07.05 Strategic Noise Maps (Edition 2017)

Overview

Legal Provisions and Competent Authorities

The "Directive of the European Parliament and of the Council relating to the assessment and management of environmental noise" (Directive 2002/49/EC) came into force on February 18, 2002, when it was published in the Official Journal of the European Community. For the European Community, this opened the path to legal provisions covering noise immission into the environment.

The German Federal Environment Agency (Umweltbundesamt) describes the objectives of the Directive as follows:

"Ensuring a high degree of health and environmental protection is part of the Community policies, one of the objectives being noise protection." To achieve this, "adverse effects of and annoyance caused by environmental noise must be prevented, avoided and reduced." This requires the following action:

- determining the load caused by environmental noise by means of noise maps, according to assessment methods to be used by all Member States;
- ensuring that the public is informed about environmental noise and its effects;
- adoption of action plans by the Member States based on the results of noise maps, aiming to prevent and reduce environmental noise where necessary, particularly in cases where exposure levels might have effects detrimental to health, and further aiming to maintain environmental noise quality where it is good.

Furthermore, the Directive is to form the basis for the further development and enhancement of measures to reduce the noise emission of the most relevant noise sources, also to inform the European Commission about the exposure caused by environmental noise in the Member States.

The Senate Department for the Environment, Transport and Climate Protection (SenUVK) has ordered and implemented the Noise Mapping Project 2017, “Level 2” as an update of the Noise Mapping Project 2012, for the State of Berlin, as provided in the requirements of the Noise Mapping Ordinance and the Federal Immission Protection Ordinance (34th BImSchV/ Bundes-Immissionschutzverordnung), in connection with §§ 47 a-f of BImSchG (Federal Immission Protection Act / Bundes-Immissionschutzgesetz) and Directive 22002/49/EC (Environmental Noise Directive), with the current LAI instructions on noise mapping taken into consideration.

Due to distinct responsibilities, only the noise maps created by the Senate Department the Environment, Transport and Climate Protection are published here. These cover the areas of road traffic (motor vehicles including buses), streetcar traffic and traffic on the above-ground sections of the subway, air traffic as well as industrial and commercial lots.
The analysis of noise from rail traffic according to the General Railway Act (Allgemeines Eisenbahngesetz, AEG) is published here on the site of the Federal Railway Authority (Eisenbahn-Bundesamt, EBA, only in German).

The plan aims at creating strategic noise maps and the related statistical evaluations (exposure for humans, dwellings, schools and hospitals in specific immissions-level classes). The results were prepared with respect to the following items for further utilization:

- Basis for reporting to the EU and for informing the public
- Basis for continuing the Noise Action Plan 2018 (noise reduction planning for Berlin (only in German))
- Basis for managing the output data (data model care)
- Basis for re-calculation and evaluation of spatially defined areas

The BImSchG, §§ 47 a-f, sets the rules for implementing the EU Environmental Noise Directive under German law. The 34th BImSchV defines the requirements for noise maps under §§47 c of the BImSchG.

Noise maps must always be based on calculations. The calculations must comply with the preliminary calculation rules set by the EU, which in some respects differ from the Technical Codes applicable under national law (see below, Calculation Method).

Noise maps are to be reviewed and, if necessary, revised every five years, after they have been drawn up (Level 1 in 2007; Level 2 in 2012; Level 3 in 2017; Level 4 in 2022 etc.).

General description of major noise sources by location, magnitude and traffic occurrence/extent of mapping

The boundaries of the area of investigation are the borders of the State of Berlin. The noise sources to reinvestigate are:

- Road traffic (motor vehicles including busses)
- Streetcar traffic and above-ground subway traffic (PBefG, Passenger Transportation Act)
- Industrial and commercial lots with facilities as per Annex 1, European Industrial Emissions Directive (IED)
- Air traffic
- Rail traffic according to the General Railway Act (AEG)

Significant other major noise sources of road traffic in areas of the state of Brandenburg near the Berlin border which exceed the stipulated immission level were also included.

An overview of the noise sources included in the responsibility of the State of Berlin is shown in Table 1:

Table 1: Main noise sources for noise mapping in the conurbation area of Berlin

Noise source	Network	Route length
Road traffic	Federal Motorway / Highway	332.8 km
	Municipal Highway	1,229.0 km
Streetcar traffic and above-ground subway traffic	Streetcar	201.3 km
	Subway (above-ground)	27.2 km
IED plants		
	18 power plant locations	
Air traffic	Berlin-Tegel Airport, reference year 2015	
	Schönefeld Airport, reference year 2010	

Table 1: Main noise sources for noise mapping in the conurbation area of Berlin

In road traffic, deviations from the route lengths on the 2012 map are due to the fact that the on- and off-ramps of the Federal motorways have been digitalized meticulously.

In streetcar rail traffic, deviations from the route lengths on the 2012 map are due to new segments (e.g. connection to Berlin Central Station).

Ancillary conditions when considering the total values of noise pollution

To date, the legal regulations described do not provide for the compilation of overall noise levels, so that each of the major sources of noise is independently determined and assessed separately. However, the 2004 Environmental Report, p. 490, of the Advisory Council on the Environment, states "a reduction in noise pollution impact upon the population can therefore only be successful if a combination of various sources of noise is considered."

However, since the dose-response relationships in case of simultaneous impact of several noise sources has hitherto been extremely difficult to describe from a medical and psychological point of view, we have here chosen a simplified approach:

- All immission values for the various major noise sources have an equal degree of impact, i.e. noise-type-specific impact factors based on a bonus-malus system will not assigned.
- Only the energy levels of the separate noise sources are added.

(A study by the TÜV (German Technical Inspection Service) on Immission Protection and Energy Systems includes more information on "total noise" (only in German)).

Note: The mapping of the railways under the General Railway Act (AEG) by the Federal Railway Authority entered into the consideration of the total values of noise pollution (as of December 2016).

When considering the total values of noise pollution, the peculiarities of the logarithmic decibel scale must be taken into account. For instance, the volumes of two 50 dB(A) events add up to 53 dB(A), since this increase by 3 dB(A) is perceived by the ear as a doubling of impact. Two components of 50 dB(A) and 60 dB(A) add up to 60.4 dB(A).

Statistical Bases and Calculation Model

Statistical Bases

For the calculation of the noise values upon which the present maps are based, the input data available to the State of Berlin for the reference year 2015 were used.

Mapping Zone

The mapping zone covers the area of the State of Berlin, amounting to 892 km². The examination covered the noise load exposure of 3,606,316 inhabitants (as of 31 December 2016).

Terrain Model

The terrain elevations for the Level 3 noise mapping were taken from the Digital Terrain Model DGM1 (as of 2015). All elevation points of the 1 m grid were used without having undergone any further editing or simplification processes.

Noise Insulation Facilities

The location, elevation and absorption behaviour of noise protection facilities on roads and rail lines were adopted from the Level 2 (2012) noise mapping. Based on knowledge of the locale and in coordination with the client, additions and corrections were made to the data where required.

Special Structures

Tunnels / Railway Stations

Tunnel facilities were depicted in the calculation model by interruptions in route lines. Tunnel openings were not modelled as separate noise sources.

Noise levels for railway traffic in railway stations were calculated as is equal to those on open tracks, without accounting for reduction in speed. The blocking of noise by railway platforms and railway station buildings was not taken into account in the calculation of rail traffic noise. For other types of noise, railway station buildings were accounted for as obstacles.

Road Bridges

Bridges were taken into account in 832 sections where the high position of a road or rail has a relevant acoustic effect on the neighbouring built-up area. A reflecting bridge platform was modelled across the width of the road or rail in each of these cases.

When using the noise map, the following must be observed: bridge structures are not included in the surface of the terrain; rather, they rise above the terrain. **Noise maps are calculated at a height of 4 m above the terrain, and can therefore be related to the area below a "noisy" road bridge which acts as a sound barrier, with accordingly low local immission levels.**

Built-up Area

The floor plans of 534,187 buildings were adopted from the Official Property Cadastre Information System (ALKIS) (SenStadtWohn n.d.) of the State of Berlin, including information on the number of floors and the following building uses (see Table 2):

Table 2: Building uses and number of buildings, used as input parameters for the strategic noise maps of Berlin	
Use	**Number of buildings**
Residential	298,908
School	2,604
Hospital	531
Miscellaneous	232,144

Table 2: Building uses and number of buildings used as input parameters for the strategic noise maps of Berlin

Explicit building heights were not available and were, therefore, defined through the following empirically determined function: [building height = 3.2 m + number of storeys x 2.8 m]. As information on use is available for most buildings, the above function will be altered in justified cases. For garages, kiosks and public toilets, a height of 2.5 m is set per storey; for halls, sheds and transformers it is 3 m per storey.
159,473 buildings in the areas surrounding Berlin were integrated into the model including their explicit height data from the State of Brandenburg. These buildings act as obstructions and reflectors of road and railway noise sources at the edge of the area under examination.
Building façades were included in the calculations as reflecting objects, with an absorption loss of 1 dB(A).

Building Inhabitants

The figures for numbers of residents, with principal and secondary domiciles, are available in 14,707 blocks and block segments of the municipal area (as of 31 December 2016). These residents were proportionately assigned to the storeys of the blocks of flats located in the respective sections. Buildings with mixed use were incorporated into the distribution, and assigned shares of between 25 and 75%, in accordance with their respective use levels.

Dwellings

The number of dwellings was taken from Kleine Berlin-Statistik 2015 the total being 1,891,800. This resulted in a mean value of 1.91 inhabitants per dwelling. This factor and the number of inhabitants affected yielded the number of dwellings affected.

Geometry / Road Traffic

For the 2017 noise map, the network of city streets and motorways from the environment network was used for the mapping (based on the detailed network of the VMZ (Traffic Control Center Berlin), as of January 2016) of the Senate Department for the Environment, Transport and Climate Protection as well as the traffic volume of the 2014 traffic count, including updates (cf. Map Traffic Volumes (07.01, Edition 2017)), permitted maximum speeds and road surface related parameters as of 2015.

In the model formation for the calculation, the following properties were taken into account:

- **Lanes**: For road segments with different numbers of lanes per direction, the (asymmetrical) position of the outermost lane is explicitly used to locate the linear noise sources (hence, the mean distance from the road centre line is not used here). The lane width for single-lane roads per direction is 3.75 m and 3 m for multi-lane roads per direction. In justified individual cases, deviating lane widths are applied for each direction. **One-way streets**: For single-lane one-way streets, the location of the road centre line is used as the linear noise source. For multi-lane one-way streets, the right lane is used, assuming the worst case scenario.
- **Bus lanes**: If bus lanes are present, the boundary between the outermost lane and the bus lane is set as the location of the linear noise source.
- **(Advisory) cycle lane**: If (advisory) cycle lanes are available, 1 metre is subtracted from the calculated distance between the road centre line and the outermost lane.
- **Time-dependent speed limits**: In sections with a time-dependent speed limit, an average speed is calculated, based on an approach weighted by hours for the periods daytime, evening and nighttime respectively.
- **Road surface**: In the case of different road surface materials (asphalt, paving stones, etc.) per direction, the inferior road surface is assigned to both directions, based on the speed-

dependent DStrO (noise immission correction value for varying road surfaces), thus assuming the worst-case scenario.

- **Road surface quality**: In case of differences in road quality (cracks, holes, etc.) per direction, the inferior road quality is assumed for both directions, thus applying the worst-case scenario. The DStrO value, which was previously determined based on the road surface, may be increased further, depending on the road quality and the speed.
- **Disparate traffic volumes**: For road segments with different levels of traffic flow in each direction, the asymmetrical distribution of traffic has purposely been taken over. The assumption of a 50-50 occurrence of traffic flow in each direction is not used in this case.

Data on the principal roads in the State of Brandenburg close to the Berlin border, including the required calculation parameters, have been provided by the Brandenburg State Environmental Agency.

A total of 1,859.2 km of roadway have been incorporated into the calculation, of which 1,561.8 km are located on the territory of the city of Berlin. Further principal main roads in Brandenburg, which are located up to 2 km from Berlin's city borders and exceed the stipulated resulting immission level, were also included. Here, the mapping network of the Level 2 noise maps for the border area was referred to, as the Level 3 noise mapping traffic numbers of the Brandenburg mapping network were not yet available at the time of calculation.

Geometry / Streetcar Traffic, Above-Ground Subway Traffic

Streetcars

A total of 201.3 km of track of the streetcar network were modelled. Differences in route lengths from the 2012 map are predominantly caused by new streetcar segments (e.g. connection to Berlin Central Station).

The situation of the streetcar network, including the route parameters, is based on the network of the 2012 Level 2 map, with the following modifications:

- Situation correction based on the planning documents of the network geometry of the streetcar tracks as provided by the BVG, with the additional use of orthophotos
- Consideration of service railyards (each modelled with one main track)
- Network expansions (e.g. connection to Berlin Central Station) and network cutbacks (e.g. segment toward Schwartzkopffstraße underground station)
- Adaptation of road types according to BVG specifications
- Adoption of correction values for screeching in curves dependent on the curve radii based on the 2012 noise mapping, assignment of correction values for squeaking sounds in curves caused by curve radii for new sections
- Assignment of correction values for bridges and railway overpasses
- Assignment of correction values to reduce noise in curves by use of rail lubrication and surface conditioning facilities
- In cases of relevant distances between the tracks in the two directions, division of those routes by direction
- Adoption of current information on maximum speed from the BVG

Streetcar traffic was adopted into the calculation model by assignment of detailed electronic "count slips" of the BVG (as of 2016) to 126 route segments, and the Schöneiche-Rüdersdorf Tram Co. GmbH (Line 88) timetable (as of 1 January 2016).

Above-Ground Subway

The situation of the subway lines, including the route parameters, is based on the network of the Level 2 (2012) map and is used with the following modifications:

- Supplementary assignment of correction values for screeching in curves dependent on the curve radii and the presence of further rail head conditioning facilities according to current BVG data (as of 2016).

The subway traffic to the segments above-ground was included in the calculation model according to BVG data (as of 2012).

A total of 27.2 km of subway track were modelled.

Geometry / Industrial and Commercial Plants

The Berlin noise map for commercial sites which affected ambient noise covers 18 power plant sites.

Plants (see Table 3) have an effect on environmental noise if they cause relevant sound immissions, i.e., those in excess of L_{DEN} = 55 dB(A) and/or L_{Night} = 50 dB(A), at a nearby type of use requiring protection. The site of the TSR Recycling GmbH & Co. KG in the Westhafen area was removed here, as compared to the 2012 noise map.

For the 18 power plants in the area of the city of Berlin, there was no change compared with the 2012 noise map.

Table 3: Location of the IED facilities taken into account for the strategic noise maps

No:	IED Facility
1	Lichtenberg Cogeneration Plant, Rhinstraße
2	Mitte Cogeneration Plant, Köpenicker Straße
3	Scharnhorststraße District Heat Plant, Habersaathstraße
4	Reuter West Cogeneration Plant, Großer Spreering
5	Reuter Cogeneration Plant, Otternbuchstraße
6	Lichterfelde Cogeneration Plant, Ostpreußendamm
7	Charlottenburg Cogeneration Plant, Am Spreebord
8	Klingenberg Cogeneration Plant, Köpenicker Chaussee
9	Wilmersdorf Cogeneration Plant, Forckenbeckstraße
10	Moabit Cogeneration Plant, Friedrich-Krause-Ufer
11	Köpenick Block-Scale Power Plant, Wendenschloßstraße
12	Buch Cogeneration Plant, Schwanebecker Chaussee
13	Neukölln District Heat Plant, Weigandufer
14	Märkisches Viertel District Heat Plant, Wallenroder Straße
15	Lange Enden Peak Heat Plant, Lange Enden
16	Schering AG Firing Plant, Müllerstraße
17	BTB mbH Berlin, Albert-Einstein-Straße
18	Neukölln Wood-fired Cogeneration Plant, Köpenicker Straße

Table 3: Location of the IED facilities considered in the strategic noise maps

Geometry / Traffic at Berlin's Tegel and Schönefeld Airports

For the aircraft noise calculation at **Berlin-Tegel Airport,** the following input data was available:

- The data recording system 2017_01_23_QSI_TXL_2015_VBUF, as of 2015
- The geometric description of the runways and the arrival and departure routes (location, altitude, flight corridors) and route assignments, with movement figures for each aircraft type
- Distribution of the 185,464 flight movements of various aircraft types on the runways for the periods daytime, evening and night-time, in 2015.

For **Schönefeld Airport**, the calculation results of 76,607 aircraft movements were taken from the mapping process of the State of Brandenburg, with reference year 2010.

The Brandenburg Ministry for Rural Development, Environment and Agriculture (MLUL) coordinated and executed the Level 3 noise mapping for Berlin-Brandenburg Airport (BER). The noise mapping was forecast for the year 2023. A report on the noise mapping process, the respective noise maps and the number of people affected can be found on the MLUL website (only in German).

Mapping process for the railways subject to the General Railway Act

The Federal Railway Authority (EBA) independently carried out the noise mapping process for the federal railways according to the General Railway Act (AEG). The current data (as of 30 June 2017) can be viewed via the EBA's map service (only in German). The data will be passed on to the Senate Department of Urban Development and the Environment and will enter into the consideration of the total values of noise pollution.

Calculation Model

Software Employed

The input data were prepared and compiled in a 3D calculation model of the software (IMMI 2016).

Obstructions

Obstructions, such as terrain edges, buildings and noise insulation facilities, were taken into account, with the parameters described in the input data (location, altitude, reflection properties, etc.). The basic model formed from the terrain and obstructions remained as it was for the calculation of all noise types.

Determination of Reception Points

At residential buildings, hospitals and schools, the position of reception points was determined according to the “Preliminary Calculation Method for Determining the Exposure Figures Caused by Environmental Noise” (VBEB). The number of inhabitants in residential buildings was distributed among the reception points of the respective residential buildings in equal shares.

Plausibility Check

The plausibility check consists of a visual check of 3D-views of the calculation model and numerous automatic plausibility queries. The following contexts are automatically checked in this process:

- Crossing of road and tram sections with buildings
- Crossing of noise protection walls with road and tram sections, buildings or bridge structures
- Value range of immission factors (traffic, speed etc.)
- Value range of building heights and areas, reflection properties
- Value range of relative and absolute heights of sound sources and obstructions
- Value range of number of inhabitants per building
- Random checks of transferred building uses

Calculation Parameters

It is not possible to carry out a mapping process, which meets the requirements of the Environmental Noise Directive within economically realistic parameters, if the calculation rules are followed completely and strictly. For that reason, calculation parameters were determined in a simplified manner (**minimum level distance = 25 dB(A)**, range of reflection surfaces limited to 500 m, **first-order reflection**), essentially resulting in a neglect of irrelevant immission effects at certain reception points. Comparative calculations with reference defaults demonstrate that the accuracy requirements for the calculation results of the LAI (Working Commission for Immission Protection) instructions on noise mapping are met with an overall accuracy of 2 dB.

Calculation Method

Road Traffic

The Preliminary Calculation Method for Environmental Noise at Roads (VBUS) was used for the acoustic calculations of the strategic noise maps (cf. 34th BImSchV, § 5, Sect. 1). The noise indices L_{DEN} (weighted 24-h mean value) and L_{Night} were calculated with a grid size of 10 m x 10 m at a reception point height of 4 m above the ground.

The number of persons exposed in their dwellings, of schools and hospitals was determined according to the Preliminary Calculation Method for Determining the Exposure Figures Caused by Environmental Noise (VBEB).

The corrections for multiple reflections were determined and considered according to the specifications made in the VBUS. Separate corrections for traffic lights are not allowed.

Streetcar and Subway Traffic

The Preliminary Calculation Method for Environmental Noise at Railways"(VBUSch and the VBEB) (cf. 34th BImSchV, § 5, Sect. 1) were used for acoustic calculation of the strategic noise maps as well as the persons exposed in their dwellings, schools and hospitals. The noise indices L_{DEN} and L_{Night} were calculated with a grid size of 10 m x 10 m at a reception point height of 4 m above the ground.

Commercial Plants

The Preliminary Calculation Method for Environmental Noise Caused by Industrial and Commercial Plants (VBUI) (cf. 34th BImSchV, § 5, Sect. 1) were used for the acoustic calculation of the strategic noise maps, as well as the persons exposed in their dwellings, schools and hospitals. The noise indices L_{DEN} and L_{Night} were calculated with a grid size of 10 m x 10 m at a reception point (façade level) height of 4 m above the ground.

Air Traffic

The Preliminary Calculation Method for Environmental Noise at Airfields - Data Acquisition System (VBUF-DES) and the Preliminary Calculation Method for Environmental Noise at Airfields - Calculation Instructions (VBUF-AzB) (cf. 34th BImSchV, § 5, Sect. 1) were used for the acoustic calculation of the strategic noise maps, as well as the persons exposed in their dwellings, schools and hospitals.

Using the Data Display

The various subject maps made available to the public here represent the noise situation in relation to areas broken down by classes, as provided in the Environmental Noise Directive. Moreover, they also provide the possibility of obtaining factual data by surveys: Maps 07.05.1 and 07.05.2 can also be used to show background information on the Federal motorway, highway and road network registered. Since the grid used for representation in these maps is a 10 m x 10 m grid, the individual statements are only of limited use in the precise evaluation of buildings. For that reason, Map 07.05.11 (Façade Levels at Residential Buildings within the Exposure Range of Main Noise Sources) provides a complete overview of the reception points used on the façades of residential buildings, schools and hospitals, including the immissions levels calculated.

Calculation Results / Tabular Evaluations

As required in the "Directive on the Assessment and Management of Environmental Noise", strategic noise maps graphically represent the noise situation in the following isophone classes:

Fig. 1: Representation of isophone classes according to the requirements of 34th BImSchV	
	L_{Night} > 50 dB(A) up to 55 dB(A)
L_{DEN} > 55 dB(A) up to 60 dB(A)	L_{Night} > 55 dB(A) up to 60 dB(A)
L_{DEN} > 60 dB(A) up to 65 dB(A)	L_{Night} > 60 dB(A) up to 65 dB(A)
L_{DEN} > 65 dB(A) up to 70 dB(A)	L_{Night} > 65 dB(A) up to 70 dB(A)
L_{DEN} > 70 dB(A) up to 75 dB(A)	L_{Night} > 70 dB(A)
L_{DEN} > 75 dB(A)	

Fig. 1: Representation of isophone classes according to the requirements of the "Directive on the Assessment and Management of Environmental Noise"

They form the basis for preparing an overall urban noise reduction plan (only in German).

The noise exposure is specified through the following variables:

- Tabular data about the estimated number of persons living in areas located within the isophone bands according to Figure 1. Figures should be rounded up or down to the next hundredth place.
- Tabular data about noise-exposed areas as well as the estimated number of dwellings, schools and hospitals in these areas for the following L_{DEN} values: L_{DEN} > 55 dB(A),

L_{DEN} > 65 dB(A), L_{DEN} > 75 dB(A). Figures of impacted dwellings should be rounded up or down to the next hundredth place here.

The summarized results of the exposure and area statistics for the main federal railway lines for conurbation areas are available here.

Road Traffic

Note: The current strategic noise maps required a change in the detailing of the statistical parameters used, including the building uses and the inhabitant distribution across block segment areas. Therefore, the impact statistics of the 2012 and 2017 Berlin noise maps cannot be compared directly to each other.

Table 4: Number of people impacted in their homes due to road traffic noise on all streets assessed (based on the noise index L_{DEN})					
Level range L_{DEN} in dB(A)	>55 to 60	>60 to 65	>65 to 70	>70 to 75	>75
Number of persons	223,200	170,900	160,700	104,200	5,500

Table 4: Number of people impacted in their homes due to road traffic noise on all streets assessed (based on the noise index L_{DEN})

Table 5: Number of persons exposed to road traffic noise in their homes on all streets assessed (based on the noise index L_{Night})					
Level range L_{Night} in dB(A)	>50 to 55	>55 to 60	>60 to 65	>65 to 70	>70
Number of persons	193,700	165,200	139,300	29,700	300

Table 5: Number of people impacted in their homes due to road traffic noise on all streets assessed (based on the noise index L_{Night})

Table 6: Plots of land, dwellings, and school and hospital buildings impacted by road traffic noise on all streets assessed				
		Level range L_{DEN} in dB(A)		
	Total	**>55**	**>65**	**>75**
Area in km²	892	261.8	90.1	17.5
Number of dwellings	1,891,800	348,200	141,700	2,900
Number of school buildings	2,604	566	56	0
Number of hospital buildings	531	120	18	0

Table 6: Plots of land, dwellings, and school and hospital buildings impacted by road traffic noise on all streets assessed

In the assessment of schools and hospitals affected, each building of the respective facility was considered.

Streetcar and Subway Traffic

Note: The current strategic noise maps required a change in the detailing of the statistical parameters used, including the building uses and the inhabitant distribution across block segment areas. Therefore, the impact statistics of the 2012 and 2017 Berlin noise maps cannot be compared directly to each other.

Table 7: Number of people impacted in their homes due to streetcar and subway noise (based on the noise index L_{DEN})					
Level range L_{DEN} in dB(A)	**>55 to 60**	**>60 to 65**	**>65 to 70**	**>70 to 75**	**>75**

Number of persons	43,100	29,200	15,900	1,700	400

Table 7: Number of people impacted in their homes due to streetcar and subway noise (based on the noise index L_{DEN})

Table 8: Number of people impacted in their homes due to streetcar and subway noise (based on the noise index L_{Night})					
Level range L_{Night} in dB(A)	**>50 to 55**	**>55 to 60**	**>60 to 65**	**>65 to 70**	**>70**
Number of persons	35,800	20,700	9,200	800	0

Table 8: Number of people impacted in their homes due to streetcar and subway noise (based on the noise index L_{Night})

Table 9: Plots of land, dwellings, and school and hospital buildings impacted by streetcar and subway noise				
		Level range L_{DEN} in dB(A)		
	Total	**>55**	**>65**	**>75**
Area in km²	892	23.3	7.0	0.3
Number of dwellings	1,891,800	47,400	9,500	200
Number of school buildings	2,604	52	2	0
Number of hospital buildings	531	13	1	0

Table 9: Plots of land, dwellings, and school and hospital buildings impacted by streetcar and subway noise

In the assessment of schools and hospitals affected, each building of the respective facility was considered.

Industry and Commerce

Table 10: Number of people impacted in their homes due to industrial and commercial noise (based on the noise index L_{DEN})					
Level range L_{DEN} in dB(A)	**>55 to 60**	**>60 to 65**	**>65 to 70**	**>70 to 75**	**>75**
Number of persons	300	100	100	0	0

Table 10: Number of people impacted in their homes due to industrial and commercial noise (based on the noise index L_{DEN})

Table 11: Number of people impacted in their homes due to industrial and commercial noise (based on the noise index L_{Night})					
Level range L_{Night} in dB(A)	**>50 to 55**	**>55 to 60**	**>60 to 65**	**>65 to 70**	**>70**
Number of persons	100	100	0	0	0

Table 11: Number of people impacted in their homes due to industrial and commercial noise (based on the noise index L_{Night})

Table 12: Plots of land, dwellings, and school and hospital buildings impacted by industrial and commercial noise		
		Level range L_{DEN} in dB(A)

	Total	>55	>65	>75
Area in km²	892	2.60	1.2	0.0
Number of dwellings	1,891,800	200	100	0
Number of school buildings	2,604	0	0	0
Number of hospital buildings	531	0	0	0

Table 12: Plots of land, dwellings, and school and hospital buildings impacted by industrial and commercial noise

All individual buildings were included in the evaluation of the schools and hospitals involved.

Air Traffic

Note: The current strategic noise maps required a change in the detailing of the statistical parameters used, including the building uses and the inhabitant distribution across block segment areas. Therefore, the impact statistics of the 2012 and 2017 Berlin noise maps cannot be compared directly to each other. However, this effect is of minor importance when it comes to air traffic, as mixed use only occurs in a limited part of the impacted areas.

Berlin-Tegel Airport, reference year 2015

Table 13: Number of people impacted in their homes due to aircraft noise from Berlin-Tegel Airport (based on the noise index L_{DEN})

Level range L_{DEN} in dB (A)	>55 to 60	>60 to 65	>65 to 70	>70 to 75	>75
Number of persons	141,900	108,600	22,800	2,500	0

Table 13: Number of people impacted in their homes due to aircraft noise from Berlin-Tegel Airport (2015) (based on the noise index L_{DEN}).

Table 14: Number of people impacted in their homes due to aircraft noise from Berlin-Tegel Airport (based on the noise index L_{Night})

Level range L_{Night} in dB (A)	>50 to 55	>55 to 60	>60 to 65	>65 to 70	>70
Number of persons	74,000	15,200	1,000	0	0

Table 14: Number of people impacted in their homes due to aircraft noise from Berlin-Tegel Airport (2015) (based on the noise index L_{Night}).

Table 15: Plots of land, dwellings, and school and hospital buildings impacted by aircraft noise from Berlin-Tegel Airport

		Level range L_{DEN} in dB (A)		
	Total	>55	> 65	> 75
Area in km²	892	60.0	10.5	1.8
Number of dwellings	1,891,800	144,600	13,300	0
Number of school buildings	2,604	226	4	0
Number of hospital buildings	531	35	1	0

Table 15: Plots of land, dwellings, and school and hospital buildings impacted by aircraft noise from Berlin-Tegel Airport

Schönefeld Airport, reference year 2010

Table 16: Number of people in Berlin impacted in their homes due to aircraft noise from Schönefeld Airport (2010) (based on the noise index L_{DEN})					
Level range L_{DEN} in dB (A)	**>55 to 60**	**>60 to 65**	**> 65 to 70**	**> 70 to 75**	**> 75**
Number of persons	4,700	1,500	0	0	0

Table 16: Number of people in Berlin impacted in their homes due to aircraft noise from Schönefeld Airport (2010) (based on the noise index L_{DEN})

Table 17: Number of people in Berlin impacted in their homes due to aircraft noise from Schönefeld Airport (2010) (based on the noise index L_{Night})					
Level range L_{Night} in dB (A)	**>50 to 55**	**>55 to 60**	**>60 to 65**	**>65 to 70**	**>70**
Number of people	2,100	200	0	0	0

Table 17: Number of people in Berlin impacted in their homes due to aircraft noise from Schönefeld Airport (2010) (based on the noise index L_{Night})

Table 18: Plots of land, dwellings, and school and hospital buildings in Berlin impacted by aircraft noise from Schönefeld Airport (2010)				
		Level range L_{DEN} in dB (A)		
	Total	**>55**	**>65**	**>75**
Area in km²	8912	9.5	0	0.0
Number of dwellings	1,891,800	3,400	0	0
Number of school buildings	2,604	0	0	0
Number of hospital buildings	531	0	0	0

Table 18: Plots of land, dwellings, and school and hospital buildings in Berlin impacted by aircraft noise from Schönefeld Airport (2010)

Berlin-Tegel (2015) and Schönefeld Airports (2010)

Table 19: Total number of people in Berlin impacted in their homes due to aircraft noise from Berlin-Tegel (2015) and Schönefeld Airports (2010) (based on the noise index L_{DEN})					
Level range L_{DEN} in dB (A)	**>55 to 60**	**>60 to 65**	**> 65 to 70**	**> 70 to 75**	**> 75**
Number of persons	146,600	110,100	22,800	2,500	0

Table 19: Total number of people in Berlin impacted in their homes due to aircraft noise from Berlin-Tegel (2015) and Schönefeld Airports (2010) (based on the noise index L_{DEN})

Table 20: Total number of people in Berlin impacted in their homes due to aircraft noise from Berlin-Tegel (2015) and Schönefeld Airports (2010) (based on the noise index L_{Night})					
Level range L_{Night} in dB (A)	**>50 to 55**	**>55 to 60**	**>60 to 65**	**>65 to 70**	**>70**

Number of persons	76,100	15,400	1,000	0	0

Table 20: Total number of people in Berlin impacted in their homes due to aircraft noise from Berlin-Tegel (2015) and Schönefeld Airports (2010) (based on the noise index L_{Night})

Table 21: Total of plots of land, dwellings, and school and hospital buildings in Berlin impacted by aircraft noise from Berlin-Tegel (2015) and Schönefeld Airports (2010)

		Level range L_{DEN} in dB (A)		
	Total	**>55**	**> 65**	**> 75**
Area in km^2	892	69.5	10.5	1.8
Number of dwellings	1,891,800	148,000	13,300	0
Number of school buildings	2.604	226	4	0
Number of hospital buildings	531	35	1	0

Tab. 21: Total of plots of land, dwellings, and school and hospital buildings in Berlin impacted by aircraft noise from Berlin-Tegel (2015) and Schönefeld Airports (2010)

All individual buildings were included in the evaluation of the schools and hospitals involved. For example, if school complexes consisted of three buildings, three school buildings were evaluated.

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