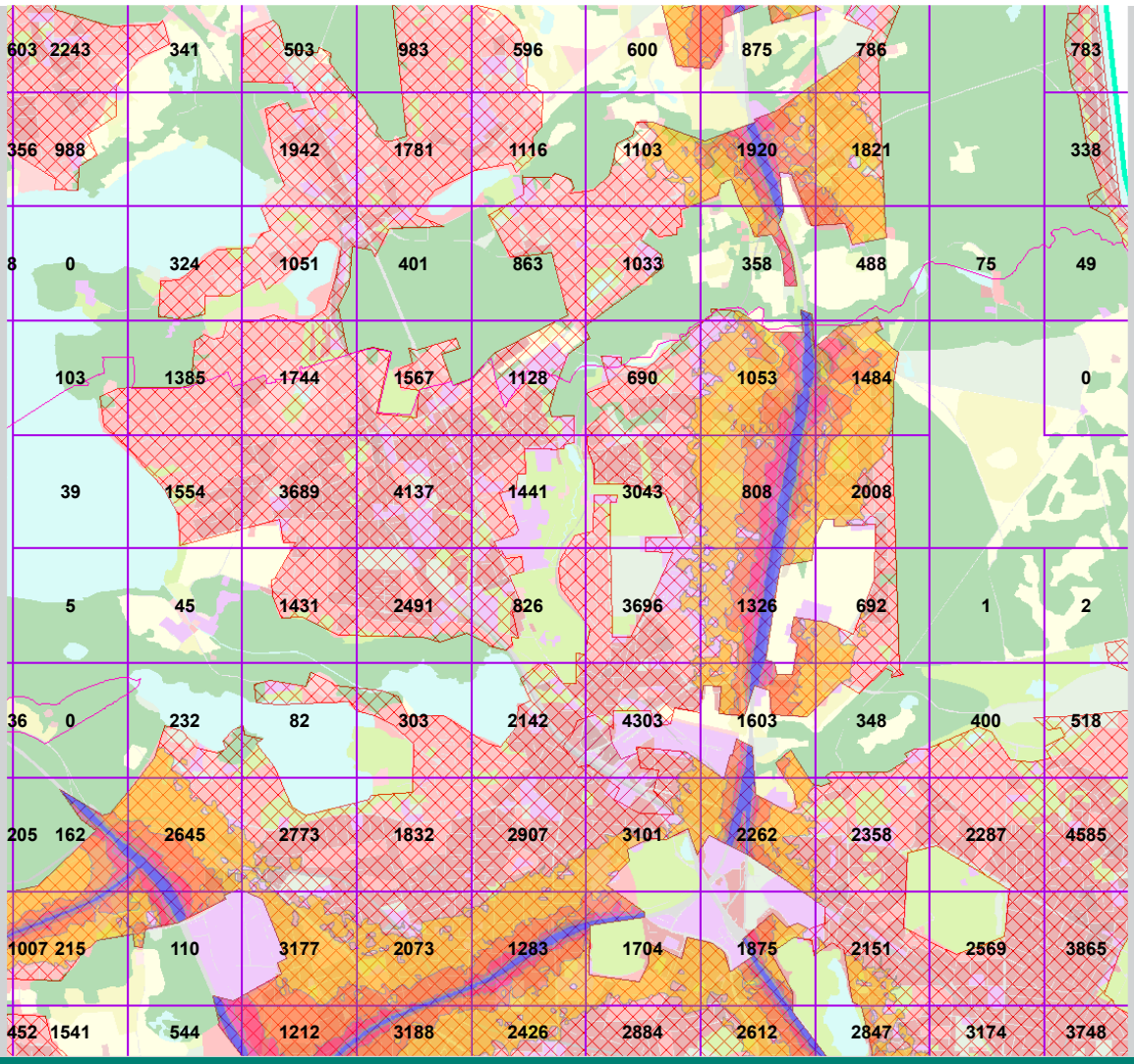
A European reference grid (1*1 km) with noise exposure information and noise contour maps for urban areas in relation to road, railways and aircraft noise

Methodological description

June 2021



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Contents

Summary

Exposure to noise and air pollution occur commonly and in the same territorial area, mainly related to transport and specifically to road traffic as the most obvious source of exposure.

This report defines the methodology to calculate the number of people exposed to different noise levels and the area of these noise bands distributed in the EEA reference grid both inside and outside agglomerations.

Acknowledgements

This report has been elaborated by Miquel Sáinz de la Maza, Núria Blanes and Jaume Fons-Esteve, from Universitat Autònoma de Barcelona (UAB), in the context of the European Topic Centre on Air Pollution, Transport, Noise and Industrial Pollution (ETC/ATNI) of the European Environment Agency (EEA).

The EEA task manager was Eulàlia Peris Aguiló.

1 Introduction

The Environmental Noise Directive (Directive 2002/49/EC relating to the assessment and management of environmental noise, END) estimates number of people exposed to different bands of L_{den} and L_{night} in aggregate form for urban agglomerations and outside agglomerations. This aggregated data on people exposed is not suitable when combining with different data with more spatial resolution. On the other hand, noise contour maps (ncm) as a result of noise modelling, have a high resolution for spatial analysis.

The purpose of this document is to define the methodology that to populate the European reference grid with noise data using an adapted methodology tested during the task "3.2.6.1 Integrated assessment of noise and air quality in Europe": ETC/ATNI Action Plan 2020.

This document will discuss the methodological approach to be followed for the different noise sources considered, both inside and outside urban areas. Nevertheless, the final product foreseen under ETC/ATNI Action Plan 2021 will only populate the European reference grid with the number of people exposed to different noise levels and noise contour maps for both L_{den} and L_{night} for road and aircraft noise inside agglomerations.

The final result will be of use for tasks to be done during 2021 described in WP 3.2.5.1 Quiet areas assessment and WP 3.2.6.1. Integrated assessment of noise and air quality in Europe.

1.1 Objective of the task

The objective of this task is to include noise information in the European Reference grid, based on noise contour maps and population exposed to different noise bands being submitted by the countries following the Environmental Noise Directive (END) (EU, 2002) requirements.

The current Approach can only be implemented in cities and countries where spatial information related to noise levels (in the form of noise contour maps) have been delivered. Therefore, it is also described how to address those cases where data is not available in order to distinguish the different situations.

1.2 Why adding data to a reference grid?

The main purposes of adding information to a reference grid can be summarised as follows:

- It is possible to aggregate information by different delineations (for example, by various administrative units EU, NUTS1, NUTS2,...).
- It is possible to combine different datasets in vector format. The European Environment Agency (EEA) uses the grid to collect geospatial information that could be combined and produce a spatial databases in a cube (e.g. tool/environment = JEDI). A cube stores the diverse information (called dimensions) in a format where all possible combinations are considered. Therefore, the cube stores the outcomes of geospatial analysis in a format that is easy to be used and applied for further assessment. For example, a cube could be opened with Excel or Tableau applications and generate figures, statistics and maps.
- It would be possible to increase the spatial resolution of the information from the reference grid from 1 x 1 km into 100 x 100 m, when 100 x 100 m will be broadly available.

1.3 Why a grid with noise data?

The main purpose of producing a grid with noise data is to undertake geospatial analysis of noise information in combination with other sources of information, such as land cover information, air

quality information, transport information, green infrastructure, and statistical information compiled at administrative level.

2 Discussion

There are some differences in the reported data delivered by the countries for the END for inside and outside agglomerations. Data inside agglomerations refer to the source that the country considers in the noise model to calculate noise exposure, not distinguishing concerning thresholds. While for outside agglomerations the noise contour maps (ncm) refers to major sources (e.g. major roads more than 3 million vehicles a year).

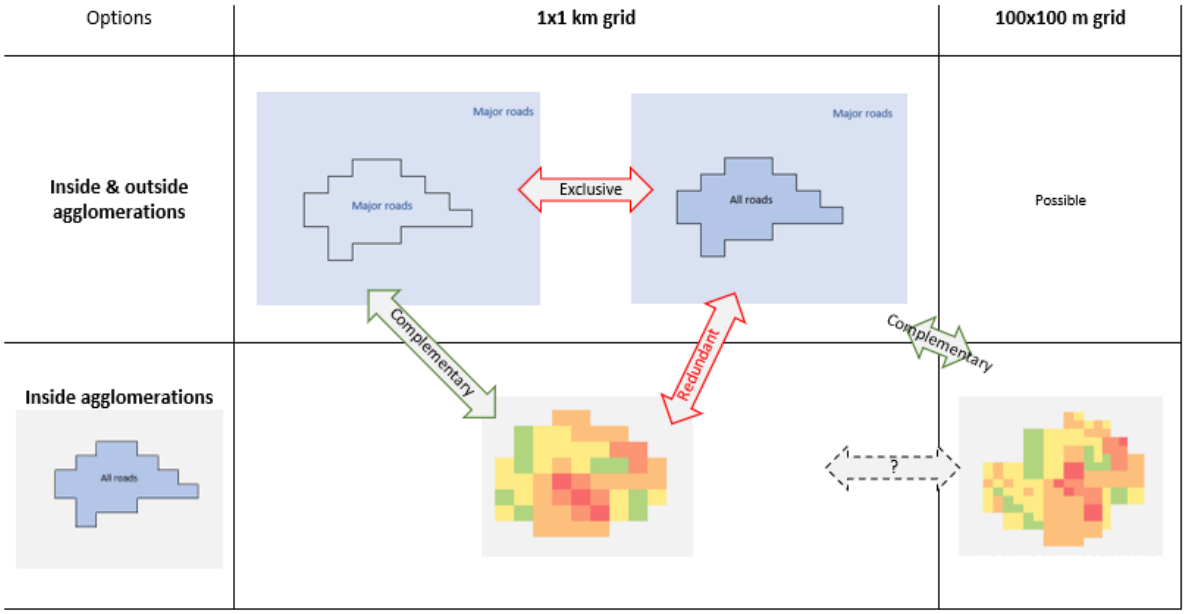
There are different options to aggregate noise information inside and outside agglomerations in a unique reference grid per each noise source: road noise, railway noise and aircraft noise (see Figure 2.1 as an example for major roads).

1. One single grid inside and outside agglomerations. Since outside agglomerations information provided referes only to major sources (e.g. roads) one option is only using major sources inside and outside agglomerations to have an homogeneus grid. However, most of the countries deliver agglomeration data without distinguishing between major sources.
2. One single grid including noise data of major sources outside agglomerations and data below major threshold inside agglomerations.
3. One grid for agglomerations and one grid for outside agglomerations.

The input information for urban areas differs from the input information outside urban areas and how the population is distributed into the different land cover polygons. So, provided this situation, 2 reference grids are proposed:

- a reference grid only including information corresponding to urban agglomerations with noise data populated in it at 1 x 1 km. The cells corresponding to a urban agglomeration will be identified with the agglomeration name. The grid cells corresponding to the border of the agglomeration will contain a percentage value of the agglomeration area. The cells outside urban agglomerations will be populated with “Outside END agglomeration”.
- a reference grid only including cells corresponding to areas outside agglomerations with noise data populated in it at 1 x 1 km grid. The cells corresponding to urban agglomerations at 1 x 1 km grid will be populated with the name of the agglomeration. The grid cells corresponding to the border of the agglomeration will contain a percentage value of the area outside agglomeration. The cells outside urban agglomerations will be populated with “Outside END agglomeration”.

Figure 2.1: Options to aggregate noise information inside and outside agglomerations in a unique reference grid distinguishing by noise sources (the figure corresponds to road noise source)



The resulting grid can be 1 x 1 km grid or 100 x 100 m grid, because the input data to be used defines the cell size. In this case, if the desired outcome is to combine information for both inside and outside agglomerations, the resulting grid cell size need to be 1 x 1 km grid because this is the most detailed information available outside urban areas to be used for this exercise. This implies that the information at city level will need to be aggregated at 1 x 1 km. In further analysis, it needs to be evaluated if both reference grid can be combined in a single reference grid related to a specific noise source, provided the different origin of population data and how this information is processed in the input dataset.

The EEA considers a priority the analysis of urban pollution in urban agglomeracions for 2021, the reference grid will only be produced inside urban areas and only considering road and aircraft noise, but this methodological document will describe both approaches inside and outside agglomerations.

The following sections will then describe how it has been decided to populate those 2 different grid cells, one related to noise data inside urban areas and one related to noise data outside urban areas.

Table 2.1: Summary table about different options of combining noise data with reference grid.

Option	Geographic domain		Attributes	Advantages	Constrains	Uses
	Outside	Inside				
1x1 km grid with **major sources**	Major source	Only major source	Population exposed Area of ncb (noise contour bands)	**Easy to communicate**: noise maps and people exposed to major roads (L_{den} >= 55 dB) The data refer to the *same traffic thresholds* in all cells (no differentiation btwn outside and inside agglomerations)	Outside agglomeration: • Identification of completeness requires to cross noise maps with DF1_5 (processing time) Inside agglomerations: • ncb not always reported • ncb does not distinguish major source. Therefore we could not select only the major source for the grid. *Another grid is explicitly needed for agglomerations with the complete source (not necessarily a constrain)*	General assessment of Europe. From the geospatial perspective, we call it the landscape level. Population exposed: • Statistics by administrative units Noise bands: • Proximity/pressure on protected areas Visualisation. Data could be aggregated at 10 km to facilitate visualisation.
1x1 km grid with **all information per source**	Major source	Complete exposure for thegiven source (no restriction on traffic threshold)	Population exposed Area of ncb	The grid aggregates **all available information at grid cell level** for a particular source. **Population exposed to Lden >= 55 dB in areas covered under the END 2017**.[1] We can further analyse separately outside and inside agglomerations. Each cell retains the information related to its location inside an agglomeration or not. From processing perspective, there is no conflict if major source is not differentiated inside agglomerations.	Mixing information coming from different thresholds. For example, in Noise in Europe 2020 most figures separate outside/inside.	Same as above, acknowledging that outside agglomerations only considers infrastructure above particular vehicles/yr.

Option	Geographic domain		Attributes	Advantages	Constrains	Uses
	Outside	Inside				
1x1 km grid inside agglomerations	Excluded	Complete exposure	Population exposed Area of ncb	Clear to communicate: noise and population exposed inside agglomerations	Only suitable for those data available at 1x1 km grid	Combined analysis with air pollutants which are provided at 1x1 km grid
1ha grid inside agglomerations	Excluded	Complete exposure	Population exposed Area of ncb	Clear to communicate: noise and population exposed inside agglomerations Information provided at a suitable level for urban assessments	No constrain	Visualisation Combined analysis with other data (point data: hospitals, schools; green infrastructure; public spaces;....)

3 Methodological description

This section describes the methodology to calculate the number of people exposed to different noise levels distributed in the EEA reference grid inside and outside urban areas.

3.1 How to populate the European reference grid with noise data inside urban areas

In order to populate the European reference grid with noise data inside urban areas, the methodology described in previous assessments (Sainz et al. 2020, Eionet- ETC/ATNI Working Paper, 2020) will be adapted to the 3 noise sources to be covered in this methodological description: road, rail and aircraft noise inside agglomerations.

The outcome of the proposed methodology are 6 different reference grids, at spatial resolution of 1 x 1 km, resulting from the combination of three noise sources inside agglomeration (road, rail and aircraft noise) with 2 types of information: area covered by different noise levels and population exposed to different noise levels per each grid cell, by L_{den} and by L_{night}.

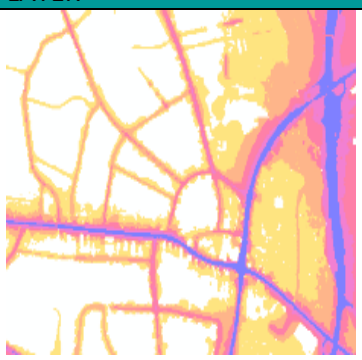
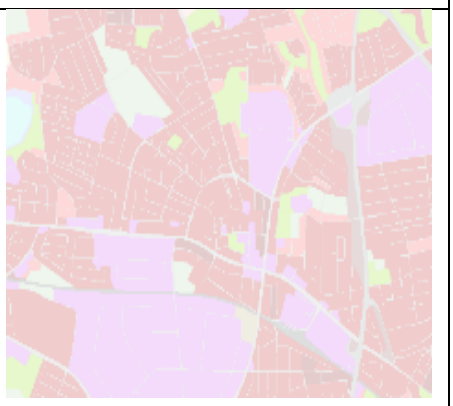
The assignment of population is based on the population allocated to the Urban Atlas polygons (UA, 2018) redistributed within the noise contour bands of the corresponding noise source at grid cell level.

For those agglomerations where noise contour maps for the selected noise sources are not available (data not delivered or data delivered but not following the GIS requested format), the grid cell will be identified accordingly, based on delineation of agglomerations delivered in 2015 under the noise sources dataflow (DF1_5). In parallel, the cells corresponding to an urban agglomeration will be identified with the agglomeration name. The grid cells corresponding to the border of the agglomeration will contain a percentage value of the agglomeration area. The cells outside urban agglomerations will be populated with “Outside END agglomeration”.

3.1.1 Input data

The needed datasets are described in Table 3.1.

Table 3.1: Input data to be used for the calculation of European noise grid reference dataset inside urban areas

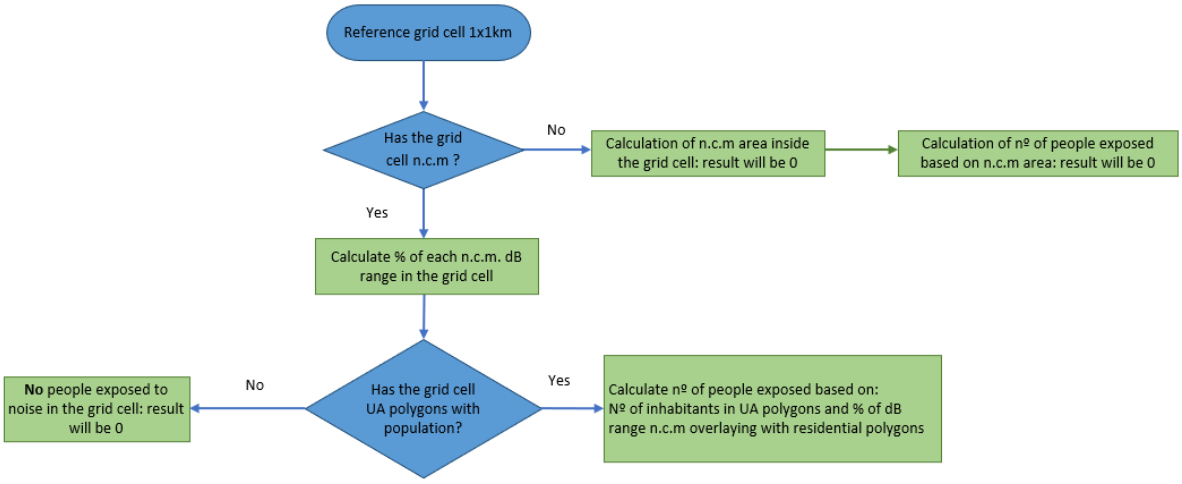
DATASET	DESCRIPTION	LAYER
Noise contour maps (DF4_8_2017) delivered by Member States inside urban areas	Polygon dataset of the strategic noise mapping of: - roads and major roads L_{den} by noise bands (55-59; 60-64; 65-69; 70-74; >75 dB) - roads and major roads L_{night} by noise bands (50-54, 55-59; 60-64; 65-69; >70 dB) - rails and major railways L_{den} by noise bands (55-59; 60-64; 65-69; 70-74; >75 dB) - rails and major railways L_{night} by noise bands (50-54, 55-59; 60-64; 65-69; >70 dB) - aircraft noise and major airports L_{den} by noise bands (55-59; 60-64; 65-69; 70-74; >75 dB) - aircraft noise and major airports L_{night} by noise bands (50-54, 55-59; 60-64; 65-69; >70 dB)	
Urban Atlas 2018	The European Urban Atlas provides reliable, inter-comparable, high-resolution land use and land cover data for 800 Functional Urban Area (FUA) for the 2018 reference year in EEA38 countries and UK. https://land.copernicus.eu/local/urban-atlas/urban-atlas-2018	
JRC Population data	Population estimates (reference year 2018) developed by JRC and integrated into every polygon within the Urban Atlas 2018 dataset. Available to download on June 2021.	
EEA reference grid for Europe (1km)	The grid is based on the recommendation at the 1st European Workshop on Reference Grids in 2003 and later INSPIRE geographical grid systems. Temporal extent: May 2011	

3.1.2 Workflow description

The workflow is shown in Figure 3.1.

Same workflow will be followed per each noise source inside urban areas (road, rail and aircraft) and for both L_{den} and L_{night} noise contour maps.

Figure 3.1: Workflow for the noise grid calculation inside urban areas (n.c.m stands for noise contour maps). Green boxes represent the calculations that will be done and included in the results



3.1.3 Data preparation

In order to prepare the input information to obtain the results described, a preliminary process need to be undertaken in order to redistribute Urban Atlas population into the EEA reference grid, following the polygons distribution and based on area surface (see Figure 3.2).

Urban Atlas (UA) contains population information at the polygon level. When the polygons of Urban Atlas are overlayed with the reference grid dataset, each UA polygon is divided into different grid cells. So, the population assigned to each UA polygon is redistributed to the different grid cells based on the percentage of the area of that polygon falling into the corresponding grid cell. It has been assumed that the population is equally distributed along all the UA polygon area.

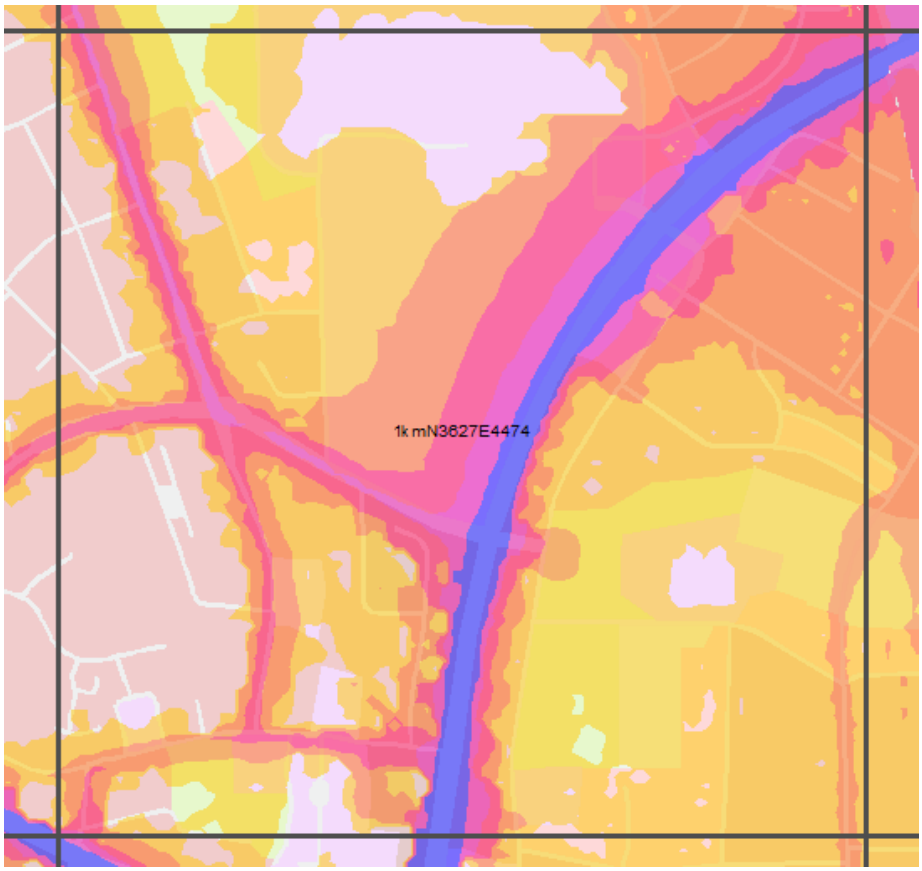
Figure 3.2: Redistribution of the population assigned to the original Urban Atlas polygon to the reference 1x1 km grid cell

Bold numbers are the original population inside polygon (e.g. 240) . Next to these ,number of people after redistributing this numbers according to the area of the polygon divided by the reference grid cell.

3.1.4 Data processing and outcome

In order to obtain the noise information per each reference grid cell, the first step is the calculation of the area covered by the different noise contour bands inside each grid cell, and this is obtained by overlaying noise contour maps for a specific source with the grid cells (see Figure 3.3).

Figure 3.3: Result of overlaying reference grid cells with noise contour maps (in this case, road noise)



The second step corresponds to the number of people exposed per band at grid cell level. To obtain this value, the result of the redistribution of the population assigned to the original Urban Atlas polygon to the reference 1x1 km grid cell (see Figure 3.2) is overlayed with the area of noise bands per grid cell (see Figure 3.3), and the population is calculated based on the area of the UA polygon located in each noise band (55-59, 60-64, 65-69, 70-75, >75 for L_{den} and 50-54, 55-59, 60-64, 65-69, >70 for L_{night}), see result in Figure 3.4.

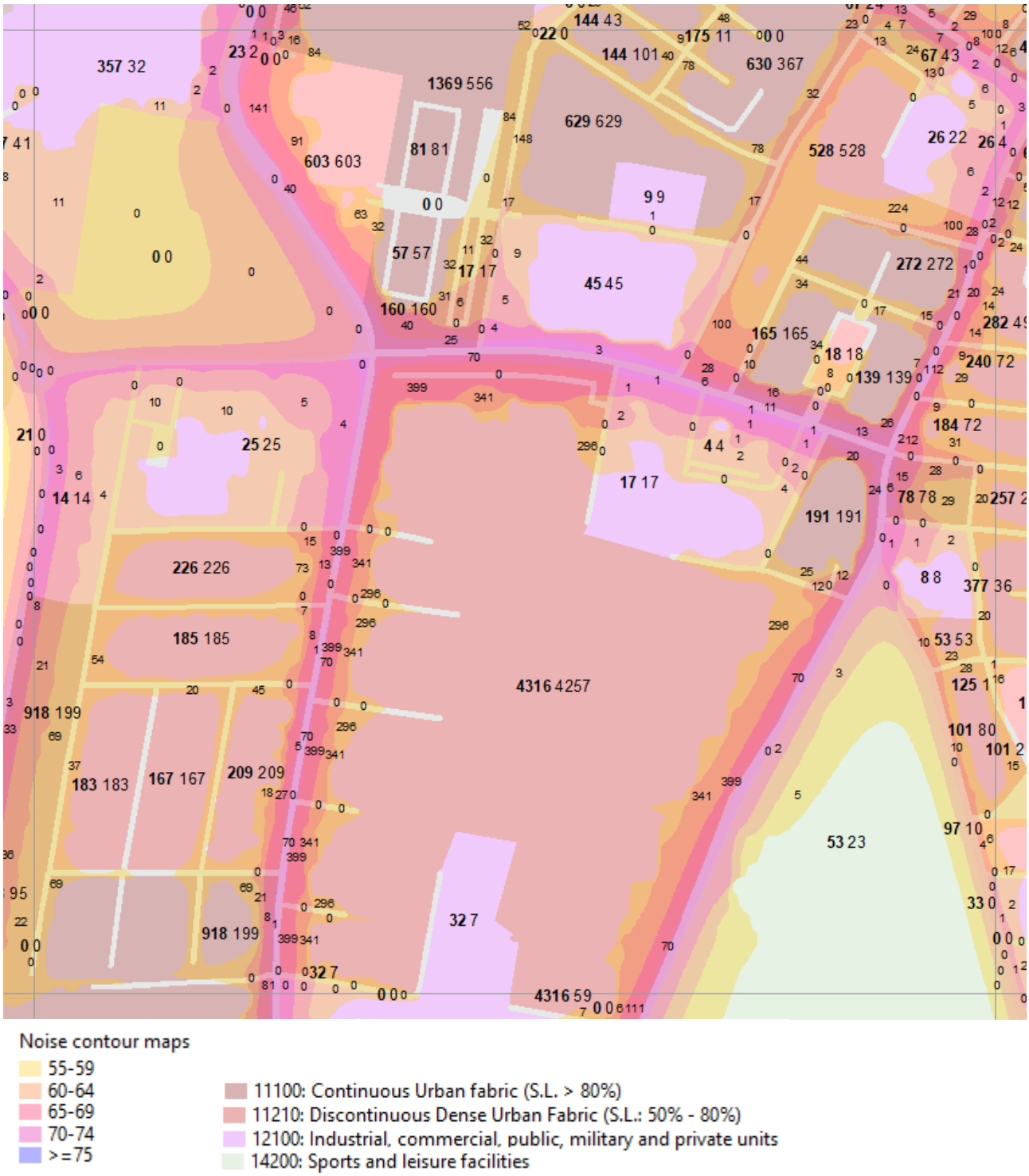
It has been assumed that the population is equally distributed along all the UA polygon area.

Grid cells not containing noise contour maps inside urban areas, there is going to be several grid cells that will not contain any noise contour map inside.

In this case, there are different reasons for not having a noise contour map:

- Not applicable case.
    - there is not a noise source as defined by the END
    - there are no people exposed to noise above the thresholds defined by the END
- Not available situation: potentially there would be a noise contour map because there is a noise source located closely or inside the grid cell under evaluation but noise data has not yet been delivered

Figure 3.4: Result of calculation of the population per noise contour band area



The result of the different calculations will be a final geodatabase with a layer containing the attributes that can be seen in Table 3.2.

Table 3.2: Description of fields that each grid cell will contain concerning noise information, included in the final geodatabase

Field	Description
CELLCODE	Cell code for 1x1 km grid
EOFORIGIN	grid cell origin
NOFORIGIN	grid cell origin
Pop_5559	Number of people exposed to 55-59 dB
Pop_6064	Number of people exposed to 60-64 dB
Pop_6569	Number of people exposed to 65-70 dB
Pop_7074	Number of people exposed to 70-74 dB
Pop_75	Number of people exposed to >=75 dB
Pop_Ge55	Number of people exposed to >=55 dB
Area_5559	Area of the noise countour dB range 5559 in the grid cell
Area_6064	Area of the noise countour dB range 6064 in the grid cell
Area_6569	Area of the noise countour dB range 6569 in the grid cell
Area_7074	Area of the noise countour dB range 7074 in the grid cell
Area_75	Area of the noise countour >= 75 dB in the grid cell
Per_5559	Percentage area of noise contour 55-59 in the grid cell
Per_6064	Percentage area of noise contour 60-64 in the grid cell
Per_6569	Percentage area of noise contour 65-70 in the grid cell
Per_7074	Percentage area of noise contour 70-74 in the grid cell
Per_75	Percentage area of noise contour >=75 in the grid cell
Pop_in_Grid	Total population of the cell from Urban Atlas 2018
Cellagg	Percentage of the 1km cell in the agglomeration (completely inside = 100)
Country	Country code
Agglomeration	Name of the END agglomeration / Outside END agglomeration
Ncm availability	Noise contour maps available (Yes / No)

* Ncm availability (Yes/No) defines the agglomerations delivered in 2015 under the noise sources dataflow (DF1_5) where noise contour maps for the selected noise sources are not available (can include data not delivered or data delivered but not following the GIS requested format).

3.2 How to populate the European reference grid with noise data outside urban areas

The methodology described in previous assessments (Sainz et al. 2020, Eionet- ETC/ATNI Working Paper, 2020) only considers how to populate the reference grid inside agglomerations. The approach that will be used for populating the reference grid outside agglomerations follow the same main principles than the ones described for populating the reference grid inside agglomerations, but the input data as well as the territorial context outside agglomerations differs from what is previously described.

The method proposed can be applied for the 3 main noise sources outside agglomerations: major roads, major railways and major airports.

The outcome of the proposed methodology are 6 different reference grids, at spatial resolution of 1 x 1 km, resulting from the combination of three noise sources inside agglomeration (road, rail and aircraft noise) with 2 types of information: area covered by different noise levels and population exposed to different noise levels per each grid cell, by L_{den} and by L_{night}.

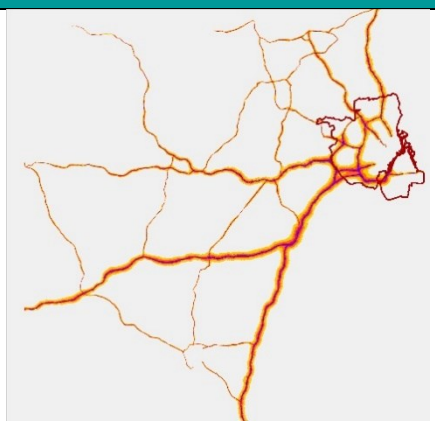
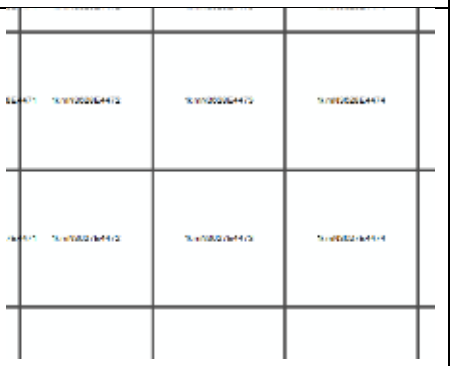
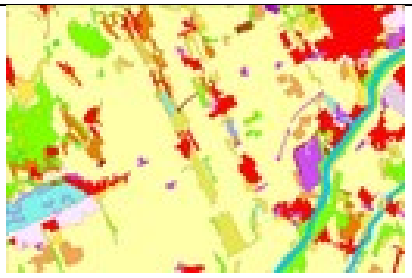
The cells corresponding to urban agglomerations at 1 x 1 km grid will be populated with the name of the agglomeration. The grid cells corresponding to the border of the agglomeration will contain a percentage value of the area outside agglomeration. The cells outside urban agglomerations will be populated with "Outside END agglomeration".

The assignment of population in this case is going to be based on the population grid (Geostat, 2017) and on Corine Land Cover 2018 residential areas (CLC, 2018), which will also be redistributed within noise contour bands of the corresponding noise source at grid cell level.

3.2.1 Input data

The needed datasets are described in Table 3.3.

Table 3.3: Input data to be used for the calculation of European noise grid reference dataset inside urban areas

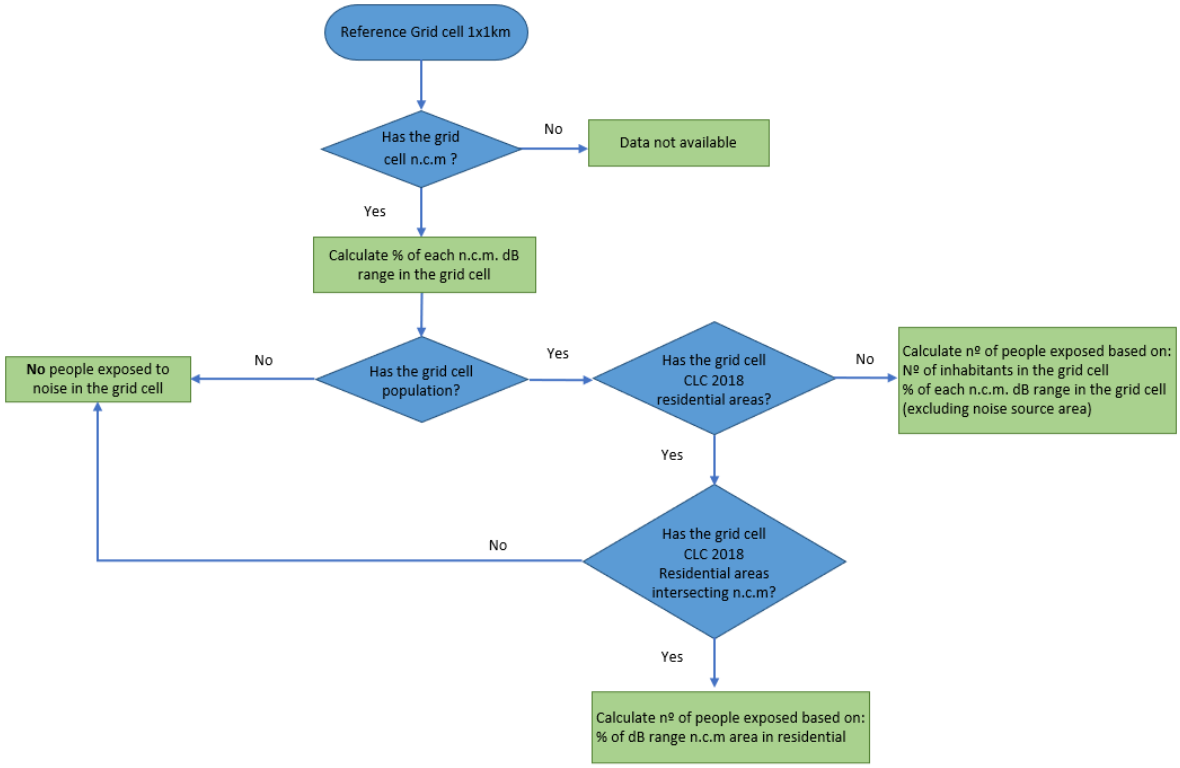
DATASET	DESCRIPTION	LAYER
Noise contour maps (DF4_8_2017) delivered by Member States.	Polygon dataset of the strategic noise mapping of: - major roads L_{den} by noise bands (55-59; 60-64; 65-69; 70-74; >75 dB) - major roads L_{night} by noise bands (50-54, 55-59; 60-64; 65-69; >70 dB) - major railways L_{den} by noise bands (55-59; 60-64; 65-69; 70-74; >75 dB) - major railways L_{night} by noise bands (50-54, 55-59; 60-64; 65-69; >70 dB) - major airports L_{den} by noise bands (55-59; 60-64; 65-69; 70-74; >75 dB) - major airports L_{night} by noise bands (50-54, 55-59; 60-64; 65-69; >70 dB)	
EEA reference grid for Europe (1km)	The grid is based on the recommendation at the 1st European Workshop on Reference Grids in 2003 and later INSPIRE geographical grid systems. Temporal extent: May 2011	
Population at 1km grid	Population at 1km grid, based on Geostat2011, scaled to 2017 using country totals	Number of people at the grid
Corine Land Cover (CLC) 2018	CLC2018 is one of the Corine Land Cover (CLC) datasets produced within the frame the Copernicus Land Monitoring Service referring to land cover / land use status of year 2018.	

3.2.2 Workflow description

The workflow to create the noise reference grid outside urban areas is shown in Figure 3.5.

The same workflow will be followed per each noise source outside urban areas (major roads, major railways and major airports) and for both L_{den} and L_{night} noise contour maps.

Figure 3.5: Workflow for the noise grid calculation outside urban areas (n.c.m stands for noise contour maps). Green boxes represent the calculations that will be done and included in the results

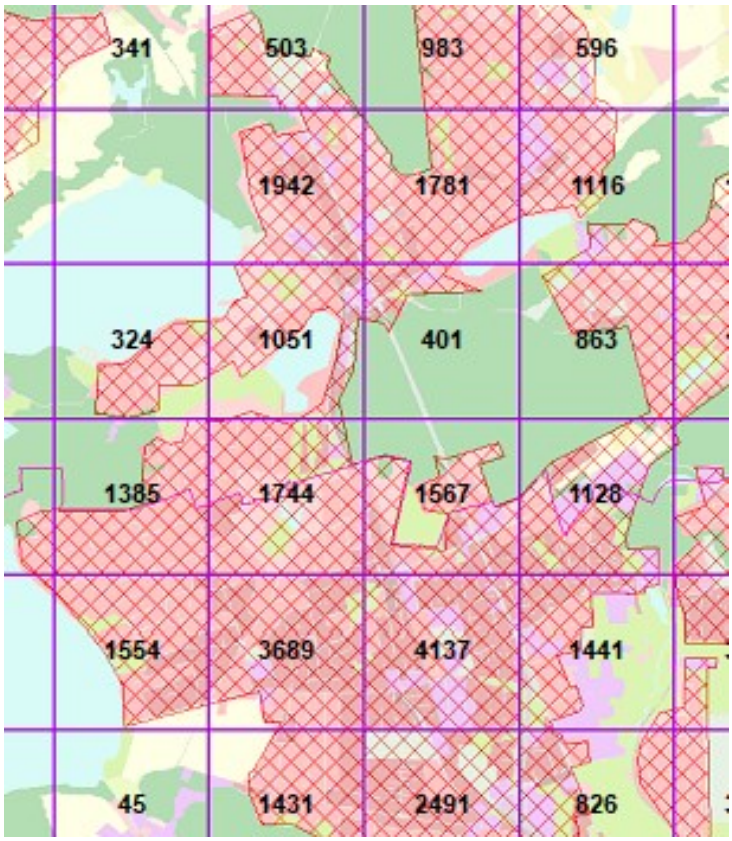


3.2.3 Data preparation

In order to prepare the input information to obtain the results described, a preliminary process need to be undertaken in order to redistribute population at 1 km grid into Corine Land Cover (CLC) residential polygons, based on area surface (see Figure 3.6).

In this case, as in Urban Atlas 2018, CLC polygons do not have associated the resident population. So, the grid population at 1x1 km will need to be associated with the residential classes of CLC 2018 (class 111 Continuous urban fabric and class 112 Discontinuous urban fabric)-

Figure 3.6: Redistribution of the population assigned to each grid cell at 1x1 km to the residential polygons of CLC based on area surface

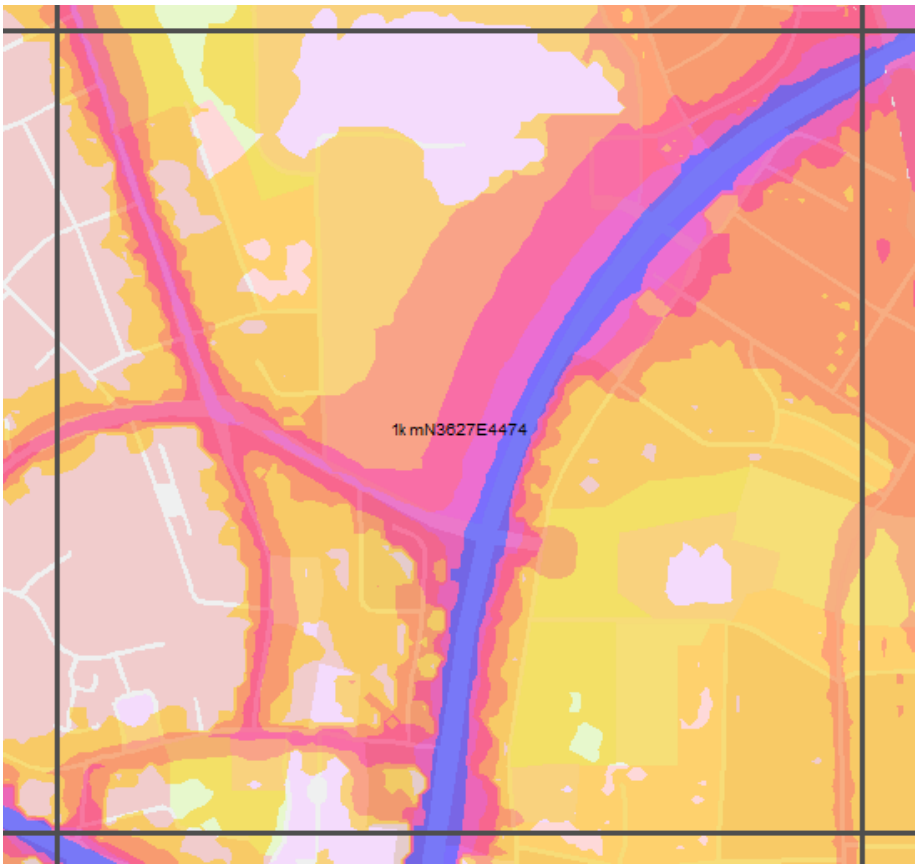


If only one residential polygon of CLC exists in the grid cell all the population is assigned to this polygon. When several residential polygons exists in the grid cell the population is assigned to the residential areas based on area surface.

3.2.4 Data calculation

To obtain the noise information per each reference grid cell, the first calculation is the area covered by the different noise contour band inside each grid cell, and this is obtained by overlaying noise contour maps for a specific source with the grid cells (see Figure 3.7).

Figure 3.7: Result of overlaying reference grid cells with noise contour maps (in this case, road noise)



Case 1: Grid cells not containing noise contour maps inside its borders

Nevertheless, provided that the reference grid is developed outside urban areas, there is going to be several grid cells that will not contain any noise contour map inside its borders.

In this case, there are different reasons for not having a noise contour map:

- Not applicable case.
    - there is not a noise source as defined by the END
    - there are no people exposed to noise above the thresholds defined by the END
- Not available situation: potentially there would be a noise contour map because there is a noise source located closely or inside the grid cell under evaluation but noise data has not yet been delivered

In order to solve the different cases, for the current purpose and to facilitate its use it it has been decided to label as “Data not available” .

Case 2: Grid cells containing noise contour maps inside its borders

Figure 3.8: depicts the situations that can occur when a cell contains noise contour bands:

Case 1: Cell with population data and CLC polygons of residential areas (overlapping or not the noise contour bands). The proposed approach is described in Figure 3.9.

- Case 2: Cell with population data but there are not CLC polygons of residential areas (residential areas below the CLC resolution). This is possible when residential areas are below the CLC resolution (25 ha minimum mapping unit). At the same time, it is possible to have some polygons from the CLC transport class.
- Case 3. No people is living in that cell but noise contour bands are available, which will result in values concerning area covered by the noise contour bands but the population will count as 0 for all noise bands.

Figure 3.8: Graphical representation of the situations found when a grid cell contains noise contour maps inside its borders

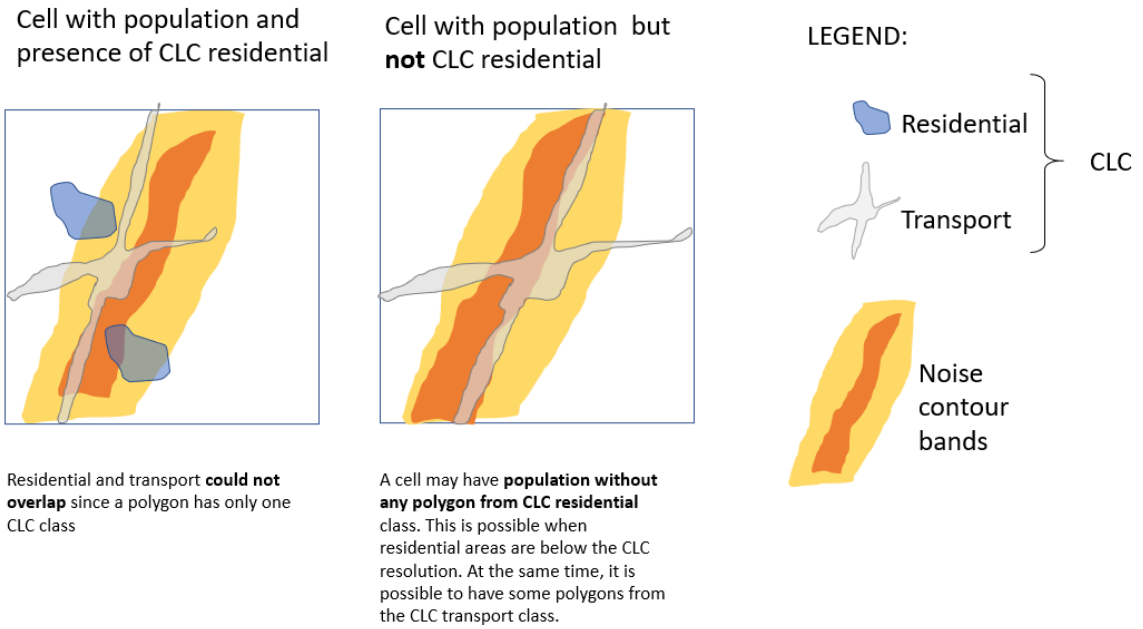
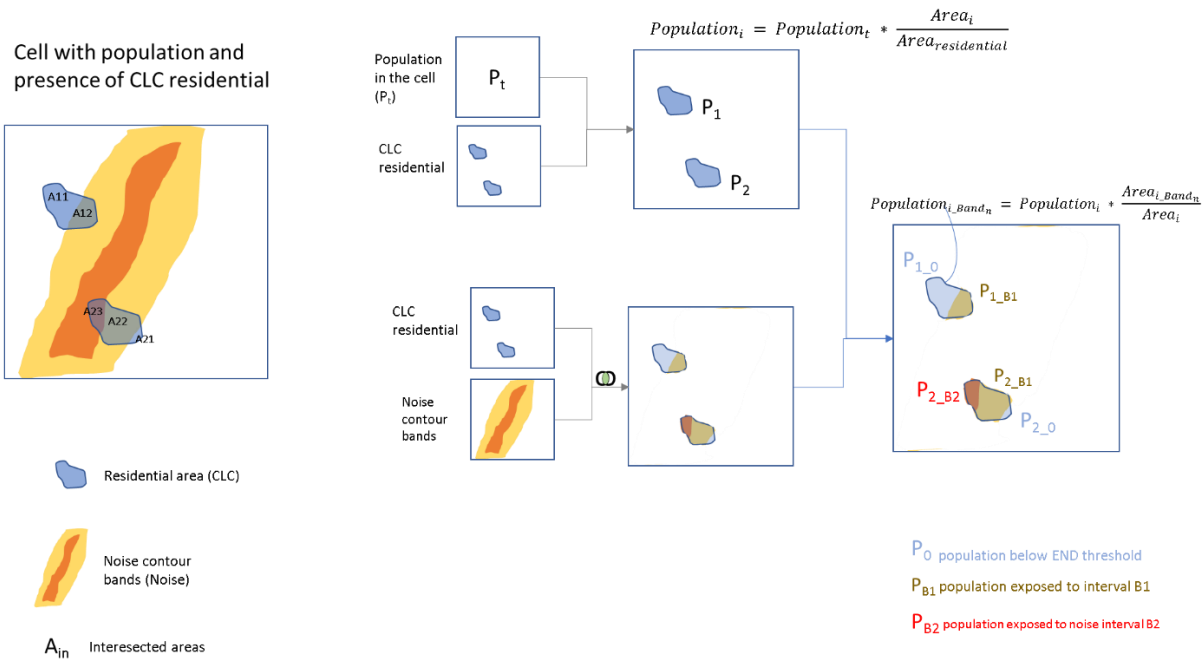
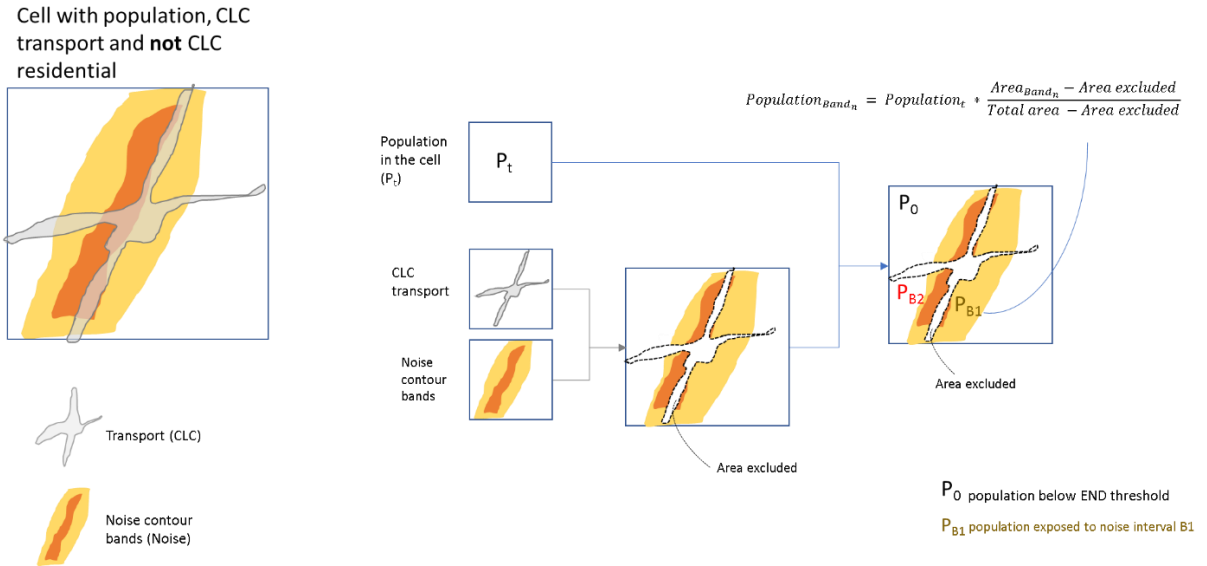


Figure 3.9: Case 1 of grid noise calculations outside agglomerations. Cell with population, CLC residential and noise contour maps



The methodology for case case 2 is presented in Figure 3.10. In this case, if there is a polygon of a CLC transport class, the area occupied by this polygon will be exluded from the final calculation.

Figure 3.10: Case 2 of grid noise calculation outside agglomerations. Cell with population and noise contour maps



In this case, the grid layer will be overlayed with the noise contour maps. This overlay will enable the calculation of the area of each noise band and assign the number of people exposed according to the percentage of this area in the grid. It is considered that the higher noise bands (> 75dB for L_{den} or > 70

dB for L_{night}) must be excluded from the analysis, as it is assumed that the infrastructure is located in those areas, where no residential areas can exist and therefore, no population can be considered as living in that specific noise contour band.

In Figure 3.11 there is an example of the different information that will need to be taken into considered in order to obtain the expected results.

Figure 3.11: Example of n.c.m, 1x1 km grid with population and CLC18 residential areas (red) outside agglomerations

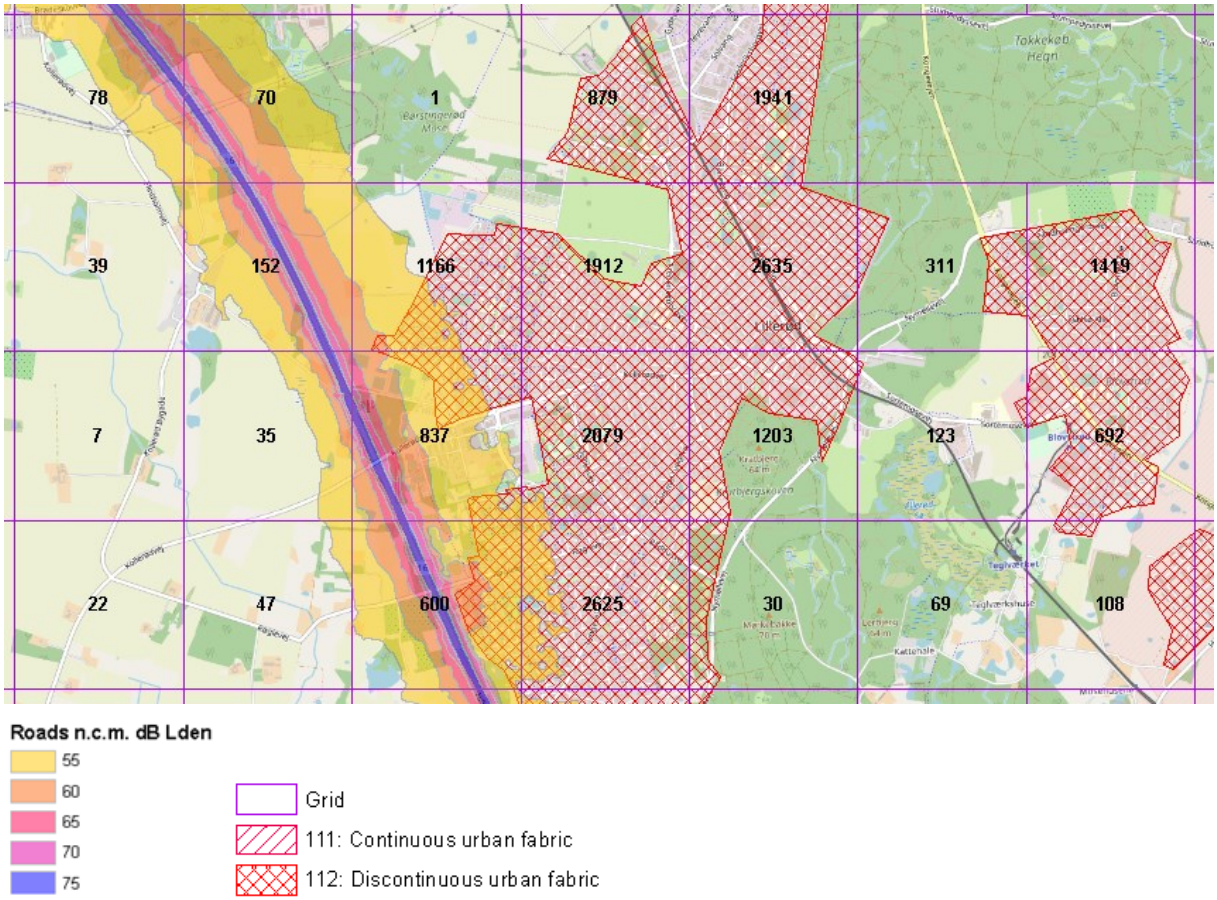


Table 3.4: Description of fields that each grid cell will contain concerning noise information, which will be included in a final geodatabase

Field	Description
CELLCODE	Cell code for 1x1 km grid
EOFORIGIN	grid cell origin
NOFORIGIN	grid cell origin
Pop_5559	Number of people exposed to 55-59 dB
Pop_6064	Number of people exposed to 60-64 dB
Pop_6569	Number of people exposed to 65-70 dB
Pop_7074	Number of people exposed to 70-74 dB
Pop_75	Number of people exposed to >=75 dB
Pop_Ge55	Number of people exposed to >=55 dB
Area_5559	Area of the noise countour dB range 5559 in the grid cell
Area_6064	Area of the noise countour dB range 6064 in the grid cell
Area_6569	Area of the noise countour dB range 6569 in the grid cell
Area_7074	Area of the noise countour dB range 7074 in the grid cell
Area_75	Area of the noise countour >= 75 dB in the grid cell
Per_5559	Percentage area of noise contour 55-59 in the grid cell
Per_6064	Percentage area of noise contour 60-64 in the grid cell
Per_6569	Percentage area of noise contour 65-70 in the grid cell
Per_7074	Percentage area of noise contour 70-74 in the grid cell
Per_75	Percentage area of noise contour >=75 in the grid cell
Pop_in_Grid	Total population of the cell from Geostat population 2017
Cellagg	Percentage of the 1km cell in the agglomeration (completely inside = 100)
Country	Country code
Agglomeration	Name of the END agglomeration / Outside END agglomeration
Ncm availability	Noise contour maps available (Yes / No)

* Ncm availability (Yes/No) defines the cells where noise data is not available (including all the different situations described in section 4.2.4.).

4 Calculation of the European reference grid with noise information and next steps

Based on priorities determined by the EEA, task for 2021 will be focused only on the production of the European noise reference grid for road noise and aircraft noise inside urban areas per L_{den} and L_{night} indicators, containing exposed people per each dB range and area of each dB range per each grid cell.

The European noise reference grid for road noise and aircraft noise inside urban areas will be both delivered by 15/10/2021, and will be used as input data for WP 3.2.5.1 Quiet areas assessment and WP 3.2.6.1. Integrated assessment of noise and air quality in Europe from ETC/ATNI Action Plan 2021.

This methodology is for the current noise data model and will need to be adapted to the next data model that will come into operation in the next reporting in 2022. The new model for strategic noise maps (DF4_8) are comprised by two types of data. The noise contours are submitted as spatial data and need to be submitted using a closed line geometry or a polygon. The population exposure data is linked to spatial units and can be provided using different reporting levels. The population exposure data for major roads and railways can be reported at country level or using smaller territorial units such as NUTS 1, 2, 3 or LAU. For major airports the data has to be reported by ICAO code with the possibility to represent the population exposure at LAU level. The information on population exposure inside agglomerations for road, rail, industry, major roads inside agglomeration or major railways inside agglomeration can be reported either at agglomeration level or using LAU units. The population exposure for airports or major airports inside agglomerations can be reported at agglomeration level or at LAU level along with the respective ICAO code when major airports' information is reported.

5 References

CLC, 2018, Corine Land Cover (CLC) 2018 (https://land.copernicus.eu/pan-european/corine-land-cover/clc2018).

EU, 2002, Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (OJ L 189, 18.7.2002, p. 12-25).

Geostat, 2017, Population at 1km grid, based on Geostat2011, scaled to 2017 using country totals.

JRC, 2021, Joint Research Centre 2021. Polygon-level estimates of population for the Urban Atlas 2018 dataset. *Pending of final publication*.

Sáinz de la Maza, M. et al., 2020, 'Integrated assessment of people exposed to noise and air quality in agglomerations', Eionet- ETC/ATNI Working Paper, 2020, European Topic Centre on Air pollution, transport, noise and industrial pollution, c/o NILU, Kjeller, Norway.

UA, 2018, Urban Atlas LCLU 2018 (https://land.copernicus.eu/local/urban-atlas/urban-atlas-2018).

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