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HEALTH IMPACT OF TRANSPORT NOISE IN THE DENSELY POPULATED ZONE OF ILE-DE-FRANCE REGION

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BRUITPARIF

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SUMMARY

Thanks to various studies that have been published on the topic at international level, the health impact of noise is now well and truly established. It goes beyond just the annoyance caused. Beyond the effects on the auditory system observed for high noise levels, several extra-auditory effects have also been identified, including sleep disturbance, cardiovascular disease and diminished learning capacity. Studies have also shown that noise is a factor that reinforces social inequality, with underprivileged populations also generally being those most exposed.

In order to raise awareness of this major public health issue, we need to collect and publish quantified data for the region. That is why Bruitparif has evaluated morbidity[1] connected to transport noise within the densely populated zone of Ile-de-France.

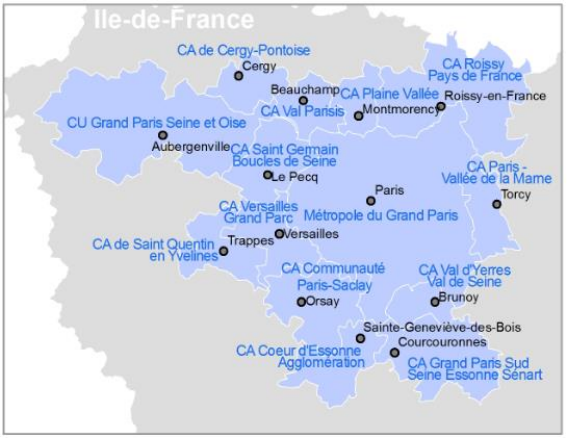
Context and objectives

European directive 2002/49/EC pertaining to the evaluation and management of environmental noise requires all urban communities of more than 100,000 inhabitants to produce a strategic noise map for their territory and update it every five years, as well as adopting an environmental noise action plan. This directive has been transposed into French law and written into the environmental code. The noises taken into account are those related to road, rail, and airport infrastructures, as well as classified industrial facilities.

Within the Ile-de-France region, 14 urban agglomerations representing a total of 436 communes and 10.1 inhabitants are concerned: the Grand Paris Métropole (131 communes, nearly 7 million inhabitants) as well as 13 "*communautés d'agglomération*" (agglomeration communities) or "*communautés urbaines*" (urban communities) (see map opposite).

The so-called third-phase strategic noise maps were produced and supplied to each urban agglomeration concerned in 2018 by Bruitparif, Ile-de-France's technical evaluation centre for environmental noise, with a view to their approval and publication.

These strategic noise maps must also serve as a reference document for these local authorities to prepare their environmental noise action plans.



14 urban agglomerations representing the densely populated zone of Ile-de-France region

To this end, and in order to help identify key priorities, Bruitparif has conducted an additional territorial diagnostic to evaluate the health impact of transport noise within all 14 urban agglomerations that make up the densely populated zone of Ile-de-France.

Bruitparif used the methodology recommended by the World Health Organisation (WHO), based on the use of the indicator of healthy life-years (DALYs - Disability-Adjusted Life-Years) lost, as well as the latest guidelines on environmental noise published by the WHO in October 2018. These guidelines define the recommended values for exposure to transport noise, as well as new exposure-response relationships that make it possible to compare levels of exposure to noise, as estimated by strategic noise maps, and the main health effects of noise.

Maps produced with a 250 m² grid, as well as at the level of the commune, demonstrate the health impact of transport noise for the whole territory mapped as per European directive 2002/49/EC. Statistical results were provided for the area of study as a whole, as well as for each urban agglomeration, and for each commune.

Main results

People within the densely populated zone of Ile-de-France are highly exposed to transport noise throughout the day since nearly 90% of inhabitants (more than 9 million people) are exposed to noise levels that exceed those recommended by the World Health Organisation to avoid the health effects of noise.

[1] *The morbidity of a population is defined as the number of sick people or the number of diseases within a given population, at a given time. In this report, the evaluation was based on level of annoyance and sleep disturbance caused by exposure to transport noise that can be estimated in the population.*

This trend can be seen through the many people who are subjected to noise levels that exceed the regulatory limit values for France in application of the noise directive: Nearly 1.5 million inhabitants (14.8% of the population) are exposed to noise levels that exceed at least one limit value for the Lden indicator. Road traffic is the main cause, with 10.8% of inhabitants exposed to excessive road traffic noise. Exposure to noise levels exceeding limit values for aircraft and rail traffic is down (respectively 3.7% and 0.5%), but these two types of nuisances have proportionally higher health risks due to their event-related nature (succession of noise peaks).

Noise levels generated by transport at night are falling. However, nearly 87% of the population still lives in accommodation exposed to outside noise levels that exceed one of the nocturnal quality objectives set by the WHO and 510,900 inhabitants (5.1% of the population) are even concerned by nocturnal levels that exceed one the regulatory limit values set for road or rail noise where the value of 50 dB(A) is believed to be critical for aircraft noise.

The majority of people exposed to transport noise (all sources) live in the Grand Paris Métropole, and 71 to 74% of people are exposed to noise levels that exceed the limit values for the Lden and Ln indicators respectively. T3 (Grand Paris Seine Ouest), T6 (Plaine Commune), and T12 (Grand Orly Seine Bièvre) are the territories with the highest proportion of exposed inhabitants within the Grand Paris Métropole, with respectively 26%, 23%, and 22% of their populations exposed to noise levels that exceed one of the limit values for the Lden indicator. In terms of nocturnal exposure to noise, T12 (Grand Orly Seine Bièvre) comes first with 10% of its population exposed to values considered to be critical.

Outside of the Grand Paris Métropole, urban areas significantly affected by airport noise are home to the highest levels of people exposed to noise levels that exceed one of the limit values for Lden. The two urban agglomerations of Roissy-Pays de France and Plaine Vallée have respectively 57% of 39% of their populations exposed to excessive noise levels. Next comes the agglomeration community of Versailles Grand Parc, where the level is 13% due to its high exposure to road noise, just ahead of the agglomeration community of Paris Saclay (12%), which is highly exposed to aircraft noise from the Paris-Orly airport.

In terms of the health impact, transport noise is responsible for the loss of 107,766 disability-adjusted life-years (DALYs) every year within the densely populated zone of the Ile-de-France region, distributed between the DALYs lost due to annoyance (46,837, 43% of the total) and the DALYs lost due to sleep disturbance (60,929, 57% of the total).

Road noise is responsible for 61% of the health impact (65,607 DALYs), followed by rail noise (23,440 DALYs, and 22%), and aircraft noise (18,718, 17%).

63% of these health impacts come from the Grand Paris Métropole, with 68,216 DALY.

A majority of the communes with the highest numbers of healthy life-years lost due to cumulated transport noise are located in the Grand Paris Métropole, but there is also the commune of Versailles, as well as communes in the Val d'Oise department that combine very densely populated areas and significant aircraft noise. The areas where the impact is greatest are the town of Argenteuil, and the 15th and 18th districts of Paris (cf. map of cumulated health impacts by commune, page 3).

At individual level, the evaluations show an average statistical value of 10.7 healthy life-months lost during a lifetime per individual due to cumulated transport noise, within the densely populated zone of Ile-de-France.

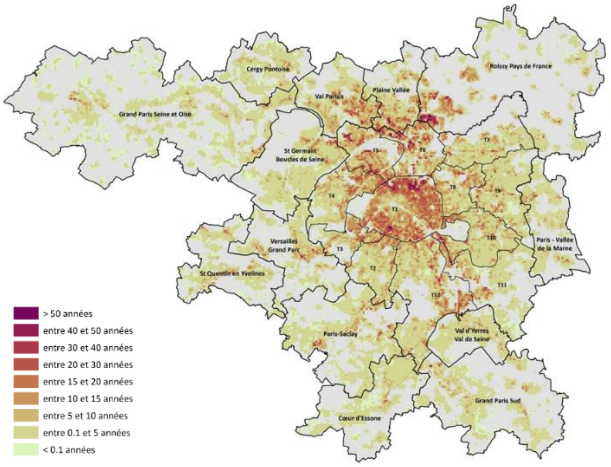
There are, however, significant territorial variations, with the impact on healthy life-months lost per inhabitant ranging from 7.1 months to 24.5 months (a ratio of 1 to 3.45) depending on the territory or urban community, and varying from 2.6 months to 38.1 months (a ratio of 1 to 14.65) depending on the commune. These significant variations highlight the impact of aircraft noise. For example, the healthy life-years lost in the agglomeration communities of Plaine Vallée, Roissy Pays de France, and Val Parisis are twice as high as the territorial average (24.5 and 20.9 healthy life-months lost per individual versus 10.7 months). On average, inhabitants of the Grand Paris Métropole lose 10.1 healthy life-months over their lifetimes - the health impacts per inhabitant ultimately being more moderate in areas concerned only by noise pollution from land transport – with values varying between 8.5 months (T1 - Paris) and 10.3 months (for T3 - Grand Paris Seine Ouest and T10 - Paris Est Marne et Bois). The territories of the Grand Paris Métropole that have the highest individual risks are T6 - Plaine Commune (15 months), T5 - Boucle Nord de Seine (14 months), and T12 - Grand Orly Seine Bièvre (12.2 months).

The individual risk can even reach or exceed three healthy life-years lost for communes that combine high exposure to aircraft noise and marked exposure to other noise pollution generated by land transport. This is the case, for example, of the towns of Compans (38.1 months), Ablon-sur-Seine (37.8 months), and Villeneuve-le-Roi (34.3 months). There are also many inhabited 250 m² grids in the vicinity of airports and/or along major rail or road infrastructures, where the individual risk can reach or exceed three years (cf. map of individual health risks, page 3).

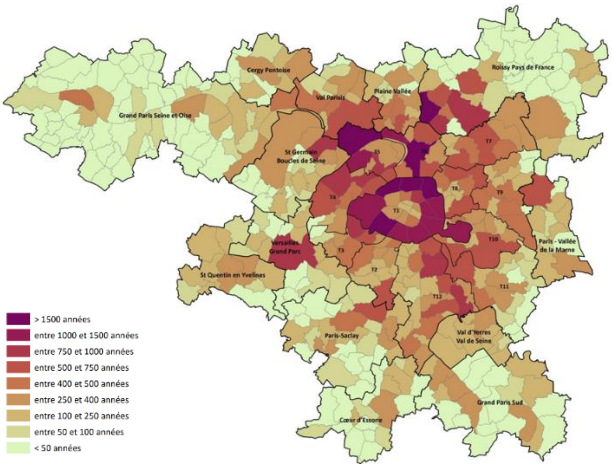
CUMULATED TRANSPORT NOISE – COLLECTIVE HEALTH IMPACT

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

PER GRID OF 250 m



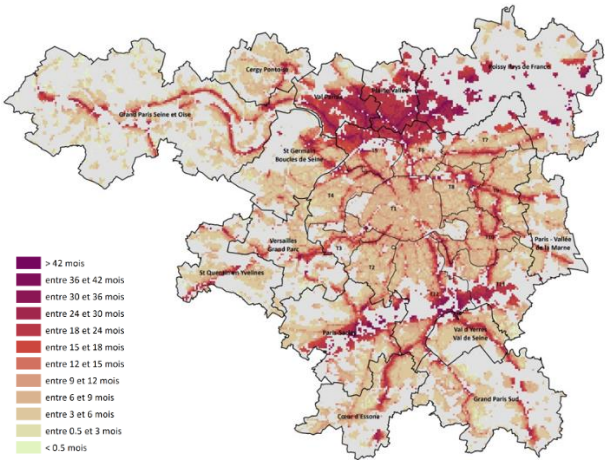
PER COMMUNE LEVEL



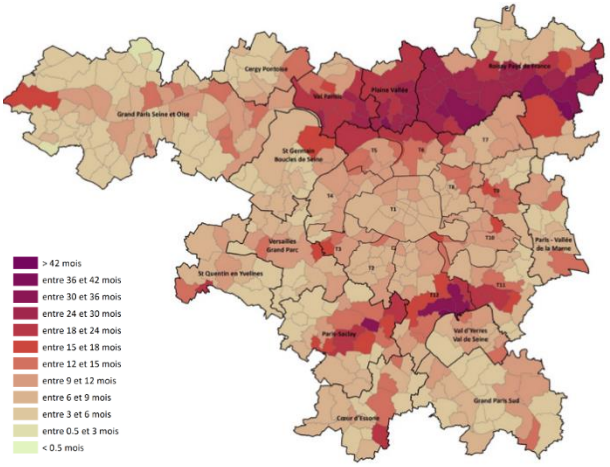
CUMULATED TRANSPORT NOISE – INDIVIDUAL HEALTH RISKS

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

PER GRID OF 250 m



PER COMMUNE LEVEL



The 1,500 priority grids (500 for road noise, 500 for rail noise, and 500 for aircraft noise) were selected (cf. figure below) by choosing the grids that showed the highest combined collective health impacts and individual risk levels.

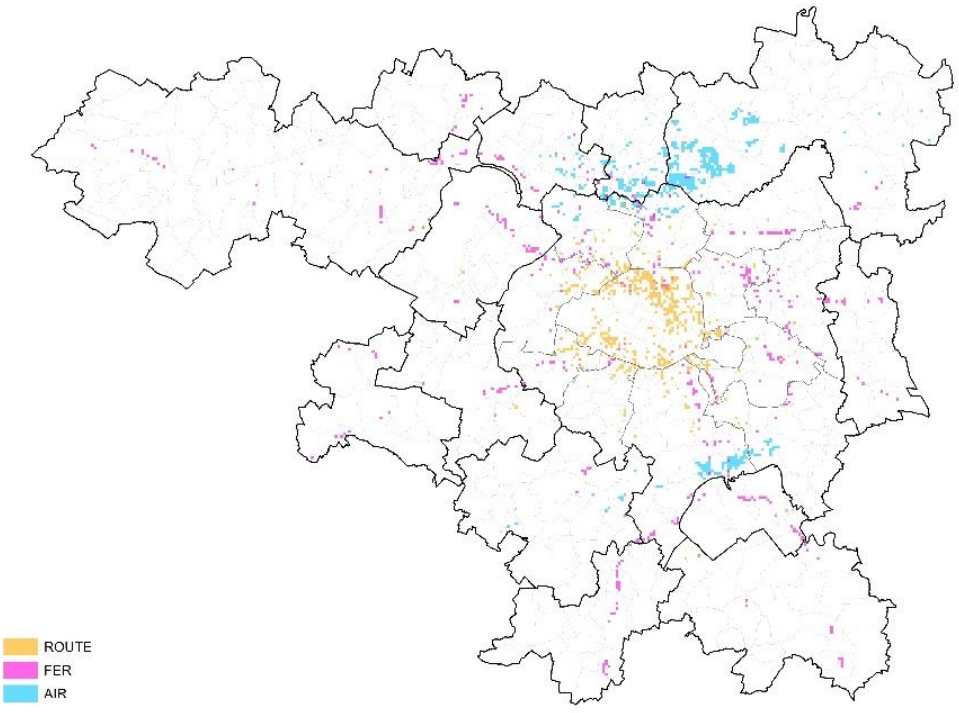
Unsurprisingly, these grids reveal the issue related to high exposure to noise generated by road traffic in Paris, along the Paris ring-road, as well as along major motorways (the A4 motorway at Charenton-le-Pont, Saint-Maurice, and Joinville; the A6a and A6b interchanges; the A13 at Pont de Saint-Cloud; the A3 interchange at porte de Bagnolet; along the A86 in Créteil and Vélizy-Villacoublay), and along very busy A-roads and B-roads: the RD910 in Boulogne-Billancourt, the RN13 in Neuilly-sur-Seine, the RD906 in Malakoff and Châtillon, the RD920 in Montrouge and Bourg-la-Reine, the RD7 in Kremlin-Bicêtre and in Villejuif, the RD5 in Ivry-sur-Seine, Vitry-sur-Seine and Choisy-le-Roi, the RD120 in Saint-Mandé and Vincennes, the RD302 in Montreuil, the RN3 in Pantin and Bondy, the RN2 in Pantin and Le Bourget, the RN1 in Saint-Denis, the RD20 in Saint-Ouen, the RD911 in Clichy-la-Garenne, the RD902 in Levallois-Perret, the RD106 in Courbevoie and Colombes, the RD7 along the banks of the Seine in Puteaux, the RN406 in Créteil, the RD316 in Villiers-le-Bel, the RD30 in Poissy, and the RD91 and the RN7 in Ris-Orangis.

Regarding rail noise, the priority grids highlight high levels of noise pollution generated by the dense rail network (in particular the Transilien network, and RER lines C, D, and E) over the whole region, as well as within the Paris city limits, up to the main stations. The priority grids are distributed fairly evenly along all overland rail lines when they cross highly urbanised areas.

And finally, the health impact of air traffic has a strong impact on the communes of Val d'Oise located on the flight path of Paris-CDG airport, but is also high in the Seine-Saint-Denis department, in the northern sector of T6 (Plaine Commune), in Epinay-sur-Seine, Villetaneuse, Pierrefitte-sur-Seine, and Stains, due to the noise pollution generated by aircraft overflight to and from Paris-Le-Bourget and Paris-CDG. It is worth noting that some of these zones are located outside of the airports' noise pollution maps. The southern part of Val-de-Marne (Ablon-sur-Seine, Villeneuve-le-Roi, Villeneuve-Saint-Georges, Valenton, Limeil-Brévannes, Boissy-Saint-Léger) also contains a high number of priority grids. And finally, there are some more dispersed zones located in Essonne (Paray Vieille Poste, Wissous, Chilly-Mazarin, Champlan, Longjumeau, Les Ulis) due to the activity of Paris-Orly airport, and in Seine-et-Marne due to overflights to and from Paris-CDG.

Furthermore, sectors that are highly impacted by noise pollution from airports are not always exempted from problems posed by rail and road traffic, and they sometimes accumulate high levels of all three sources of environmental noise, as is the case in Ablon-sur-Seine, Villeneuve-le-Roi, Villeneuve-Saint-Georges, Epinay-sur-Seine, Sarcelles, and Compans.

THE 1500 PRIORITY GRIDS



Although it must, of course, be completed by fieldwork, and compared with qualitative surveys with the population, and the consideration of other the sources of noise pollution (very noisy motorised two-wheeled vehicles, horns, building sites, lively neighbourhoods, etc.), the diagnostic prepared by Bruitparif provides policymakers with a precise and prioritised overview of the challenges in terms of environmental noise from transport within the densely populated zone of Ile-de-France.

With nearly 108,000 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, at an economic cost of €5.4 billion per year, the results obtained confirm the trends highlighted by the WHO at European level. Noise pollution is the second-highest cause of morbidity among environmental risk factors in urban environments, behind atmospheric pollution.

These results have been compared with the previous evaluations carried out by Bruitparif and the Ile-de-France regional health watchdog between 2011 and 2015. Estimations have been reviewed significantly upwards (from 75,000 to 108,000 DALYs, +43%), especially for aircraft noise (multiplied by a factor of 3.7) and rail noise (multiplied by a factor of 3.5), due to the use of new exposure-response relationships recommended by the WHO.

Adjusted to the level of an average citizen living within the densely populated zone of Ile-de-France, healthy life-months lost over a lifetime now reach 10.7 compared to 7.3 for the 2015 estimation. Regional differences are also significantly exacerbated, with the individual health risk now reaching more than three healthy life-years lost in sectors that suffer from exposure to multiple aircraft and land sources, compared to 18 months in the 2015 estimation.

The study conducted by Bruitparif has therefore re-evaluated upwards the health and economic impact of noise in the densely populated zone of Ile-de-France and, above all, has provided essential new information for public policymakers: The provision of results by territory, as well as the determination of priority areas. The ambition of this study is therefore to fully contribute to anticipating where to focus resources in the fight against noise pollution, by creating a reference document to help stakeholders prepare the various environmental noise action plans that the competent authorities will have to produce in 2019.

Detailed results for road traffic noise

The population of the densely populated zone of Ile-de-France faces high exposure to road noise throughout the day since 85% of inhabitants (8.6 million people) are exposed to levels exceeding 53 dB(A) using the Lden indicator, which is the World Health Organisation's threshold value to avoid consequences on health due to road noise.

This trend can be seen through the many people who are subjected to noise levels that exceed the regulatory limit values for France in application of the noise directive: 1,091,000 people (10.8% of the population) are exposed to levels exceeding 68 dB(A) using the Lden indicator.

At night, exposure to road noise drops. However, 80% of the population still live in accommodation where noise levels in front of the building exceed 45 dB(A), which is the night-time threshold value according to the WHO, and 331,100 inhabitants (3.3% of the population) are exposed to night-time levels that exceed the regulatory limit value of 62 dB(A) using the Ln indicator.

The majority of people exposed to road noise live in the Grand Paris Métropole, with between 86 and 91% of people exposed to noise levels that exceed the limit values for the Lden and Ln indicators respectively. T3 (Grand Paris Seine Ouest) seems to be the territory with the highest proportion of its population exposed within the Grand Paris Métropole: Exactly ¼ of its population is exposed to values that exceed the 68 dB(A) limit for the Lden indicator. T6 (Plaine Commune) comes second. In terms of night-time exposure to road noise, T10 (Paris Est Marne et Bois), T12 (Grand Orly Seine Bièvre), T6 (Plaine Commune), and T1 (Paris) are the territories with the highest proportion of their populations exposed to values exceeding the 62 dB(A) limit value using the Ln indicator: more than 5% of their populations are concerned. Outside the Grand Paris Métropole, it is the agglomeration community of Versailles Grand Parc that has the highest proportion of its population (12%) subjected to noise levels exceeding limit values using the Lden indicator.

In terms of the health impact, road noise is responsible for 65,607 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, with a fairly even distribution between the DALYs lost due to annoyance (31,994 DALYs or 49% of the total) and the DALYs lost due to sleep disturbance (33,613 DALYs, or 51% of the total).

Due to its high population density, the Grand Paris Métropole alone contains 73% of these health risks, with 47,738 DALY. The 50 communes with the highest number of disability-adjusted life-years lost due to road noise are all located within the Grand Paris Métropole, except for Versailles. The highest values are recorded in the peripheral districts of Paris (especially the 15th, the 18th, and the 20th).

At individual level, the evaluations show an average statistical value of 6.5 healthy life-months lost due to road noise by individuals during a lifetime, within the

densely populated zone of Ile-de-France. This value can reach as high as 10 months on average for communes where the individual risk is highest (Saint-Maurice, Vaudherland, Charenton-le-Pont) and up to 18 months within the zones most exposed to noise pollution from road infrastructure.

Detailed results for rail traffic noise

Rail noise affects a non-negligible proportion of inhabitants within the densely populated zone of Ile-de-France. However, far fewer inhabitants are exposed to this source than to road noise. 16% of inhabitants (1.6 million people) are exposed to levels that exceed 54 dB(A) using the Lden indicator, which is the World Health Organisation's threshold value to avoid consequences on health due to rail noise.

Approximately 51,000 people (0.5% of the population) are exposed to noise levels that exceed one of the regulatory limit values using the Lden indicator (73 dB(A) for conventional lines and 68 dB(A) for high-speed rail lines).

Rail noise falls at night along passenger transport lines but can remain a high along certain freight lines. Approximately 82,600 people (2.8% of the population) are exposed to noise levels that exceed one of the regulatory limit values using the Ln indicator (65 dB(A) for conventional lines and 62 dB(A) for high-speed rail lines), which is more than for the Lden indicator.

The majority of people exposed to rail noise live in the Grand Paris Métropole, with around 62% of people exposed to noise levels that exceed regulatory limit values. The territories most affected by noise pollution from railways are (in descending order): T5 (Boucle Nord de Seine), T9 (Grand Paris Grand Est), T10 (Paris Est Marne et Bois), T12 (Grand Orly Seine Bièvre), T4 (Paris Ouest La Défense), T6 (Plaine Commune), and T3 (Grand Paris Seine Ouest). It is worth noting that more people are affected by noise levels exceeding limit values at night.

Outside the Grand Paris Métropole, it is the Grand Paris Seine et Oise urban community that has the highest proportions of people exposed to noise levels exceeding limit values using Lden (1.1%) and Ln (1.8%), followed by the agglomeration communities of Versailles Grand Parc (1.1% and 1.6% respectively) and Plaine Vallée (1.1% and 1.5%).

In terms of the health impact, rail noise is responsible for 23,440 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, distributed between the DALYs lost due to annoyance (8,352 DALYs or 36% of the total) and the DALYs lost due to sleep disturbance (15,088 DALYs, or 64% of the total).

63% of these health impacts come from the Grand Paris Métropole, with 13,809 DALY.

The communes that have the highest level of disability-adjusted life-years lost due to rail noise are the 18th district of Paris, Saint-Denis, and Versailles.

At an individual level, the evaluations show an average statistical value of 2.3 healthy life-months lost by individual due to rail noise during a lifetime, within the densely populated zone of Ile-de-France. This value can reach as high as 12 months in communes where the average individual risk is highest (Marolles-en-Hurepoix, La Verrière) and up to 24 months within the grids most exposed to noise pollution from rail infrastructure.

Detailed results for air traffic noise

Aircraft noise affects a non-negligible proportion of inhabitants within the densely populated zone of Ile-de-France. A similar proportion of the population is exposed to aircraft noise as to rail noise. Just over 15% of inhabitants (nearly 1.6 million people) are exposed to levels that exceed 45 dB(A) using the Lden indicator, which is the World Health Organisation's threshold value to avoid consequences on health due to aircraft noise.

375,000 people (3.7% of the population) in the densely populated zone of Ile-de-France are exposed to noise levels that exceed the regulatory limit value of 55 dB(A) using the Lden indicator. This is around seven times higher than the number of people affected by rail noise using the same indicator. However, it is also around one third of the number of people exposed to road noise levels exceeding the limit value.

At night-time, exposure to aircraft noise decreases, especially around Paris-Orly airport, which has a curfew between 11:30 PM and 6 AM, and around airfields (no night-time flights, except in exceptional cases). However, 11% of the population still lives in housing exposed to aircraft noise levels that exceed 40 dB(A), which is the WHO's night-time noise threshold value for aircraft noise. Although France does not have any regulations on limit values for night-time aircraft noise, more than 102,000 inhabitants (1% of the population) are concerned by night-time levels that exceed 50 dB(A) using the Ln indicator, a value that is considered critical for quality of sleep according to the exposure-response curves recently published by the WHO. Even around Paris-Orly airport, nearly 31,000 people are subjected to noise levels that exceed 50 dB(A) on average between 10 PM and 6 AM, due to noise pollution generated by overflights that occur between 10 PM and the start of the curfew at 11:30 PM.

In terms of the health impact, aircraft noise is responsible for 18,718 disability-adjusted life-years

lost every year within the densely populated zone of Ile-de-France, distributed between the DALYs lost due to annoyance (6,491 DALYs, or 35% of the total) and the DALYs lost due to sleep disturbance (12,227 DALYs, or 65% of the total).

Contrary to road and rail noise, which are relatively evenly distributed around the territory, air traffic noise is very unevenly distributed. It is concentrated in certain sectors: This is the case in the agglomeration communities of Roissy Pays de France (4,612 DALYs, 25% of the total), Plaine Vallée (2,814 DALYs, 15% of the total), Val Parisis (2,793 DALYs, 15%), Paris-Saclay (1,194 DALYs, 6%), and the territories of T6 - Plaine Commune (2,283 DALYs, 12%), T5 - Boucle Nord de Seine (1,563 DALYs, 8%), T12 - Grand Orly Seine Bièvre (1,526 DALYs, 8%), T11 - Grand Paris Sud Est Avenir (751 DALYs, 4%), and T7 - Paris Terres d'Envol (447 DALYs, 2%).

The cumulated noise pollution from Paris-CDG and Paris-Le Bourget is responsible for 15,008 DALYs lost (80% of the total DALYs), compared with 3,581 DALYs (19%) for Paris-Orly airport and 1% for the other airfields (Paris-Issy-les Moulineaux heliport, Toussus-le-Noble airfield, etc.). Disturbances caused by Paris-CDG represent 85% of the DALYs lost from sleep disturbance (compared with 15% for Paris-Orly) due to night-time flights. 71% of DALYs lost due to annoyance come from the northern zone (Paris-CDG and Paris-Le Bourget), with 27% from the southern zone (Paris-Orly), and 2% for the other airfields.

Due to their high population density, it is the communes of Argenteuil, Sarcelles, Epinay-Sur-Seine, and Garges-lès-Gonesse that have the highest levels of healthy life-years lost due to traffic noise per year.

At individual level, the evaluations show an average statistical value of 1.9 healthy life-months lost due to air traffic noise per individual during a lifetime, within the densely populated zone of Ile-de-France. But disparities are very high; this value can reach as much as two years for communes where the average individual risk is the highest (Le Mesnil Amelot, Thieux, Bouqueval) and more than three years within the grids of the territory that have the highest exposure to aircraft noise.

INTRODUCTION

European directive 2002/49/EC of 25 June 2002 pertaining to the evaluation and management of environmental noise requires all urban communities of more than 100,000 inhabitants to produce a strategic noise map for their territory and update it every five years, as well as adopting an environmental noise action plan. This directive has been transposed into French law and written into the environmental code. The noises taken into account are those related to road, rail, and airport infrastructures, as well as classified industrial facilities.

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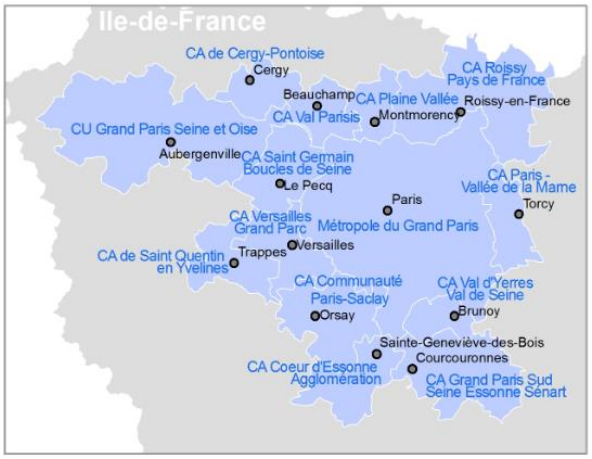
These 14 agglomerations are:

- Métropole du Grand Paris
- CU Grand Paris Seine et Oise
- CA Paris Vallée de la Marne
- CA Saint Germain Boucles de Seine
- CA Versailles Grand Parc
- CA Saint Quentin en Yvelines
- CA Cœur d'Essonne Agglomération
- CA Paris Saclay
- CA Grand Paris Sud
- CA Val d'Yerres Val de Seine
- CA Cergy Pontoise
- CA Plaine Vallée
- CA Roissy Pays de France
- CA Val Parisis.



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Maps produced with a 250 m² grid, as well as at the level of the commune, demonstrate the health impact of transport noise for the whole territory mapped as per European directive 2002/49/EC. Statistical results were provided for the area of study as a whole, as well as for each urban agglomeration, and for each commune.

CONTEXT

Noise is a major source of annoyance in Ile-de-France due to the high population density and the dense transport infrastructure. Noise is one of the main nuisances cited as impacting quality of life.

Ile-de-France is the most populous region of France with 12 million inhabitants in a surface area of 12,000 km², mainly concentrated in the region's densely populated zone, which has a population of 10.1 million.

The majority of exposure to noise is caused by transport infrastructures, which are very highly developed and dense:

- France's largest road network, with more than 40,000 km of roads (including more than 1,000 km of motorways and expressways).
- A first-class public transport network that records approximately 32 billion passenger kilometres every year. The region has more than 1,800 km of railway lines, 1,519 bus lines (source: Key figures for Ile-de-France region in 2017, IAU INSEE Chamber of Commerce and industry of Paris Ile-de-France). By the year 2030, there will be an additional 200 km of self-driving metro lines (the Grand Paris Express).
- An airport system that is unparalleled in Europe, with two international airports (Paris-Orly and Paris-Charles de Gaulle), which generate more than 707,000 flights per year (473,000 for Paris-CDG and 234,000 for Paris-Orly), as well as 25 other airfields (civilian, military and private) including Le Bourget airport (approximately 53,000 flights), and the Paris Issy-les-Moulineaux heliport (number of flights limited to 12,000 per year) (source for traffic data: ADP, 2016). By 2037, there could be an additional 170,000 flights per year (+36% compared to Paris-CDG's current traffic, source: ADP) if the proposed construction of a fourth terminal at Paris-CDG goes ahead.[2]

There is, therefore, great concern related to noise in Ile-de-France. According to the results of one survey[3] on 3,000 Ile-de-France residents, three-quarters of the population of Ile-de-France (76%) claim to be concerned about noise pollution (25% very concerned and 51% somewhat concerned), and one in three residents believe that noise is a major disadvantage of living in Ile-de-France. One in four people even claim to have thought about moving house due to noise (24%).

Noise is the second-biggest environmental nuisance cited by residents of Ile-de-France, behind air pollution. It is a legitimate concern since the impact on health (hearing disorders, annoyance, fatigue, stress, sleep disturbance, increased cardiovascular risk, including high blood-pressure, and myocardial infarction, learning difficulties, etc.) are proven and recognised by the highest international health organisations.

However, not all areas of the region are equally affected, and sensitivity to noise also depends on a variety of factors, including age, type of accommodation, and socio-professional category.

54% of Ile-de-France residents claim to be annoyed by noise at home, with this annoyance growing with the degree of urbanisation, on average 42% in the Seine-et-Marne department and 62% in Paris.

Transport, in particular road traffic, is the main source of annoyance cited by people who complain of noise in their home (cited first by 43% of people who claim to be annoyed), with the second source of annoyance being neighbours, for 31% of people. Next comes noise from construction sites (6%), the activity of bars, restaurants, concert halls, and discos (4%), garbage removal (3%), the maintenance of parks and gardens (3%), and other industrial activities (1%).

Noise is also a nuisance that reinforces social inequality, as people with the lowest revenues are more concerned by noise in their homes due to their housing conditions (small homes or poorly insulated urban collective housing, proximity to noisy transport infrastructure or facilities). The people with the lowest incomes are also those with the noisiest working conditions (workshops, factories, construction work). We also see an increase in exposure to noise at home and in the workplace for these people. Noise also tends to generate a pauperisation phenomenon in certain neighbourhoods, with more affluent populations more able to move house to avoid the noise.

Exposure to noise has an impact on health. The population of the Ile-de-France region is convinced of this, with 82% of the population perceiving the health risk related to noise as somewhat high. Four in ten people (41%) have already felt the effects on their own health. Fatigue (29%) and irritability (28%) are

[2] *Consultation file for terminal 4, ADP group, January 2019.*

[3] *Crédoc survey for Bruitparif: "Qualité de vie et nuisances sonores : opinions et comportements des Franciliens, September 2016".*

the most commonly described signs. One in four residents of Ile-de-France acknowledges the impact on their sleep. 23% cite the need to speak more loudly and 22% evoke difficulty concentrating or learning. 20% of people questioned believe that noise causes headaches and 17% say they are concerned about hearing problems.

Despite constantly increasing awareness, the consideration of environmental noise and the extra-auditory effects of noise are apparently still underestimated by the authorities compared to other environmental factors like air quality. In order to guide the public authorities' efforts to reduce environmental noise levels, quantitative methods for evaluating the health risks were developed, making it possible to evaluate the health impact attributable to this exposure.

The WHO has believed for decades that noise is one of the environmental factors with the highest risks for health. A report published in 2011[4] by the WHO's Europe bureau and the European Union's centre for joint research evaluated the impact of environmental noise pollution at more than 1.5 million disability-adjusted life-years lost every year in Western Europe, taking into account sleep disturbance (903,000 years) and annoyance (564,000 years), as well as cardiovascular disease, cognitive impairment, and tinnitus.

A first estimation of the number of healthy life-years lost within the Paris urban area was also published in 2011 by Bruitparif in partnership with ORS ÎdF (the Ile-de-France's regional health watchdog) with the help of the WHO's European bureau,[5] [6]based on data on exposure to noise from so-called first-phase strategic noise maps. It was updated in 2015[7] using partial second-phase data, taking into account adjustments to the methodology recommended by the WHO. These first evaluations enabled us to quantify the burden of disease from environmental noise due to transport in the Paris urban area.

The results of the strategic noise maps indicated first of all that within the Paris urban area, 22% of the population (2.2 million people) was potentially exposed to excessive noise levels generated by transport in front of their homes, in view of the limit values chosen by France in application of European directive 2002/49/EC: 1.7 million people (17.1%) due to road noise, 350,000 (3.5%) due to aircraft noise, and 115,000 (1.1%) due to rail noise.

It is estimated that this high exposure to transport noise was responsible for 75,000 healthy life-years lost every year within the Paris urban area, based on the understanding of the health impact of noise at the time. This represented an average loss per individual of 7.3 months of life in good health over an entire lifetime. The economic cost of this noise-related disease was initially estimated at €3.8 billion per year.

With the publication[8] of new WHO guidelines for environmental noise in October 2018, and in light of the finalisation of the third-phase noise maps, Bruitparif wanted to update its evaluation using the latest available knowledge and data. The approach chosen uses the same one used in 2011 by Bruitparif and the Ile-de-France regional health watchdog, adding two essential new dimensions for policymakers: the calculation of results by territory, as well as the determination of priority grids.

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[4] *Burden of disease from environmental noise - Quantification of healthy life-years lost in Europe, WHO 2011 / Charge de morbidité imputable au bruit environnemental : quantification du nombre d'années de vie en bonne santé perdues en Europe, published on 30 March 2011.*

[5] *Impact sanitaire du bruit dans l'agglomération parisienne : quantification des années de vie en bonne santé perdues - Note de synthèse sur l'application à l'agglomération parisienne de la méthode de l'OMS pour la détermination de la morbidité liée au bruit, ORS Ile-de-France, Bruitparif, with the support of the WHO's European bureau, November 2011.*

[6] *F. Mietlicki, S. Host, R. Kim, R. Da Silva, C. Ribeiro, E. Chatignoux, "Health impact of noise in the Paris agglomeration: assessment of healthy life-years lost", Internoise 2013, Innsbruck, Austria (2013).*

[7] *Impact sanitaire du bruit des transports dans l'agglomération parisienne : quantification des années de vie en bonne santé perdues. Application à l'agglomération parisienne de la méthode de l'OMS pour la détermination de la morbidité liée au bruit, Bruitparif, ORS Ile-de-France, September 2015.*

[8] *Environmental Noise Guidelines, WHO, Bureau Europe, October 2018.*

METHODOLOGY

The diagnostic was developed based on the latest knowledge on the effects of noise on health, published by the World Health Organisation (WHO) in October 2018[9] and using the methodology recommended by the WHO[10] for quantifying the number of healthy life-years (DALYs - Disability-Adjusted Life-Years) lost.

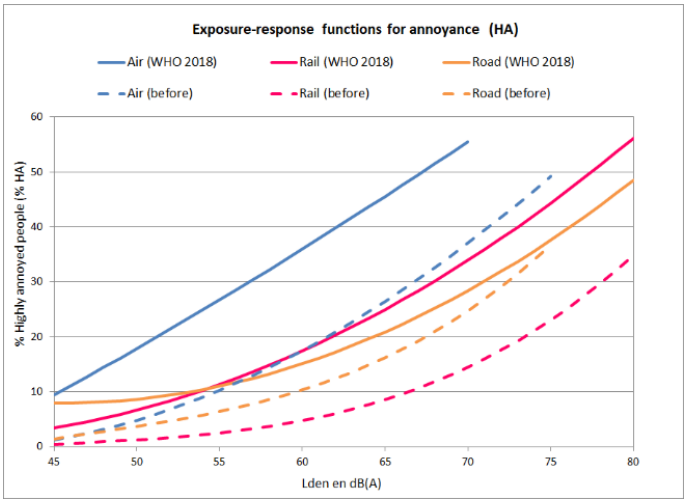
RECOGNISED HEALTH IMPACT OF NOISE

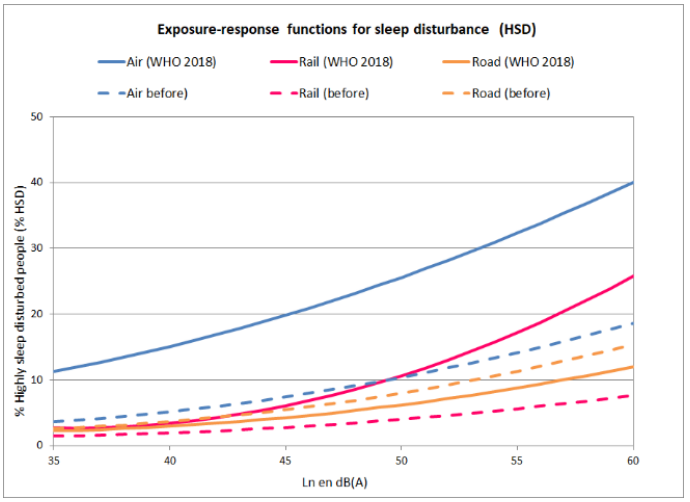
Based on a wide review of the scientific literature, in its most recent publication in October 2018, the WHO claims that there is a robust and proven exposure-response relationships between populations' levels of exposure to noise and the rates of people who claim to be highly annoyed or have highly disturbed sleep. The strength of association for these relationships has been significantly upgraded (by a factor of 2 to 3) compared to the previous relationships available, especially for event-based noises like air traffic and rail traffic. The graphs opposite show the exposure-response curves now available for these effects and their variation compared to previous curves.

Other health effects of noise are considered critical by the WHO, in particular cardiovascular risk (coronary heart disease, high blood pressure, myocardial infarction) and learning difficulties. However, we do not currently have sufficiently robust exposure-response curves for these three sources of transport noise cumulated. Cardiovascular risk, for example, is well described for exposure to road noise but not yet sufficiently for rail and aircraft noise. As for learning difficulties, the available studies have mainly focused on young student populations subjected to aircraft noise pollution.

For questions of homogeneity and coherence in the treatment of different noise sources, for this study, Bruitparif chose to only process the two best-documented effects, namely annoyance and sleep disturbance.

The levels of exposure to noise used for these exposure-response curves are expressed using the indicators used in the strategic noise maps, namely Lden (noise weighted over 24h) and Ln (night-time noise for the 10 PM-6 AM period).





Exposure-response functions for annoyance and sleep disturbance

NOISE INDICATORS

The Lden indicator (which stands for Level day evening night) is an indicator of overall noise perceived over 24 hours which takes into account individuals' heightened sensitivity to noise in the evenings and at night. The Lden indicator is calculated using equivalent average noise levels during the day (6AM-6 PM), in the evening (6 PM-10 PM), and at night (10 PM-6 AM) applying a weighting of +5 dB(A) and +10 dB(A) to noise in the evening and at night. It is calculated as an average over the year.

The Ln indicator (Level night) is the average noise energy over the night-time period (10 PM-6 AM). It is calculated as an average over the year.

[9] *Environmental Noise Guidelines for the European Region, WHO bureau for Europe, October 2018.*

[10] *Burden of disease from environmental noise, WHO bureau for Europe, April 2011.*

REFERENCE VALUES

WHO recommendations

To protect the health of populations, in its October 2018 report, the WHO published guidelines concerning environmental noise, strongly recommending reducing exposure to transport noise to the levels below:

WHO recommendations in dB(A)	Lden	Ln
Road traffic noise	53	45
Rail traffic noise	54	44
Air traffic noise	45	40

The WHO's recommendations must be considered as targets to reach in order to minimise the negative effects of noise on populations.

Regulatory limit values

France adopted regulatory limit values based on the framework of the transposition of European directive 2002/49/EC.

Limit values are defined in European directive as "a value of Lden or Lnight, and where appropriate Lday and Levening, as determined by the Member State, the exceeding of which causes competent authorities to consider or enforce mitigation measures; limit values may be different for different types of noise (road-, rail-, aircraft noise, industrial noise, etc.), different surroundings and different noise sensitiveness of the populations; they may also be different for existing situations and for new situations (where there is a change in the situation regarding the noise source or the use of the surrounding)".

The limit values set by France in application of the European directive are mentioned in the decree of 24 March 2006 and the order of 4 April 2006, pertaining to the creation of noise maps and environmental noise prevention action plans. For the sources of transport, they are as follows:

French limit values in dB(A)	Lden	Ln
Road traffic noise	68	62
Rail traffic noise Conventional railways High speed railways	 73 68	 65 62
Air traffic noise	55	No limit value

It should be noted that France did not define a limit value for aircraft noise at night.

Following this report, in the absence of a limit value for night-time traffic, we used the value of 50 dB (A). This value may be considered as critical considering the exposure-response curves provided by the WHO for sleep disturbance related to aircraft noise. 20% of people exposed to night-time noise levels of 50 dB (A) claim that their sleep is highly disturbed.

DISABILITY ADJUSTED LIFE-YEARS (DALY)

BASED on the data from strategic noise maps expressed using the Lden and Ln indicators, it was possible to calculate the number of people affected and people whose sleep was disturbed at any point in the territory, depending on the level of exposure to transport noise, using the previously mentioned dose-effect relationships recommended by the WHO.

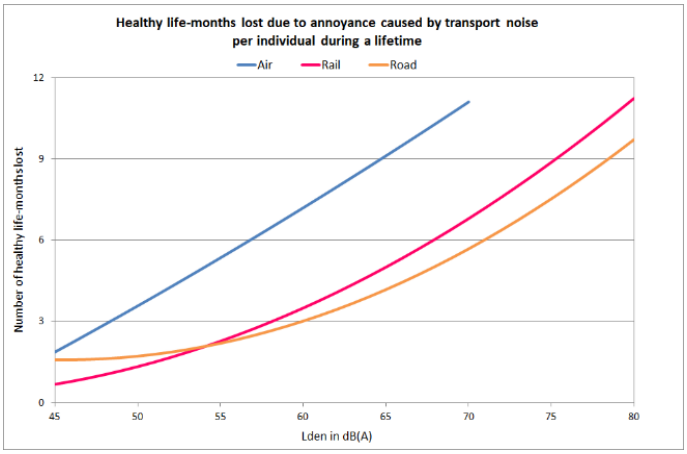
This work continued with the evaluation of healthy life-years (disability-adjusted life-years, DALY) lost due to annoyance and sleep disturbance caused by transport noise. The DALY is a metric recommended by the WHO[11] which quantifies the deterioration of populations' health due to disease or by exposure to environmental factors.

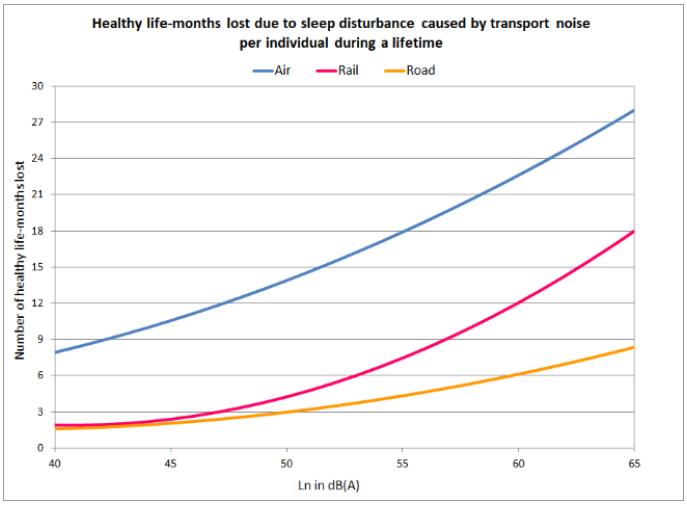
The WHO estimates that annoyance can be translated by a health deterioration coefficient (also called disability weight) of 0.02, and 0.07 for sleep disturbance. The disability weights related to each health impact vary on a scale of 0 (undeteriorated health) to 1 (death). They were calculated based on expert opinions collected by the WHO.

It is thereby possible to convert the previously presented exposure-response relationships (cf. page 11) into graphs that show the potential individual health risk depending on the level of exposure to noise. For this, the DALYs lost due to annoyance or sleep disturbance are calculated applying the corresponding disability weights and then applied to an individual whose exposure to noise would remain stable throughout their life. The figures provided are for an average individual with a life expectancy of 83.4 years, which is the average life expectancy for men and women living in Ile-de-France (85.8 years for women and 80.9 years for men – source: INSEE 2014).

The following figures show the results obtained in numbers of healthy life-months lost due to noise during a lifetime for annoyance and sleep disturbance for exposure to each source of transport noise.

[11] *Burden of disease from environmental noise, WHO bureau for Europe, April 2011.*





Healthy life-months lost due to noise during a lifetime for annoyance and sleep disturbance

By using these relationships, it is possible to convert strategic noise maps into potential individual health risk maps for the noise from each mode of transport and the cumulated transport noise. These maps, on pages 14 and 15, give an idea of the scale of inconvenience caused by transport noise for an individual who lives their whole life within one part of the region.

We provide below a few examples of concrete cases of situations of high exposure to noise that can be encountered:

High exposure to road traffic noise

- Case of an average individual exposed to day- and night-time road noise levels close to the regulatory limit values, namely Lden = 68 dB(A) and Ln = 62 dB (A) (a so-called "super blackspot" for road noise): 12 months of healthy life lost due to noise (five months due to the annoyance and seven months due to sleep disturbance).

High exposure to rail traffic noise

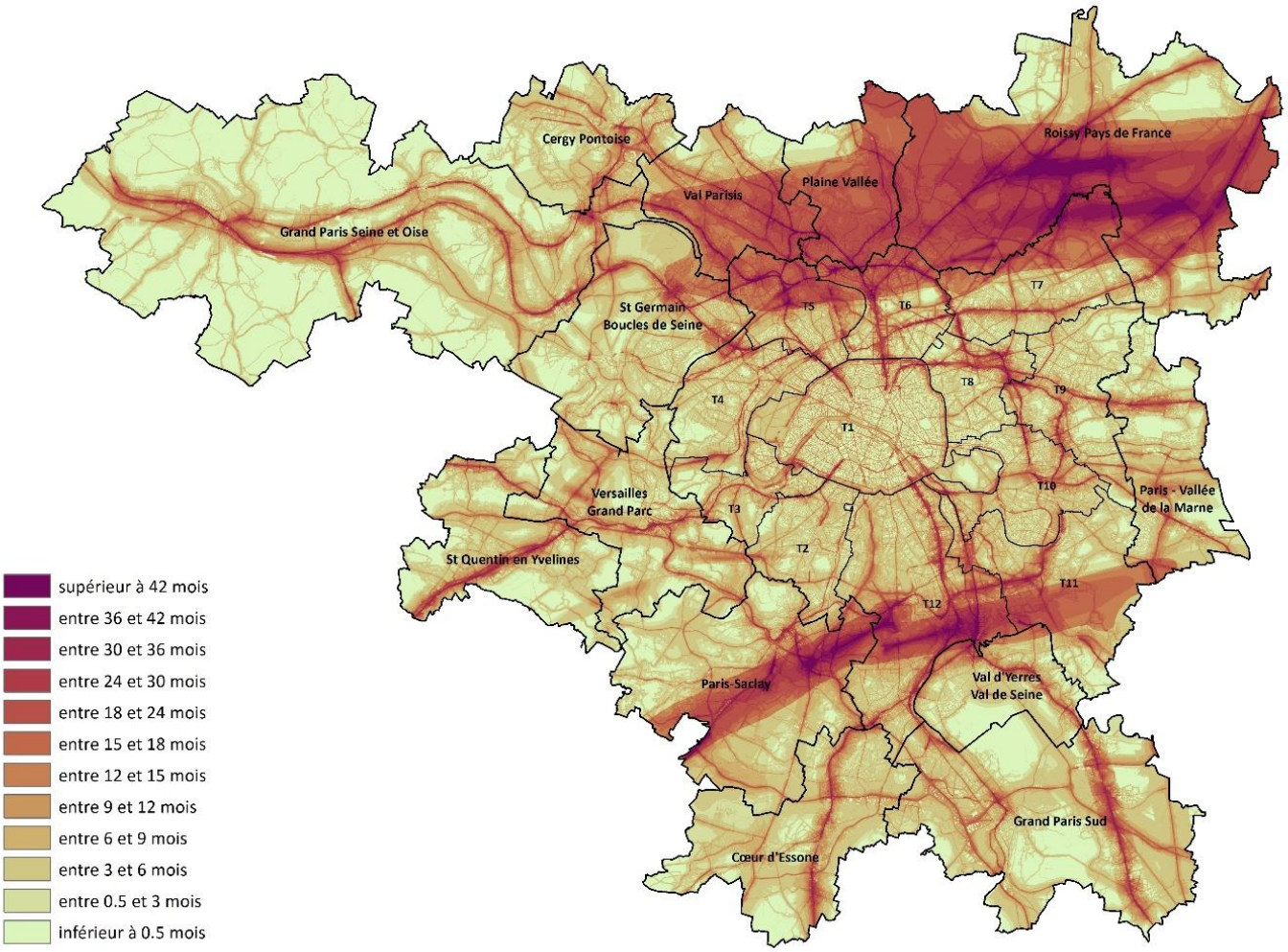
- Case of an average individual exposed to day- and night-time rail noise levels close to the regulatory limit values, namely Lden = 73 dB(A) and Ln = 65 dB (A) (a so-called "super blackspot" for rail noise) 26 months of healthy life lost due to noise (8 months due to the annoyance and 18 months due to sleep disturbance).

High exposure to air traffic noise

- Case of an average individual living on the edge of zone III of the Paris-CDG noise pollution map, i.e. exposed to Lden air traffic noise levels of 55 dB(A) and around 47 dB (A) at night: 17 months of healthy life lost due to noise (5 months due to the annoyance and 12 months due to sleep disturbance).
- Case of an average individual living on the edge of zone II of the Paris-CDG noise pollution map, i.e. exposed to Lden air traffic noise levels of 65 dB(A) and around 57 dB (A) at night: 29 months of healthy life lost due to noise (9 months due to the annoyance and 20 months due to sleep disturbance).
- Case of an average individual living on the edge of zone I of the Paris-CDG noise pollution map, i.e. exposed to Lden air traffic noise levels of 70 dB(A) and around 62 dB (A) at night: 36 months of healthy life lost due to noise (11 months due to the annoyance and 25 months due to sleep disturbance).
- Case of an average individual living on the edge of zone III of the Paris-Orly noise pollution map, i.e. exposed to Lden air traffic noise levels of 55 dB(A) and around 43 dB (A) at night: 15 months of healthy life lost due to noise (5 months due to the annoyance and 10 months due to sleep disturbance).
- Case of an average individual living on the edge of zone II of the Paris-Orly noise pollution map, i.e. exposed to Lden air traffic noise levels of 65 dB(A) and Around 53 dB (A) at night: 25 months of healthy life lost due to noise (9 months due to the annoyance and 16 months due to sleep disturbance).
- Case of an average individual living on the edge of zone I of the Paris-Orly noise pollution map, i.e. exposed to Lden air traffic noise levels of 70 dB(A) and around 58 dB (A) at night: 32 months of healthy life lost due to noise (11 months due to the annoyance and 21 months due to sleep disturbance).

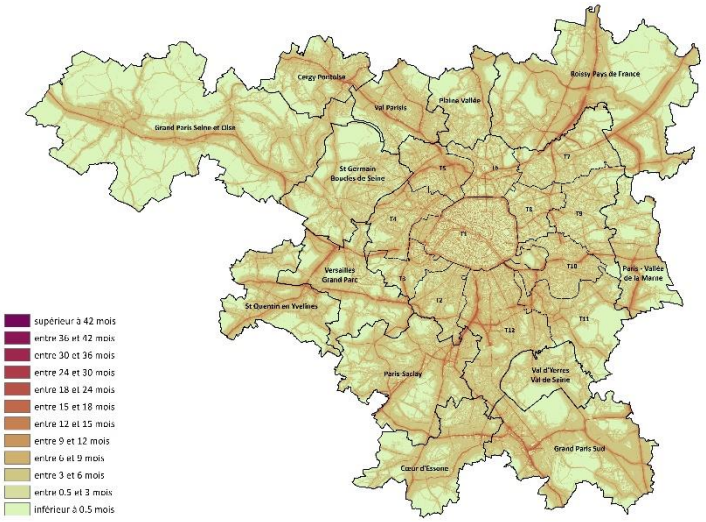
POTENTIAL OF HEALTH RISKS FOR AN INDIVIDUAL DUE TO CUMULATED TRANSPORT NOISE EXPOSURE

NUMBER OF HEALTHY LIFE-MONTHS LOST DURING A LIFETIME



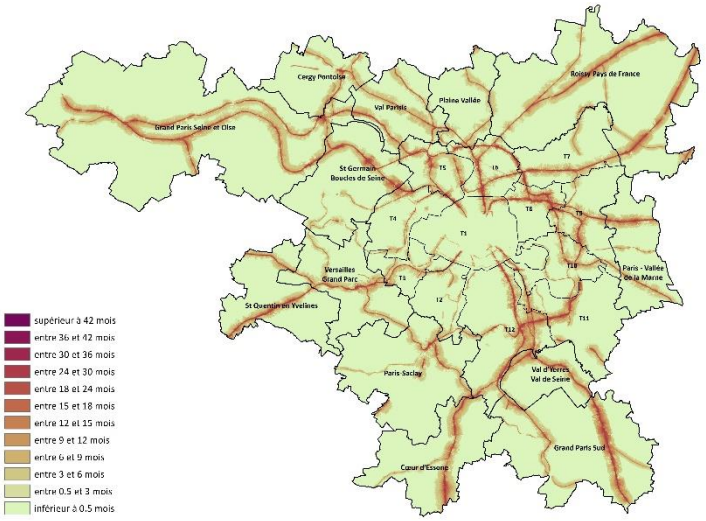
POTENTIAL OF HEALTH RISKS FOR AN INDIVIDUAL DUE TO ROAD TRAFFIC NOISE EXPOSURE

NUMBER OF HEALTHY LIFE-MONTHS LOST DURING A LIFETIME



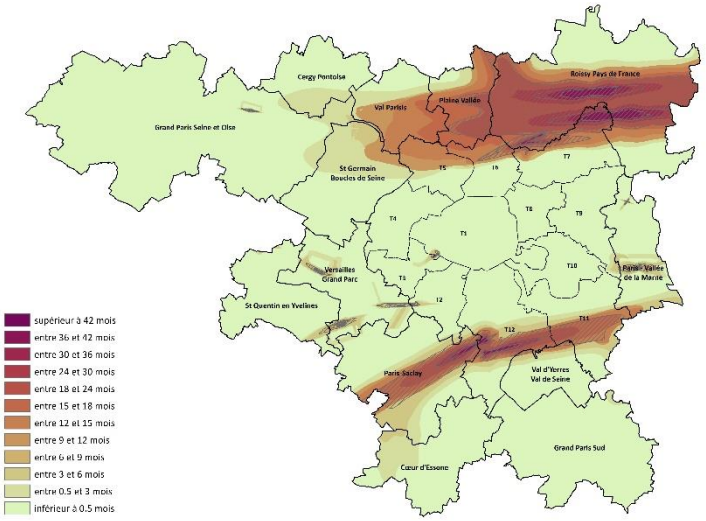
POTENTIAL OF HEALTH RISKS FOR AN INDIVIDUAL DUE TO RAIL TRAFFIC NOISE EXPOSURE

NUMBER OF HEALTHY LIFE-MONTHS LOST DURING A LIFETIME



POTENTIAL OF HEALTH RISKS FOR AN INDIVIDUAL DUE TO AIR TRAFFIC NOISE EXPOSURE

NUMBER OF HEALTHY LIFE-MONTHS LOST DURING A LIFETIME



UNCERTAINTY FACTORS

There are uncertainties at every step of this method for assessing health impact. Several uncertainty factors have been identified. They are described below.

Uncertainties related to the noise exposure data

The estimations for healthy life-years lost due to noise are based on data from the first noise maps produced under European directive 2002/49/EC.

The quality of estimations is highly dependent on input data (traffic, speed, road surface, noise barriers, topography, etc.). There are, therefore, many potential sources of imprecision. Comparisons of the data from strategic noise maps and the measurements carried out in the field generally show variations of +/-3 dB (A), which corresponds to a multiplication/division of the sound energy by 2.

Furthermore, the method for calculating the population's exposure consists in attributing residents of a given building with the highest noise levels estimated at 4 m from the ground and 2 m in front of the building's façade (having previously subtracted 3 dB (A) from the values calculated in order to account for the sound's reflection off the building's façade). This method of allocation appears to overestimate the values insofar as that it does not take into account the layout of homes, the presence or absence of a quiet façade, the vertical variation of noise levels, or the varying performance levels of acoustic insulation between different housing.

A theoretical calculation was carried out on the consequences of an error of +/-3 dB (A) on levels of exposure to noise, on the evaluation of disability-adjusted life-years lost. The results indicate that the number of disability-adjusted life-years lost within the densely populated zone of Ile-de-France varies between 81,000 (if we apply -3dB (A) everywhere) and 135,000 years (if we apply +3 dB (A) everywhere), so a range of +/-25% for the value calculated in this study.

Uncertainties related to the health effects considered

As previously explained, it was decided to only focus on the best-known and documented health effects of noise, namely annoyance and sleep disturbance, although the WHO also considers the effects of cardiovascular risk and learning difficulties to be critical.

This approach leads to a probable underestimation of the health impact of noise. However, the WHO's 2011 qualification of the burden of disease from transport noise in Western Europe indicates that sleep disturbance and annoyance alone represented a total of 92% of the 1.62 million disability-adjusted life-years lost calculated.

Not taking into account the effects of cardiovascular risks and learning difficulties in the evaluation therefore leads to a probable underestimation of the burden of disease from noise in the densely populated zone of Ile-de-France of around 10%.

Uncertainties related to the exposure-response relationship

In order to prepare its new guidelines published in October 2018, the WHO conducted a full review of the scientific literature concerning the effects of noise, systematically evaluating the results of various research and the epidemiological studies taken into account and their uncertainties thanks to a robust standardised method (PICOS/PEECOS)[12].

The dose-effect relationships come from the results of epidemiological studies. The validity of these relationships was evaluated using the following criteria:

- The quality of studies used (the choice of criteria must be clearly stated);
- The exhaustiveness of the collection of studies;
- The quality of the estimation of exposure;
- The convergence of results;
- The possibility of transposing the results to the population to which one wants to apply the exposure-risk relationship;
- Biological plausibility.

Using these criteria, the WHO selected dose-effect relationships for the various noise sources, when the scientific evidence was solid enough, for each health effect chosen. These relationships include uncertainties related to the confidence intervals as a result of the variability of results from epidemiological studies. However, the WHO believes that these relationships can be applied in order to estimate the percentage of people affected based on their level of exposure.

The WHO mentions in its report that the review of the scientific evidence does not show a generalisable exposure-response relationship for annoyance due to the high heterogeneity of studies and the fact that the concept of annoyance is context- and culture-dependent. Therefore, it encourages the use of

[12] *Population, intervention, comparator, outcome and study design/Population, exposure, comparator, confounders, outcome and study design.*

exposure-response curves from local studies wherever possible. The WHO nevertheless believes that the exposure-response relationships recommended in its report can be used by default. These relationships must be adjusted in the future based on a more complete meta-analysis. This additional research is particularly highly anticipated for aircraft and rail noise, for which the new studies indicate levels of annoyance that are far higher than the previous data.

It is also important to specify that dose-effect relationships were established for noise levels estimated outside buildings, considering that the majority of epidemiological studies examined the relationships between the health effects caused to populations with noise levels measured or modelled inside their homes. The average differences between noise levels inside and outside homes are around 10 dB when the windows are open, 15 dB when the windows are ajar, and 25 dB when they're closed. The dose-effect relationships are based on the indirect integration of these average statistical values on exposure differences between the inside and outside of buildings.

However, for homes that have more effective acoustic insulation (30 to 35 dB), in particular those that have received subsidies for sound insulation within the airports' noise pollution maps, the application of exposure-response curves as recommended by the WHO probably over-inflates the health effects.

In the absence of precise data allowing us to identify precisely which buildings have acoustic insulation, it was decided to apply the dose-effect relationships uniformly. We therefore draw the readers' attention to this point, which may lead to the potential overestimation of the effects, in particular within zones that were part of the sound insulation programme.

Uncertainties related to the choice of disability weight

The WHO recommends evaluating disease caused by environmental noise using the Disability-Adjusted Life-Year (DALY) metric, using the recommended Global Burden of Disease (GBD) method.

In this calculation, the choice of disability weight has a strong influence on the results. Several coefficient values can be suggested, as shown in the following table (the value chosen for the calculation made according to WHO recommendations is in bold):

Disability weight (DW)	DWinf	**DW**	DWsup
Annoyance	0.01	**0.02**	0.12
Sleep Disturbance	0.04	**0.07**	0.10

In the case of annoyance, although there are relatively few studies devoted to the determination of the disability weight (DW), the WHO recommends using a DW value of 0.02 with a high range of uncertainty (between 0.01 and 0.12). The value of 0.02 leads to a "conservative" approach, where the emphasis is on underestimating disease.

Based on an exhaustive study of several research projects carried out by the WHO's group of experts, the DW disability coefficient due to sleep disturbance was set at 0.07 to calculate DALY. The value chosen takes into consideration the statistical distribution of DW observed in various research projects studied whose variations translate an uncertainty interval of between 0.04 and 0.1.

In their October 2018 report, the WHO indicates that the effects of annoyance and sleep disturbance due to a single noise source must be considered to be cumulative and that it is therefore possible to add the DALY values calculated for both annoyance and sleep disturbance for a single noise source.

Uncertainty related to the consideration of exposure to multiple sources of noise

In its October 2018 report, the WHO noted a relative lack of understanding of the effects of exposure to multiple sources of noise simultaneously, or the exposure to noise combined with other environmental nuisances (air pollution, for example), as most epidemiological and biological studies only address the health impacts of exposure to a single source of noise.

Yet many people within the densely populated zone of Ile-de-France are concerned by exposure to multiple sources of transport noise. The WHO indicates that, in this type of case, there is a risk of potential double counting. However, it does not suggest an operational method for dealing with the combined health effects of exposure to multiple sources of noise (addition of effects or consideration of a masking phenomenon by the noise source with the most marked effect).

To present the results in this study, we decided to cumulate the health impacts of the three noise sources in the knowledge that this probably over-evaluates the effect. We therefore draw the reader's attention to this point.

The health impact of noise was calculated in parallel using the maximum health effect of the three noise sources, for annoyance and sleep disturbance, for each population associated with a building. The result of this calculation makes it possible to determine the health impact of noise within the population, without taking into account potentially cumulative effects related to exposure to multiple noise sources, and therefore underestimates the effect. The result of this calculation is 85,065 disability-adjusted life-years lost within the densely populated zone of Ile-de-France; 21% less than the estimation made in this study by cumulating the health impact of three noise sources. The "true" value probably lies somewhere between these two figures.

RESULTS PRODUCED

This report produces a certain number of results pertaining to the population's exposure to transport noise and its health impact, in the form of maps and statistics.

It was decided to present the results by noise source (road noise, rail noise, and aircraft noise) and cumulatively for the three sources.

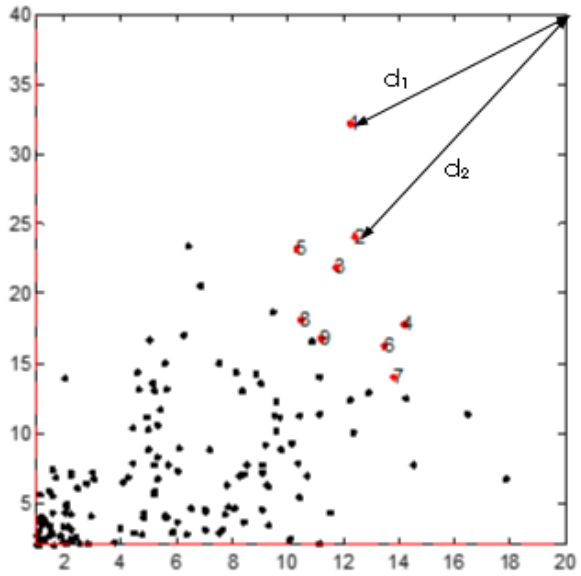
For each source, after a reminder of the main results from the strategic noise maps (population distribution by range of noise level and comparison with the different reference values), the health impacts are presented.

By adding the values of disability-adjusted life-years lost combined with the annoyance and sleep disturbance values, with a 250 m² grid, as well as at commune level, these maps illustrate the territorial distribution of disease caused by noise as well as the potential individual risks.

There are statistics presenting results for the entire territory and for each agglomeration, as well as for the 50 communes with the highest values, bearing in mind that results for every commune are provided in the appendix. The data is provided for each territorial unit as a total number of disability-adjusted life-years lost each year as well as the average individual risk (healthy life-months lost per individual over a lifetime).

These two types of information seem complementary in terms of the selection of the territory's priority sectors. The figure on disability-adjusted life-years lost per territorial unit provides information on the collective scale of disturbance, whereas the figure on healthy life-months lost at individual level over a lifetime represents the individual risk.

In order to take into consideration both of these aspects of health risks (collective and individual), Bruitparif has produced additional maps that highlight the territory's grids that have high values for both aspects. This ranking of grids was done using the so-called Euclidean distance technique. The grids that had the total DALY and individual risk values that were closest to the highest values observed were sorted in ascending order of Euclidean distance. The figure below illustrates the process used.



Process using Euclidean distance.

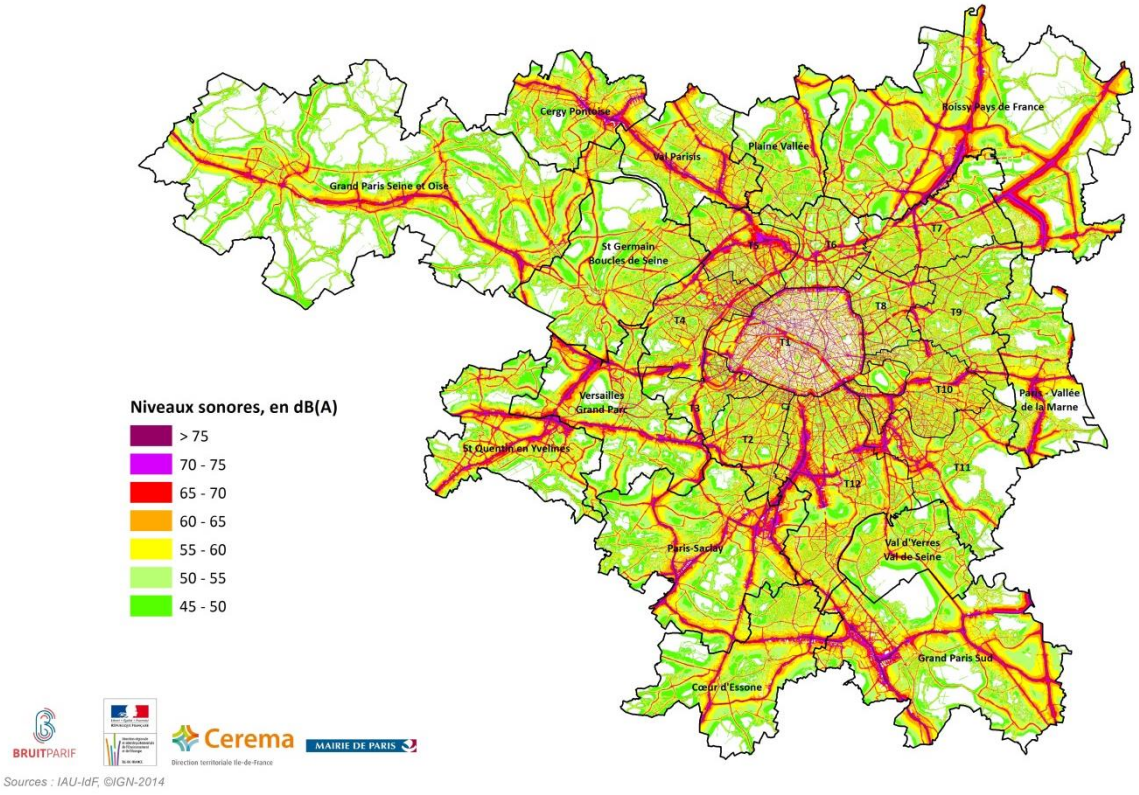
Once the ranking was completed, the 500 grids with the highest values were selected for each noise source. This ranking highlights the neighbourhoods that should be the priority in terms of public action to reduce noise pollution.

And finally, the results of the health impact and the related economic costs were compared with those obtained during the first evaluations conducted between 2011 and 2015 by Bruitparif and the Ile-de-France's regional health watchdog.

PART 1
ROAD TRAFFIC NOISE

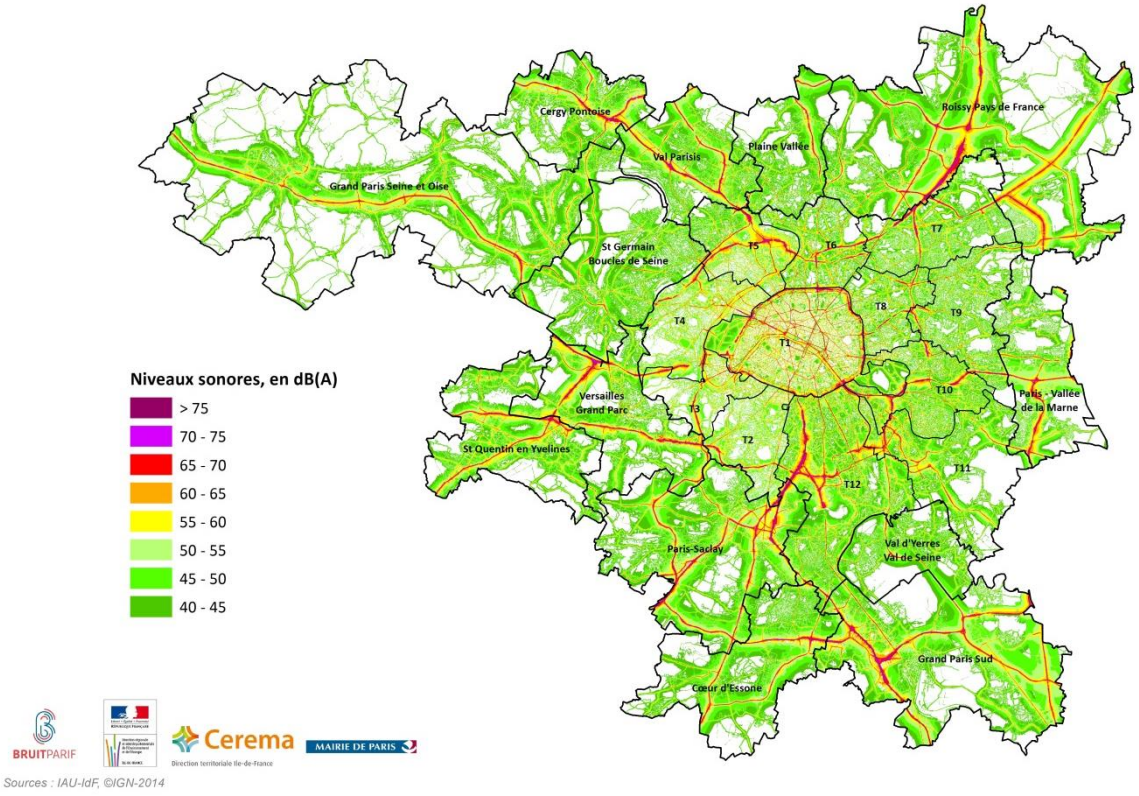
ROAD TRAFFIC NOISE - NOISE LEVELS

INDICATOR LDEN



Sources : IAU-IdF, ©IGN-2014

INDICATOR LN



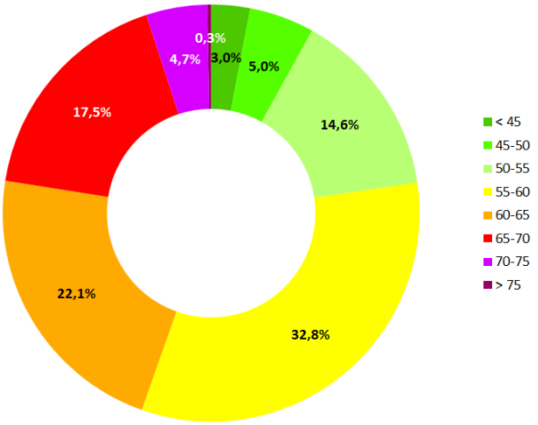
Sources : IAU-IdF, ©IGN-2014

ROAD TRAFFIC NOISE - STATISTICS BY RANGE OF NOISE LEVELS

INDICATOR LDEN

	Nombre d'habitants (à la centaine près)	%
> 75	30 500	0,3%
70-75	479 400	4,7%
65-70	1 764 400	17,5%
60-65	2 231 300	22,1%
55-60	3 309 600	32,8%
50-55	1 476 400	14,6%
45-50	508 500	5,0%
< 45	304 100	3,0%

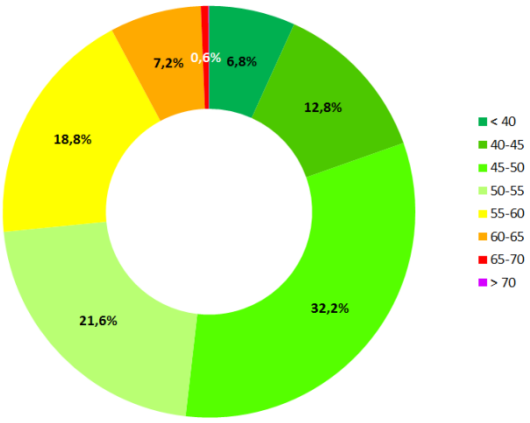
POPULATION



INDICATOR LN

	Nombre d'habitants (à la centaine près)	%
> 70	5 000	0,0%
65-70	59 200	0,6%
60-65	724 800	7,2%
55-60	1 894 600	18,8%
50-55	2 185 400	21,6%
45-50	3 256 300	32,2%
40-45	1 294 300	12,8%
< 40	684 500	6,8%

POPULATION



ROAD TRAFFIC NOISE - STATISTICS PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN — POPULATION

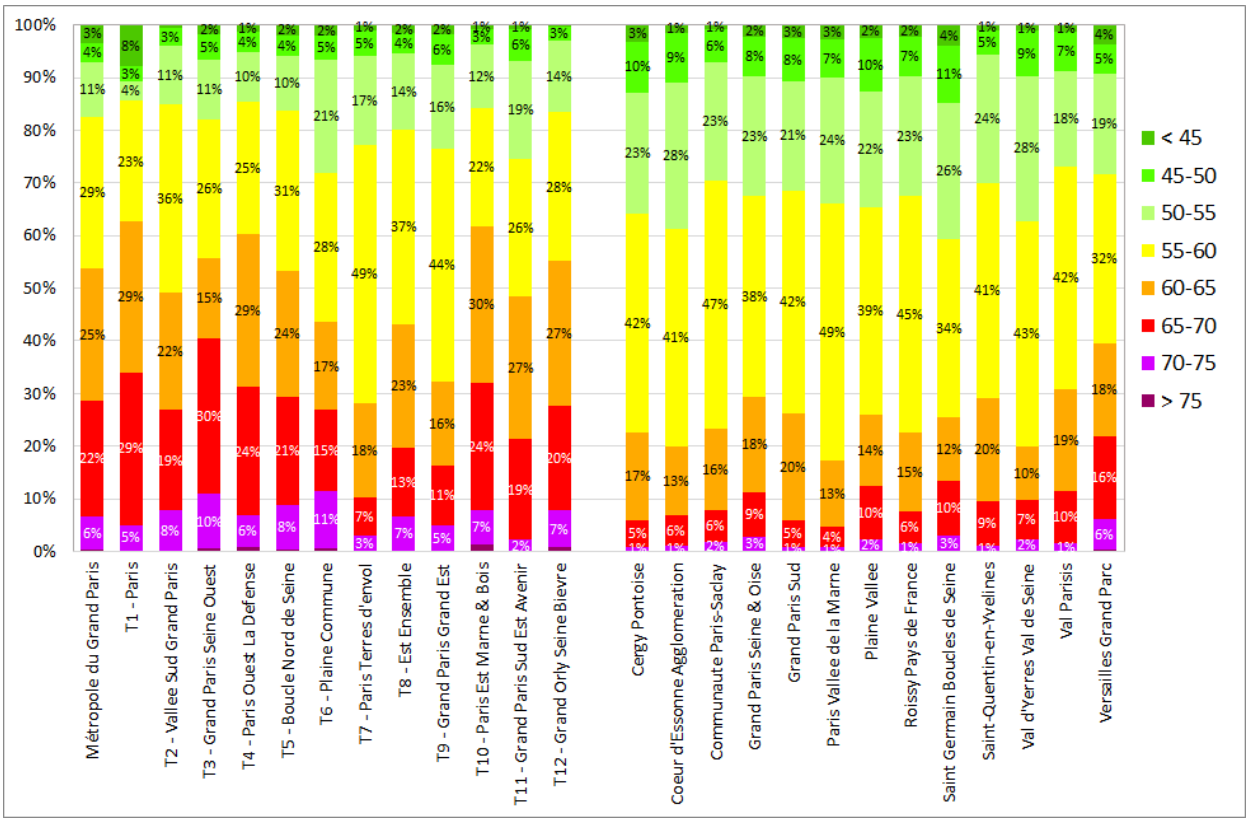
Nombre d'habitants (à la centaine près)	< 45	45-50	50-55	55-60	60-65	65-70	70-75	> 75
Métropole du Grand Paris	**228 000**	**247 500**	**714 400**	**1 945 500**	**1 699 900**	**1 498 400**	**416 100**	**26 200**
T1 - Paris	*171 200*	*63 500*	*80 300*	*504 200*	*626 300*	*633 700*	*106 200*	*3 800*
T2 - Vallee Sud Grand Paris	*2 600*	*12 800*	*42 100*	*136 600*	*85 100*	*73 000*	*28 900*	*600*
T3 - Grand Paris Seine Ouest	*5 600*	*13 800*	*34 100*	*78 600*	*45 500*	*87 900*	*30 800*	*1 500*
T4 - Paris Ouest La Defense	*7 600*	*20 400*	*52 900*	*137 700*	*160 600*	*134 600*	*32 900*	*4 600*
T5 - Boucle Nord de Seine	*8 300*	*16 600*	*43 200*	*127 400*	*99 400*	*85 900*	*35 300*	*1 500*
T6 - Plaine Commune	*8 100*	*18 000*	*84 900*	*112 400*	*65 900*	*60 400*	*43 200*	*2 600*
T7 - Paris Terres d'envol	*3 300*	*16 800*	*57 100*	*167 200*	*60 800*	*24 400*	*10 100*	-
T8 - Est Ensemble	*6 400*	*14 800*	*56 200*	*145 100*	*90 800*	*51 500*	*25 400*	*200*
T9 - Grand Paris Grand Est	*6 500*	*21 200*	*59 500*	*162 800*	*58 700*	*42 300*	*18 000*	*100*
T10 - Paris Est Marne & Bois	*4 100*	*14 500*	*59 200*	*110 600*	*146 800*	*118 300*	*32 700*	*6 500*
T11 - Grand Paris Sud Est Avenir	*2 500*	*17 600*	*55 500*	*78 200*	*80 500*	*56 900*	*6 400*	*100*
T12 - Grand-Orly Seine Bievre	*1 600*	*17 600*	*89 400*	*184 600*	*179 400*	*129 600*	*46 100*	*4 600*
Cergy Pontoise	**6 400**	**18 700**	**45 500**	**81 500**	**32 600**	**9 900**	**1 500**	**200**
Coeur d'Essonne Agglomeration	**2 700**	**17 400**	**51 100**	**76 400**	**24 200**	**10 700**	**1 700**	**200**
Communaute Paris-Saclay	**2 500**	**17 500**	**64 500**	**134 300**	**44 500**	**17 500**	**4 300**	**500**
Grand Paris Seine & Oise	**8 500**	**29 900**	**88 800**	**149 600**	**70 200**	**33 500**	**10 000**	**700**
Grand Paris Sud	**8 000**	**25 800**	**65 900**	**134 200**	**65 000**	**15 700**	**2 500**	**200**
Paris Vallee de la Marne	**6 100**	**15 700**	**51 900**	**106 600**	**27 300**	**8 600**	**1 600**	-
Plaine Vallee	**4 300**	**17 700**	**38 300**	**68 800**	**23 900**	**17 700**	**3 700**	**100**
Roissy Pays de France	**7 300**	**24 800**	**76 000**	**149 300**	**49 500**	**20 500**	**4 600**	**500**
Saint Germain Boucles de Seine	**13 000**	**36 100**	**84 700**	**111 700**	**39 600**	**34 300**	**9 400**	**400**
Saint-Quentin-en-Yvelines	**2 300**	**10 600**	**54 300**	**91 500**	**43 900**	**19 200**	**1 800**	**300**
Val d'Yerres Val de Seine	**1 900**	**14 200**	**45 800**	**71 300**	**17 000**	**12 300**	**3 800**	-
Val Parisis	**3 400**	**18 300**	**45 100**	**105 200**	**48 300**	**24 700**	**3 700**	**100**
Versailles Grand Parc	**9 700**	**14 300**	**50 000**	**83 900**	**45 700**	**41 200**	**14 700**	**1 100**

INDICATOR LN — POPULATION

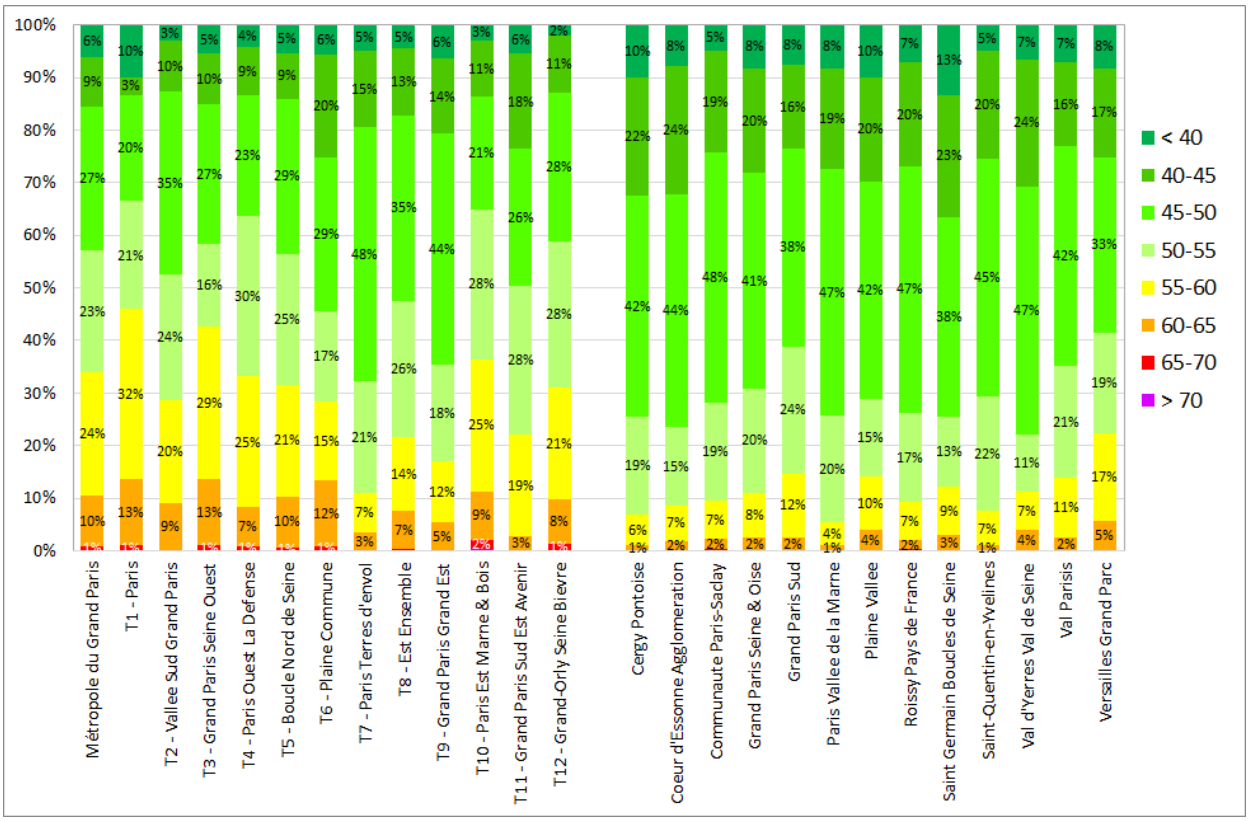
Nombre d'habitants (à la centaine près)	< 40	40-45	45-50	50-55	55-60	60-65	65-70	> 70
Métropole du Grand Paris	**415 800**	**633 700**	**1 851 000**	**1 574 200**	**1 597 200**	**645 000**	**54 500**	**4 600**
T1 - Paris	217 100	75 300	442 000	449 100	707 600	275 800	20 600	1 700
T2 - Vallee Sud Grand Paris	11 800	36 600	132 800	91 200	75 400	33 400	500	200
T3 - Grand Paris Seine Ouest	16 100	28 700	79 200	47 000	86 200	37 900	2 900	-
T4 - Paris Ouest La Defense	23 700	49 600	127 400	168 100	137 300	40 200	5 000	100
T5 - Boucle Nord de Seine	22 200	36 500	122 900	103 900	88 700	40 400	2 700	200
T6 - Plaine Commune	22 500	77 400	115 700	67 900	59 000	49 400	3 300	300
T7 - Paris Terres d'envol	16 500	49 700	164 600	72 000	25 300	11 700	300	-
T8 - Est Ensemble	17 700	49 600	137 400	101 400	54 800	28 200	1 300	-
T9 - Grand Paris Grand Est	23 700	52 900	162 200	67 600	42 900	19 600	300	-
T10 - Paris Est Marne & Bois	14 500	52 600	105 800	140 200	123 700	45 600	8 700	1 600
T11 - Grand Paris Sud Est Avenir	16 400	54 000	77 500	84 000	57 500	7 700	600	-
T12 - Grand-Orly Seine Bievre	13 700	70 800	183 800	181 800	139 000	55 000	8 300	600
Cergy Pontoise	**19 800**	**44 000**	**82 300**	**36 600**	**11 600**	**1 800**	**200**	-
Coeur d'Essonne Agglomeration	**14 600**	**44 800**	**81 600**	**27 600**	**12 400**	**3 300**	**100**	**100**
Communaute Paris-Saclay	**14 000**	**55 200**	**136 000**	**53 000**	**20 700**	**5 600**	**900**	**100**
Grand Paris Seine & Oise	**32 200**	**78 200**	**159 800**	**77 700**	**33 200**	**9 300**	**700**	-
Grand Paris Sud	**24 400**	**49 900**	**119 800**	**76 600**	**38 500**	**7 700**	**400**	**100**
Paris Vallee de la Marne	**17 900**	**42 100**	**101 900**	**44 300**	**9 500**	**2 100**	-	-
Plaine Vallee	**17 400**	**34 500**	**72 500**	**25 400**	**17 900**	**6 600**	**200**	-
Roissy Pays de France	**23 600**	**65 700**	**155 600**	**56 500**	**24 400**	**5 600**	**800**	-
Saint Germain Boucles de Seine	**43 700**	**76 400**	**125 300**	**43 400**	**30 800**	**9 300**	**400**	-
Saint-Quentin-en-Yvelines	**11 200**	**45 700**	**101 300**	**48 900**	**14 600**	**1 700**	**300**	**100**
Val d'Yerres Val de Seine	**10 800**	**40 400**	**78 300**	**18 300**	**12 100**	**6 200**	**200**	-
Val Parisis	**17 600**	**39 800**	**103 900**	**52 800**	**28 400**	**6 200**	**100**	-
Versailles Grand Parc	**21 500**	**44 100**	**87 000**	**50 100**	**43 400**	**14 300**	**400**	-

ROAD TRAFFIC NOISE - STATISTICS PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN PERCENTAGE OF POPULATION

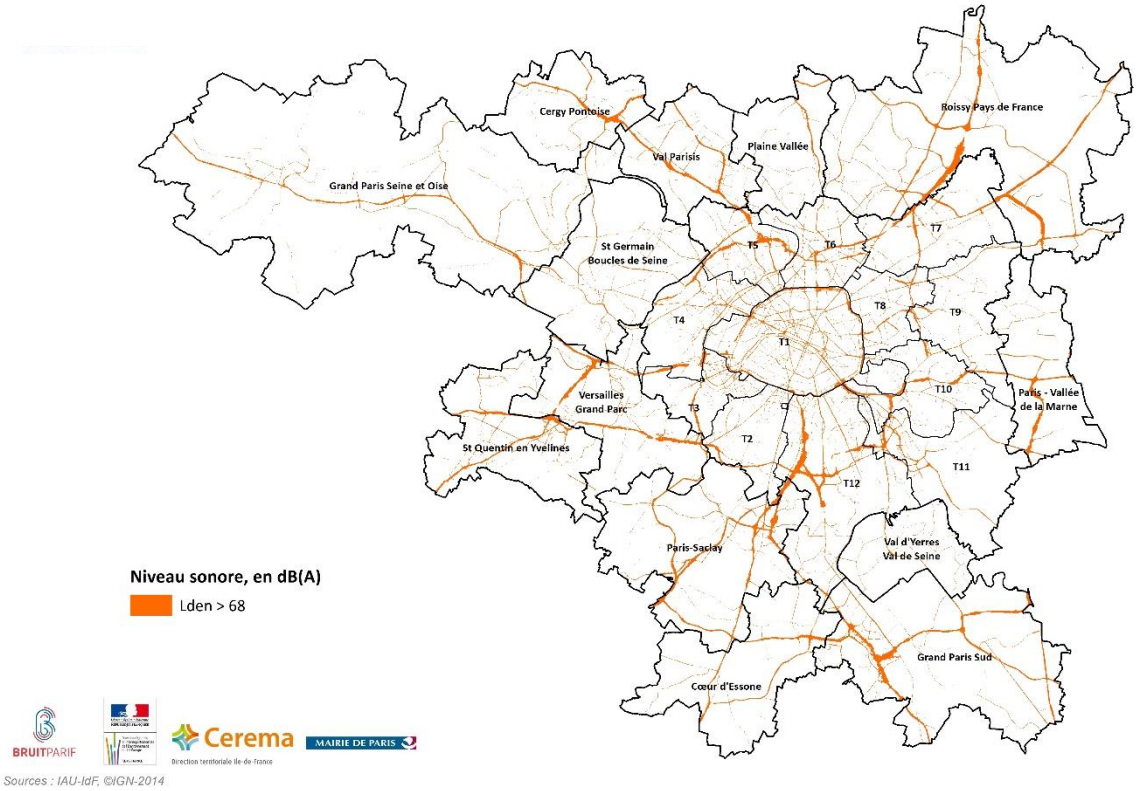


INDICATOR LN PERCENTAGE OF POPULATION



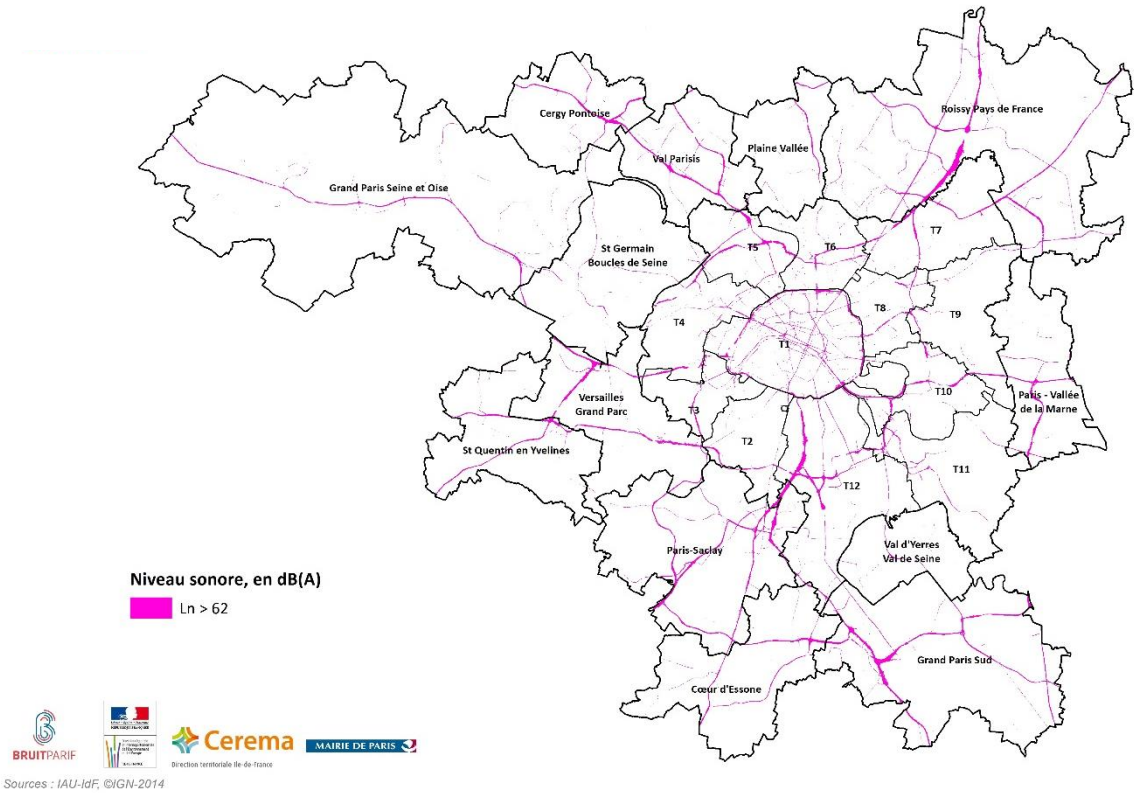
ROAD TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 68 dB(A) AREAS OF EXCEEDANCE



Sources : IAU-IdF, ©IGN-2014

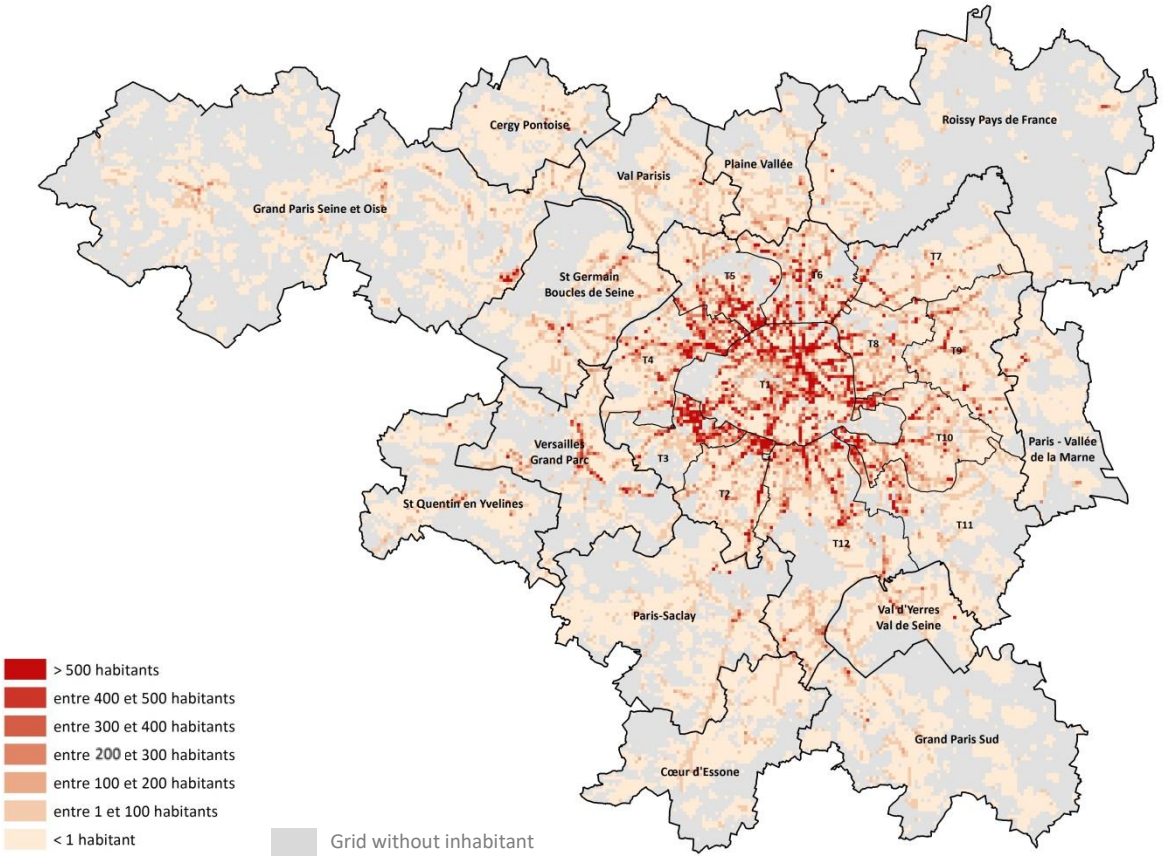
INDICATOR LN > 62 dB(A) AREAS OF EXCEEDANCE



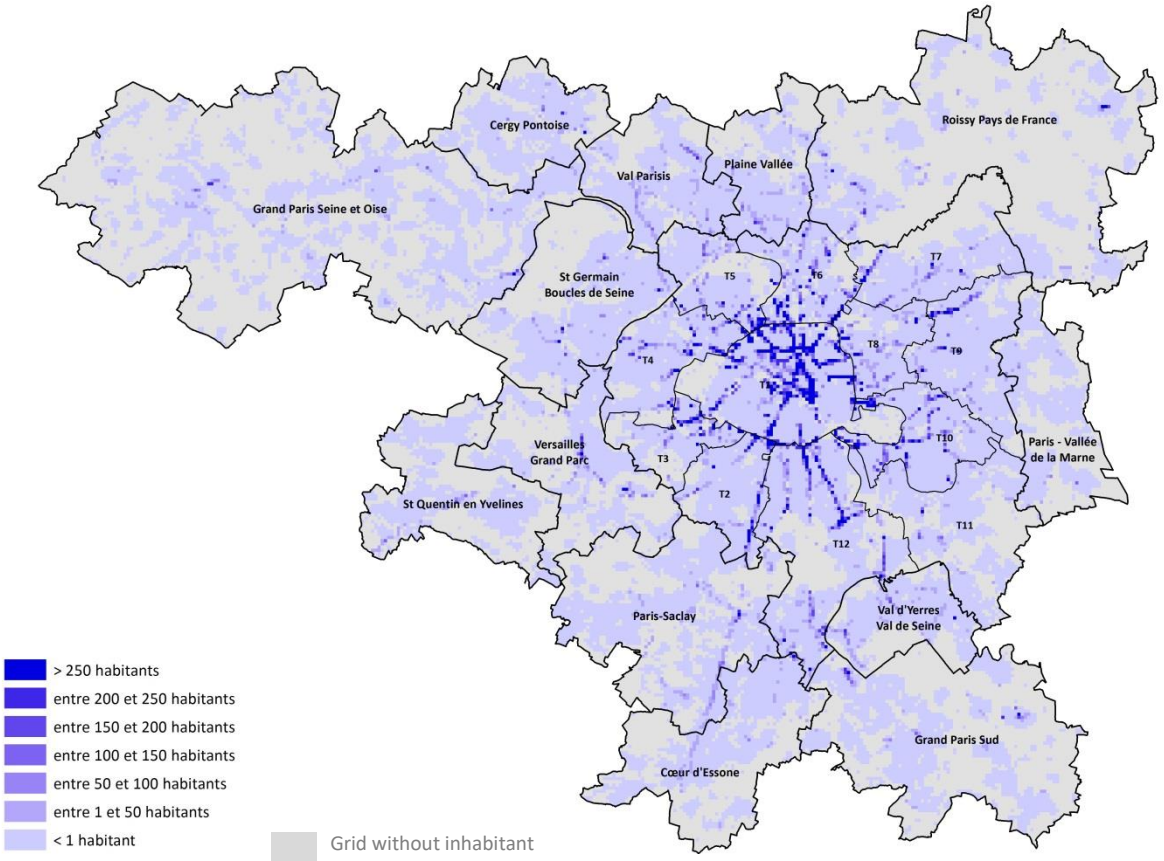
Sources : IAU-IdF, ©IGN-2014

ROAD TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 68 dB(A) POPULATION PER GRID OF 250 m

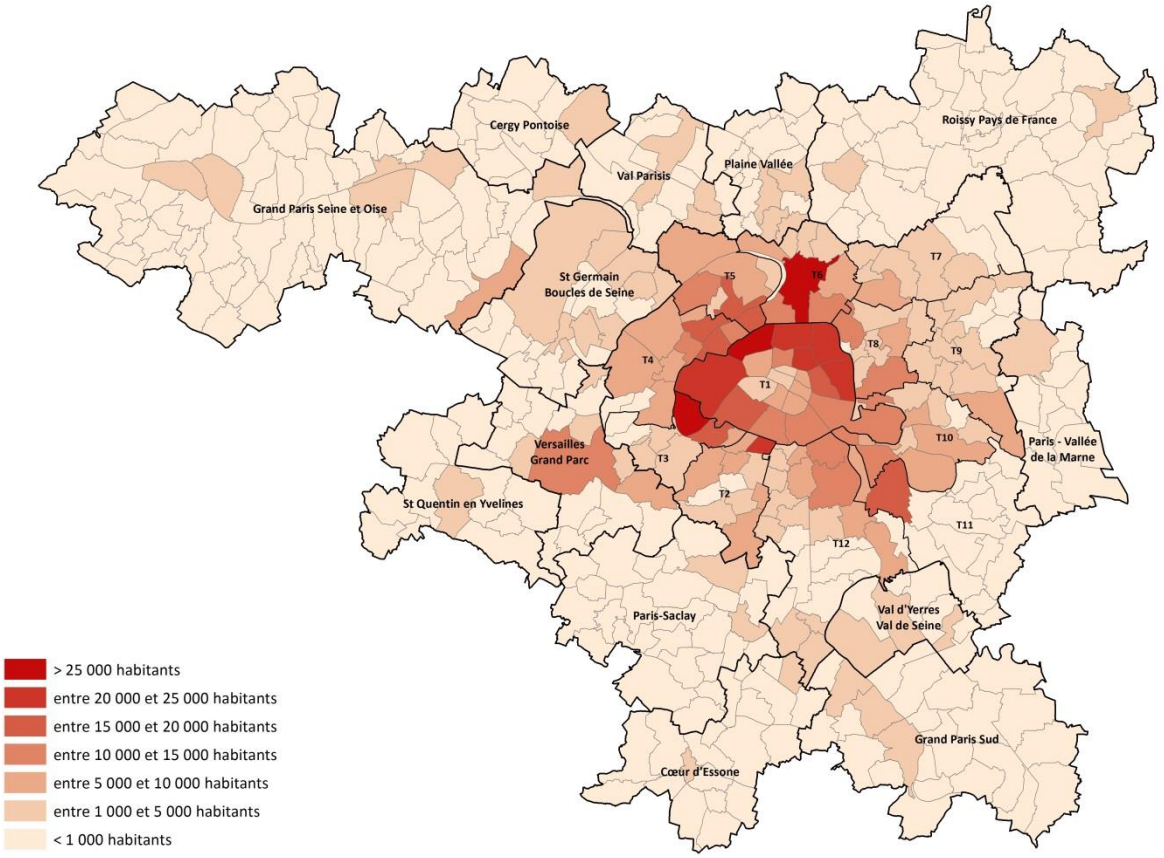


INDICATOR LN > 62 dB(A) POPULATION PER GRID OF 250 m

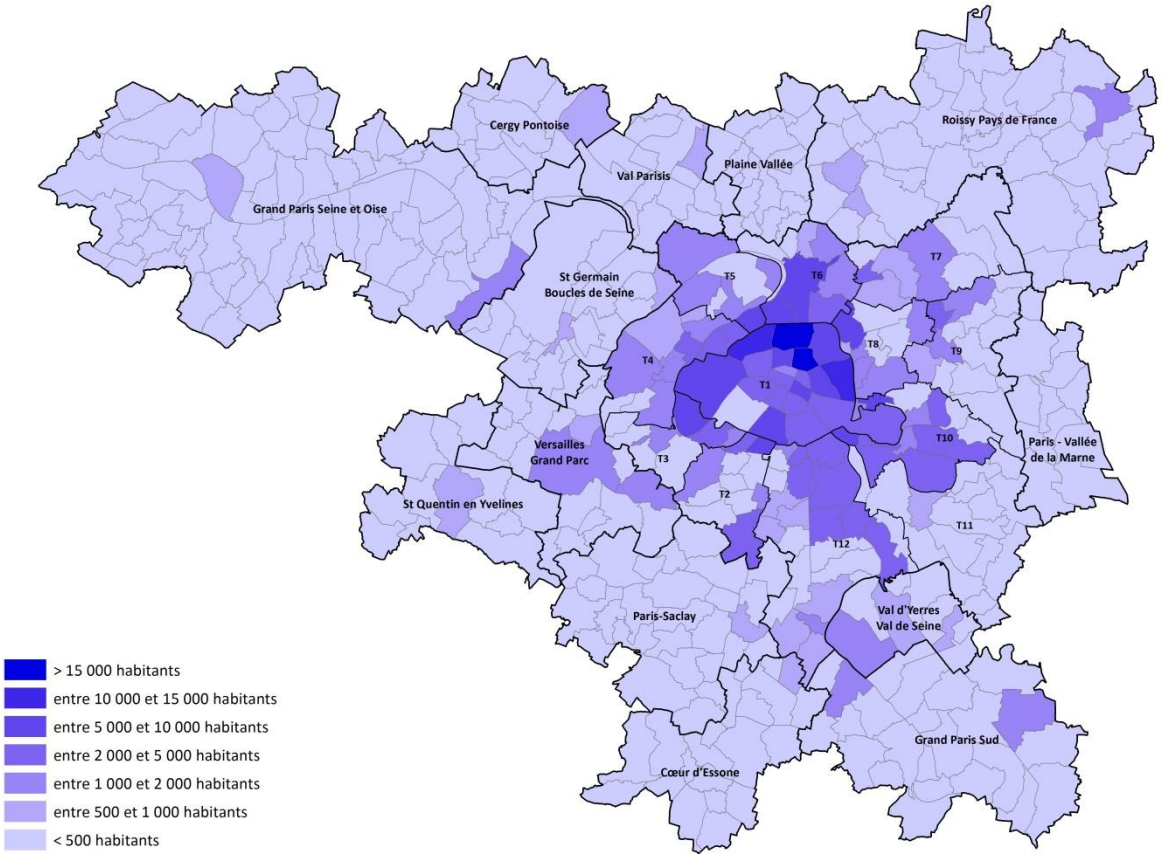


ROAD TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 68 dB(A) POPULATION PER COMMUNE LEVEL

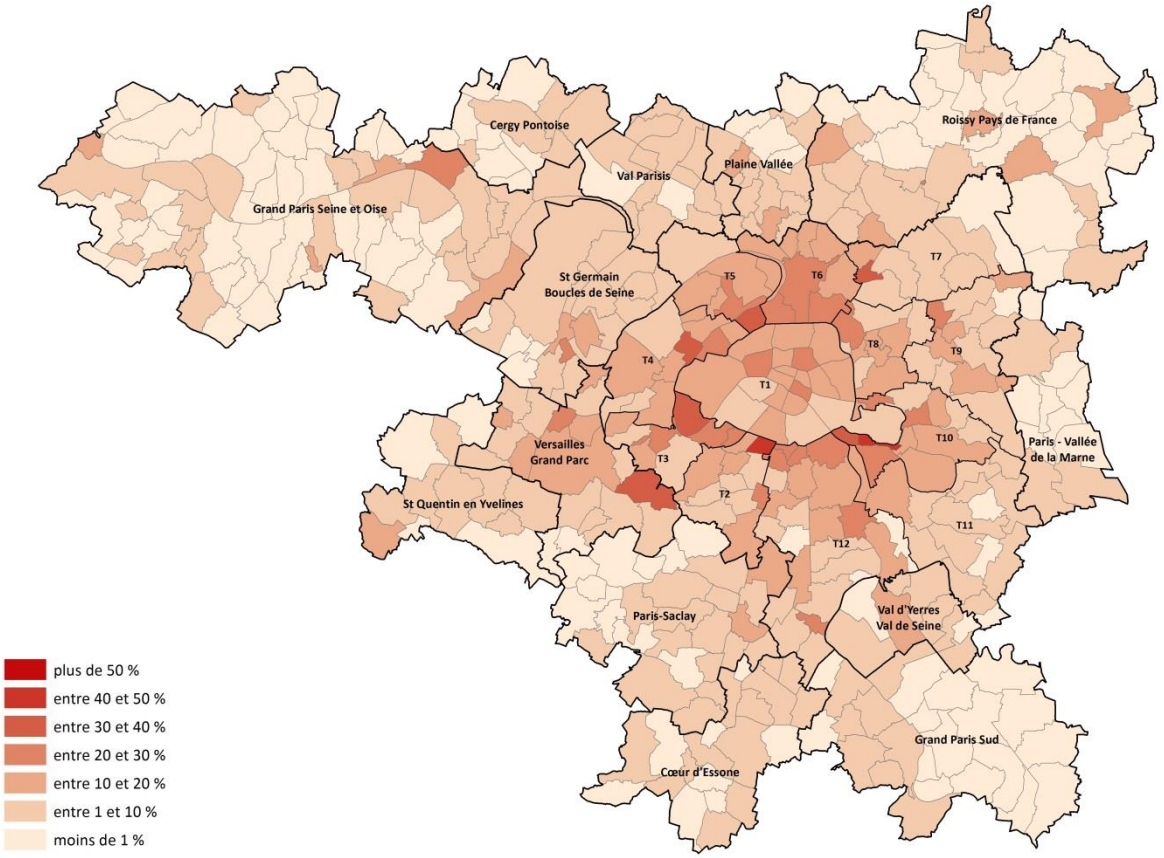


INDICATOR LN > 62 dB(A) POPULATION PER COMMUNE LEVEL

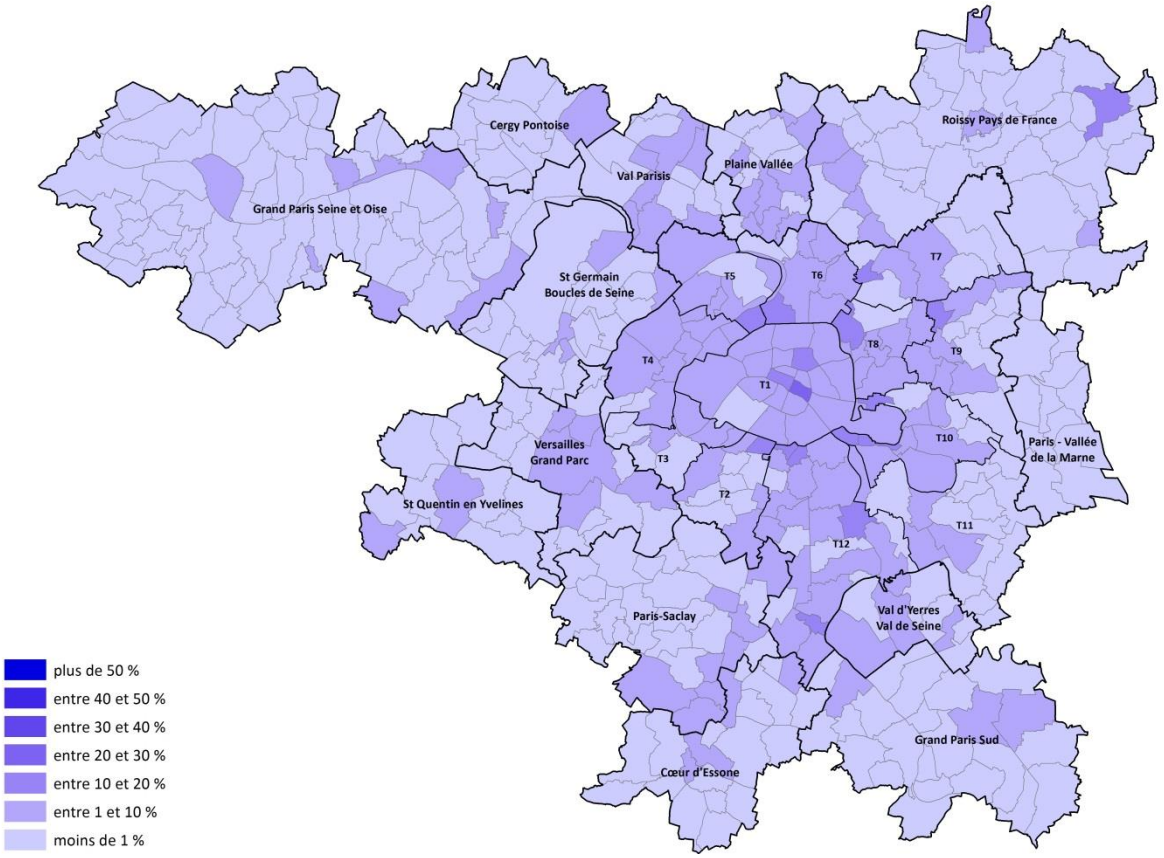


ROAD TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 68 dB(A) IN PERCENTAGE PER COMMUNE LEVEL

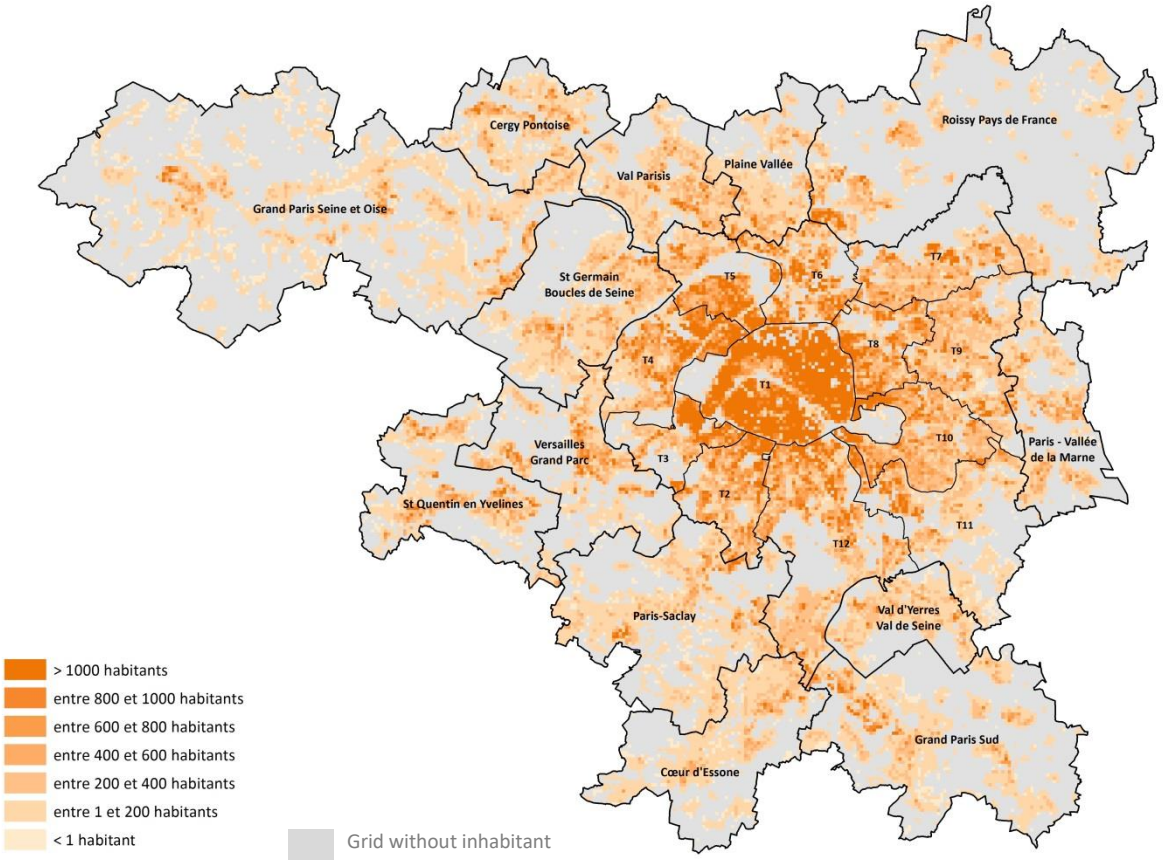


INDICATOR LN > 62 dB(A) IN PERCENTAGE PER COMMUNE LEVEL

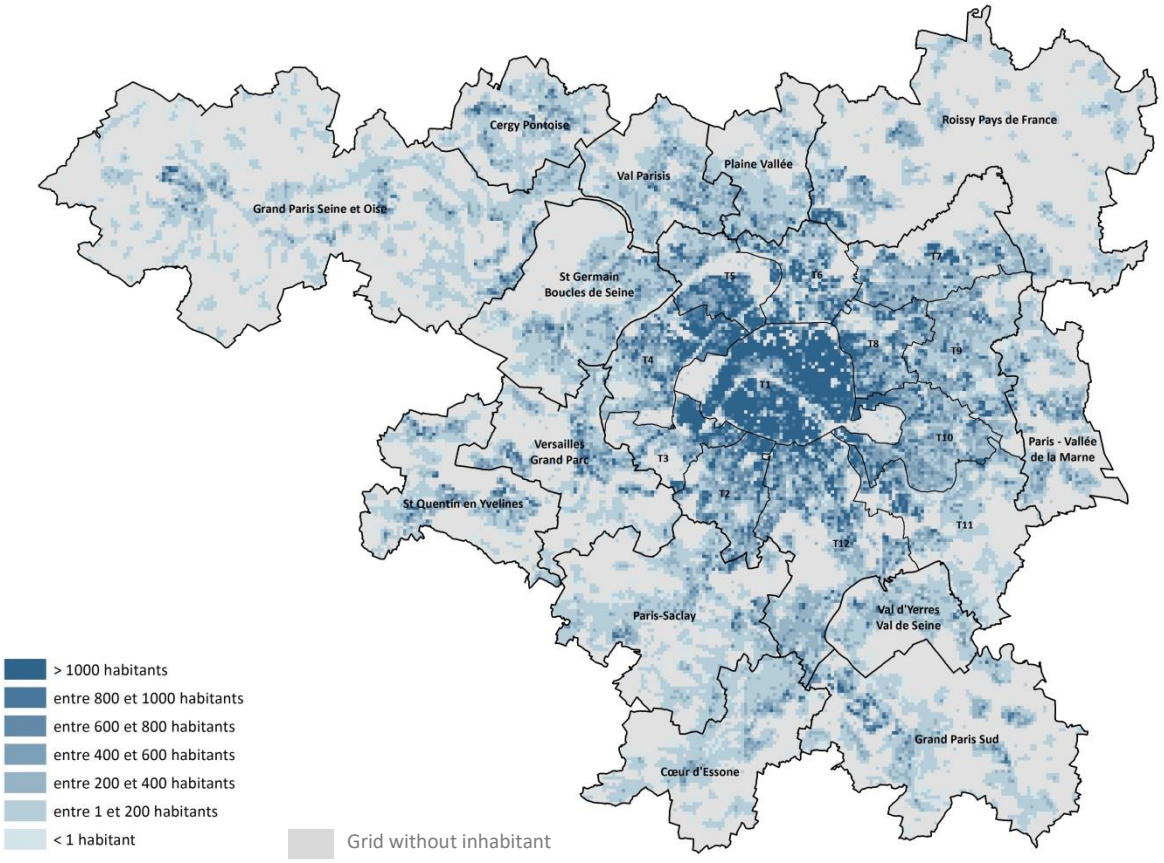


ROAD TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 53 dB(A) POPULATION PER GRID OF 250 m

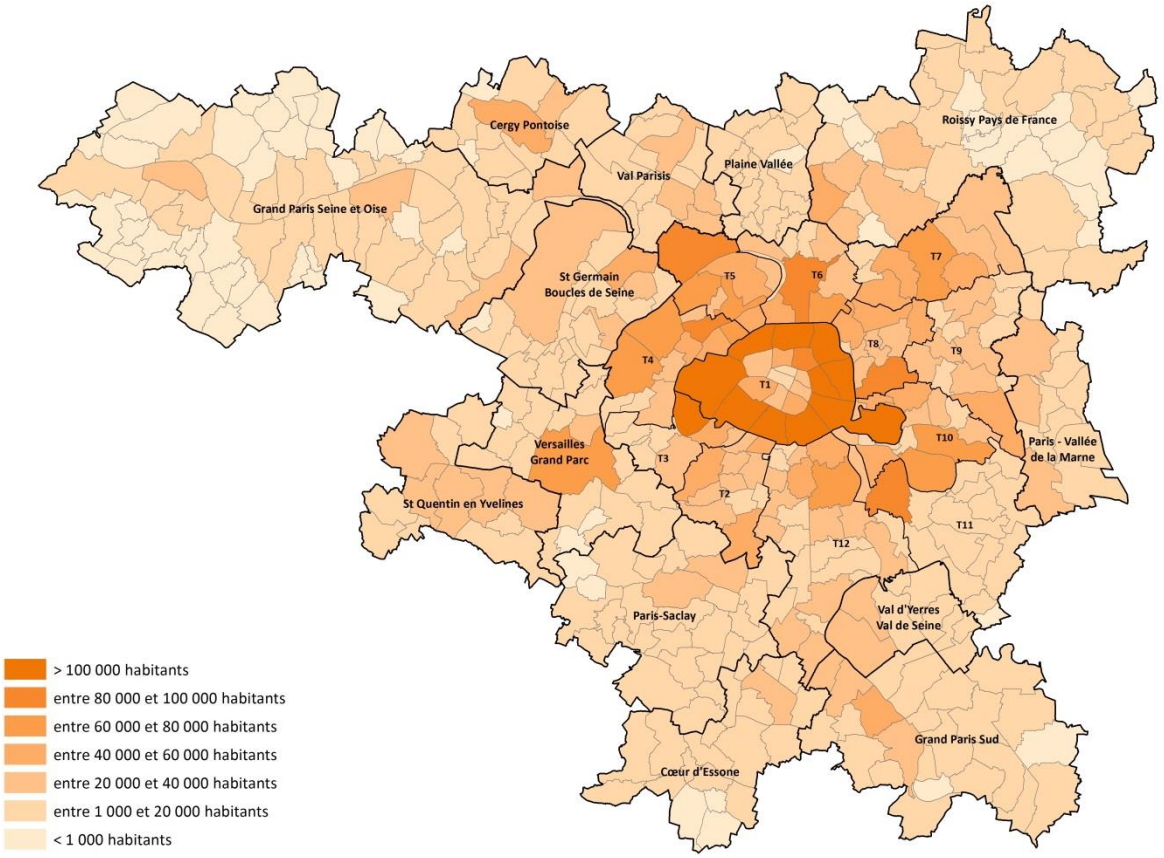


INDICATOR LN > 45 dB(A) POPULATION PER GRID OF 250 m

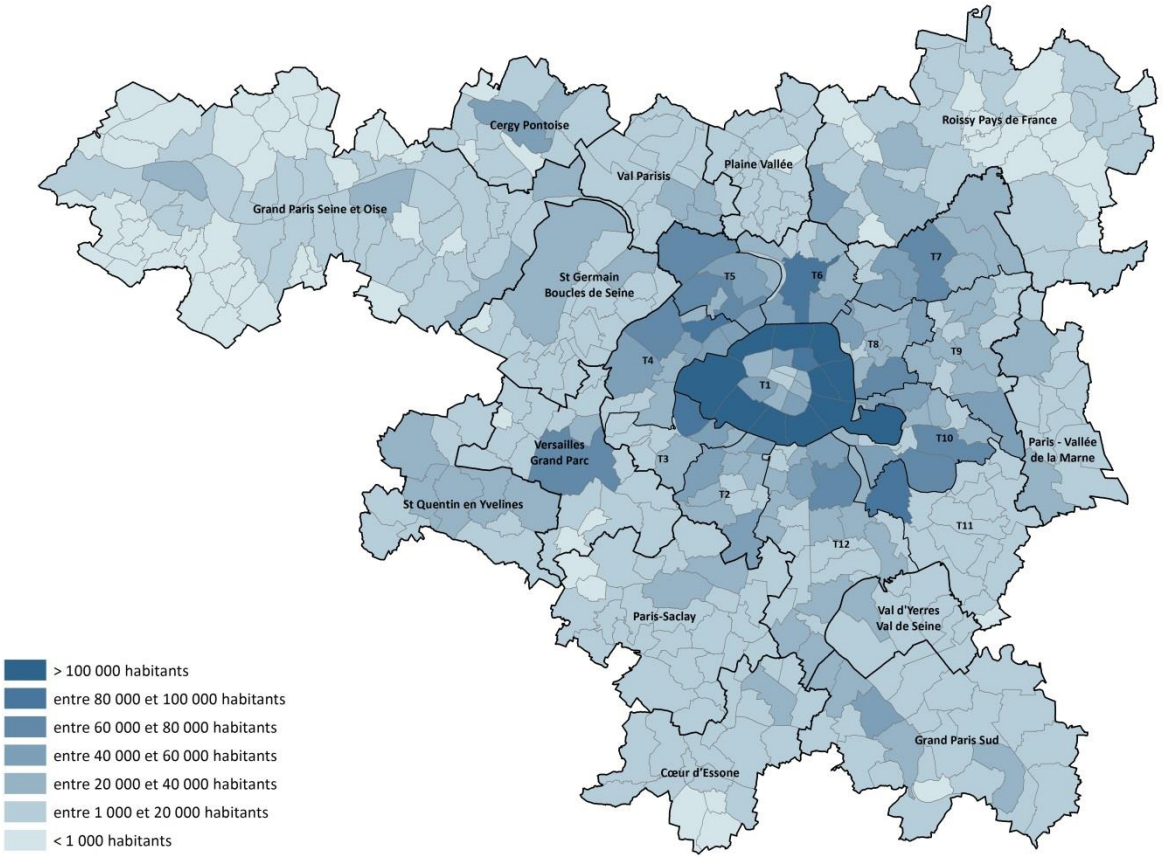


ROAD TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 53 dB(A) POPULATION PER COMMUNE LEVEL

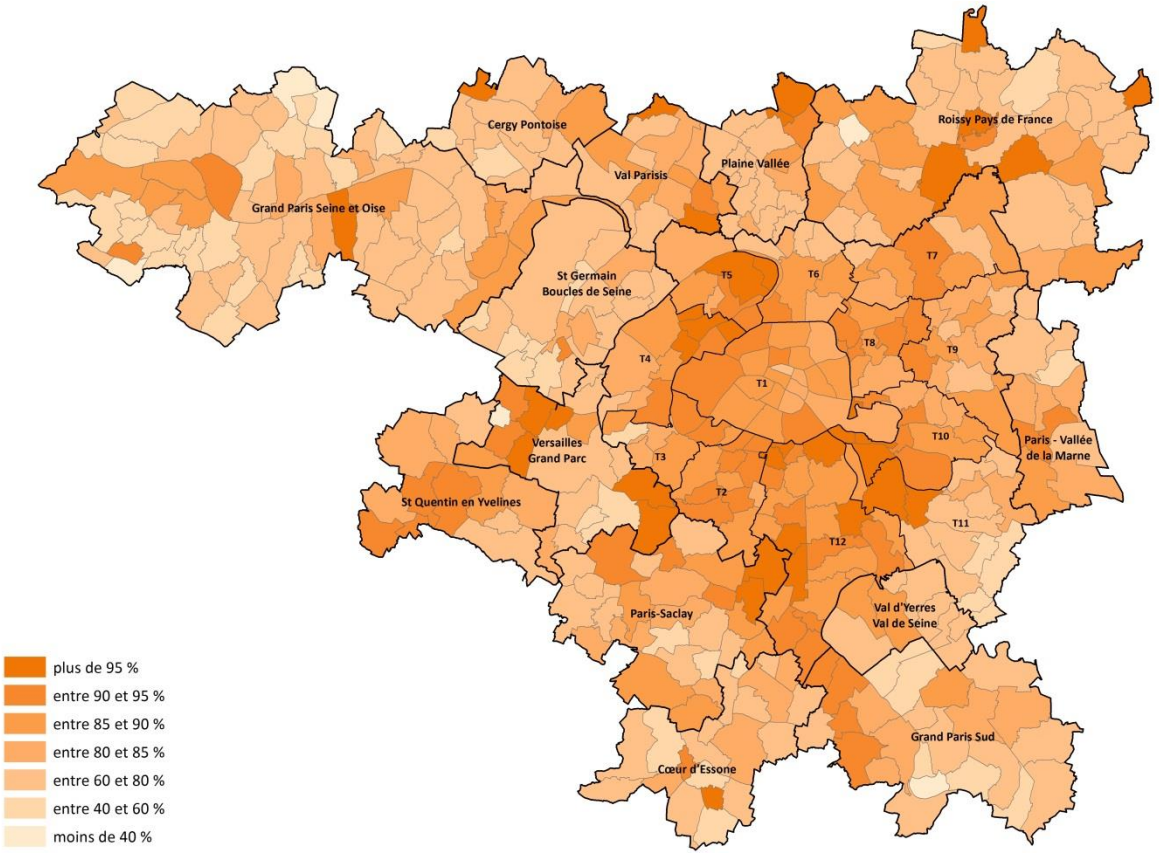


INDICATOR LN > 45 dB(A) POPULATION PER COMMUNE LEVEL

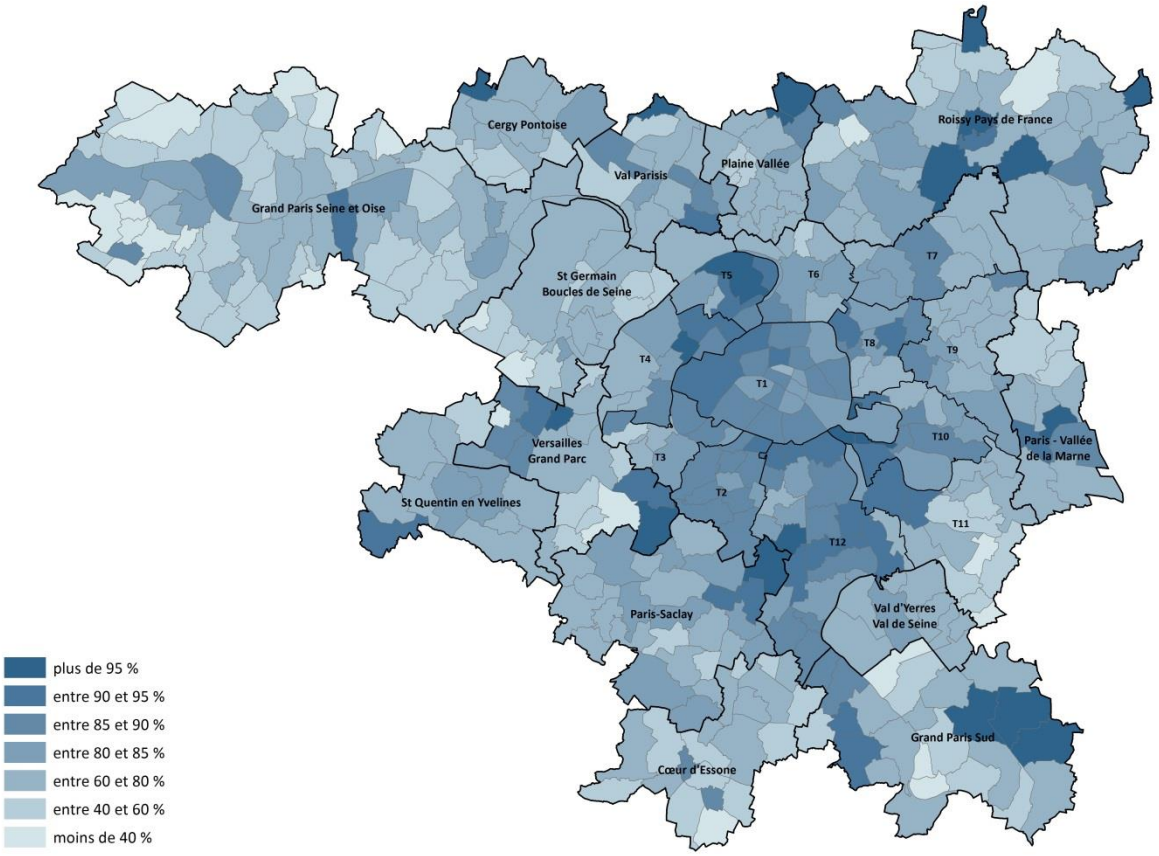


ROAD TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 53 dB(A) IN PERCENTAGE PER COMMUNE LEVEL



INDICATOR LN > 45 dB(A) IN PERCENTAGE PER COMMUNE LEVEL

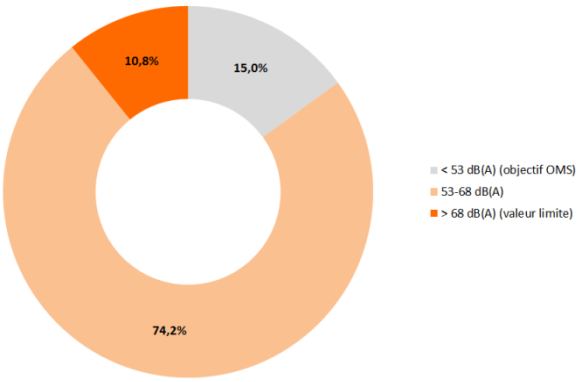


ROAD TRAFFIC NOISE - STATISTICS
COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN

POPULATION

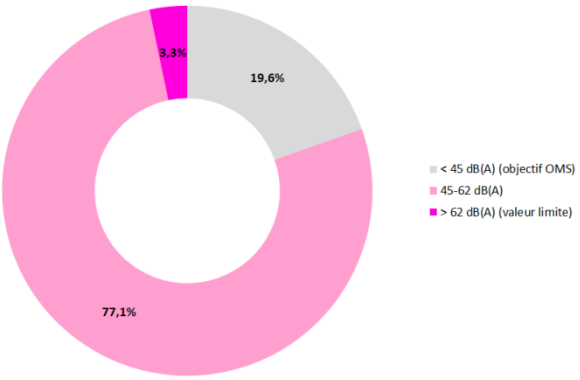
	Nombre d'habitants (à la centaine près)	%
< 53 dB(A) (objectif OMS)	1 515 700	15,0%
53-68 dB(A)	7 497 000	74,2%
> 68 dB(A) (valeur limite)	1 091 700	10,8%



INDICATOR LN

POPULATION

	Nombre d'habitants (à la centaine près)	%
< 45 dB(A) (objectif OMS)	1 978 800	19,6%
45-62 dB(A)	7 794 400	77,1%
> 62 dB(A) (valeur limite)	331 100	3,3%



ROAD TRAFFIC NOISE - STATISTICS PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN POPULATION

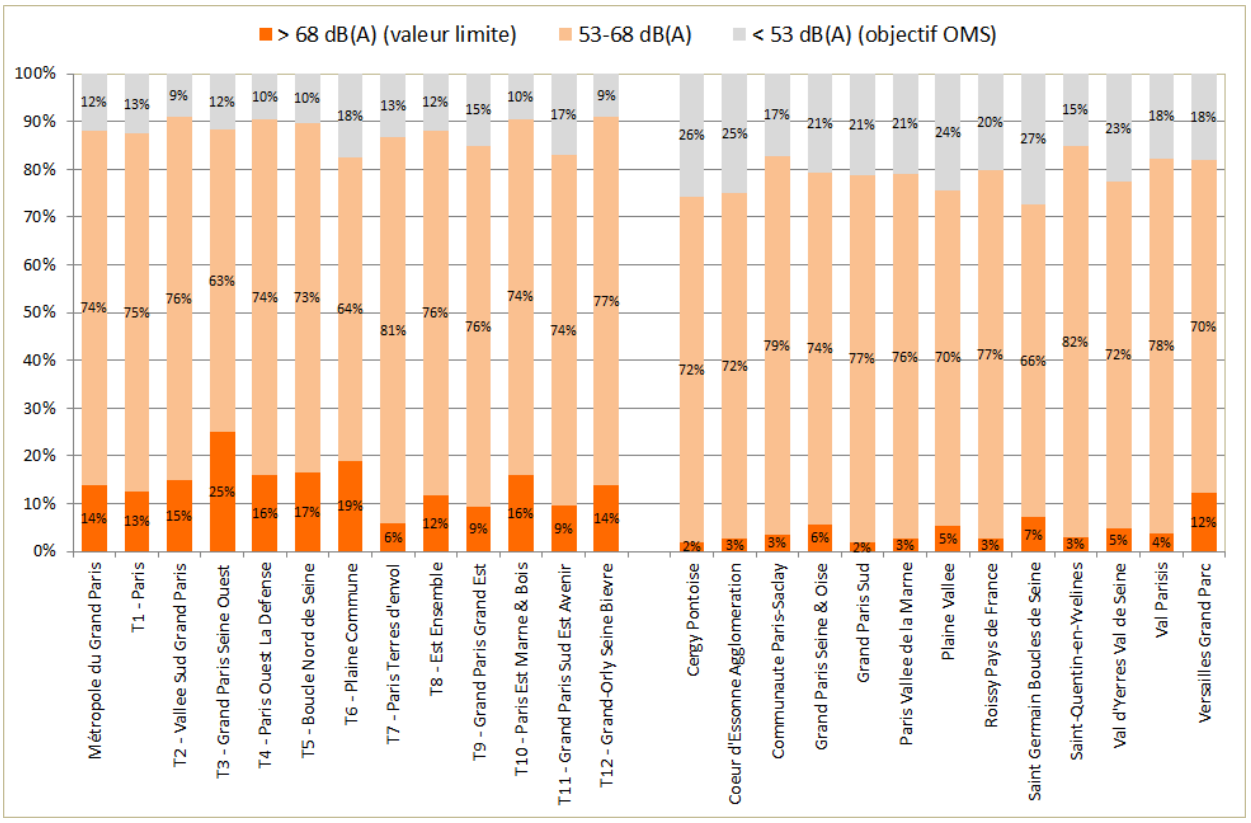
Nombre d'habitants (à la centaine près)	< 53 dB(A) (objectif OMS)	53-68 dB(A)	> 68 dB(A) (valeur limite)
Métropole du Grand Paris	**813 800**	**5 021 200**	**941 000**
T1 - Paris	*275 000*	*1 637 200*	*277 100*
T2 - Vallee Sud Grand Paris	*34 800*	*289 800*	*57 200*
T3 - Grand Paris Seine Ouest	*34 700*	*188 500*	*74 600*
T4 - Paris Ouest La Defense	*53 000*	*409 500*	*88 900*
T5 - Boucle Nord de Seine	*43 300*	*305 000*	*69 200*
T6 - Plaine Commune	*69 500*	*251 100*	*74 800*
T7 - Paris Terres d'envol	*45 200*	*274 400*	*20 200*
T8 - Est Ensemble	*46 100*	*298 400*	*45 800*
T9 - Grand Paris Grand Est	*55 300*	*279 300*	*34 400*
T10 - Paris Est Marne & Bois	*46 900*	*366 300*	*79 400*
T11 - Grand Paris Sud Est Avenir	*50 400*	*219 200*	*28 300*
T12 - Grand-Orly Seine Bievre	*59 600*	*502 500*	*90 900*
Cergy Pontoise	**50 500**	**142 200**	**3 600**
Coeur d'Essonne Agglomeration	**46 100**	**133 300**	**5 100**
Communaute Paris-Saclay	**49 300**	**226 500**	**9 800**
Grand Paris Seine & Oise	**80 700**	**288 300**	**22 100**
Grand Paris Sud	**67 200**	**244 300**	**5 700**
Paris Vallee de la Marne	**45 800**	**166 300**	**5 700**
Plaine Vallee	**42 500**	**122 500**	**9 600**
Roissy Pays de France	**67 300**	**255 800**	**9 200**
Saint Germain Boucles de Seine	**89 800**	**216 000**	**23 400**
Saint-Quentin-en-Yvelines	**33 900**	**183 100**	**6 900**
Val d'Yerres Val de Seine	**37 700**	**120 500**	**8 100**
Val Parisis	**43 900**	**195 200**	**9 700**
Versailles Grand Parc	**47 100**	**181 800**	**31 800**

INDICATOR LN POPULATION

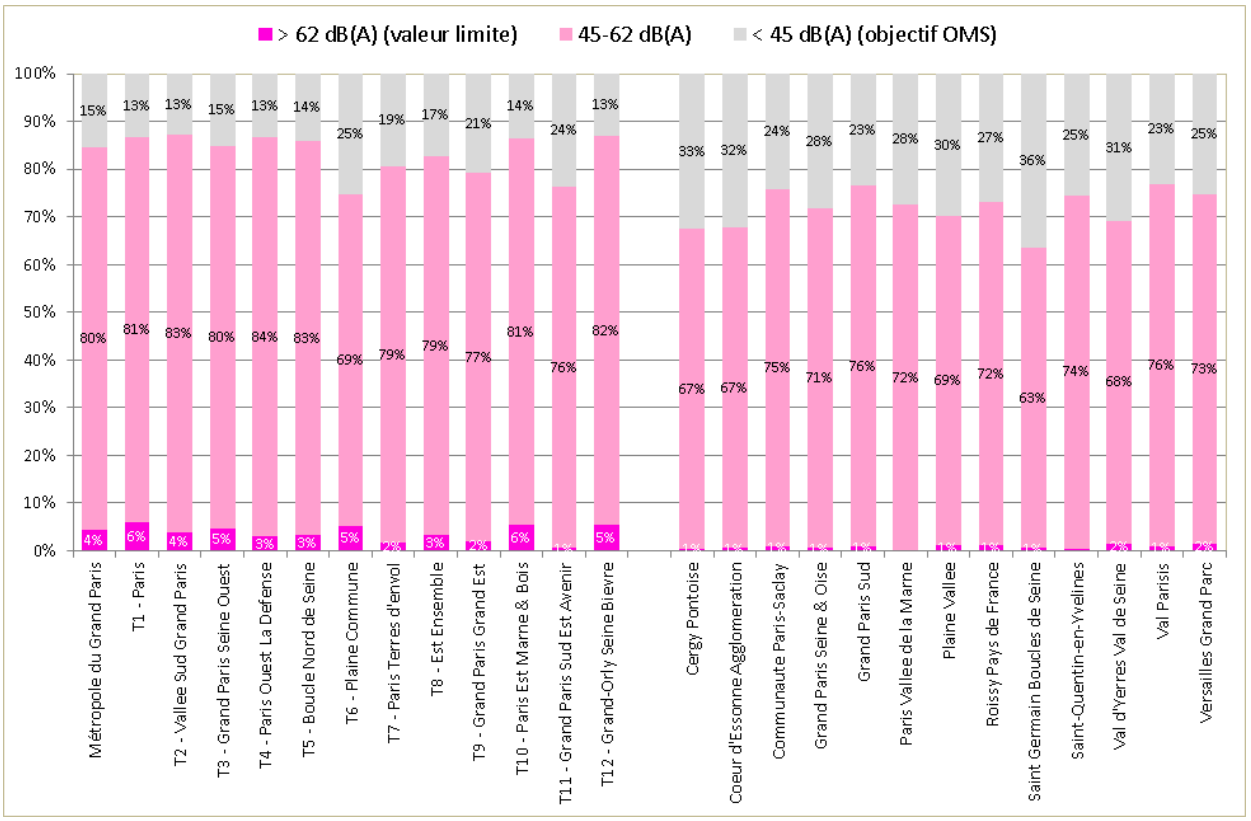
Nombre d'habitants (à la centaine près)	< 45 dB(A) (objectif OMS)	45-62 dB(A)	> 62 dB(A) (valeur limite)
Métropole du Grand Paris	**1 049 400**	**5 425 300**	**301 300**
T1 - Paris	*292 500*	*1 766 600*	*130 200*
T2 - Vallee Sud Grand Paris	*48 300*	*318 400*	*15 100*
T3 - Grand Paris Seine Ouest	*44 800*	*239 100*	*14 000*
T4 - Paris Ouest La Defense	*73 300*	*461 900*	*16 300*
T5 - Boucle Nord de Seine	*58 700*	*345 100*	*13 700*
T6 - Plaine Commune	*99 900*	*274 600*	*20 900*
T7 - Paris Terres d'envol	*66 100*	*267 700*	*6 000*
T8 - Est Ensemble	*67 200*	*310 100*	*13 000*
T9 - Grand Paris Grand Est	*76 600*	*285 100*	*7 400*
T10 - Paris Est Marne & Bois	*67 100*	*398 400*	*27 100*
T11 - Grand Paris Sud Est Avenir	*70 400*	*225 300*	*2 100*
T12 - Grand-Orly Seine Bievre	*84 500*	*533 000*	*35 600*
Cergy Pontoise	**63 800**	**131 500**	**1 000**
Coeur d'Essonne Agglomeration	**59 400**	**123 800**	**1 200**
Communaute Paris-Saclay	**69 200**	**213 400**	**2 900**
Grand Paris Seine & Oise	**110 400**	**277 800**	**3 000**
Grand Paris Sud	**74 300**	**240 100**	**2 900**
Paris Vallee de la Marne	**59 900**	**157 400**	**500**
Plaine Vallee	**51 900**	**120 600**	**2 100**
Roissy Pays de France	**89 300**	**239 100**	**3 800**
Saint Germain Boucles de Seine	**120 100**	**206 700**	**2 400**
Saint-Quentin-en-Yvelines	**57 000**	**166 000**	**1 000**
Val d'Yerres Val de Seine	**51 200**	**112 600**	**2 600**
Val Parisis	**57 400**	**189 000**	**2 400**
Versailles Grand Parc	**65 600**	**191 200**	**4 000**

ROAD TRAFFIC NOISE - STATISTICS PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN PERCENTAGE OF POPULATION



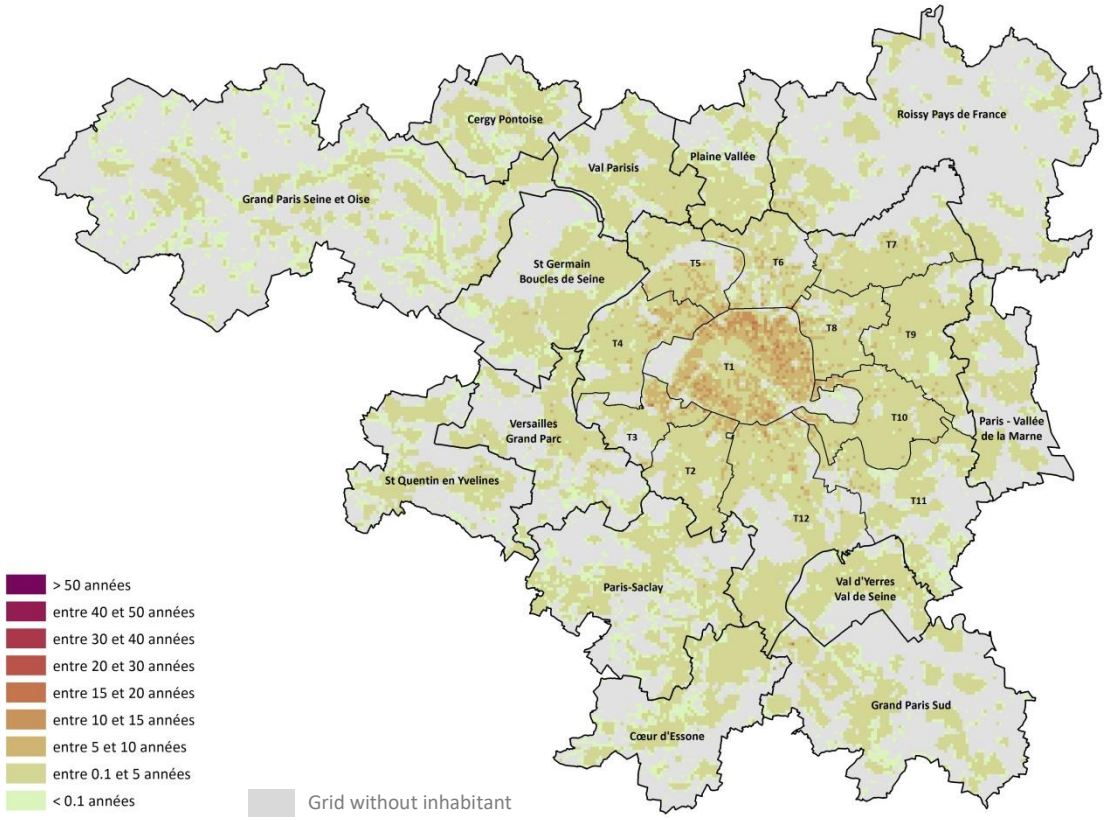
INDICATOR LN PERCENTAGE OF POPULATION



ROAD TRAFFIC NOISE - HEALTH IMPACT

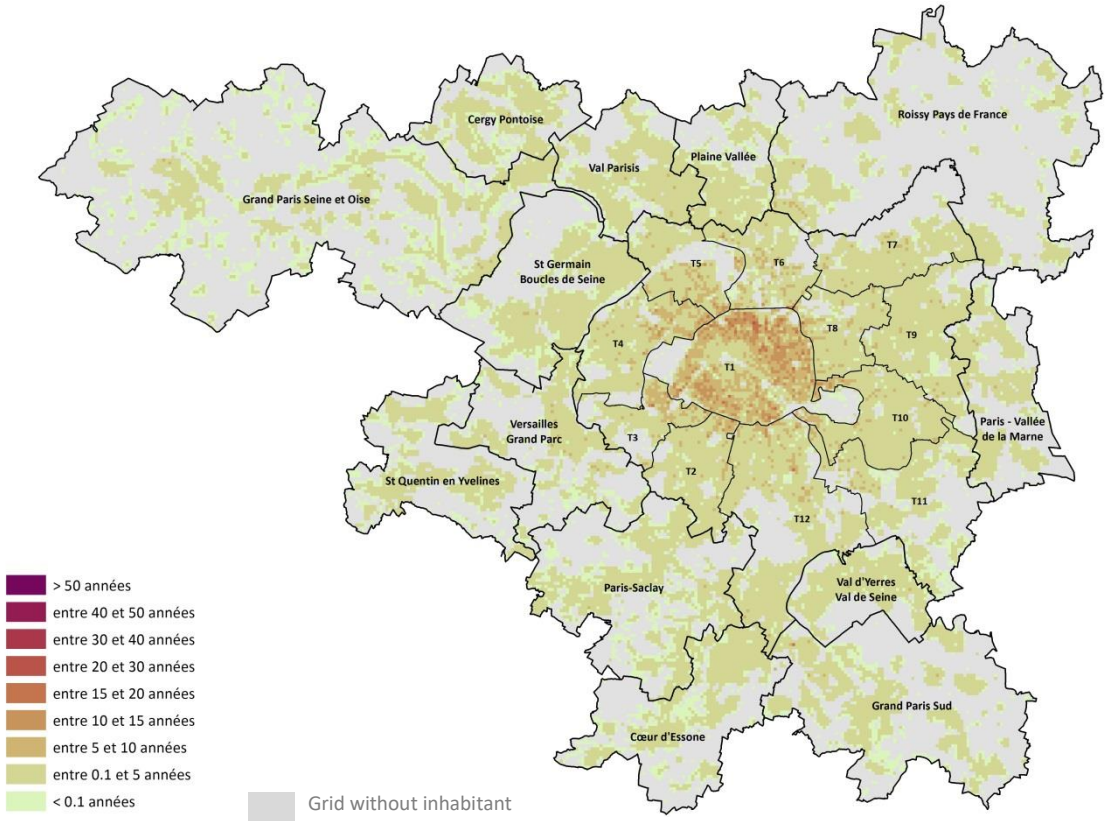
INDICATOR DALY FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER GRID OF 250 m

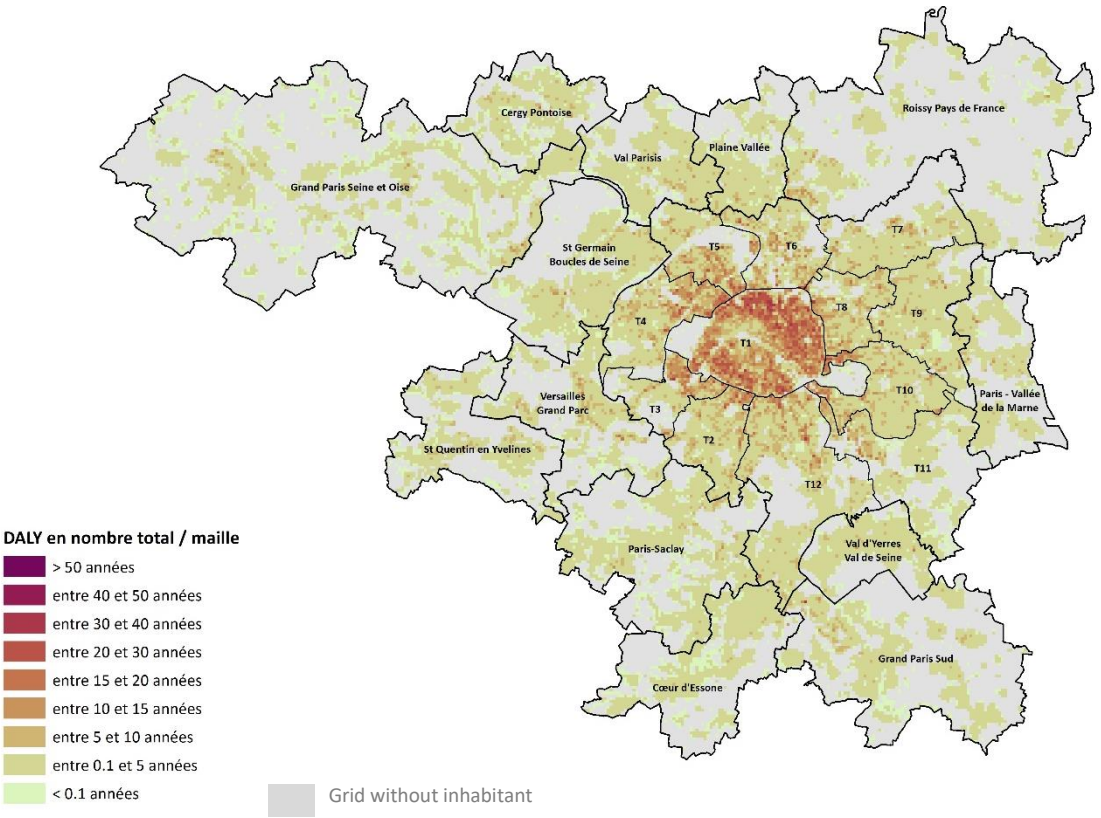
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



ROAD TRAFFIC NOISE - HEALTH IMPACT

INDICATOR DALY PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



STATISTICS

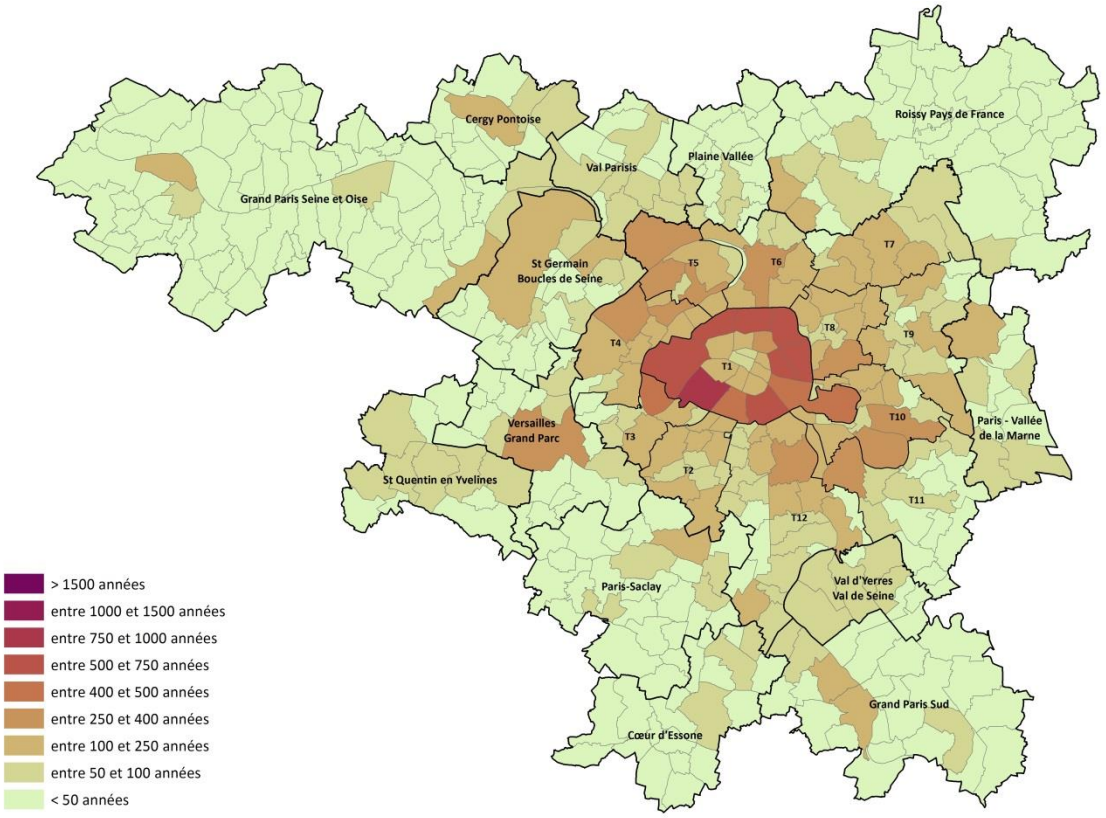
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

ANNÉES DE VIE EN BONNE SANTÉ PERDUE PAR AN	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**23 033**	**24 706**	**47 738**
T1 - Paris	*7 621*	*8 683*	*16 304*
T2 - Vallee Sud Grand Paris	*1 299*	*1 355*	*2 654*
T3 - Grand Paris Seine Ouest	*1 095*	*1 157*	*2 252*
T4 - Paris Ouest La Defense	*1 966*	*2 042*	*4 008*
T5 - Boucle Nord de Seine	*1 443*	*1 506*	*2 949*
T6 - Plaine Commune	*1 309*	*1 347*	*2 656*
T7 - Paris Terres d'envol	*967*	*966*	*1 932*
T8 - Est Ensemble	*1 243*	*1 287*	*2 530*
T9 - Grand Paris Grand Est	*1 093*	*1 098*	*2 191*
T10 - Paris Est Marne & Bois	*1 786*	*1 901*	*3 687*
T11 - Grand Paris Sud Est Avenir	*939*	*945*	*1 884*
T12 - Grand-Orly Seine Bievre	*2 273*	*2 419*	*4 692*
Cergy Pontoise	**499**	**485**	**984**
Coeur d'Essonne Agglomeration	**470**	**463**	**933**
Communaute Paris-Saclay	**766**	**774**	**1 540**
Grand Paris Seine & Oise	**1 084**	**1 050**	**2 133**
Grand Paris Sud	**831**	**909**	**1 740**
Paris Vallee de la Marne	**547**	**546**	**1 093**
Plaine Vallee	**470**	**469**	**939**
Roissy Pays de France	**869**	**865**	**1 733**
Saint Germain Boucles de Seine	**876**	**823**	**1 698**
Saint-Quentin-en-Yvelines	**618**	**593**	**1 212**
Val d'Yerres Val de Seine	**434**	**433**	**867**
Val Parisis	**697**	**703**	**1 400**
Versailles Grand Parc	**799**	**796**	**1 595**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**31 994**	**33 613**	**65 607**

ROAD TRAFFIC NOISE - HEALTH IMPACT

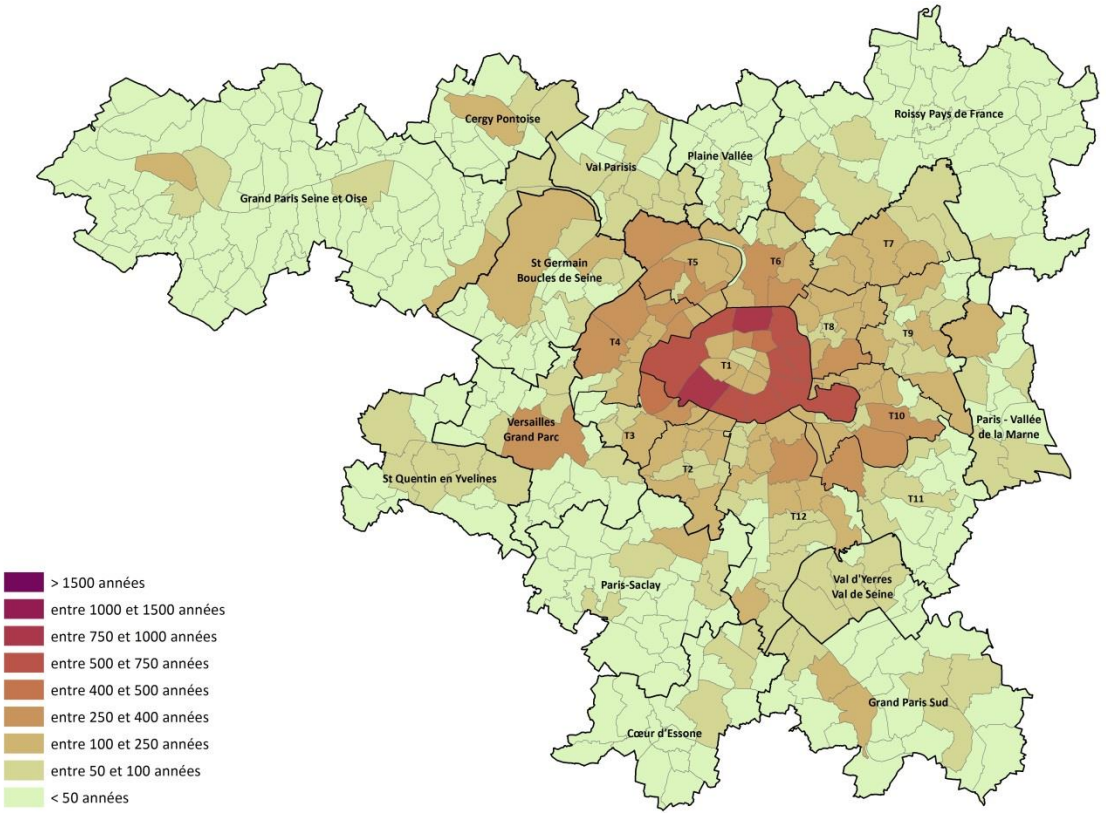
INDICATOR DALY FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

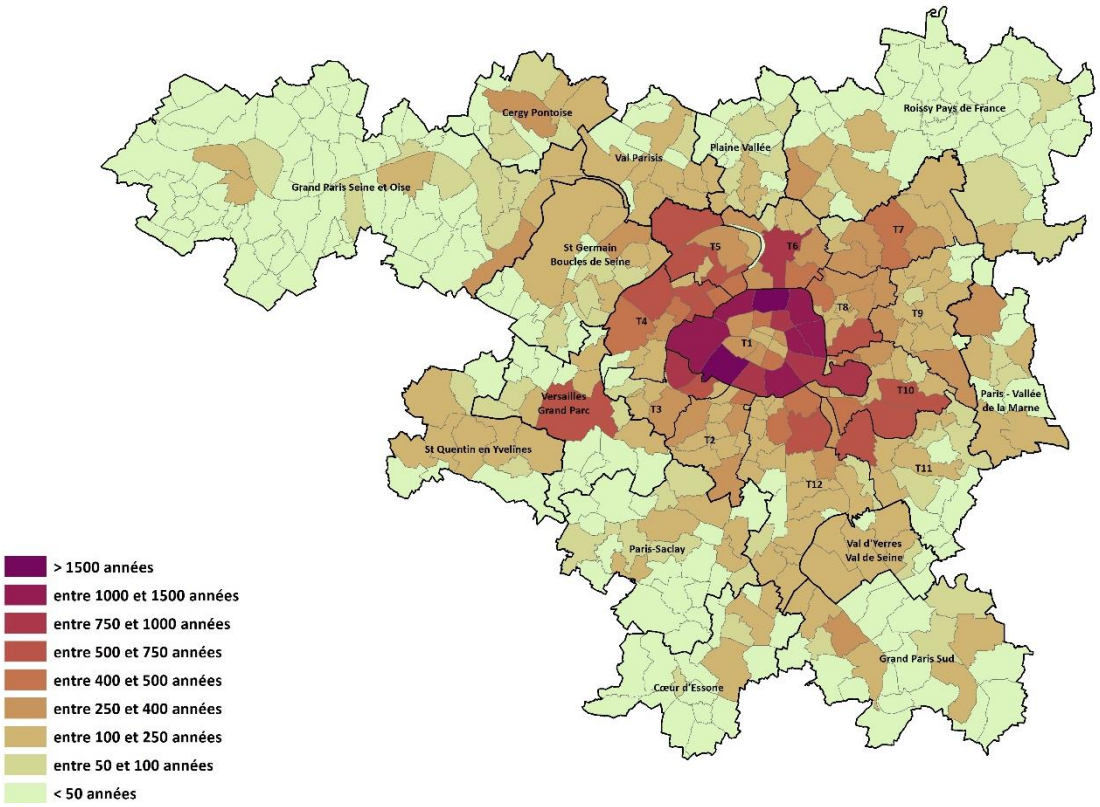
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



ROAD TRAFFIC NOISE - HEALTH IMPACT

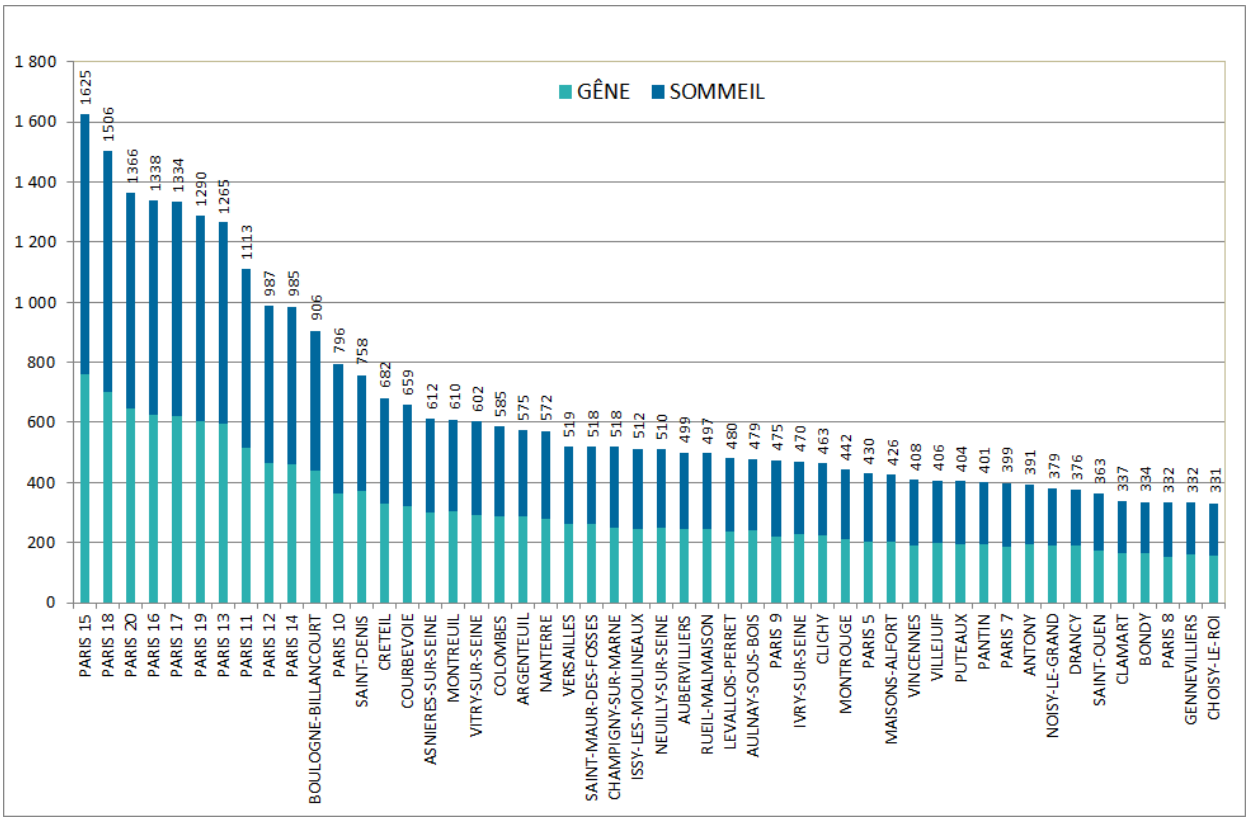
INDICATOR DALY PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



THE 50 COMMUNES WITH THE HIGHEST VALUES

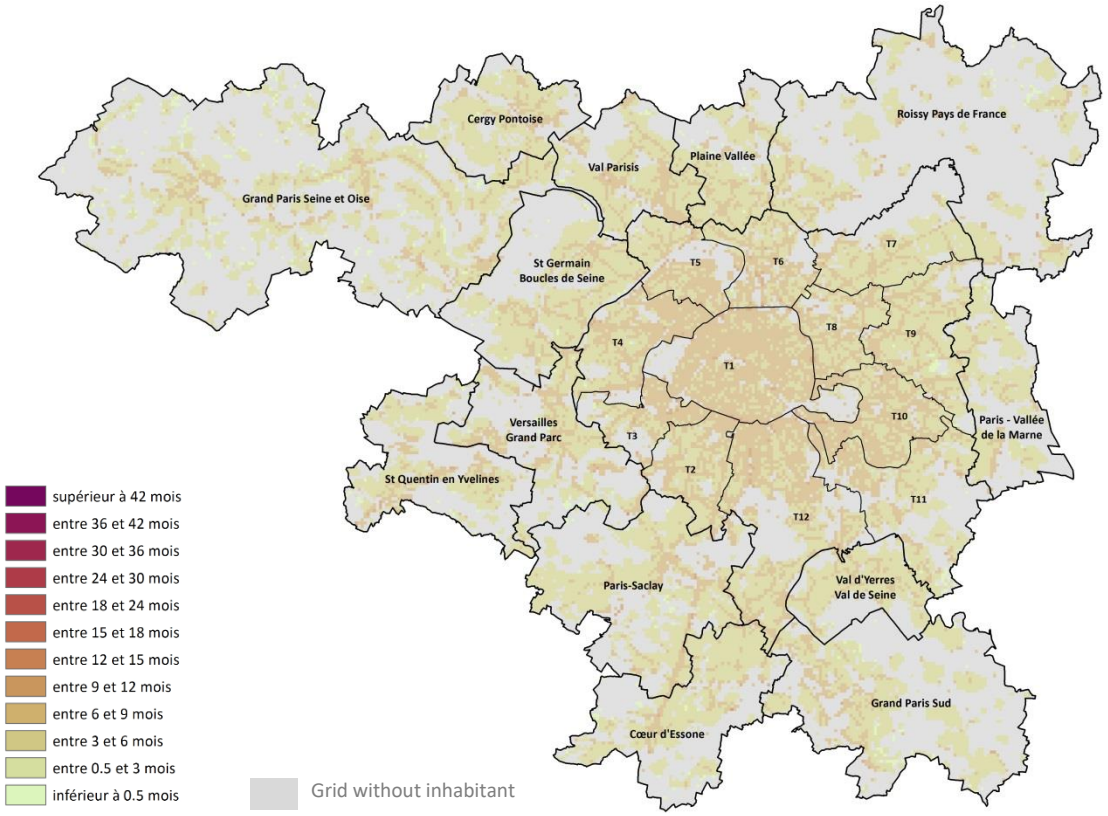
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



ROAD TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

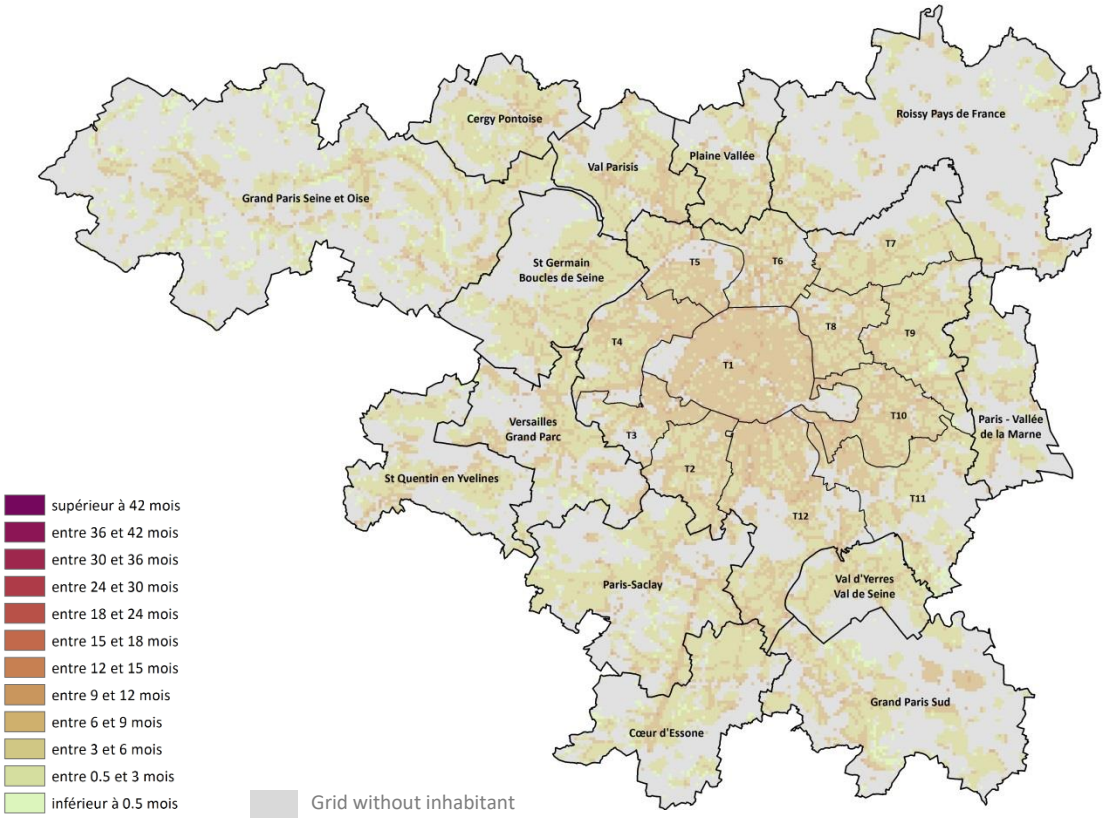
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER GRID OF 250 m

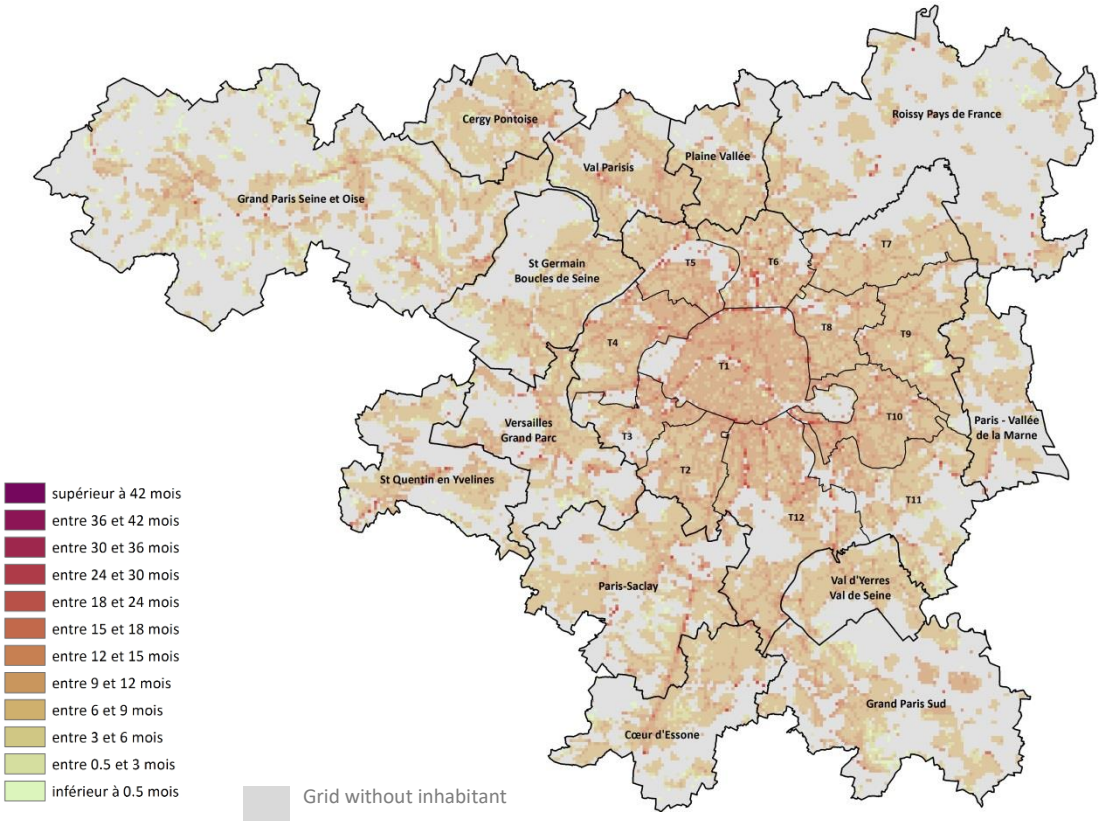
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



ROAD TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

INDIVIDUAL HEALTH RISKS PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



STATISTICS

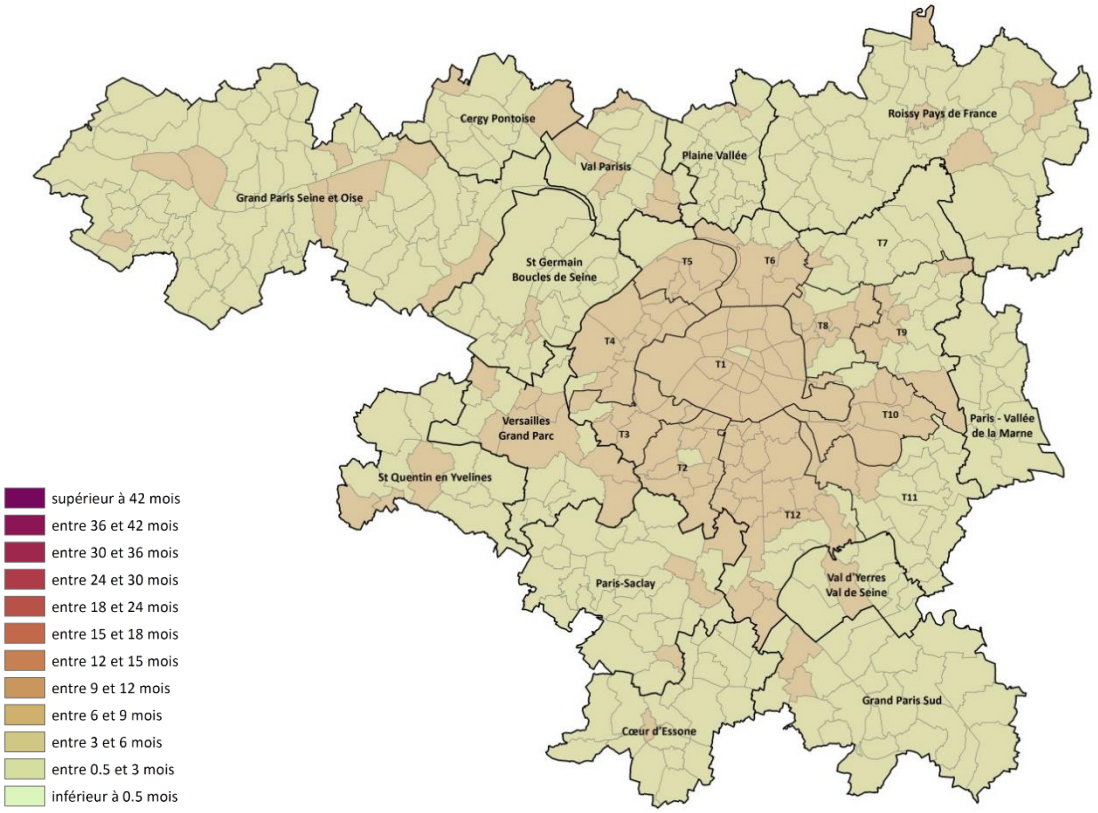
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

MOIS DE VIE EN BONNE SANTÉ PERDUE PAR INDIVIDU AU COURS D'UNE VIE ENTIÈRE	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**3,4**	**3,6**	**7,1**
T1 - Paris	*3,5*	*4,0*	*7,5*
T2 - Vallee Sud Grand Paris	*3,4*	*3,6*	*7,0*
T3 - Grand Paris Seine Ouest	*3,7*	*3,9*	*7,6*
T4 - Paris Ouest La Defense	*3,6*	*3,7*	*7,3*
T5 - Boucle Nord de Seine	*3,5*	*3,6*	*7,1*
T6 - Plaine Commune	*3,3*	*3,4*	*6,7*
T7 - Paris Terres d'envol	*2,8*	*2,8*	*5,7*
T8 - Est Ensemble	*3,2*	*3,3*	*6,5*
T9 - Grand Paris Grand Est	*3,0*	*3,0*	*5,9*
T10 - Paris Est Marne & Bois	*3,6*	*3,9*	*7,5*
T11 - Grand Paris Sud Est Avenir	*3,2*	*3,2*	*6,3*
T12 - Grand-Orly Seine Bievre	*3,5*	*3,7*	*7,2*
Cergy Pontoise	**2,5**	**2,5**	**5,0**
Coeur d'Essonne Agglomeration	**2,5**	**2,5**	**5,1**
Communaute Paris-Saclay	**2,7**	**2,7**	**5,4**
Grand Paris Seine & Oise	**2,8**	**2,7**	**5,5**
Grand Paris Sud	**2,6**	**2,9**	**5,5**
Paris Vallee de la Marne	**2,5**	**2,5**	**5,0**
Plaine Vallee	**2,7**	**2,7**	**5,4**
Roissy Pays de France	**2,6**	**2,6**	**5,2**
Saint Germain Boucles de Seine	**2,7**	**2,5**	**5,2**
Saint-Quentin-en-Yvelines	**2,8**	**2,7**	**5,4**
Val d'Yerres Val de Seine	**2,6**	**2,6**	**5,2**
Val Parisis	**2,8**	**2,8**	**5,6**
Versailles Grand Parc	**3,1**	**3,1**	**6,1**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**3,2**	**3,3**	**6,5**

ROAD TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

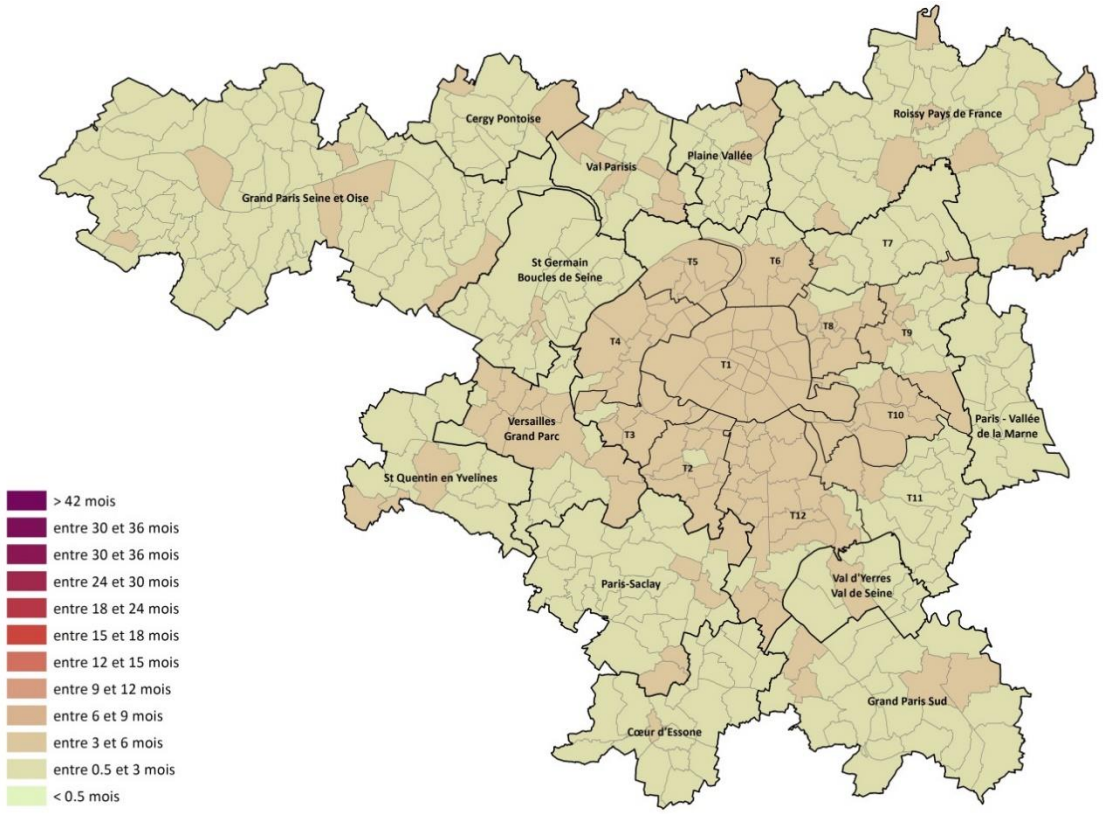
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

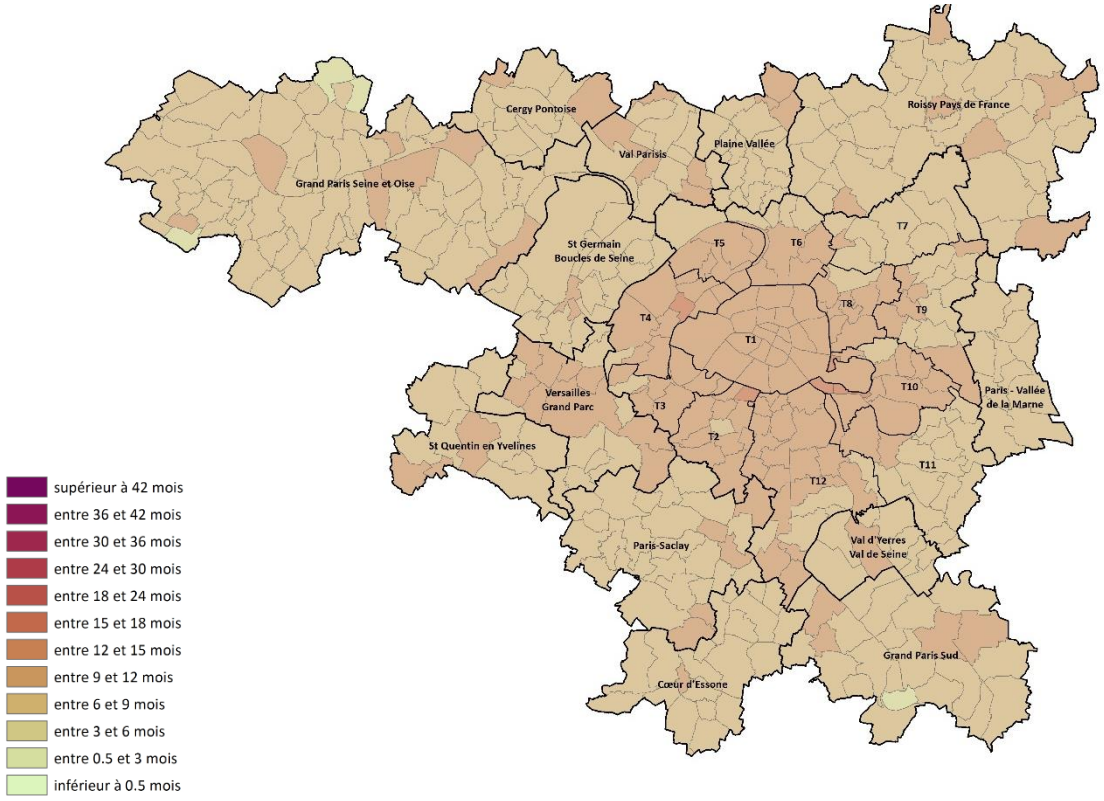
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



ROAD TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

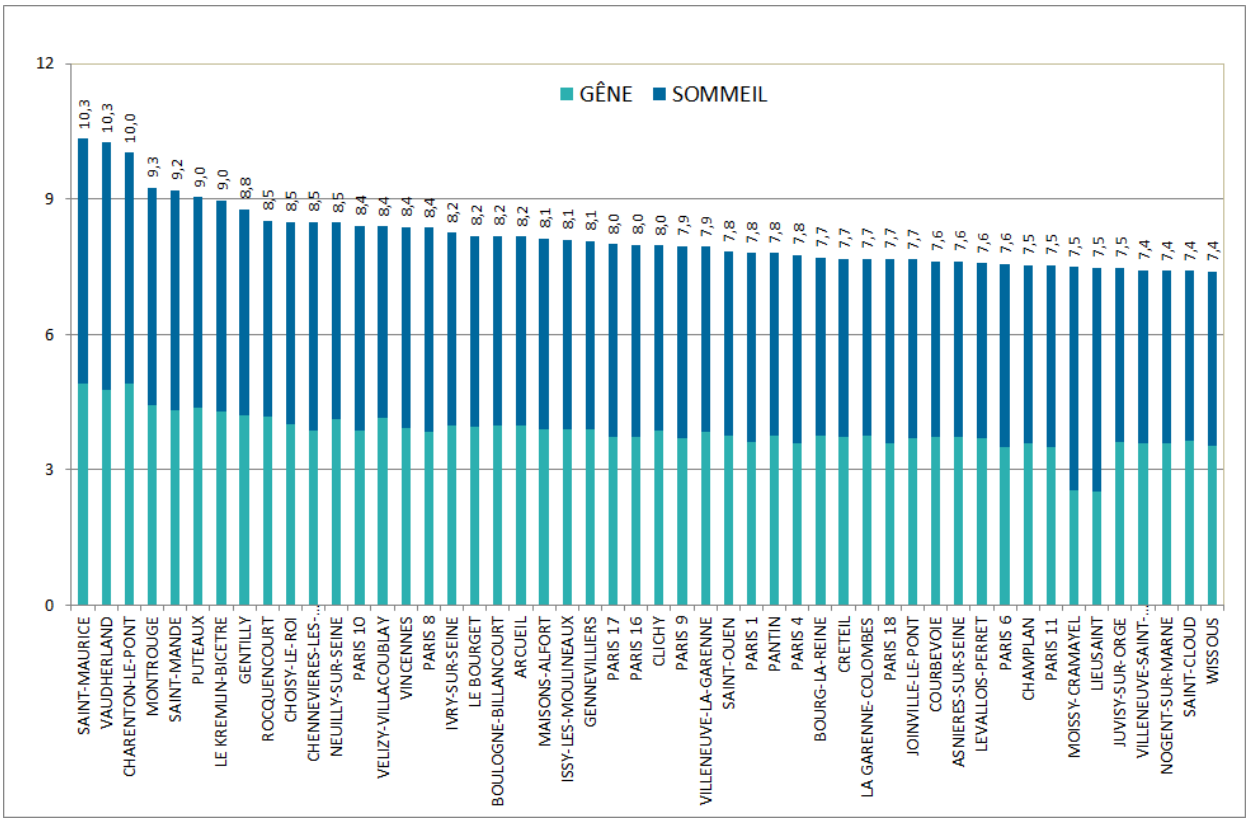
INDIVIDUAL HEALTH RISKS PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



THE 50 COMMUNES WITH THE HIGHEST VALUES

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



ROAD TRAFFIC NOISE – THE 500 PRIORITY GRIDS

HIGHEST VALUES FOR COMBINED RISKS (COLLECTIVE AND INDIVIDUAL)

ROAD TRAFFIC NOISE – IN BRIEF

The population of the densely populated zone of Ile-de-France faces high exposure to road noise throughout the day since 85% of inhabitants (8.6 million people) are exposed to levels exceeding 53 dB(A) using the Lden indicator, which is the World Health Organisation's threshold value to avoid consequences on health due to road noise.

This trend can be seen through the many people who are subjected to noise levels that exceed the regulatory limit values for France in application of the noise directive: 1,091,000 people (10.8% of the population) are exposed to levels exceeding 68 dB(A) using the Lden indicator.

At night, exposure to road noise drops. However, 80% of the population still live in accommodation where noise levels in front of the building exceed 45 dB(A), which is the night-time threshold value according to the WHO, and 331,100 inhabitants (3.3% of the population) are exposed to night-time levels that exceed the regulatory limit value of 62 dB(A) using the Ln indicator.

The majority of people exposed to road noise live in the Grand Paris Métropole, with between 86 and 91% of people exposed to noise levels that exceed the limit values for the Lden and Ln indicators respectively. T3 (Grand Paris Seine Ouest) seems to be the territory with the highest proportion of its population exposed within the Grand Paris Métropole: Exactly ¼ of its population is exposed to values that exceed the 68 dB(A) limit for the Lden indicator. T6 (Plaine Commune) comes second. In terms of night-time exposure to road noise, T10 (Paris Est Marne et Bois), T12 (Grand Orly Seine Bièvre), T6 (Plaine Commune), and T1 (Paris) are the territories with the highest proportion of their populations exposed to values exceeding the 62 dB(A) limit value using the Ln indicator: more than 5% of their populations are concerned. Outside the Grand Paris Métropole, it is the agglomeration community of Versailles Grand Parc that has the highest proportion of its population (12%) subjected to noise levels exceeding limit values using the Lden indicator.

In terms of the health impact, road noise is responsible for 65,607 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, with a fairly even distribution between the DALYs lost due to annoyance (31,994 DALYs or 49% of the total) and the DALYs lost due to sleep disturbance (33,613 DALYs, or 51% of the total).

Due to its high population density, the Grand Paris Métropole alone contains 73% of these health risks, with 47,738 DALY. The 50 communes with the highest number of disability-adjusted life-years lost due to road noise are all located within the Grand Paris Métropole, except for Versailles. The highest values are recorded in the peripheral districts of Paris (especially the 15th, the 18th, and the 20th).

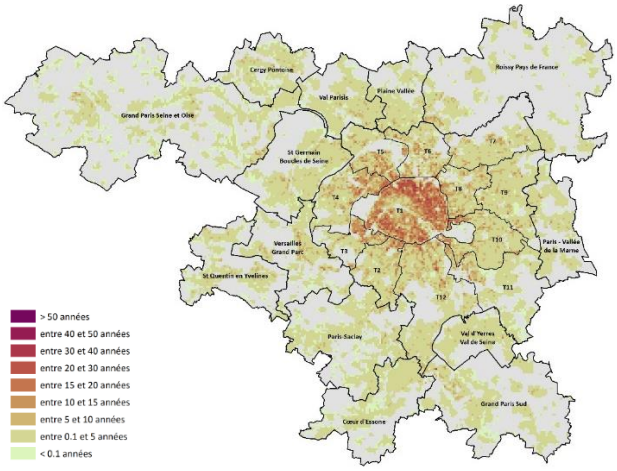
At individual level, the evaluations show an average statistical value of 6.5 healthy life-months lost due to road noise by individuals during a lifetime, within the densely populated zone of Ile-de-France. This value can reach as high as 10 months on average for communes where the individual risk is highest (Saint-Maurice, Vaudherland, Charenton-le-Pont) and up to 18 months within the zones most exposed to noise pollution from road infrastructure (cf. maps of individual health risks, next page).

Unsurprisingly, these grids reveal the issue related to high exposure to noise generated by road traffic in Paris, along the Paris ring-road, as well as along major motorways (the A4 motorway at Charenton-le-Pont, Saint-Maurice, and Joinville; the A6a and A6b interchanges; the A13 at Pont de Saint-Cloud; the A3 interchange at porte de Bagnolet; along the A86 in Créteil and Vélizy-Villacoublay), and along very busy A-roads and B-roads: the RD910 in Boulogne-Billancourt, the RN13 in Neuilly-sur-Seine, the RD906 in Malakoff and Châtillon, the RD920 in Montrouge and Bourg-la-Reine, the RD7 in Kremlin-Bicêtre and in Villejuif, the RD5 in Ivry-sur-Seine, Vitry-sur-Seine and Choisy-le-Roi, the RD120 in Saint-Mandé and Vincennes, the RD302 in Montreuil, the RN3 in Pantin and Bondy, the RN2 in Pantin and Le Bourget, the RN1 in Saint-Denis, the RD20 in Saint-Ouen, the RD911 in Clichy-la-Garenne, the RD902 in Levallois-Perret, the RD106 in Courbevoie and Colombes, the RD7 along the banks of the Seine in Puteaux, the RN406 in Créteil, the RD316 in Villiers-le-Bel, the RD30 in Poissy, and the RD91 and the RN7 in Ris-Orangis....

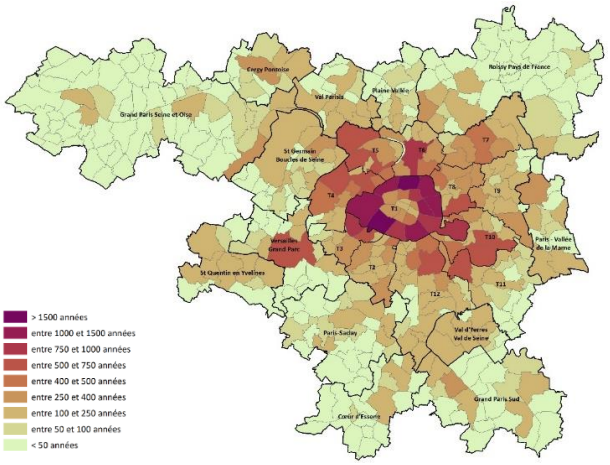
ROAD TRAFFIC NOISE – COLLECTIVE HEALTH IMPACT

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

PER GRID OF 250 m



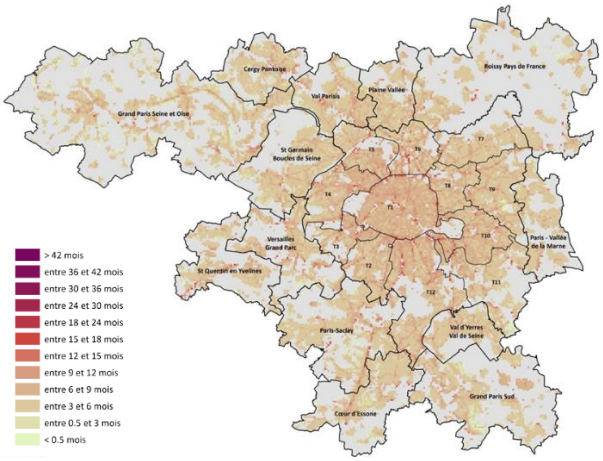
PER COMMUNE LEVEL



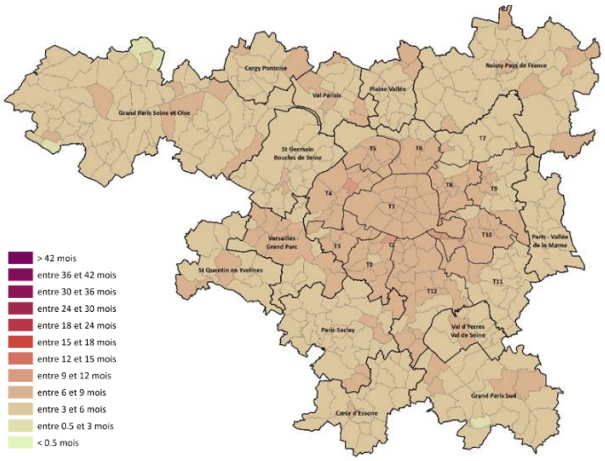
ROAD TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

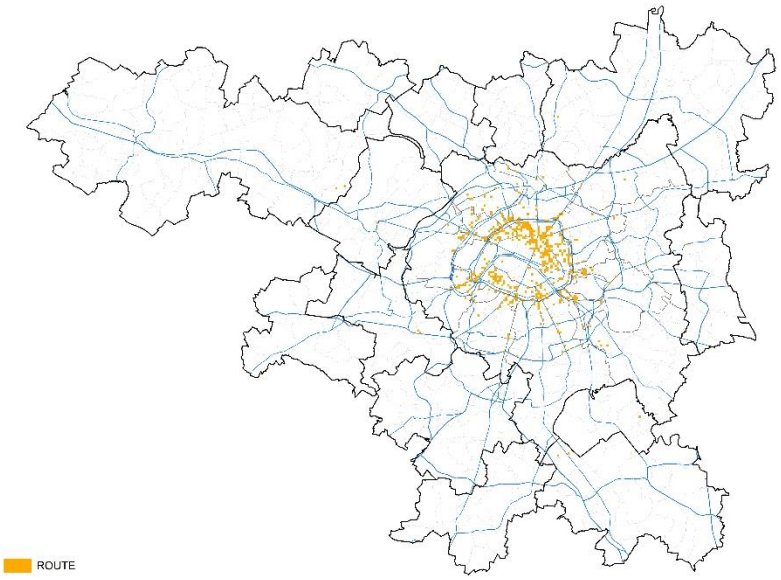
PER GRID OF 250 m



PER COMMUNE LEVEL



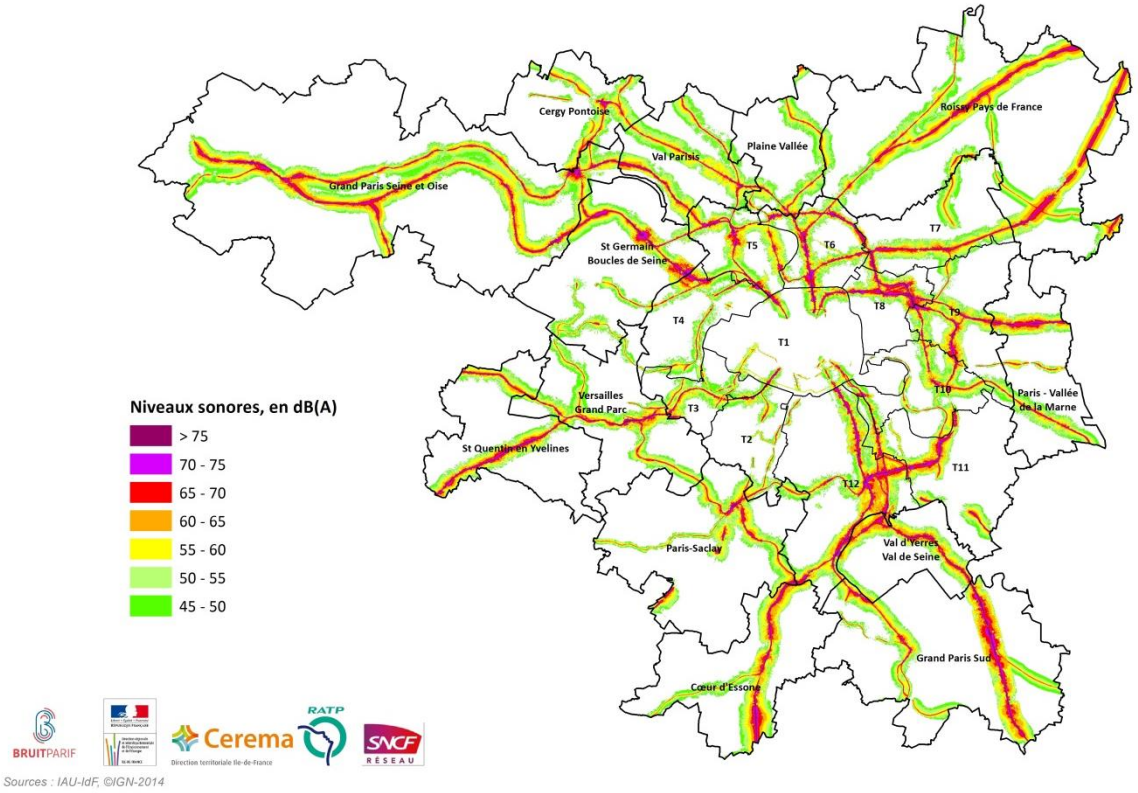
THE 500 PRIORITY GRIDS



PART 2
RAIL TRAFFIC NOISE

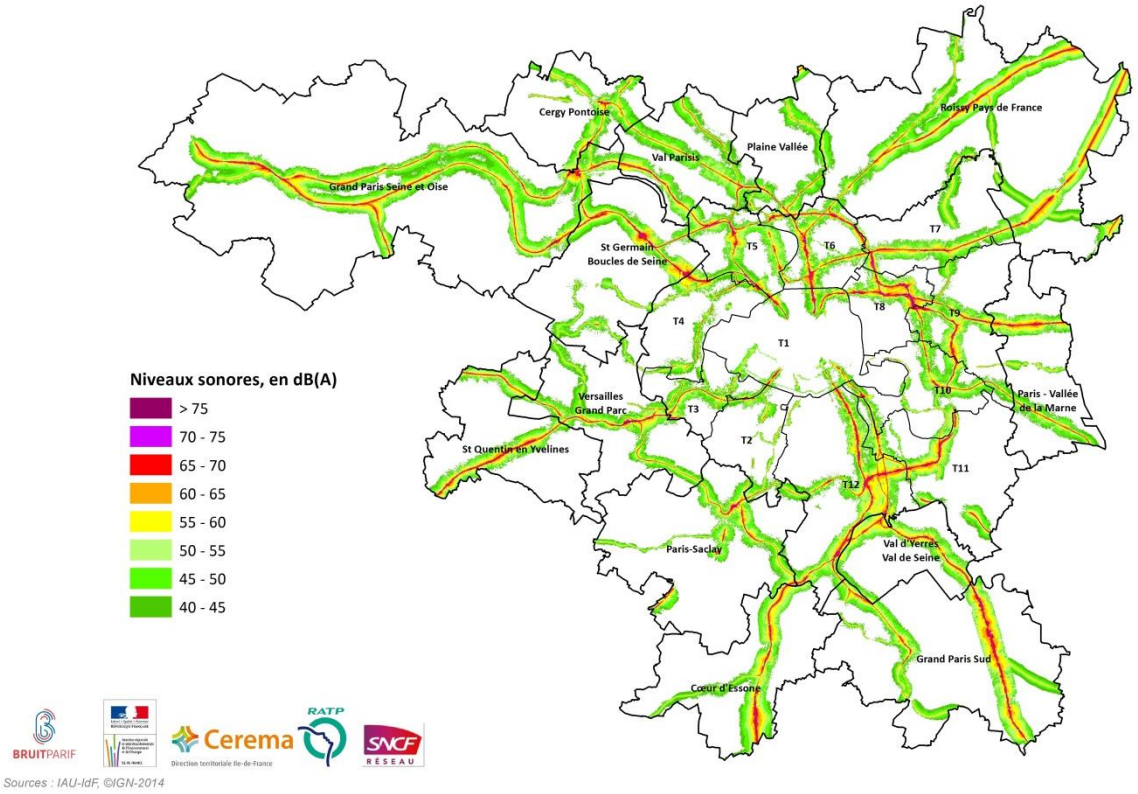
RAIL TRAFFIC NOISE - NOISE LEVELS

INDICATOR LDEN



Sources : IAU-IdF, ©IGN-2014

INDICATOR LN



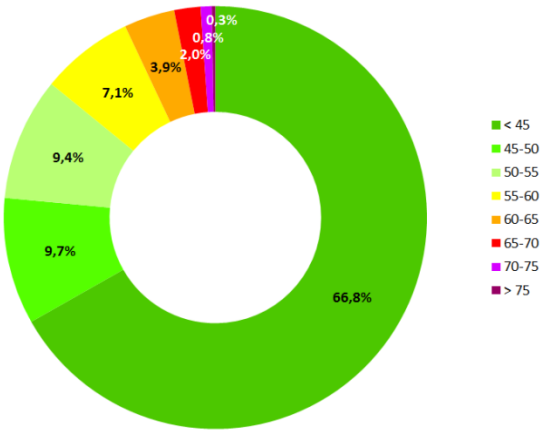
Sources : IAU-IdF, ©IGN-2014

RAIL TRAFFIC NOISE - STATISTICS BY RANGE OF NOISE LEVELS

INDICATOR LDEN

POPULATION

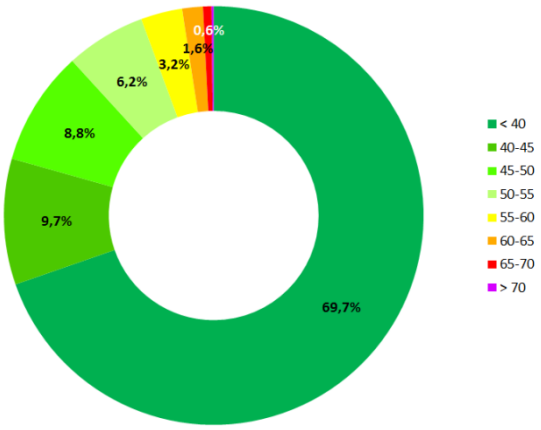
	Nombre d'habitants (à la centaine près)	%
> 75	27 100	0,3%
70-75	85 800	0,8%
65-70	202 500	2,0%
60-65	392 500	3,9%
55-60	718 400	7,1%
50-55	949 600	9,4%
45-50	979 500	9,7%
< 45	6 748 900	66,8%



INDICATOR LN

POPULATION

	Nombre d'habitants (à la centaine près)	%
> 70	17 100	0,2%
65-70	65 600	0,6%
60-65	160 700	1,6%
55-60	323 500	3,2%
50-55	622 400	6,2%
45-50	894 100	8,8%
40-45	981 900	9,7%
< 40	7 039 100	69,7%



RAIL TRAFFIC NOISE - STATISTICS PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN POPULATION

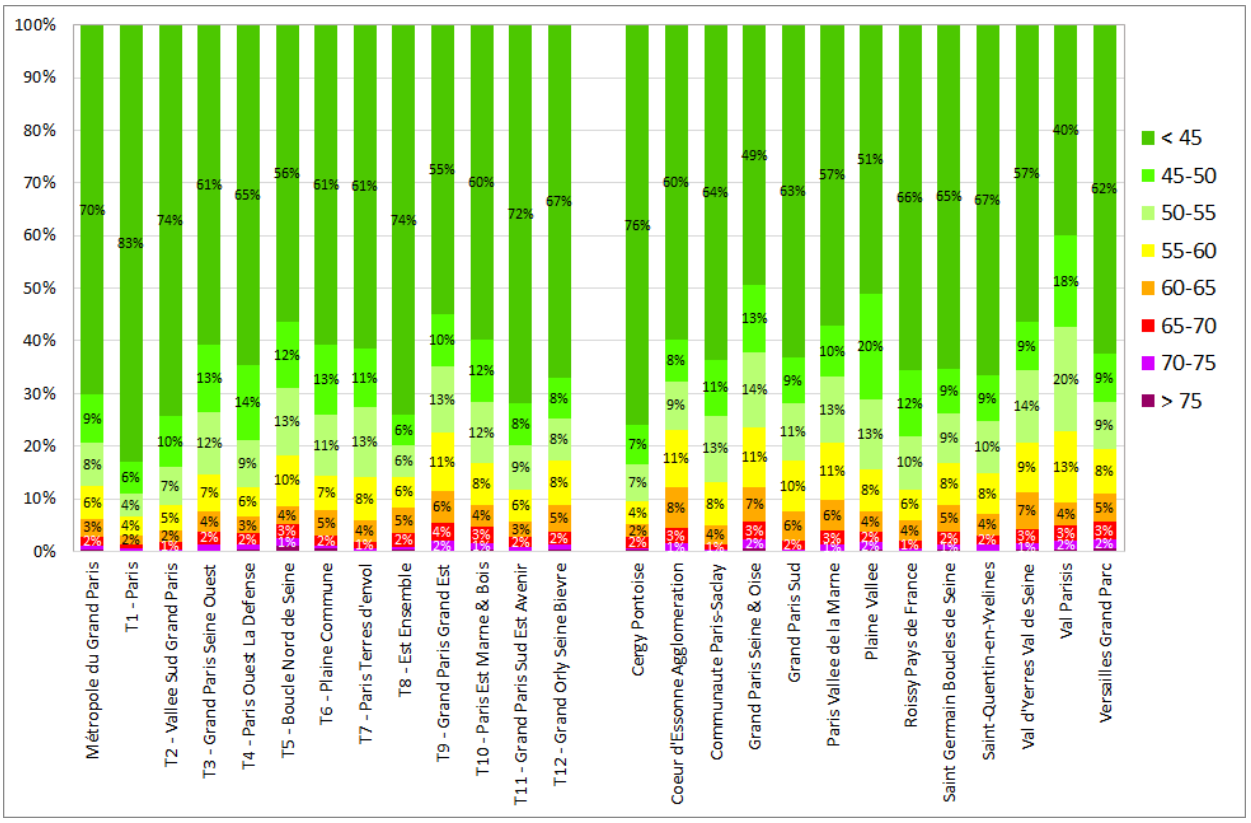
Nombre d'habitants (à la centaine près)	< 45	45-50	50-55	55-60	60-65	65-70	70-75	> 75
Métropole du Grand Paris	**4 762 800**	**615 600**	**558 200**	**420 600**	**223 500**	**125 500**	**51 700**	**18 000**
T1 - Paris	*1 818 400*	*128 400*	*98 300*	*78 600*	*36 100*	*18 400*	*9 500*	*1 600*
T2 - Vallee Sud Grand Paris	*283 800*	*37 000*	*27 100*	*18 600*	*8 600*	*5 200*	*1 200*	*200*
T3 - Grand Paris Seine Ouest	*181 200*	*37 700*	*35 100*	*21 300*	*11 100*	*7 400*	*3 500*	*600*
T4 - Paris Ouest La Defense	*356 100*	*78 200*	*49 900*	*31 000*	*17 400*	*12 000*	*4 300*	*2 400*
T5 - Boucle Nord de Seine	*235 900*	*51 800*	*53 600*	*40 200*	*14 700*	*11 200*	*5 500*	*4 700*
T6 - Plaine Commune	*239 900*	*53 300*	*45 300*	*26 100*	*19 000*	*7 600*	*2 100*	*2 200*
T7 - Paris Terres d'envol	*208 700*	*38 200*	*45 000*	*28 100*	*13 300*	*4 400*	*1 400*	*700*
T8 - Est Ensemble	*289 200*	*22 800*	*22 900*	*23 000*	*19 300*	*9 700*	*2 200*	*1 400*
T9 - Grand Paris Grand Est	*202 800*	*36 300*	*47 000*	*40 600*	*22 100*	*13 000*	*6 500*	*800*
T10 - Paris Est Marne & Bois	*295 000*	*58 000*	*56 900*	*40 000*	*19 500*	*15 200*	*7 000*	*1 200*
T11 - Grand Paris Sud Est Avenir	*213 900*	*23 600*	*25 500*	*18 100*	*8 500*	*5 900*	*2 000*	*300*
T12 - Grand-Orly Seine Bievre	*438 000*	*50 200*	*51 800*	*55 000*	*33 900*	*15 500*	*6 700*	*2 000*
Cergy Pontoise	**149 200**	**14 500**	**13 800**	**8 800**	**4 700**	**4 100**	**700**	**500**
Coeur d'Essonne Agglomeration	**110 200**	**14 600**	**17 000**	**20 300**	**14 100**	**5 600**	**2 300**	**400**
Communaute Paris-Saclay	**181 700**	**30 100**	**36 100**	**23 600**	**10 300**	**2 900**	**800**	-
Grand Paris Seine & Oise	**193 300**	**49 700**	**55 700**	**44 500**	**26 300**	**12 800**	**6 500**	**2 400**
Grand Paris Sud	**200 200**	**27 700**	**34 600**	**30 300**	**17 600**	**5 400**	**1 300**	**200**
Paris Vallee de la Marne	**124 400**	**21 000**	**27 700**	**23 200**	**13 000**	**5 800**	**2 500**	**200**
Plaine Vallee	**89 100**	**35 000**	**23 300**	**14 100**	**6 800**	**3 200**	**2 700**	**400**
Roissy Pays de France	**218 100**	**41 100**	**33 900**	**19 200**	**13 200**	**4 700**	**1 800**	**200**
Saint Germain Boucles de Seine	**214 900**	**28 100**	**31 000**	**25 700**	**17 200**	**8 200**	**2 700**	**1 300**
Saint-Quentin-en-Yvelines	**149 000**	**19 200**	**22 600**	**17 000**	**9 300**	**3 700**	**2 800**	**300**
Val d'Yerres Val de Seine	**94 000**	**15 100**	**23 000**	**15 600**	**11 700**	**4 600**	**2 000**	**500**
Val Parisis	**99 300**	**43 700**	**49 300**	**33 400**	**11 100**	**7 200**	**3 900**	**1 000**
Versailles Grand Parc	**162 700**	**24 100**	**23 200**	**22 100**	**13 800**	**8 900**	**4 100**	**1 800**

INDICATOR LN POPULATION

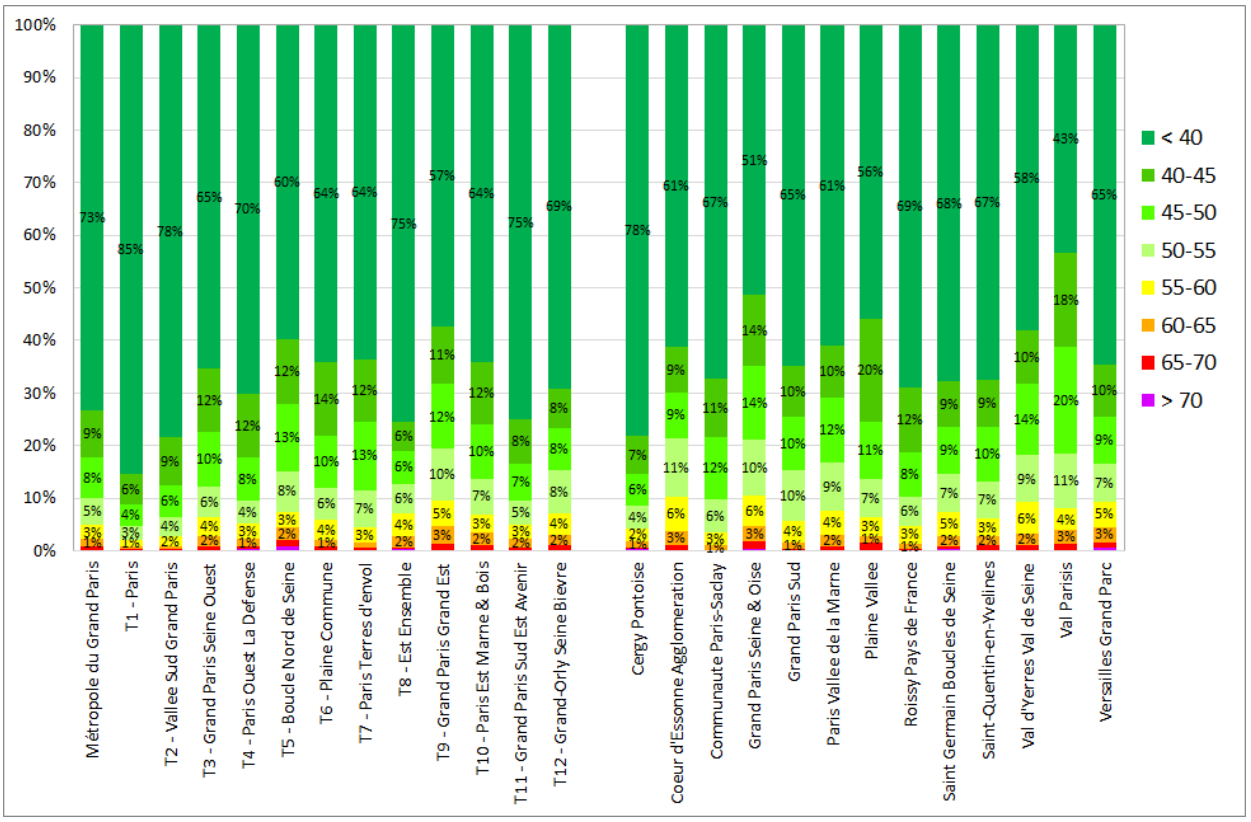
Nombre d'habitants (à la centaine près)	< 40	40-45	45-50	50-55	55-60	60-65	65-70	> 70
Métropole du Grand Paris	**4 966 800**	**604 400**	**522 200**	**352 600**	**182 800**	**96 800**	**39 700**	**10 800**
T1 - Paris	1 869 800	125 100	93 400	56 500	24 000	14 100	5 700	700
T2 - Vallee Sud Grand Paris	299 300	34 800	23 200	14 400	6 600	2 400	1 000	100
T3 - Grand Paris Seine Ouest	194 700	35 700	31 000	17 500	10 500	5 700	2 600	200
T4 - Paris Ouest La Defense	386 600	66 900	45 100	24 600	16 200	6 900	3 800	1 400
T5 - Boucle Nord de Seine	249 600	51 700	52 900	32 200	12 600	10 100	5 200	3 200
T6 - Plaine Commune	254 000	55 200	39 300	23 700	15 200	4 500	2 900	700
T7 - Paris Terres d'envol	216 200	40 200	44 300	24 100	10 000	3 200	1 300	500
T8 - Est Ensemble	294 700	21 700	24 000	22 000	17 100	8 200	1 700	900
T9 - Grand Paris Grand Est	211 300	41 000	45 500	35 900	18 100	12 500	4 300	600
T10 - Paris Est Marne & Bois	315 700	58 000	51 200	33 600	17 000	12 100	4 300	800
T11 - Grand Paris Sud Est Avenir	223 600	24 900	20 700	13 800	8 200	5 000	1 300	300
T12 - Grand-Orly Seine Bievre	451 400	49 300	51 700	54 300	27 400	12 200	5 400	1 400
Cergy Pontoise	**153 500**	**13 900**	**12 200**	**8 400**	**4 600**	**2 800**	**500**	**400**
Coeur d'Essonne Agglomeration	**113 100**	**15 700**	**16 200**	**20 700**	**11 700**	**5 000**	**1 800**	**300**
Communaute Paris-Saclay	**192 300**	**31 500**	**34 000**	**17 600**	**7 300**	**2 500**	**300**	-
Grand Paris Seine & Oise	**201 100**	**52 800**	**54 800**	**41 000**	**23 100**	**11 200**	**5 500**	**1 700**
Grand Paris Sud	**205 600**	**31 200**	**31 500**	**31 300**	**12 300**	**4 300**	**900**	**100**
Paris Vallee de la Marne	**133 000**	**21 500**	**26 800**	**20 200**	**9 600**	**4 800**	**1 900**	**100**
Plaine Vallee	**97 500**	**34 400**	**18 900**	**12 800**	**6 100**	**2 200**	**2 500**	**200**
Roissy Pays de France	**229 300**	**40 900**	**28 100**	**18 300**	**11 000**	**3 700**	**1 000**	**100**
Saint Germain Boucles de Seine	**223 100**	**28 300**	**29 700**	**23 700**	**15 000**	**6 100**	**2 200**	**1 000**
Saint-Quentin-en-Yvelines	**151 100**	**20 100**	**23 200**	**15 500**	**7 800**	**3 600**	**2 500**	-
Val d'Yerres Val de Seine	**96 800**	**16 600**	**22 800**	**14 900**	**10 000**	**3 400**	**1 700**	**300**
Val Parisis	**107 600**	**44 800**	**50 100**	**26 400**	**10 100**	**6 600**	**2 700**	**400**
Versailles Grand Parc	**168 400**	**25 600**	**23 700**	**18 800**	**12 300**	**7 700**	**2 600**	**1 600**

RAIL TRAFFIC NOISE - STATISTICS PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN PERCENTAGE OF POPULATION



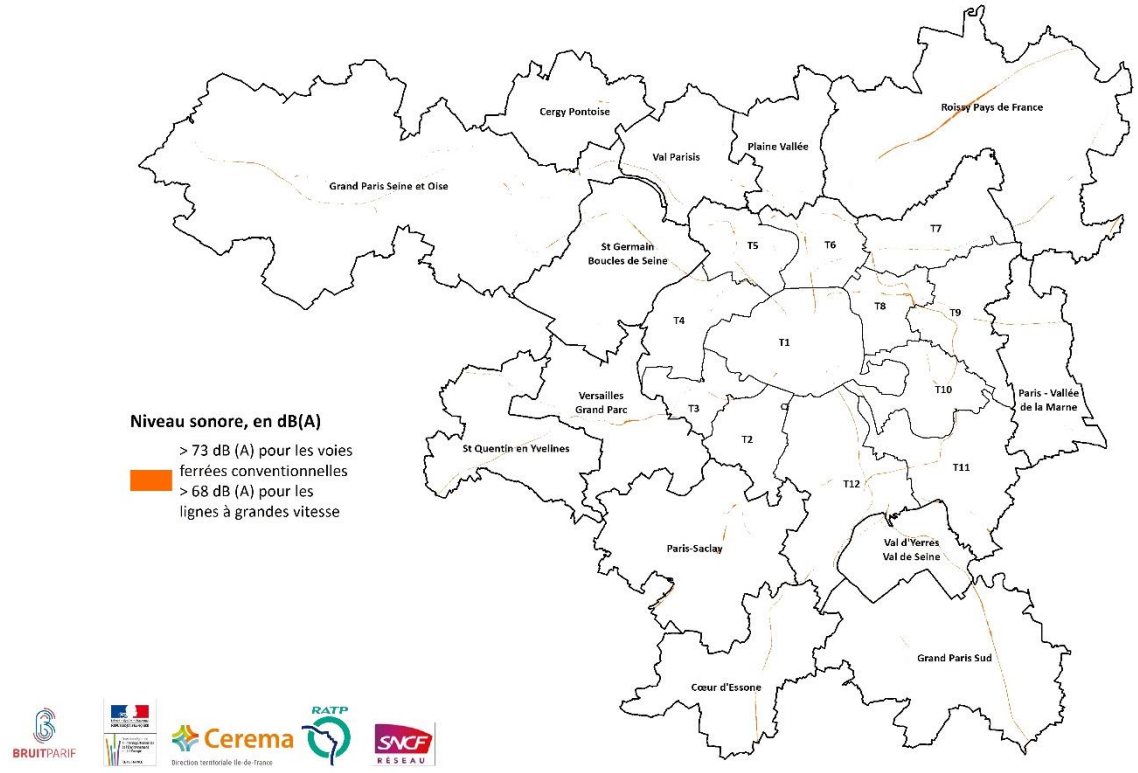
INDICATOR LN PERCENTAGE OF POPULATION



RAIL TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > VL* AREAS OF EXCEEDANCE

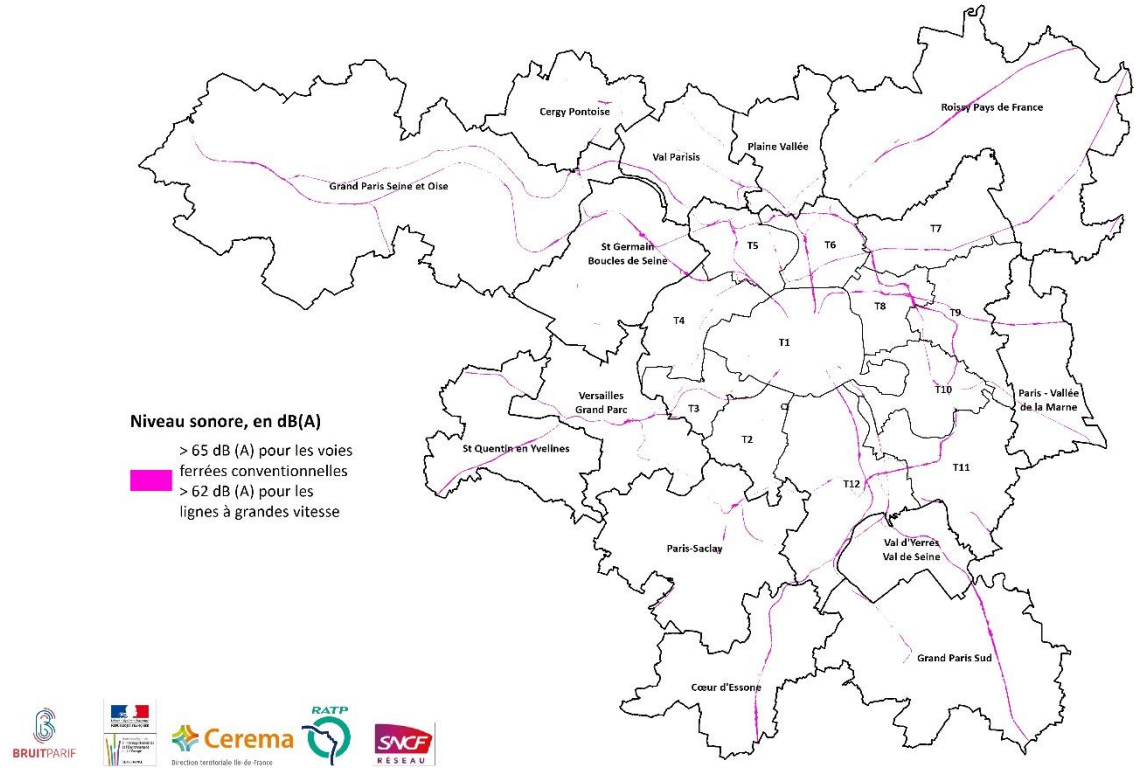
** The limit values for the Lden indicator are 73 dB(A) for conventional railways and 68 dB(A) for high speed ones.*



Sources : IAU-IdF, ©IGN-2014

INDICATOR LN > VL* AREAS OF EXCEEDANCE

** The limit values for the Ln indicator are 65 dB(A) for conventional railways and 62 dB(A) for high speed ones*

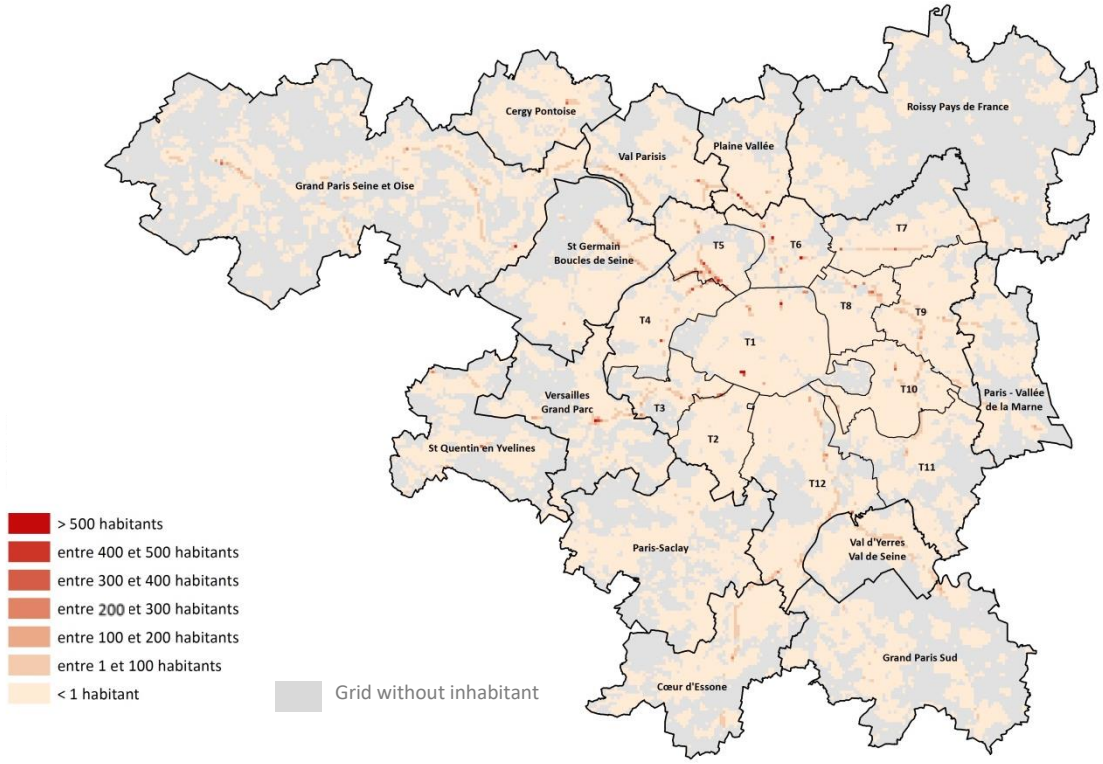


Sources : IAU-IdF, ©IGN-2014

RAIL TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

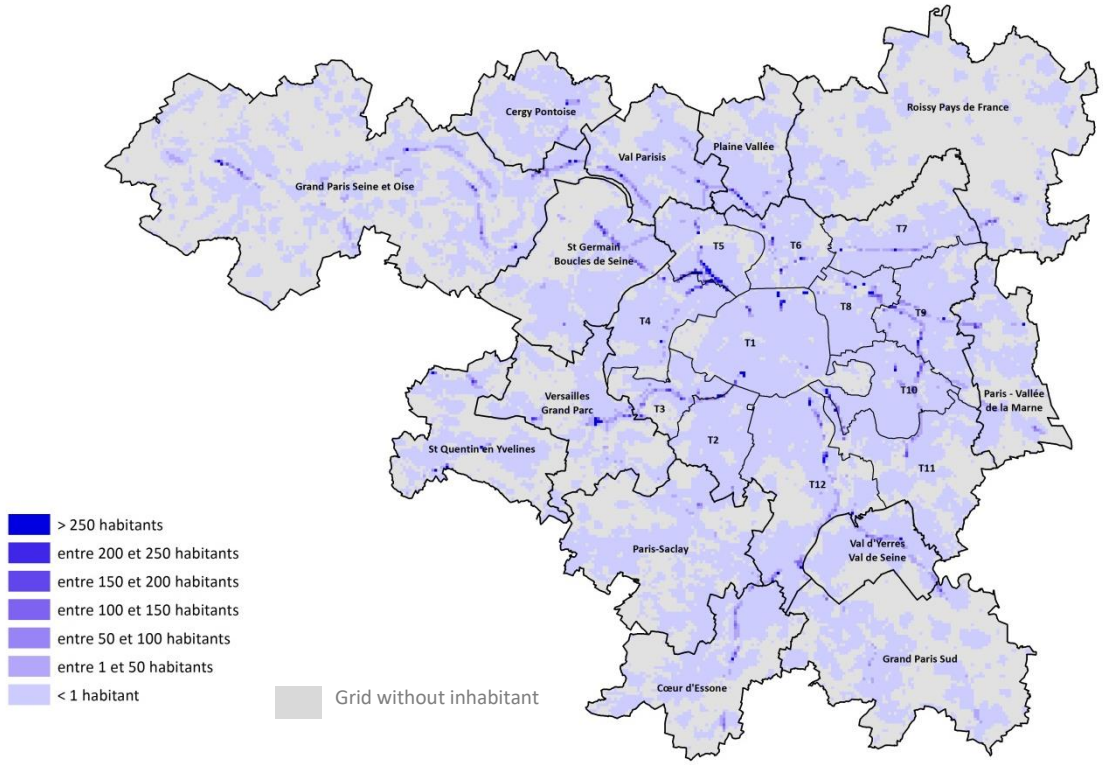
INDICATOR LDEN > VL* POPULATION PER GRID OF 250 m

** The limit values for the Lden indicator are 73 dB(A) for conventional railways and 68 dB(A) for high speed ones*



INDICATOR LN > VL* POPULATION PER GRID OF 250 m

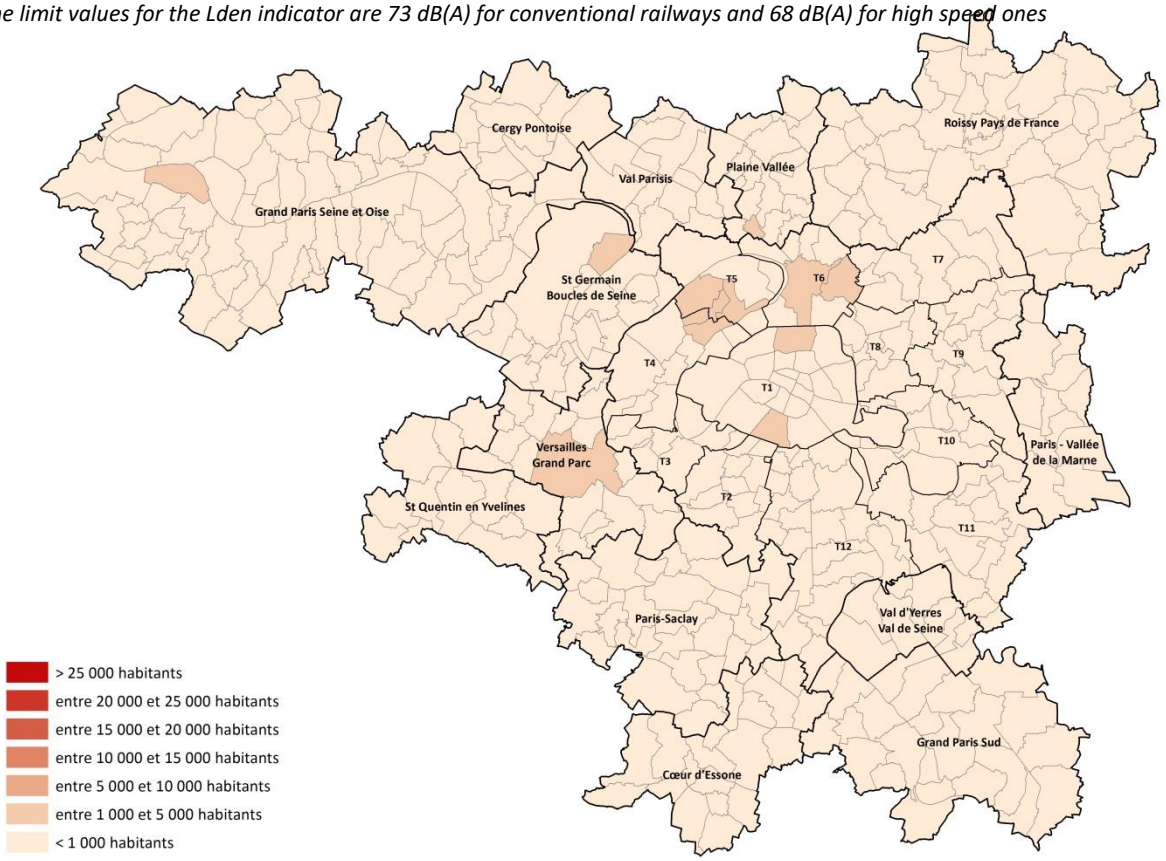
** The limit values for the Ln indicator are 65 dB(A) for conventional railways and 62 dB(A) for high speed ones*



RAIL TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

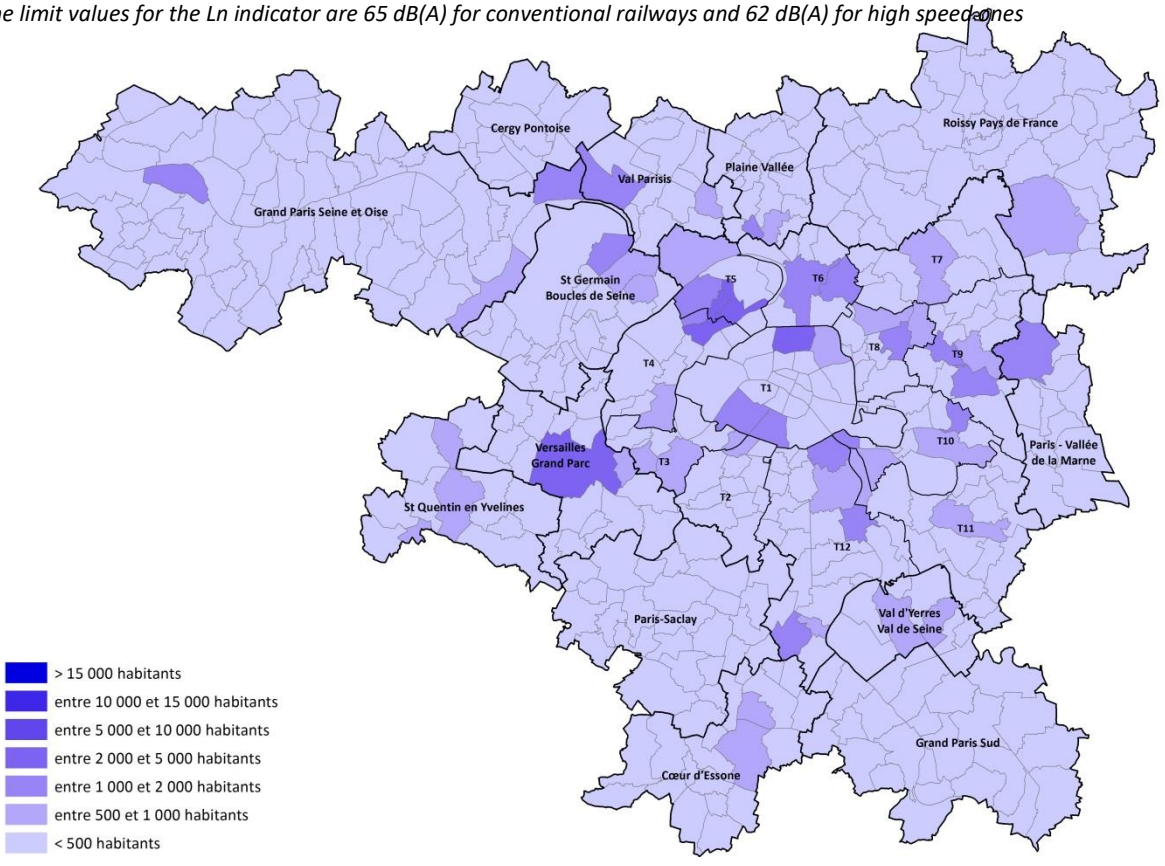
INDICATOR LDEN > VL* POPULATION PER COMMUNE LEVEL

** The limit values for the Lden indicator are 73 dB(A) for conventional railways and 68 dB(A) for high speed ones*



INDICATOR LN > VL* POPULATION PER COMMUNE LEVEL

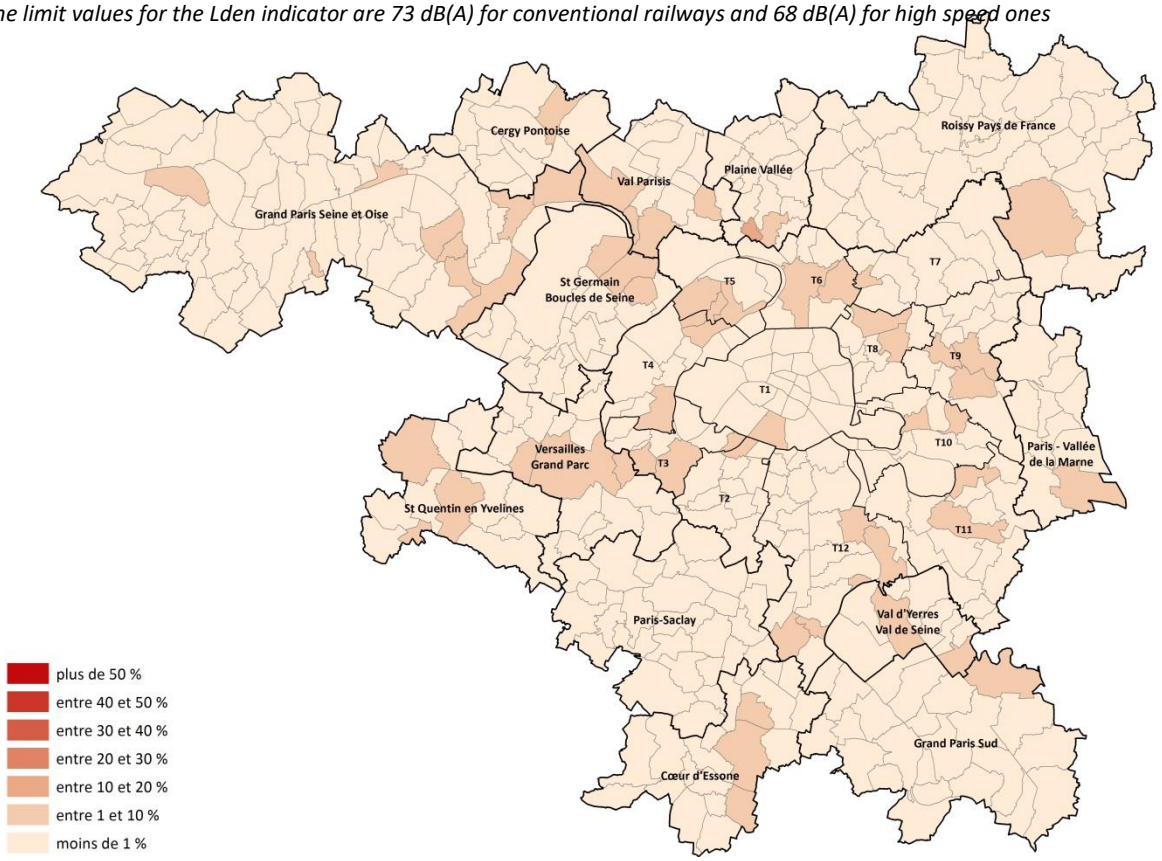
** The limit values for the Ln indicator are 65 dB(A) for conventional railways and 62 dB(A) for high speed ones*



RAIL TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

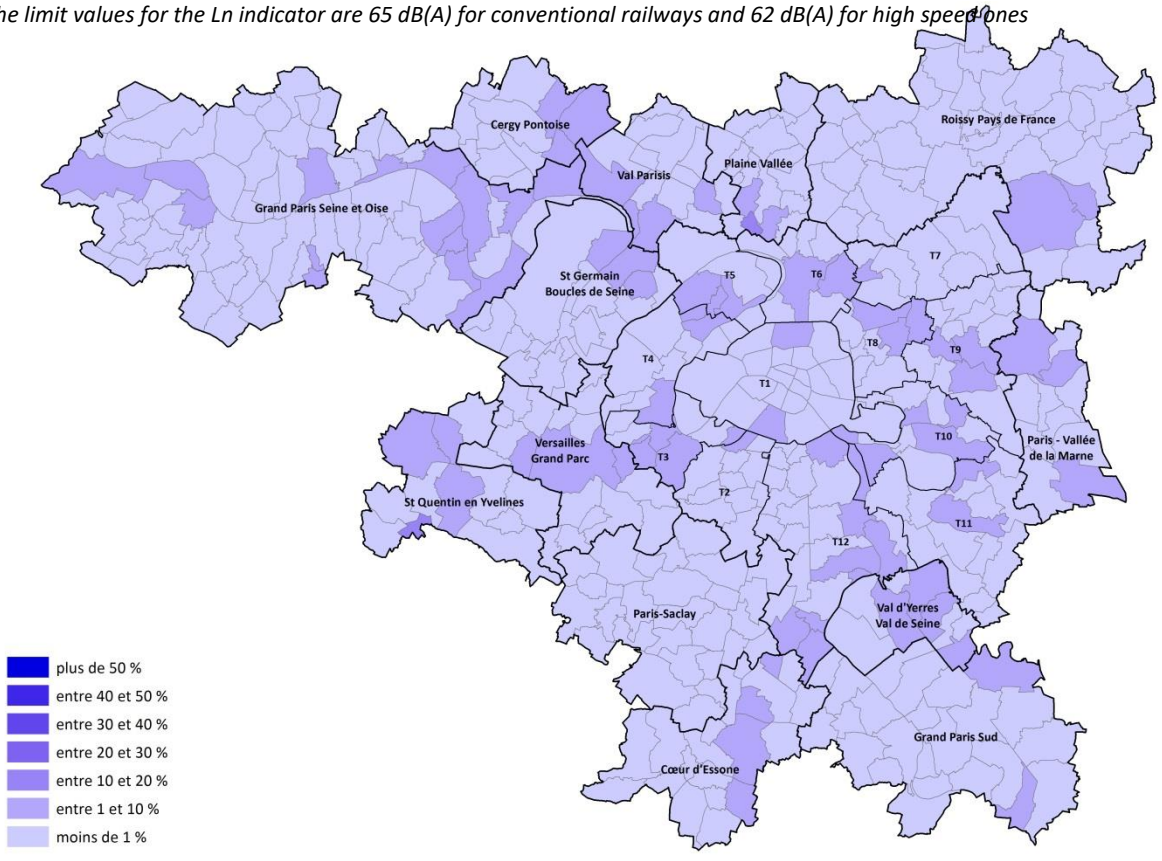
INDICATOR LDEN > VL* IN PERCENTAGE PER COMMUNE LEVEL

** The limit values for the Lden indicator are 73 dB(A) for conventional railways and 68 dB(A) for high speed ones*



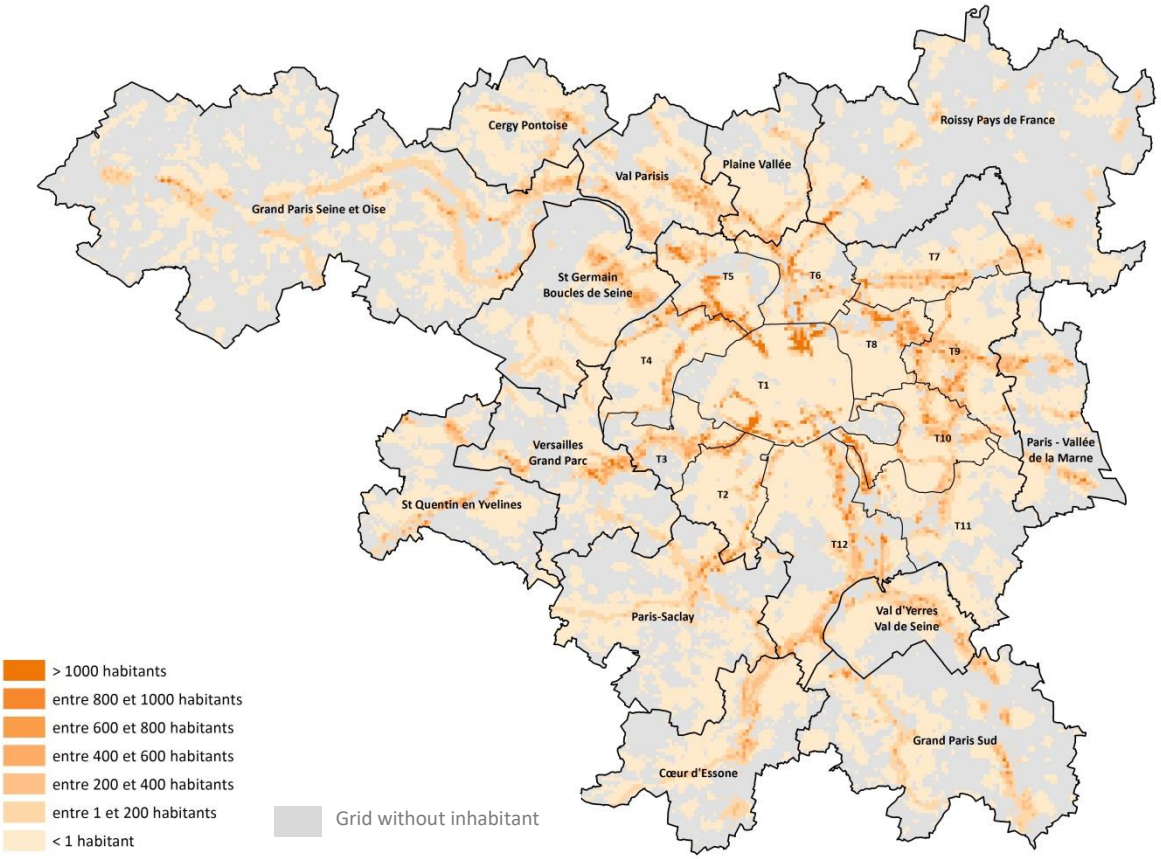
INDICATOR LN > VL* IN PERCENTAGE PER COMMUNE LEVEL

** The limit values for the Ln indicator are 65 dB(A) for conventional railways and 62 dB(A) for high speed ones*

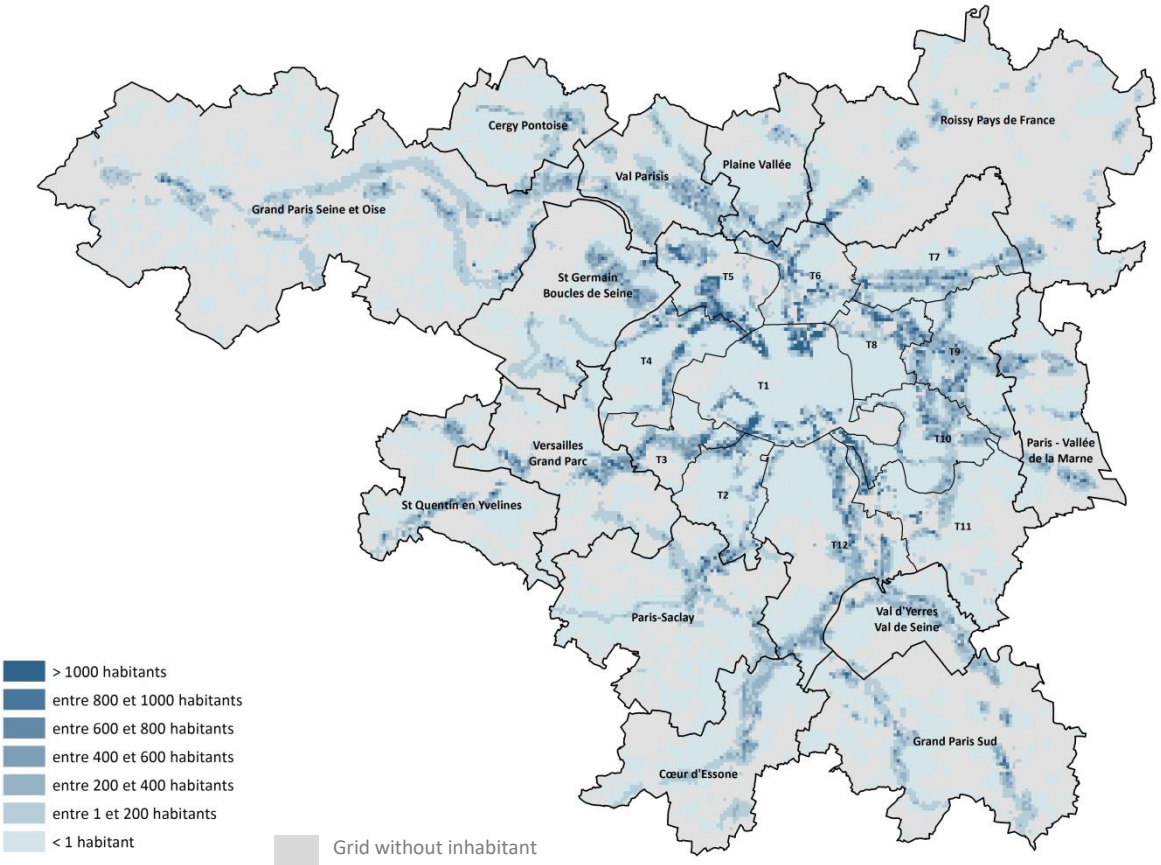


RAIL TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 54 dB(A) POPULATION PER GRID OF 250 m

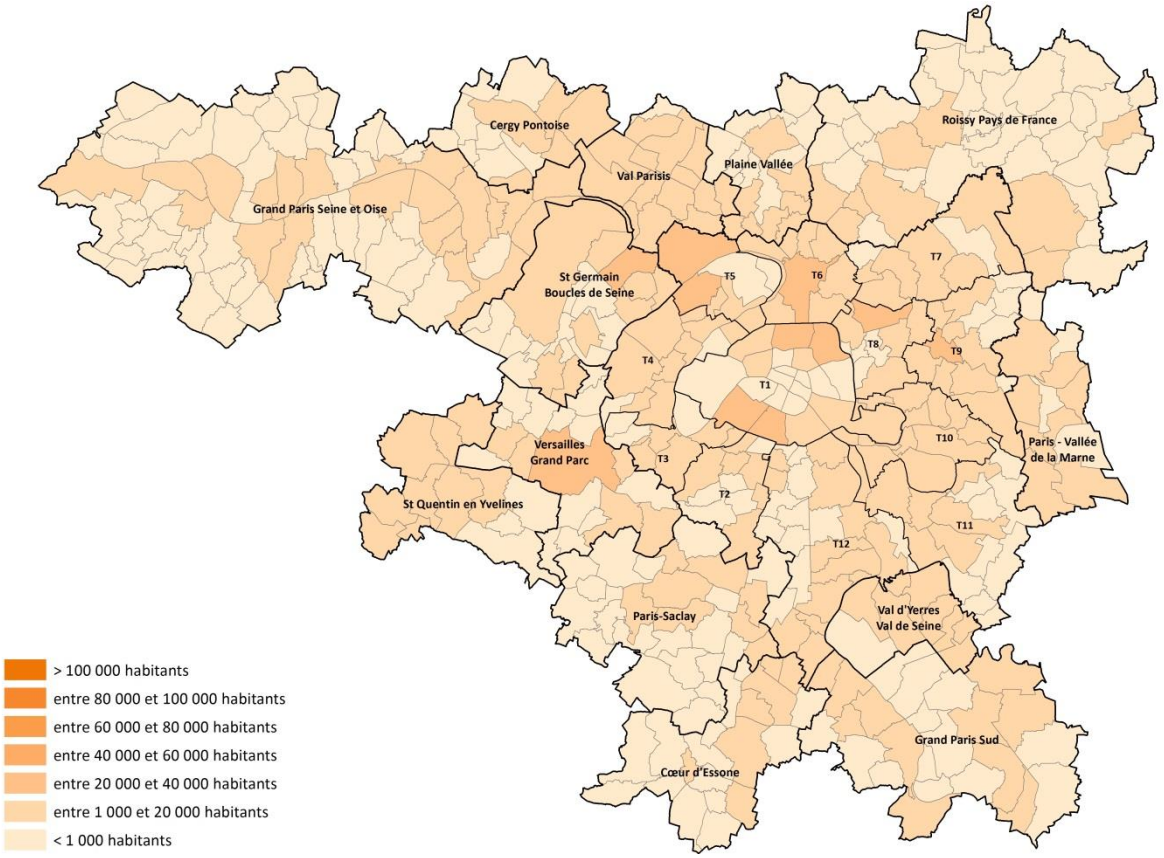


INDICATOR LN > 44 dB(A) POPULATION PER GRID OF 250 m

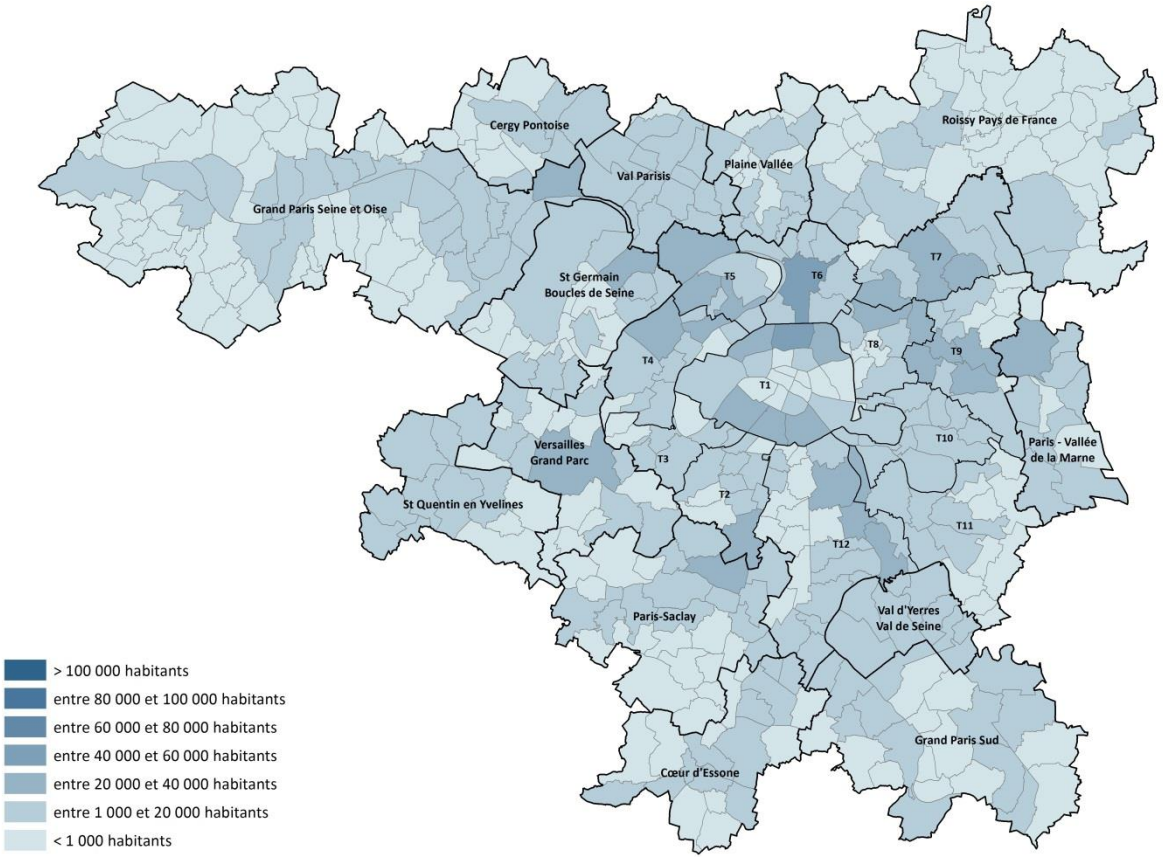


RAIL TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 54 dB(A) POPULATION PER COMMUNE LEVEL

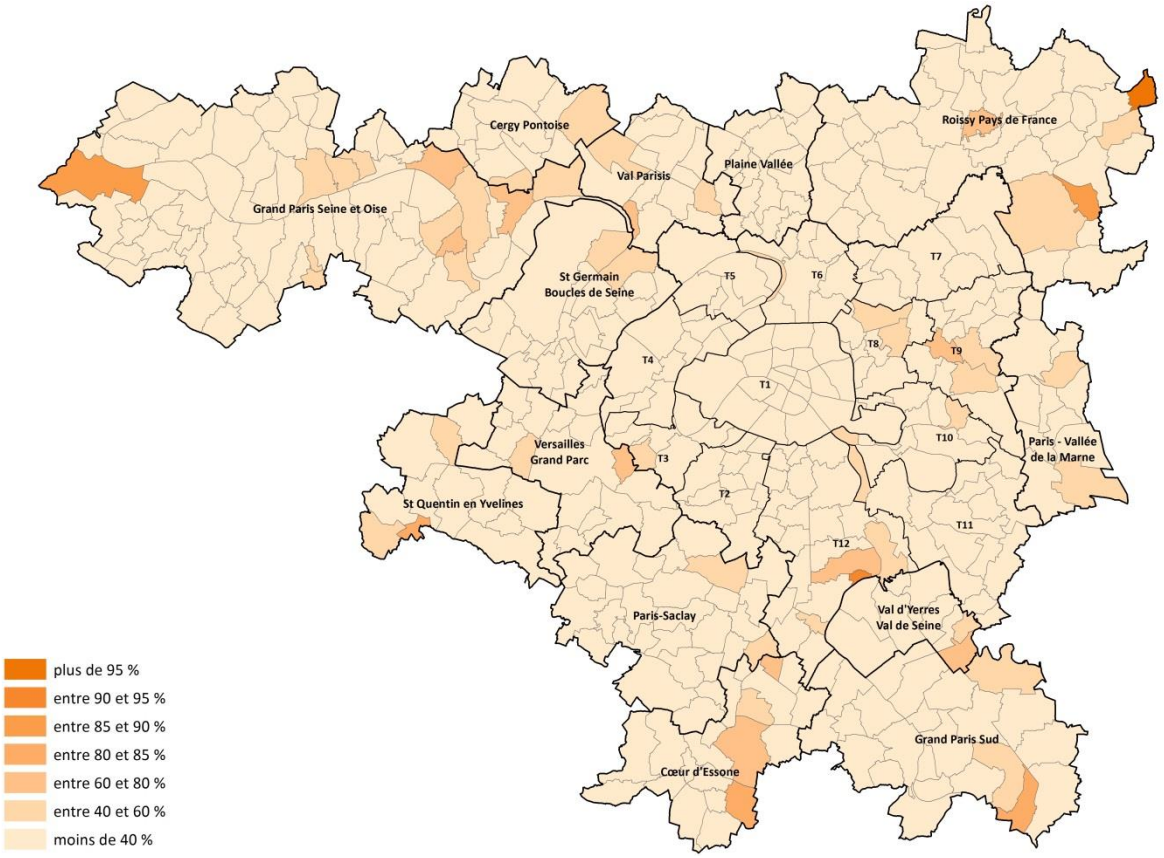


INDICATOR LN > 44 dB(A) POPULATION PER COMMUNE LEVEL

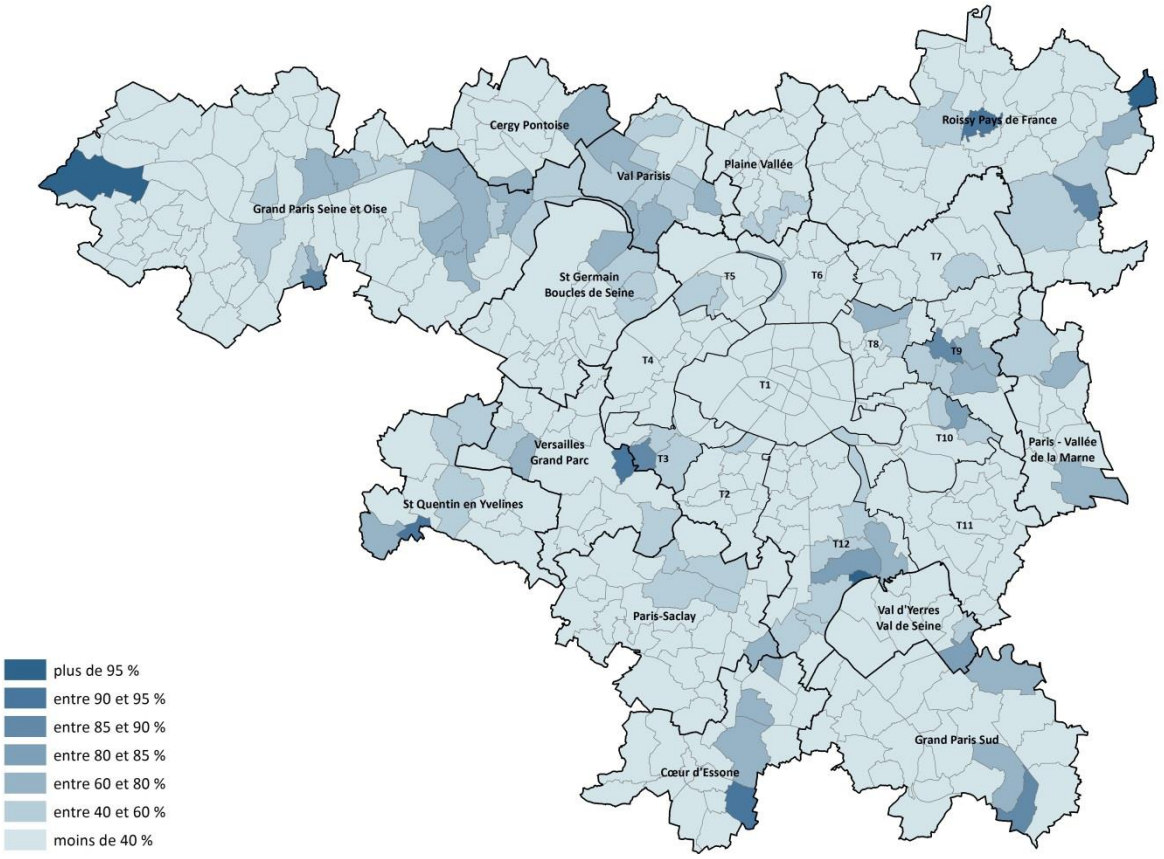


RAIL TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 54 dB(A) IN PERCENTAGE PER COMMUNE LEVEL



INDICATOR LN > 44 dB(A) IN PERCENTAGE PER COMMUNE LEVEL



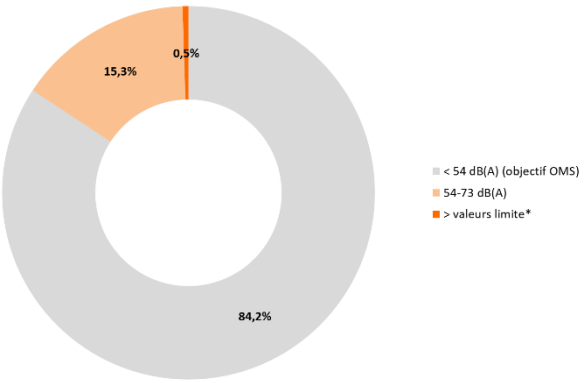
RAIL TRAFFIC NOISE - STATISTICS
COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN

	Nombre d'habitants (à la centaine près)	%
< 54 dB(A) (objectif OMS)	8 511 900	84,2%
54-73 dB(A)	1 541 100	15,3%
> valeurs limite*	51 400	0,5%

** The limit values for the Lden indicator are 73 dB(A) for conventional railways and 68 dB(A) for high speed ones.*

POPULATION

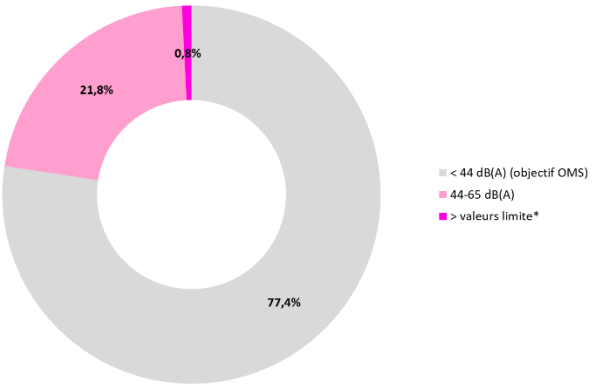


INDICATOR LN

	Nombre d'habitants (à la centaine près)	%
< 44 dB(A) (objectif OMS)	7 822 500	77,4%
44-65 dB(A)	2 199 100	21,8%
> valeurs limite*	82 600	0,8%

** The limit values for the Ln indicator are 65 dB(A) for conventional railways and 62 dB(A) for high speed ones.*

POPULATION



RAIL TRAFFIC NOISE - STATISTICS PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN POPULATION

Nombre d'habitants (à la centaine près)	< 54 dB(A) (objectif OMS)	54-73 dB(A)	> valeurs limite*
Métropole du Grand Paris	**5 839 600**	**904 200**	**32 200**
T1 - Paris	*2 032 000*	*152 900*	*4 400*
T2 - Vallee Sud Grand Paris	*343 200*	*37 800*	*700*
T3 - Grand Paris Seine Ouest	*248 400*	*47 700*	*1 800*
T4 - Paris Ouest La Defense	*476 000*	*71 200*	*4 200*
T5 - Boucle Nord de Seine	*330 900*	*80 400*	*6 200*
T6 - Plaine Commune	*330 200*	*62 300*	*2 900*
T7 - Paris Terres d'envol	*283 600*	*54 800*	*1 400*
T8 - Est Ensemble	*329 600*	*58 600*	*2 100*
T9 - Grand Paris Grand Est	*276 900*	*90 100*	*2 100*
T10 - Paris Est Marne & Bois	*400 400*	*89 800*	*2 500*
T11 - Grand Paris Sud Est Avenir	*258 200*	*39 000*	*600*
T12 - Grand-Orly Seine Bievre	*530 200*	*119 600*	*3 200*
Cergy Pontoise	**175 400**	**20 300**	**600**
Coeur d'Essonne Agglomeration	**138 100**	**45 100**	**1 200**
Communaute Paris-Saclay	**241 500**	**44 000**	**100**
Grand Paris Seine & Oise	**289 300**	**97 600**	**4 300**
Grand Paris Sud	**256 900**	**59 700**	**600**
Paris Vallee de la Marne	**168 700**	**48 300**	**700**
Plaine Vallee	**144 100**	**28 500**	**1 900**
Roissy Pays de France	**288 400**	**43 300**	**500**
Saint Germain Boucles de Seine	**267 700**	**59 100**	**2 300**
Saint-Quentin-en-Yvelines	**186 200**	**36 700**	**1 000**
Val d'Yerres Val de Seine	**127 700**	**37 700**	**1 000**
Val Parisis	**182 000**	**64 500**	**2 300**
Versailles Grand Parc	**206 200**	**51 700**	**2 900**

** Les valeurs limites pour l'indicator Lden sont de 73 dB(A) pour les voies conventionnelles et de 68 dB(A) pour les LGV*

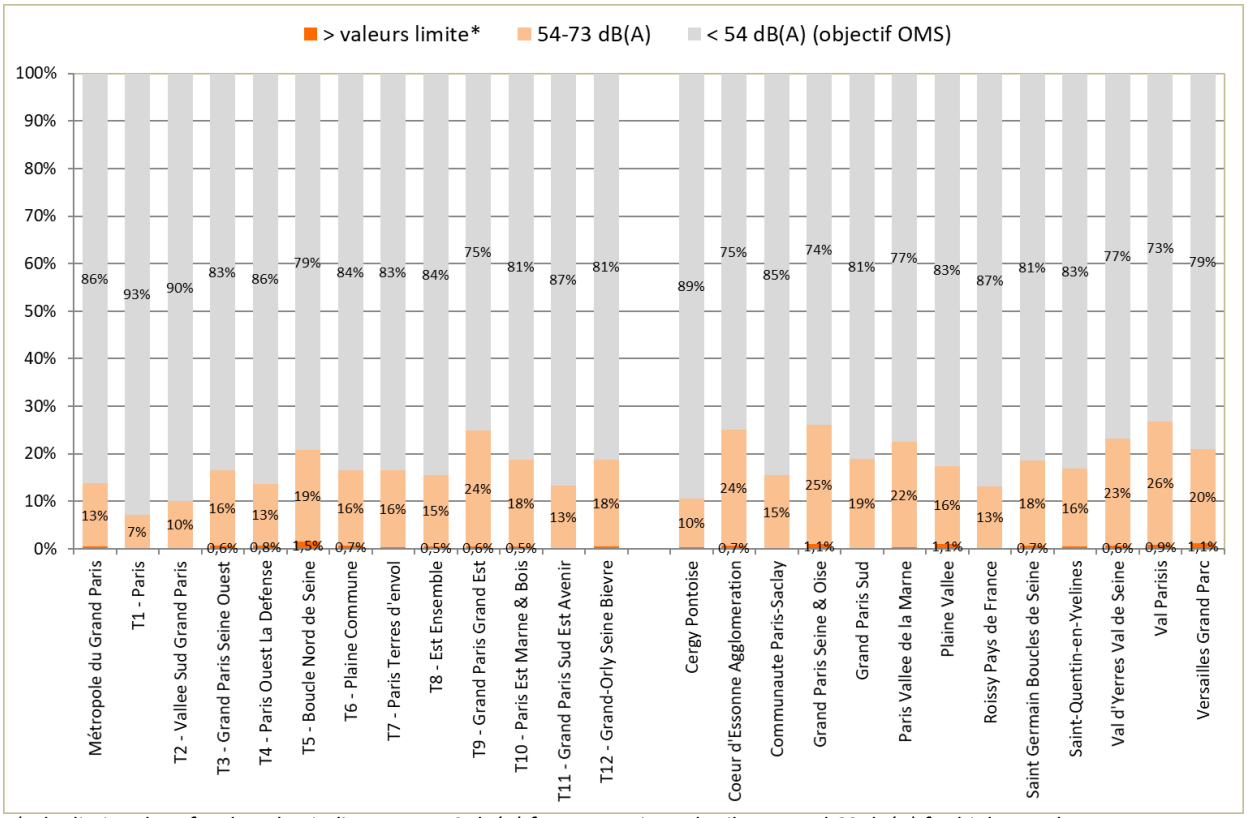
INDICATOR LN POPULATION

Nombre d'habitants (à la centaine près)	< 44 dB(A) (objectif OMS)	44-65 dB(A)	> valeurs limite*
Métropole du Grand Paris	**5 452 100**	**1 273 400**	**50 500**
T1 - Paris	*1 974 300*	*208 600*	*6 400*
T2 - Vallee Sud Grand Paris	*326 400*	*54 200*	*1 100*
T3 - Grand Paris Seine Ouest	*223 000*	*72 100*	*2 800*
T4 - Paris Ouest La Defense	*444 100*	*102 100*	*5 200*
T5 - Boucle Nord de Seine	*290 700*	*118 400*	*8 500*
T6 - Plaine Commune	*298 200*	*93 600*	*3 600*
T7 - Paris Terres d'envol	*247 500*	*90 500*	*1 800*
T8 - Est Ensemble	*312 400*	*75 200*	*2 700*
T9 - Grand Paris Grand Est	*243 600*	*120 600*	*4 900*
T10 - Paris Est Marne & Bois	*361 300*	*126 200*	*5 100*
T11 - Grand Paris Sud Est Avenir	*240 100*	*56 100*	*1 600*
T12 - Grand-Orly Seine Bievre	*490 400*	*155 800*	*6 800*
Cergy Pontoise	**164 400**	**31 000**	**900**
Coeur d'Essonne Agglomeration	**125 300**	**57 000**	**2 100**
Communaute Paris-Saclay	**217 200**	**68 100**	**300**
Grand Paris Seine & Oise	**242 900**	**141 100**	**7 200**
Grand Paris Sud	**229 100**	**87 200**	**1 000**
Paris Vallee de la Marne	**149 900**	**65 800**	**2 000**
Plaine Vallee	**125 600**	**46 200**	**2 700**
Roissy Pays de France	**261 900**	**69 200**	**1 100**
Saint Germain Boucles de Seine	**245 000**	**81 100**	**3 100**
Saint-Quentin-en-Yvelines	**167 600**	**53 800**	**2 600**
Val d'Yerres Val de Seine	**109 300**	**55 100**	**2 000**
Val Parisis	**143 800**	**101 900**	**3 100**
Versailles Grand Parc	**188 300**	**68 200**	**4 200**

** The limit values for the Ln indicator are 65 dB(A) for conventionnal railways and 62 dB(A) for high speed ones*

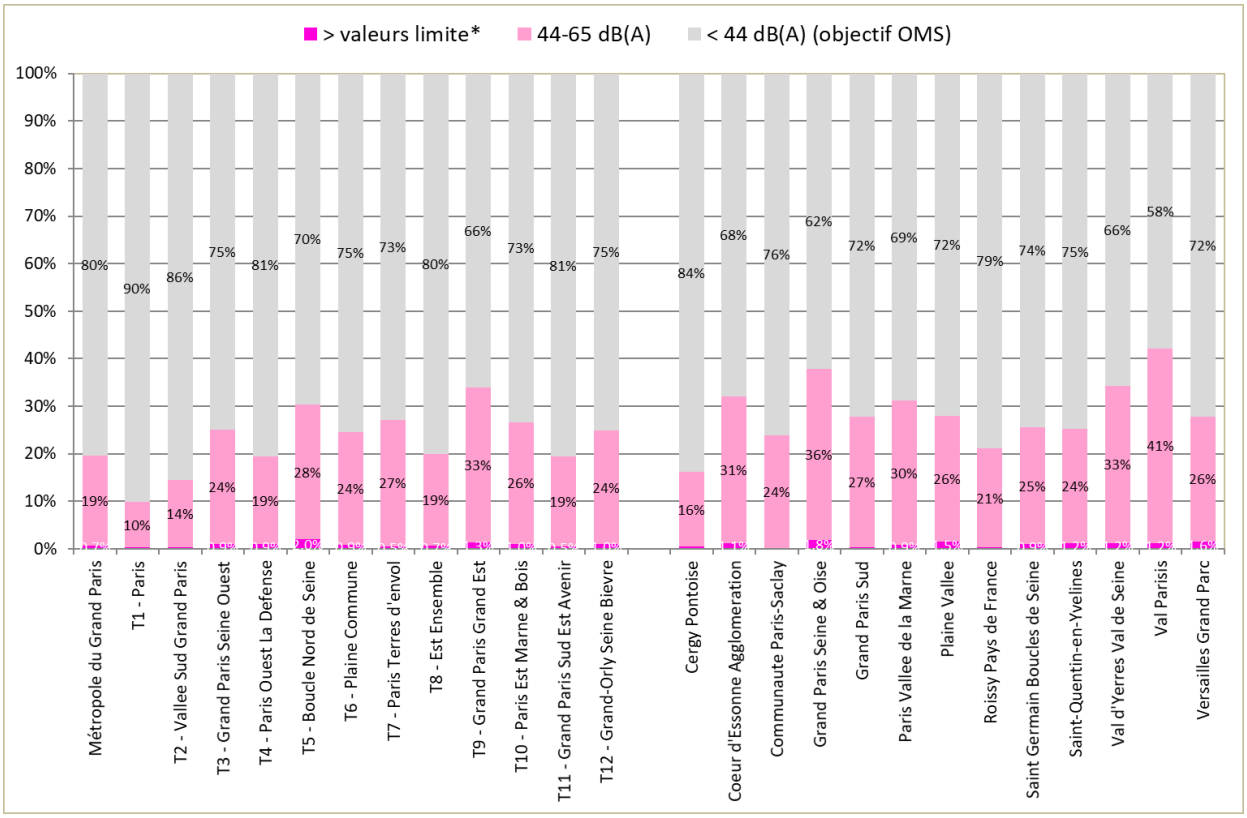
RAIL TRAFFIC NOISE - STATISTICS PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN PERCENTAGE OF POPULATION



** The limit values for the Lden indicator are 73 dB(A) for conventionnal railways and 68 dB(A) for high speed ones*

INDICATOR LN PERCENTAGE OF POPULATION

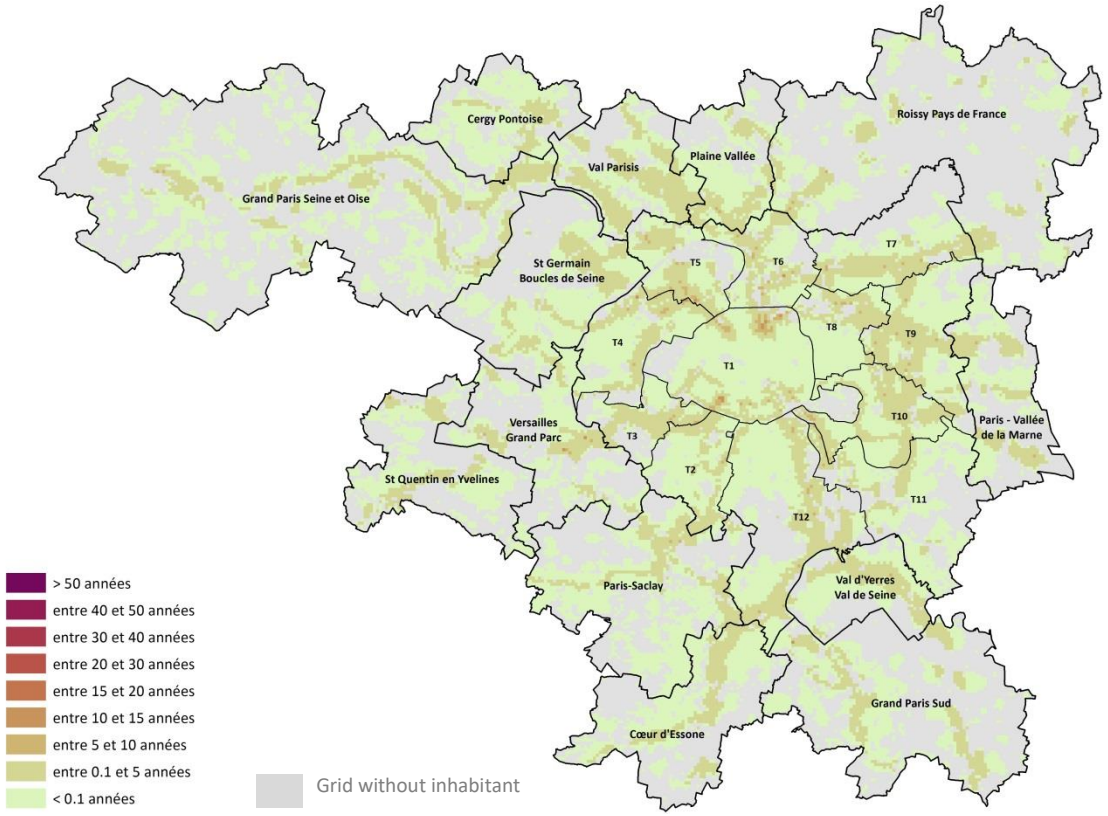


** The limit values for the Ln indicator are 65 dB(A) for conventionnal railways and 62 dB(A) for high speed ones*

RAIL TRAFFIC NOISE - HEALTH IMPACT

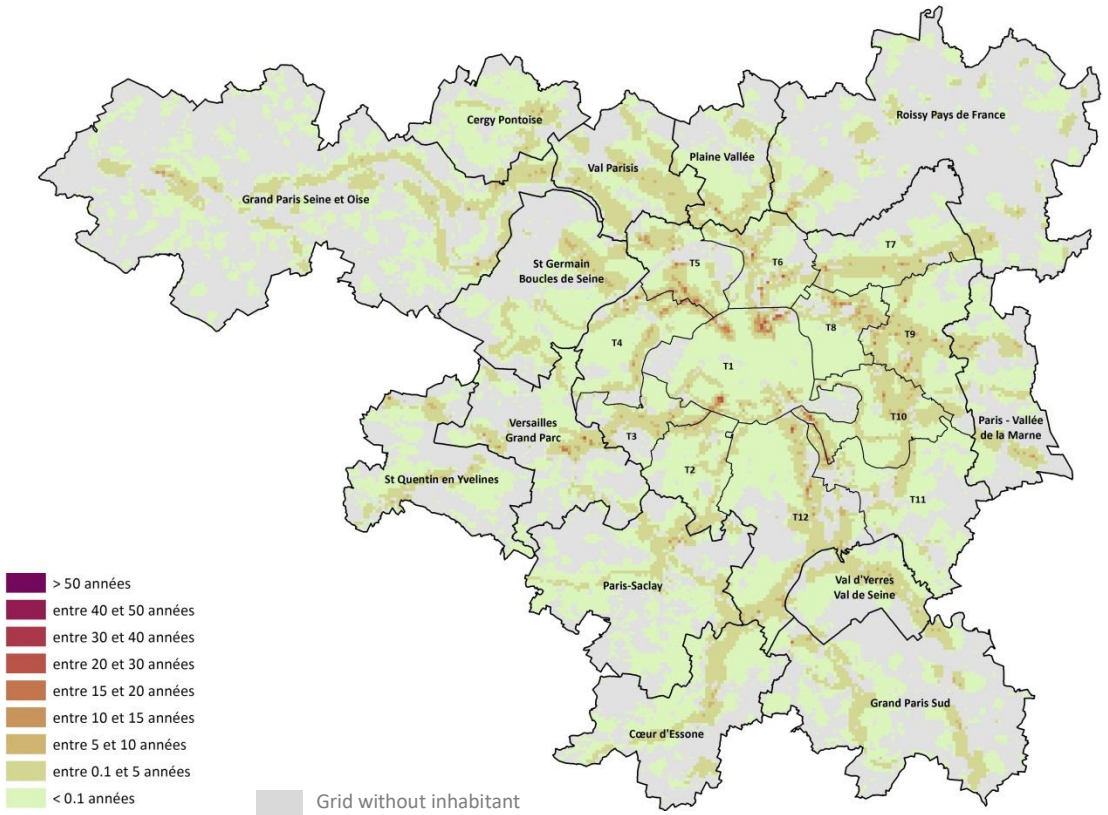
INDICATOR DALY FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER GRID OF 250 m

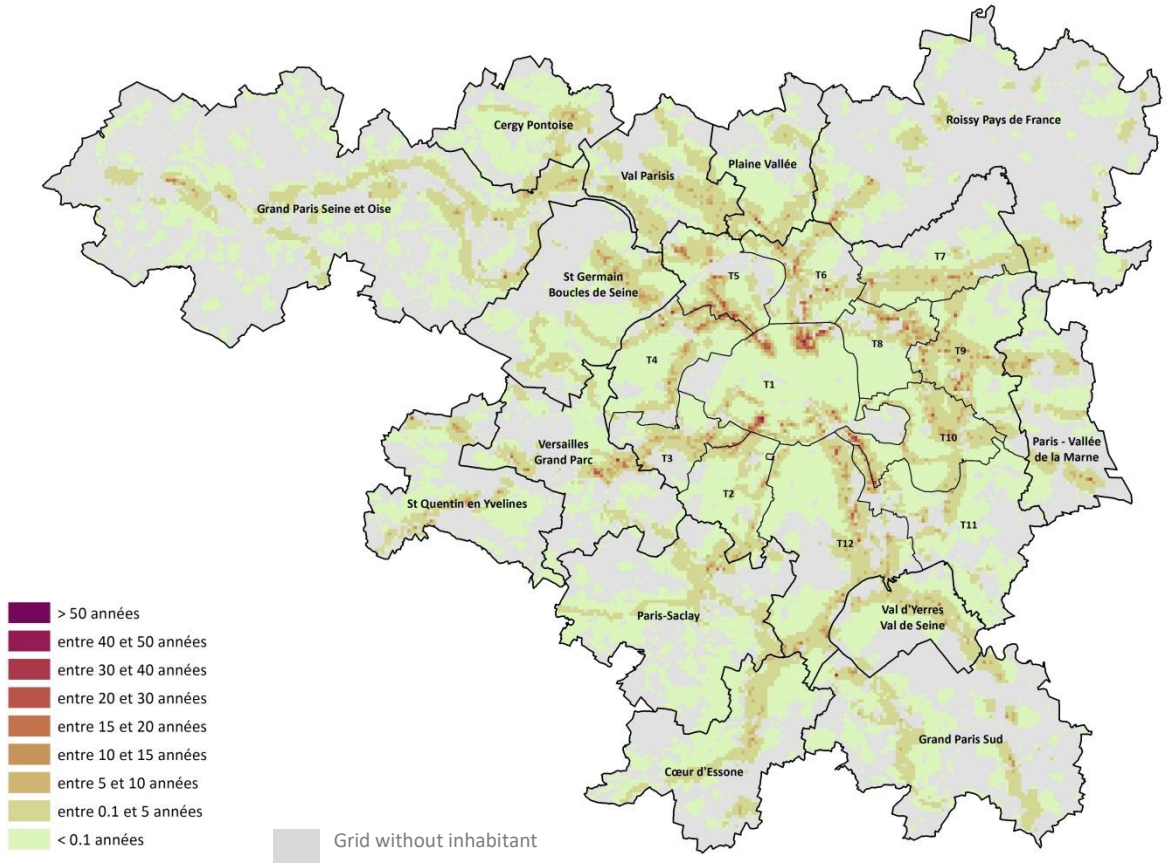
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



RAIL TRAFFIC NOISE - HEALTH IMPACT

INDICATOR DALY PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



STATISTICS

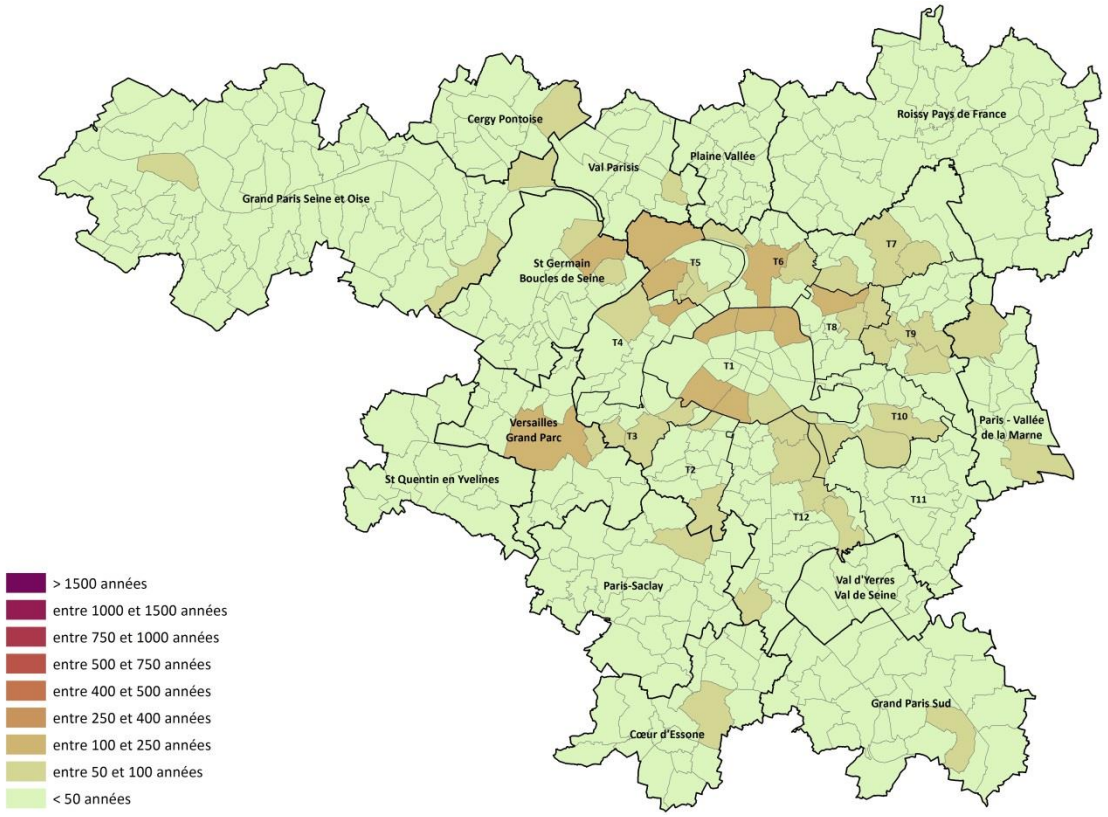
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

ANNÉES DE VIE EN BONNE SANTÉ PERDUE PAR AN	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**4 972**	**8 837**	**13 809**
T1 - Paris	*856*	*1 402*	*2 258*
T2 - Vallee Sud Grand Paris	*213*	*342*	*555*
T3 - Grand Paris Seine Ouest	*278*	*495*	*773*
T4 - Paris Ouest La Defense	*446*	*759*	*1 205*
T5 - Boucle Nord de Seine	*473*	*862*	*1 334*
T6 - Plaine Commune	*361*	*635*	*996*
T7 - Paris Terres d'envol	*292*	*524*	*816*
T8 - Est Ensemble	*293*	*566*	*859*
T9 - Grand Paris Grand Est	*457*	*869*	*1 326*
T10 - Paris Est Marne & Bois	*504*	*889*	*1 392*
T11 - Grand Paris Sud Est Avenir	*206*	*374*	*580*
T12 - Grand-Orly Seine Bievre	*595*	*1 120*	*1 715*
Cergy Pontoise	**116**	**214**	**329**
Coeur d'Essonne Agglomeration	**215**	**421**	**636**
Communaute Paris-Saclay	**225**	**377**	**602**
Grand Paris Seine & Oise	**528**	**1 014**	**1 542**
Grand Paris Sud	**288**	**532**	**821**
Paris Vallee de la Marne	**245**	**432**	**676**
Plaine Vallee	**187**	**337**	**524**
Roissy Pays de France	**249**	**444**	**693**
Saint Germain Boucles de Seine	**308**	**568**	**876**
Saint-Quentin-en-Yvelines	**191**	**371**	**562**
Val d'Yerres Val de Seine	**194**	**367**	**561**
Val Parisis	**350**	**641**	**991**
Versailles Grand Parc	**284**	**534**	**818**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**8 352**	**15 088**	**23 440**

RAIL TRAFFIC NOISE - HEALTH IMPACT

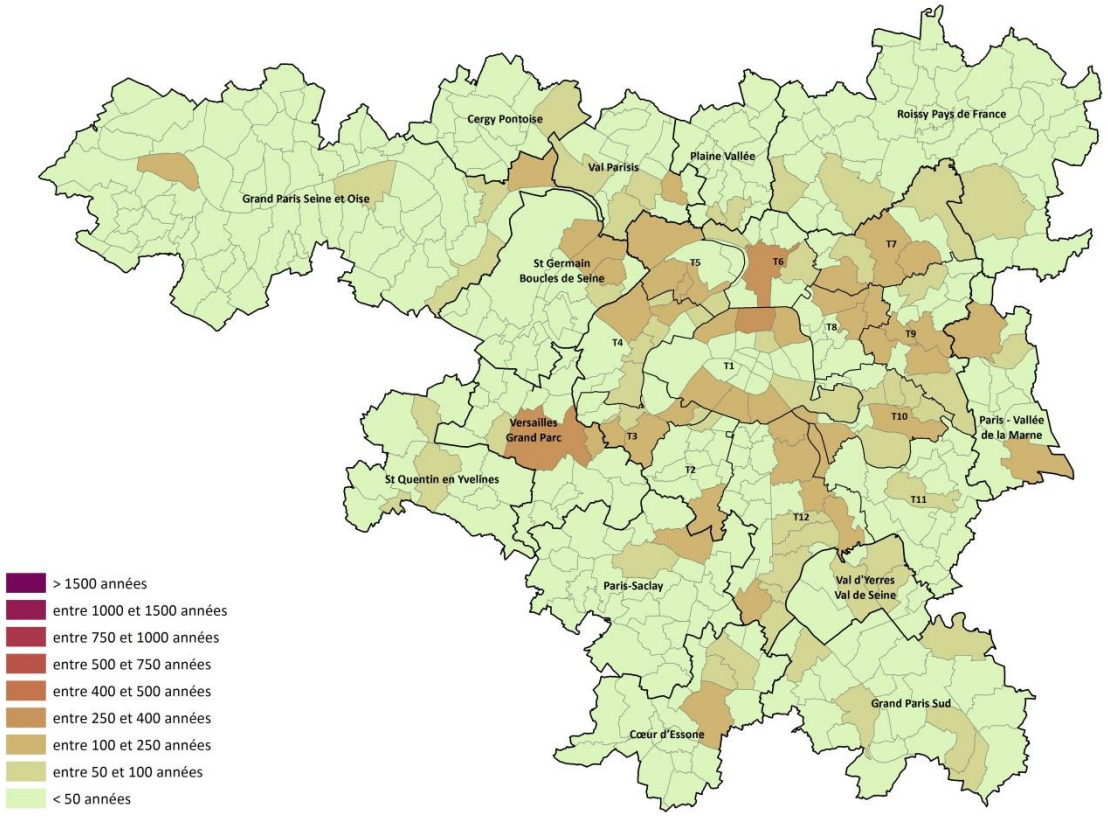
INDICATOR DALY FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

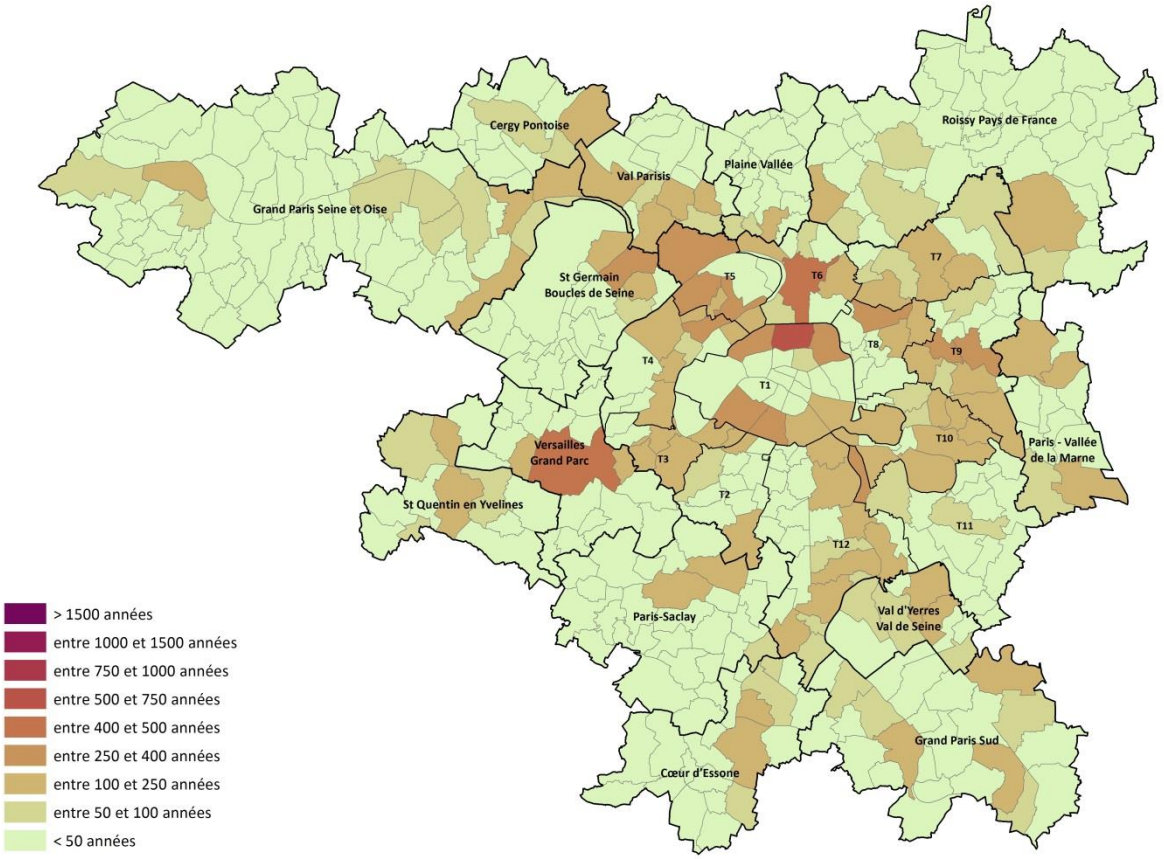
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



RAIL TRAFFIC NOISE - HEALTH IMPACT

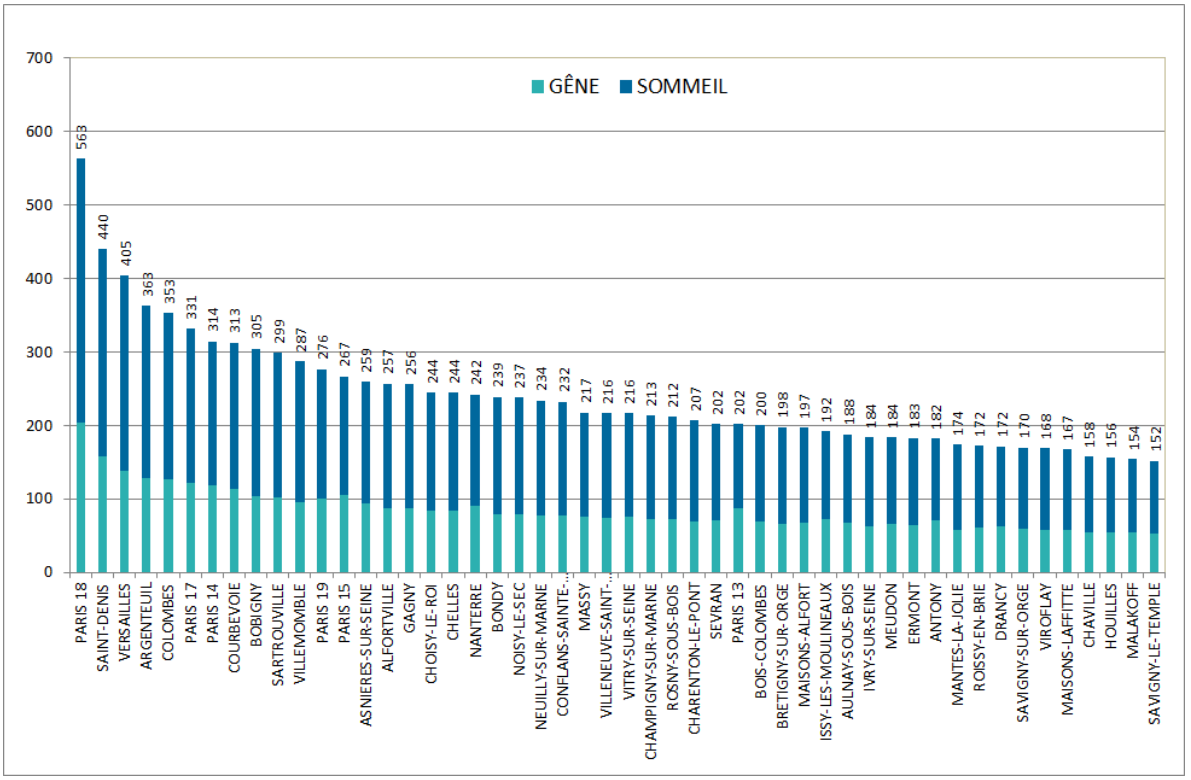
INDICATOR DALY PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



THE 50 COMMUNES WITH THE HIGHEST VALUES

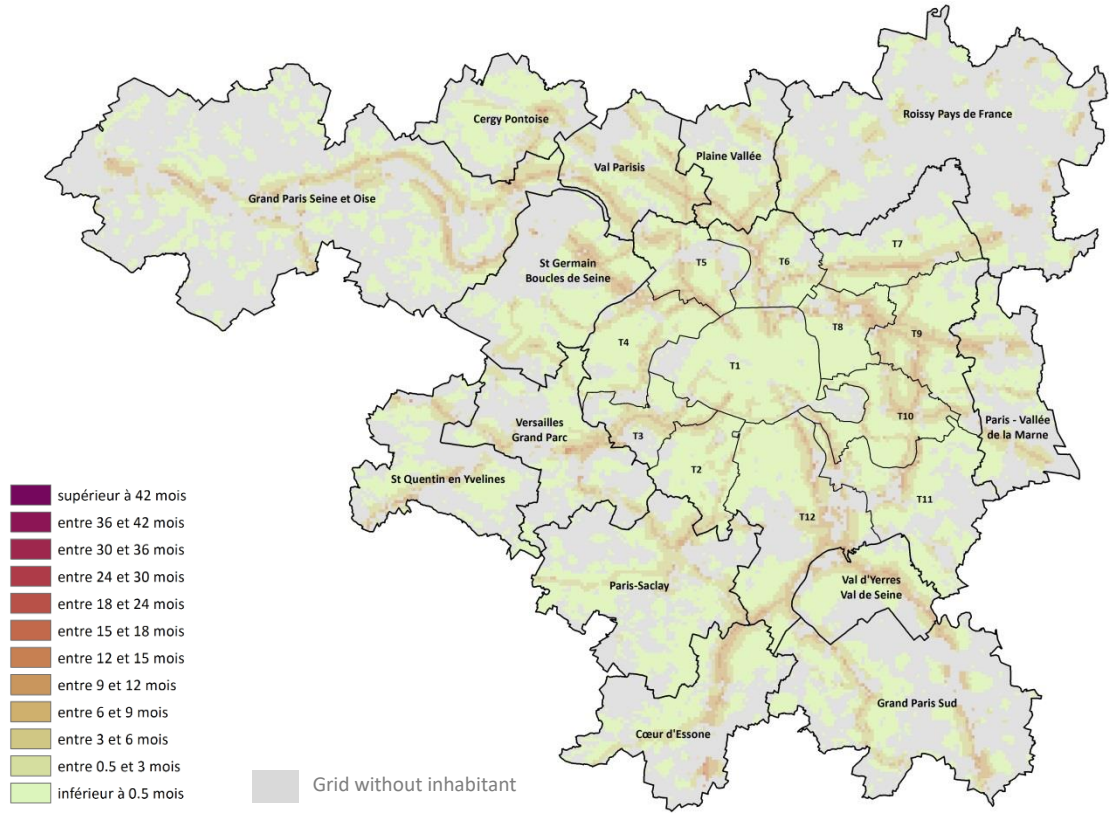
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



RAIL TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

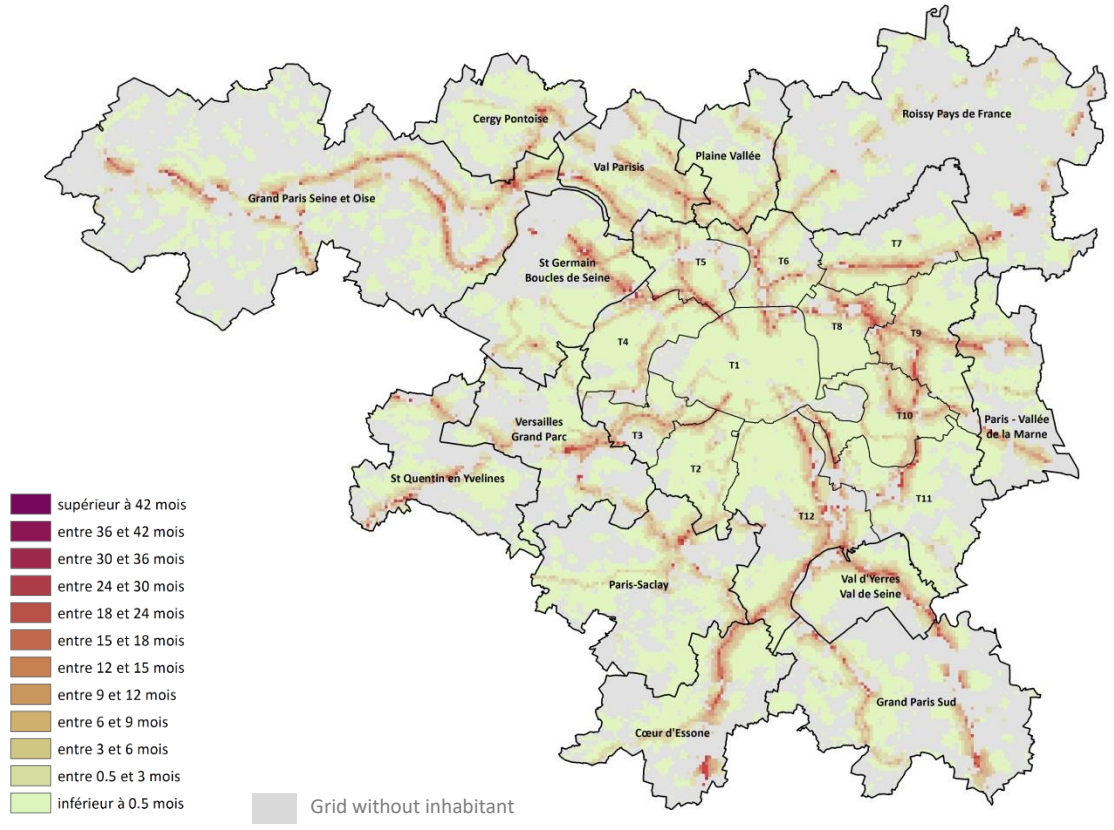
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER GRID OF 250 m

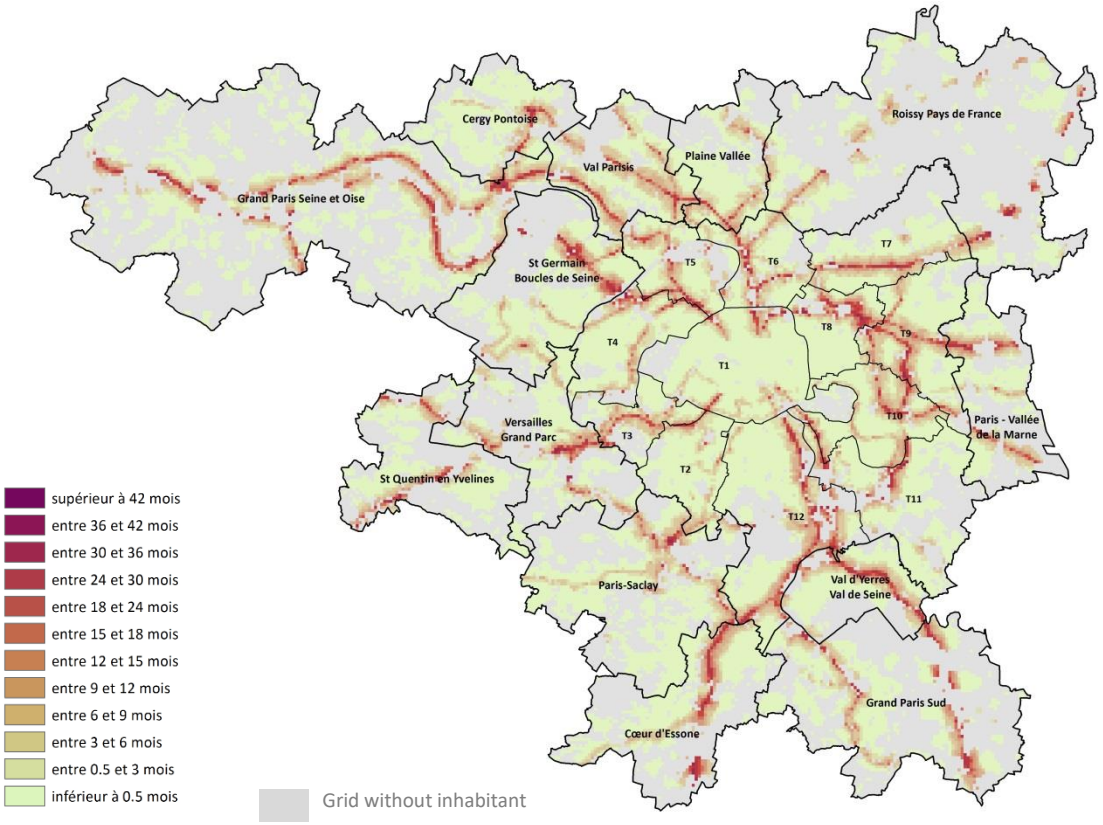
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



RAIL TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

INDIVIDUAL HEALTH RISKS PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



STATISTICS

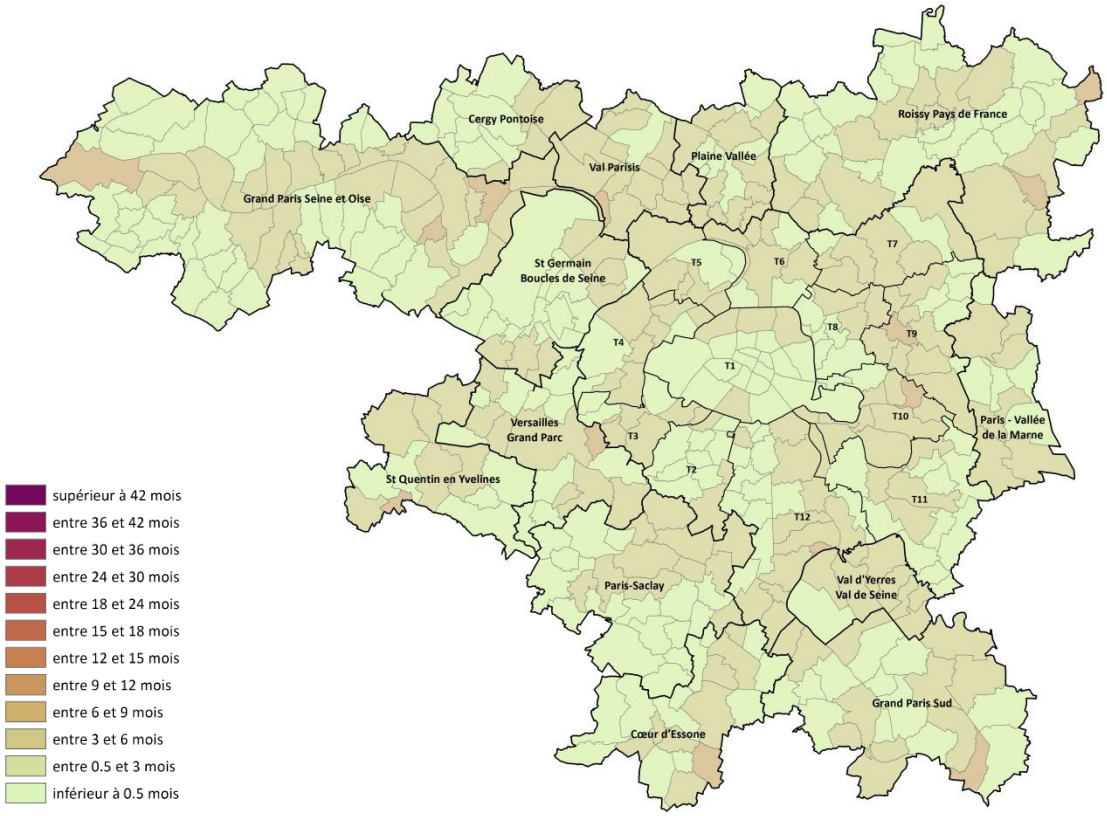
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

MOIS DE VIE EN BONNE SANTÉ PERDUE PAR INDIVIDU AU COURS D'UNE VIE ENTIÈRE	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**0,7**	**1,3**	**2,0**
T1 - Paris	*0,4*	*0,6*	*1,0*
T2 - Vallee Sud Grand Paris	*0,6*	*0,9*	*1,5*
T3 - Grand Paris Seine Ouest	*0,9*	*1,7*	*2,6*
T4 - Paris Ouest La Defense	*0,8*	*1,4*	*2,2*
T5 - Boucle Nord de Seine	*1,1*	*2,1*	*3,2*
T6 - Plaine Commune	*0,9*	*1,6*	*2,5*
T7 - Paris Terres d'envol	*0,9*	*1,5*	*2,4*
T8 - Est Ensemble	*0,8*	*1,5*	*2,2*
T9 - Grand Paris Grand Est	*1,2*	*2,4*	*3,6*
T10 - Paris Est Marne & Bois	*1,0*	*1,8*	*2,8*
T11 - Grand Paris Sud Est Avenir	*0,7*	*1,3*	*1,9*
T12 - Grand-Orly Seine Bievre	*0,9*	*1,7*	*2,6*
Cergy Pontoise	**0,6**	**1,1**	**1,7**
Coeur d'Essonne Agglomeration	**1,2**	**2,3**	**3,4**
Communaute Paris-Saclay	**0,8**	**1,3**	**2,1**
Grand Paris Seine & Oise	**1,4**	**2,6**	**3,9**
Grand Paris Sud	**0,9**	**1,7**	**2,6**
Paris Vallee de la Marne	**1,1**	**2,0**	**3,1**
Plaine Vallee	**1,1**	**1,9**	**3,0**
Roissy Pays de France	**0,8**	**1,3**	**2,1**
Saint Germain Boucles de Seine	**0,9**	**1,7**	**2,7**
Saint-Quentin-en-Yvelines	**0,9**	**1,7**	**2,5**
Val d'Yerres Val de Seine	**1,2**	**2,2**	**3,4**
Val Parisis	**1,4**	**2,6**	**4,0**
Versailles Grand Parc	**1,1**	**2,1**	**3,1**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**0,8**	**1,5**	**2,3**

RAIL TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

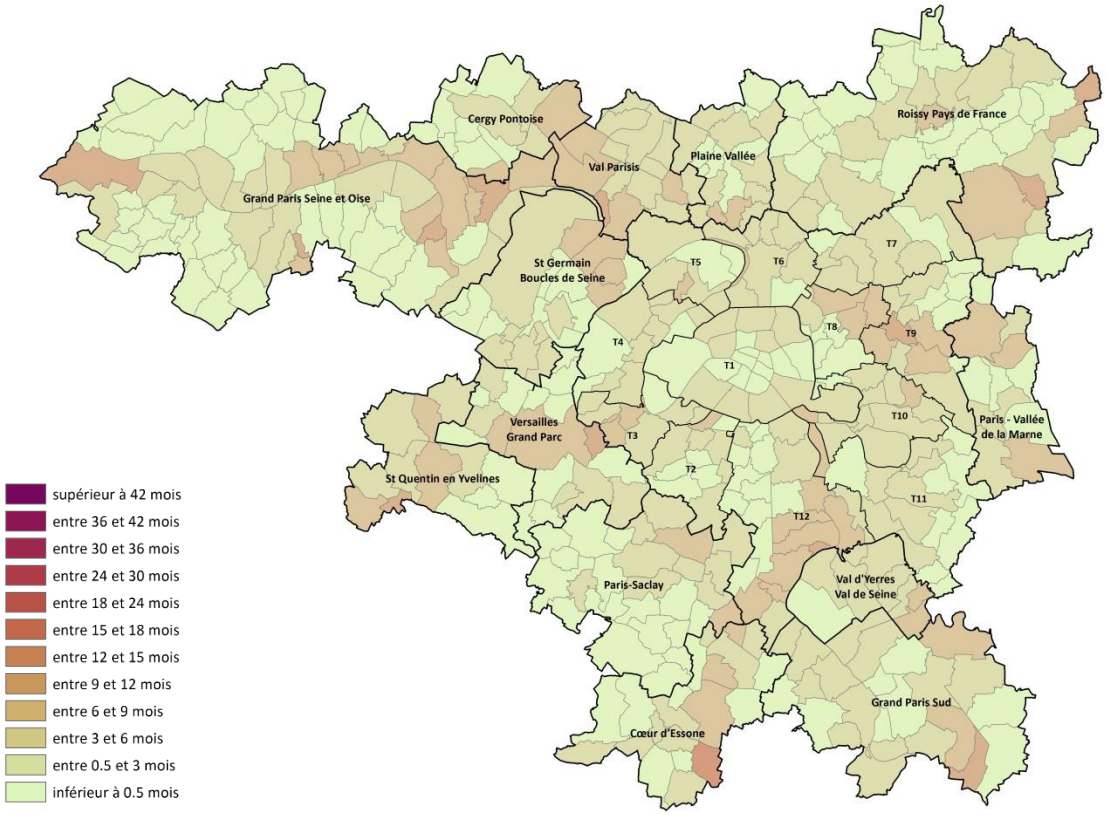
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

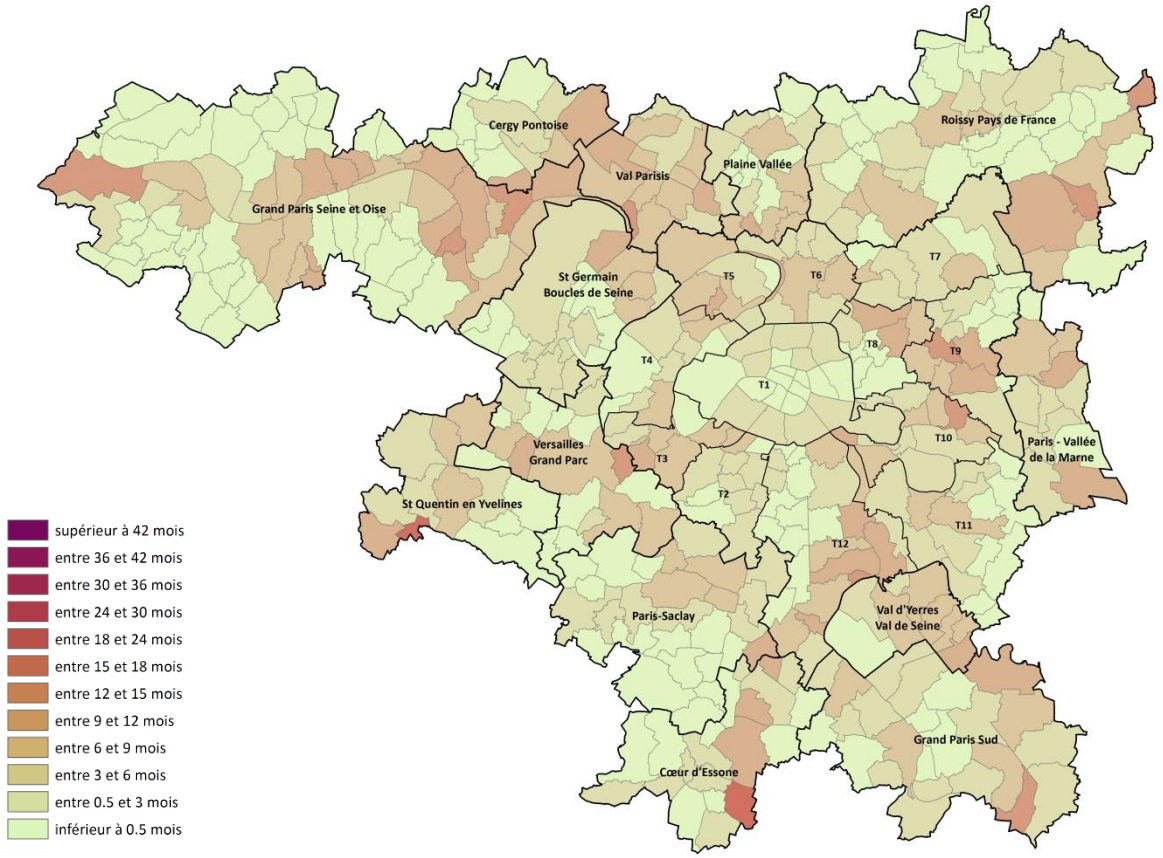
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



RAIL TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

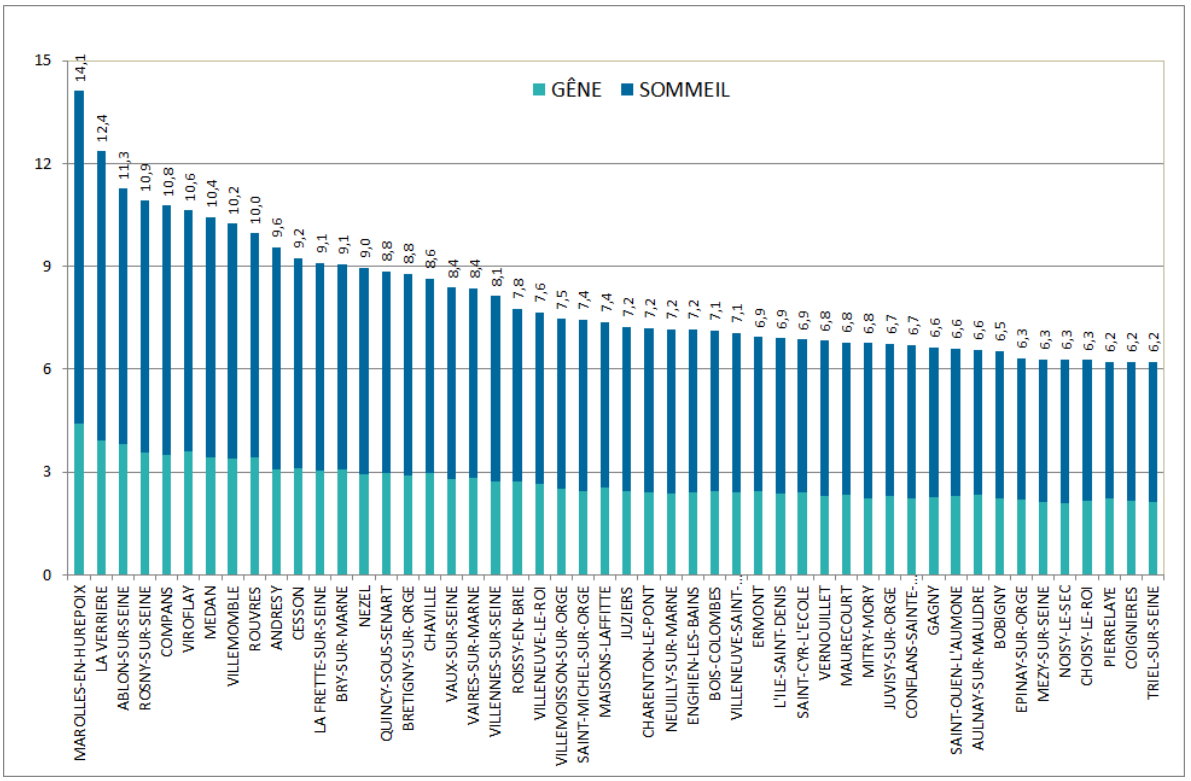
INDIVIDUAL HEALTH RISKS PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



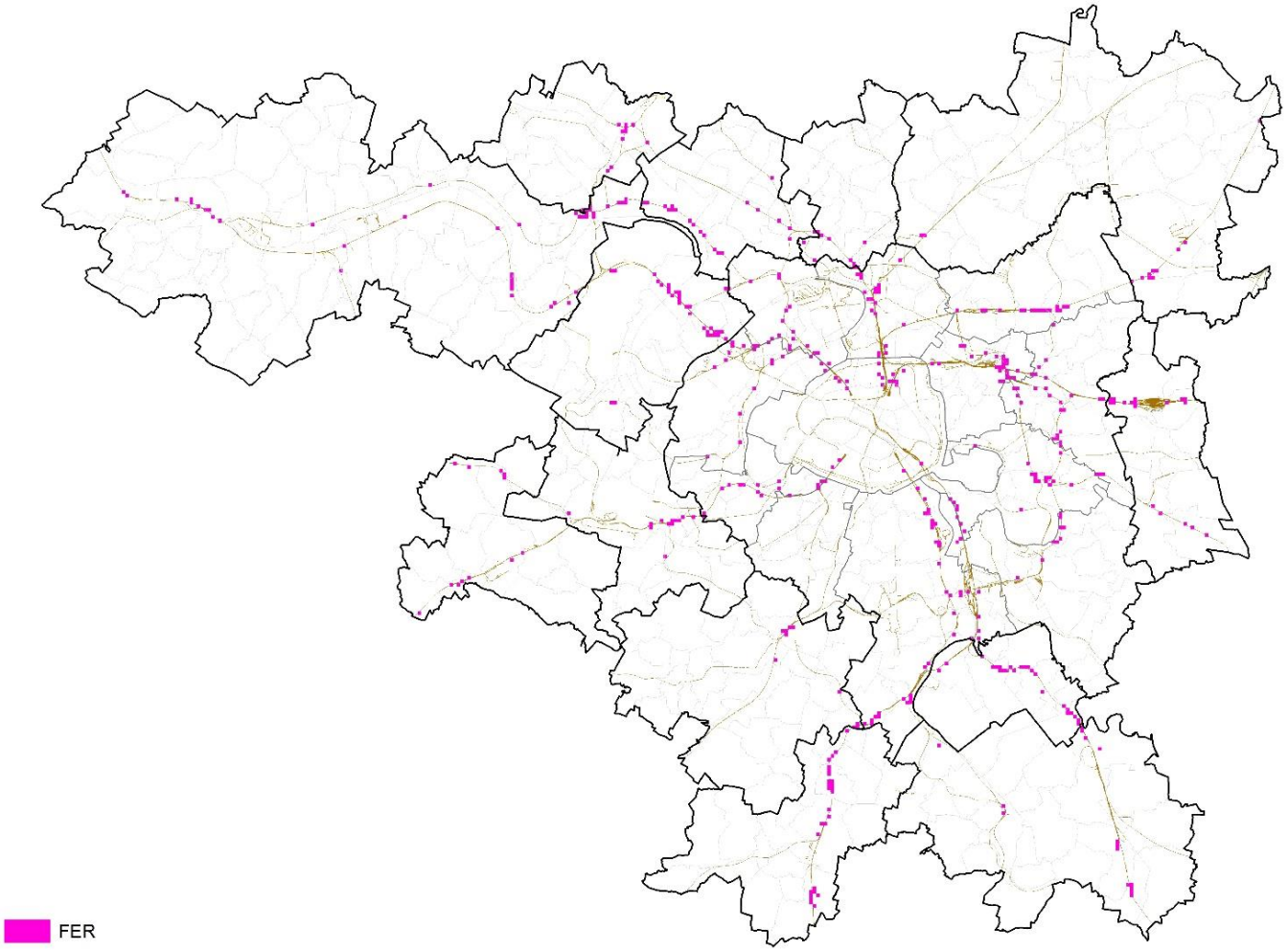
THE 50 COMMUNES WITH THE HIGHEST VALUES

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



RAIL TRAFFIC NOISE – THE 500 PRIORITY GRIDS

HIGHEST VALUES FOR COMBINED RISKS (COLLECTIVE AND INDIVIDUAL)



RAIL TRAFFIC NOISE – IN BRIEF

Rail noise affects a non-negligible proportion of inhabitants within the densely populated zone of Ile-de-France. However, far fewer inhabitants are exposed to this source than to road noise. 16% of inhabitants (1.6 million people) are exposed to levels that exceed 54 dB(A) using the Lden indicator, which is the World Health Organisation's threshold value to avoid consequences on health due to rail noise.

Approximately 51,000 people (0.5% of the population) are exposed to noise levels that exceed one of the regulatory limit values using the Lden indicator (73 dB(A) for conventional lines and 68 dB(A) for high-speed rail lines).

Rail noise falls at night along passenger transport lines but can remain a high along certain freight lines. Approximately 82,600 people (2.8% of the population) are exposed to noise levels that exceed one of the regulatory limit values using the Ln indicator (65 dB(A) for conventional lines and 62 dB(A) for high-speed rail lines), which is more than for the Lden indicator.

The majority of people exposed to rail noise live in the Grand Paris Métropole, with around 62% of people exposed to noise levels that exceed regulatory limit values. The territories most affected by noise pollution from railways are (in descending order): T5 (Boucle Nord de Seine), T9 (Grand Paris Grand Est), T10 (Paris Est Marne et Bois), T12 (Grand Orly Seine Bièvre), T4 (Paris Ouest La Défense), T6 (Plaine Commune), and T3 (Grand Paris Seine Ouest). It is worth noting that more people are affected by noise levels exceeding limit values at night.

Outside the Grand Paris Métropole, it is the Grand Paris Seine et Oise urban community that has the highest proportions of people exposed to noise levels exceeding limit values using Lden (1.1%) and Ln (1.8%), followed by the agglomeration communities of Versailles Grand Parc (1.1% and 1.6% respectively) and Plaine Vallée (1.1% and 1.5%).

In terms of the health impact, rail noise is responsible for 23,440 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, distributed between the DALYs lost due to annoyance (8,352 DALYs or 36% of the total) and the DALYs lost due to sleep disturbance (15,088 DALYs, or 64% of the total).

63% of these health impacts come from the Grand Paris Métropole, with 13,809 DALY.

The communes that have the highest level of disability-adjusted life-years lost due to rail noise are the 18th district of Paris, Saint-Denis, and Versailles.

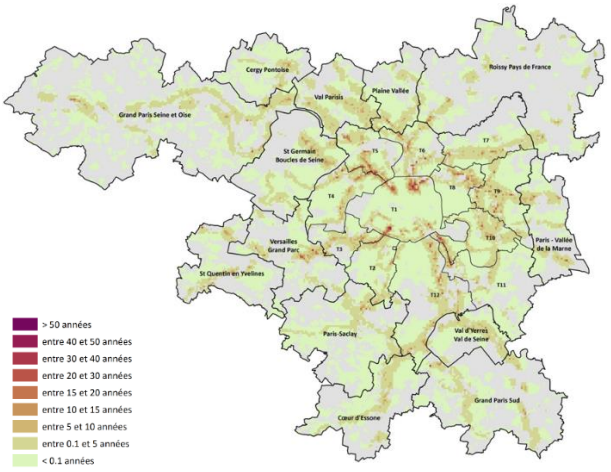
At an individual level, the evaluations show an average statistical value of 2.3 healthy life-months lost by individual due to rail noise during a lifetime, within the densely populated zone of Ile-de-France. This value can reach as high as 12 months in communes where the average individual risk is highest (Marolles-en-Hurepoix, La Verrière) and up to 24 months within the grids most exposed to noise pollution from rail infrastructure (cf. maps of individual health risks, next page).

Regarding rail noise, the priority grids highlight high levels of noise pollution generated by the dense rail network (in particular the Transilien network, and RER lines C, D, and E) over the whole region, as well as within the Paris city limits, up to the main stations. The priority grids are distributed fairly evenly along all overland rail lines when they cross highly urbanised areas.

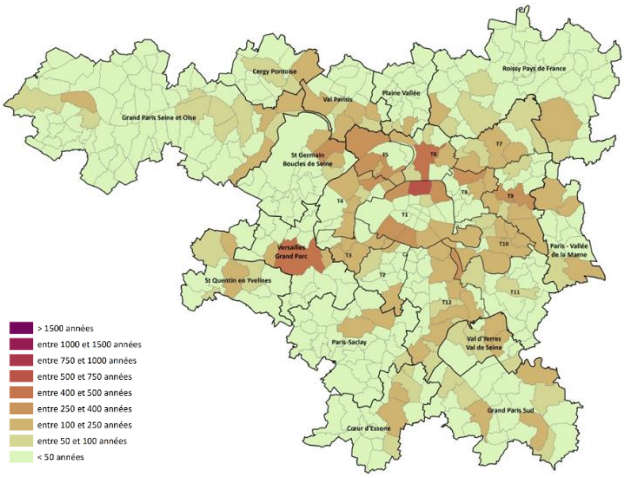
RAIL TRAFFIC NOISE – COLLECTIVE HEALTH IMPACT

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

PER GRID OF 250 m



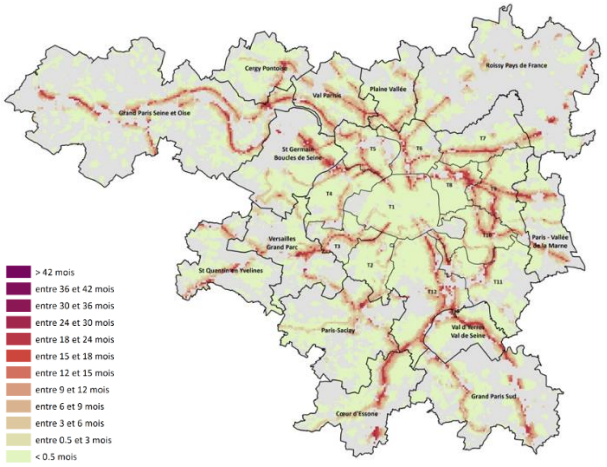
PER COMMUNE LEVEL



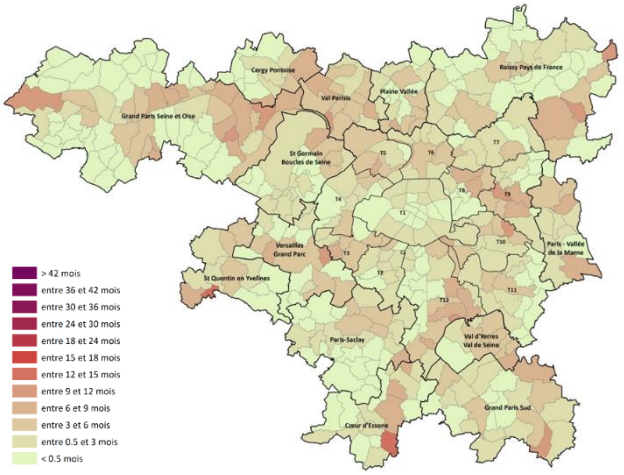
RAIL TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

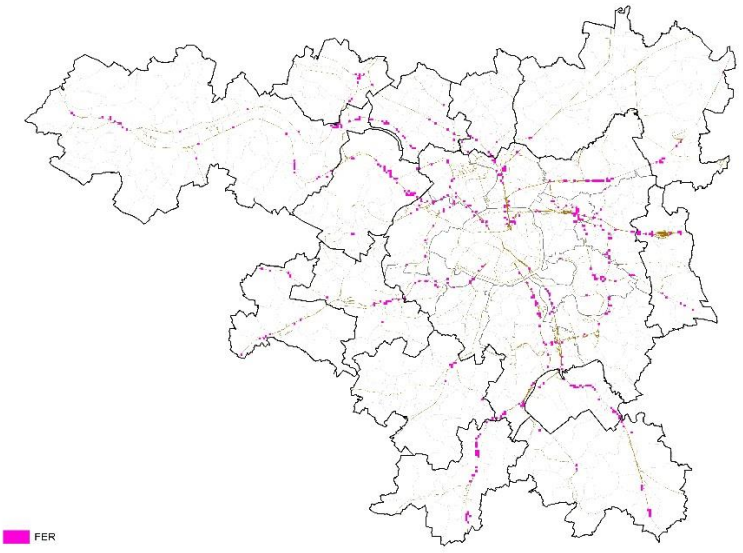
PER GRID OF 250 m



PER COMMUNE LEVEL



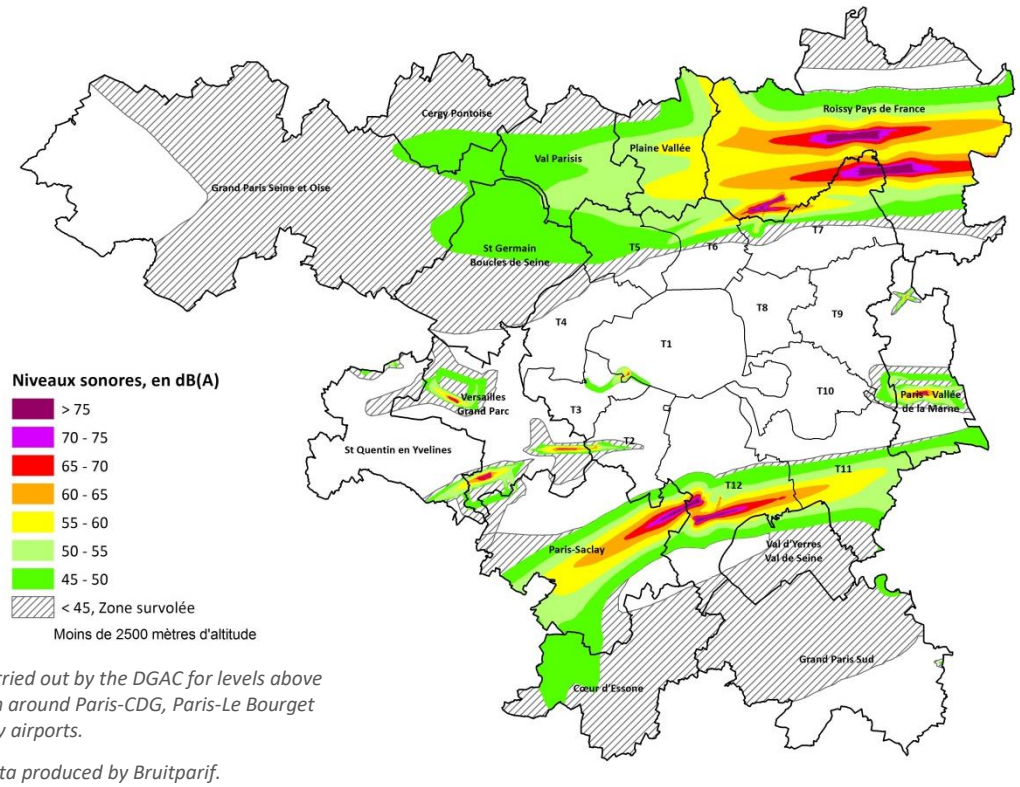
THE 500 PRIORITY GRIDS



PART 3
AIR TRAFFIC NOISE

AIR TRAFFIC NOISE - NOISE LEVELS

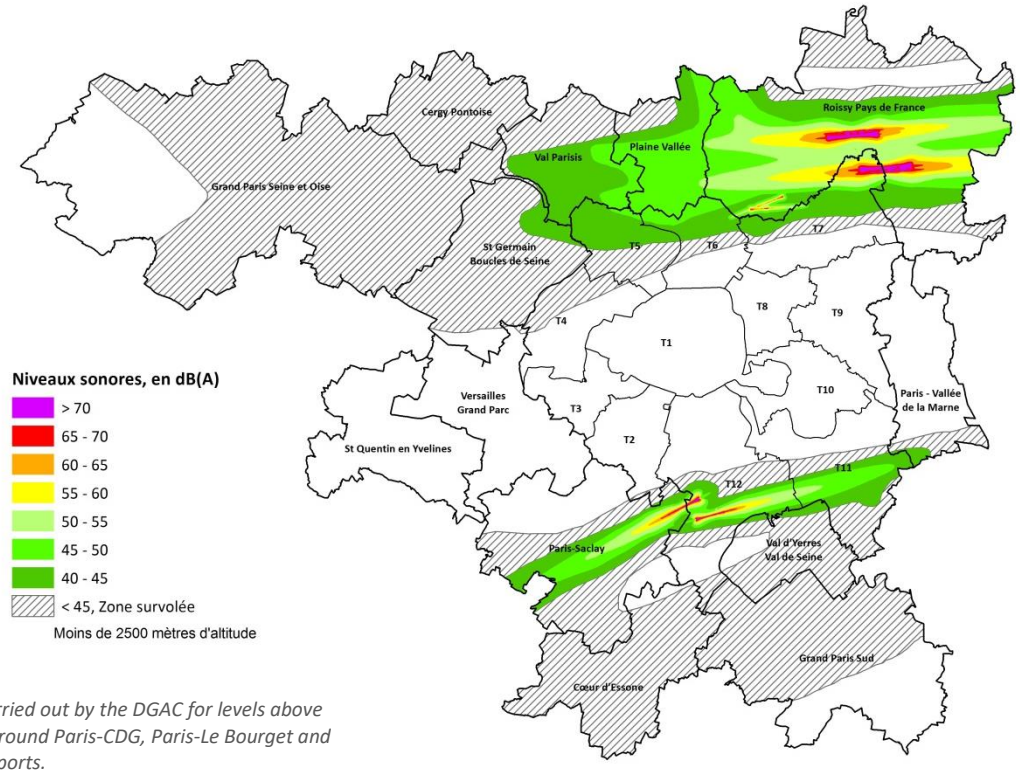
INDICATOR LDEN



Modelling carried out by the DGAC for levels above 55 dB(A) Lden around Paris-CDG, Paris-Le Bourget and Paris-Orly airports.

Additional data produced by Bruitparif.

INDICATOR LN



Modelling carried out by the DGAC for levels above 50 dB(A) Ln around Paris-CDG, Paris-Le Bourget and Paris-Orly airports.

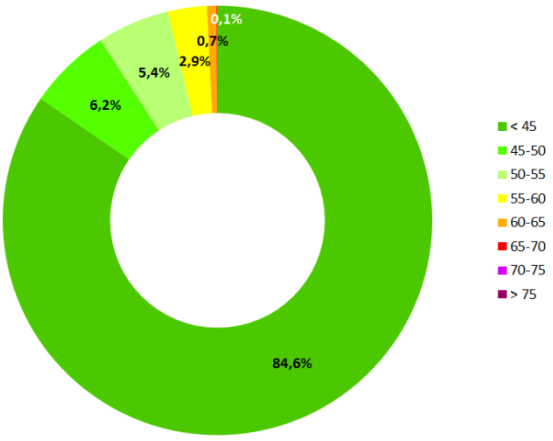
Additional data produced by Bruitparif.

AIR TRAFFIC NOISE - STATISTICS BY RANGE OF NOISE LEVELS

INDICATOR LDEN

	Nombre d'habitants (à la centaine près)	%
> 75	-	0,0%
70-75	200	0,0%
65-70	8 100	0,1%
60-65	71 200	0,7%
55-60	295 800	2,9%
50-55	550 400	5,4%
45-50	628 900	6,2%
< 45	8 549 600	84,6%

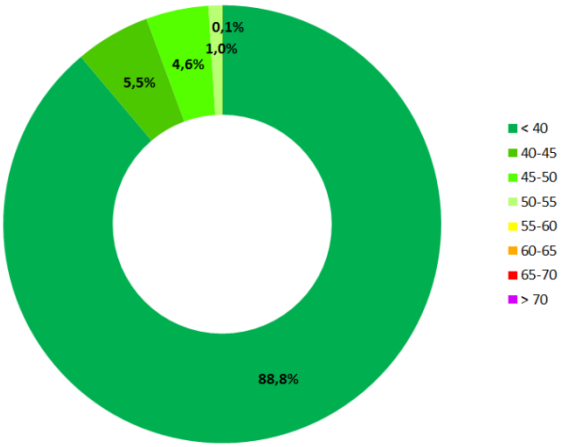
POPULATION



INDICATOR LN

	Nombre d'habitants (à la centaine près)	%
> 70	-	0,0%
65-70	-	0,0%
60-65	100	0,0%
55-60	6 100	0,1%
50-55	96 200	1,0%
45-50	466 000	4,6%
40-45	559 200	5,5%
< 40	8 976 700	88,8%

POPULATION



AIR TRAFFIC NOISE - STATISTICS PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN — POPULATION

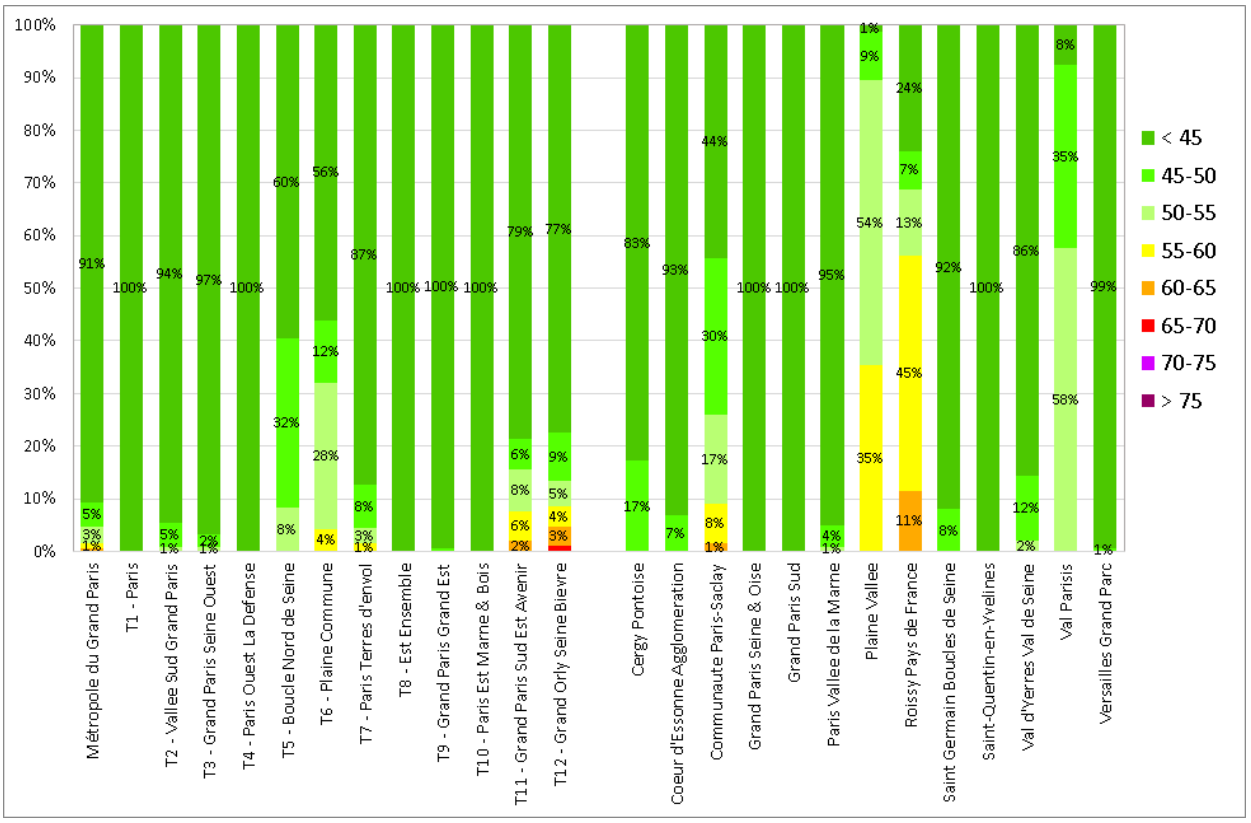
Nombre d'habitants (à la centaine près)	< 45	45-50	50-55	55-60	60-65	65-70	70-75	> 75
Métropole du Grand Paris	**6 144 800**	**313 100**	**217 100**	**63 800**	**29 800**	**7 300**	**200**	-
T1 - Paris	*2 186 300*	*2 000*	*1 000*	-	-	-	-	-
T2 - Vallee Sud Grand Paris	*360 700*	*17 600*	*3 200*	*200*	-	-	-	-
T3 - Grand Paris Seine Ouest	*288 400*	*7 000*	*2 400*	*100*	-	-	-	-
T4 - Paris Ouest La Defense	*551 400*	-	-	-	-	-	-	-
T5 - Boucle Nord de Seine	*248 700*	*134 300*	*34 500*	-	-	-	-	-
T6 - Plaine Commune	*221 700*	*46 900*	*109 700*	*16 700*	*300*	-	-	-
T7 - Paris Terres d'envol	*297 100*	*27 400*	*10 300*	*4 800*	*300*	-	-	-
T8 - Est Ensemble	*390 300*	-	-	-	-	-	-	-
T9 - Grand Paris Grand Est	*367 300*	*1 800*	-	-	-	-	-	-
T10 - Paris Est Marne & Bois	*492 600*	-	-	-	-	-	-	-
T11 - Grand Paris Sud Est Avenir	*234 100*	*17 300*	*23 500*	*16 600*	*6 300*	-	-	-
T12 - Grand-Orly Seine Bievre	*506 100*	*58 800*	*32 500*	*25 300*	*22 900*	*7 300*	*200*	-
Cergy Pontoise	**162 500**	**33 800**	-	-	-	-	-	-
Coeur d'Essonne Agglomeration	**171 700**	**12 800**	-	-	-	-	-	-
Communaute Paris-Saclay	**126 200**	**85 000**	**48 500**	**21 700**	**3 600**	**600**	-	-
Grand Paris Seine & Oise	**391 100**	-	-	-	-	-	-	-
Grand Paris Sud	**317 000**	**300**	-	-	-	-	-	-
Paris Vallee de la Marne	**206 800**	**9 100**	**1 800**	-	-	-	-	-
Plaine Vallee	**2 300**	**15 900**	**94 600**	**61 700**	-	-	-	-
Roissy Pays de France	**79 600**	**24 000**	**42 000**	**148 600**	**37 700**	**300**	-	-
Saint Germain Boucles de Seine	**302 900**	**26 300**	-	-	-	-	-	-
Saint-Quentin-en-Yvelines	**223 900**	-	-	-	-	-	-	-
Val d'Yerres Val de Seine	**142 500**	**20 600**	**3 300**	-	-	-	-	-
Val Parisis	**19 000**	**86 600**	**143 100**	-	-	-	-	-
Versailles Grand Parc	**259 400**	**1 400**	-	-	-	-	-	-

INDICATOR LN — POPULATION

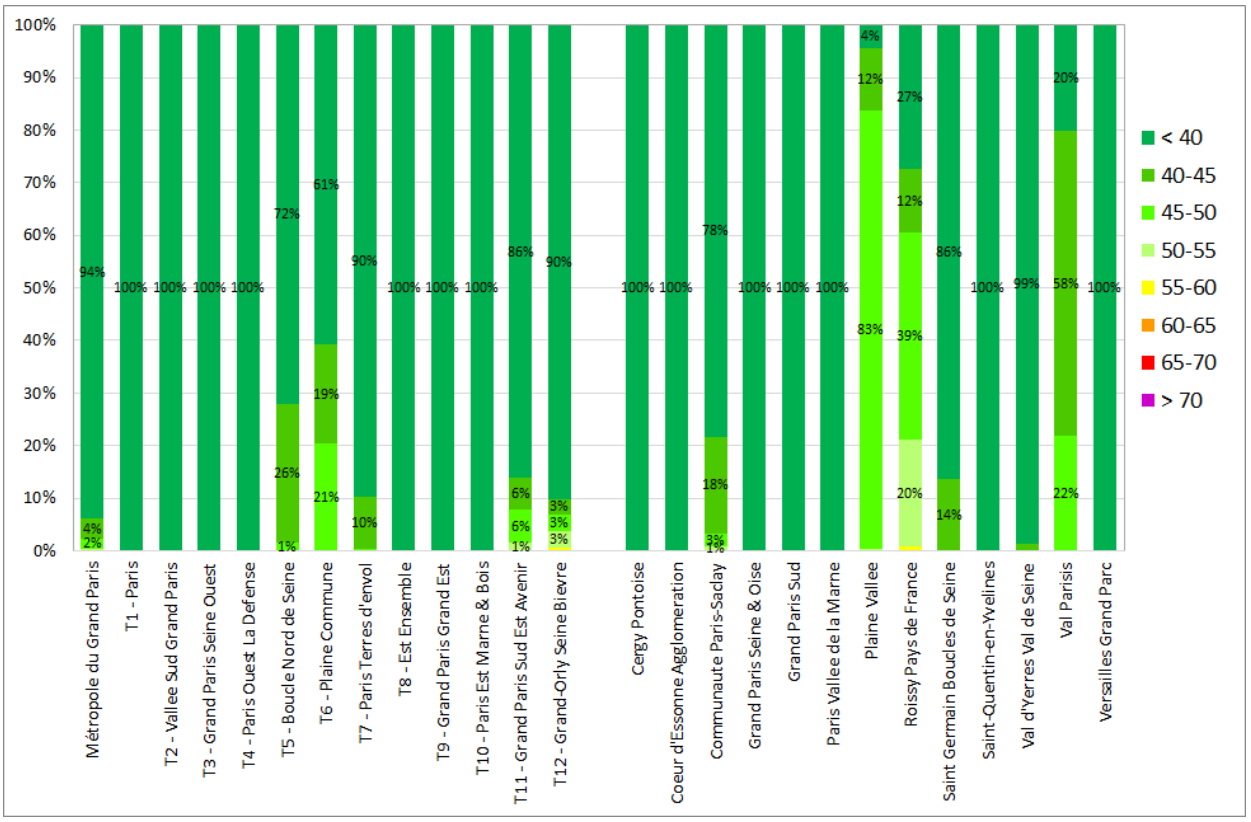
Nombre d'habitants (à la centaine près)	< 40	40-45	45-50	50-55	55-60	60-65	65-70	> 70
Métropole du Grand Paris	**6 364 200**	**254 700**	**127 900**	**25 500**	**3 600**	**100**	-	-
T1 - Paris	2 189 300	-	-	-	-	-	-	-
T2 - Vallee Sud Grand Paris	381 800	-	-	-	-	-	-	-
T3 - Grand Paris Seine Ouest	297 900	-	-	-	-	-	-	-
T4 - Paris Ouest La Defense	551 400	-	-	-	-	-	-	-
T5 - Boucle Nord de Seine	300 700	110 500	6 200	-	-	-	-	-
T6 - Plaine Commune	240 600	73 800	81 100	-	-	-	-	-
T7 - Paris Terres d'envol	305 000	34 000	400	400	-	-	-	-
T8 - Est Ensemble	390 300	-	-	-	-	-	-	-
T9 - Grand Paris Grand Est	369 100	-	-	-	-	-	-	-
T10 - Paris Est Marne & Bois	492 600	-	-	-	-	-	-	-
T11 - Grand Paris Sud Est Avenir	256 600	17 800	18 900	4 400	-	-	-	-
T12 - Grand-Orly Seine Bievre	588 800	18 600	21 200	20 700	3 600	100	-	-
Cergy Pontoise	**196 300**	-	-	-	-	-	-	-
Coeur d'Essonne Agglomeration	**184 500**	-	-	-	-	-	-	-
Communaute Paris-Saclay	**223 500**	**52 500**	**7 200**	**2 300**	**100**	-	-	-
Grand Paris Seine & Oise	**391 100**	-	-	-	-	-	-	-
Grand Paris Sud	**317 300**	-	-	-	-	-	-	-
Paris Vallee de la Marne	**217 800**	-	-	-	-	-	-	-
Plaine Vallee	**7 600**	**20 600**	**145 700**	**700**	-	-	-	-
Roissy Pays de France	**91 400**	**39 800**	**130 900**	**67 700**	**2 400**	-	-	-
Saint Germain Boucles de Seine	**284 400**	**44 800**	-	-	-	-	-	-
Saint-Quentin-en-Yvelines	**223 900**	-	-	-	-	-	-	-
Val d'Yerres Val de Seine	**164 100**	**2 300**	-	-	-	-	-	-
Val Parisis	**50 000**	**144 500**	**54 300**	-	-	-	-	-
Versailles Grand Parc	**260 700**	-	-	-	-	-	-	-

AIR TRAFFIC NOISE - STATISTICS PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN PERCENTAGE OF POPULATION

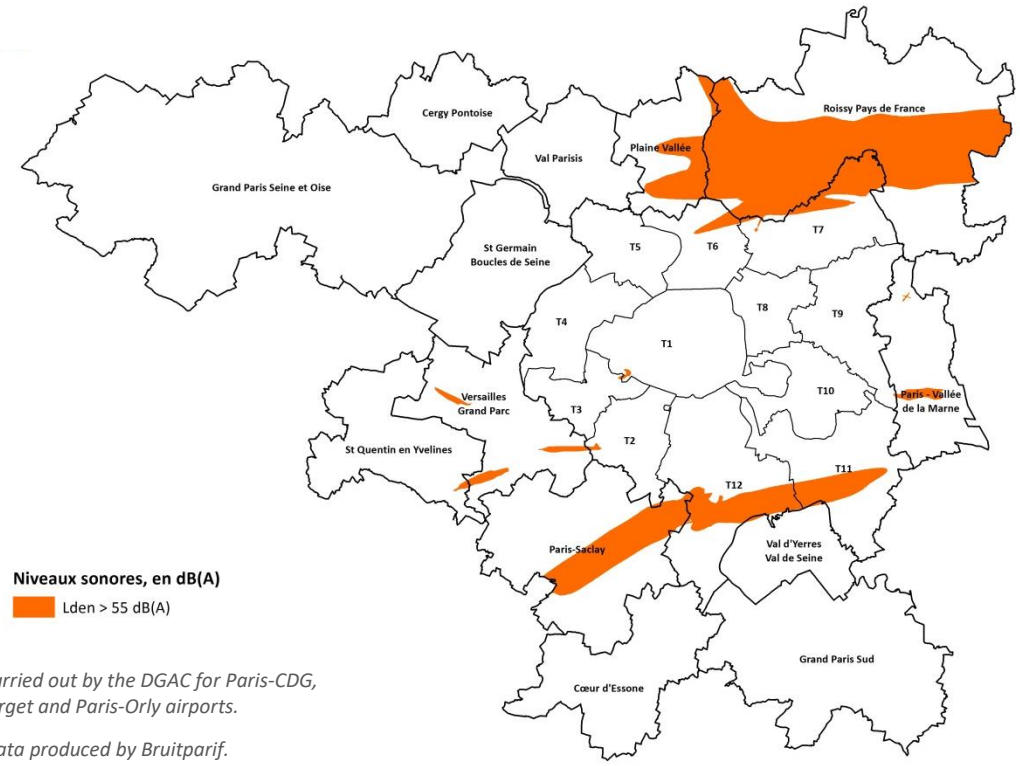


INDICATOR LN PERCENTAGE OF POPULATION



AIR TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 68 dB(A) AREAS OF EXCEEDANCE

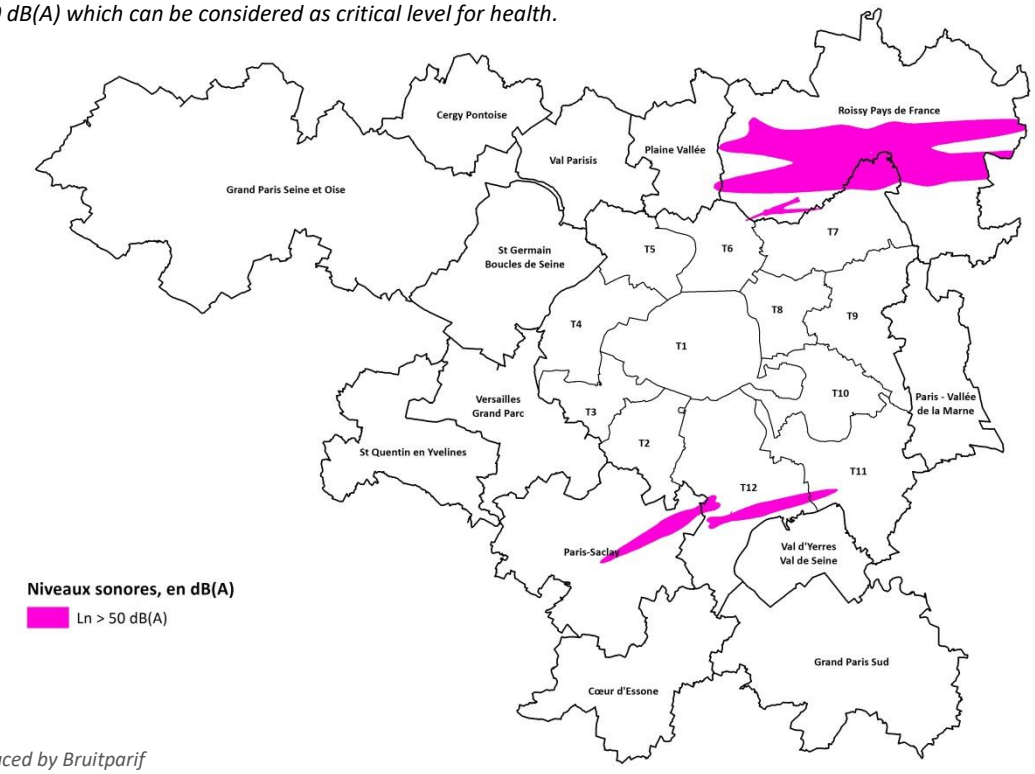


Modelling carried out by the DGAC for Paris-CDG, Paris-Le Bourget and Paris-Orly airports.

Additional data produced by Bruitparif.

INDICATOR LN* > 50 dB(A) AREAS OF EXCEEDANCE

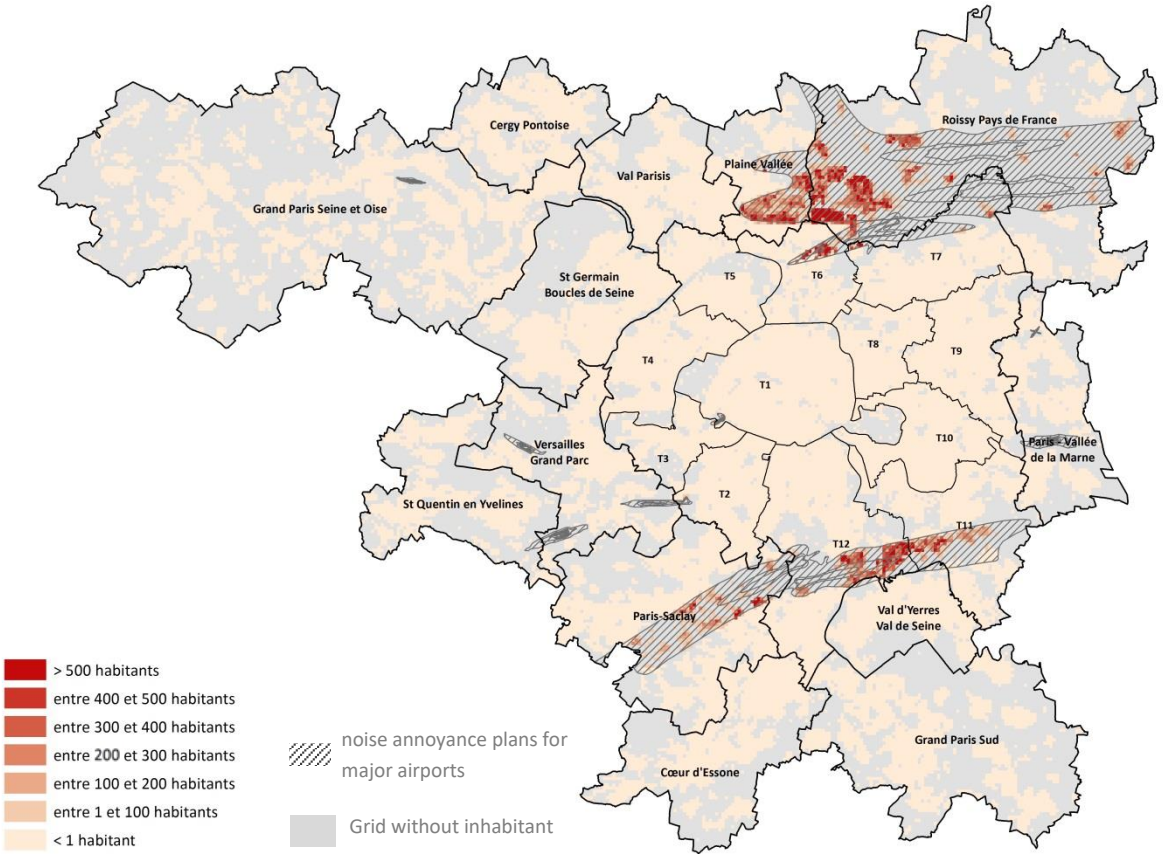
** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



Map produced by Bruitparif

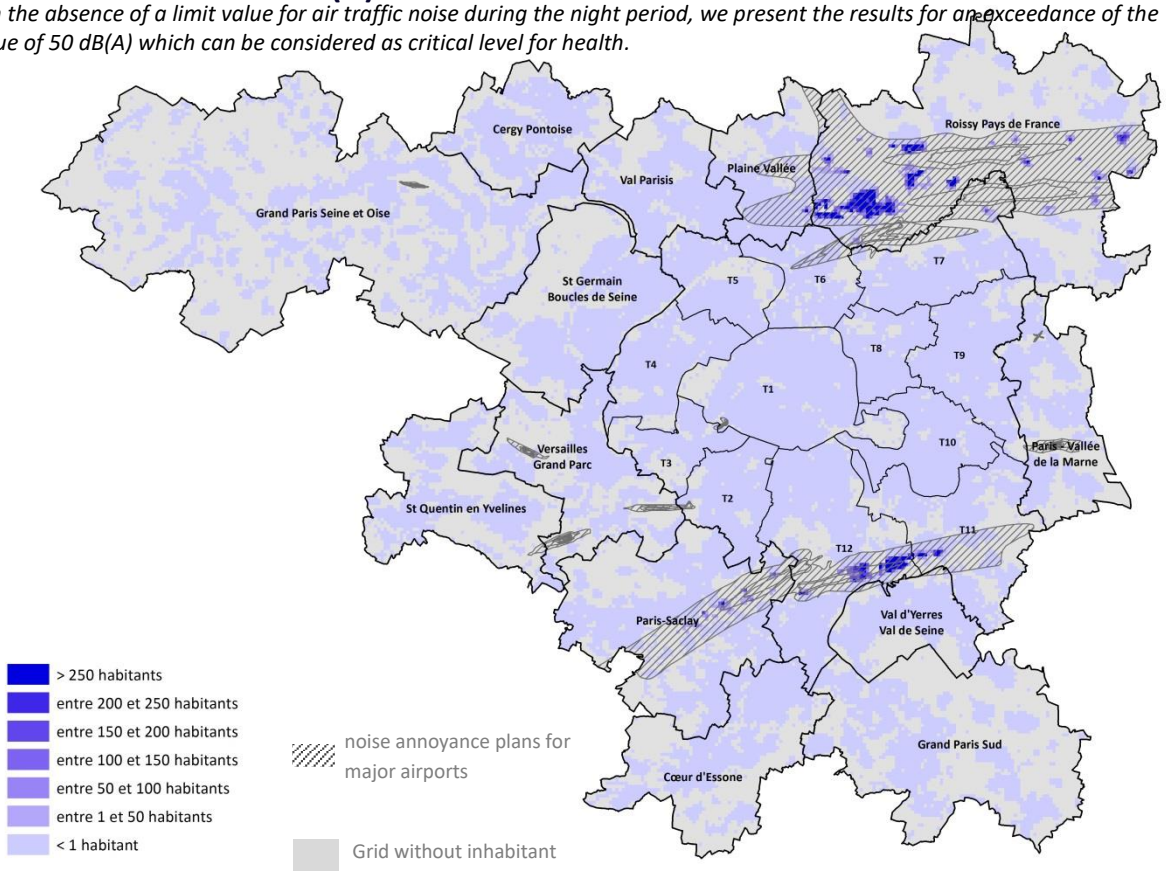
AIR TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 55 dB(A) POPULATION PER GRID OF 250 m



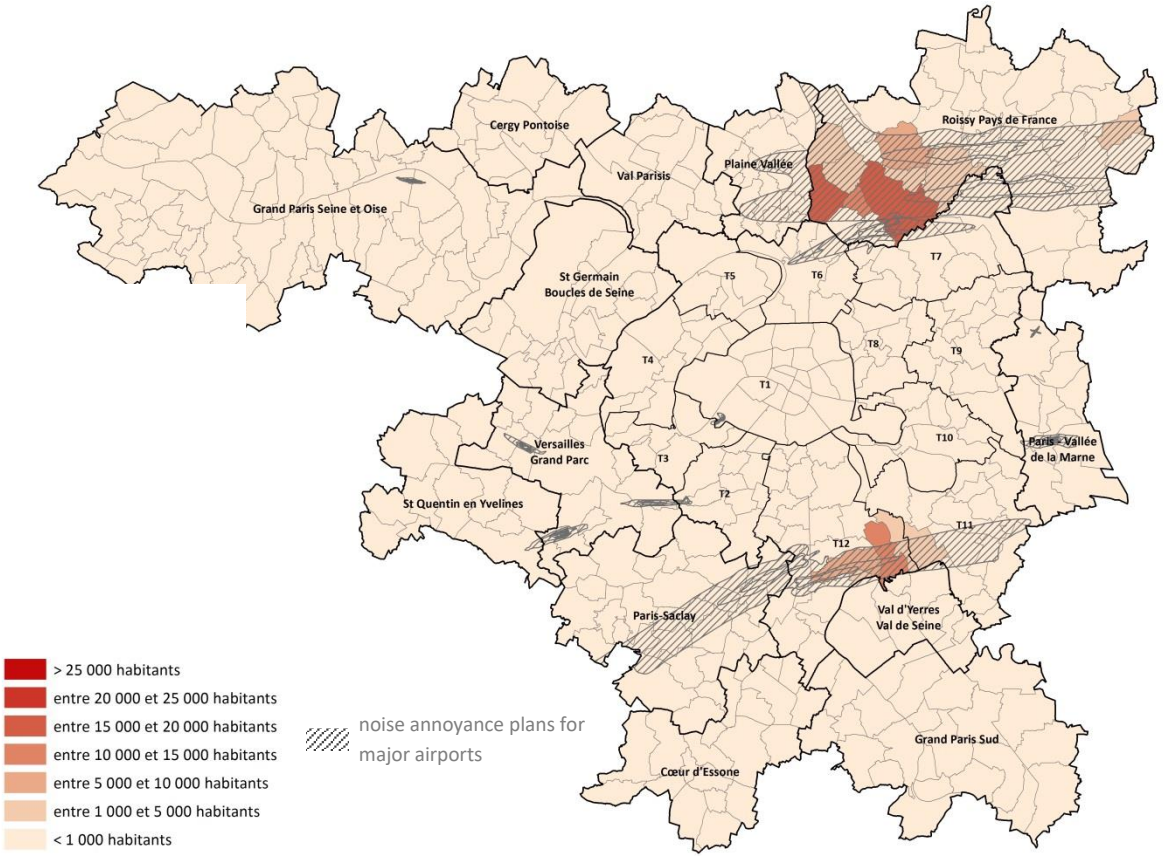
INDICATOR LN* > 50 dB(A) POPULATION PER GRID OF 250 m

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



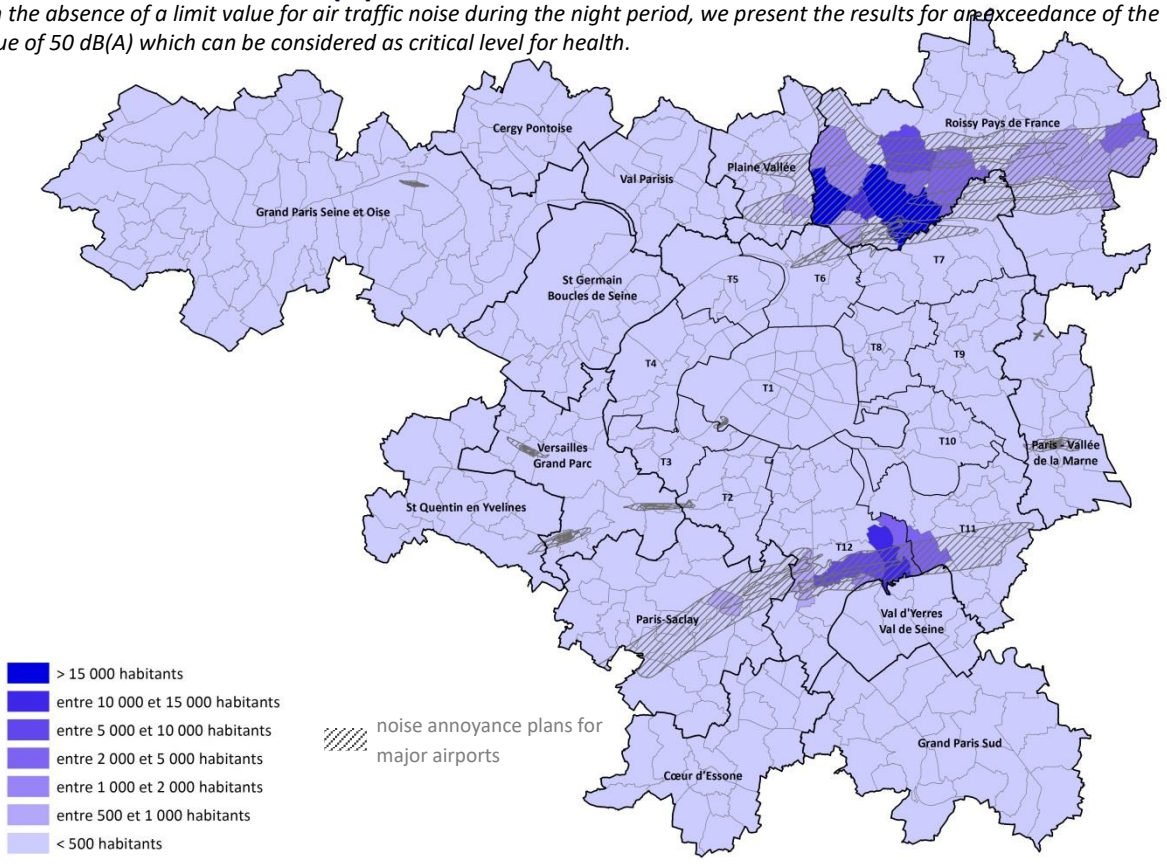
AIR TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 55 dB(A) POPULATION PER COMMUNE LEVEL



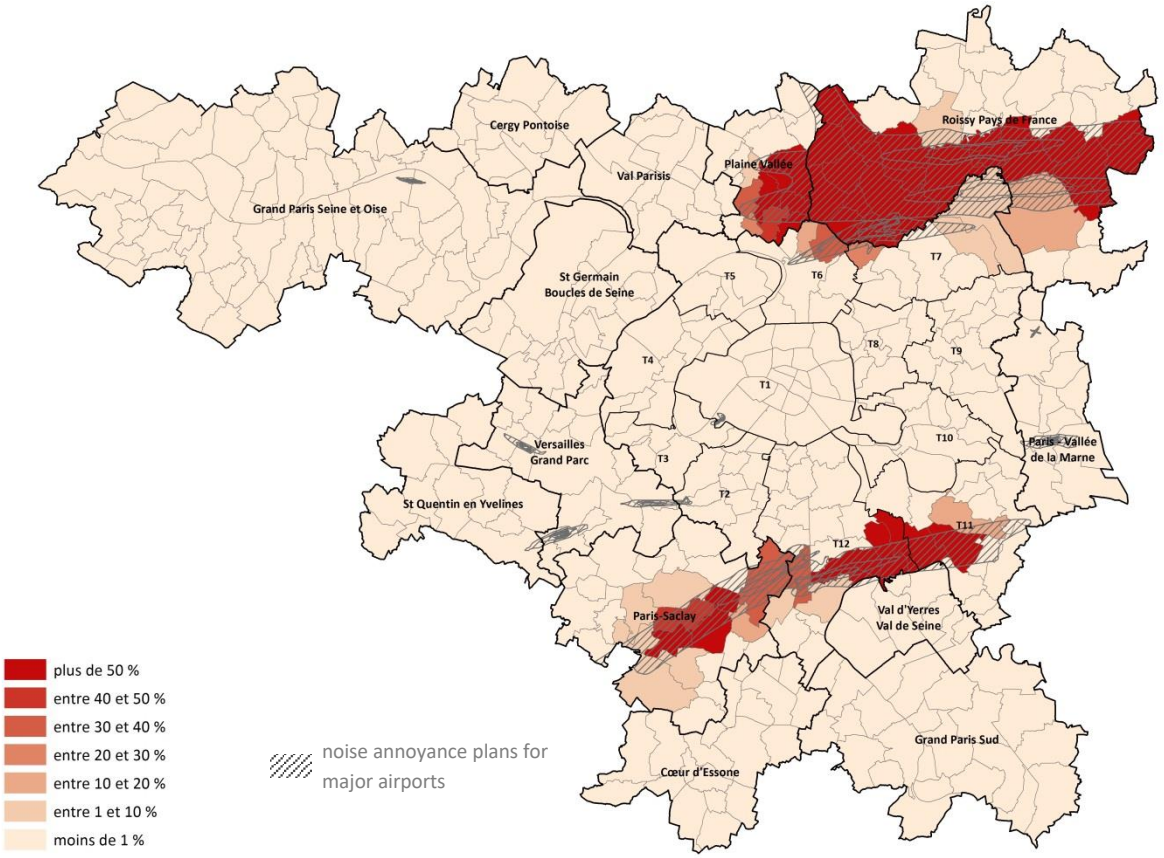
INDICATOR LN* > 50 dB(A) POPULATION PER COMMUNE LEVEL

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



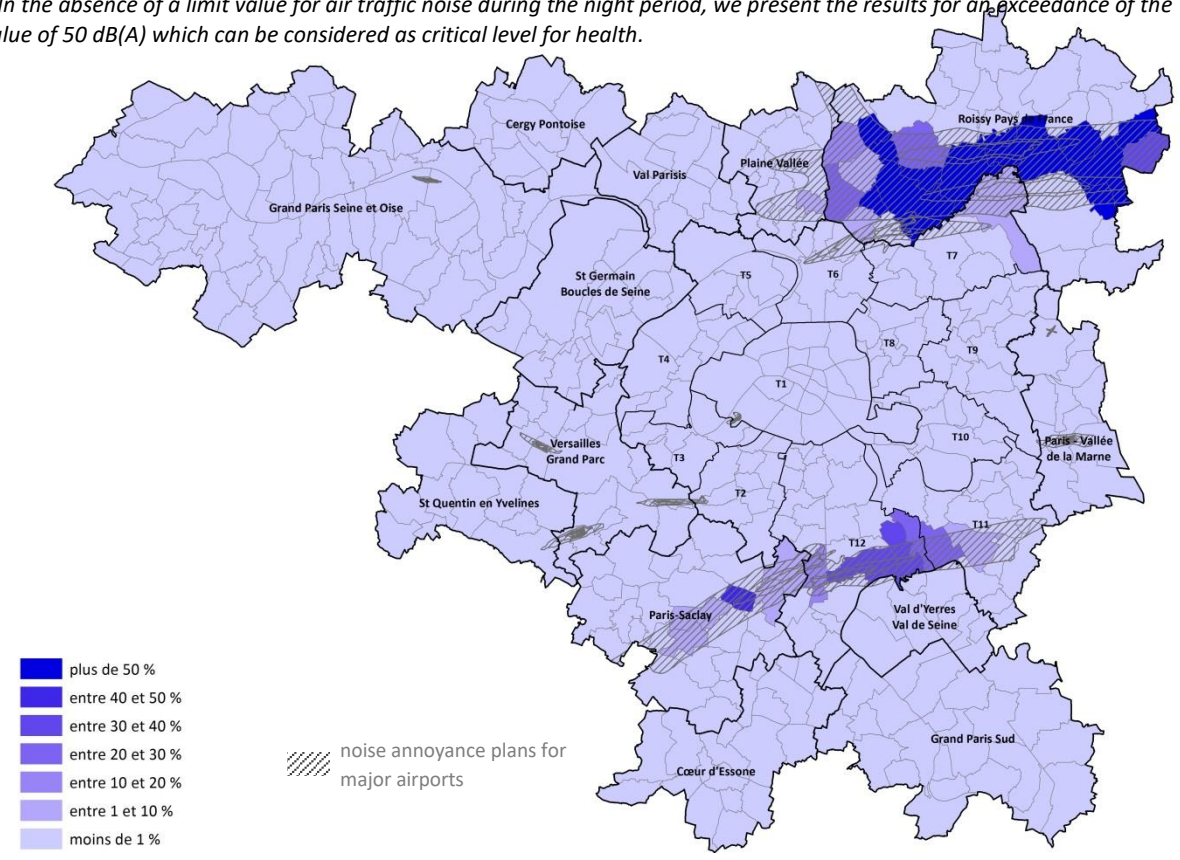
AIR TRAFFIC NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > 55 dB(A) IN PERCENTAGE PER COMMUNE LEVEL



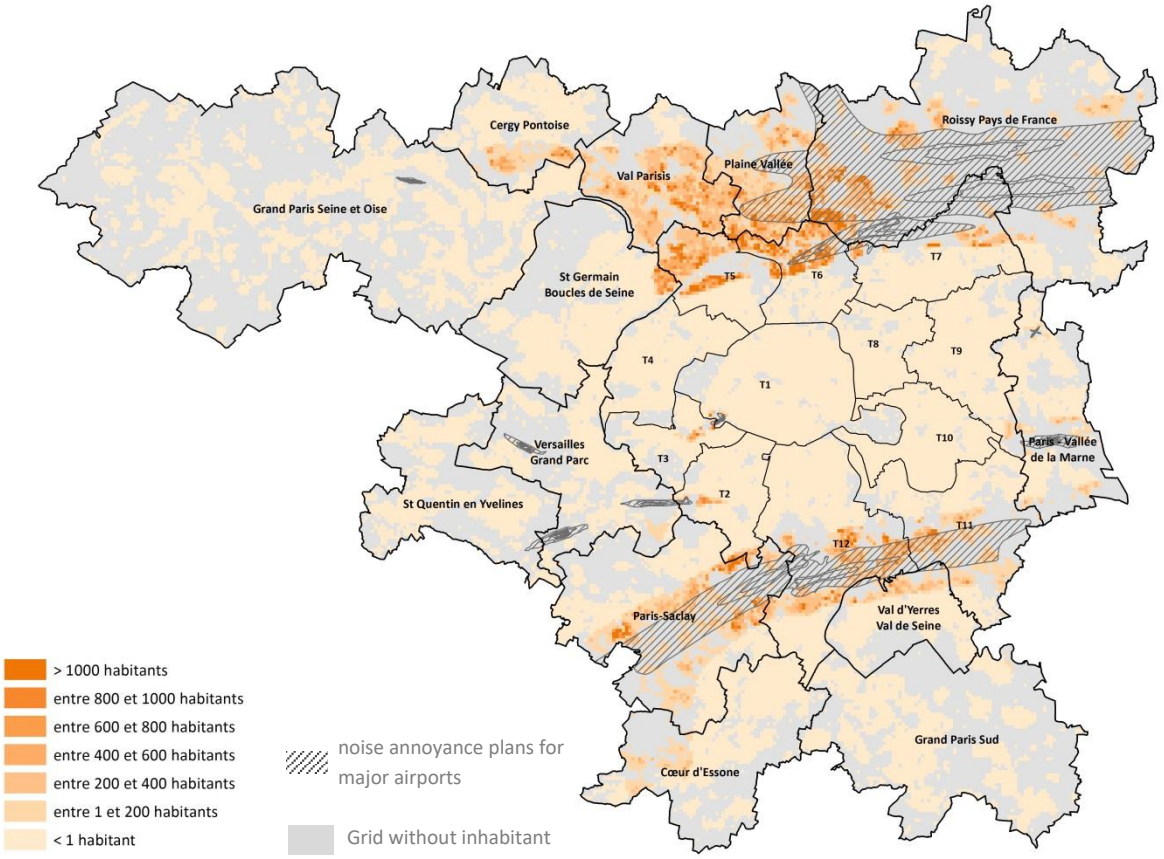
INDICATOR LN* > 50 dB(A) IN PERCENTAGE PER COMMUNE LEVEL

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*

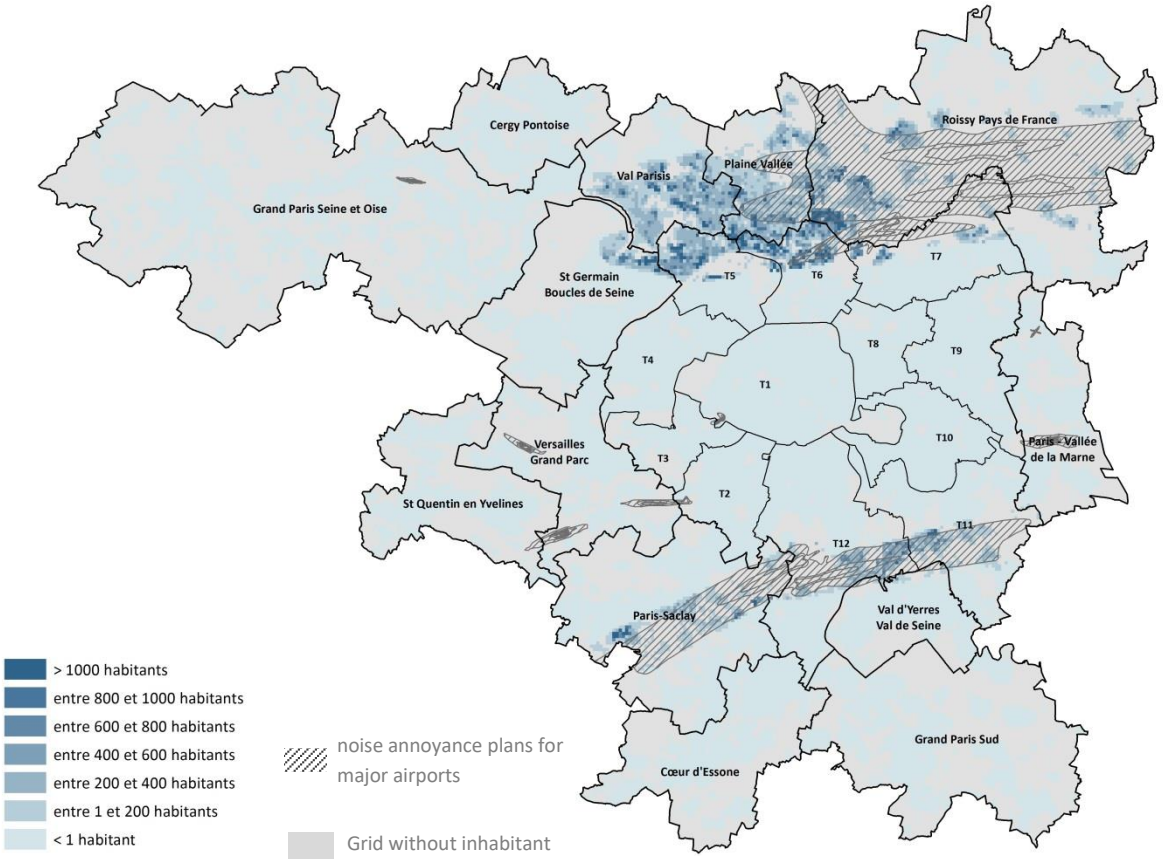


AIR TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 45 dB(A) POPULATION PER GRID OF 250 m

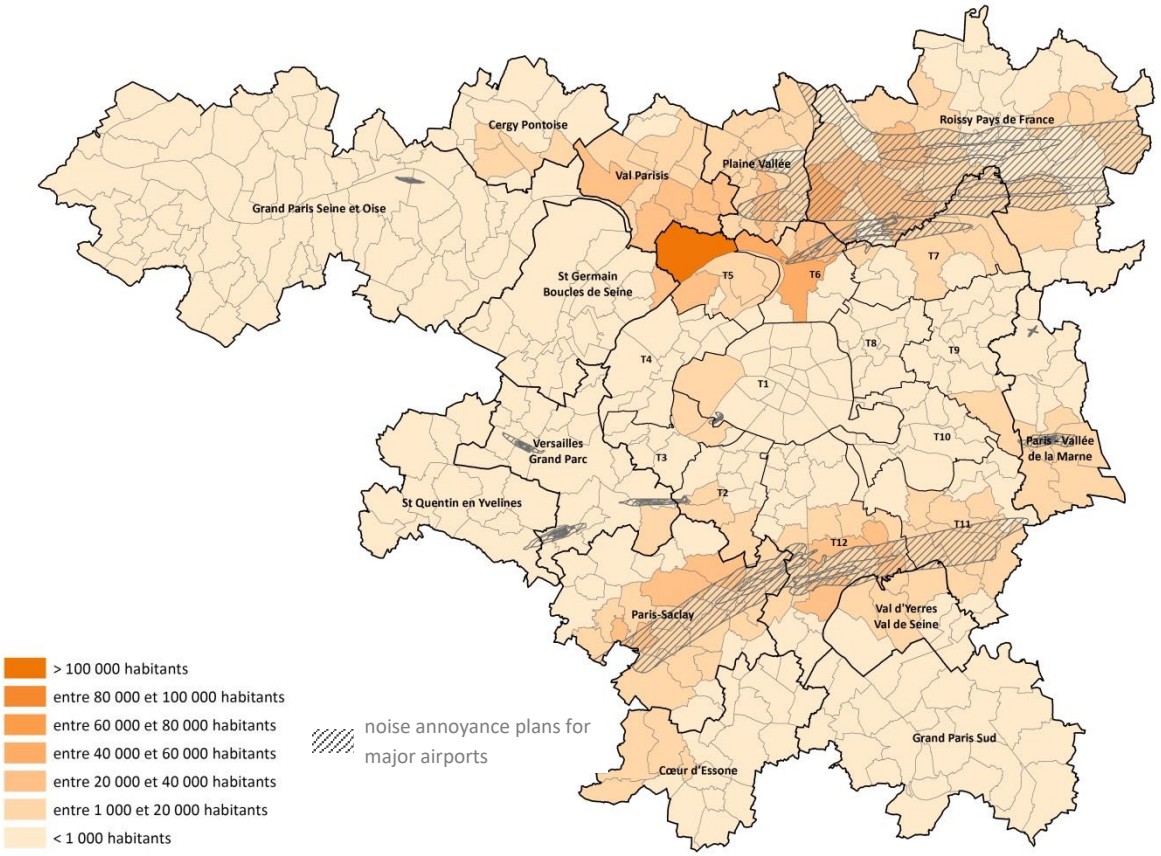


INDICATOR LN > 40 dB(A) POPULATION PER GRID OF 250 m

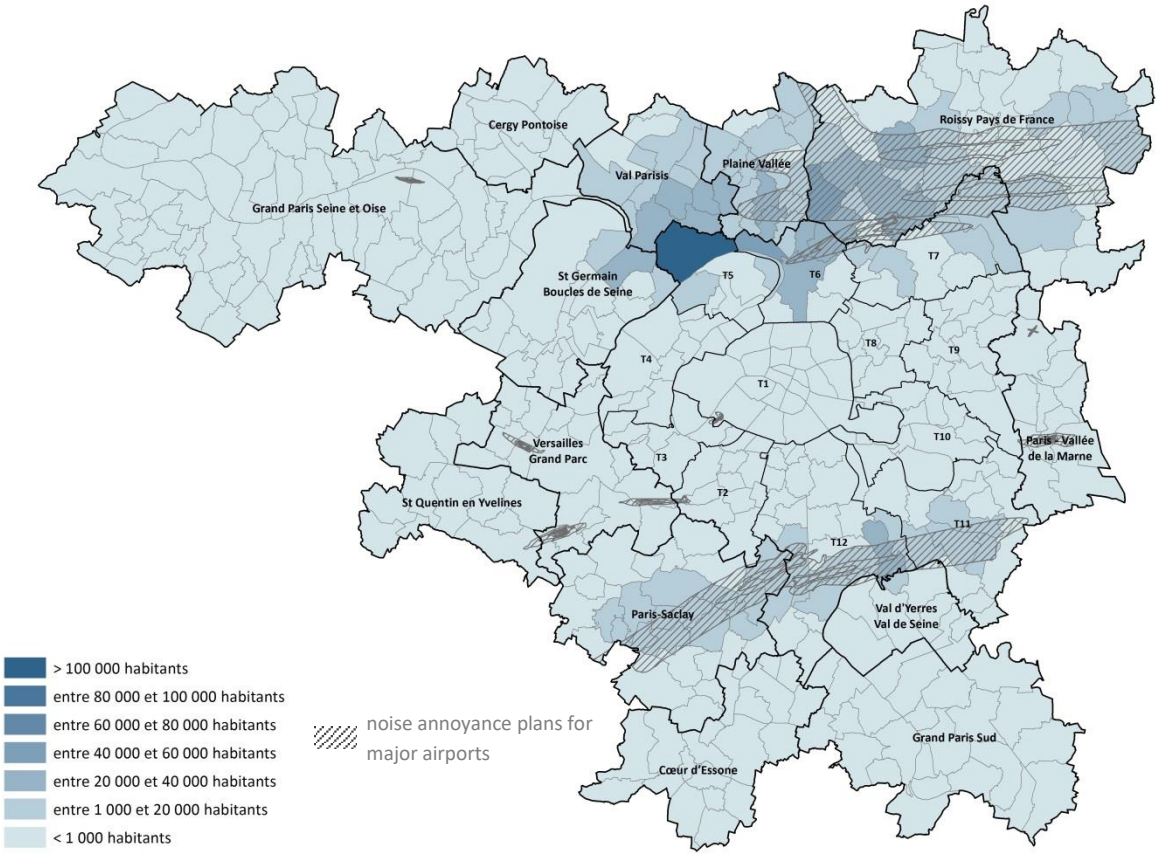


AIR TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 45 dB(A) POPULATION PER COMMUNE LEVEL

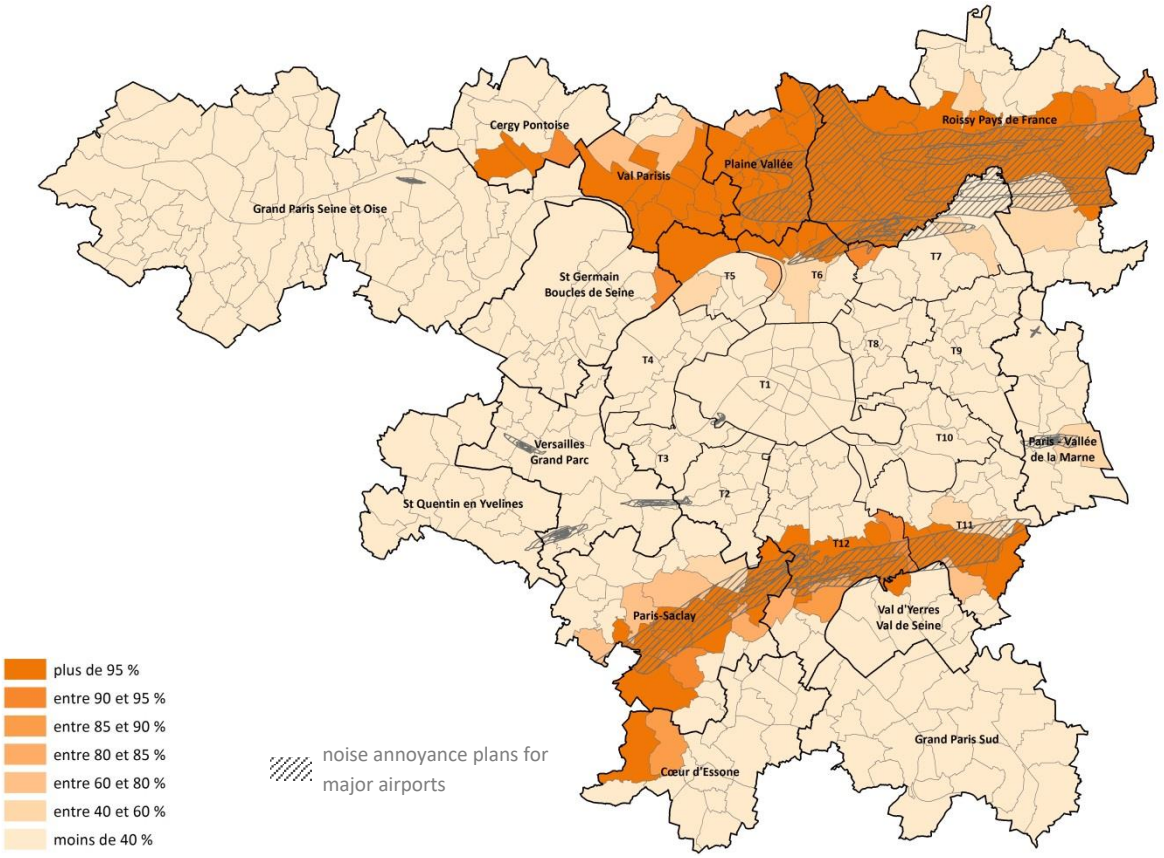


INDICATOR LN > 40 dB(A) POPULATION PER COMMUNE LEVEL

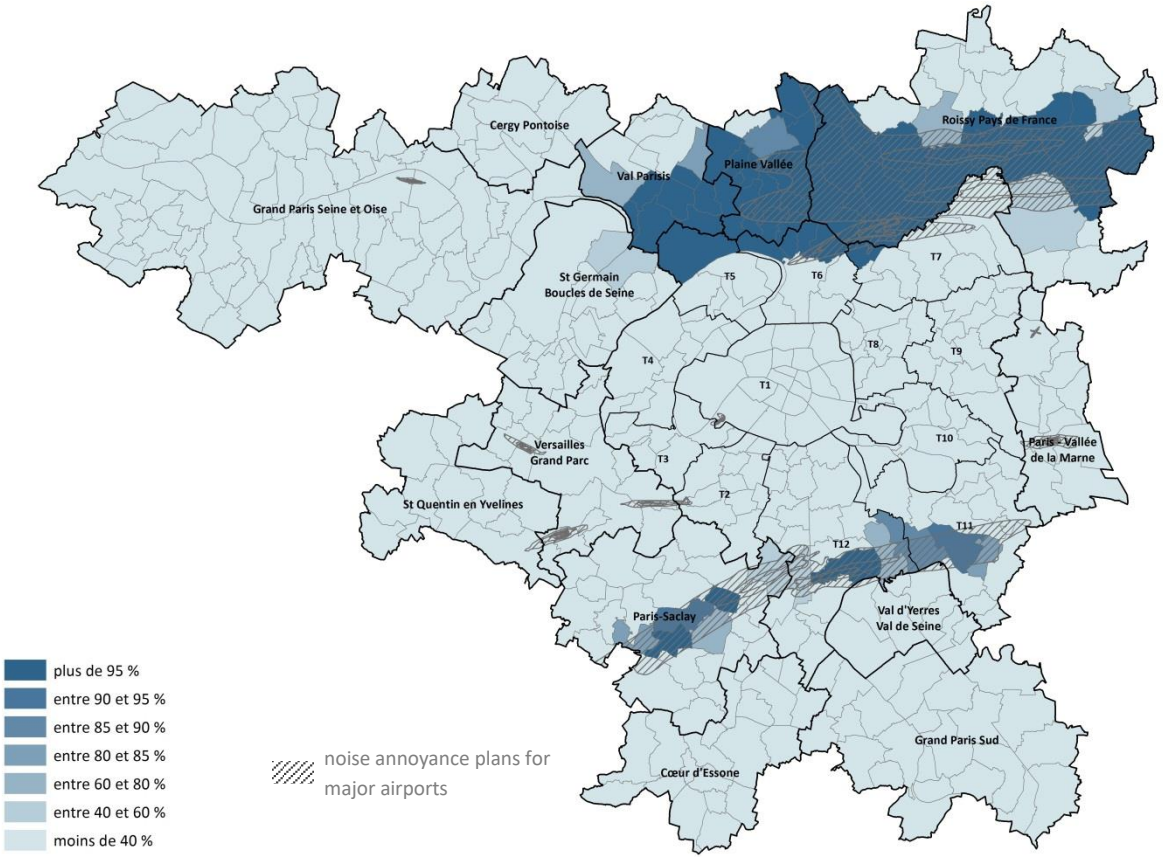


AIR TRAFFIC NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > 45 dB(A) IN PERCENTAGE PER COMMUNE LEVEL



INDICATOR LN > 40 dB(A) IN PERCENTAGE PER COMMUNE LEVEL

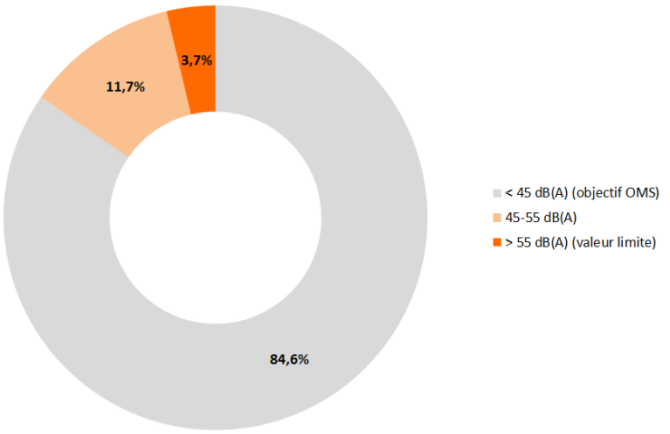


AIR TRAFFIC NOISE - STATISTICS
COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN

POPULATION

	Nombre d'habitants (à la centaine près)	%
< 45 dB(A) (objectif OMS)	8 549 600	84,6%
45-55 dB(A)	1 179 300	11,7%
> 55 dB(A) (valeur limite)	375 300	3,7%

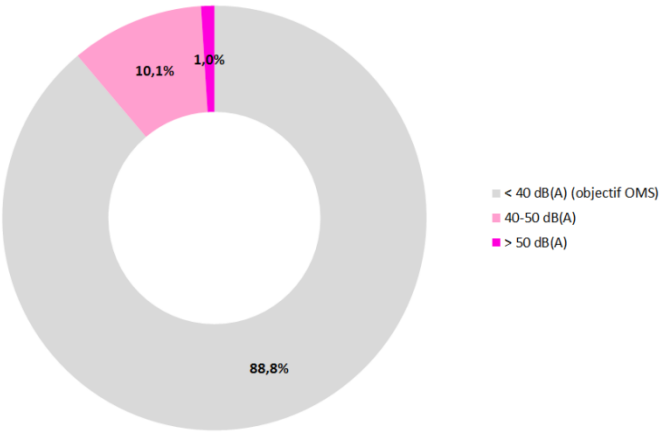


INDICATOR LN*

POPULATION

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*

	Nombre d'habitants (à la centaine près)	%
< 40 dB(A) (objectif OMS)	8 976 700	88,8%
40-50 dB(A)	1 025 200	10,1%
> 50 dB(A)	102 300	1,0%



AIR TRAFFIC NOISE - STATISTICS PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN POPULATION

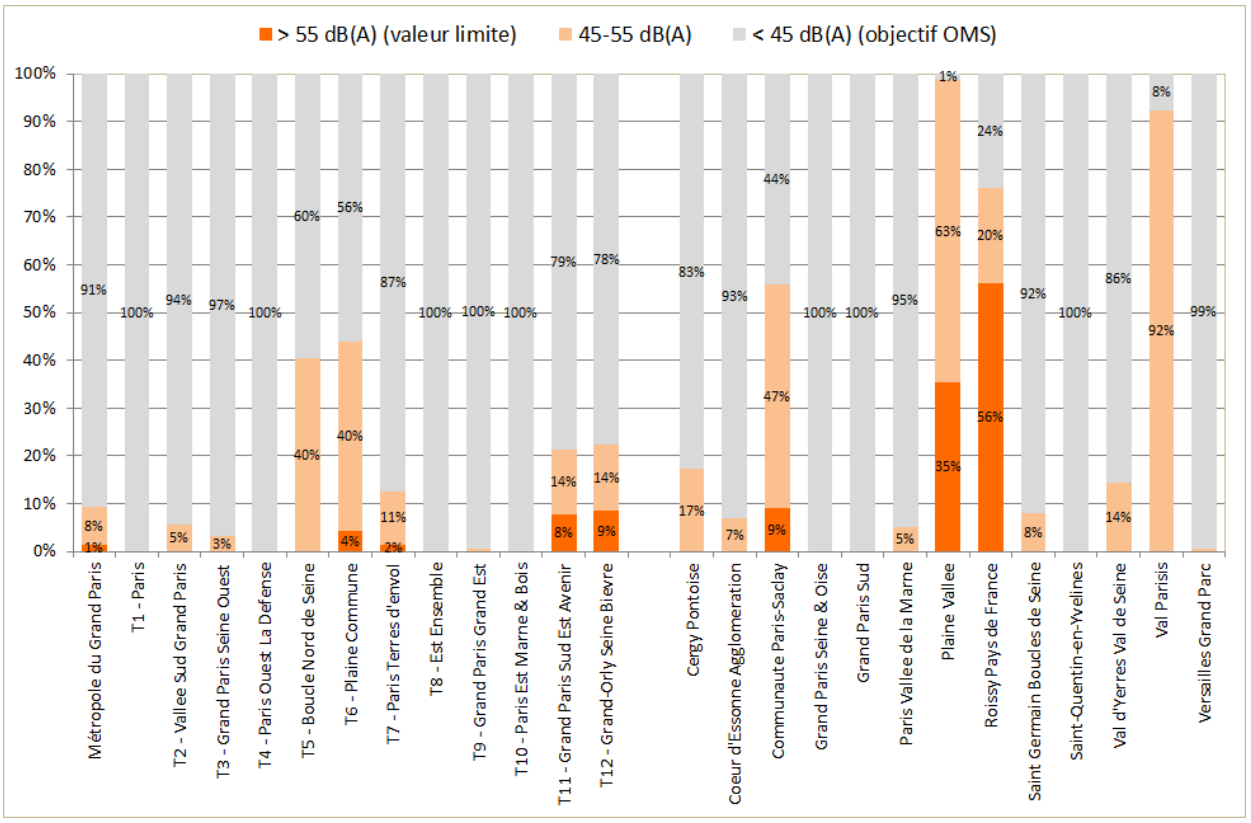
Nombre d'habitants (à la centaine près)	< 45 dB(A) (objectif OMS)	45-55 dB(A)	> 55 dB(A) (valeur limite)
Métropole du Grand Paris	**6 144 800**	**530 200**	**101 100**
T1 - Paris	*2 186 300*	*3 000*	-
T2 - Vallee Sud Grand Paris	*360 700*	*20 800*	*300*
T3 - Grand Paris Seine Ouest	*288 400*	*9 300*	*100*
T4 - Paris Ouest La Defense	*551 400*	-	-
T5 - Boucle Nord de Seine	*248 700*	*168 800*	-
T6 - Plaine Commune	*221 700*	*156 600*	*17 100*
T7 - Paris Terres d'envol	*297 100*	*37 700*	*5 100*
T8 - Est Ensemble	*390 300*	-	-
T9 - Grand Paris Grand Est	*367 300*	*1 800*	-
T10 - Paris Est Marne & Bois	*492 600*	-	-
T11 - Grand Paris Sud Est Avenir	*234 100*	*40 800*	*22 900*
T12 - Grand-Orly Seine Bievre	*506 100*	*91 300*	*55 600*
Cergy Pontoise	**162 500**	**33 800**	-
Coeur d'Essonne Agglomeration	**171 700**	**12 800**	-
Communaute Paris-Saclay	**126 200**	**133 500**	**25 900**
Grand Paris Seine & Oise	**391 100**	-	-
Grand Paris Sud	**317 000**	**300**	-
Paris Vallee de la Marne	**206 800**	**11 000**	-
Plaine Vallee	**2 300**	**110 500**	**61 700**
Roissy Pays de France	**79 600**	**66 000**	**186 700**
Saint Germain Boucles de Seine	**302 900**	**26 300**	-
Saint-Quentin-en-Yvelines	**223 900**	-	-
Val d'Yerres Val de Seine	**142 500**	**23 900**	-
Val Parisis	**19 000**	**229 800**	-
Versailles Grand Parc	**259 400**	**1 400**	-

INDICATOR LN POPULATION

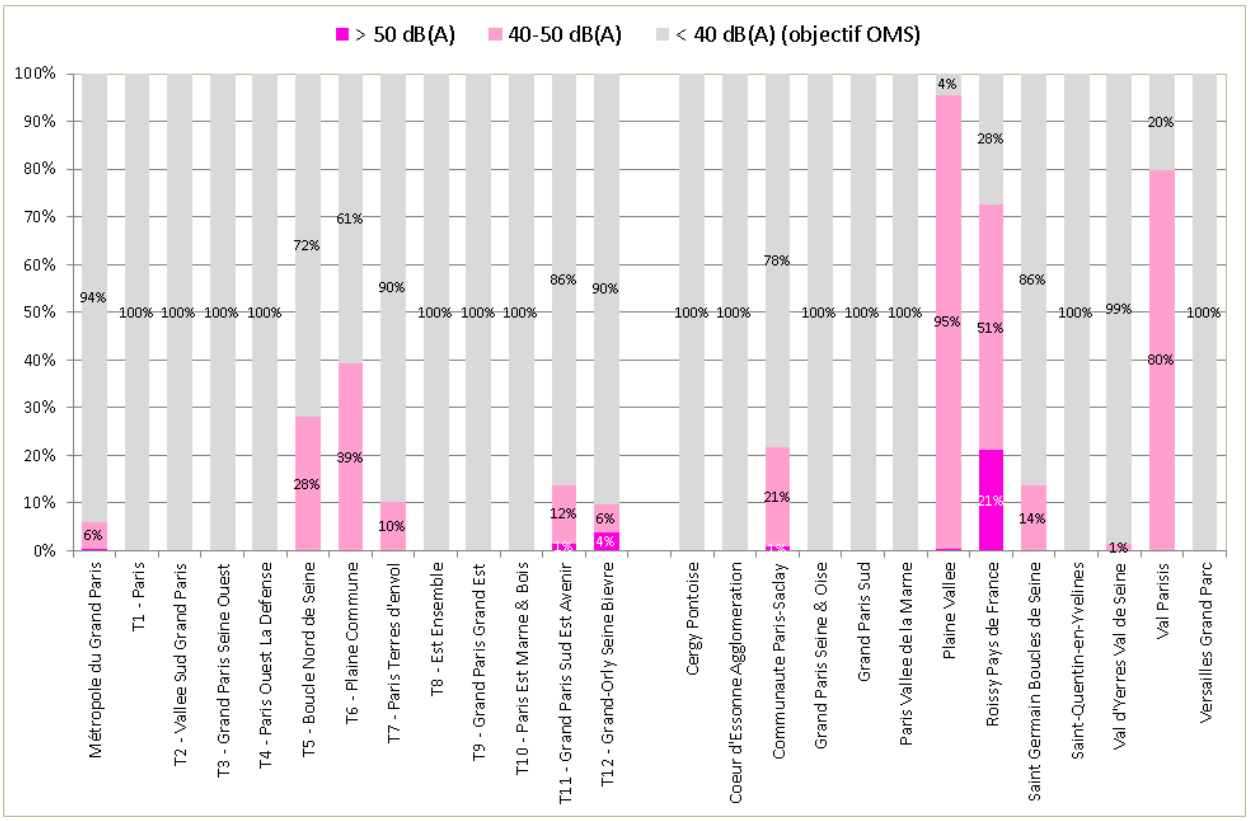
Nombre d'habitants (à la centaine près)	< 40 dB(A) (objectif OMS)	40-50 dB(A)	> 50 dB(A)
Métropole du Grand Paris	**6 364 200**	**382 600**	**29 200**
T1 - Paris	*2 189 300*	-	-
T2 - Vallee Sud Grand Paris	*381 800*	-	-
T3 - Grand Paris Seine Ouest	*297 900*	-	-
T4 - Paris Ouest La Defense	*551 400*	-	-
T5 - Boucle Nord de Seine	*300 700*	*116 800*	-
T6 - Plaine Commune	*240 600*	*154 900*	-
T7 - Paris Terres d'envol	*305 000*	*34 400*	*400*
T8 - Est Ensemble	*390 300*	-	-
T9 - Grand Paris Grand Est	*369 100*	-	-
T10 - Paris Est Marne & Bois	*492 600*	-	-
T11 - Grand Paris Sud Est Avenir	*256 600*	*36 800*	*4 400*
T12 - Grand-Orly Seine Bievre	*588 800*	*39 800*	*24 400*
Cergy Pontoise	**196 300**	-	-
Coeur d'Essonne Agglomeration	**184 500**	-	-
Communaute Paris-Saclay	**223 500**	**59 700**	**2 400**
Grand Paris Seine & Oise	**391 100**	-	-
Grand Paris Sud	**317 300**	-	-
Paris Vallee de la Marne	**217 800**	-	-
Plaine Vallee	**7 600**	**166 300**	**700**
Roissy Pays de France	**91 400**	**170 800**	**70 100**
Saint Germain Boucles de Seine	**284 400**	**44 800**	-
Saint-Quentin-en-Yvelines	**223 900**	-	-
Val d'Yerres Val de Seine	**164 100**	**2 300**	-
Val Parisis	**50 000**	**198 800**	-
Versailles Grand Parc	**260 700**	-	-

AIR TRAFFIC NOISE - STATISTICS PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN PERCENTAGE OF POPULATION



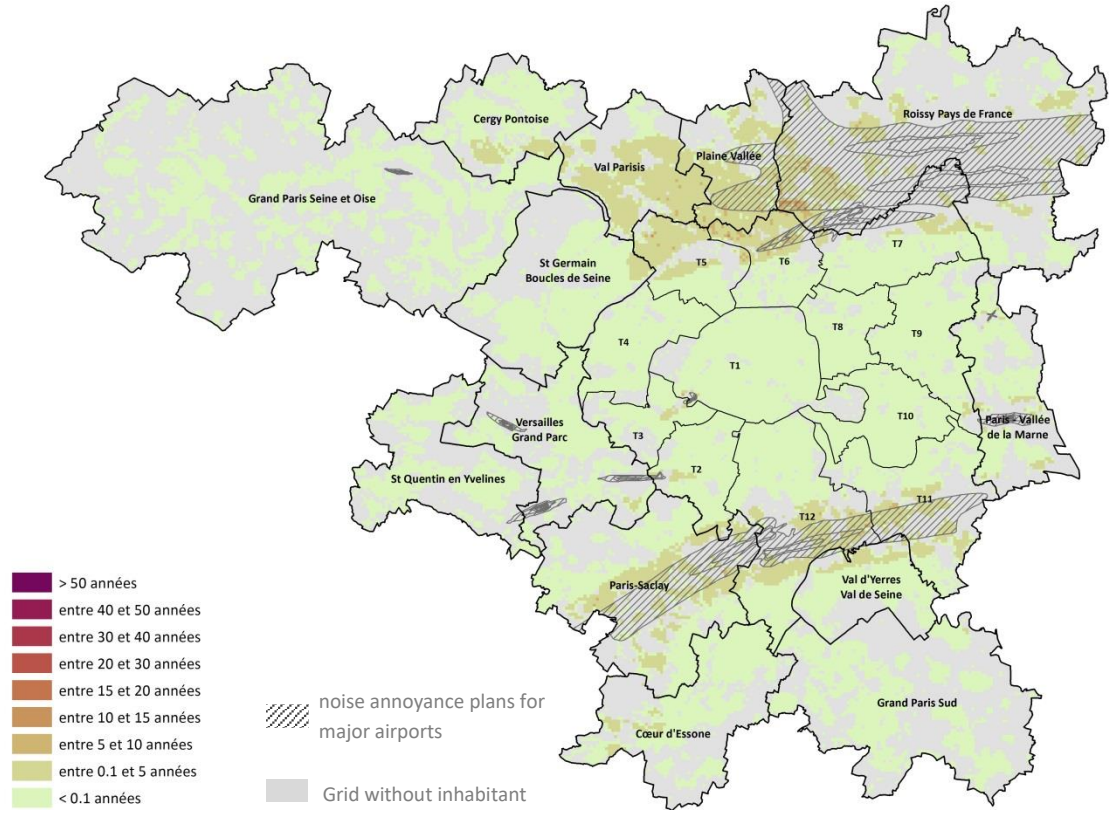
INDICATOR LN PERCENTAGE OF POPULATION



AIR TRAFFIC NOISE - HEALTH IMPACT

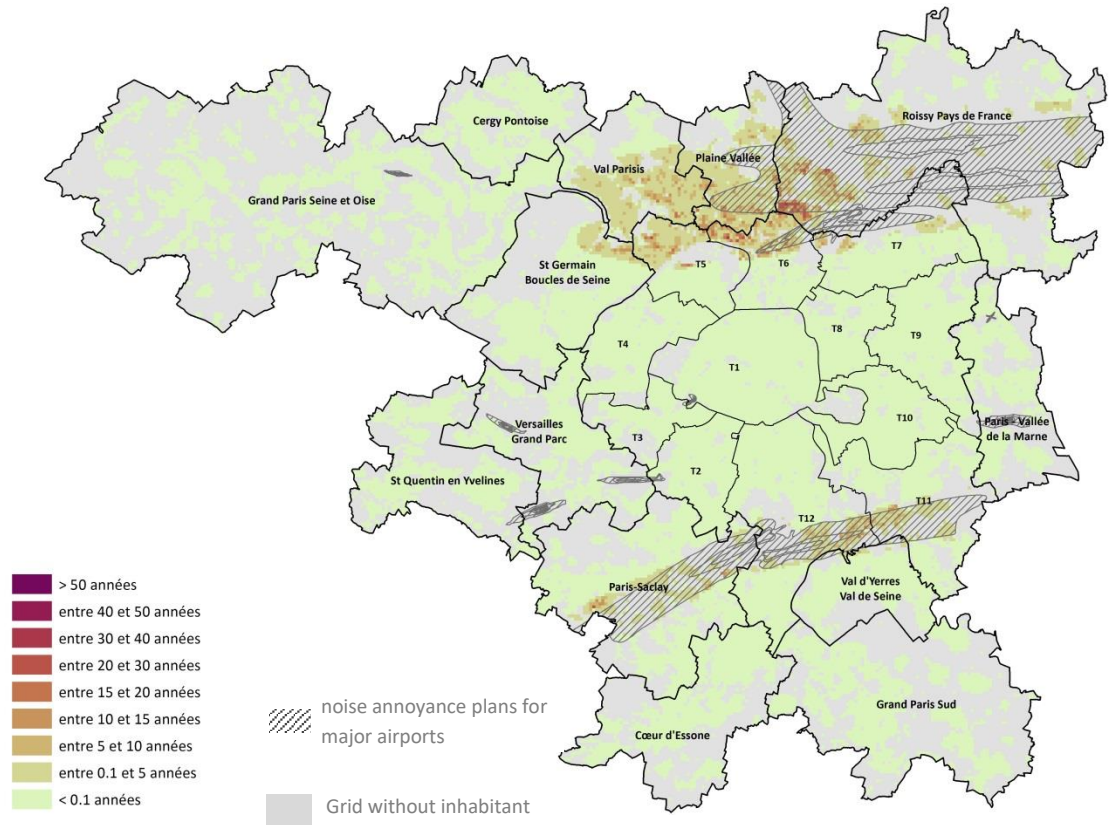
INDICATOR DALY FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER GRID OF 250 m

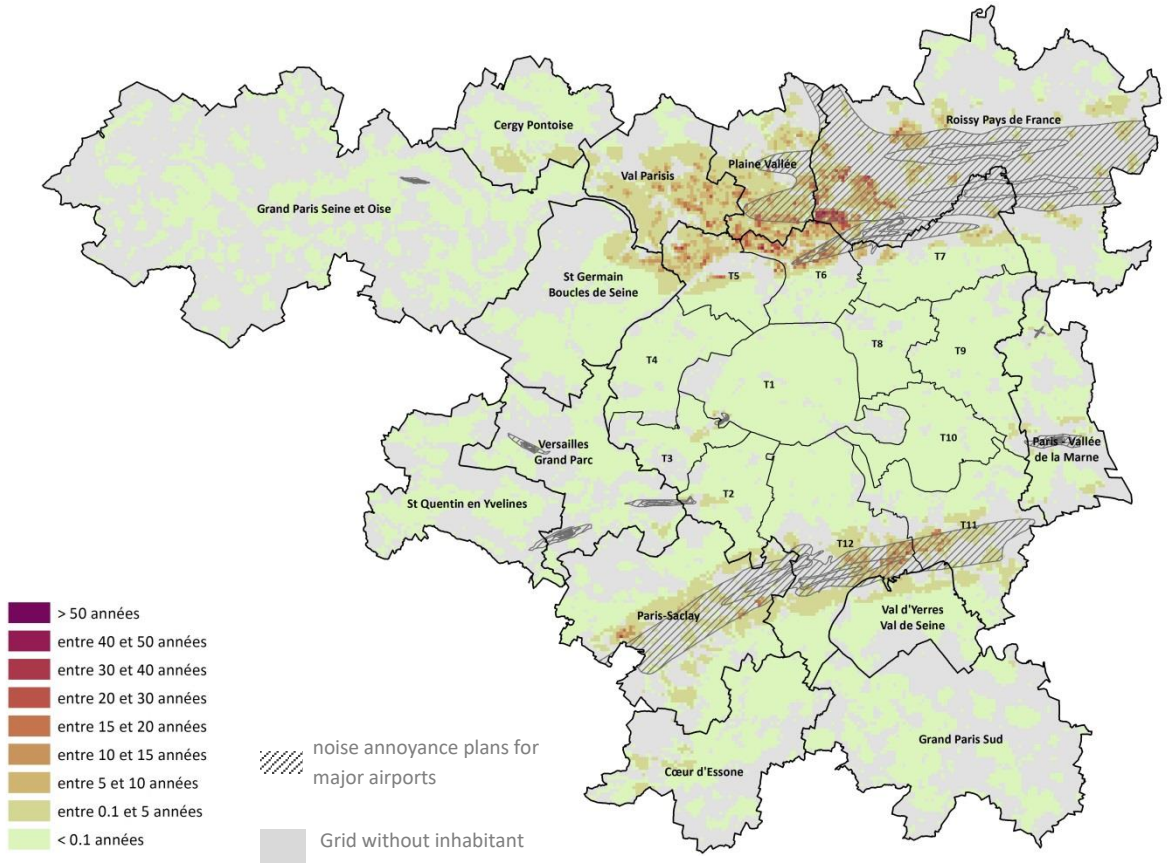
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



AIR TRAFFIC NOISE - HEALTH IMPACT

INDICATOR DALY PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



STATISTICS

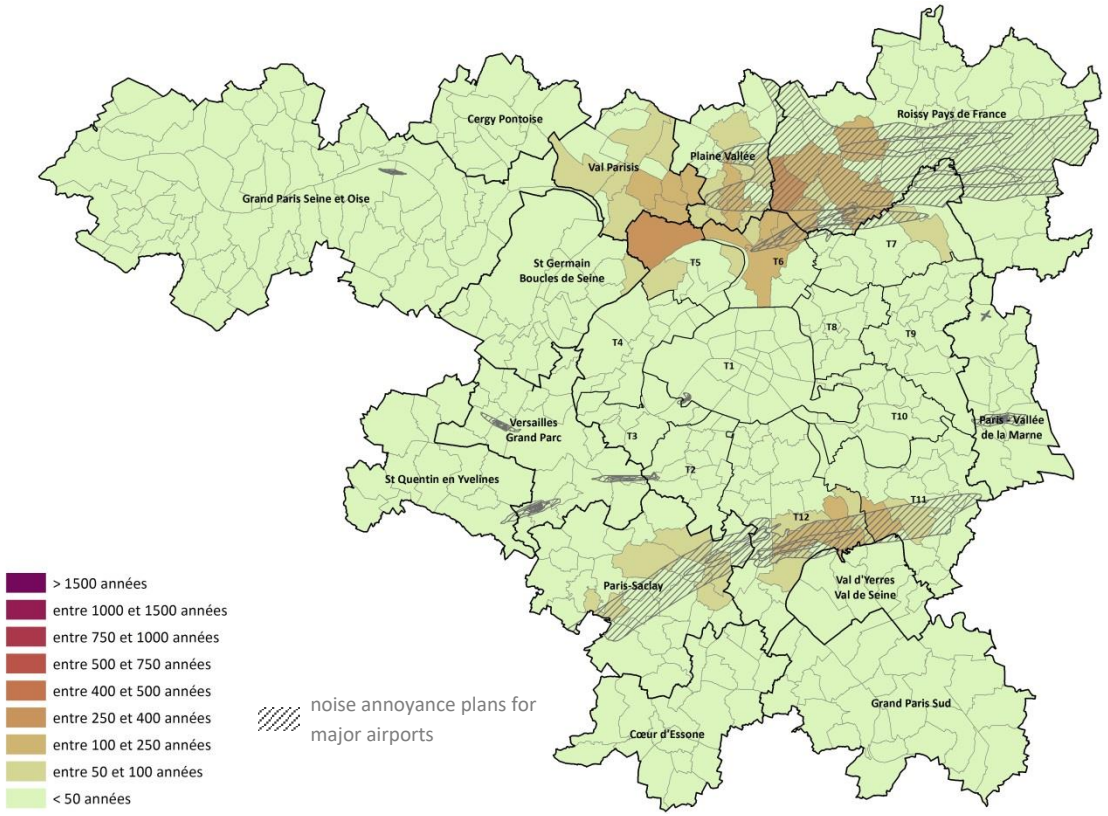
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

ANNÉES DE VIE EN BONNE SANTÉ PERDUE PAR AN	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**2 453**	**4 215**	**6 669**
T1 - Paris	*10*	-	*10*
T2 - Vallee Sud Grand Paris	*57*	-	*57*
T3 - Grand Paris Seine Ouest	*26*	-	*26*
T4 - Paris Ouest La Defense	-	-	-
T5 - Boucle Nord de Seine	*490*	*1 073*	*1 563*
T6 - Plaine Commune	*700*	*1 583*	*2 283*
T7 - Paris Terres d'envol	*140*	*307*	*447*
T8 - Est Ensemble	-	-	-
T9 - Grand Paris Grand Est	*4*	-	*4*
T10 - Paris Est Marne & Bois	-	-	-
T11 - Grand Paris Sud Est Avenir	*304*	*447*	*751*
T12 - Grand-Orly Seine Bievre	*721*	*805*	*1 526*
Cergy Pontoise	**72**	-	**72**
Coeur d'Essonne Agglomeration	**27**	-	**27**
Communaute Paris-Saclay	**610**	**584**	**1 194**
Grand Paris Seine & Oise	-	**0**	**0**
Grand Paris Sud	**1**	-	**1**
Paris Vallee de la Marne	**28**	**0**	**28**
Plaine Vallee	**836**	**1 978**	**2 814**
Roissy Pays de France	**1 478**	**3 134**	**4 612**
Saint Germain Boucles de Seine	**59**	**364**	**424**
Saint-Quentin-en-Yvelines	-	-	-
Val d'Yerres Val de Seine	**64**	**19**	**83**
Val Parisis	**860**	**1 933**	**2 793**
Versailles Grand Parc	**3**	-	**3**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**6 491**	**12 227**	**18 718**

AIR TRAFFIC NOISE - HEALTH IMPACT

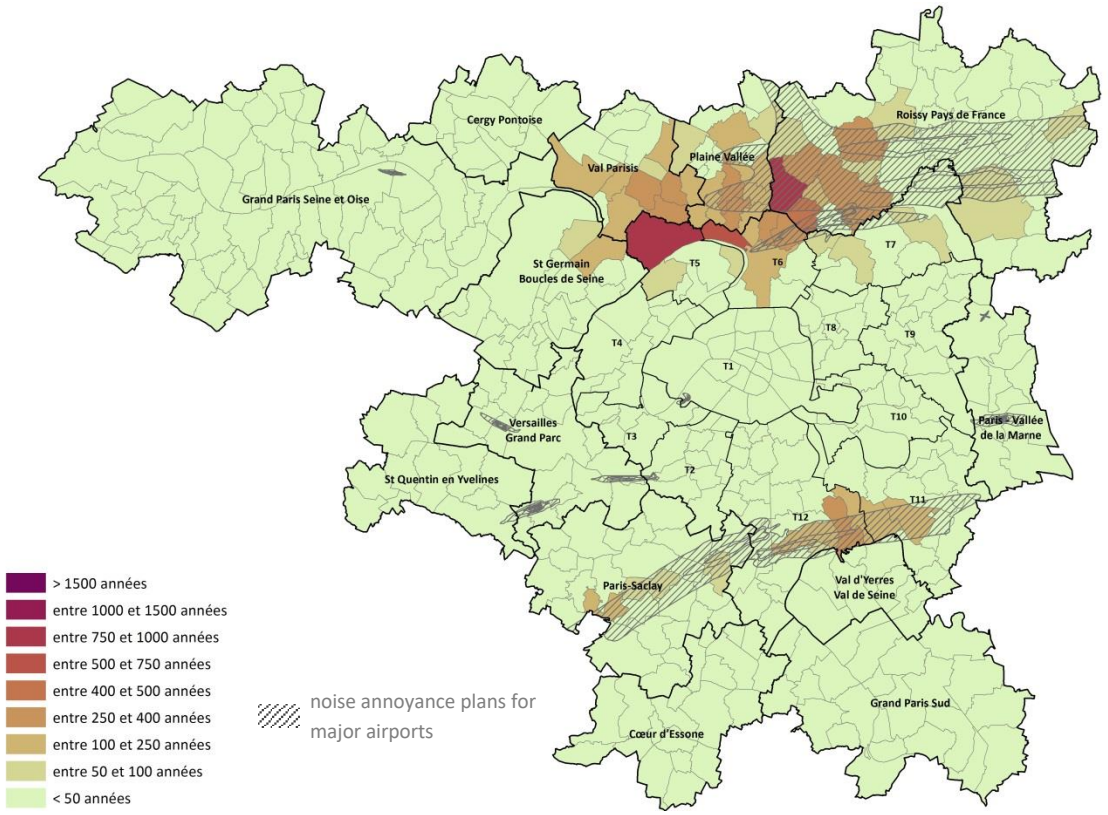
INDICATOR DALY FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

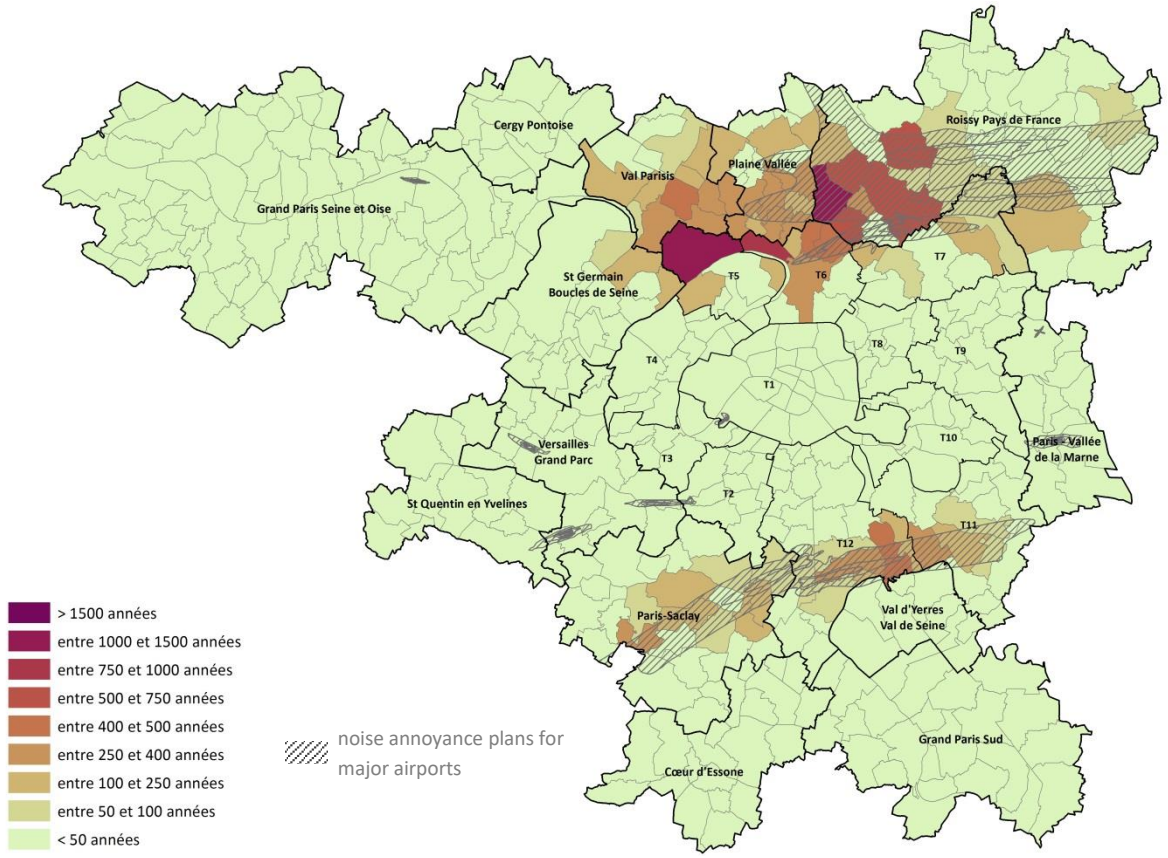
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



AIR TRAFFIC NOISE - HEALTH IMPACT

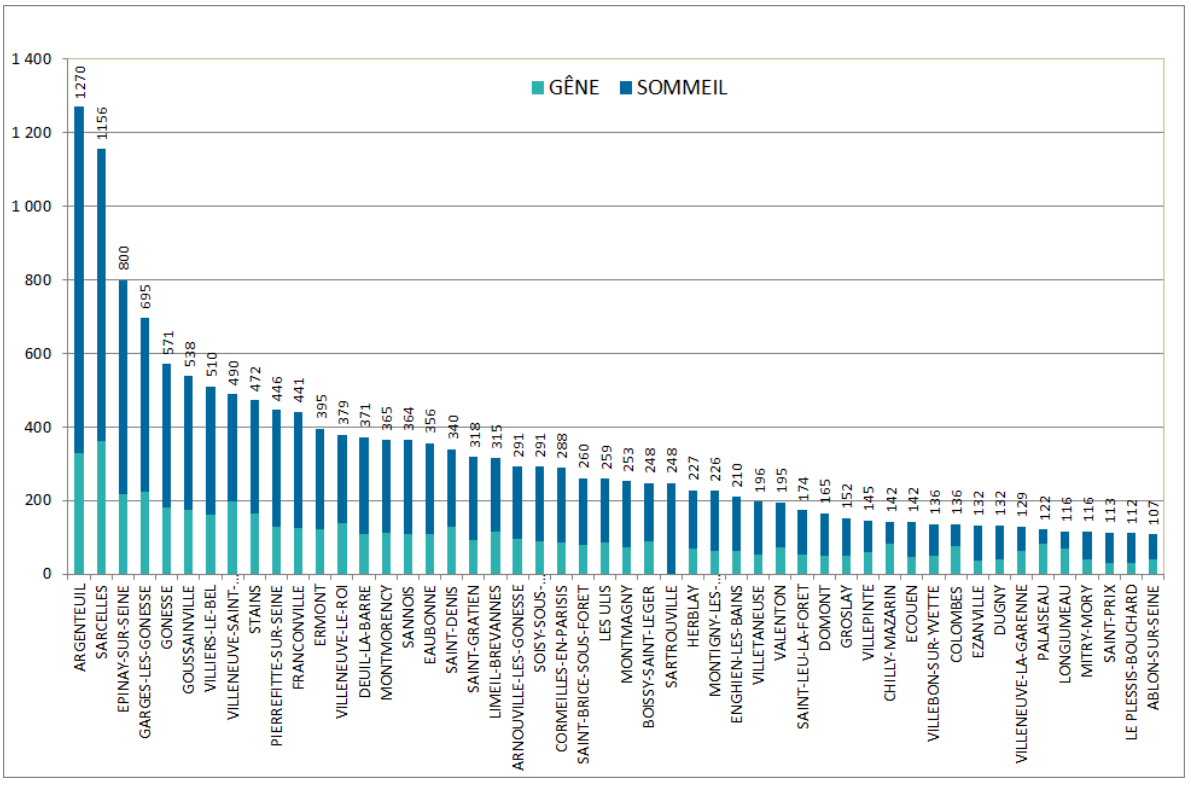
INDICATOR DALY PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



THE 50 COMMUNES WITH THE HIGHEST VALUES

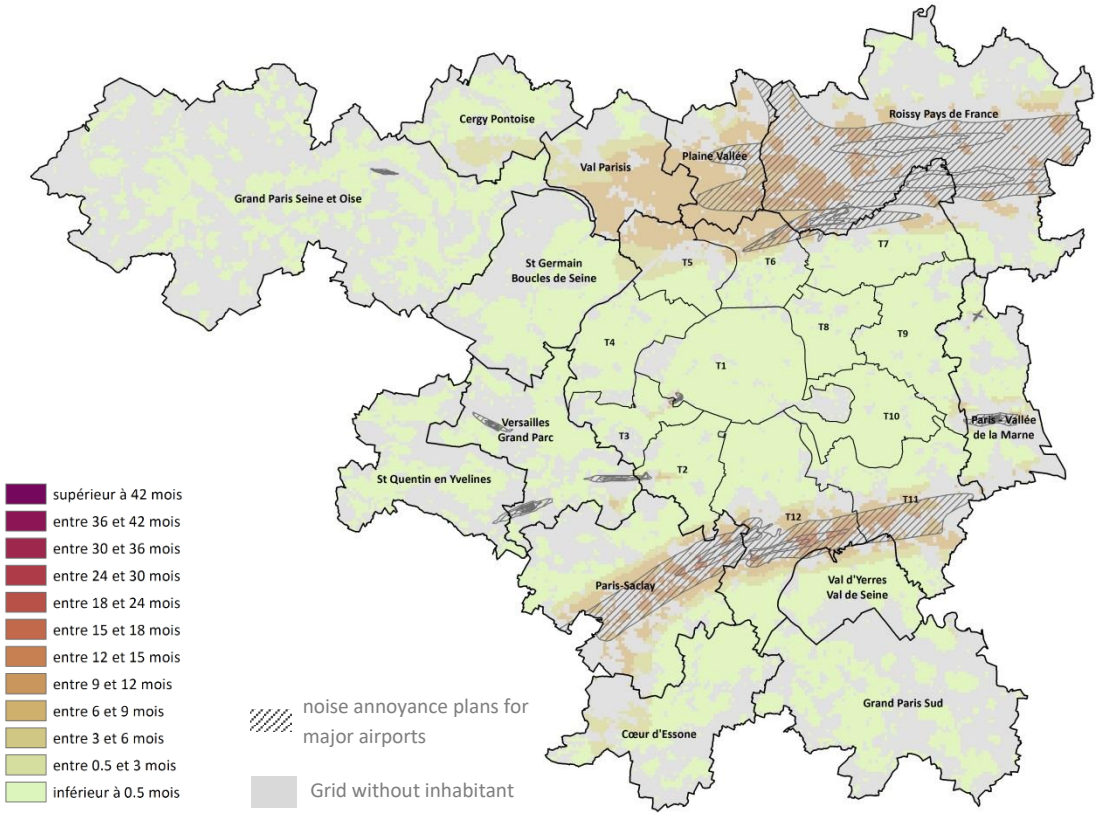
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



AIR TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

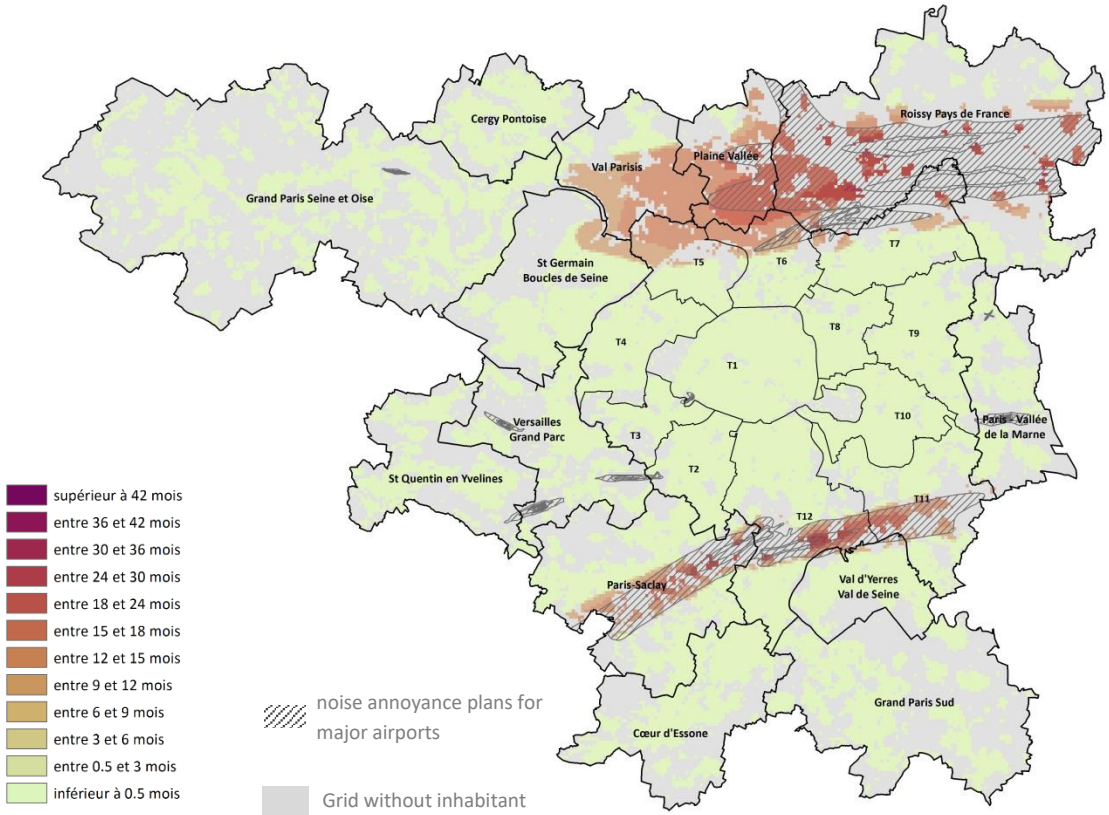
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER GRID OF 250 m

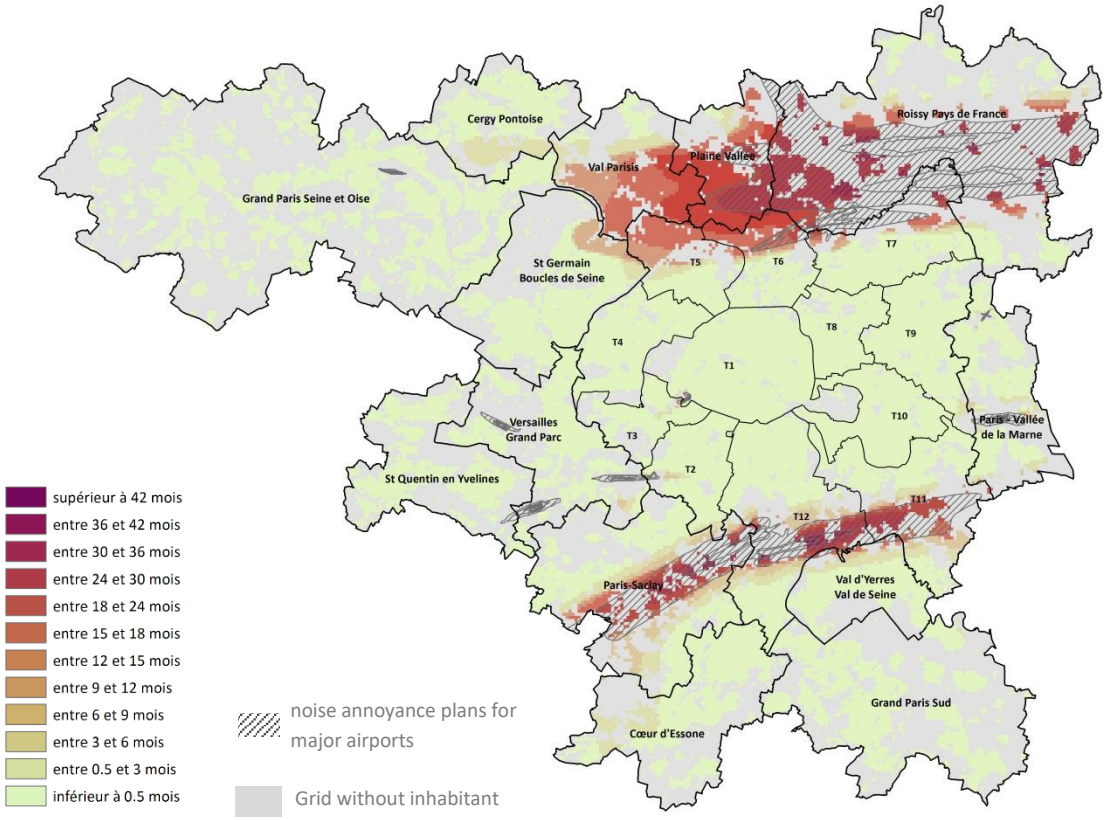
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



AIR TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

INDIVIDUAL HEALTH RISKS PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



STATISTICS

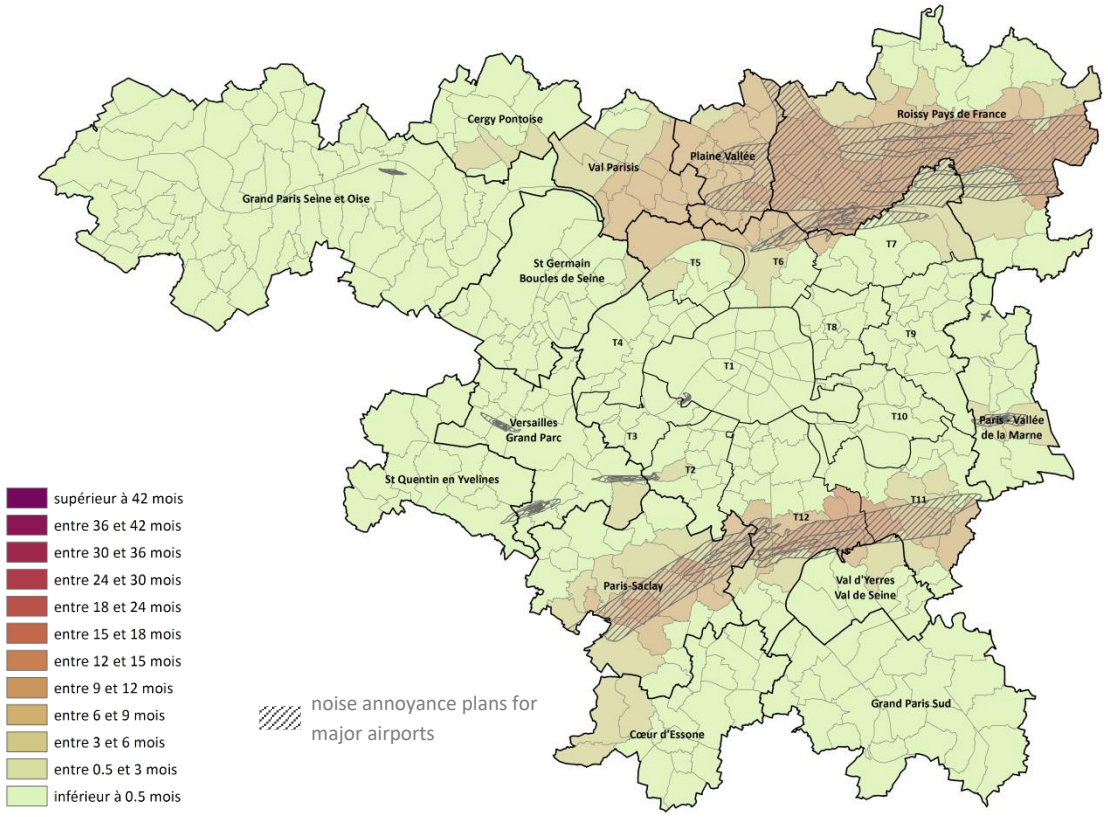
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

MOIS DE VIE EN BONNE SANTÉ PERDUE PAR INDIVIDU AU COURS D'UNE VIE ENTIÈRE	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**0,4**	**0,6**	**1,0**
T1 - Paris	*0,0*	-	*0,0*
T2 - Vallee Sud Grand Paris	*0,1*	-	*0,1*
T3 - Grand Paris Seine Ouest	*0,1*	-	*0,1*
T4 - Paris Ouest La Defense	-	-	-
T5 - Boucle Nord de Seine	*1,2*	*2,6*	*3,7*
T6 - Plaine Commune	*1,8*	*4,0*	*5,8*
T7 - Paris Terres d'envol	*0,4*	*0,9*	*1,3*
T8 - Est Ensemble	-	-	-
T9 - Grand Paris Grand Est	*0,0*	-	*0,0*
T10 - Paris Est Marne & Bois	-	-	-
T11 - Grand Paris Sud Est Avenir	*1,0*	*1,5*	*2,5*
T12 - Grand-Orly Seine Bievre	*1,1*	*1,2*	*2,3*
Cergy Pontoise	**0,4**	-	**0,4**
Coeur d'Essonne Agglomeration	**0,1**	-	**0,1**
Communaute Paris-Saclay	**2,1**	**2,0**	**4,2**
Grand Paris Seine & Oise	-	**0,0**	**0,0**
Grand Paris Sud	**0,0**	-	**0,0**
Paris Vallee de la Marne	**0,1**	**0,0**	**0,1**
Plaine Vallee	**4,8**	**11,3**	**16,1**
Roissy Pays de France	**4,5**	**9,4**	**13,9**
Saint Germain Boucles de Seine	**0,2**	**1,1**	**1,3**
Saint-Quentin-en-Yvelines	-	-	-
Val d'Yerres Val de Seine	**0,4**	**0,1**	**0,5**
Val Parisis	**3,5**	**7,8**	**11,2**
Versailles Grand Parc	**0,0**	-	**0,0**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**0,6**	**1,2**	**1,9**

AIR TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

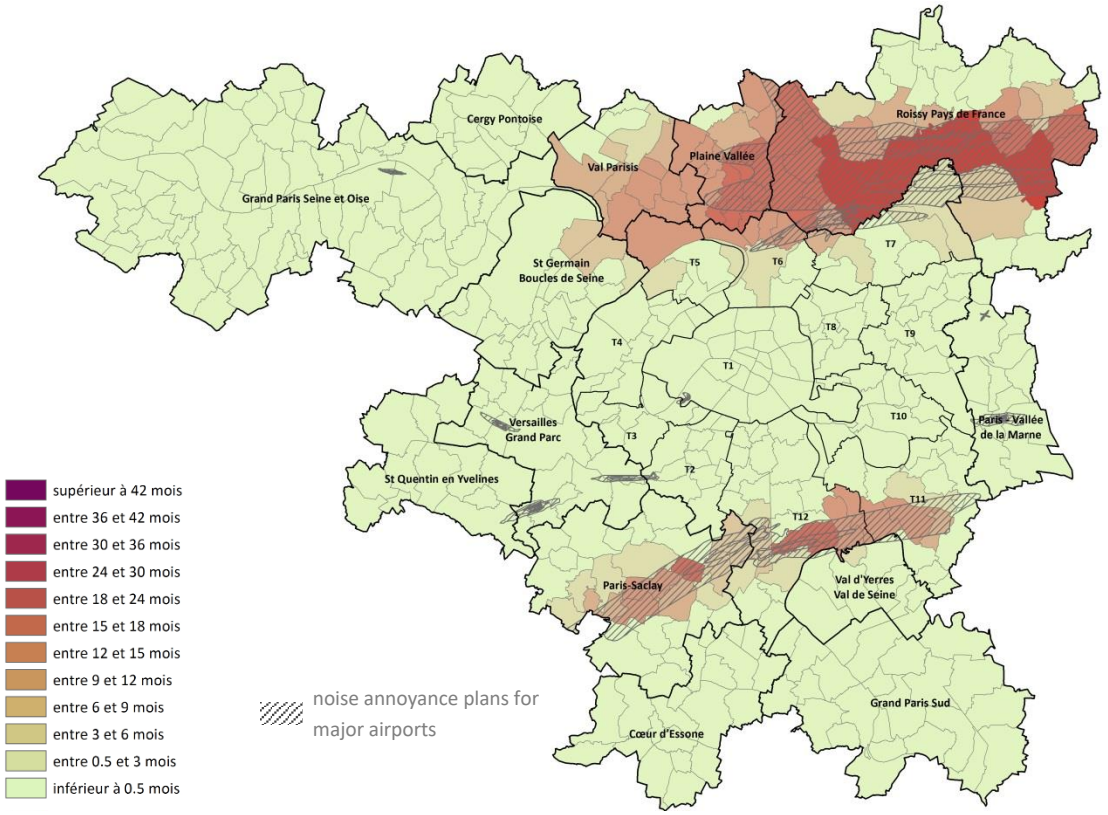
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

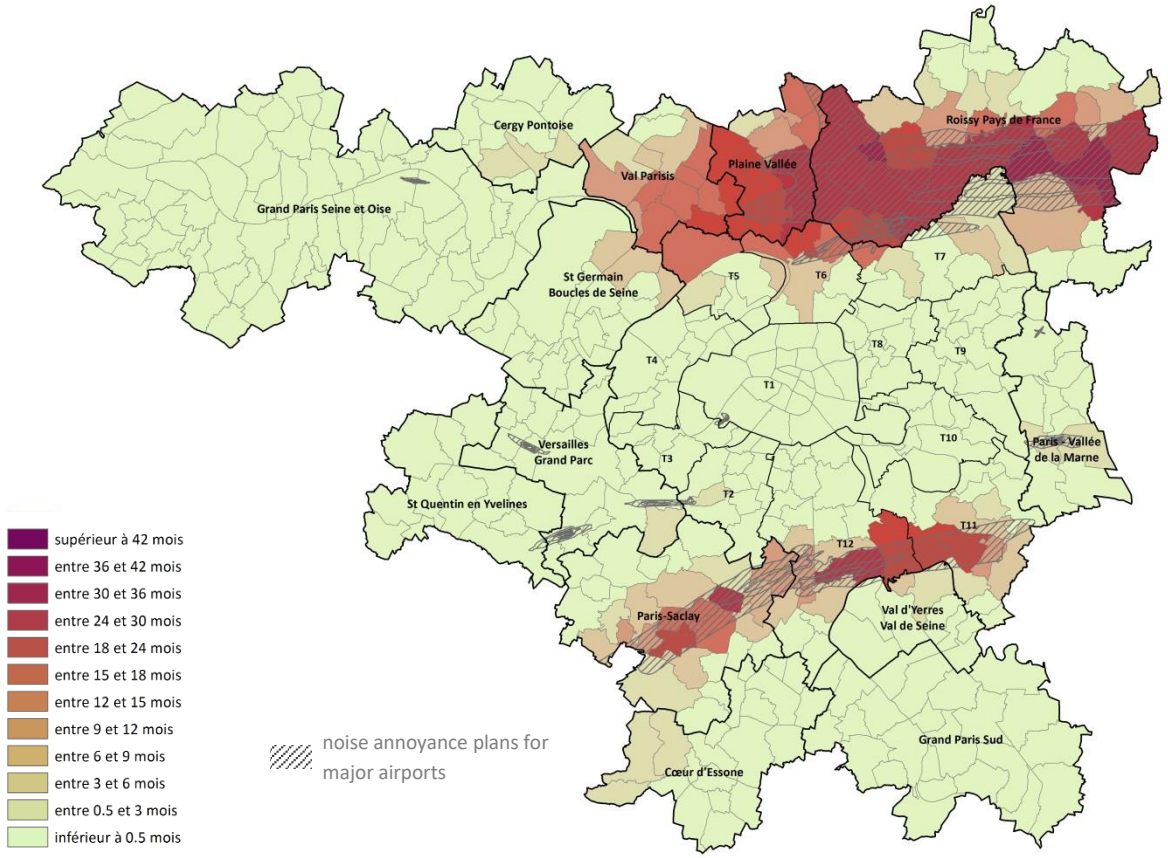
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



AIR TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

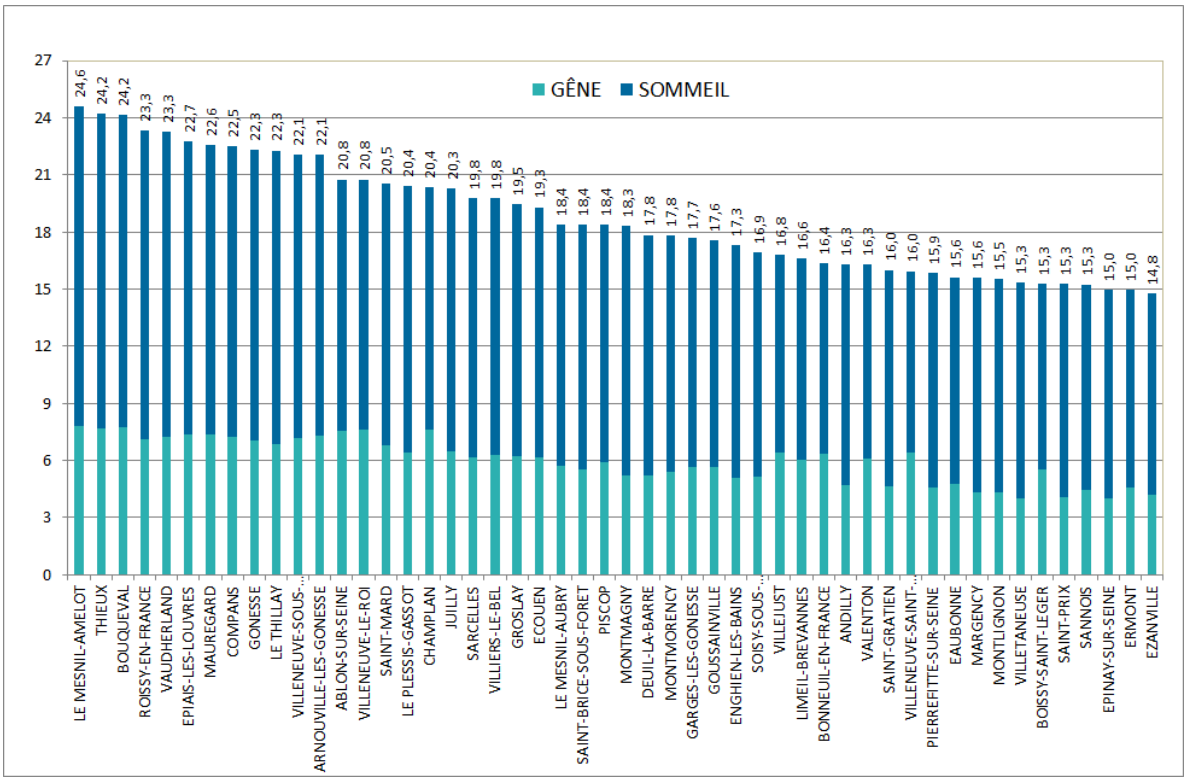
INDIVIDUAL HEALTH RISKS PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



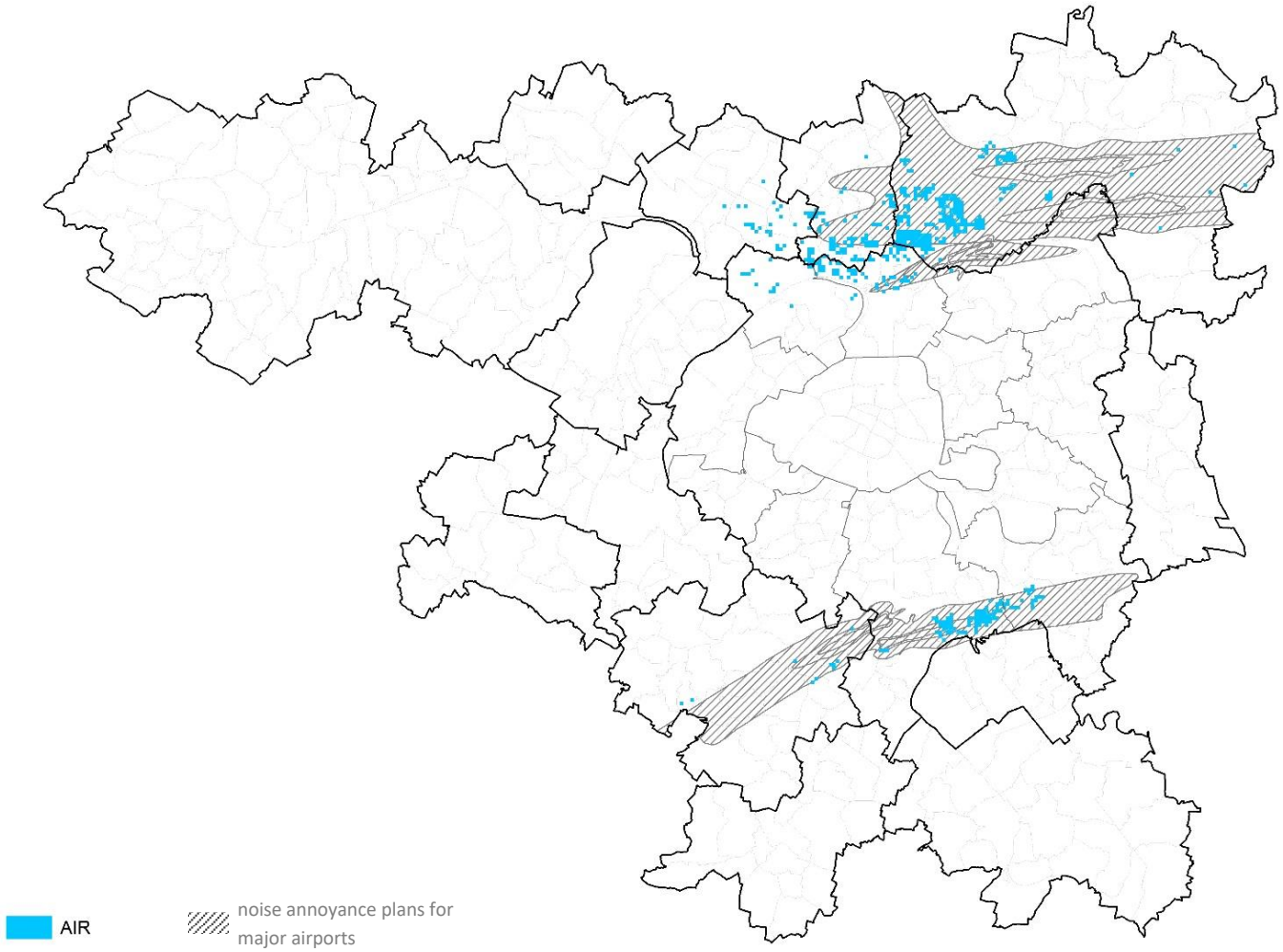
THE 50 COMMUNES WITH THE HIGHEST VALUES

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



AIR TRAFFIC NOISE – THE 500 PRIORITY GRIDS

HIGHEST VALUES FOR COMBINED RISKS (COLLECTIVE AND INDIVIDUAL)



AIR TRAFFIC NOISE – IN BRIEF

Aircraft noise affects a non-negligible proportion of inhabitants within the densely populated zone of Ile-de-France. A similar proportion of the population is exposed to aircraft noise as to rail noise. Just over 15% of inhabitants (nearly 1.6 million people) are exposed to levels that exceed 45 dB(A) using the Lden indicator, which is the World Health Organisation's threshold value to avoid consequences on health due to aircraft noise.

375,000 people (3.7% of the population) in the densely populated zone of Ile-de-France are exposed to noise levels that exceed the regulatory limit value of 55 dB(A) using the Lden indicator. This is around seven times higher than the number of people affected by rail noise using the same indicator. However, it is also around one third of the number of people exposed to road noise levels exceeding the limit value.

At night-time, exposure to aircraft noise decreases, especially around Paris-Orly airport, which has a curfew between 11:30 PM and 6 AM, and around airfields (no night-time flights, except in exceptional cases). However, 11% of the population still lives in housing exposed to aircraft noise levels that exceed 40 dB(A), which is the WHO's night-time noise threshold value for aircraft noise. Although France does not have any regulations on limit values for night-time aircraft noise, more than 102,000 inhabitants (1% of the population) are concerned by night-time levels that exceed 50 dB(A) using the Ln indicator, a value that is considered critical for quality of sleep according to the exposure-response curves recently published by the WHO. Even around Paris-Orly airport, nearly 31,000 people are subjected to noise levels that exceed 50 dB(A) on average between 10 PM and 6 AM, due to noise pollution generated by overflights that occur between 10 PM and the start of the curfew at 11:30 PM.

In terms of the health impact, aircraft noise is responsible for 18,718 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, distributed between the DALYs lost due to annoyance (6,491 DALYs, or 35% of the total) and the DALYs lost due to sleep disturbance (12,227 DALYs, or 65% of the total).

Contrary to road and rail noise, which are relatively evenly distributed around the territory, air traffic noise is very unevenly distributed. It is concentrated in certain sectors: This is the case in the agglomeration communities of Roissy Pays de France (4,612 DALYs, 25% of the total), Plaine Vallée (2,814 DALYs, 15% of the total), Val Parisis (2,793 DALYs, 15%), Paris-Saclay (1,194 DALYs, 6%), and the territories of T6 - Plaine Commune (2,283 DALYs, 12%), T5 - Boucle Nord de Seine (1,563 DALYs, 8%), T12 - Grand Orly Seine Bièvre (1,526 DALYs, 8%), T11 - Grand Paris Sud Est Avenir (751 DALYs, 4%), and T7 - Paris Terres d'Envol (447 DALYs, 2%).

The cumulated noise pollution from Paris-CDG and Paris-Le Bourget is responsible for 15,008 DALYs lost (80% of the total DALYs), compared with 3,581 DALYs (19%) for Paris-Orly airport and 1% for the other airfields (Paris-Issy-les Moulineaux heliport, Toussus-le-Noble airfield, etc.). Disturbances caused by Paris-CDG represent 85% of the DALYs lost from sleep disturbance (compared with 15% for Paris-Orly) due to night-time flights. 71% of DALYs lost due to annoyance come from the northern zone (Paris-CDG and Paris-Le Bourget), with 27% from the southern zone (Paris-Orly), and 2% for the other airfields.

Due to their high population density, it is the communes of Argenteuil, Sarcelles, Epinay-Sur-Seine, and Garges-lès-Gonesse that have the highest levels of healthy life-years lost due to traffic noise per year.

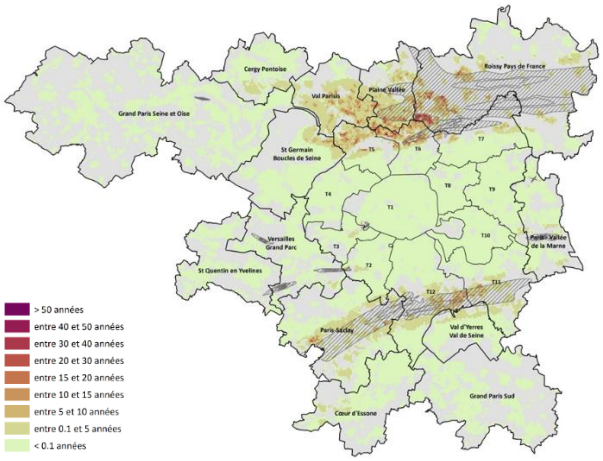
At individual level, the evaluations show an average statistical value of 1.9 healthy life-months lost due to air traffic noise per individual during a lifetime, within the densely populated zone of Ile-de-France. But disparities are very high; this value can reach as much as two years for communes where the average individual risk is the highest (Le Mesnil Amelot, Thieux, Bouqueval) and more than three years within the grids of the territory that have the highest exposure to aircraft noise.

And finally, the health impact of air traffic has a strong impact on the communes of Val d'Oise located on the flight path of Paris-CDG airport, but is also high in the Seine-Saint-Denis department, in the northern sector of T6 (Plaine Commune), in Epinay-sur-Seine, Villetaneuse, Pierrefitte-sur-Seine, and Stains, due to the noise pollution generated by aircraft overflight to and from Paris-Le-Bourget and Paris-CDG. It is worth noting that some of these zones are located outside of the airports' noise annoyance plans. The southern part of Val-de-Marne (Ablon-sur-Seine, Villeneuve-le-Roi, Villeneuve-Saint-Georges, Valenton, Limeil-Brévannes, Boissy-Saint-Léger) also contains a high number of priority grids. And finally, there are some more dispersed zones located in Essonne (Paray Vieille Poste, Wissous, Chilly-Mazarin, Champlan, Longjumeau, Les Ulis) due to the activity of Paris-Orly airport, and in Seine-et-Marne due to overflights to and from Paris-CDG.

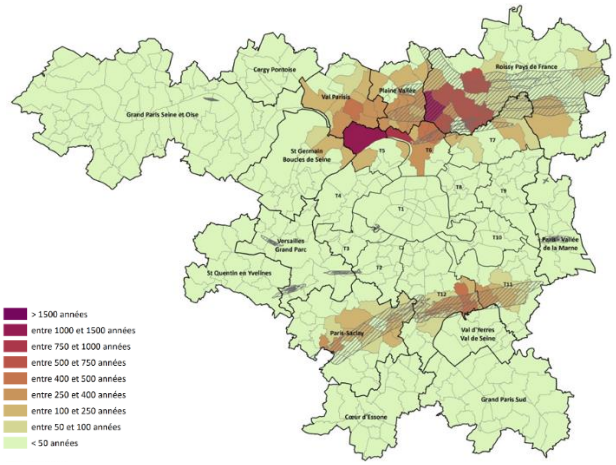
AIR TRAFFIC NOISE – COLLECTIVE HEALTH IMPACT

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

PER GRID OF 250 m



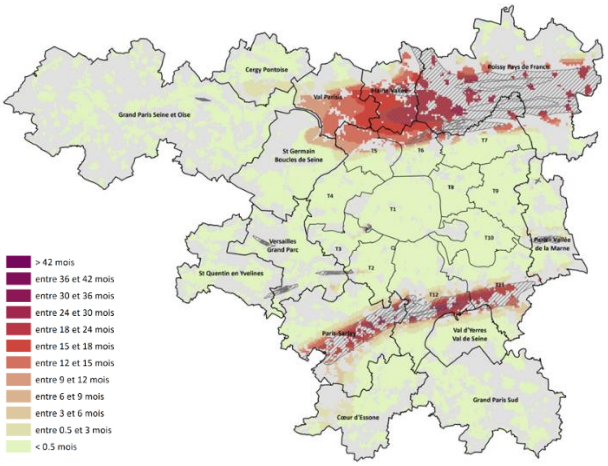
PER COMMUNE LEVEL



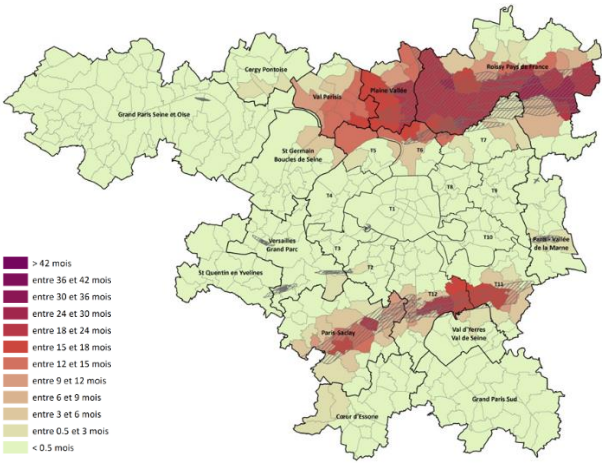
AIR TRAFFIC NOISE – INDIVIDUAL HEALTH RISKS

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

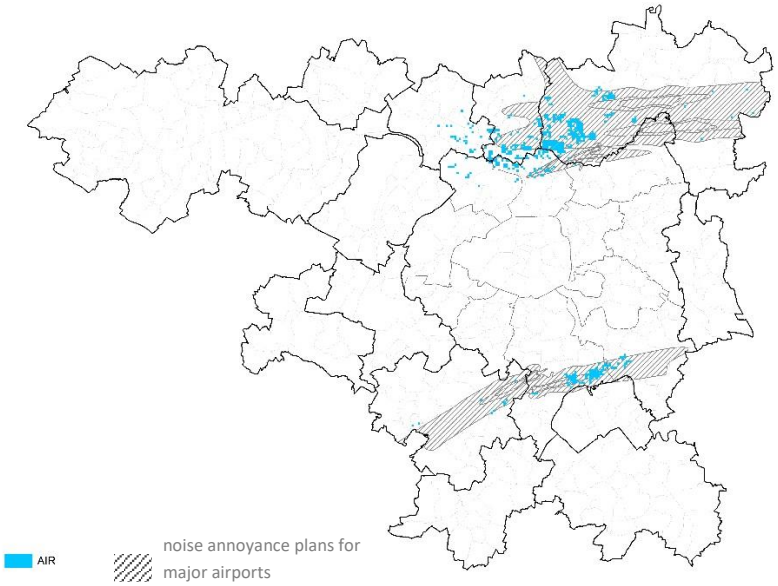
PER GRID OF 250 m



PER COMMUNE LEVEL



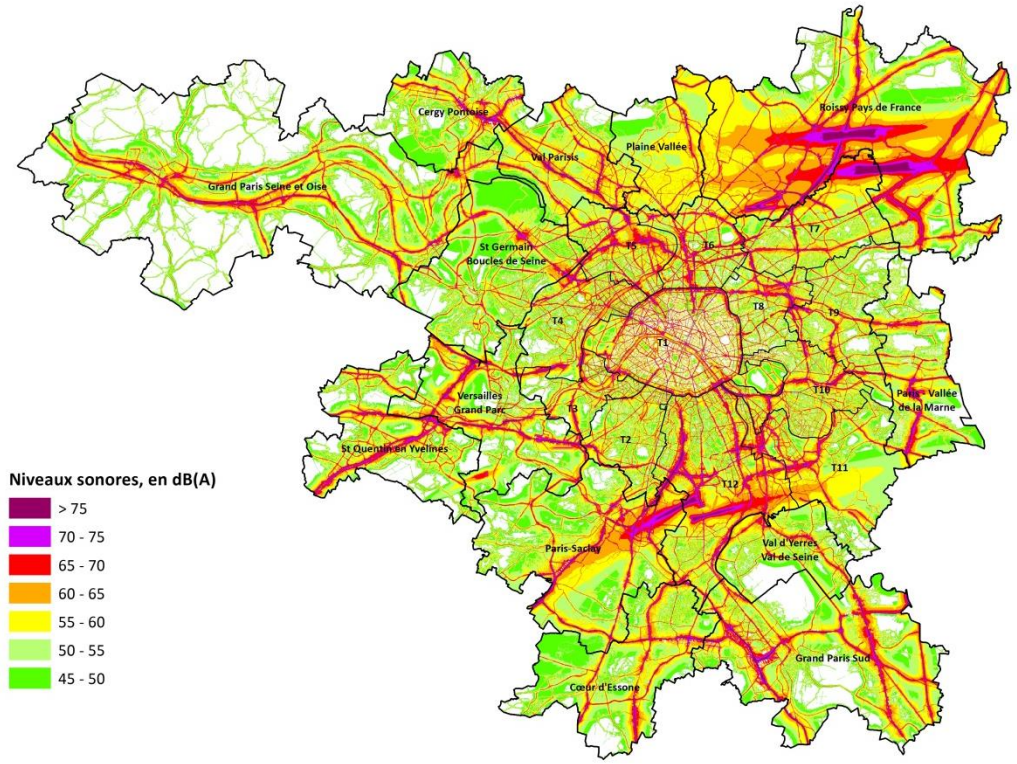
THE 500 PRIORITY GRIDS



PART 4
CUMULATED TRANSPORT NOISE

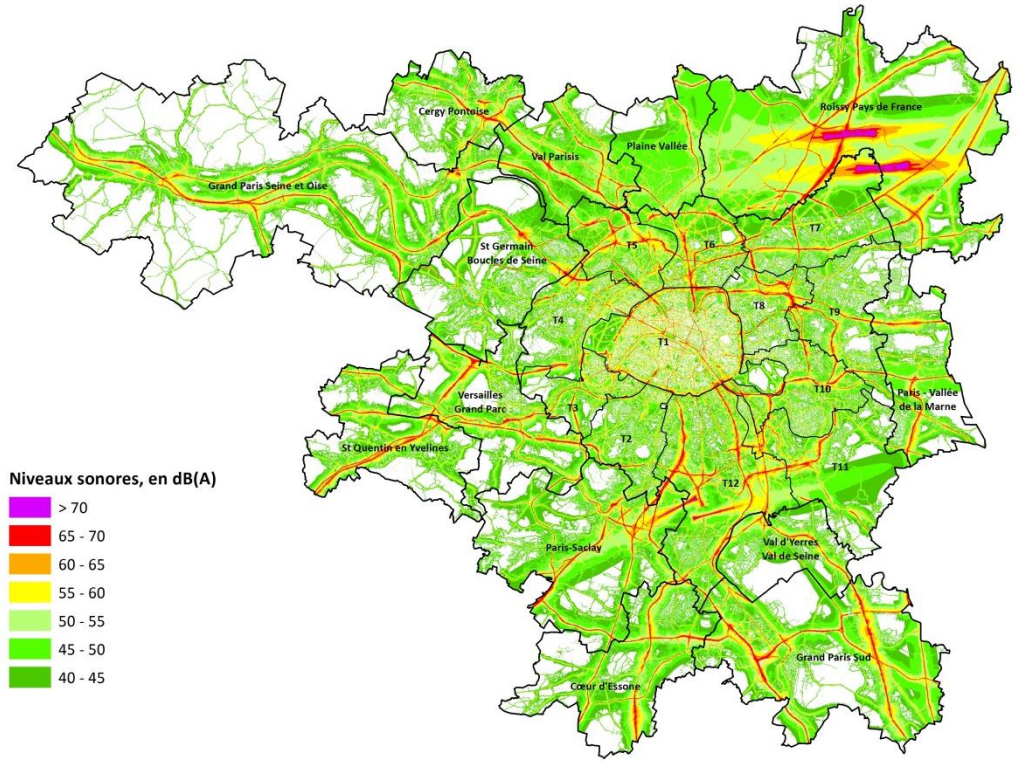
CUMULATED TRANSPORT NOISE - NOISE LEVELS

INDICATOR LDEN



Sources : IAU-IdF, ©IGN-2014

INDICATOR LN



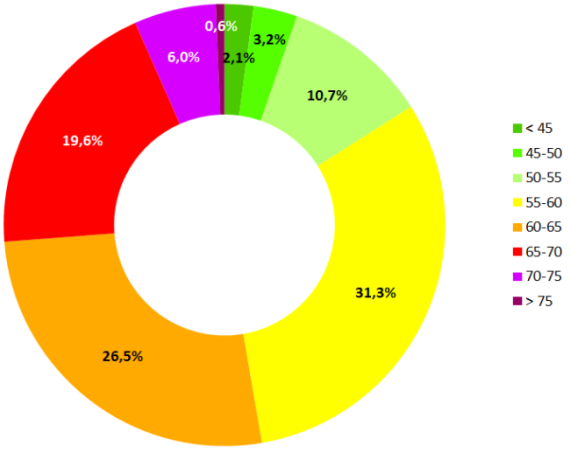
Sources : IAU-IdF, ©IGN-2014

CUMULATED TRANSPORT NOISE - STATISTICS BY RANGE OF NOISE LEVELS

INDICATOR LDEN

POPULATION

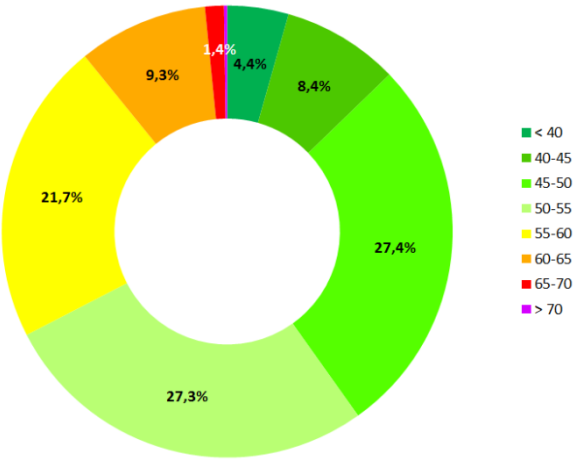
	Nombre d'habitants (à la centaine près)	%
> 75	63 900	0,6%
70-75	605 400	6,0%
65-70	1 978 500	19,6%
60-65	2 678 300	26,5%
55-60	3 160 300	31,3%
50-55	1 079 800	10,7%
45-50	324 500	3,2%
< 45	213 700	2,1%



INDICATOR LN

POPULATION

	Nombre d'habitants (à la centaine près)	%
> 70	23 000	0,2%
65-70	136 400	1,4%
60-65	939 500	9,3%
55-60	2 190 900	21,7%
50-55	2 758 100	27,3%
45-50	2 764 700	27,4%
40-45	847 400	8,4%
< 40	444 200	4,4%



CUMULATED TRANSPORT NOISE - PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN POPULATION

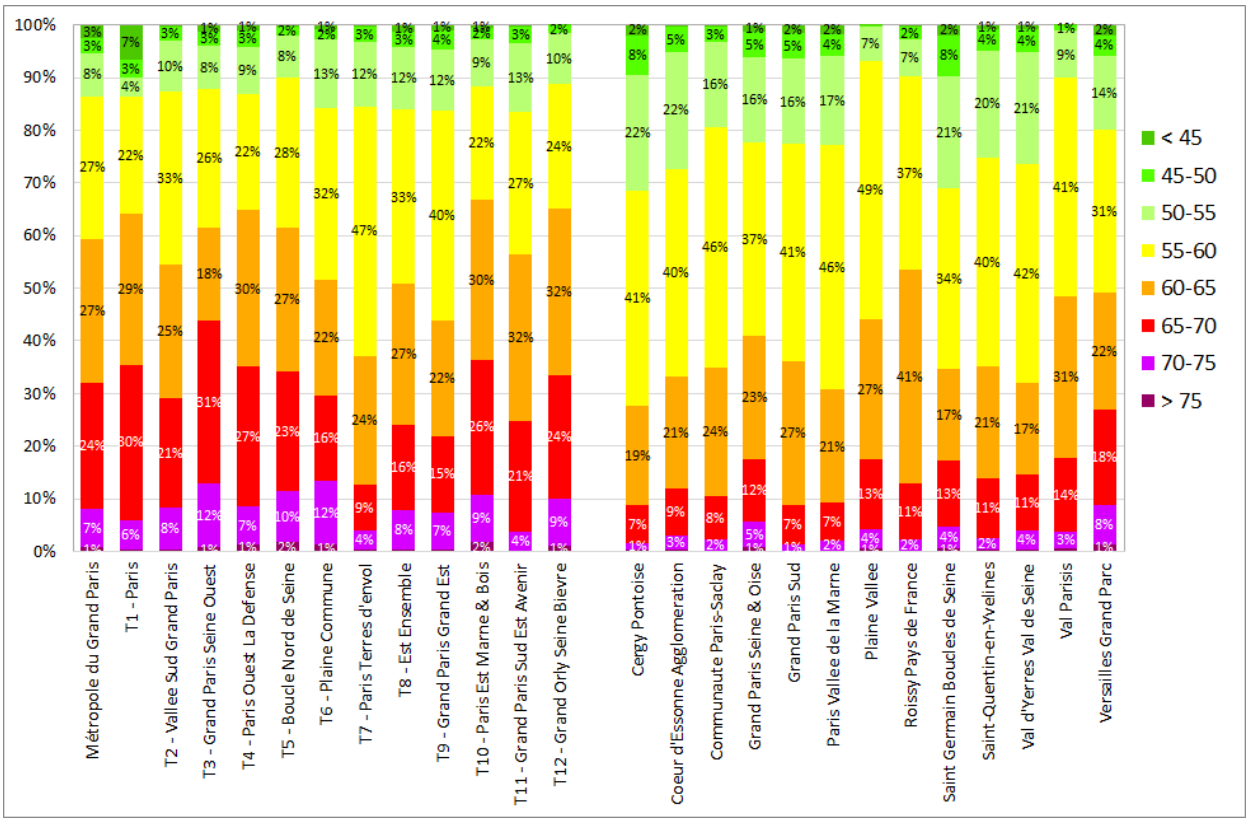
Nombre d'habitants (à la centaine près)	< 45	45-50	50-55	55-60	60-65	65-70	70-75	> 75
Métropole du Grand Paris	**177 100**	**186 500**	**553 900**	**1 838 000**	**1 857 600**	**1 614 700**	**499 500**	**48 600**
T1 - Paris	*146 700*	*72 700*	*80 000*	*486 500*	*626 200*	*647 700*	*123 300*	*6 000*
T2 - Vallee Sud Grand Paris	*1 600*	*9 800*	*37 300*	*125 500*	*96 600*	*79 200*	*30 900*	*900*
T3 - Grand Paris Seine Ouest	*3 500*	*8 400*	*24 200*	*78 500*	*52 500*	*92 300*	*36 300*	*2 200*
T4 - Paris Ouest La Defense	*5 400*	*18 200*	*48 900*	*121 800*	*163 800*	*146 400*	*39 600*	*7 400*
T5 - Boucle Nord de Seine	*1 200*	*7 500*	*33 100*	*118 700*	*114 000*	*95 100*	*40 600*	*7 300*
T6 - Plaine Commune	*3 200*	*7 300*	*52 400*	*128 400*	*86 900*	*64 400*	*47 900*	*5 000*
T7 - Paris Terres d'envol	*1 300*	*9 400*	*42 100*	*160 700*	*83 100*	*29 700*	*12 800*	*800*
T8 - Est Ensemble	*5 300*	*11 000*	*46 800*	*129 200*	*104 000*	*63 000*	*29 400*	*1 700*
T9 - Grand Paris Grand Est	*3 600*	*13 600*	*42 700*	*146 900*	*81 300*	*53 600*	*26 100*	*1 200*
T10 - Paris Est Marne & Bois	*3 300*	*9 700*	*44 600*	*106 300*	*149 200*	*126 600*	*44 600*	*8 300*
T11 - Grand Paris Sud Est Avenir	*1 200*	*9 100*	*38 700*	*81 000*	*93 800*	*62 900*	*10 500*	*400*
T12 - Grand-Orly Seine Bievre	*800*	*9 800*	*63 100*	*154 500*	*206 200*	*153 900*	*57 300*	*7 400*
Cergy Pontoise	**3 900**	**15 000**	**43 000**	**80 100**	**37 100**	**14 000**	**2 500**	**700**
Coeur d'Essonne Agglomeration	**800**	**8 600**	**41 000**	**73 000**	**39 200**	**16 500**	**4 700**	**800**
Communaute Paris-Saclay	**1 200**	**8 100**	**45 900**	**130 800**	**69 900**	**23 500**	**5 700**	**600**
Grand Paris Seine & Oise	**5 300**	**19 100**	**62 900**	**143 900**	**91 400**	**46 800**	**18 300**	**3 300**
Grand Paris Sud	**5 100**	**15 500**	**51 200**	**130 600**	**86 800**	**23 500**	**4 100**	**400**
Paris Vallee de la Marne	**3 600**	**9 100**	**37 000**	**101 200**	**46 700**	**15 500**	**4 400**	**200**
Plaine Vallee	-	**400**	**11 400**	**85 900**	**46 300**	**23 000**	**6 500**	**900**
Roissy Pays de France	**1 500**	**7 600**	**23 400**	**122 100**	**135 000**	**35 000**	**7 000**	**600**
Saint Germain Boucles de Seine	**6 300**	**25 500**	**70 500**	**112 600**	**57 500**	**41 400**	**13 500**	**1 800**
Saint-Quentin-en-Yvelines	**2 000**	**8 900**	**45 300**	**89 100**	**47 800**	**25 000**	**5 200**	**600**
Val d'Yerres Val de Seine	**1 400**	**7 400**	**35 200**	**69 200**	**29 100**	**17 700**	**6 000**	**500**
Val Parisis	**400**	**2 500**	**22 200**	**103 200**	**76 400**	**34 600**	**8 300**	**1 200**
Versailles Grand Parc	**5 000**	**10 200**	**36 800**	**80 700**	**57 600**	**47 300**	**19 600**	**3 500**

INDICATOR LN POPULATION

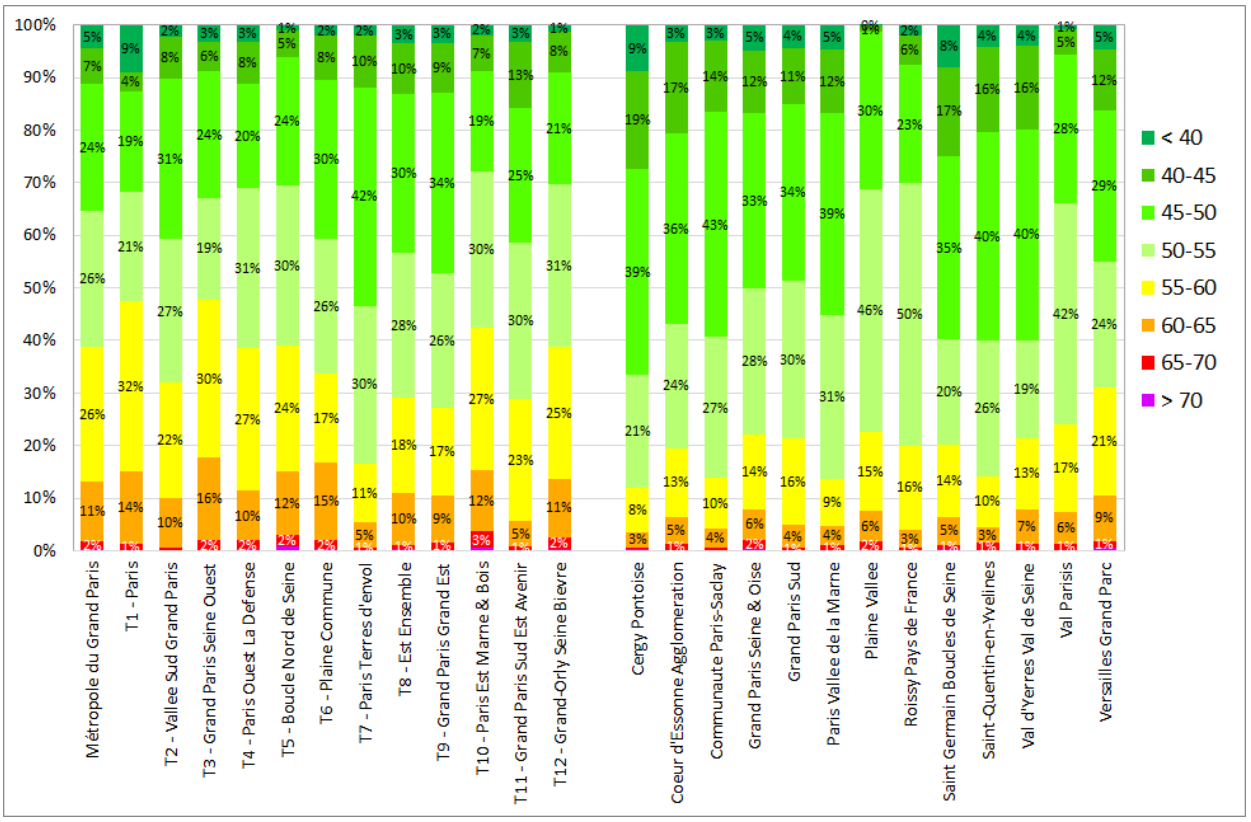
Nombre d'habitants (à la centaine près)	< 40	40-45	45-50	50-55	55-60	60-65	65-70	> 70
Métropole du Grand Paris	**305 300**	**452 100**	**1 635 100**	**1 756 700**	**1 731 700**	**776 100**	**102 800**	**16 200**
T1 - Paris	195 400	79 900	419 700	457 200	707 400	298 900	28 300	2 500
T2 - Vallee Sud Grand Paris	8 200	30 400	117 000	104 300	83 200	36 700	1 600	300
T3 - Grand Paris Seine Ouest	9 600	16 800	71 700	57 400	89 700	46 600	5 900	200
T4 - Paris Ouest La Defense	18 300	43 000	110 000	168 200	148 800	52 500	8 900	1 700
T5 - Boucle Nord de Seine	4 800	20 600	102 200	127 300	99 700	50 900	8 400	3 700
T6 - Plaine Commune	8 000	33 600	118 900	102 100	66 100	59 000	6 800	1 000
T7 - Paris Terres d'envol	7 300	33 000	141 200	102 200	38 200	15 800	1 700	500
T8 - Est Ensemble	13 600	38 100	117 400	107 500	71 200	38 000	3 500	1 000
T9 - Grand Paris Grand Est	12 600	35 100	126 700	94 700	61 000	33 000	5 400	600
T10 - Paris Est Marne & Bois	9 900	33 500	94 400	145 800	133 500	57 600	15 500	2 400
T11 - Grand Paris Sud Est Avenir	9 800	37 500	75 700	88 500	69 400	14 400	2 100	300
T12 - Grand-Orly Seine Bievre	7 800	50 600	140 200	201 500	163 400	72 700	14 700	2 100
Cergy Pontoise	**17 300**	**36 300**	**77 100**	**42 200**	**16 500**	**5 700**	**900**	**400**
Coeur d'Essonne Agglomeration	**6 200**	**32 000**	**66 700**	**43 600**	**24 300**	**9 200**	**2 100**	**400**
Communaute Paris-Saclay	**8 600**	**38 900**	**122 000**	**76 700**	**27 400**	**10 500**	**1 300**	**100**
Grand Paris Seine & Oise	**19 000**	**46 800**	**130 100**	**108 700**	**55 500**	**22 800**	**6 600**	**1 700**
Grand Paris Sud	**13 700**	**34 300**	**106 600**	**95 200**	**52 100**	**13 300**	**1 800**	**200**
Paris Vallee de la Marne	**10 300**	**26 100**	**84 000**	**67 700**	**19 400**	**8 300**	**1 900**	**200**
Plaine Vallee	**300**	**2 100**	**52 100**	**80 500**	**26 400**	**10 200**	**2 700**	**200**
Roissy Pays de France	**6 800**	**18 600**	**74 800**	**165 400**	**53 400**	**11 200**	**1 900**	**100**
Saint Germain Boucles de Seine	**26 200**	**55 900**	**114 700**	**66 400**	**44 700**	**17 500**	**2 700**	**1 000**
Saint-Quentin-en-Yvelines	**9 400**	**36 000**	**89 100**	**57 500**	**21 800**	**6 600**	**3 300**	**100**
Val d'Yerres Val de Seine	**6 700**	**26 300**	**66 600**	**31 100**	**22 400**	**11 000**	**1 900**	**300**
Val Parisis	**2 100**	**11 800**	**70 700**	**104 200**	**41 800**	**14 700**	**3 000**	**500**
Versailles Grand Parc	**12 100**	**30 300**	**75 200**	**62 100**	**53 600**	**22 400**	**3 300**	**1 700**

CUMULATED TRANSPORT NOISE - PER AGGLOMERATION BY RANGE OF NOISE LEVELS

INDICATOR LDEN PERCENTAGE OF POPULATION

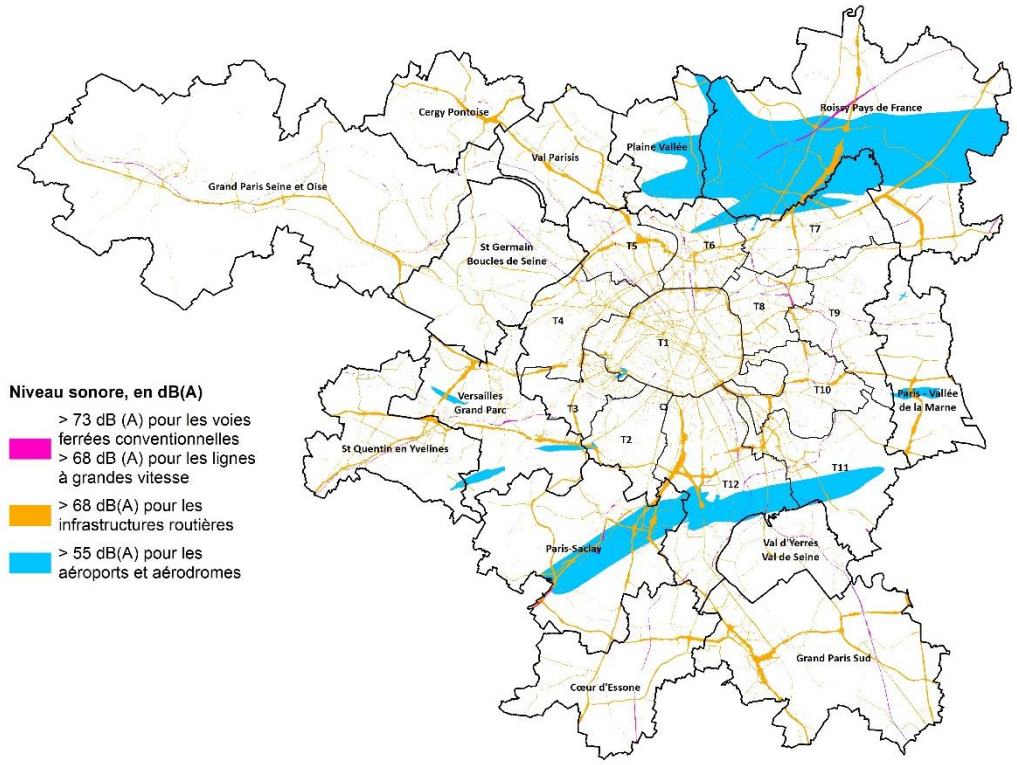


INDICATOR LN PERCENTAGE OF POPULATION



CUMULATED TRANSPORT NOISE - EXCEEDANCE OF LIMIT VALUES

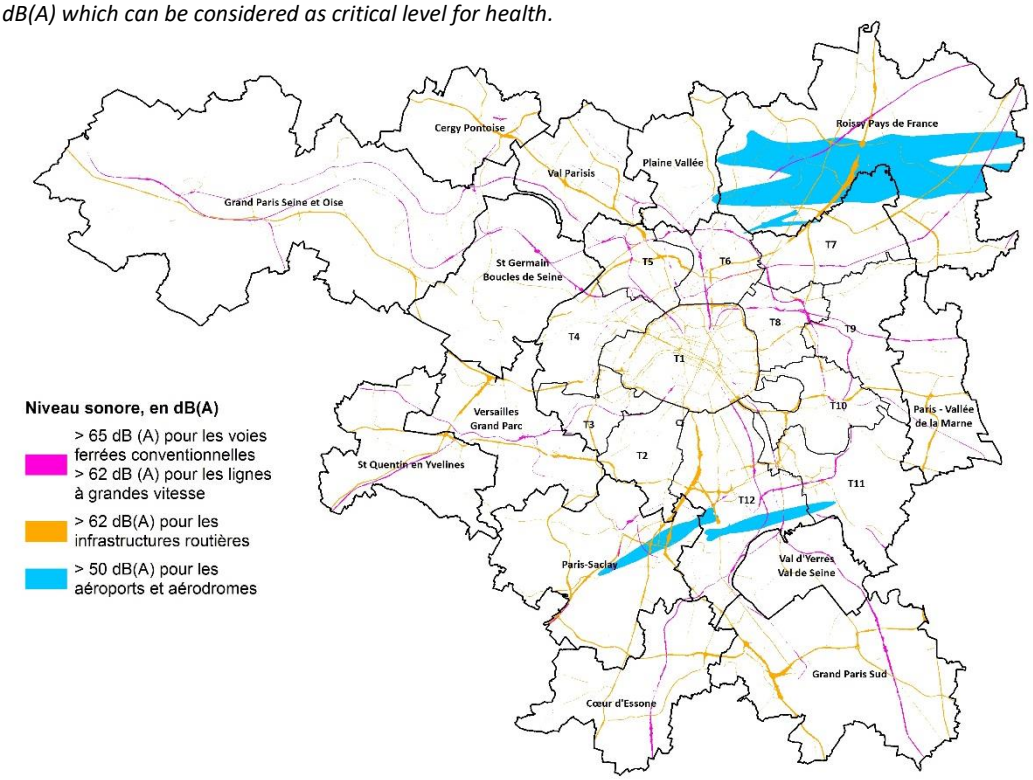
INDICATOR LDEN > LV ROAD, RAIL OR AIR AREAS OF EXCEEDANCE



Sources : IAU-IdF, ©IGN-2014

INDICATOR LN > LV ROAD, RAIL OU AIR* AREAS OF EXCEEDANCE

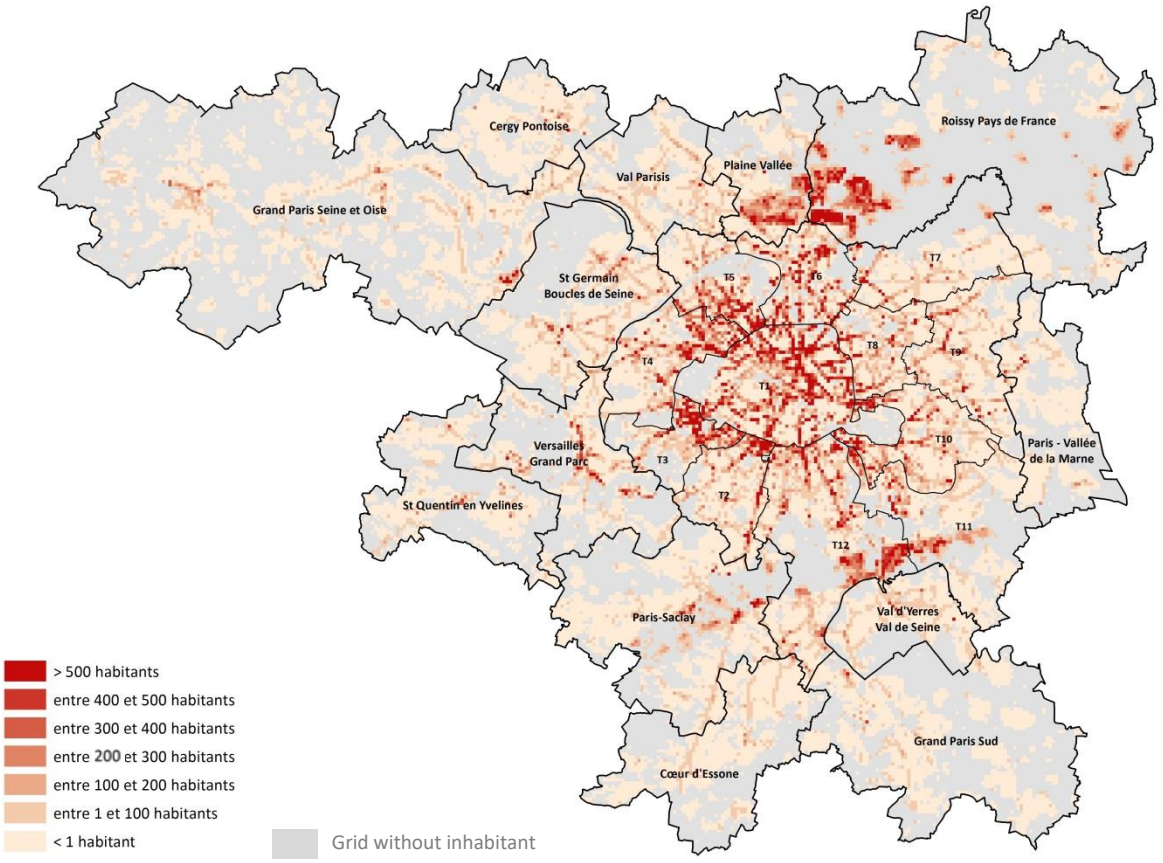
** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



Sources : IAU-IdF, ©IGN-2014

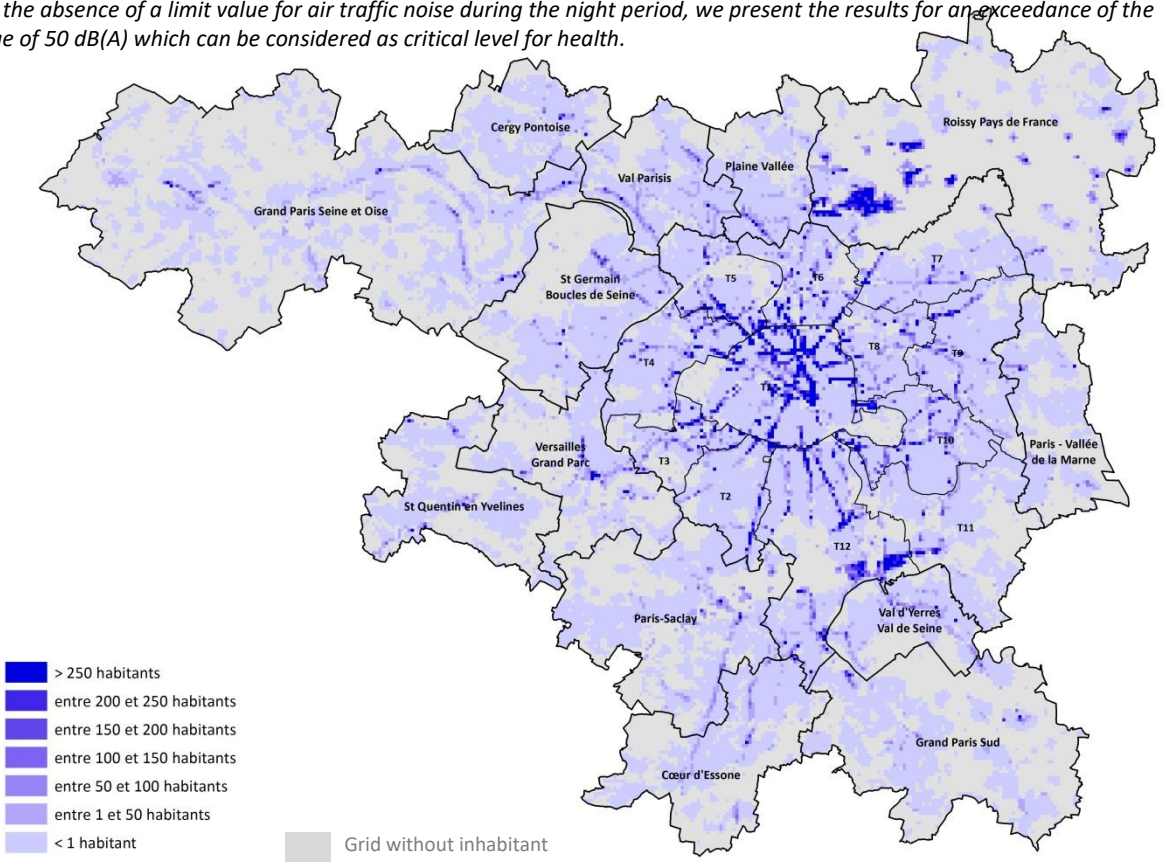
CUMULATED TRANSPORT NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > LV ROAD, RAIL OR AIR PER GRID OF 250 m



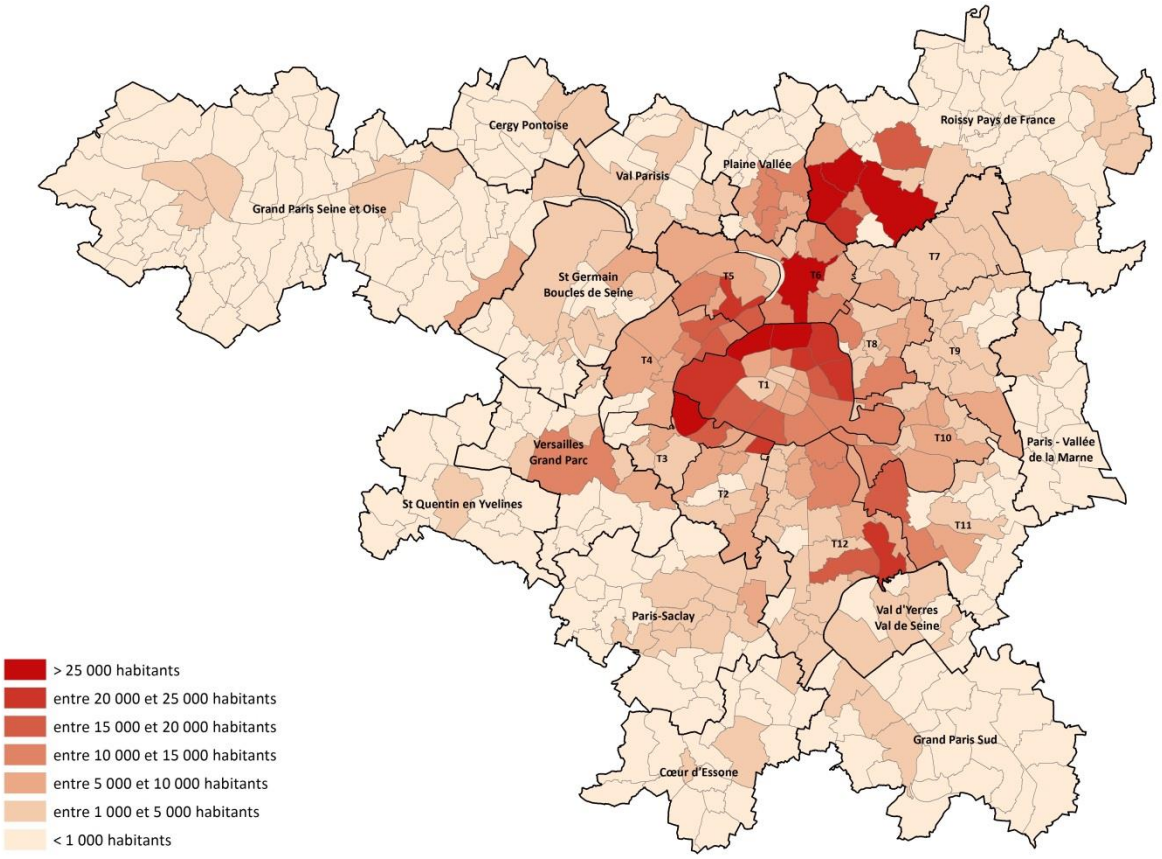
INDICATOR LN > LV ROAD, RAIL OR AIR* PER GRID OF 250 m

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



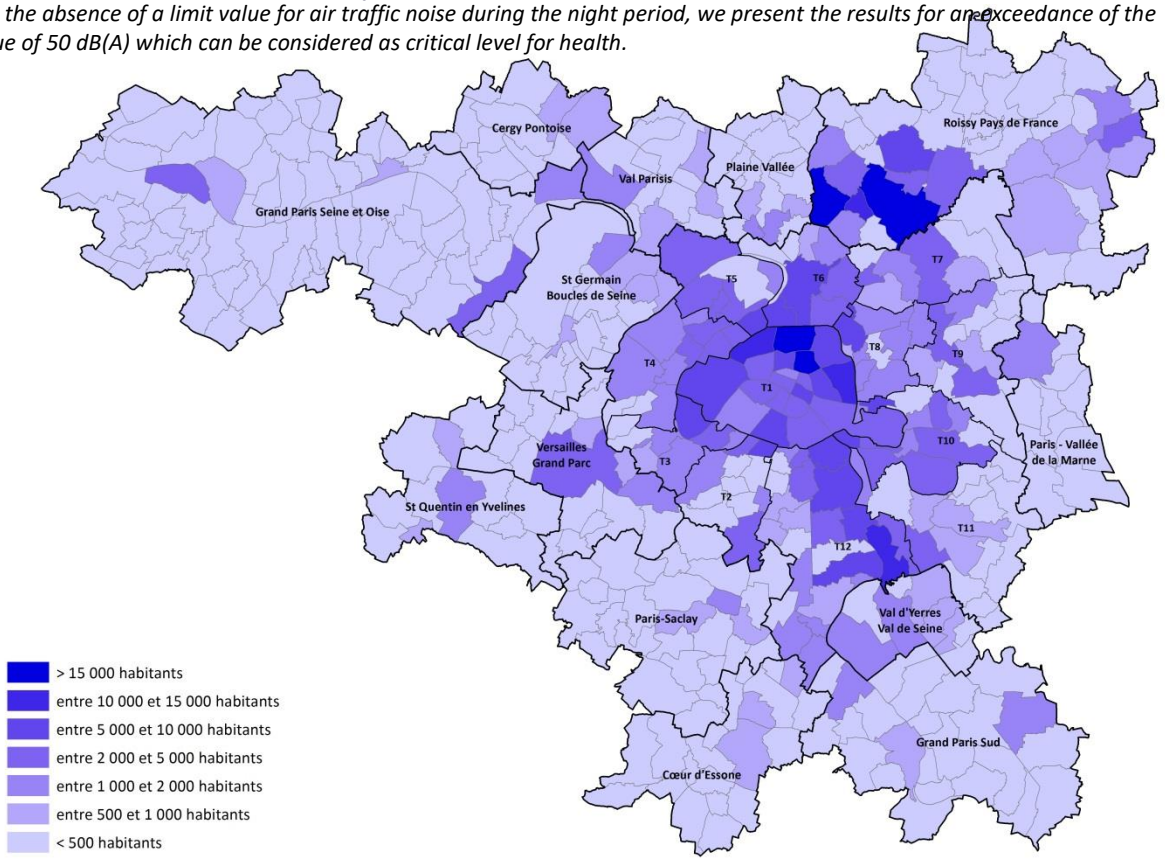
CUMULATED TRANSPORT NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > LV ROAD, RAIL OR AIR POPULATION PER COMMUNE LEVEL



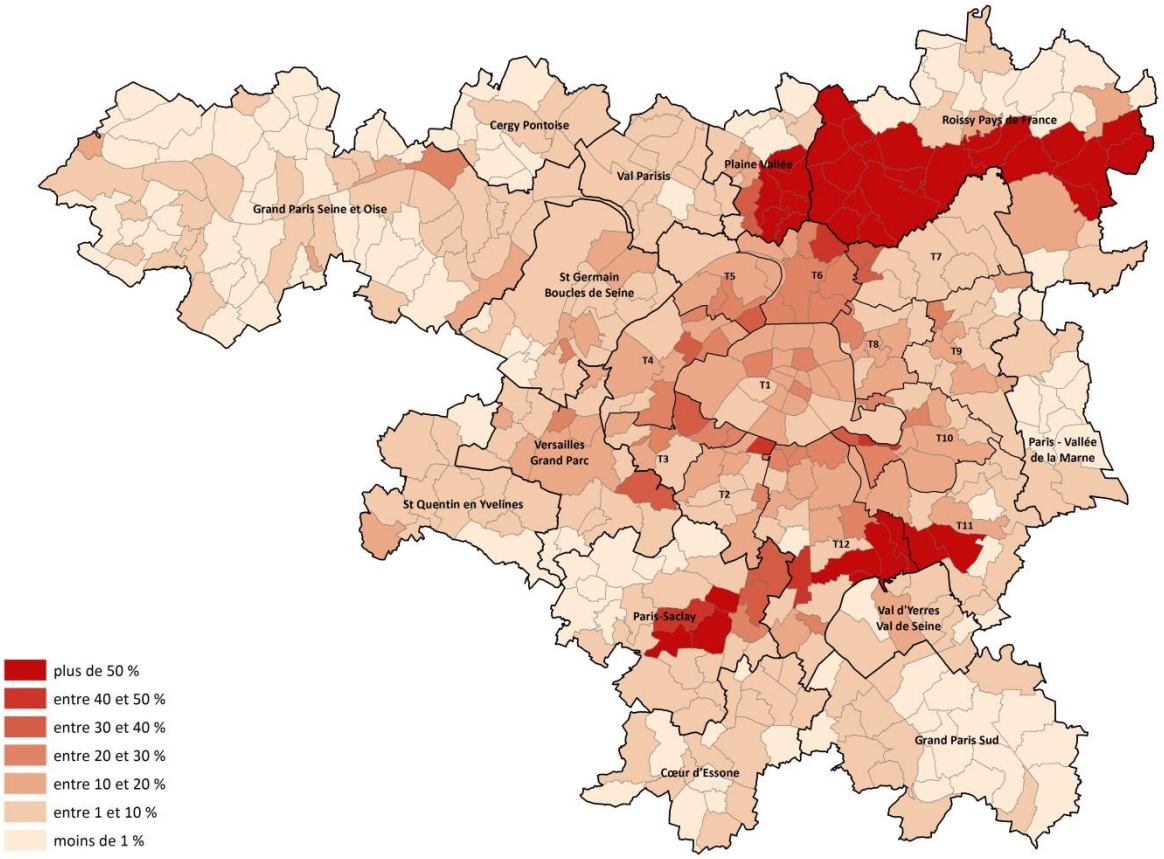
INDICATOR LN > LV ROAD, RAIL OR AIR * POPULATION PER COMMUNE LEVEL

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



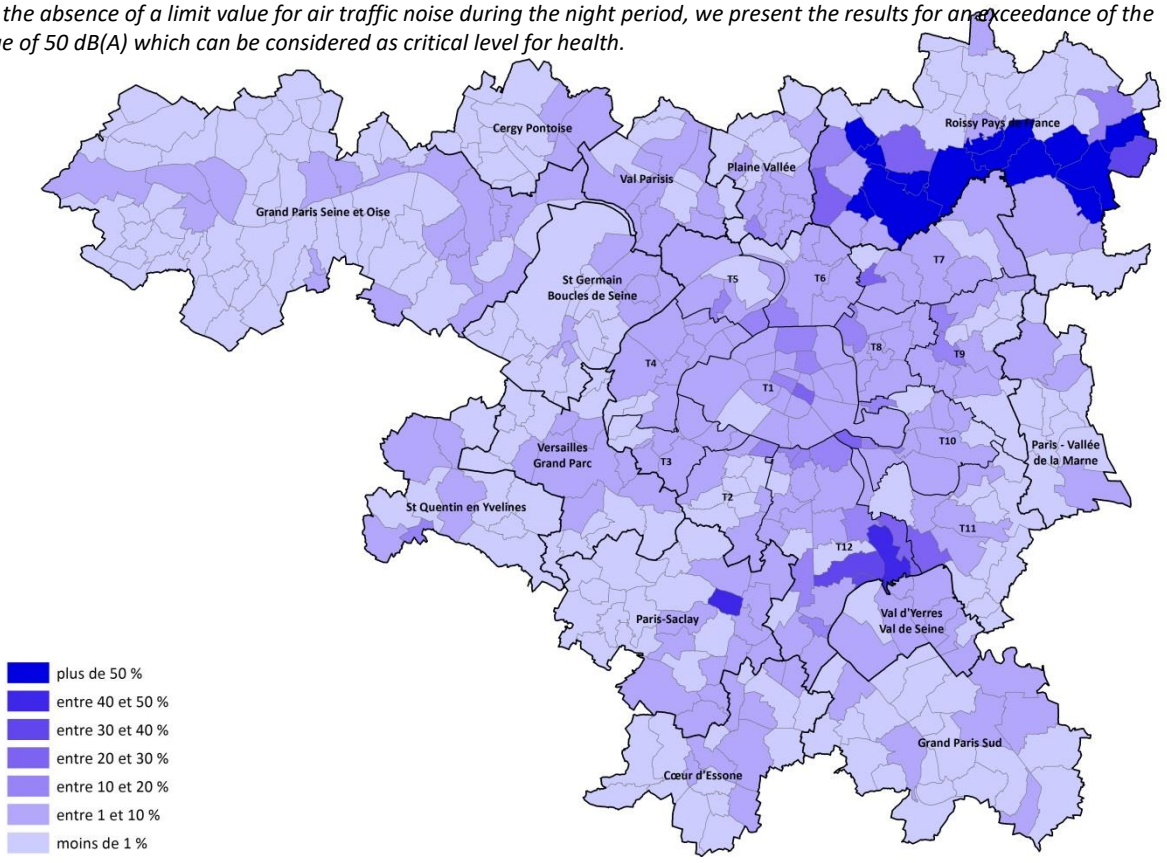
CUMULATED TRANSPORT NOISE - EXCEEDANCE OF LIMIT VALUES

INDICATOR LDEN > VL IN PERCENTAGE PER COMMUNE LEVEL



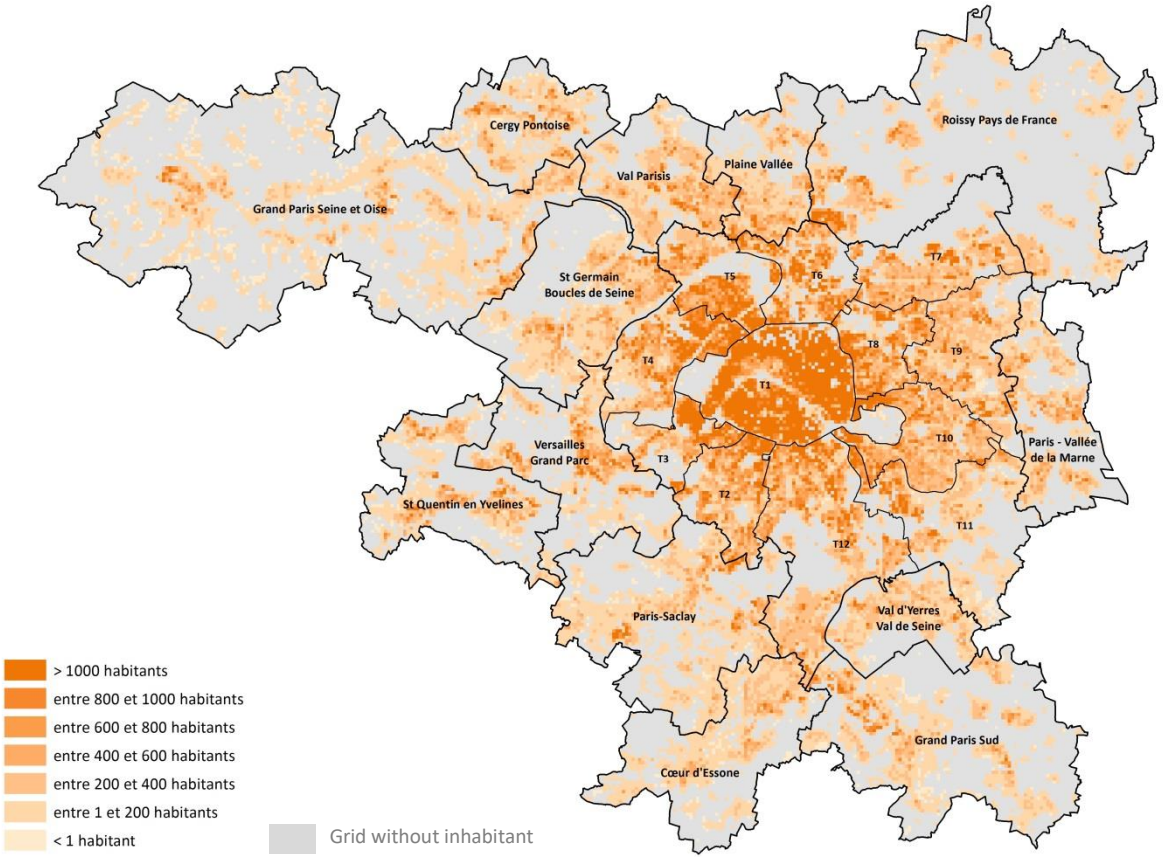
INDICATOR LN > VL* IN PERCENTAGE PER COMMUNE LEVEL

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*

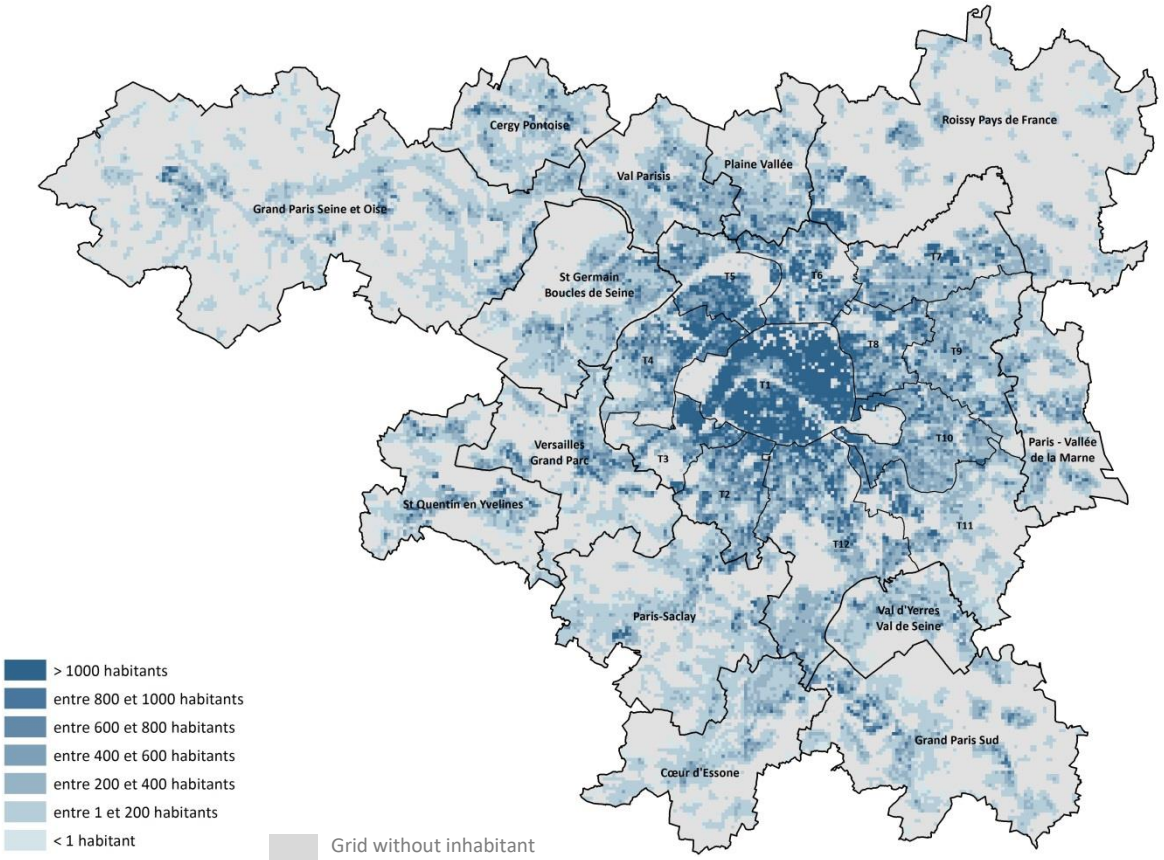


CUMULATED TRANSPORT NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > GUIDELINES PER GRID OF 250 m

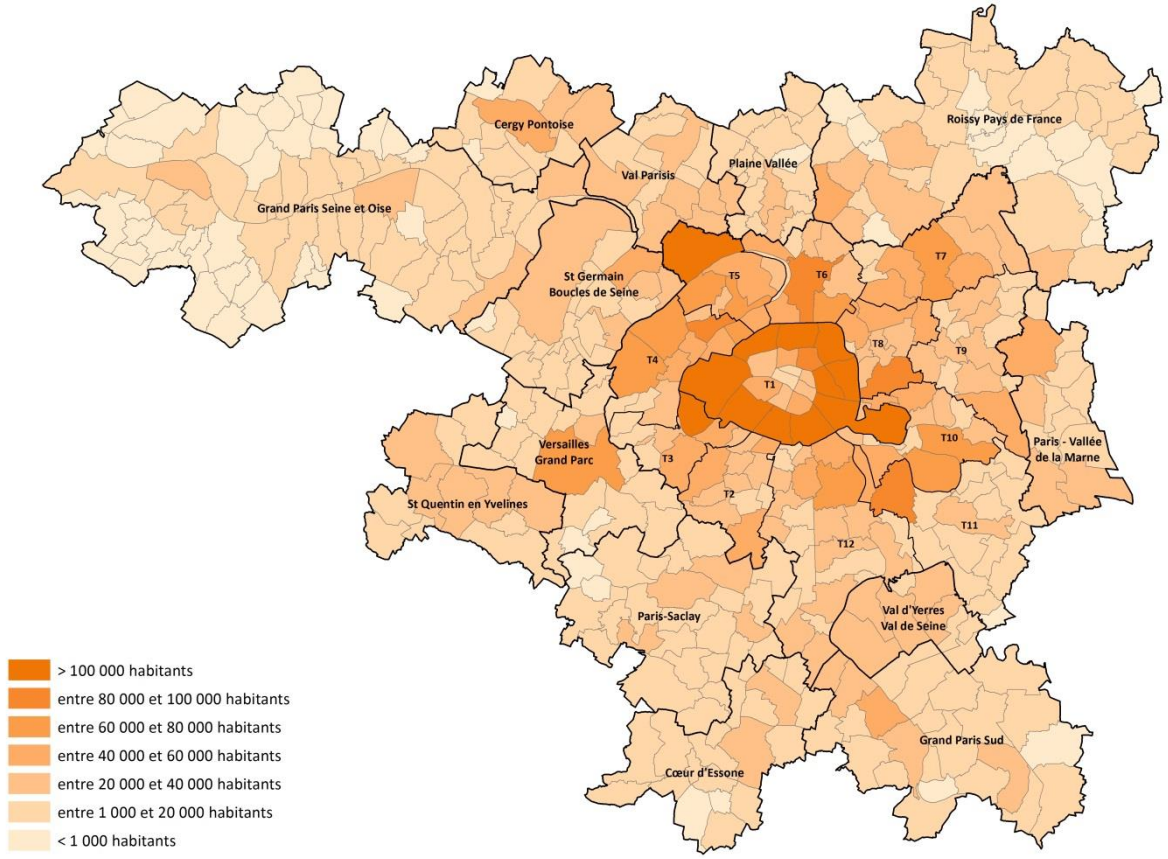


INDICATOR LN > GUIDELINES PER GRID OF 250 m

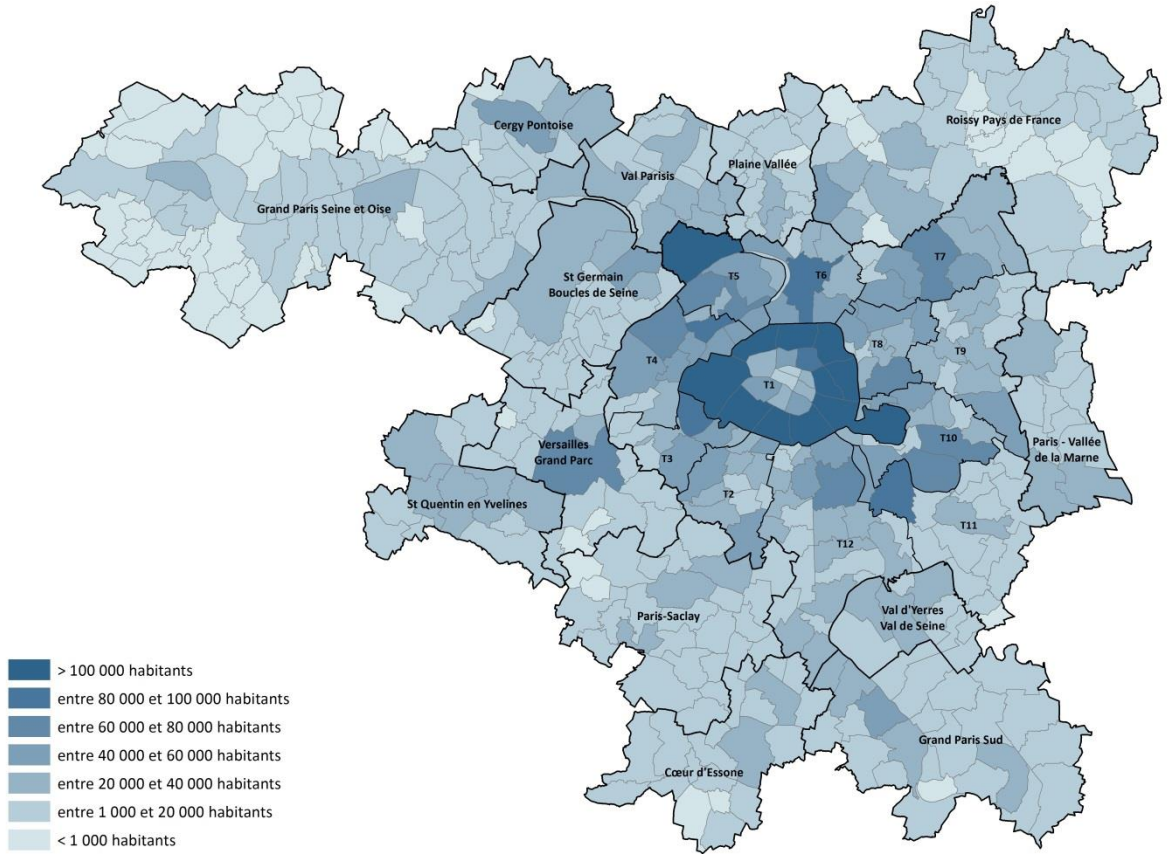


CUMULATED TRANSPORT NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > GUIDELINES POPULATION PER COMMUNE LEVEL

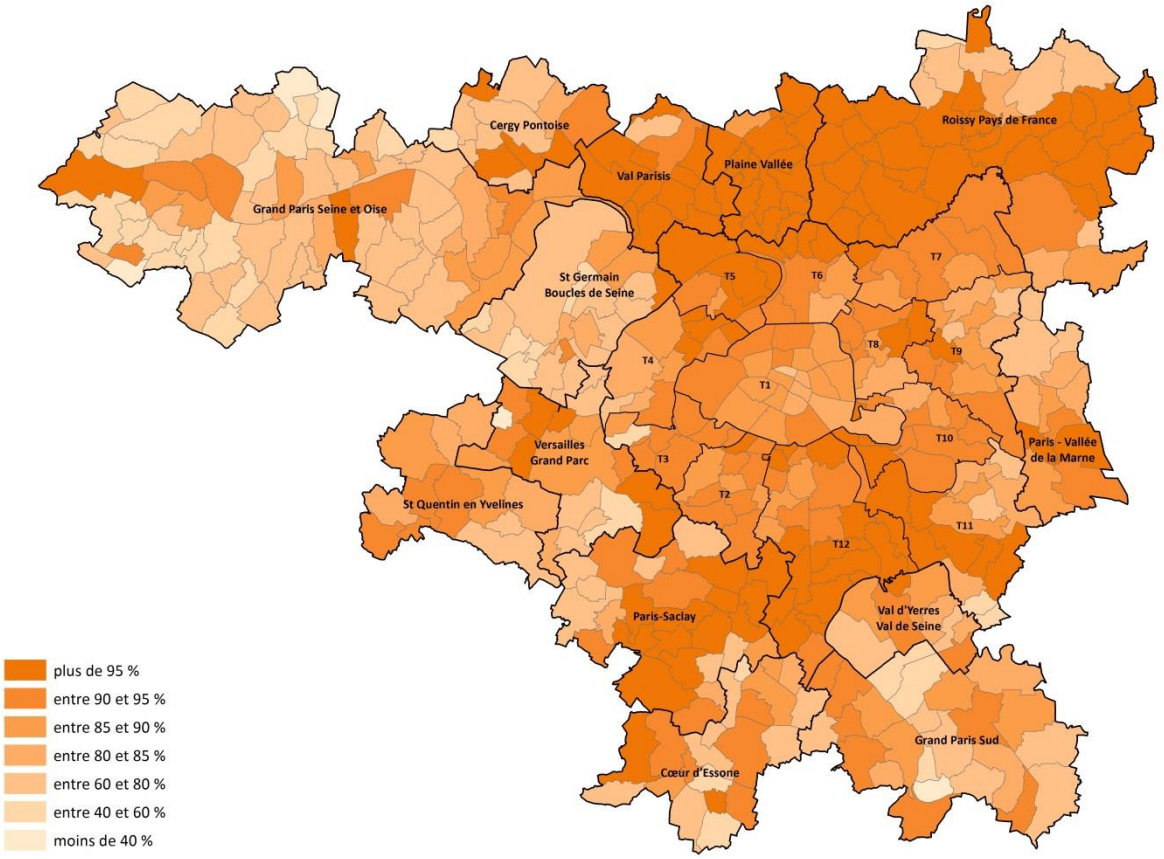


INDICATOR LN > GUIDELINES POPULATION PER COMMUNE LEVEL

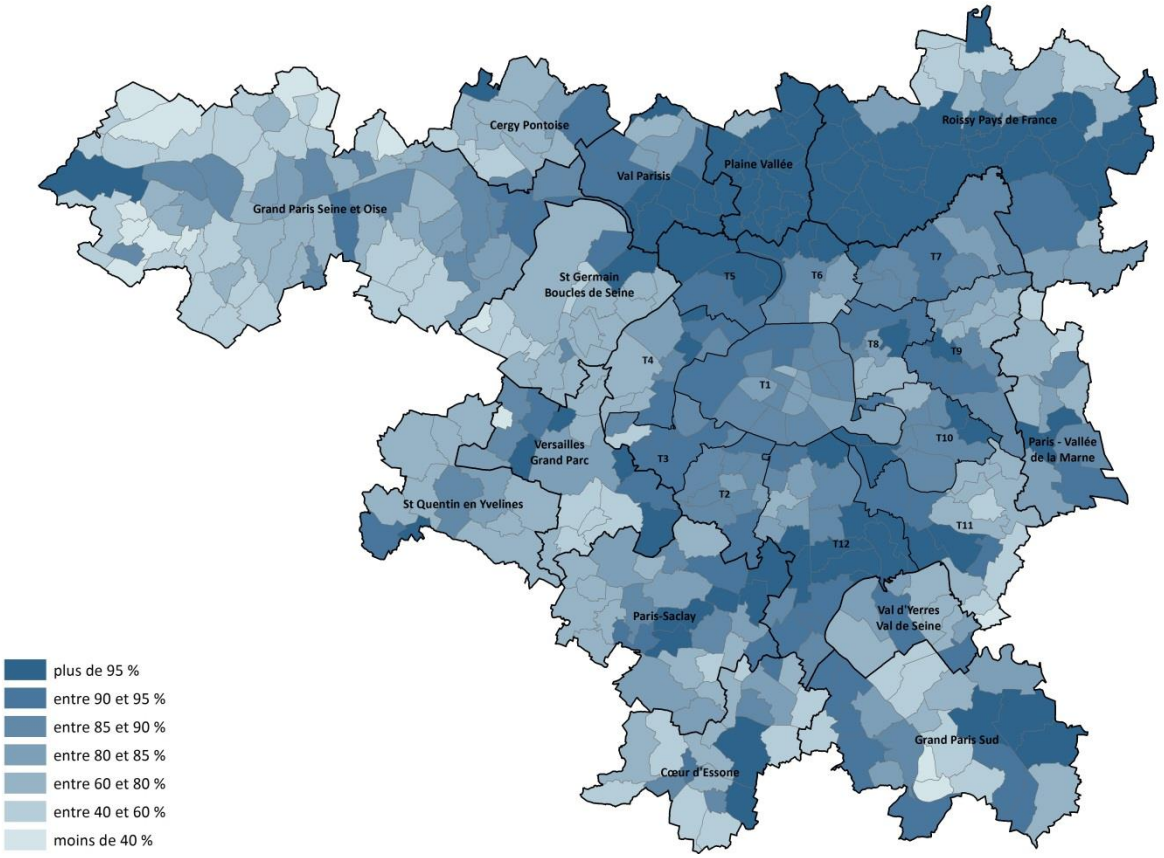


CUMULATED TRANSPORT NOISE - EXCEEDANCE OF WHO GUIDELINES

INDICATOR LDEN > GUIDELINES IN PERCENTAGE PER COMMUNE LEVEL



INDICATOR LN > GUIDELINES IN PERCENTAGE PER COMMUNE LEVEL

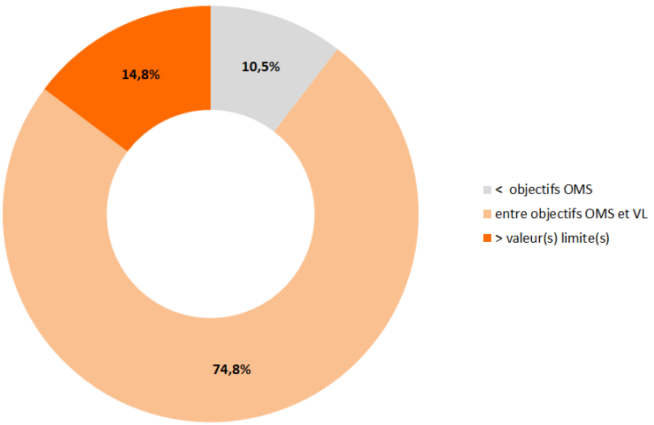


CUMULATED TRANSPORT NOISE - STATISTICS COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN

POPULATION

	Nombre d'habitants (à la centaine près)	%
< objectifs OMS	1 056 000	10,5%
entre objectifs OMS et VL	7 557 500	74,8%
> valeur(s) limite(s)	1 490 800	14,8%

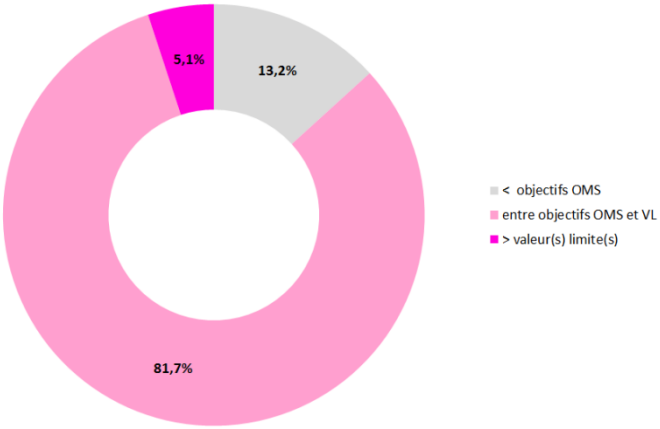


INDICATOR LN

POPULATION

	Nombre d'habitants (à la centaine près)	%
< objectifs OMS	1 338 800	13,2%
entre objectifs OMS et VL	8 254 600	81,7%
> valeur(s) limite(s)	510 900	5,1%

** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*



CUMULATED TRANSPORT NOISE - PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN POPULATION

Nombre d'habitants (à la centaine près)	< objectifs OMS	entre objectifs OMS et VL	> valeur(s) limite(s)
Métropole du Grand Paris	**635 700**	**5 077 900**	**1 062 400**
T1 - Paris	*266 100*	*1 642 000*	*281 100*
T2 - Vallee Sud Grand Paris	*30 100*	*293 700*	*58 100*
T3 - Grand Paris Seine Ouest	*26 900*	*194 600*	*76 300*
T4 - Paris Ouest La Defense	*49 600*	*409 200*	*92 600*
T5 - Boucle Nord de Seine	*18 100*	*325 400*	*74 000*
T6 - Plaine Commune	*26 100*	*276 800*	*92 500*
T7 - Paris Terres d'envol	*29 300*	*283 900*	*26 600*
T8 - Est Ensemble	*39 500*	*302 900*	*47 900*
T9 - Grand Paris Grand Est	*42 400*	*290 500*	*36 200*
T10 - Paris Est Marne & Bois	*39 900*	*371 000*	*81 700*
T11 - Grand Paris Sud Est Avenir	*27 800*	*219 000*	*51 000*
T12 - Grand-Orly Seine Bievre	*39 800*	*468 800*	*144 500*
Cergy Pontoise	**34 700**	**157 500**	**4 200**
Coeur d'Essonne Agglomeration	**29 900**	**148 200**	**6 300**
Communaute Paris-Saclay	**25 100**	**226 700**	**33 800**
Grand Paris Seine & Oise	**65 000**	**300 800**	**25 300**
Grand Paris Sud	**52 600**	**258 300**	**6 400**
Paris Vallee de la Marne	**32 600**	**178 800**	**6 400**
Plaine Vallee	**600**	**106 000**	**67 900**
Roissy Pays de France	**18 100**	**124 100**	**190 000**
Saint Germain Boucles de Seine	**66 200**	**237 300**	**25 600**
Saint-Quentin-en-Yvelines	**30 800**	**185 300**	**7 900**
Val d'Yerres Val de Seine	**24 900**	**132 300**	**9 100**
Val Parisis	**4 100**	**232 700**	**11 900**
Versailles Grand Parc	**35 700**	**191 400**	**33 600**

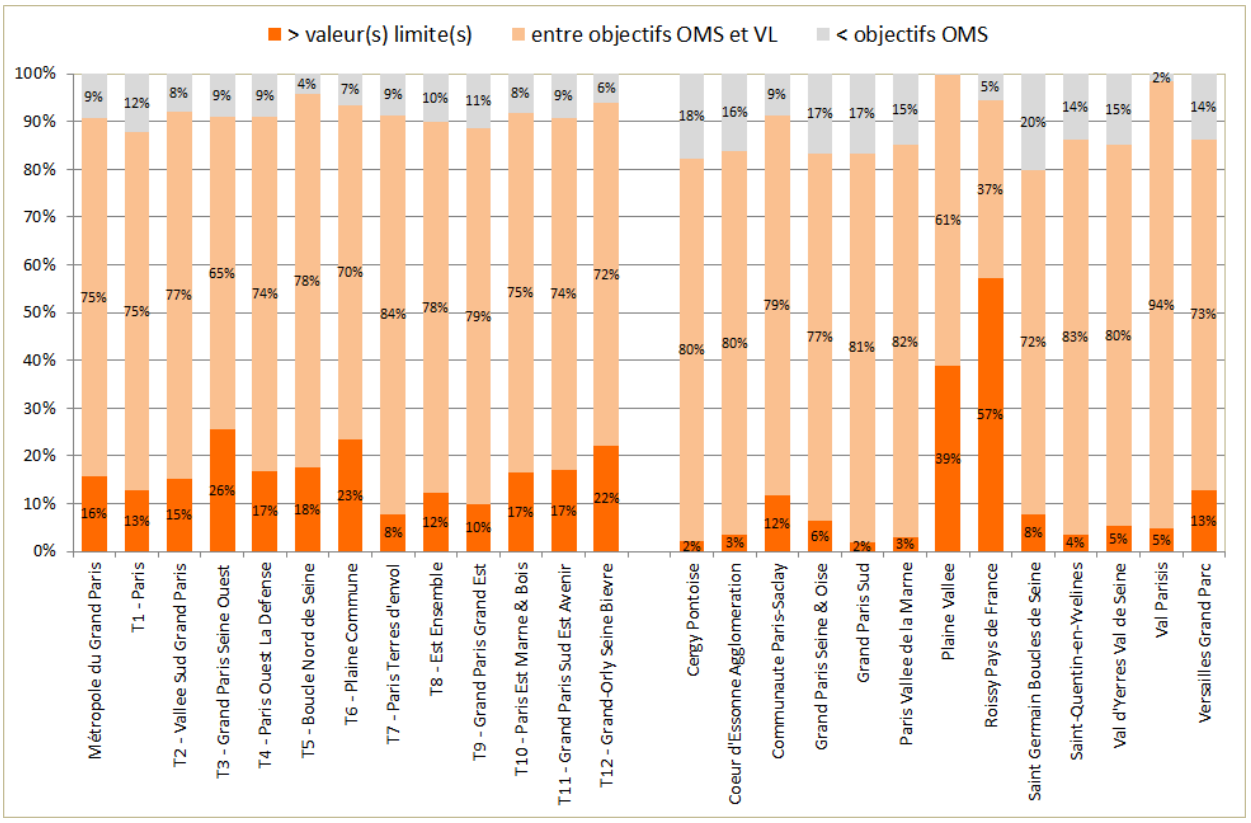
INDICATOR LN POPULATION

Nombre d'habitants (à la centaine près)	< objectifs OMS	entre objectifs OMS et VL	> valeur(s) limite(s)*
Métropole du Grand Paris	**779 900**	**5 618 600**	**377 500**
T1 - Paris	*278 000*	*1 775 200*	*136 100*
T2 - Vallee Sud Grand Paris	*41 500*	*324 100*	*16 200*
T3 - Grand Paris Seine Ouest	*30 000*	*251 200*	*16 600*
T4 - Paris Ouest La Defense	*65 900*	*464 000*	*21 500*
T5 - Boucle Nord de Seine	*21 300*	*374 500*	*21 700*
T6 - Plaine Commune	*39 700*	*331 300*	*24 400*
T7 - Paris Terres d'envol	*40 400*	*291 200*	*8 200*
T8 - Est Ensemble	*53 700*	*320 900*	*15 700*
T9 - Grand Paris Grand Est	*51 300*	*305 600*	*12 200*
T10 - Paris Est Marne & Bois	*51 300*	*409 400*	*31 900*
T11 - Grand Paris Sud Est Avenir	*46 100*	*243 600*	*8 100*
T12 - Grand-Orly Seine Bievre	*60 700*	*527 500*	*64 900*
Cergy Pontoise	**56 300**	**138 000**	**2 000**
Coeur d'Essonne Agglomeration	**40 000**	**141 200**	**3 300**
Communaute Paris-Saclay	**48 800**	**231 400**	**5 400**
Grand Paris Seine & Oise	**74 600**	**306 500**	**10 000**
Grand Paris Sud	**50 900**	**262 400**	**3 900**
Paris Vallee de la Marne	**39 000**	**176 300**	**2 400**
Plaine Vallee	**2 000**	**167 300**	**5 300**
Roissy Pays de France	**25 000**	**233 400**	**73 900**
Saint Germain Boucles de Seine	**81 900**	**241 700**	**5 500**
Saint-Quentin-en-Yvelines	**48 900**	**171 400**	**3 500**
Val d'Yerres Val de Seine	**35 200**	**126 700**	**4 500**
Val Parisis	**10 700**	**232 700**	**5 500**
Versailles Grand Parc	**45 600**	**207 000**	**8 100**

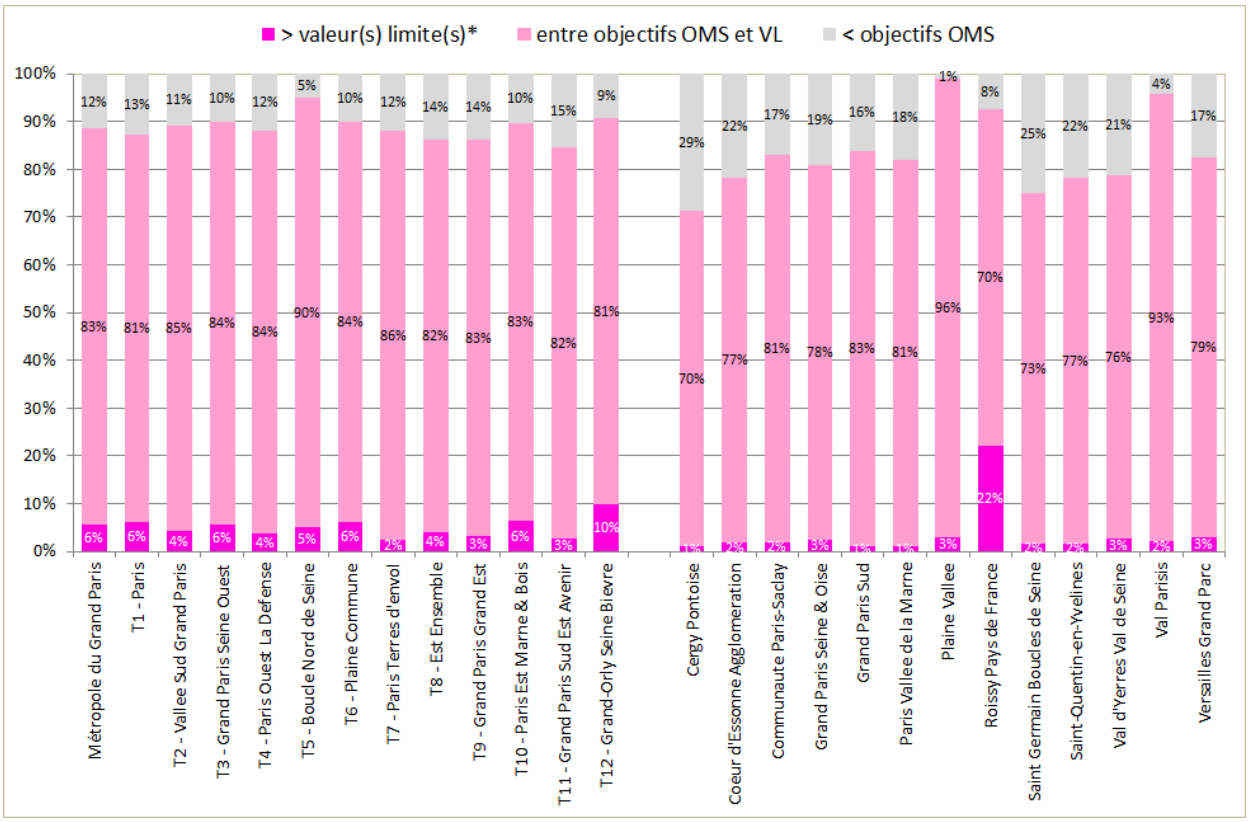
** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*

CUMULATED TRANSPORT NOISE - PER AGGLOMERATION COMPARISON WITH THE REFERENCE VALUES

INDICATOR LDEN PERCENTAGE OF POPULATION



INDICATOR LN PERCENTAGE OF POPULATION

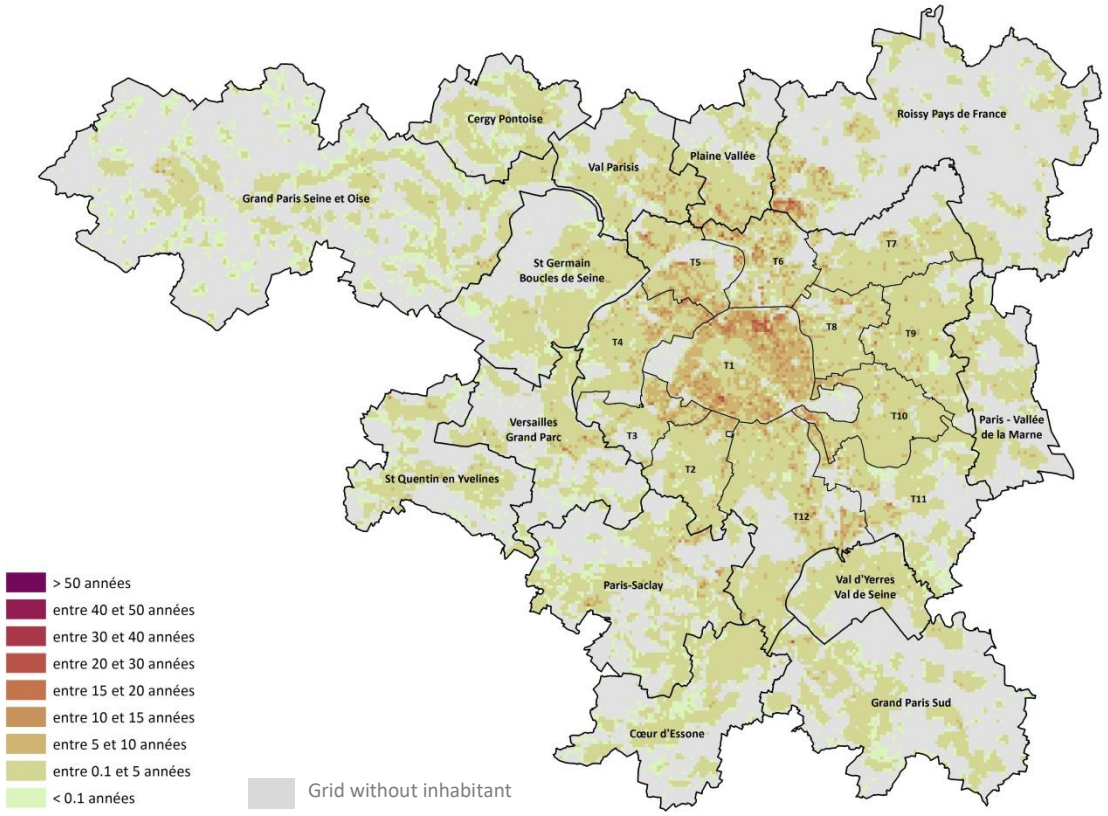


** In the absence of a limit value for air traffic noise during the night period, we present the results for an exceedance of the value of 50 dB(A) which can be considered as critical level for health.*

CUMULATED TRANSPORT NOISE - HEALTH IMPACT

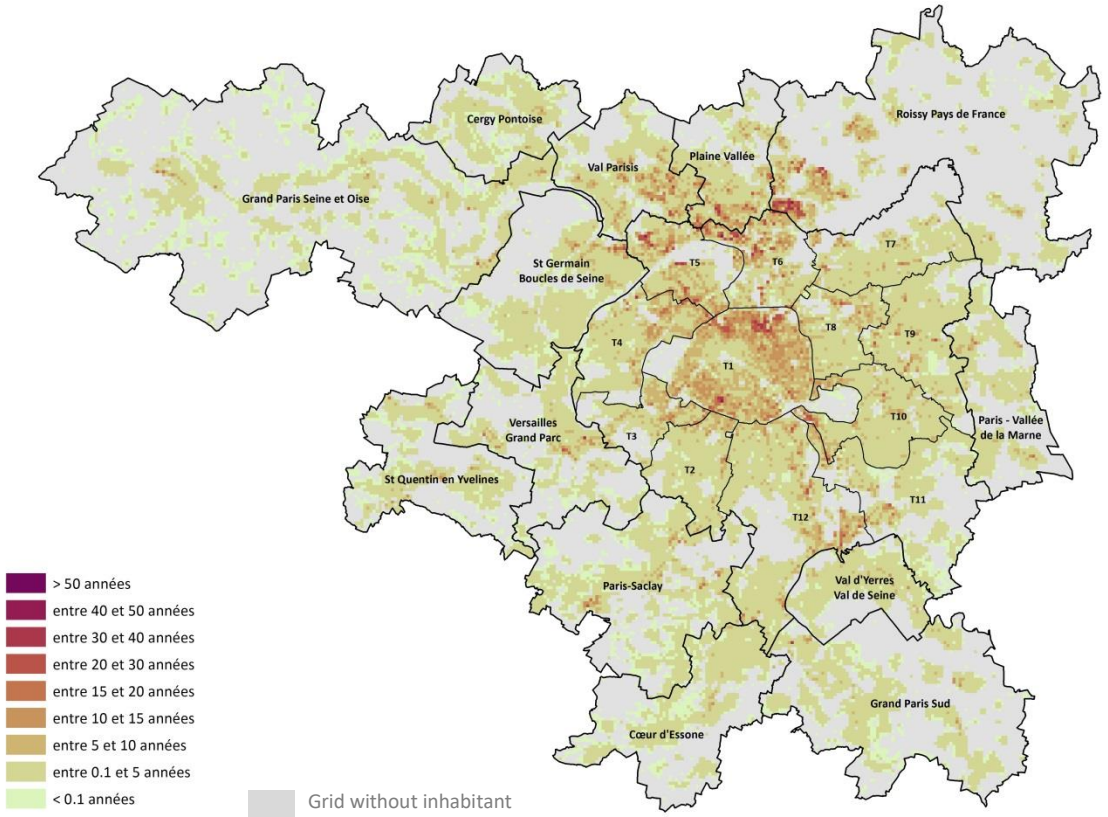
INDICATOR DALY FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER GRID OF 250 m

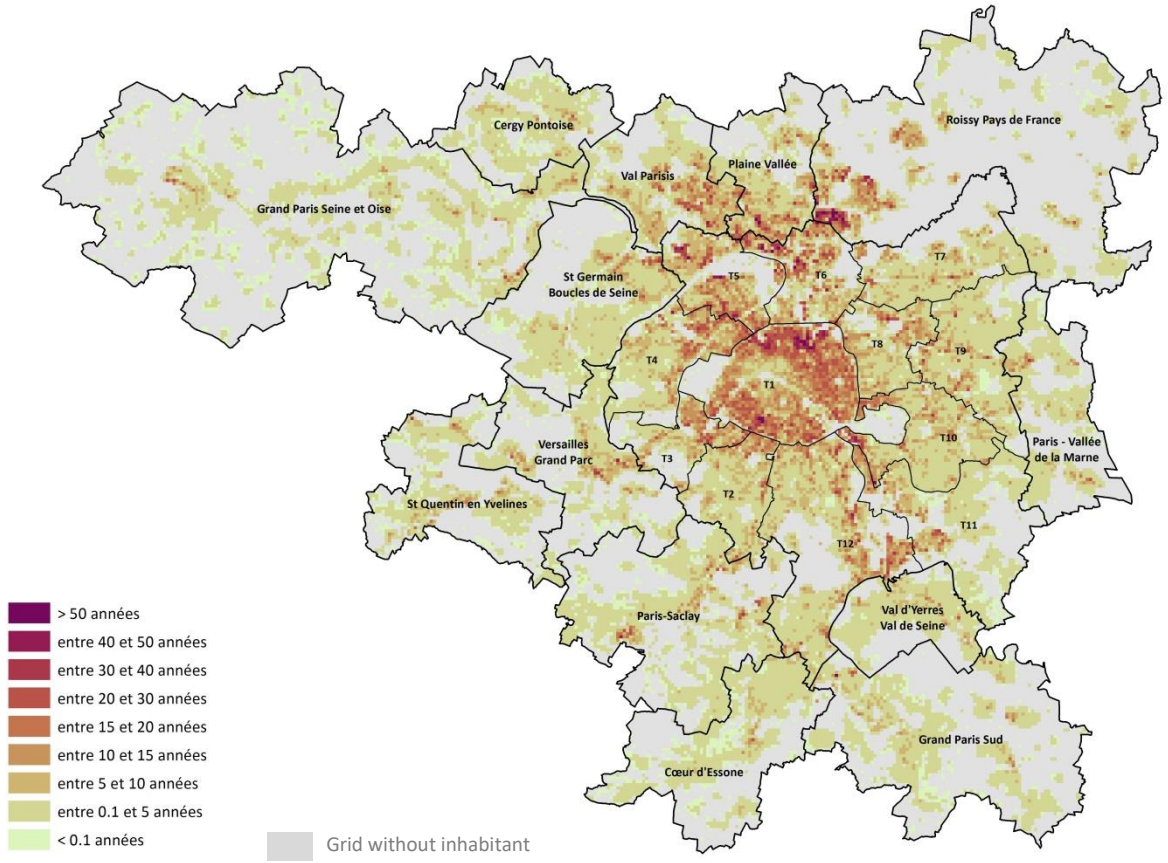
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



CUMULATED TRANSPORT NOISE - HEALTH IMPACT

INDICATOR DALY PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



STATISTICS

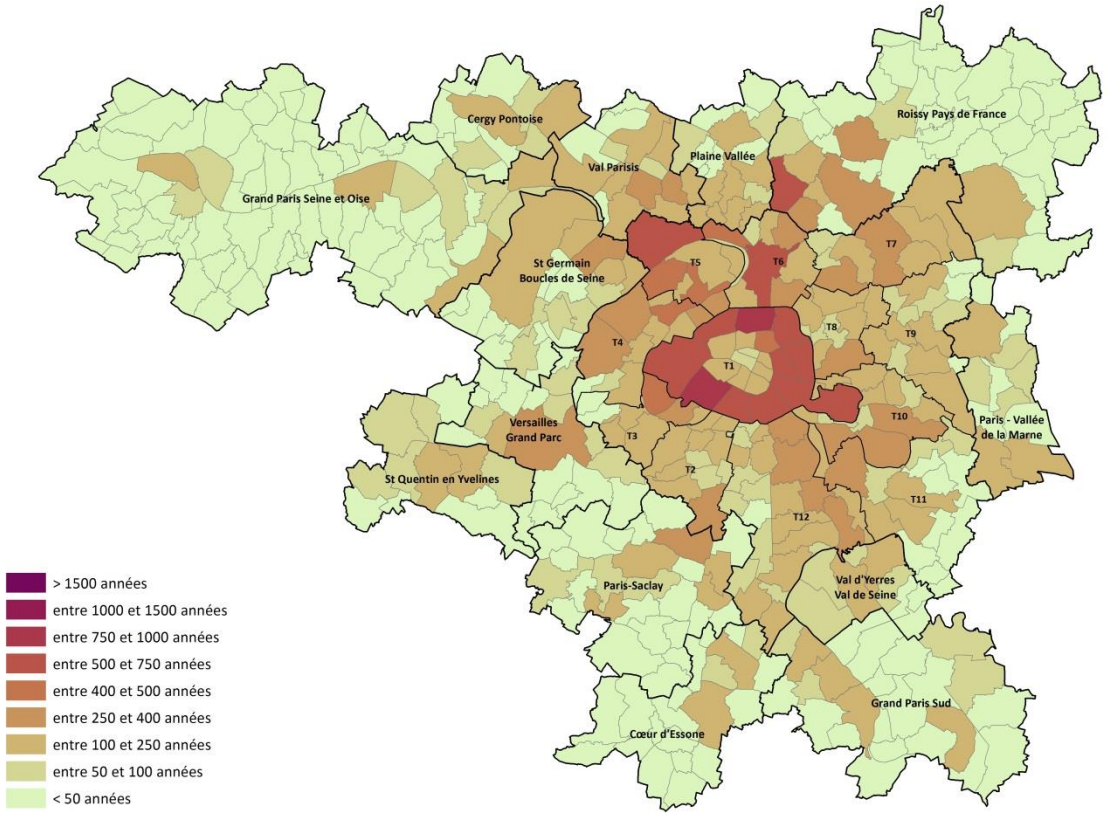
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

ANNÉES DE VIE EN BONNE SANTÉ PERDUE PAR AN	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**30 458**	**37 758**	**68 216**
T1 - Paris	*8 487*	*10 085*	*18 572*
T2 - Vallee Sud Grand Paris	*1 569*	*1 697*	*3 265*
T3 - Grand Paris Seine Ouest	*1 399*	*1 652*	*3 051*
T4 - Paris Ouest La Defense	*2 411*	*2 802*	*5 213*
T5 - Boucle Nord de Seine	*2 406*	*3 441*	*5 846*
T6 - Plaine Commune	*2 370*	*3 565*	*5 935*
T7 - Paris Terres d'envol	*1 398*	*1 797*	*3 196*
T8 - Est Ensemble	*1 536*	*1 853*	*3 389*
T9 - Grand Paris Grand Est	*1 554*	*1 967*	*3 520*
T10 - Paris Est Marne & Bois	*2 289*	*2 790*	*5 079*
T11 - Grand Paris Sud Est Avenir	*1 448*	*1 766*	*3 215*
T12 - Grand-Orly Seine Bievre	*3 589*	*4 344*	*7 933*
Cergy Pontoise	**687**	**699**	**1 386**
Coeur d'Essonne Agglomeration	**711**	**884**	**1 595**
Communaute Paris-Saclay	**1 601**	**1 735**	**3 336**
Grand Paris Seine & Oise	**1 612**	**2 064**	**3 676**
Grand Paris Sud	**1 120**	**1 441**	**2 561**
Paris Vallee de la Marne	**820**	**978**	**1 798**
Plaine Vallee	**1 493**	**2 783**	**4 277**
Roissy Pays de France	**2 596**	**4 442**	**7 038**
Saint Germain Boucles de Seine	**1 243**	**1 755**	**2 998**
Saint-Quentin-en-Yvelines	**809**	**964**	**1 774**
Val d'Yerres Val de Seine	**692**	**819**	**1 511**
Val Parisis	**1 907**	**3 277**	**5 184**
Versailles Grand Parc	**1 086**	**1 331**	**2 417**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**46 837**	**60 929**	**107 766**

CUMULATED TRANSPORT NOISE - HEALTH IMPACT

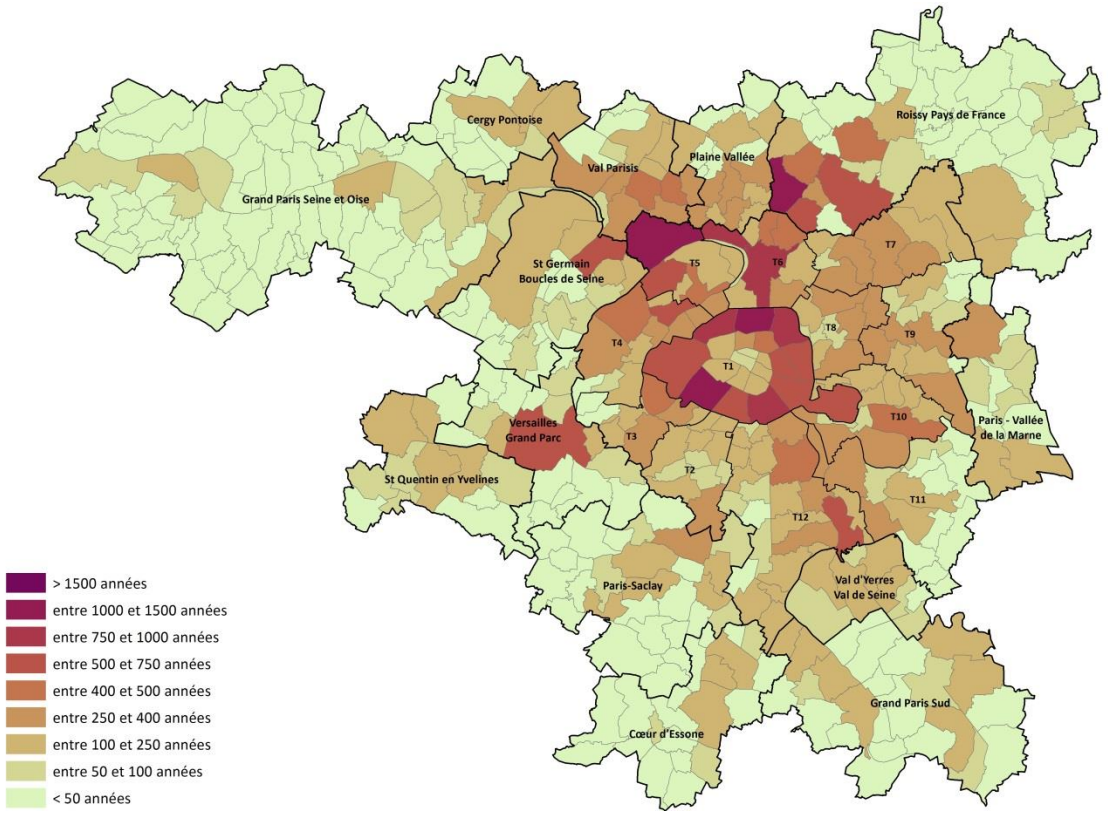
INDICATOR DALY FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



INDICATOR DALY FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

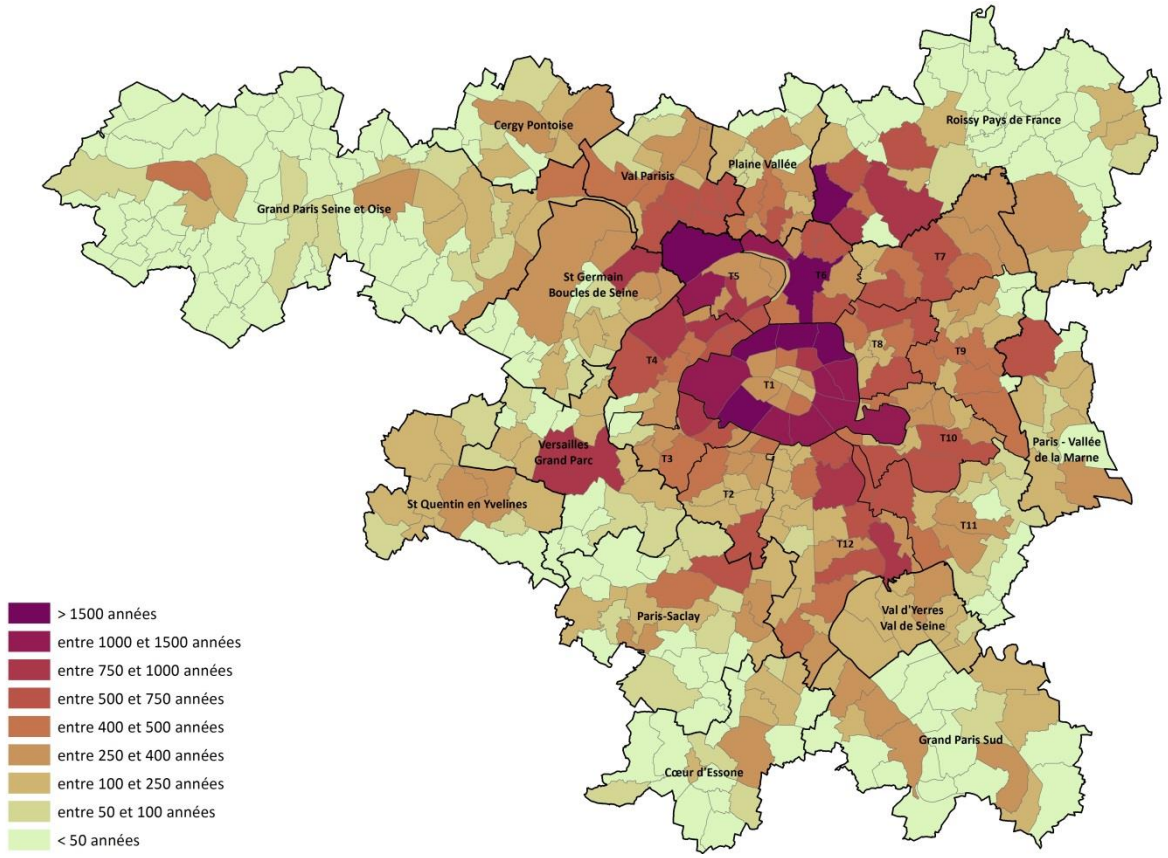
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



CUMULATED TRANSPORT NOISE - HEALTH IMPACT

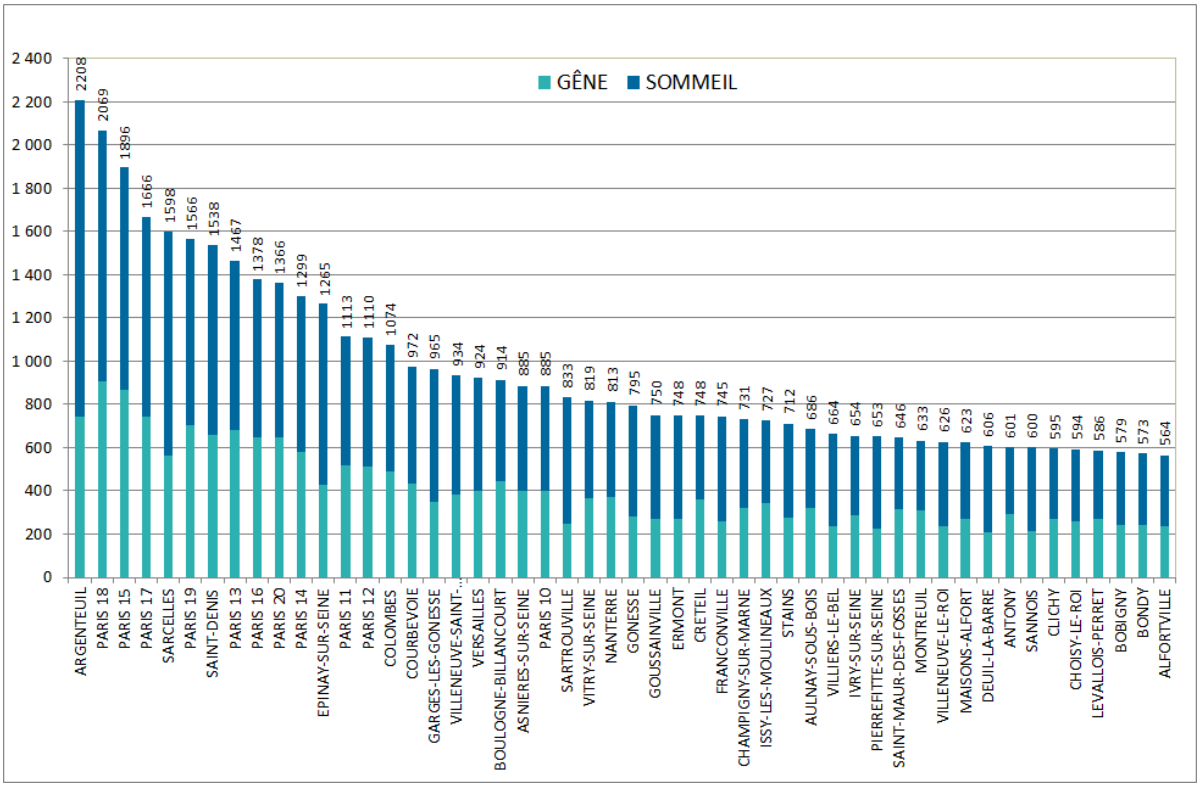
INDICATOR DALY PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



THE 50 COMMUNES WITH THE HIGHEST VALUES

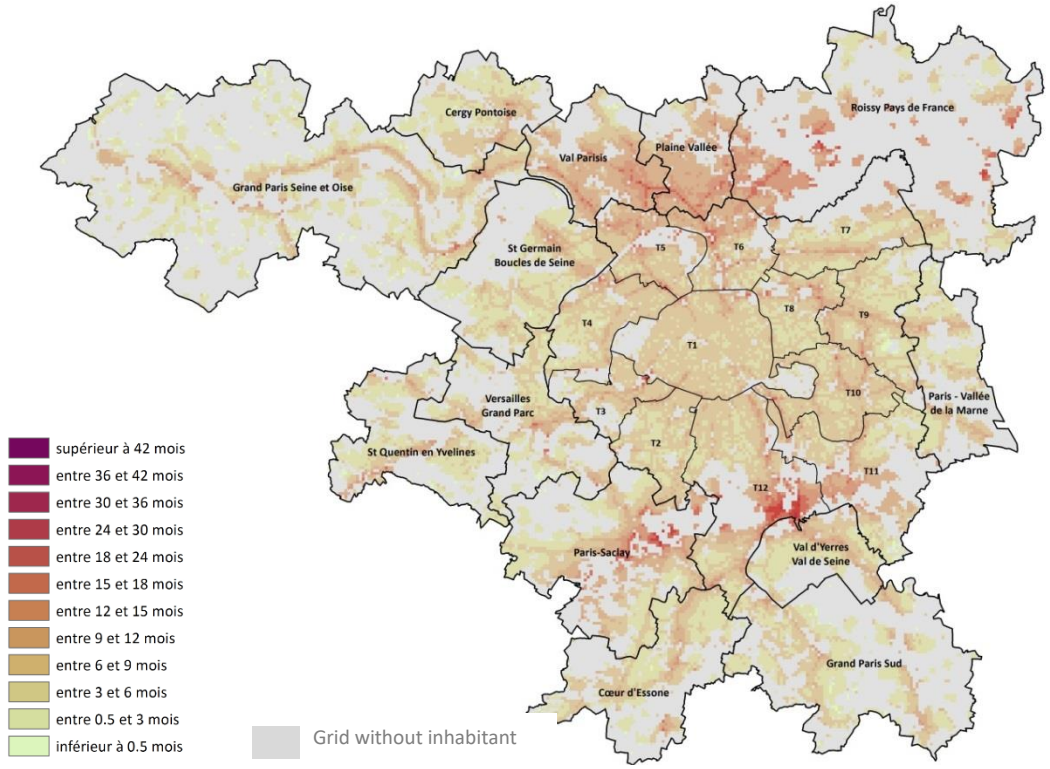
NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR



CUMULATED TRANSPORT NOISE – INDIVIDUAL HEALTH RISKS

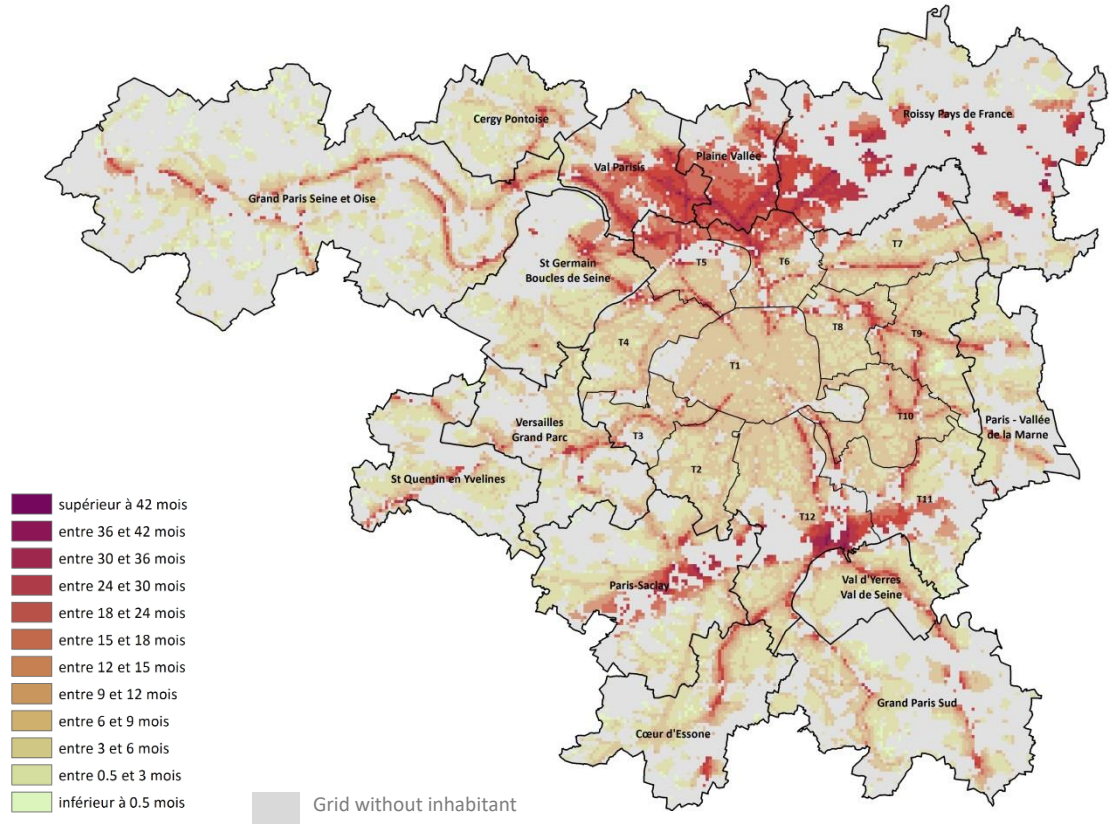
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER GRID OF 250 m

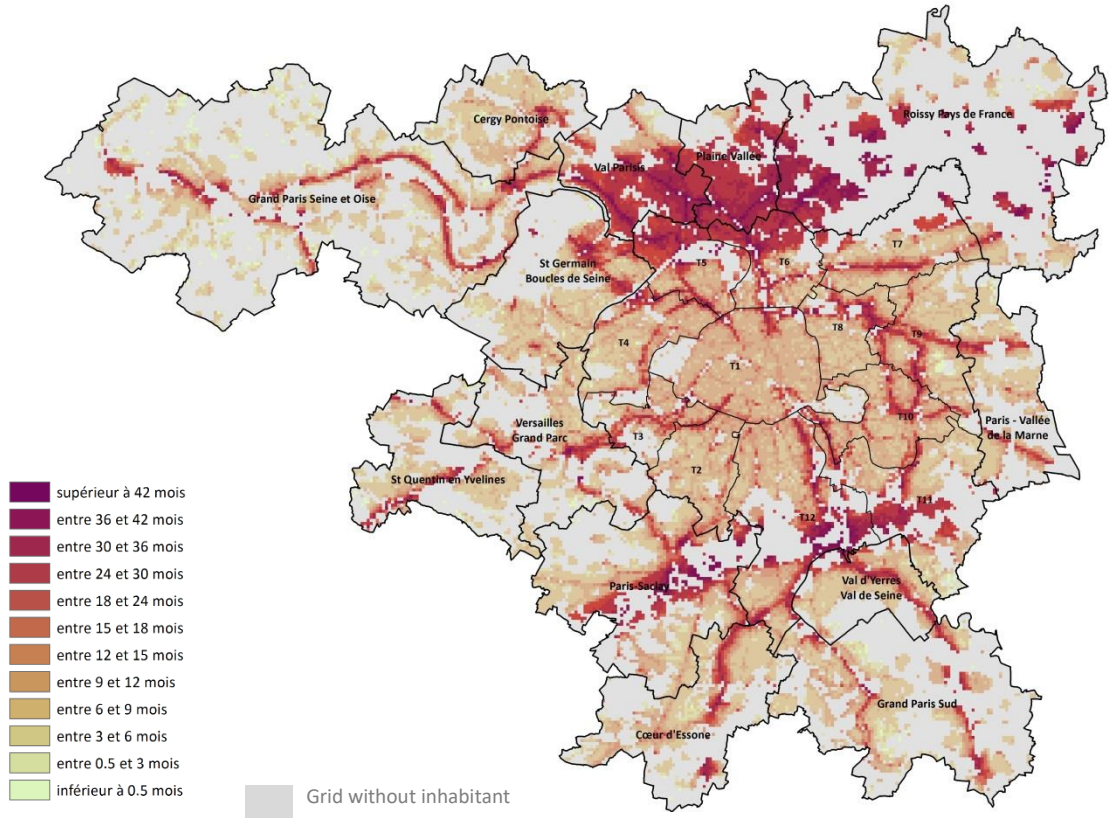
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



CUMULATED TRANSPORT NOISE – INDIVIDUAL HEALTH RISKS

INDIVIDUAL HEALTH RISKS PER GRID OF 250 m

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



STATISTICS

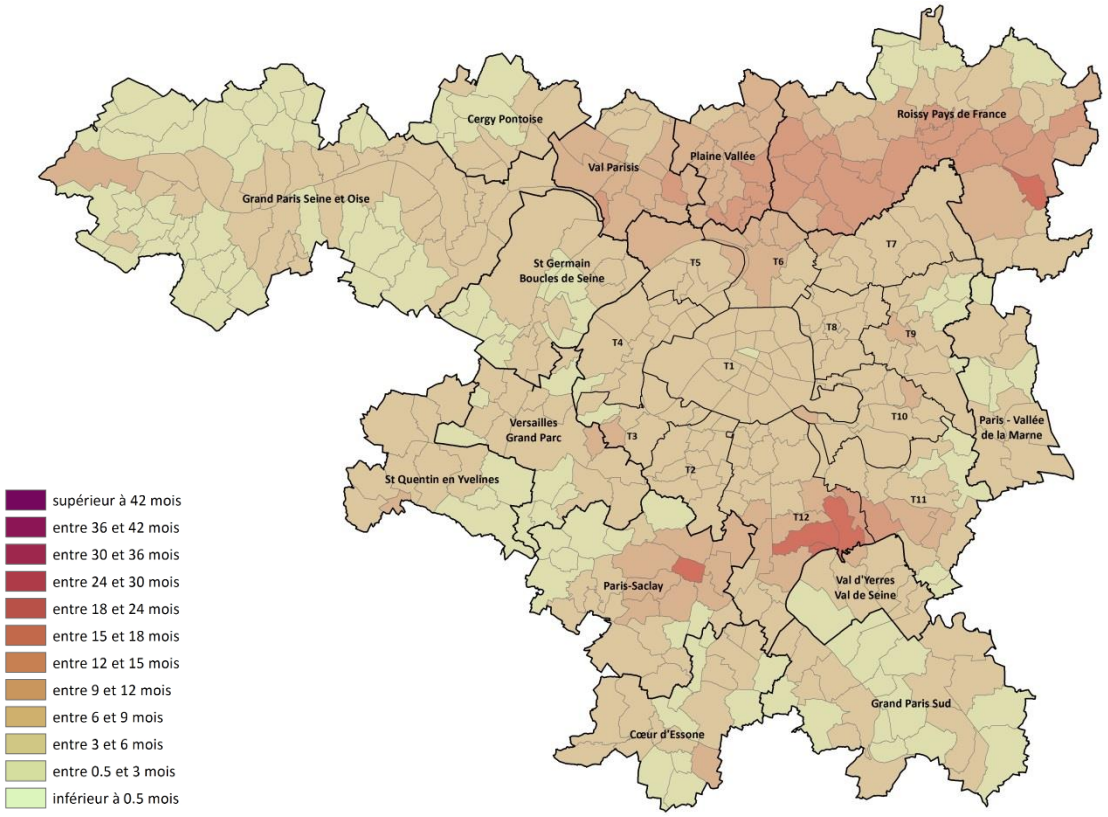
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

MOIS DE VIE EN BONNE SANTÉ PERDUE PAR INDIVIDU AU COURS D'UNE VIE ENTIÈRE	Du fait de la gêne	Du fait des troubles du sommeil	TOTAL
Métropole du Grand Paris	**4,5**	**5,6**	**10,1**
T1 - Paris	*3,9*	*4,6*	*8,5*
T2 - Vallee Sud Grand Paris	*4,1*	*4,4*	*8,6*
T3 - Grand Paris Seine Ouest	*4,7*	*5,6*	*10,3*
T4 - Paris Ouest La Defense	*4,4*	*5,1*	*9,5*
T5 - Boucle Nord de Seine	*5,8*	*8,2*	*14,0*
T6 - Plaine Commune	*6,0*	*9,0*	*15,0*
T7 - Paris Terres d'envol	*4,1*	*5,3*	*9,4*
T8 - Est Ensemble	*3,9*	*4,8*	*8,7*
T9 - Grand Paris Grand Est	*4,2*	*5,3*	*9,5*
T10 - Paris Est Marne & Bois	*4,7*	*5,7*	*10,3*
T11 - Grand Paris Sud Est Avenir	*4,9*	*5,9*	*10,8*
T12 - Grand-Orly Seine Bievre	*5,5*	*6,7*	*12,2*
Cergy Pontoise	**3,5**	**3,6**	**7,1**
Coeur d'Essonne Agglomeration	**3,9**	**4,8**	**8,7**
Communaute Paris-Saclay	**5,6**	**6,1**	**11,7**
Grand Paris Seine & Oise	**4,1**	**5,3**	**9,4**
Grand Paris Sud	**3,5**	**4,5**	**8,1**
Paris Vallee de la Marne	**3,8**	**4,5**	**8,3**
Plaine Vallee	**8,6**	**16,0**	**24,5**
Roissy Pays de France	**7,8**	**13,4**	**21,2**
Saint Germain Boucles de Seine	**3,8**	**5,3**	**9,1**
Saint-Quentin-en-Yvelines	**3,6**	**4,3**	**7,9**
Val d'Yerres Val de Seine	**4,2**	**4,9**	**9,1**
Val Parisis	**7,7**	**13,2**	**20,9**
Versailles Grand Parc	**4,2**	**5,1**	**9,3**
ZONE DENSE DE LA RÉGION ÎLE-DE-FRANCE	**4,6**	**6,0**	**10,7**

CUMULATED TRANSPORT NOISE – INDIVIDUAL HEALTH RISKS

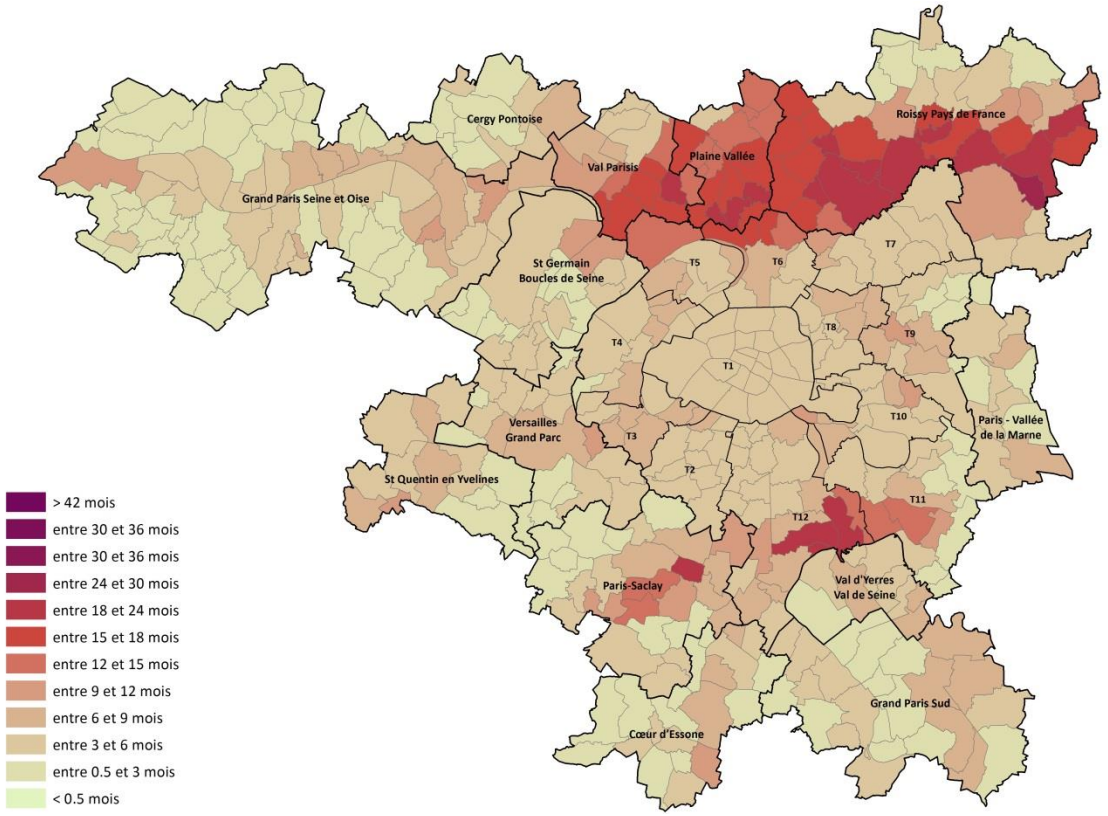
INDIVIDUAL HEALTH RISKS FOR ANNOYANCE PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



INDIVIDUAL HEALTH RISKS FOR SLEEP DISTURBANCE PER COMMUNE LEVEL

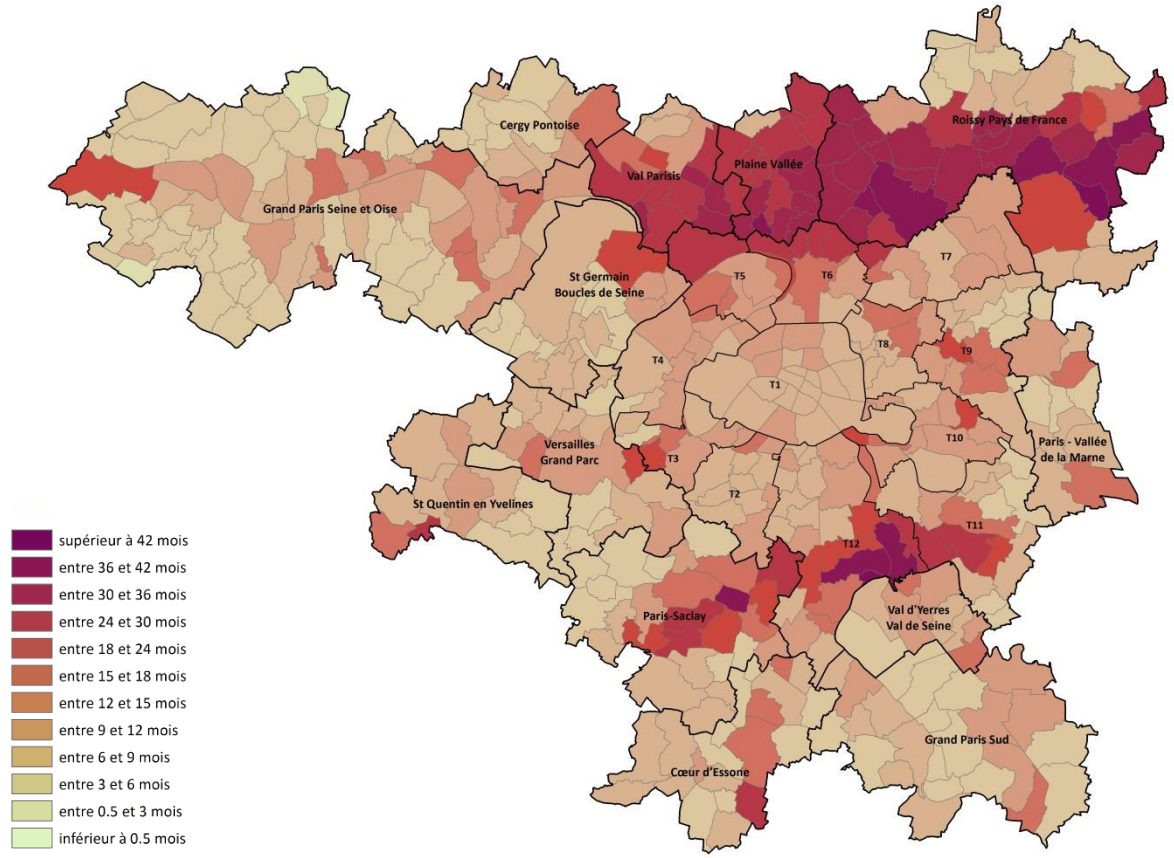
NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



CUMULATED TRANSPORT NOISE – INDIVIDUAL HEALTH RISKS

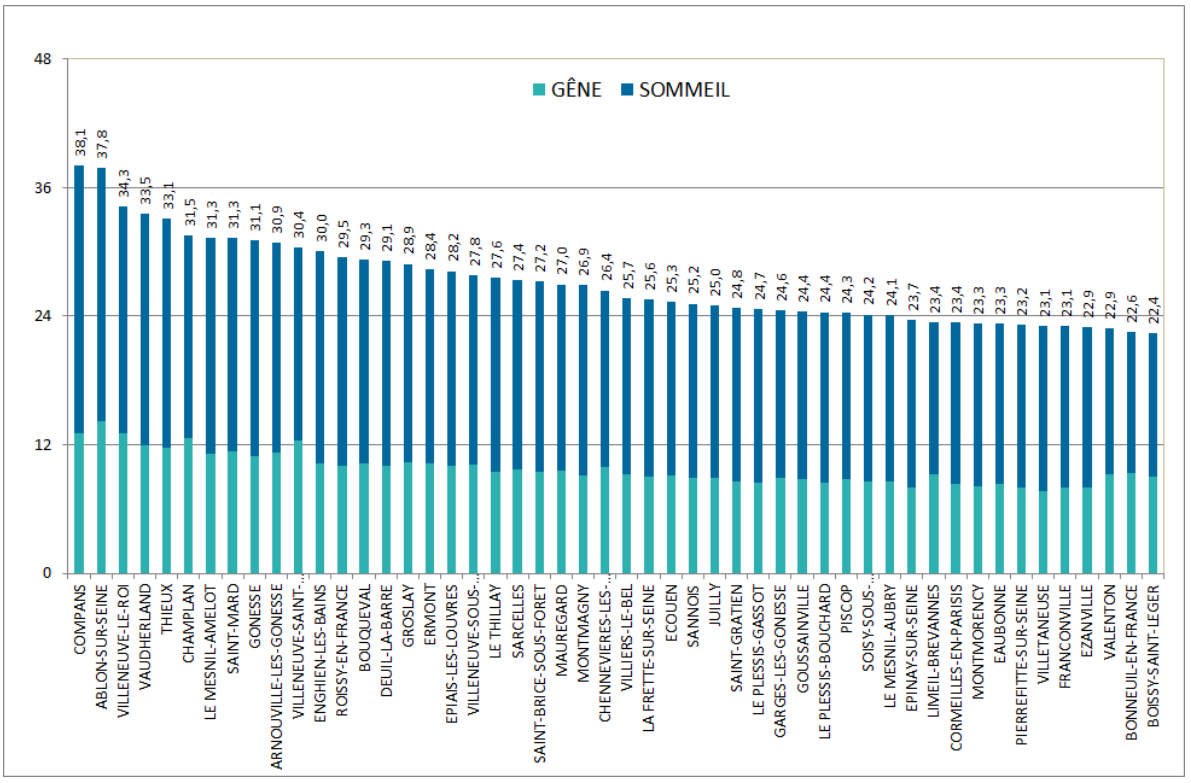
INDIVIDUAL HEALTH RISKS PER COMMUNE LEVEL

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



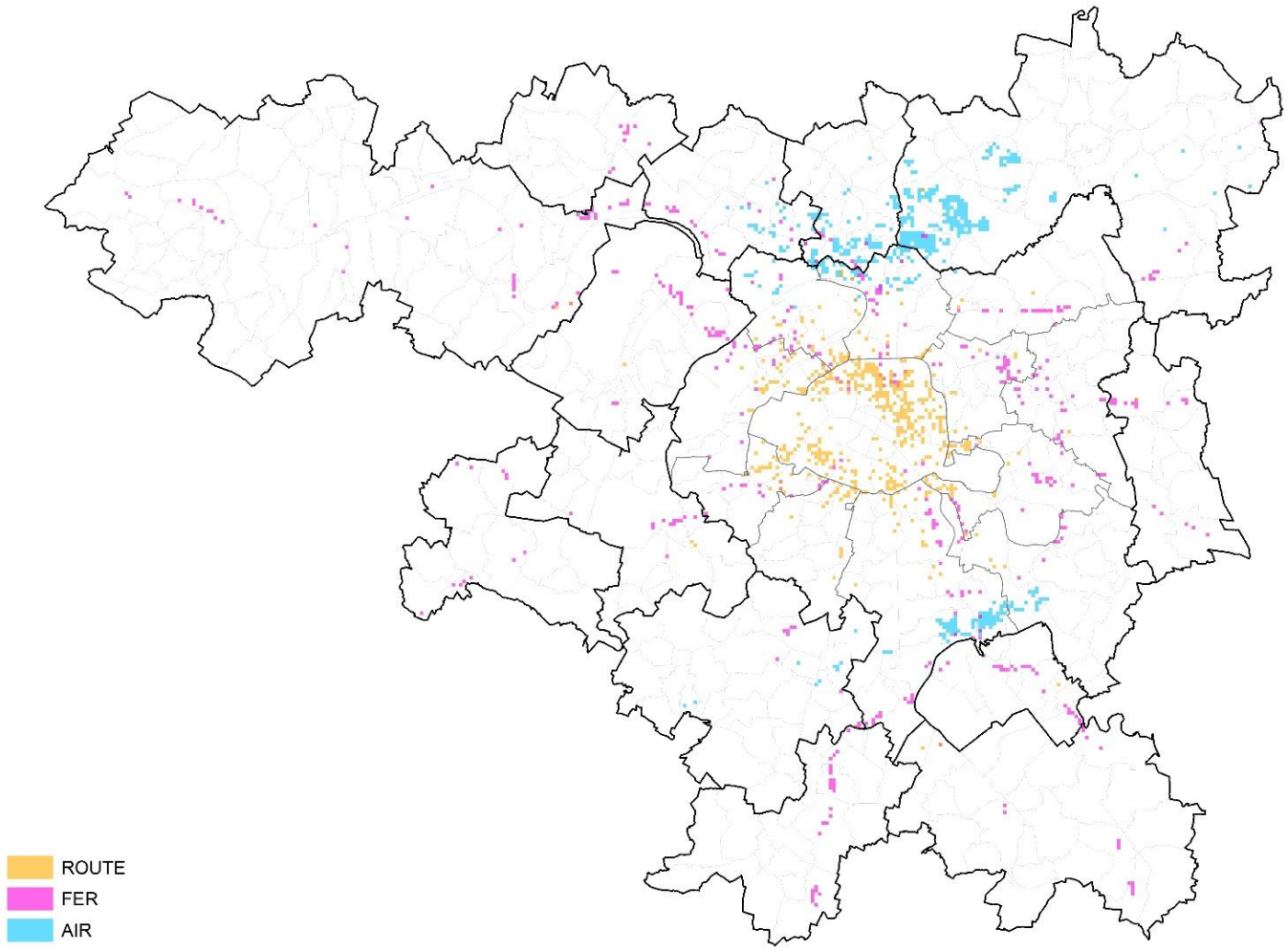
THE 50 COMMUNES WITH THE HIGHEST VALUES

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME



CUMULATED TRANSPORT NOISE – THE 1500 PRIORITY GRIDS

HIGHEST VALUES FOR COMBINED RISKS (COLLECTIVE AND INDIVIDUAL)



CUMULATED TRANSPORT NOISE – IN BRIEF

People within the densely populated zone of Ile-de-France are highly exposed to transport noise throughout the day since nearly 90% of inhabitants (more than 9 million people) are exposed to noise levels that exceed those recommended by the World Health Organisation to avoid the health effects of noise.

This trend can be seen through the many people who are subjected to noise levels that exceed the regulatory limit values for France in application of the noise directive: Nearly 1.5 million inhabitants (14.8% of the population) are exposed to noise levels that exceed at least one limit value for the Lden indicator. Road traffic is the main cause, with 10.8% of inhabitants exposed to excessive road traffic noise. Exposure to noise levels exceeding limit values for aircraft and rail traffic is down (respectively 3.7% and 0.5%), but these two types of nuisances have proportionally higher health risks due to their event-related nature (succession of noise peaks).

Noise levels generated by transport at night are falling. However, nearly 87% of the population still lives in accommodation exposed to outside noise levels that exceed one of the nocturnal quality objectives set by the WHO and 510,900 inhabitants (5.1% of the population) are even concerned by nocturnal levels that exceed one the regulatory limit values set for road or rail noise where the value of 50 dB(A) is believed to be critical for aircraft noise.

The majority of people exposed to transport noise (all sources) live in the Grand Paris Métropole, and 71 to 74% of people are exposed to noise levels that exceed the limit values for the Lden and Ln indicators respectively. T3 (Grand Paris Seine Ouest), T6 (Plaine Commune), and T12 (Grand Orly Seine Bièvre) are the territories with the highest proportion of exposed inhabitants within the Grand Paris Métropole, with respectively 26%, 23%, and 22% of their populations exposed to noise levels that exceed one of the limit values for the Lden indicator. In terms of nocturnal exposure to noise, T12 (Grand Orly Seine Bièvre) comes first with 10% of its population exposed to values considered to be critical.

Outside of the Grand Paris Métropole, urban areas significantly affected by airport noise are home to the highest levels of people exposed to noise levels that exceed one of the limit values for Lden. The two urban agglomerations of Roissy-Pays de France and Plaine Vallée have respectively 57% of 39% of their populations exposed to excessive noise levels. Next comes the agglomeration community of Versailles Grand Parc, where the level is 13% due to its high exposure to road noise, just ahead of the agglomeration community of Paris Saclay (12%), which is highly exposed to aircraft noise from the Paris-Orly airport.

In terms of the health impact, transport noise is responsible for the loss of 107,766 disability-adjusted life-years (DALYs) every year within the densely populated zone of the Ile-de-France region, distributed between the DALYs lost due to annoyance (46,837, 43% of the total) and the DALYs lost due to sleep disturbance (60,929, 57% of the total).

Road noise is responsible for 61% of the health impact (65,607 DALYs), followed by rail noise (23,440 DALYs, and 22%), and aircraft noise (18,718, 17%).

63% of these health impacts come from the Grand Paris Métropole, with 68,216 DALY.

A majority of the communes with the highest numbers of healthy life-years lost due to cumulated transport noise are located in the Grand Paris Métropole, but there is also the commune of Versailles, as well as communes in the Val d'Oise department that combine very densely populated areas and significant aircraft noise. The areas where the impact is greatest are the town of Argenteuil, and the 15th and 18th districts of Paris (cf. map of cumulated health impacts by commune, page 123).

At individual level, the evaluations show an average statistical value of 10.7 healthy life-months lost during a lifetime per individual due to cumulated transport noise, within the densely populated zone of Ile-de-France.

There are, however, significant variations within the region, with the impact on healthy life-months lost per inhabitant ranging from 7.1 months to 24.5 months (a ratio of 1 to 3.45) depending on the territory or urban community, and varying from 2.6 months to 38.1 months (a ratio of 1 to 14.65) depending on the commune.

These significant variations highlight the impact of aircraft noise. For example, the healthy life-years lost in the agglomeration communities of Plaine Vallée, Roissy Pays de France, and Val Parisis are twice as high as the territorial average (24.5 and 20.9 healthy life-months lost per individual versus 10.7 months). On average, inhabitants of the Grand Paris Métropole lose 10.1 healthy life-months over their lifetimes - the health impacts per inhabitant ultimately being more moderate in areas concerned only by noise pollution from land transport – with values varying between 8.5 months (T1 - Paris) and 10.3 months (for T3 - Grand Paris Seine Ouest and T10 - Paris Est Marne et Bois). The territories of the Grand Paris Métropole that have the highest individual risks are T6 - Plaine Commune (15 months), T5 - Boucle Nord de Seine (14 months), and T12 - Grand Orly Seine Bièvre (12.2

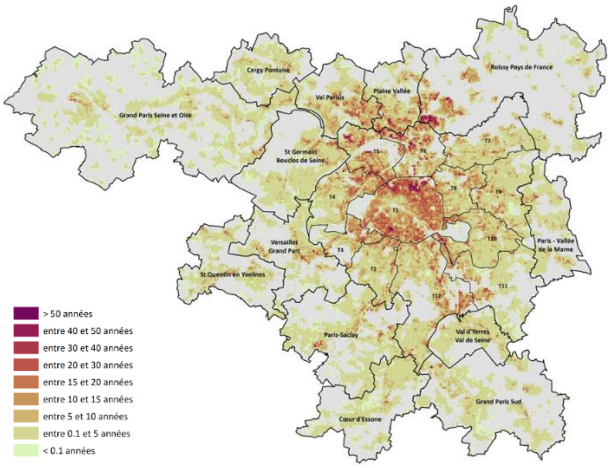
months).

The individual risk can even reach or exceed three healthy life-years lost for communes that combine high exposure to aircraft noise and marked exposure to other noise pollution generated by land transport. This is the case, for example, of the towns of Compans (38.1 months), Ablon-sur-Seine (37.8 months), and Villeneuve-le-Roi (34.3 months). There are also many inhabited 250 m² grids in the vicinity of airports and/or along major rail or road infrastructures, where the individual risk can reach or exceed three years (cf. individual health risk maps below).

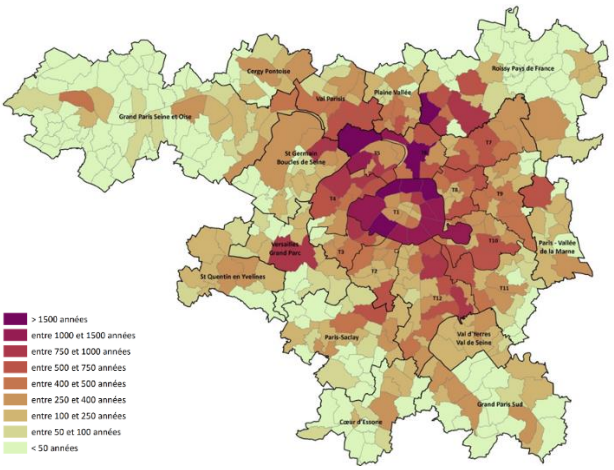
CUMULATED TRANSPORT NOISE- COLLECTIVE HEALTH IMPACT

NUMBER OF HEALTHY LIFE-YEARS LOST PER YEAR

PER GRID OF 250 m



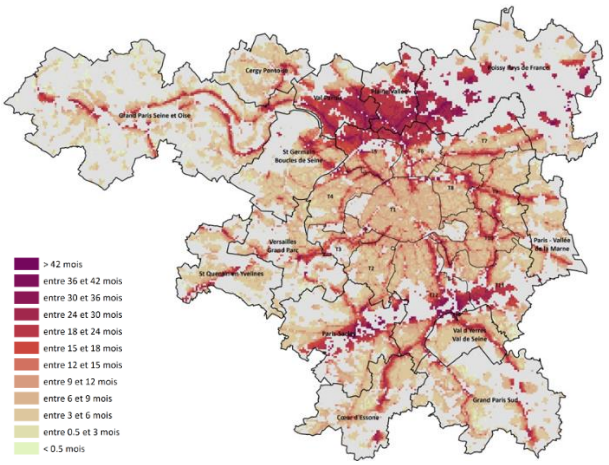
PER COMMUNE LEVEL



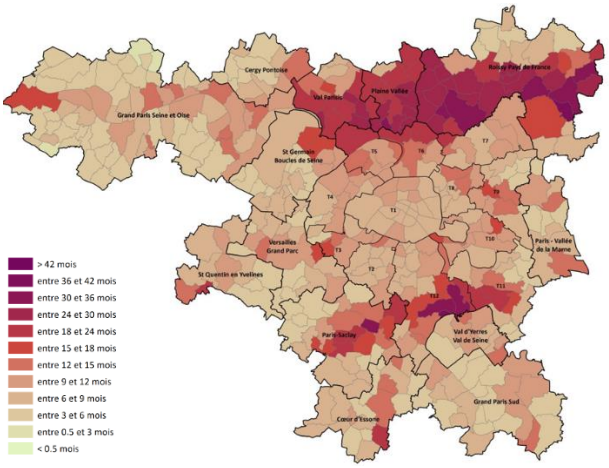
CUMULATED TRANSPORT NOISE – INDIVIDUAL HEALTH RISKS

NUMBER OF HEALTHY LIFE-MONTHS LOST PER INDIVIDUAL DURING A LIFETIME

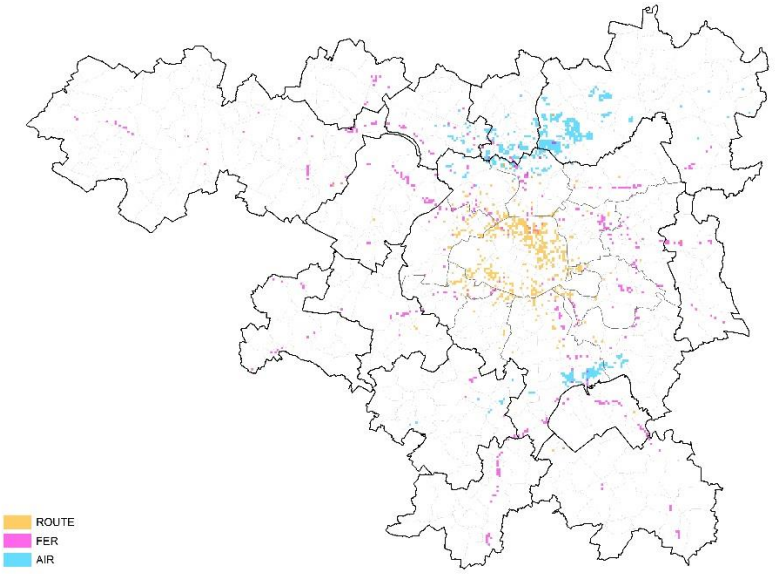
PER GRID OF 250 m



PER COMMUNE LEVEL



THE 1500 PRIORITY GRIDS



ECONOMIC COST

The economic cost related to the health impact of environmental noise is useful information for policymakers.

It allows us to better understand the scale of the problem and allows an analysis of the trade-off between the negative externalities of noise pollution with the financial cost of tried and tested noise reduction measures (for example, low-noise road surfaces, anti-noise screens, sound insulation for buildings, acoustic insulation of schools, housing, and hospitals, reduction of traffic speeds, fighting antisocial and noisy behaviour, etc.) and the resulting social benefits (reduction of annoyance and sleep disturbance related to transport noise).

A first attempt to estimate the economic cost of healthy life-years lost due to environmental noise in the European Union was proposed by WHO's Europe bureau in 2013[13].

METHOD OF ESTIMATION

In the scientific literature, generally speaking, the approaches to estimating the economic cost of disability-adjusted life-years (DALY) are based, on the notion of "willingness to pay" (WTP). These approaches can be used to provide estimations of the economic cost of health effects related to environmental noise.

In the absence of any research or surveys specifically on environmental noise, the WHO suggested a first method for economic estimations specific to the European Union. The method relies on existing research in other fields related to the health impact of environmental factors such as air pollution and chemical risks.

Value of statistical life year (VSLY)

In simple terms, the conversion of DALY into a monetary figure consists in multiplying the number of DALYs by the "value of statistical life year" (VSLY).

The process of quantifying the economic cost of the health impact of environmental noise is relatively complex because the VSLY varies considerably, not only depending on the period, but also depending on the country, the region, and GDP, as well as the author of the study (for comparable issues).

The VSLY can also vary significantly depending on the subject of the study. For example, a VSLY for respiratory diseases that result from air pollution may be very different to those related to road accidents. The region being studied has a direct effect on the VSLY due to disparities in income, healthcare services, attitudes towards practically every aspect of life, and social and personal perceptions. As a result, the VSLY found in the scientific literature varies between €23,706 and €126,000.

For this evaluation, the WHO used the methodology and hypotheses applied in the European Commission's "Assessment of the Health and environmental benefits of REACH" report (EU policy on chemical products) prepared for the directorate-general for the environment in April 2012. This report is itself based on general guidelines from the European Commission on the evaluation of health impacts, favouring a monetary evaluation where the scientific understanding allows it. The range of values for different measurement units suggested in the REACH report is €50,000 to €100,000 for the economic value of statistical life year (VSLY) in Europe.

Specific VSLY for environmental noise

When the WHO published its work in 2013, no other research on making a monetary estimation of the health impact of environmental noise existed, with existing research having a limited scope (limited range of health impacts focusing exclusively on the evaluation of the impact of transport noise - by specific sources of transport[14]).

Based on the values suggested in European research literature evaluating other environmental risks, the WHO decided to apply a generic VSLY of €50,000 for environmental noise. This value is considered to be fairly low and conservative.

This initial exploratory approach does not apply an actualisation rate that depreciates the VSLY depending on age.

Application of the method to the European Union

For the five health effects of environmental noise

[13] *F. Georges, M-E. Heroux, K. Fong, 'Public health and economic burden of environmental noise', Internoise 2013, Innsbruck, Austria (2013).*

[14] *The global burden of disease: 2004 update. Geneva, World Health Organization, 2008. (http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html)*

studied, the WHO applied the generic VSLY of €50,000 for a DALY. The table below summarises the economic cost of the burden of disease due to environmental noise published by the WHO for the European Union[15].

Health effect	DALY	Economic cost in € billion
Sleep disturbance	903 000	45,15
Annoyance	654 000	32,70
Cardiovascular disease	60 000	3
Cognitive impairment	45 000	2,25
Tinnitus	21 000	1,05
TOTAL	1 683 000	84,15

APPLICATION OF THE METHOD TO THE DENSELY POPULATED ZONE OF ILE-DE-FRANCE

The table below summarises the economic cost of the burden of disease due to environmental noise for the densely populated zone of Ile-de-France for the two main health effects studied (annoyance and sleep disturbance), applying the generic VSLY of €50,000 suggested by the WHO for DALY.

Health effect	DALY	Economic cost in € billion
Sleep disturbance	60 929	3,05
Annoyance	46 837	2,34
TOTAL	107 766	5,39

This estimation of the economic cost of the burden of disease due to environmental noise amounts to approximately €5.4 billion for the densely populated zone of Ile-de-France.

It is important to remember that only the costs related to willingness to pay have been taken into account here. It is necessary to add the other costs related to professional absenteeism, healthcare, depreciation of real estate assets, learning difficulties, as well as the consequences of exposure to other sources of noise (neighbours, professional environment, and leisure in particular).

A previous study by Bruitparif[16] in 2016 estimated the social cost of noise in Ile-de-France at more than €16 billion, considering the various items that could be included.

Such studies illustrate the necessity to invest in policies to reduce point source noise and appropriate noise management measures.

[15] *F. Georges, M-E. Heroux, K. Fong, 'Public health and economic burden of environmental noise', Internoise 2013, Innsbruck, Austria (2013).*

[16] *Note de synthèse sur le coût social du bruit en Ile-de-France, Bruitparif, June 2016.*

EVOLUTIONS

The results of the evaluation of the health impact of transport noise can be compared with the previous evaluations carried out by Bruitparif and the Ile-de-France regional health watchdog between 2011 and 2015.

In a region with a comparable number of inhabitants (approximately 10 million) despite the creation of and changes to groupings of communes between the two evaluations, the estimation of the number of people exposed to noise levels above the limit values for road noise has fallen by 35%, from 1.7 million to 1.1 million. This development is partly related to the improvement in the quality of strategic noise maps produced (homogeneity and coherence of methods used over the entire territory for the third phase, contrary to the first two phases; and the use of more recent and more representative databases in terms of the acoustic power of vehicles on the road). However, the estimations of the number of people exposed to noise levels that exceed the limit values for rail noise and aircraft noise have not changed significantly between the two periods.

However, estimations of the health impact have increased significantly, in particular for aircraft noise and rail noise due to the use of new exposure-response relationships recommended by the WHO. The total number of disability-adjusted life-years (DALYs) lost has risen from 75,435 (2015) to 107,766 in 2019; an increase of 43% (see figure below).

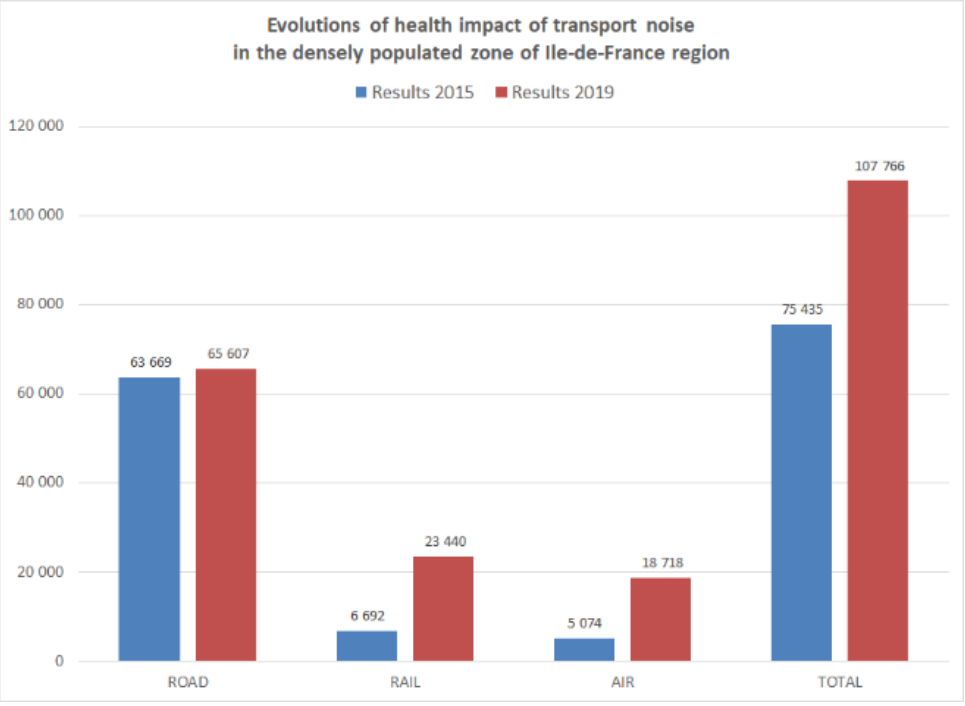
This also results in a proportional increase in the economic costs associated with disease caused by transport noise, which increased from €3.8 to €5.4 billion per year.

The strongest relative increase is for the health impact of aircraft noise, which rose from an estimated 5,074 DALYs in 2015 to 18,718, which is a multiplication by a factor of 3.7.

As for the health impact of rail noise, it has also increased significantly, with 23,440 DALYs in 2019 compared with 6,692 previously; up by a factor of 3.5.

And finally, for road noise, despite a reduction in the most critical exposure to noise between the two phases due to the improvement in estimation methods, the figures on health impacts are still up slightly from 63,669 DALYs to 65,607 in 2019 (+3%). This can be explained in particular by a significant re-evaluation by the WHO of annoyance related to road noise for levels between 45 and 65 dB (A) using the Lden indicator.

Adjusted to the level of an average citizen living within the densely populated zone of Ile-de-France, the healthy life-months lost over a lifetime now reaches 10.7 compared to 7.3 for the 2015 estimation. The regional differences are also significantly exacerbated, with the individual health risk now reaching more than three healthy years lost in sectors that are highly exposed to multiple noise sources, compared to 18 months in the 2015 estimation.



CONCLUSION

Nearly 1.5 million inhabitants (14.8% of the population) are exposed to noise levels that exceed at least one limit value for the Lden indicator. Road traffic is the main cause, with 10.8% of inhabitants exposed to excessive road traffic noise. Exposure to noise levels exceeding limit values for aircraft and rail traffic is down (respectively 3.7% and 0.5%), but these two types of nuisances have proportionally higher health risks due to their event-related nature (succession of noise peaks).

Thanks to various studies that have been published on the topic at international level, the health impact of noise is now well and truly established. It goes beyond just the annoyance caused. Beyond the effects on the auditory system observed for high noise levels, several extra-auditory effects have also been identified, including sleep disturbance, cardiovascular disease and diminished learning capacity. Studies have also shown that noise is a factor that reinforces social inequality, with underprivileged populations also generally being those most exposed.

In order to raise awareness of this major public health issue, we need to collect and publish quantified data for the region. That is why Bruitparif has evaluated morbidity[17] connected to transport noise within the densely populated zone of Ile-de-France.

Bruitparif used the methodology recommended by the World Health Organisation (WHO), based on the use of the indicator of healthy life-years (DALYs - Disability-Adjusted Life-Years) lost, as well as the latest guidelines on environmental noise published by the WHO in October 2018.

With nearly 108,000 disability-adjusted life-years lost every year within the densely populated zone of Ile-de-France, at an economic cost of €5.4 billion per year, the results obtained confirm the trends highlighted by the WHO at European level. Noise pollution is the second-highest cause of morbidity among environmental risk factors in urban environments, behind atmospheric pollution.

Road noise is responsible for 61% of the health impact (65,607 DALYs), followed by rail noise (23,440 DALYs, and 22%), and aircraft noise (18,718, 17%).

63% of these health impacts come from the Grand Paris Métropole, with 68,216 DALY.

These results have been compared with the previous evaluations carried out by Bruitparif and the Ile-de-France regional health watchdog between 2011 and 2015. Estimations have been reviewed significantly upwards (from 75,000 to 108,000 DALYs, +43%), especially for aircraft noise (multiplied by a factor of 3.7) and rail noise (multiplied by a factor of 3.5), due to the use of new exposure-response relationships recommended by the WHO.

Adjusted to the level of an average citizen living within the densely populated zone of Ile-de-France, healthy life-months lost over a lifetime now reach 10.7 compared to 7.3 for the 2015 estimation.

Regional differences are also significantly exacerbated, with the individual health risk now reaching more than three healthy life-years lost in sectors that suffer from exposure to multiple aircraft and land sources, compared to 18 months in the 2015 estimation.

The study conducted by Bruitparif has therefore re-evaluated upwards the health and economic impact of noise in the densely populated zone of Ile-de-France and, above all, has provided essential new information for public policymakers: The provision of results by territory, as well as the determination of priority areas. The ambition of this study is therefore to fully contribute to anticipating where to focus resources in the fight against noise pollution, by creating a reference document to help stakeholders prepare the various environmental noise action plans that the competent authorities will have to produce in 2019.

[17] *The morbidity of a population is defined as the number of sick people or the number of diseases within a given population, at a given time. In this report, the evaluation was based on level of annoyance and sleep disturbance caused by exposure to transport noise that can be estimated in the population.*

APPENDIX

RESULTS PER COMMUNE

Entité	Population (source : densibati IAU IdF)	DALY ROUTE	DALY FER	DALY AIR	DALY TOT	Risque individuel ROUTE	Risque individuel FER	Risque individuel AIR	Risque individuel TOT
Zone dense de la région Île-de-France	**10 104 322**	**65 607**	**23 440**	**18 718**	**107 766**	**6,5**	**2,3**	**1,9**	**10,7**
Métropole du Grand Paris	**6 776 007**	**47 738**	**13 809**	**6 669**	**68 216**	**7,1**	**2,0**	**1,0**	**10,1**
T1 - Paris	**2 189 273**	**16 304**	**2 258**	**10**	**18 572**	**7,5**	**1,0**	**0,0**	**8,5**
PARIS 1	17 323	135	-	-	135	7,8	0,0	0,0	7,8
PARIS 2	22 404	137	-	-	137	6,1	0,0	0,0	6,1
PARIS 3	35 485	252	-	-	252	7,1	0,0	0,0	7,1
PARIS 4	28 057	218	0	-	218	7,8	0,0	0,0	7,8
PARIS 5	60 579	430	10	-	440	7,1	0,2	0,0	7,3
PARIS 6	42 495	321	-	-	321	7,6	0,0	0,0	7,6
PARIS 7	56 958	399	0	-	399	7,0	0,0	0,0	7,0
PARIS 8	39 766	332	45	-	377	8,4	1,1	0,0	9,5
PARIS 9	59 830	475	4	-	479	7,9	0,1	0,0	8,0
PARIS 10	94 765	796	89	-	885	8,4	0,9	0,0	9,3
PARIS 11	147 773	1 113	-	-	1 113	7,5	0,0	0,0	7,5
PARIS 12	138 424	987	123	-	1 110	7,1	0,9	0,0	8,0
PARIS 13	175 499	1 265	202	-	1 467	7,2	1,2	0,0	8,4
PARIS 14	134 868	985	314	-	1 299	7,3	2,3	0,0	9,6
PARIS 15	231 121	1 625	267	4	1 896	7,0	1,2	0,0	8,2
PARIS 16	167 831	1 338	33	6	1 378	8,0	0,2	0,0	8,2
PARIS 17	166 999	1 334	331	-	1 666	8,0	2,0	0,0	10,0
PARIS 18	196 412	1 506	563	-	2 069	7,7	2,9	0,0	10,5
PARIS 19	181 167	1 290	276	-	1 566	7,1	1,5	0,0	8,7
PARIS 20	191 504	1 366	-	-	1 366	7,1	0,0	0,0	7,1
T2 - Vallee Sud Grand Paris	**381 789**	**2 654**	**555**	**57**	**3 265**	**7,0**	**1,5**	**0,1**	**8,6**
ANTONY	61 279	391	182	29	601	6,4	3,0	0,5	9,8
BAGNEUX	37 632	253	47	-	300	6,7	1,3	0,0	8,0
BOURG-LA-REINE	19 662	151	38	-	189	7,7	1,9	0,0	9,6
CHATENAY-MALABRY	32 343	203	4	3	211	6,3	0,1	0,1	6,5
CHATILLON	32 344	226	36	-	262	7,0	1,1	0,0	8,1
CLAMART	51 822	337	62	3	402	6,5	1,2	0,0	7,8
FONTENAY-AUX-ROSES	22 933	132	12	-	144	5,8	0,5	0,0	6,3
LE PLESSIS-ROBINSON	26 015	179	0	23	202	6,9	0,0	0,9	7,8
MALAKOFF	30 793	216	154	-	370	7,0	5,0	0,0	12,0
MONTROUGE	47 826	442	7	-	449	9,3	0,1	0,0	9,4
SCEAUX	19 138	123	13	0	136	6,4	0,7	0,0	7,1
T3 - Grand Paris Seine Ouest	**297 852**	**2 252**	**773**	**26**	**3 051**	**7,6**	**2,6**	**0,1**	**10,3**
BOULOGNE-BILLANCOURT	110 842	906	5	3	914	8,2	0,0	0,0	8,3
CHAVILLE	18 276	118	158	-	276	6,5	8,6	0,0	15,1
ISSY-LES-MOULINEAUX	63 279	512	192	22	727	8,1	3,0	0,4	11,5
MARNES-LA-COQUETTE	1 614	11	2	-	13	6,7	1,0	0,0	7,8
MEUDON	44 104	293	184	1	478	6,6	4,2	0,0	10,8
SEVRES	22 412	164	110	0	274	7,3	4,9	0,0	12,2
VANVES	26 610	195	112	-	307	7,3	4,2	0,0	11,6
VILLE-D'AVRAY	10 714	53	10	-	63	4,9	1,0	0,0	5,9
T4 - Paris Ouest La Defense	**551 407**	**4 008**	**1 205**	**-**	**5 213**	**7,3**	**2,2**	**0,0**	**9,5**
COURBEVOIE	86 562	659	313	-	972	7,6	3,6	0,0	11,2
GARCHES	18 222	111	25	-	135	6,1	1,4	0,0	7,4
LA GARENNE-COLOMBES	27 049	207	121	-	328	7,7	4,5	0,0	12,1
LEVALLOIS-PERRET	63 404	480	107	-	586	7,6	1,7	0,0	9,3
NANTERRE	88 399	572	242	-	813	6,5	2,7	0,0	9,2
NEUILLY-SUR-SEINE	60 223	510	3	-	513	8,5	0,1	0,0	8,5
PUTEAUX	44 703	404	96	-	500	9,0	2,2	0,0	11,2
RUEIL-MALMAISON	78 671	497	36	-	533	6,3	0,5	0,0	6,8
SAINT-CLOUD	29 594	219	125	-	343	7,4	4,2	0,0	11,6
SURESNES	45 993	305	134	-	439	6,6	2,9	0,0	9,6
VAUCRESSON	8 585	45	4	-	49	5,3	0,5	0,0	5,7
T5 - Boucle Nord de Seine	**417 507**	**2 949**	**1 334**	**1 563**	**5 846**	**7,1**	**3,2**	**3,7**	**14,0**
ARGENTEUIL	101 116	575	363	1 270	2 208	5,7	3,6	12,6	21,9
ASNIERES-SUR-SEINE	80 450	612	259	13	885	7,6	3,2	0,2	11,0
BOIS-COLOMBES	28 040	185	200	-	385	6,6	7,1	0,0	13,7
CLICHY	58 140	463	132	-	595	8,0	2,3	0,0	10,2
COLOMBES	83 697	585	353	136	1 074	7,0	4,2	1,6	12,8
GENNEVILLIERS	41 211	332	27	15	374	8,1	0,7	0,4	9,1
VILLENEUVE-LA-GARENNE	24 853	197	0	129	326	7,9	0,0	5,2	13,1
T6 - Plaine Commune	**395 414**	**2 656**	**996**	**2 283**	**5 935**	**6,7**	**2,5**	**5,8**	**15,0**
AUBERVILLIERS	73 232	499	39	-	538	6,8	0,5	0,0	7,3
EPINAY-SUR-SEINE	53 416	318	147	800	1 265	6,0	2,8	15,0	23,7
LA COURNEUVE	36 910	253	136	-	389	6,9	3,7	0,0	10,6
L'ILE-SAINT-DENIS	7 004	45	48	29	123	6,5	6,9	4,2	17,6
PIERREFITTE-SUR-SEINE	28 112	149	58	446	653	5,3	2,1	15,9	23,2
SAINT-DENIS	103 928	758	440	340	1 538	7,3	4,2	3,3	14,8
SAINT-OUEN	46 447	363	57	-	421	7,8	1,2	0,0	9,1
STAINS	33 540	196	44	472	712	5,8	1,3	14,1	21,3
VILLETANEUSE	12 826	74	26	196	296	5,8	2,0	15,3	23,1

Entité	Population (source : densibati IAU IdF)	DALY ROUTE	DALY FER	DALY AIR	DALY TOT	Risque individuel ROUTE	Risque individuel FER	Risque individuel AIR	Risque individuel TOT
T7 - Paris Terres d'envol	**339 841**	**1 932**	**816**	**447**	**3 196**	**5,7**	**2,4**	**1,3**	**9,4**
AULNAY-SOUS-BOIS	81 488	479	188	20	686	5,9	2,3	0,2	8,4
DRANCY	65 043	376	172	-	547	5,8	2,6	0,0	8,4
DUGNY	10 549	62	-	132	194	5,9	0,0	12,5	18,4
LE BLANC-MESNIL	50 660	300	100	85	484	5,9	2,0	1,7	9,6
LE BOURGET	13 595	111	55	-	166	8,2	4,1	0,0	12,3
SEVRAN	48 440	258	202	-	459	5,3	4,2	0,0	9,5
TREMBLAY-EN-FRANCE	34 839	172	83	66	321	4,9	2,4	1,9	9,2
VILLEPINTE	35 228	175	17	145	337	5,0	0,5	4,1	9,6
T8 - Est Ensemble	**390 306**	**2 530**	**859**	**-**	**3 389**	**6,5**	**2,2**	**0,0**	**8,7**
BAGNOLET	33 706	207	-	-	207	6,1	0,0	0,0	6,1
BOBIGNY	46 601	275	305	-	579	5,9	6,5	0,0	12,4
BONDY	52 657	334	239	-	573	6,4	4,5	0,0	10,9
LE PRE-SAINT-GERVAIS	18 026	125	-	-	125	6,9	0,0	0,0	6,9
LES LILAS	22 450	156	-	-	156	7,0	0,0	0,0	7,0
MONTREUIL	101 760	610	22	-	633	6,0	0,2	0,0	6,2
NOISY-LE-SEC	37 879	262	237	-	500	6,9	6,3	0,0	13,2
PANTIN	51 485	401	48	-	450	7,8	0,9	0,0	8,7
ROMAINVILLE	25 743	160	7	-	167	6,2	0,3	0,0	6,5
T9 - Grand Paris Grand Est	**369 128**	**2 191**	**1 326**	**4**	**3 520**	**5,9**	**3,6**	**0,0**	**9,5**
CLICHY-SOUS-BOIS	28 911	163	0	-	163	5,6	0,0	0,0	5,6
COUBRON	4 510	21	-	-	21	4,6	0,0	0,0	4,6
GAGNY	38 560	213	256	-	469	5,5	6,6	0,0	12,2
GOURNAY-SUR-MARNE	6 408	36	-	-	36	5,7	0,0	0,0	5,7
LE RAINCY	13 765	84	26	-	110	6,1	1,9	0,0	8,0
LES PAVILLONS-SOUS-BOIS	20 715	140	42	-	182	6,8	2,0	0,0	8,8
LIVRY-GARGAN	41 391	238	80	-	318	5,8	1,9	0,0	7,7
MONTFERMEIL	24 420	130	0	-	130	5,3	0,0	0,0	5,3
NEUILLY-PLAISANCE	20 229	118	77	-	195	5,8	3,8	0,0	9,7
NEUILLY-SUR-MARNE	32 712	184	234	-	418	5,6	7,2	0,0	12,8
NOISY-LE-GRAND	62 674	379	108	4	491	6,1	1,7	0,1	7,8
ROSNY-SOUS-BOIS	40 519	259	212	-	471	6,4	5,2	0,0	11,6
VAUJOURS	6 239	45	3	-	48	7,2	0,5	0,0	7,7
VILLEMOMBLE	28 075	181	287	-	468	6,4	10,2	0,0	16,7
T10 - Paris Est Marne & Bois	**492 624**	**3 687**	**1 392**	**-**	**5 079**	**7,5**	**2,8**	**0,0**	**10,3**
BRY-SUR-MARNE	15 215	96	138	-	233	6,3	9,1	0,0	15,4
CHAMPIGNY-SUR-MARNE	75 000	518	213	-	731	6,9	2,8	0,0	9,8
CHARENTON-LE-PONT	28 833	289	207	-	496	10,0	7,2	0,0	17,2
FONTENAY-SOUS-BOIS	53 038	312	61	-	374	5,9	1,2	0,0	7,1
JOINVILLE-LE-PONT	17 535	134	41	-	176	7,7	2,4	0,0	10,0
LE PERREUX-SUR-MARNE	32 169	230	119	-	350	7,2	3,7	0,0	10,9
MAISONS-ALFORT	52 474	426	197	-	623	8,1	3,8	0,0	11,9
NOGENT-SUR-MARNE	30 815	228	94	-	322	7,4	3,1	0,0	10,5
SAINT-MANDE	22 333	205	16	-	221	9,2	0,7	0,0	9,9
SAINT-MAUR-DES-FOSSES	74 785	518	128	-	646	6,9	1,7	0,0	8,6
SAINT-MAURICE	14 425	149	26	-	175	10,3	1,8	0,0	12,1
VILLIERS-SUR-MARNE	27 253	172	113	-	285	6,3	4,1	0,0	10,5
VINCENNES	48 750	408	40	-	448	8,4	0,8	0,0	9,2
T11 - Grand Paris Sud Est Avenir	**297 806**	**1 884**	**580**	**751**	**3 215**	**6,3**	**1,9**	**2,5**	**10,8**
ALFORTVILLE	44 031	307	257	-	564	7,0	5,8	0,0	12,8
BOISSY-SAINT-LEGER	16 241	89	27	248	364	5,5	1,7	15,3	22,4
BONNEUIL-SUR-MARNE	16 351	115	49	2	166	7,0	3,0	0,1	10,2
CHENNEVIERES-SUR-MARNE	18 050	103	45	-	148	5,7	2,5	0,0	8,2
CRETEIL	88 875	682	66	-	748	7,7	0,7	0,0	8,4
LA QUEUE-EN-BRIE	11 271	62	-	0	63	5,5	0,0	0,0	5,6
LE PLESSIS-TREVISE	18 842	99	1	-	99	5,2	0,0	0,0	5,3
LIMEIL-BREVANNES	18 991	107	21	315	444	5,6	1,1	16,6	23,4
MANDRES-LES-ROSES	4 380	22	0	-	22	5,0	0,1	0,0	5,1
MAROLLES-EN-BRIE	4 994	21	2	60	82	4,2	0,4	11,9	16,4
NOISEAU	4 662	23	-	3	26	4,9	0,0	0,7	5,7
ORMESSON-SUR-MARNE	9 838	51	8	-	59	5,2	0,8	0,0	6,0
PERIGNY	2 268	8	-	0	8	3,7	0,0	0,0	3,7
SANTENY	3 675	17	0	14	31	4,6	0,0	3,7	8,3
SUCY-EN-BRIE	25 835	131	96	89	315	5,1	3,7	3,4	12,2
VILLECRESNES	9 504	47	8	20	76	5,0	0,9	2,1	8,0
T12 - Grand-Orly Seine Bievre	**653 060**	**4 692**	**1 715**	**1 526**	**7 933**	**7,2**	**2,6**	**2,3**	**12,2**
ABLON-SUR-SEINE	5 156	30	58	107	195	5,8	11,3	20,8	37,8
ARCUEIL	19 457	159	32	-	191	8,2	1,7	0,0	9,8
ATHIS-MONS	30 390	178	139	97	414	5,9	4,6	3,2	13,6
CACHAN	27 666	190	15	-	206	6,9	0,6	0,0	7,4
CHEVILLY-LARUE	18 515	133	-	-	133	7,2	0,0	0,0	7,2
CHOISY-LE-ROI	39 036	331	244	19	594	8,5	6,3	0,5	15,2
FRESNES	25 118	169	-	-	169	6,7	0,0	0,0	6,7
GENTILLY	17 463	153	3	-	156	8,8	0,2	0,0	8,9
IVRY-SUR-SEINE	57 070	470	184	-	654	8,2	3,2	0,0	11,5
JUVISY-SUR-ORGE	14 202	106	96	1	202	7,5	6,7	0,0	14,3
LE KREMLIN-BICETRE	26 284	235	-	-	235	9,0	0,0	0,0	9,0
L'HAY-LES-ROSES	29 792	199	-	-	199	6,7	0,0	0,0	6,7
MORANGIS	11 697	62	3	40	104	5,3	0,3	3,4	8,9
ORLY	20 583	140	99	81	321	6,8	4,8	4,0	15,6
PARAY-VIEILLE-POSTE	6 936	46	-	79	124	6,6	0,0	11,3	17,9
RUNGIS	5 635	39	0	26	65	6,9	0,1	4,6	11,6
SAVIGNY-SUR-ORGE	36 950	232	170	2	404	6,3	4,6	0,1	10,9
THIAIS	29 492	216	6	11	234	7,3	0,2	0,4	7,9
VALENTON	11 997	67	12	195	274	5,6	1,0	16,3	22,9
VILLEJUIF	55 128	406	-	-	406	7,4	0,0	0,0	7,4
VILLENEUVE-LE-ROI	18 278	107	140	379	626	5,9	7,6	20,8	34,3
VILLENEUVE-SAINT-GEORGES	30 719	228	216	490	934	7,4	7,1	16,0	30,4
VIRY-CHATILLON	31 107	193	80	-	273	6,2	2,6	0,0	8,8
VITRY-SUR-SEINE	84 391	602	216	-	819	7,1	2,6	0,0	9,7

Entité	Population (source : densibati IAU IdF)	DALY ROUTE	DALY FER	DALY AIR	DALY TOT	Risque individuel ROUTE	Risque individuel FER	Risque individuel AIR	Risque individuel TOT
Cergy Pontoise (CA)	**196 297**	**984**	**329**	**72**	**1 386**	**5,0**	**1,7**	**0,4**	**7,1**
BOISEMONT	754	3	-	0	3	4,5	0,0	0,1	4,6
CERGY	62 235	303	51	0	355	4,9	0,8	0,0	5,7
COURDIMANCHE	6 786	31	-	-	31	4,6	0,0	0,0	4,6
ERAGNY	16 184	72	59	30	161	4,4	3,6	1,9	9,9
JOUY-LE-MOUTIER	16 469	70	-	36	106	4,2	0,0	2,2	6,4
MAURECOURT	4 244	20	29	-	48	4,6	6,8	0,0	11,4
MENUCOURT	5 245	18	-	-	18	3,4	0,0	0,0	3,4
NEUVILLE-SUR-OISE	1 508	8	1	3	12	5,5	0,6	2,2	8,3
OSNY	15 584	73	-	-	73	4,7	0,0	0,0	4,7
PONTOISE	29 024	163	44	-	206	5,6	1,5	0,0	7,1
PUISEUX-PONTOISE	447	3	-	-	3	7,0	0,0	0,0	7,0
SAINT-OUEN-L'AUMONE	22 104	144	146	-	290	6,5	6,6	0,0	13,1
VAUREAL	15 713	77	-	2	79	4,9	0,0	0,1	5,0
Coeur d'Essonne Agglomeration (CA)	**184 460**	**933**	**636**	**27**	**1 595**	**5,1**	**3,4**	**0,1**	**8,7**
ARPAJON	10 380	71	24	5	100	6,9	2,3	0,5	9,7
AVRAINVILLE	725	3	-	-	3	4,8	0,0	0,0	4,8
BRETIGNY-SUR-ORGE	22 525	124	198	-	322	5,5	8,8	0,0	14,3
BREUILLET	8 272	36	9	5	51	4,4	1,1	0,6	6,1
BRUYERES-LE-CHATEL	3 147	16	0	7	23	5,0	0,0	2,3	7,3
CHEPTAINVILLE	1 904	7	4	-	12	3,8	2,3	0,0	6,1
EGLY	5 293	31	11	1	43	5,8	2,1	0,2	8,1
FLEURY-MEROGIS	9 080	48	-	-	48	5,3	0,0	0,0	5,3
GUIBEVILLE	727	3	0	-	3	4,6	0,1	0,0	4,8
LA NORVILLE	4 101	17	10	-	27	4,1	2,5	0,0	6,6
LE PLESSIS-PATE	3 992	18	-	-	18	4,6	0,0	0,0	4,6
LEUVILLE-SUR-ORGE	4 097	20	-	-	20	4,9	0,0	0,0	4,9
LONGPONT-SUR-ORGE	6 502	34	0	-	34	5,2	0,1	0,0	5,3
MAROLLES-EN-HUREPOIX	4 709	20	67	-	87	4,2	14,1	0,0	18,4
MORSANG-SUR-ORGE	20 822	110	21	-	131	5,3	1,0	0,0	6,3
OLLAINVILLE	4 368	19	0	8	27	4,4	0,0	1,8	6,2
SAINTE-GENEVIEVE-DES-BOIS	33 992	168	79	-	247	4,9	2,3	0,0	7,3
SAINT-GERMAIN-LES-ARPAJON	9 068	42	9	0	52	4,6	1,0	0,0	5,7
SAINT-MICHEL-SUR-ORGE	20 017	95	149	-	244	4,8	7,4	0,0	12,2
VILLEMOISSON-SUR-ORGE	6 843	32	51	-	83	4,7	7,5	0,0	12,2
VILLIERS-SUR-ORGE	3 895	15	3	-	19	4,0	0,9	0,0	4,9
Communaute Paris-Saclay (CA)	**285 571**	**1 540**	**602**	**1 194**	**3 336**	**5,4**	**2,1**	**4,2**	**11,7**
BALLAINVILLIERS	3 773	19	-	1	20	5,2	0,0	0,1	5,3
BURES-SUR-YVETTE	9 580	45	10	19	74	4,7	1,1	1,9	7,7
CHAMPLAN	2 438	18	9	50	77	7,5	3,7	20,4	31,5
CHILLY-MAZARIN	18 314	106	49	142	298	5,8	2,7	7,8	16,3
EPINAY-SUR-ORGE	10 058	55	64	-	118	5,4	6,3	0,0	11,8
GIF-SUR-YVETTE	20 651	90	11	-	101	4,4	0,5	0,0	4,9
GOMETZ-LE-CHATEL	2 413	13	-	9	22	5,3	0,0	3,7	9,0
IGNY	10 097	52	44	-	96	5,1	4,3	0,0	9,5
LA VILLE-DU-BOIS	7 073	31	-	3	35	4,4	0,0	0,5	4,9
LES ULIS	23 604	111	0	259	369	4,7	0,0	11,0	15,7
LINAS	6 334	39	-	1	39	6,1	0,0	0,1	6,2
LONGJUMEAU	21 238	131	27	116	274	6,2	1,3	5,5	12,9
MARCOUSSIS	7 766	45	0	22	67	5,7	0,0	2,9	8,6
MASSY	40 194	229	217	72	519	5,7	5,4	1,8	12,9
MONTLHERY	6 718	43	-	-	43	6,4	0,0	0,0	6,4
NOZAY	4 655	21	-	16	36	4,4	0,0	3,4	7,8
ORSAY	16 239	92	16	77	185	5,7	1,0	4,7	11,4
PALAISEAU	30 198	173	105	122	400	5,7	3,5	4,0	13,3
SACLAY	3 040	16	-	0	16	5,4	0,0	0,0	5,4
SAINT-AUBIN	688	3	-	-	3	4,5	0,0	0,0	4,5
SAULX-LES-CHARTREUX	4 974	26	0	62	88	5,2	0,1	12,4	17,8
VAUHALLAN	1 966	9	-	-	9	4,3	0,0	0,0	4,3
VERRIERES-LE-BUISSON	15 534	67	21	-	88	4,3	1,4	0,0	5,7
VILLEBON-SUR-YVETTE	9 465	53	17	136	206	5,6	1,8	14,4	21,8
VILLEJUST	2 200	9	0	37	46	4,3	0,0	16,8	21,1
VILLIERS-LE-BACLE	1 173	5	-	0	5	4,4	0,0	0,2	4,6
WISSOUS	5 189	38	11	51	100	7,4	2,2	9,8	19,3
Grand Paris Seine & Oise (CU)	**391 150**	**2 133**	**1 542**	**0**	**3 676**	**5,5**	**3,9**	**0,0**	**9,4**
ACHERES	19 415	103	59	0	163	5,3	3,1	0,0	8,4
ANDRESY	12 001	63	115	-	177	5,2	9,6	0,0	14,8
ARNOUVILLE-LES-MANTES	831	4	-	-	4	4,8	0,0	0,0	4,8
AUBERGENVILLE	11 887	61	1	-	62	5,1	0,1	0,0	5,2
AUFFREVILLE-BRASSEUIL	583	2	-	-	2	4,0	0,0	0,0	4,0
AULNAY-SUR-MAULDRE	1 127	4	7	-	12	3,8	6,6	0,0	10,3
BOINVILLE-EN-MANTOIS	304	1	-	-	1	4,4	0,0	0,0	4,4
BOUAFLE	2 128	10	-	-	10	4,9	0,0	0,0	4,9
BREUIL-BOIS-ROBERT	703	3	-	-	3	4,6	0,0	0,0	4,6
BRUEIL-EN-VEXIN	690	3	-	-	3	4,1	0,0	0,0	4,1
BUCHELAY	2 258	12	5	-	17	5,2	2,2	0,0	7,3
CARRIERES-SOUS-POISSY	14 103	77	11	-	88	5,4	0,8	0,0	6,2
CHANTELOUP-LES-VIGNES	9 377	51	46	-	96	5,4	4,9	0,0	10,3
CHAPET	1 172	6	-	-	6	4,9	0,0	0,0	4,9
CONFLANS-SAINTE-HONORINE	34 692	176	232	-	408	5,1	6,7	0,0	11,8
DROCOURT	491	2	-	-	2	4,7	0,0	0,0	4,7
ECQUEVILLY	3 826	16	-	-	16	4,3	0,0	0,0	4,3
EPONE	6 253	34	22	-	56	5,4	3,5	0,0	8,9
EVECQUEMONT	778	3	2	-	6	4,4	3,0	0,0	7,4
FAVRIEUX	145	1	-	-	1	6,9	0,0	0,0	6,9
FLACOURT	143	0	-	-	0	3,0	0,0	0,0	3,0
FLINS-SUR-SEINE	2 490	15	0	-	15	6,1	0,0	0,0	6,1
FOLLAINVILLE-DENNEMONT	1 821	8	-	-	8	4,5	0,0	0,0	4,5
FONTENAY-MAUVOISIN	433	1	-	-	1	3,1	0,0	0,0	3,1
FONTENAY-SAINT-PERE	996	4	-	-	4	4,3	0,0	0,0	4,3

Entité	Population (source : densibati IAU IdF)	DALY ROUTE	DALY FER	DALY AIR	DALY TOT	Risque individuel ROUTE	Risque individuel FER	Risque individuel AIR	Risque individuel TOT
GAILLON-SUR-MONTCIENT	680	3	0	-	3	4,1	0,0	0,0	4,1
GARGENVILLE	6 681	35	24	-	59	5,3	3,5	0,0	8,8
GOUSSONVILLE	604	2	-	-	2	3,5	0,0	0,0	3,5
GUERNES	1 009	4	0	-	4	3,6	0,0	0,0	3,7
GUERVILLE	2 015	7	0	-	7	3,6	0,1	0,0	3,7
GUITRANCOURT	637	2	-	-	2	3,9	0,0	0,0	3,9
HARDRICOURT	2 078	13	12	-	25	6,1	6,0	0,0	12,1
HARGEVILLE	386	2	-	-	2	4,4	0,0	0,0	4,4
ISSOU	4 474	20	16	-	36	4,5	3,6	0,0	8,0
JAMBVILLE	765	2	-	-	2	2,6	0,0	0,0	2,6
JOUY-MAUVOISIN	531	2	0	-	2	4,0	0,1	0,0	4,1
JUMEAUVILLE	577	2	-	-	2	4,3	0,0	0,0	4,3
JUZIERS	3 760	19	27	-	46	4,9	7,2	0,0	12,2
LA FALAISE	620	3	2	-	5	4,3	3,6	0,0	7,9
LAINVILLE-EN-VEXIN	792	2	-	-	2	2,7	0,0	0,0	2,7
LE TERTRE-SAINT-DENIS	94	0	-	-	0	4,4	0,0	0,0	4,4
LES ALLUETS-LE-ROI	1 194	6	-	-	6	4,9	0,0	0,0	4,9
LES MUREAUX	30 357	189	86	-	275	6,2	2,8	0,0	9,1
LIMAY	15 909	100	47	-	147	6,3	3,0	0,0	9,2
MAGNANVILLE	5 571	26	-	-	26	4,8	0,0	0,0	4,8
MANTES-LA-JOLIE	42 030	247	174	-	421	5,9	4,1	0,0	10,0
MANTES-LA-VILLE	18 714	108	60	-	168	5,8	3,2	0,0	9,0
MEDAN	1 462	6	15	-	21	4,2	10,4	0,0	14,6
MERICOURT	390	2	-	-	2	4,3	0,0	0,0	4,3
MEULAN	8 762	52	51	-	103	6,0	5,8	0,0	11,8
MEZIERES-SUR-SEINE	3 443	17	14	-	32	5,0	4,2	0,0	9,2
MEZY-SUR-SEINE	1 919	8	12	-	20	4,2	6,3	0,0	10,5
MONTALET-LE-BOIS	319	1	-	-	1	3,6	0,0	0,0	3,6
MORAINVILLIERS	2 389	11	-	-	11	4,5	0,0	0,0	4,5
MOUSSEAUX-SUR-SEINE	616	2	-	-	2	3,4	0,0	0,0	3,4
NEZEL	998	6	9	-	15	5,6	9,0	0,0	14,6
OINVILLE-SUR-MONTCIENT	1 111	5	-	-	5	4,2	0,0	0,0	4,2
ORGEVAL	5 794	27	0	-	27	4,6	0,0	0,0	4,6
PERDREAUVILLE	591	2	1	-	3	3,2	1,1	0,0	4,3
POISSY	37 361	252	147	-	399	6,8	3,9	0,0	10,7
PORCHEVILLE	2 697	13	7	-	21	4,9	2,7	0,0	7,6
ROLLEBOISE	405	2	-	-	2	5,0	0,0	0,0	5,0
ROSNY-SUR-SEINE	5 433	31	59	-	90	5,7	10,9	0,0	16,6
SAILLY	375	2	-	-	2	4,8	0,0	0,0	4,8
SAINT-MARTIN-LA-GARENNE	883	3	-	-	3	3,8	0,0	0,0	3,8
SOINDRES	594	2	-	-	2	3,9	0,0	0,0	3,9
TESSANCOURT-SUR-AUBETTE	944	3	0	-	3	3,7	0,0	0,0	3,7
TRIEL-SUR-SEINE	11 580	61	72	-	133	5,3	6,2	0,0	11,5
VAUX-SUR-SEINE	4 824	29	40	-	69	6,0	8,4	0,0	14,4
VERNEUIL-SUR-SEINE	15 071	68	61	-	129	4,5	4,0	0,0	8,6
VERNOUILLET	9 241	47	63	-	110	5,0	6,8	0,0	11,9
VERT	768	3	-	-	3	4,3	0,0	0,0	4,3
VILLENNES-SUR-SEINE	5 056	22	41	-	63	4,3	8,1	0,0	12,4
Grand Paris Sud (CA)	**317 271**	**1 740**	**821**	**1**	**2 561**	**5,5**	**2,6**	**0,0**	**8,1**
BONDOUFLE	9 279	42	-	-	42	4,5	0,0	0,0	4,5
CESSON	8 195	30	76	-	106	3,7	9,2	0,0	12,9
COMBS-LA-VILLE	21 218	93	128	1	221	4,4	6,0	0,0	10,4
CORBEIL-ESSONNES	40 652	234	125	-	359	5,8	3,1	0,0	8,8
COURCOURONNES	13 860	90	17	-	107	6,5	1,2	0,0	7,8
ETIOLLES	3 103	13	3	-	16	4,3	0,9	0,0	5,2
EVRY	51 746	295	61	-	357	5,7	1,2	0,0	6,9
GRIGNY	26 410	153	42	-	195	5,8	1,6	0,0	7,4
LE COUDRAY-MONTCEAUX	4 563	24	12	-	36	5,2	2,6	0,0	7,8
LIEUSAINT	10 205	76	23	-	99	7,5	2,3	0,0	9,8
LISSES	7 154	41	0	-	41	5,7	0,0	0,0	5,7
MOISSY-CRAMAYEL	16 668	125	64	-	189	7,5	3,9	0,0	11,3
MORSANG-SUR-SEINE	500	1	1	-	2	2,2	1,5	0,0	3,7
NANDY	5 790	24	5	-	29	4,1	0,9	0,0	5,0
REAU	1 051	5	1	-	6	5,1	0,7	0,0	5,8
RIS-ORANGIS	27 228	168	83	-	250	6,2	3,0	0,0	9,2
SAINT-GERMAIN-LES-CORBEIL	7 092	34	1	-	35	4,8	0,2	0,0	5,0
SAINT-PIERRE-DU-PERRAY	8 071	35	0	-	35	4,4	0,0	0,0	4,4
SAINTRY-SUR-SEINE	5 093	18	-	-	18	3,5	0,0	0,0	3,5
SAVIGNY-LE-TEMPLE	27 948	139	152	-	291	5,0	5,4	0,0	10,4
SOISY-SUR-SEINE	7 129	28	12	-	40	4,0	1,7	0,0	5,6
TIGERY	2 516	13	-	-	13	5,0	0,0	0,0	5,0
VERT-SAINT-DENIS	6 963	32	5	-	37	4,6	0,7	0,0	5,2
VILLABE	4 835	27	11	-	37	5,5	2,2	0,0	7,7
Paris Vallee de la Marne (CA)	**217 786**	**1 093**	**676**	**28**	**1 798**	**5,0**	**3,1**	**0,1**	**8,3**
BROU-SUR-CHANTEREINE	4 137	20	13	-	33	4,9	3,1	0,0	8,0
CHAMPS-SUR-MARNE	24 297	125	15	-	139	5,1	0,6	0,0	5,7
CHELLES	52 421	262	244	2	508	5,0	4,7	0,0	9,7
COURTRY	5 920	25	-	-	25	4,3	0,0	0,0	4,3
CROISSY-BEAUBOURG	2 135	10	-	4	14	4,8	0,0	1,9	6,7
EMERAINVILLE	7 488	42	14	5	61	5,6	1,9	0,7	8,1
LOGNES	14 843	82	36	6	124	5,5	2,4	0,4	8,4
NOISIEL	15 091	80	10	-	90	5,3	0,7	0,0	6,0
PONTAULT-COMBAULT	35 117	185	57	4	246	5,3	1,6	0,1	7,0
ROISSY-EN-BRIE	22 142	105	172	7	284	4,8	7,8	0,3	12,8
TORCY	22 154	108	14	1	123	4,9	0,6	0,0	5,6
VAIRES-SUR-MARNE	12 042	49	101	-	150	4,1	8,4	0,0	12,5

Entité	Population (source : densibati IAU IdF)	DALY ROUTE	DALY FER	DALY AIR	DALY TOT	Risque individuel ROUTE	Risque individuel FER	Risque individuel AIR	Risque individuel TOT
Plaine Vallee (CA)	**174 548**	**939**	**524**	**2 814**	**4 277**	**5,4**	**3,0**	**16,1**	**24,5**
ANDILLY	2 573	13	-	42	55	5,2	0,0	16,3	21,5
ATTAINVILLE	1 847	11	0	24	36	6,0	0,0	13,2	19,3
BOUFFEMONT	5 794	28	13	7	49	4,8	2,3	1,3	8,4
DEUIL-LA-BARRE	20 828	116	119	371	606	5,6	5,7	17,8	29,1
DOMONT	14 458	68	45	165	278	4,7	3,1	11,4	19,3
ENGHIEN-LES-BAINS	12 153	68	87	210	365	5,6	7,2	17,3	30,0
EZANVILLE	8 956	55	18	132	205	6,1	2,0	14,8	22,9
GROSLAY	7 817	42	31	152	226	5,4	4,0	19,5	28,9
MARGENCY	2 865	14	-	45	59	4,9	0,0	15,6	20,5
MOISSELLES	1 075	8	-	12	20	7,1	0,0	11,6	18,7
MONTLIGNON	2 574	15	-	40	55	5,9	0,0	15,5	21,4
MONTMAGNY	13 794	72	47	253	371	5,2	3,4	18,3	26,9
MONTMORENCY	20 513	109	4	365	478	5,3	0,2	17,8	23,3
PISCOP	654	4	-	12	16	5,9	0,0	18,4	24,3
SAINT-BRICE-SOUS-FORET	14 173	83	42	260	386	5,9	3,0	18,4	27,2
SAINT-GRATIEN	19 888	107	67	318	492	5,4	3,4	16,0	24,8
SAINT-PRIX	7 409	37	16	113	165	5,0	2,1	15,3	22,3
SOISY-SOUS-MONTMORENCY	17 176	90	34	291	415	5,2	2,0	16,9	24,2
Roissy Pays de France (CA)	**332 245**	**1 733**	**693**	**4 612**	**7 038**	**5,2**	**2,1**	**13,9**	**21,2**
ARNOUVILLE-LES-GONESSE	13 212	71	45	291	407	5,4	3,4	22,1	30,9
BONNEUIL-EN-FRANCE	800	5	-	13	18	6,2	0,0	16,4	22,6
BOUQUEVAL	322	2	-	8	9	5,1	0,0	24,2	29,3
CHENNEVIERES-LES-LOUVRES	332	3	2	4	9	8,5	5,8	12,1	26,4
CLAYE-SOUILLY	10 944	66	3	-	69	6,1	0,3	0,0	6,3
COMPANS	684	3	7	15	26	4,8	10,8	22,5	38,1
DAMMARTIN-EN-GO?LE	7 923	52	-	53	105	6,5	0,0	6,7	13,3
ECOUEN	7 342	40	4	142	186	5,5	0,5	19,3	25,3
EPIAIS-LES-LOUVRES	82	0	-	2	2	5,5	0,0	22,7	28,2
FONTENAY-EN-PARISIS	1 901	10	-	8	18	5,2	0,0	4,0	9,2
FOSSES	9 588	38	4	-	43	4,0	0,5	0,0	4,5
GARGES-LES-GONESSE	39 342	204	66	695	965	5,2	1,7	17,7	24,6
GONESSE	25 615	141	83	571	795	5,5	3,3	22,3	31,1
GOUSSAINVILLE	30 694	149	62	538	750	4,9	2,0	17,6	24,4
GRESSY	924	4	2	0	7	4,9	1,9	0,5	7,2
JUILLY	2 034	10	-	41	51	4,7	0,0	20,3	25,0
LE MESNIL-AMELOT	764	5	-	19	24	6,7	0,0	24,6	31,3
LE MESNIL-AUBRY	921	5	-	17	22	5,7	0,0	18,4	24,1
LE PLESSIS-GASSOT	77	0	-	2	2	4,2	0,0	20,4	24,7
LE THILLAY	3 949	18	2	88	109	4,7	0,6	22,3	27,6
LONGPERRIER	2 351	11	-	28	39	4,7	0,0	11,9	16,6
LOUVRES	8 943	43	39	93	175	4,8	4,3	10,4	19,5
MARLY-LA-VILLE	5 469	26	0	-	26	4,7	0,0	0,0	4,7
MAUREGARD	292	1	-	7	8	4,4	0,0	22,6	27,0
MITRY-MORY	18 301	84	124	116	324	4,6	6,8	6,4	17,7
MOUSSY-LE-NEUF	2 797	11	6	0	17	3,8	2,2	0,1	6,1
MOUSSY-LE-VIEUX	1 042	5	-	14	19	4,7	0,0	13,3	18,0
OTHIS	6 481	27	6	-	32	4,1	0,9	0,0	5,0
PUISEUX-EN-FRANCE	3 339	14	1	2	17	4,1	0,4	0,7	5,2
ROISSY-EN-FRANCE	2 673	16	1	62	79	6,0	0,2	23,3	29,5
ROUVRES	624	4	6	1	11	6,1	10,0	2,1	18,2
SAINT-MARD	3 754	18	22	77	117	4,9	5,8	20,5	31,3
SAINT-WITZ	2 554	11	-	-	11	4,5	0,0	0,0	4,5
SARCELLES	58 441	315	127	1 156	1 598	5,4	2,2	19,8	27,4
SURVILLIERS	3 700	26	0	-	26	7,1	0,0	0,0	7,2
THIEUX	791	4	3	19	26	5,6	3,3	24,2	33,1
VAUDHERLAND	91	1	-	2	3	10,3	0,0	23,3	33,5
VEMARS	2 168	10	4	1	15	4,8	1,6	0,6	7,0
VILLENEUVE-SOUS-DAMMARTIN	615	4	-	14	17	5,7	0,0	22,1	27,8
VILLEPARISIS	23 806	118	72	-	189	4,9	3,0	0,0	8,0
VILLERON	722	4	1	1	6	5,5	2,0	1,2	8,6
VILLIERS-LE-BEL	25 843	154	0	510	664	6,0	0,0	19,8	25,7
Saint Germain Boucles de Seine (CA)	**329 169**	**1 698**	**876**	**424**	**2 998**	**5,2**	**2,7**	**1,3**	**9,1**
AIGREMONT	1 077	4	-	-	4	4,1	0,0	0,0	4,1
BEZONS	27 774	134	18	103	254	4,8	0,6	3,7	9,2
CARRIERES-SUR-SEINE	15 083	70	79	-	149	4,6	5,2	0,0	9,9
CHAMBOURCY	5 789	25	-	-	25	4,3	0,0	0,0	4,3
CHATOU	29 524	153	7	-	160	5,2	0,3	0,0	5,4
CROISSY-SUR-SEINE	9 971	51	0	-	51	5,1	0,0	0,0	5,1
FOURQUEUX	4 114	17	1	-	19	4,2	0,3	0,0	4,5
HOUILLES	30 844	138	156	-	295	4,5	5,1	0,0	9,6
LE MESNIL-LE-ROI	6 414	29	1	-	29	4,5	0,1	0,0	4,6
LE PECQ	16 542	112	11	-	123	6,8	0,7	0,0	7,5
LE PORT-MARLY	4 550	33	5	-	38	7,3	1,0	0,0	8,3
LE VESINET	15 931	91	15	-	106	5,7	1,0	0,0	6,7
L'ETANG-LA-VILLE	4 823	19	11	-	30	3,8	2,3	0,0	6,1
LOUVECIENNES	7 211	34	20	-	54	4,7	2,8	0,0	7,5
MAISONS-LAFFITTE	22 656	109	167	73	349	4,8	7,4	3,2	15,4
MAREIL-MARLY	3 501	14	4	-	18	4,1	1,2	0,0	5,2
MARLY-LE-ROI	16 499	76	45	-	121	4,6	2,7	0,0	7,3
MONTESSON	15 274	76	0	-	76	5,0	0,0	0,0	5,0
SAINT-GERMAIN-EN-LAYE	40 525	226	36	-	262	5,6	0,9	0,0	6,5
SARTROUVILLE	51 066	286	299	248	833	5,6	5,9	4,9	16,3

Entité	Population (source : densibati IAU IdF)	DALY ROUTE	DALY FER	DALY AIR	DALY TOT	Risque individuel ROUTE	Risque individuel FER	Risque individuel AIR	Risque individuel TOT
Saint-Quentin-en-Yvelines (CA)	**223 917**	**1 212**	**562**	**-**	**1 774**	**5,4**	**2,5**	**0,0**	**7,9**
COIGNIERES	4 358	30	27	-	57	6,9	6,2	0,0	13,1
ELANCOURT	27 021	149	29	-	179	5,5	1,1	0,0	6,6
GUYANCOURT	28 078	149	1	-	151	5,3	0,0	0,0	5,4
LA VERRIERE	6 048	40	75	-	114	6,6	12,4	0,0	18,9
LES CLAYES-SOUS-BOIS	17 404	94	102	-	195	5,4	5,9	0,0	11,2
MAGNY-LES-HAMEAUX	8 878	38	-	-	38	4,3	0,0	0,0	4,3
MAUREPAS	18 836	101	22	-	123	5,4	1,2	0,0	6,5
MONTIGNY-LE-BRETONNEUX	33 179	185	71	-	255	5,6	2,1	0,0	7,7
PLAISIR	30 628	152	64	-	216	5,0	2,1	0,0	7,0
TRAPPES	27 701	171	129	-	300	6,2	4,7	0,0	10,8
VILLEPREUX	9 870	44	43	-	86	4,4	4,3	0,0	8,8
VOISINS-LE-BRETONNEUX	11 915	59	-	-	59	4,9	0,0	0,0	4,9
Val d'Yerres Val de Seine (CA)	**166 392**	**867**	**561**	**83**	**1 511**	**5,2**	**3,4**	**0,5**	**9,1**
BOUSSY-SAINT-ANTOINE	6 304	35	34	-	69	5,6	5,5	0,0	11,0
BRUNOY	25 300	125	100	-	225	4,9	4,0	0,0	8,9
CROSNE	8 796	48	24	39	111	5,5	2,7	4,5	12,7
DRAVEIL	28 333	145	14	-	159	5,1	0,5	0,0	5,6
EPINAY-SOUS-SENART	12 142	63	42	-	105	5,2	3,4	0,0	8,6
MONTGERON	22 572	140	97	6	243	6,2	4,3	0,3	10,8
QUINCY-SOUS-SENART	7 872	36	70	-	106	4,6	8,8	0,0	13,5
VIGNEUX-SUR-SEINE	26 328	130	57	10	196	4,9	2,2	0,4	7,4
YERRES	28 745	144	123	28	295	5,0	4,3	1,0	10,3
Val Parisis (CA)	**248 779**	**1 400**	**991**	**2 793**	**5 184**	**5,6**	**4,0**	**11,2**	**20,9**
BEAUCHAMP	8 462	42	38	49	130	5,0	4,5	5,8	15,3
BESSANCOURT	7 118	33	28	-	61	4,7	3,9	0,0	8,6
CORMEILLES-EN-PARISIS	22 467	115	122	288	525	5,1	5,4	12,8	23,4
EAUBONNE	22 759	126	47	356	529	5,6	2,1	15,6	23,3
ERMONT	26 368	171	183	395	748	6,5	6,9	15,0	28,4
FRANCONVILLE	32 351	173	132	441	745	5,3	4,1	13,6	23,1
FREPILLON	2 658	18	4	-	22	6,6	1,5	0,0	8,1
HERBLAY	25 270	112	126	227	466	4,4	5,0	9,0	18,4
LA FRETTE-SUR-SEINE	4 521	21	41	54	115	4,6	9,1	11,8	25,6
LE PLESSIS-BOUCHARD	7 575	45	28	112	185	6,0	3,7	14,7	24,4
MONTIGNY-LES-CORMEILLES	18 608	114	62	226	402	6,1	3,3	12,2	21,6
PIERRELAYE	6 705	43	42	9	94	6,4	6,2	1,4	14,0
SAINT-LEU-LA-FORET	14 273	80	46	174	300	5,6	3,2	12,2	21,0
SANNOIS	23 879	171	66	364	600	7,2	2,7	15,3	25,2
TAVERNY	25 765	136	28	99	263	5,3	1,1	3,8	10,2
Versailles Grand Parc (CA)	**260 731**	**1 595**	**818**	**3**	**2 417**	**6,1**	**3,1**	**0,0**	**9,3**
BAILLY	3 879	24	0	-	24	6,2	0,1	0,0	6,3
BIEVRES	5 219	35	19	3	57	6,8	3,6	0,6	11,0
BOIS-D'ARCY	13 626	79	1	-	80	5,8	0,1	0,0	5,9
BOUGIVAL	8 422	46	5	-	51	5,5	0,6	0,0	6,1
BUC	5 261	27	-	-	27	5,1	0,0	0,0	5,1
CHATEAUFORT	1 401	7	-	-	7	4,9	0,0	0,0	4,9
FONTENAY-LE-FLEURY	12 591	76	46	-	122	6,1	3,6	0,0	9,7
JOUY-EN-JOSAS	8 036	31	25	-	55	3,8	3,1	0,0	6,9
LA CELLE-SAINT-CLOUD	20 763	109	14	-	124	5,3	0,7	0,0	6,0
LE CHESNAY	29 095	188	-	-	188	6,5	0,0	0,0	6,5
LES LOGES-EN-JOSAS	1 519	7	2	-	9	4,4	1,5	0,0	5,8
NOISY-LE-ROI	7 880	49	12	-	61	6,2	1,5	0,0	7,7
RENNEMOULIN	121	1	-	-	1	4,4	0,0	0,0	4,4
ROCQUENCOURT	3 243	28	-	-	28	8,5	0,0	0,0	8,5
SAINT-CYR-L'ECOLE	17 320	121	119	-	240	7,0	6,9	0,0	13,9
TOUSSUS-LE-NOBLE	910	4	-	-	4	4,3	0,0	0,0	4,3
VELIZY-VILLACOUBLAY	19 644	165	2	-	167	8,4	0,1	0,0	8,5
VERSAILLES	85 937	519	405	-	924	6,0	4,7	0,0	10,8
VIROFLAY	15 864	80	168	-	248	5,0	10,6	0,0	15,6

HEALTH IMPACT OF TRANSPORT NOISE IN THE DENSELY POPULATED ZONE OF ILE-DE-FRANCE REGION

FEBRUARY 2019

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