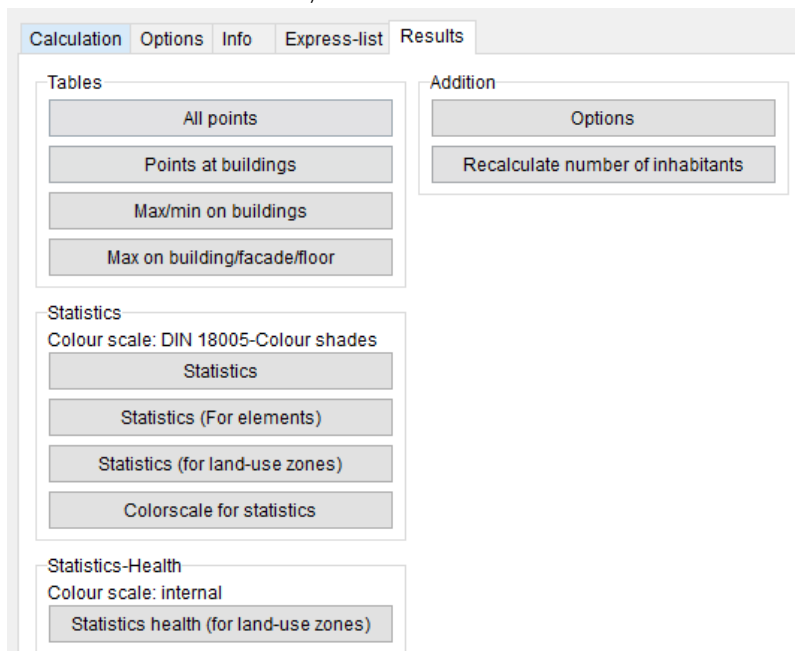
If the error message is still displayed, the old generation of hardkey is no longer executable on your system and can be exchanged for a new generation hardkey (at a charge).

2.9 Changes since IMMI30 (release from 2022)

- For Spanish rail vehicles, the speed limit for aerodynamic influence is now 250 km/h. Before, it was 200 km/h. The aerodynamic effect is taken into account when the vehicle speed is **greater** than the speed limit. In Spain, however, this should already happen when the speed is **greater than or equal** to the speed limit. To activate this special feature, the switch "national special features" has to be set to "Spain" in the project properties.



- The buttons in the **Façade level results** dialog box have been regrouped. The **Color scale** button has been included in the **Statistics** group. In addition, the color scale used for the statistics is now displayed above the statistics buttons. This is to inform the user more clearly that a color scale must be selected for the statistics or which scale is set for the calculation.
- For the health statistics, internal color scales are used according to the applicable guidelines. No color scales can be selected by the user here.



- The dialog box for **Options/Health** has been simplified. It is now no longer possible (and not really necessary) to define your own color scales for the health statistics. It is only possible to select whether to calculate according to Directive EU 2020/367 or – in Germany – according to the 34th BImSchV. If the calculation is done according to EU2020/367, it can be selected whether the values should be rounded before they are sorted into the corresponding level band.

Options ×

Display **Health**

type of noise:

incidence rate for IHD:

Calculate statistics according:

Round values:

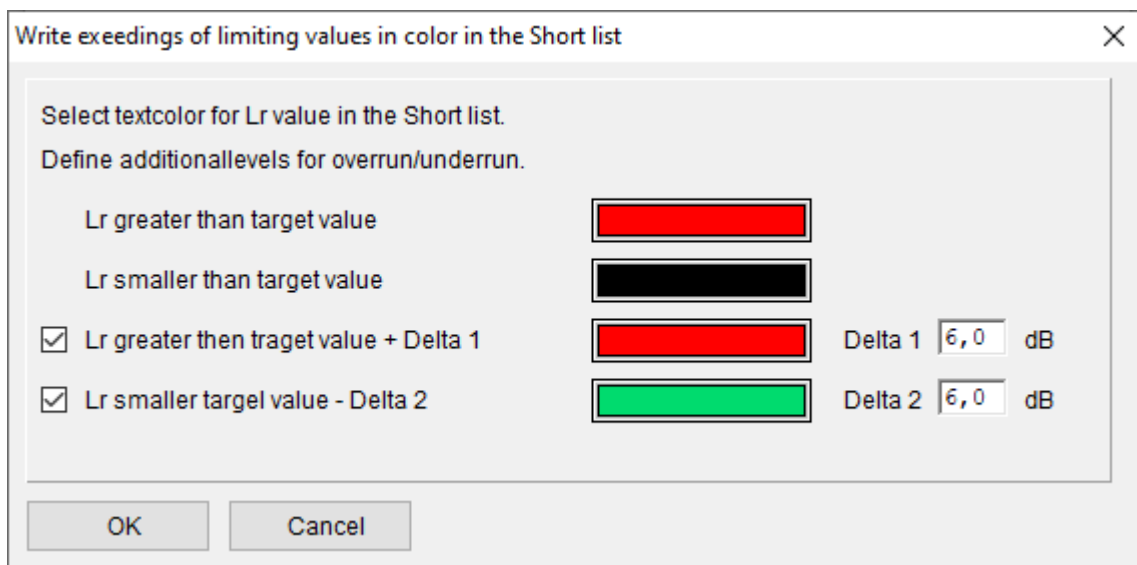
- The following information has been added to the general statistics of the façade levels:

Layer name	Valid levels (> -99)	Minimum	Maximum
Day	15	25.5	35.9
Night	15	5.5	15.9

- sonRoad18, Change of the input type DTV; N1/N2: The sound power $L_{w'eq, A}$ in dB(A) was output in version 2022 Update 1 via the input type "DTV; N1/N2" for only one lane. If the road width $dsq > 0$ was set, too low emission levels per lane were used. The procedure is also described in detail in the IMMI online help.
- Element library Schall 03 and the parameter KMet: Until now, KMet was also calculated for lateral detours according to the formula of Schall 03 for the path over the obstacle. Now it can be set whether KMet should be calculated laterally or always set to 1.
- Result List/Flexible Short List: The coloured display of the exceeding of guide values has been added for this list.
- Directivity: Display of the directivity balloon for CFL and XHN Import: The input fields for the rotation angles are now marked in colour so that you can assign them to the coloured axes.
- Output of detailed test protocols for checking test items: In the menu Settings | Environment | Calculation the checkbox for test protocols can be activated. This is then applied for Schall 03 or RLS-19.

3 Corrections in IMMI 2022

- Exporting grids to GeoTIFF format: If not all layers were selected at the same time when exporting a raster to GeoTIFF format, the wrong layers were exported, depending on the selection. That is now corrected.
- Memory overflow during calculations Schall03 and RLS19: Calculations according to Schall03 or RLS-19 could abort due to insufficient memory. The results calculated up to that point were correct, but the project could not be completed. This affected IP and grid calculations. The problem no longer occurs.
- Loading and saving spectra: Loading and saving spectra from the list of spectra ("External database") could lead to program crashes. That's fixed now.
- Short list: Target values: The colored marking for exceeding or falling below the target values was not correct. Some of the values were not drawn or were drawn with the wrong color. The dialog that controls the color display has been slightly revised to make the function easier to understand.



- CNOSSOS-EU Road: SHAPE import: With the shape import of CNOSSOS roads, the traffic figures and the emissions are calculated correctly immediately after the import. When importing the DTV, the road type was not always correctly taken into account.
- CNOSSOS-EU Industry sources: When selecting the "Indoor level Lp" emission, the parameters for room conditions according to DIN 12354-4 were not displayed. This has been corrected, the input fields are now visible again and can be used.
- CNOSSOS-EU Parking lot noise study: The propagation calculation of the parking lot noise study according to CNOSSOS could lead to a crash, a calculation was then not possible. Now the propagation calculation can also be carried out correctly according to CNOSSOS-EU.
- Aircraft Noise (BUF): Numerical problems could occur in rare cases when segmenting projects. Therefore, adjustments were made to avoid these numerical problems.
- In the middle result list, a dialogue with further functions could be displayed when double-clicking on the list. Selecting the function "1-point table" could cause a crash. This no longer happens.
- The parameter IHD, which is described for noise mapping according to the Environmental Directive, is only defined for road noise. If another noise type was set in the options for calculating the IHD, the value for road noise was always calculated. Now, no IHD is shown if rail or aircraft noise are set as noise type.
- Element library sonROAD18: Error correction in input mode "Q and V: The K1 and surcharge values were not taken into account in the dialogue, i.e. the $Lw'_{eq,A} / dB(A)$ was not adjusted here.

3.1 Corrections since IMMI30 (release from 2022)

- In the input dialog box of the sonROAD-18 road in mode "Q, v" the selection of the road surface was missing. This is now visible again.
- The calculation of the Health statistics was incorrect. This is now corrected.
- The memory limit above which a grid is stored to the disk could be entered by the user but was not saved and read correctly. This is now corrected.
- The option "Show sound beams as auxiliary lines" could no longer be activated. This is now possible again.
- In the input dialogue of CNOSSOS-EU point, line and area sound source, the room conditions according to EN 12354-4 are available again when selecting indoor level.
- Parking lot noise study according to CNOSSOS: The dispersion calculation according to CNOSSOS for the parking lot noise study no longer deletes CNOSSOS area sources.
- Attachment of nodes: If a node is attached when generating elements, the "zAbsolute" or "zRelative" setting of the element is now preserved.
- Setting background image: For the X and Y coordinates, 10 digits before the decimal point are now possible.
- Photovoltaics: The input of the angles of the sun's position and the direction of reflection are now limited to sensible angles. Nonsensical entries are now no longer possible.
- Coloured guide value overruns in the result list/short list: The option switches (\geq , \leq etc.) were not evaluated correctly. This is fixed.
- Shape import CNOSSOS road: Problem: After the import the values Q are recalculated, but the road type was not considered correctly.
- Spectra database: "Save spectra" and load the saved entries into another project did not work.
- Assessment: In the dialogue of entries for a sound source, the fields for exposure times and repetition were enlarged. Now 3-digit entries are also possible here.

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