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Executive Summary
The structure of this report is summarised here:

The judgement that mandated this report, required an independent and scientific developed solution to aircraft noise at BRU that would reduce or stop the present continual noise related litigations. A scientific assessment of the existing noise impact was provided in Chapter 1 of this report. This Chapter 2 also provides some initial analysis of potential operational solutions to some of the highlighted issues.

In preparing Chapter 1 however, Envisa has found the much of the noise related problems around BRU have been stimulated by non-technical and non-scientific factors including:

- multiple arbitrary changes to where and how aircraft fly;
- fragmented regulation and governance;
- lack of coherent and commonly agreed aircraft noise policy;
- poor public communications and engagement (evidenced by widespread lack of understanding amongst many stakeholders);
- nimbyism driving political and judicial decision-making;
- lack of clarity on the application of operational rules;
- public uncertainty as to where, when or how aircraft are supposed to fly;
- despite general good application of operational rules, some exceptions where less than optimal application were found (some potential solutions are provided in Ch2)
- communities being set against neighbouring communities; and,
- loss of public trust

The solutions to these factors are not scientific but are more structural and process related. Whilst solutions to these kinds of structural issues may be widely practiced, and can by suggested, no external agency has the power impose these – they transcend pure noise management. These issues need to be solved before any overall commonly agreed scientific or technical noise management solution can be designed.

It is likely that the public expect a ‘silver bullet’ noise management solution to be provided by this report that will remove the BRU aircraft noise issue for every individual reader of this report. Sadly, this is not possible. The problems have existed for many years and even though some rapid improvements are
suggested in this report, it will take time to design and agree the ultimate solutions. Even then, aircraft noise can be expected by anyone living near a major airport and no single solution will protect everyone all the time.

To enable a single scientific solution for the entire noise problems around BRU to be produced however, a specific and commonly agreed set of policy objectives for the solution to achieve would be required. No external agency can impose such policy on a State since the balance of sustainability required can only be determined (hopefully inclusively) by that State. The economic and social benefits delivered by the National airport, are significant, and these need to be “politically” weighed against the negative impacts.

A commonly agreed BRU noise policy is a prerequisite for any agency to determine the optimum operational solution for that policy. For example, are the noise policy objectives to:

- have the least number of people severely affected by aircraft noise?
- overfly the least number of people?
- avoid all tranquil areas?
- avoid all sleep disturbance from aircraft noise?
- offer some respite to every population?
- distribute aircraft on an equitable basis?
- have a successful BRU airport?
- ensure planning law effectively prevents encroachment of inappropriate development?
- maximise economic benefit?
- avoid all unacceptable aircraft noise for every individual within a defined distance from BRU?
- to prioritise those most severely affected by aircraft noise even if it means overflying some more densely populated areas further out?

These objectives are not fully compatible with each other and nowhere are these kinds of objectives set down as a commonly-agreed Belgian BRU aircraft noise policy that explains how, when and where such objectives are to be realised.

The closest thing to such a policy is the BRU Noise Action Plan (responding to EU Directive 2002/49/EC), but this does not appear to be commonly-agreed and does not clearly state what the policy objectives are. It also seems to focus on delivery of existing rules and as such does not provide a basis to design a new independent noise solution for BRU.

Until a harmonised and commonly agreed policy process is completed therefore, no external agency can provide the hoped for scientifically derived ‘silver bullet’ operational noise solution called for by the judgment.

Policy should drive the scientifically assessed operational solutions and not the other-way around.

In addition to providing candidate technical solutions for short-term improvements to existing noise management operational rules and practices, this report therefore provides advice on the structures and processes that would be required to:

- Agree the principles to be applied to noise management at BRU (and possibly for all Belgian airports)
- Agree an overall aircraft noise policy for BRU (and possibly for all Belgian airports)
- Avoid arbitrary interventions and uncertainty
- Harmonise aircraft noise governance and regulation for BRU
- Develop commonly agreed solutions and the rules to deliver these
- Enhance public understanding, engagement and trust (over time)

No external agency can impose a purely noise driven solution to the present problems related to aircraft noise from BRU. Such solutions will require common agreement to the desired outcome and should be produced inclusively and not arbitrarily. This must come from inside Belgium and from the involved stakeholders and affected parties, taking into account wider sustainability implications and not just aircraft noise.
This study is aimed at helping to facilitate discussion and propose a framework for everyone to join the debate in a fair and equitable way. We see no miracle cure for the problems that people have spoken to us about. But there are clearly many ideas that need further debate and evaluation, which when taken individually or as a package, will inevitably lead to an improvement upon the current situation.

Agreeing that improvement is possible and indeed, agreeing that progress is being made in the right direction, depends on reaching a consensus on what the criteria are to be used to assess this “improvement”. This in turn requires effective regulatory, political and community engagement infrastructure and processes to be in place.

Understanding the true impact and deliverability of options will be essential to ensure good decision-making. Protecting the majority from the most severe adverse impacts will require difficult decisions, since not everyone can be protected all the time. Predictability, clarity and honesty will be needed to avoid raising unrealistic expectations and to re-build trust. Longer-term, more radical planning may be required.

Only through observing an improvement of measurable facts, can we be satisfied that progress is being made.

A Cautionary Note

“You can please some of the people all of the time, you can please all of the people some of the time, but you can’t please all of the people all of the time.”
Preface to Chapter 2

Thank you to everyone that took time to talk to us.

From the business of running an airport that creates employment and generates economic and social benefit, to those impacted by the airport activity - positively and negatively to everyone - of all political and regional colour

We honestly believe there is a workable compromise for all reasonable people.

Everyone should think about a real sustainable future for Brussels National Airport.

NOTE: The international codes for Brussels National Airport are the IATA code 'BRU' and the ICAO code 'EBBR'. For brevity, ENVISA uses 'BRU' throughout this report
1 Introduction & Context

Envisa have been commissioned by the Belgian Federal Public Service (FPS) Mobility and Transport, to independently review the performance, compliance, effectiveness and completeness of the management and mitigation regime covering noise arising from Brussels Airport (BRU) activities and operations on and around the airfield and to propose mitigation solutions.

This report (Chapter 2) should be read together with Chapter 1.

1.1 The Belgian Paradox

To the casual reader of this report, it is not possible to understand the complexity of the noise issues around BRU, without first understanding something about the history and culture of Belgium.¹

When it was created in 1831, Belgium was a unified constitutional monarchy, with a simple hierarchical structure on three levels: the national State, with nine provinces and more than 2,700 municipalities under its authority. The present rather complex State structure is the result of a number of institutional reforms. These reforms began in 1962-1963 with the final definition of the language border. Following the institutional reforms of 1970, 1980, 1988-89, 1993 and 2014, Belgium is gradually being transformed into a fully Federal State. This is shown by Article 1 of the revised Constitution: “Belgium is a Federal State which is made up of Communities and Regions”.

This means that several bodies (the Federal State, the Regions and the Communities) which are equal in law, now share the powers which were formerly controlled solely by the central State.

In fact, there is no hierarchy between these three types of authorities. Each one has its own legislative and executive bodies and, within the limitations of their competencies and territorial scope, they can pass laws (at the federal level) or decrees (at the level of the Regions and Communities; ordinances in the Region of Brussels-Capital (RBC)) which have the same legal force.

This absence of a hierarchy and sharing of powers between the Federal State, the Regions and the Communities constitutes the basis of Belgian federalism. The 10 provinces (the former Brabant was divided in two provinces along the linguistic border, Brussels as a specific Region not belonging to any province), and the municipalities which represent local authorities, have been transferred to the responsibility of the Regions.

¹ Dominique Istat, Belgium and the Belgian State, DOI: 10.4000/belgeo.13869
Although there are many powers which now fall to the Regions and Communities, the Federal State still retains power over foreign policy, national defence, the justice system, the army, monetary policy and the management of the national debt, social security, etc.

On a federal level, legislative power is exercised by the King (formality), the Chamber of Representatives and the Senate (i.e. the Parliament). Elections take place every five years. Executive power is given to the King, although it is exercised de facto by the Federal Government.

Belgium has three Regions, whose territory is defined by its Constitution: the Walloon Region (the five Walloon provinces), the Flemish Region (the five Flemish provinces) and the Region of Brussels-Capital. Their powers are bound to their geographical area. These essentially relate to town and country planning, environment, housing, regional economic policy, employment, public works, transport, agriculture, water, etc.

There are also three Communities, distinct from the Regions: the Flemish Community, the French Community and the German-speaking Community.

The Regions and Communities have a considerable degree of autonomy and exercise whole powers in the areas which are allocated to them by or pursuant to the Constitution.

This autonomy is illustrated by the fact that each Region and Community:

- Has a parliament, and an executive, ie: the Government (of the Region or of the Community). The Regional and Community Parliaments are directly elected every five years;
- Passes decrees (ordinances in the case of the Region of Brussels-Capital) which have the force of statute;
- Control their own budget, whose considerable resources come from both fiscal and non-fiscal revenues.

With the 6th reform of the State of 2011 (in effect since 2014), additional competencies have been transferred to the states. Regions are responsible for territorial matters (infrastructure, industrial policy, etc.) but also employment and tax matters since 2014 while communities are responsible for people-related matters (e.g. culture, education, welfare, health, sport), including since 2014 family allowances, care of the aged, health care; hospitals, justice homes, etc.

Of particular note here, is the fact that Environmental matters are dealt with by the Regions.

Regions are composed of Provinces. Both Flemish Region and Walloon Region have five Provinces.

In 1995, the Province of Brabant was split into three areas: Flemish Brabant, which became a part of the region of Flanders; Walloon Brabant, which became part of the region of Wallonia; and the Brussels-Capital Region, which became a third region. These divisions reflected political tensions between the French-speaking Walloons and the Dutch-speaking Flemish; the Brussels-Capital Region is officially bilingual.

Political tensions based on language and culture are however just as evident today with a clear polarisation between French-speaking Walloons and the predominantly French-speaking Brussels-Capital Region against the Dutch-speaking Flemish.
These two fundamentally different ethos play a significant role in today's difficulties in finding agreement to the noise impact generated by a (perceived) "Flemish" airport.

Over and above the linguistic, cultural and historical context, there is also tension between communities based on their geographical location. This is a more classical (even conventional?) divide that exists for most communities living around airports anywhere in the world. But for Brussels, this is an added layer of complexity.

The only practical way forward from this impasse would seem to be an intergovernmental agreement, (which has been widely supported in the past in political manifestos).

1.2 The Belgian Judicial System

Some simple notes are provided here to inform the casual reader of the pertinent elements of the Belgian Judicial System.

Brussels is one of five judicial areas in Belgium.

These areas are in turn divided in 27 judicial districts each with a Court of First Instance, a Labour Court and a Commercial Court.

Almost all cases relating to noise issues at BRU start in the Court of First Instance of Brussels.

Challenges to decisions made in the Court of First Instance can made through the Court of Appeal.

Decisions of the Law Courts are known as judgements (NL: vonnis, FR: jugement); Decisions of the Court of Appeal are decisions (NL: arrest, FR: arrêt).

There are three federal level, high courts:

The Court of Cassation which would be asked to decide whether the rules of law have been correctly or incorrectly applied by the lower courts, in fact, does not deliver a ruling on the disputes which are at the origin of the decisions, but rules on the decisions themselves

The Constitutional Court (Grondwettelijk Hof/Cour Constitutionnelle) was originally called the Court of Arbitration. It oversees the constitutional division of powers between the Federal State, the Communities and the Regions. It deals with the application of some fundamental articles of the Belgian constitution such as the principles of equality, non-discrimination and human rights.

The Council of State (De Raad van State/Conseil d’État), is the supreme administrative court of Belgium. It hears claims against the Federal Government (royal decrees, regulations issued by ministers, etc.) and decisions of the regional, provincial and municipal governments. The Council’s decisions are final and unappealable.

1.3 Local Context

The current context for BRU is mainly covered in Chapter 1 of this report. Further analysis of the current situation is developed in Sections 2-6 of this Chapter 2 report. This section simply recaps some of the key aspects of the BRU context that are relevant to potential solutions discussed in Sections 7-11 of this report.
BRU makes a very significant positive contribution to the sustainability of Belgium with a focus around Brussels and surrounding areas. This is especially true in terms of the economy and social aspects, employment and leisure. Depending on the degree of deprivation in areas around an airport, they can even have a positive impact on human health through poverty reduction. It is also true however, that BRU could have a major negative affect on the environment and on society because of noise, house prices, fear of accident and uncertainty.

The location and orientation of BRU is less than ideal given the proximity to the Brussels conurbation. The noise capacity of BRU has not been protected and inappropriate development has been permitted to encroach into noise affected zones. Such demographic factors mean that opportunities to avoid overflight of populations centres are limited. Some communities will therefore be affected by aircraft noise to differing degrees regardless of noise reduction procedures and overflight patterns. Noise from flying aircraft disperses over a wide area and people living away from the centreline of flight paths will still hear aircraft noise. Overflight patterns and the dispersion of noise from a given aircraft position will also vary according to weather – which is beyond human control.

The bottom line is, that people living in the general vicinity of BRU will hear aircraft noise to varying degrees. It is not possible to fully alleviate every person around BRU from aircraft noise. It is also true that different individuals will find the same degree of aircraft noise to be more or less annoying - every person's perception of aircraft noise is unique.

Short-term action is required for BRU and its associated processes in terms of improving communications and consultation, decision-making processes and compliance with existing rules, etc. It should be recognised however that changing such a long standing high-profile and emotive issue will take time – and given that consensus in preferable to autocracy in this topic – it may possibly take years to fully embed the required governance, structural and operational improvements.

Crucially, for major changes, effective processes and consultation mechanisms will need to be established before decisions can be taken. These decisions will be difficult, and some communities will be disappointed with the outcomes, but it is important that Belgium evolves from its present position, where arbitrary and locally driven decisions are made even when the result may be non-optimal for other local communities and more general Belgian sustainability, to a situation where the most sustainable solutions are adopted through an inclusive processes informed by good information.

Some of the solutions suggested in this report will already be in place and should form part of any future planning. Some of the solutions may not be optimal for Belgian situation and may not be suitable. Other solutions that are not covered in this report will arise through local discussions, research and investigations. Unrealistic public expectations for this report should therefore not be generated. The degree of success of this report will depend on the effectiveness of how Belgium adopts the principles offered in the report and how these are adapted to suit the local situation in Belgium.

Care should be taken not to cause problems for the other airports or the wider Air Traffic Management (ATM) system by decision-making at BRU. It may be found therefore, that it is beneficial to apply some of the principles for this report to all Belgian airports or to clarify the special status of BRU. An example of this would be if it is decided to place aircraft noise under the control of a national regulator (e.g. Civil Aviation Authority (CAA) or Environment Agency). It may be decided either to extend the regulator powers to cover all Belgian airports, or to ‘designate’ BRU as a special case.
For the avoidance of doubt, all reference to ‘noise’ in this document related to ‘aircraft noise’ from aircraft operating on and around BRU. The extent around BRU to which this report is applied is a matter for local agreement.

Additionally, noise driven changes to airport capacity or how and where aircraft fly can have transboundary affects that can even extend internationally. For example, affecting both international airspace and airports of cities paired with BRU.

The significance of new aircraft noise (e.g. under a proposed new flight path) is generally of far higher public concern than the same degree of noise that has been unchanged for some time. The increased significance of new noise is especially important for communities that are relatively tranquil before being overflown. Change in noise level is therefore very important and should be taken into account alongside absolute noise levels. Increasing noise over a new community should therefore be avoided unless there is a clear and significant benefit over the status quo – and full consultation should be undertaken before decisions are taken.

As explained in Chapter 1, the relatively high public profile and significance of aircraft noise to residents in the vicinity of BRU has been heightened in part by the number of changes to overflight patterns in recent times and by the rather arbitrary way these have been implemented. This has been further exacerbated by the raising of BRU noise as a political issue. The rules, limitations and justification of such decisions and associated operational rules have not been adequately explained to interested parties. The same is true for the reporting of compliance with rules by operational stakeholders. Trust and credibility have been lost both between formal stakeholders and by the general public who don’t know what to believe.

1.4 Addressing Noise within the Airport Business

The airport must take responsibility for the noise problem that is generated by the fact that it is in the business of generating aircraft movements in and out of the airport.

Evidence to date suggests that the airport does not take the lead in managing the noise issue, preferring instead to defer the problem to other operational stakeholders such as skeyes or the Federal or Regional Governments.

In reality, it seems that the airport is protected from much of the negative outfall of noise impact it creates by the Flemish political and regional institutions. This cannot be considered a sustainable policy, and this is discussed further in Section 10.

As already stated in Chapter 1, there is much for the airport to be proud of, in the way that it manages other aspects of its environmental impact, with a well-developed website and annually published Environmental Reports.

However, more accountability is needed in dealing with the noise issue. It is in the Airport’s long term interest to manage this like any other business risk.
# Judicial Timeline (Revised)

Table 2-1 Judicial timeline for BRU

<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16/11/1919</td>
<td>Loi du 16 novembre 1919 relative à la réglementation de la navigation aérienne</td>
</tr>
<tr>
<td>2</td>
<td>27/06/1937</td>
<td>Loi portant révision de la loi du 16 novembre 1919 relative à la réglementation de la navigation aérienne²</td>
</tr>
<tr>
<td>3</td>
<td>15/03/1954</td>
<td>Arrêté royal réglementant la navigation aérienne</td>
</tr>
<tr>
<td>4</td>
<td>11/06/1954</td>
<td>Arrêté royal du 11 juin 1954 portant interdiction de survol de certaines parties du territoire du Royaume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aircraft are prohibited from flying over those parts of the territory delimited by a circumference of 1,500 m radius centred on the Royal Castles of Laeken and Ciergnon</td>
</tr>
<tr>
<td>5</td>
<td>14/04/1958</td>
<td>Arrêté royal du 14 avril 1958 portant interdiction de survol de certaines parties du territoire du Royaume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aircraft are prohibited from flying over the part of the Brussels agglomeration within a circumference of 5 km radius, centred on the Brussels Park</td>
</tr>
<tr>
<td>6</td>
<td>08/08/1980</td>
<td>Loi spéciale de réformes institutionnelles³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Airports are a generally a regional competence, except for BRU. This is enshrined in a special law, see art. 6 § 1, X, 7°, which can only be changed with a special majority</td>
</tr>
<tr>
<td>7</td>
<td>06/1988</td>
<td>Petitions of the communes of Evere, Woluwe-St-Lambert et Woluwe-St-Pierre (WSP) to the Court of First Instance to prohibit overflights over their territories</td>
</tr>
<tr>
<td>8</td>
<td>01/06/1995</td>
<td>VLAREM I – Order of the Flemish Government of 1 June 1995 concerning General and Sectoral provisions relating to Environmental Safety⁴</td>
</tr>
</tbody>
</table>

² Loi portant révision de la loi du 16 novembre 1919 relative à la réglementation de la navigation aérienne de 27 juin 1937

³ Loi spéciale de réformes institutionnelles de 8 aout 1980

⁴ VLAREM I
**BRU is classified as an establishment ‘class 1’. The special conditions under art. 5.57.2.1. §1 determine, among other things, that conditions may be imposed in the environmental permit that have an impact on the number of movements and on the noise production of the movements, without prejudice to the application of European Union (EU) directive 2002/30/EC.**

<table>
<thead>
<tr>
<th>Page</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>07/1996</td>
<td>Decision of the Court of First Instance to prohibit overflights over Evere, Woluwe-St-Lambert et Woluwe-St-Pierre from 23h to 6h</td>
</tr>
<tr>
<td>10</td>
<td>01/1997</td>
<td>Decision of the Court of Appeal to cancel the decision of the Tribunal de Première Instance of July 1996</td>
</tr>
</tbody>
</table>
| 11   | 17/07/1997 | **Ordonnance du 17 juillet 1997 relative à la lutte contre le bruit en milieu urbain**

A noise control plan to avoid, prevent or reduce exposure to environmental noise is ordered, the main objectives being the reduction of noise and vibration at source, the installation of adequate acoustic protection to limit the emission of noise and vibrations, insulation against noise and vibration in buildings occupied for protection, and compensation for injured parties. Strategic noise maps and evaluation will be conducted every five years.

<table>
<thead>
<tr>
<th>Page</th>
<th>Date</th>
<th>Description</th>
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</thead>
</table>
| 12   | 27/05/1999 | **Arrêté du Gouvernement de la Région de Bruxelles Capitale relatif à la lutte contre le bruit généré par le trafic aérien**

This decree defines three zones (zone 0, 1 and 2). These concentric areas are delineated by 10 and 12 km arcs of circles centred on a beacon located on the axis of runway (RWY) 25L/07R North-East of the airport. Two types of indicators are included in the decree:

- **Levt** is an event indicator related to a given flight and measured in Sound Exposure Level (SEL), see Section 3.5
- **the LSp** is an integrated indicator defined as \( L_{AEq,T} \) (see Section 3.4) for the day period (\( T = \text{period} [7h, 22h59]\)) and the night period (\( T = \text{period} [23h-6h59]\))

Whatever the weather conditions, the Levt and Lsp aircraft levels may not exceed the following values:

<table>
<thead>
<tr>
<th>Zones</th>
<th>Levt en dB(A)</th>
<th>Lsp avion en dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>Zone 1</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>Zone 2</td>
<td>100</td>
<td>90</td>
</tr>
</tbody>
</table>

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5. [Ordonnance relative à la lutte contre le bruit en milieu urbain de 17 juillet 1997](#)

6. [Arrêté du gouvernement de RBC relatif à la lutte contre le bruit généré par le trafic aérien de 27 mai 1999](#)
At the end of an adaptation period set by the government, the limit values per passage and per period shall be automatically adjusted in accordance with the following table:

<table>
<thead>
<tr>
<th>Zones</th>
<th>Lev’t en dB(A) jour</th>
<th>Lev’t en dB(A) nuit</th>
<th>Lsp avion en dB(A) jour</th>
<th>Lsp avion en dB(A) nuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>75</td>
<td>70</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Zone 1</td>
<td>65</td>
<td>75</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Zone 2</td>
<td>90</td>
<td>60</td>
<td>60</td>
<td>50</td>
</tr>
</tbody>
</table>

Note à l’attention du Conseil des Ministres du 11 février 2000, Problématique de l’aéroport de Zaventem

The government intends to systematically reduce the number of people who are exposed to noise at night. In this context, it applies a twofold approach: on the one hand, it aims to limit as much as possible the areas exposed to noise pollution, and on the other hand, it wants to pursue, in areas confronted with noise pollution, a particular policy in terms of spatial planning and isolation programmes.

Loi portant des dispositions sociales, budgétaires et diverses

The collection of fines, premiums for the soundproofing of existing houses, house purchases, costs and related compensation are set out.

Arrêté royal du 17 septembre 2000 relatif à la limitation de l’exploitation des avions relevant de l’annexe 16 de la convention relative à l’aviation civile internationale, volume 1, deuxième partie, chapitre 2, deuxième édition (1988)

Environmental Permit for Brussels National Airport

Night flights are limited to 25,000 movements per year

Arrêté ministériel portant approbation du règlement adopté par le conseil d’administration de BIAC, S.A. de droit public, du 15 juin 2000, concernant l’instauration d’un système de quotas acoustiques pendant la nuit et déterminant la quantité maximale de bruit autorisée la nuit à l’aéroport de Bruxelles-National

Quota count (QC) for night flights are introduced.

The following seasonal noise quotas are introduced for take-offs:

- Winter 2000/2001: 44,500 (21 weeks)
- Summer 2001: 68,500 (31 weeks)
- Winter 2001/2002: 41,500 (22 weeks)
<table>
<thead>
<tr>
<th>#</th>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>09/02/2001</td>
<td>History of night flight procedures at BRU and Service de Médiation pour l’Aéroport de Bruxelles-National, departure routes are optimised by A.A.C. (Airport Aviation Consultancy)</td>
</tr>
</tbody>
</table>
| 19 | 04/05/2001 | Note du Secrétariat général du Ministère des Communications et de l'Infrastructures du 4 mai 2001  
The Council of Ministers decides to abolish the Fonds pour l’Atténuation des Nuisances dans le Voisinage de l’Aéroport Bruxelles-National, its missions and financial flows being transferred to Brussels International Airport Company (BIAC) under the control of the administration |
| 21 | 22/2/2002  | Accord de principe entre le Gouvernement fédéral, le Gouvernement flamand, le Gouvernement de la Région de Bruxelles - Capitale relatif à une politique cohérente en matière de nuisances sonores nocturnes concernant l’aéroport de Bruxelles National⁸  
Coherent noise policy to reduce the number of inhabitants flown over and to ensure that other residents are not affected |
| 22 | 15/03/2002 | Arrêté royal portant création d’un Service de Médiation pour l’Aéroport de Bruxelles-National  
Creation of Brussels Airport Mediation Service |

⁷ EU Directive 2001/42/EC  
⁸ Intergovernmental decision for concentrated runway night flights, 2002  
⁹ EU Directive 2002/30/EC
environmental noise – Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise\textsuperscript{10}

This is the Environmental Noise Directive (END).

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<tbody>
<tr>
<td>25</td>
<td>14/01/2003</td>
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<td>26</td>
<td>24/01/2003</td>
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<tr>
<td>27</td>
<td>04/05/2003</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>10/06/2003</td>
</tr>
<tr>
<td>29</td>
<td>23/06/2003</td>
</tr>
</tbody>
</table>

\textsuperscript{10} EU Environmental Noise Directive 2002/49/EC

\textsuperscript{11} Intergovernmental decision to cancel concentration, 2003
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/07/2003</td>
<td>Accord de gouvernement Verhofstadt II – Plan Anciaux</td>
</tr>
<tr>
<td>25/09/2003</td>
<td>Arrêté royal établissant des règles et procédures concernant l'introduction de restrictions d'exploitation à l'aéroport de Bruxelles-National</td>
</tr>
<tr>
<td>03/05/2004</td>
<td>Arrêté ministériel du 3 mai 2004 relatif à la gestion des nuisances sonores à l'aéroport de Bruxelles-National</td>
</tr>
<tr>
<td>27/05/2004</td>
<td>Arrêté royal du 27 mai 2004 relatif à la transformation de Brussels International Airport Company (B.I.A.C.) en société anonyme de droit privé et aux installations aéroportuaires</td>
</tr>
</tbody>
</table>

*Priorities for slot allocation are set according to the most acoustically efficient aircraft.*

The impact of the noise annoyance will be assessed area by area, defined objectively and according to the principle of equitable distribution. More equitable distribution includes a revision of flight procedures according to populations and/or areas flown over and the type of aircraft, as well as a more diversified use of the different possible take-off and landing strips, taking into account the safety of populations, air traffic and airport management.

This ministerial decree is the transposition of the directive 2002/30/EC.

Night noise quotas are fixed in terms of seasonal civil aircraft movements.

The maximum noise per aircraft movement during 23:00 and 05:59 is fixed at 12.

The maximum noise per aircraft movement during 06:00 and 06:59 is fixed at 24.

The noise quotas per season are set at:
- 35,000 for the winter of 2003/2004 (22 weeks)
- 49,000 for the summer of 2004 (31 weeks)
- 33,600 for the winter of 2004/2005 (21 weeks)

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12 Arrêté royal établissant des règles et procédures concernant l'introduction de restrictions d'exploitation de BRU de 25 septembre 2003

13 Arrêté ministériel relatif à la gestion des nuisances sonores à l'aéroport de Bruxelles-National de 3 mai 2004
<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>21/06/2004</td>
<td>Arrêté royal octroyant la licence d'exploitation de l'aéroport de Bruxelles-National&lt;sup&gt;14&lt;/sup&gt;</td>
</tr>
<tr>
<td>35</td>
<td>08/07/2004</td>
<td><strong>Environmental Permit for Brussels National Airport</strong>&lt;br&gt;<em>The number of night flight take-offs between 23:00 - 05:59 must not exceed that of 1999, i.e. 10,000 per year</em></td>
</tr>
<tr>
<td>36</td>
<td>2005</td>
<td><strong>VLAREM II</strong>&lt;sup&gt;15&lt;/sup&gt;&lt;br&gt;<em>Directive 2002/49/EC is transposed in 2005 into Flemish legislation under VLAREM II</em></td>
</tr>
<tr>
<td>37</td>
<td>17/03/2005</td>
<td>Arrête of the Court of Appeal ordering the temporary cessation of using RWY 01 (réf. 2004/KR/458)</td>
</tr>
<tr>
<td>38</td>
<td>09/06/2005</td>
<td>Arrêté of the Court of Appeal to modify the dispersion plan of Minister Anciaux (cf. 4.4.9 p. 73) which led to infringements of the decree “bruit des avions”</td>
</tr>
<tr>
<td>39</td>
<td>13/02/2006</td>
<td>Law regarding the assessment of the effects of certain plans and programmes on the environment and on public participation in the preparation of plans and programmes relating to the environment&lt;sup&gt;16&lt;/sup&gt;&lt;br&gt;<em>This federal law transposes the EU 2001/42/EC directive on the environmental assessment of plans and programmes.</em></td>
</tr>
<tr>
<td>40</td>
<td>01/03/2006</td>
<td>Decision of the Court of Appeal confirming the imposition of a dispersion policy over Noordrand et l'Oostrand</td>
</tr>
<tr>
<td>41</td>
<td>21/12/2006</td>
<td>Validation of the decree “bruit des avions” by the Court of Cassation and dismissal of the appeal in cassation brought by the State, BIAC and Belgocontrol against a judgment of the Court of Appeal of 9 June 2005</td>
</tr>
<tr>
<td>42</td>
<td>27/11/2007</td>
<td>Arrêté ministériel modifiant l'arrêté ministériel du 3 mai 2004 relatif à la gestion des nuisances sonores à l'aéroport de Bruxelles-National&lt;sup&gt;17&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>14</sup> [Arrêté royal octroyant la licence d'exploitation de l'aéroport de Bruxelles-National de 21 juin 2004](#)

<sup>15</sup> [VLAREM II](#)

<sup>16</sup> [Loi relative à l'évaluation de certains plans et à la participation du public dans les plans environnementaux de 13 février 2016](#)

<sup>17</sup> [Arrêtés Ministériels 2004 to 2009. Time slots for night flights](#)
Aircrafts presenting a low level of conformity are not authorised at BRU during the night time periods

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/01/2008</td>
<td>Arrêté de la Cour d'Appel d'annuler la décision de la Cour d'Appel du 01 mars 2006</td>
</tr>
<tr>
<td>11/09/2008</td>
<td>Decision of the province of Brabant Flamand</td>
</tr>
<tr>
<td>17/11/2008</td>
<td>Arrêt 187.998 du Conseil d'État du 17 novembre 2008(^\text{18})</td>
</tr>
</tbody>
</table>

\(^{18}\) **Conseil d'Etat, Section du Contentieux Administratif - Arrêté n187,998 de 17 novembre 2008**

The Council of State acknowledges that the decision to intensify the use of runway 02 for landing cannot be taken without a compelling reason, which is lacking in the context of the Plan Anciaux bis and notes that the file drawn up in the implementation of the Plan Anciaux do not contain any reason likely to justify the reasons why the use of this runway, hitherto exceptional for environmental and safety reasons, would lose its character. The Council of State admits that the standstill obligation prohibits the competent legislator from significantly reducing the level of protection offered by the applicable legislation, without any grounds in the general interest being provided for this purpose.

The Council of State notes that the Belgian State has discretionary power in the management of noise pollution and air traffic. Both the decision to maintain air traffic to and from BRU and the decision to set up a system for dispersing noise pollution caused by this traffic among local residents are decisions involving political options. In this respect, it is, for example, within the authority's discretion to choose either a model according to which nuisances are borne as much as possible by a minimum number of people living near the airport, with flights being concentrated over areas with the lowest population density (concentration model), or a model according to which noise nuisances are distributed as much as possible among all people living near the airport, with each person being exposed to noise in a comparable way (dispersion model). The Belgian State also has a discretionary power to implement the chosen option, using concrete measures. In the exercise of its legality control, it is not within the power of the Council of State to deprive the administration of its political freedom. It cannot therefore replace the Belgian State, for
example, in choosing the model for distributing noise pollution among inhabitants (concentration or dispersion model) or in deciding on concrete measures to implement the chosen system.

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
</table>
| 46  | 17/12/2008 | **Note au Conseil des Ministres, Gestion des nuisances sonores de l’aéroport de Bruxelles-National (Accord aéroportuaire de 2008)**

The following points are proposed:

- Take-off ban during part of the nights of Friday/Saturday, Saturday/Sunday and Sunday/Monday
- Reduction of the noise level authorised at night (23:00 and 05:59) and in the early morning (06:00-06:59) as well as the introduction of limits during the day (07:00-20:59) and at the end of the day/beginning of the night (21:00-22:59), with a number of derogations
- Limitation of the number of night flights to 16,000 per year, including 5,000 take-offs
- Repeal of Minister Anciaux's dispersion plan with regard to the use of runways; wind standards to be reviewed by international experts, preferential use of runways 25 during the day and 25/19 at night is re-established
- Routes will be evaluated by a working group composed of representatives of the Deputy Prime Ministers and Belgocontrol under the chairmanship of the State Secretariat for Mobility

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
</table>
| 47  | 21/01/2009 | **Arrêté ministériel modifiant l’arrêté ministériel du 3 mai 2004 relatif à la gestion des nuisances sonores à l’aéroport de Bruxelles-National**

The night time slots allotted by the airport coordinator must not exceed 16,000 per year, including 5,000 take-off slots

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
</table>
| 48  | 06/04/2009 | **Arrêté ministériel modifiant l’arrêté ministériel du 3 mai 2004 relatif à la gestion des nuisances sonores à l’aéroport de Bruxelles-National**

BRU will not allocate any take-off slots during the following periods:

- Night of Friday/Saturday between 02:00 and 06:00 starting from the International Air Transport Association (IATA) summer season of 2009, and between 01:00 and 06:00 from the IATA winter season of 2009-2010

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19 Note to the Council of Ministers, Management of noise pollution at BRU, 2008
• Night of Saturday/Sunday between 00:00 and 06:00
• Night of Sunday/Monday between 00:00 and 06:00

49 27/07/2009 Arrêté ministériel modifiant l’arrêté ministériel du 3 mai 2004 relatif à la gestion des nuisances sonores à l’aéroport de Bruxelles-National

The maximum amount of noise per take-off of civil aircraft shall be fixed:
(1) for the time slot between 23:00 and 05:59, at 8.0, except for 2009, when the maximum noise quantity is set at 12
(2) for the time slot between 06:00 and 06:59, at 12.0
(3) for the time slot between 07:00 and 20:59, at 48.0
(4) for the time slot between 21:00 and 22:59, at 24.0

Take-offs exceeding the quota set for the time slot between 21:00 and 22:59 are permitted, provided that the maximum noise quantity per movement does not exceed 26.0 and at a maximum rate of 3%, on an annual basis, of all take-offs operated at the airport during this time slot.

Take-offs exceeding the quota set for the time slot between 23:00 and 05:59 are permitted for aircraft that operated at Brussels National Airport during the year preceding the entry into force of this Order, provided that the maximum noise quantity per movement does not exceed 12.0 and with a maximum limit of 200 take-offs per year.

The maximum amount of noise per arrival of civil aircraft shall be fixed:
(1) for the time slot between 23:00 and 05:59, at 8.0, except for 2009, when the maximum noise quantity is set at 12
(2) for the time slot between 06:00 and 06:59, at 12.0
(3) for the time slot between 07:00 and 20:59, at 24.0
(4) for the time slot between 21:00 and 22:59, at 12.0

Arrivals exceeding the quota set for the time slot between 23:00 and 05:59 are permitted provided that the maximum noise quantity per movement does not exceed 12.0 and with a maximum limit of 500 landings for 2010, 430 landings for 2011, 360 for 2012 and 300 landings per year for subsequent years.

50 10/11/2009 Note to the Council of Ministers - Progress report on noise management at Brussels Airport and Proposed decision

Intermediate governmental airport agreement of 2009 repeating the principle of 'repartition equitable' and adoption of five principles for SID's and STAR's
<table>
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| 51| 25/02/2010 | **Note to the Council of Ministers - Progress report on noise management at Brussels Airport and Proposed decision**<sup>20</sup>  
Governmental airport agreement of 2010 repeating the principle of ‘repartition equitable’ and adoption of 5 principles for SIDs and STARs and determining wind criteria. The present note takes note of the implementation of directive (Council of Ministers of 19/12/2008, item 63 - 2000A61460. 255) and requests the approval of the Council of Ministers on the proposal of changes made to the operating procedures (selection procedure of runways in use and flight procedures) as well as on the preliminary design of Law on the operating framework of BRU. |
| 52| 14/04/2011 | Judgement of the Court of First Instance that favours 93 families. This is the first decision in the Hardy case which is followed by the appeal in 2018. |
| 53| 15/03/2012 | **Instruction ministérielle du Secrétaire d’État aux Transports adressées à l’administrateur-délégué de Belgocontrol**  
*Note related to the increase in the maximum tailwind speed to 7 knots is sent to Belgocontrol* |
| 54| 21/06/2012 | **Complément n°1 à l’Instruction Ministérielle datée du jeudi 15 mars 2012 portant exécution des accords du Conseil des Ministres des 19 décembre 2008 et 26 février 2010 en matière de procédures de décollage et de sélection des pistes; clarification et fixation des valeurs de composantes de vent applicables à l’aéroport de Bruxelles-National**  
*Ministerial instructions for Wathelet Plan following decisions of the Cabinet from 19 December 2008 and 26 February 2010* |
| 55| 28/07/2012 | **Plan Wathelet Phase I**  
The first phase of the plan is to remove the Chabert Route. Traffic is transferred to the Canal Route (CIV 8D), which therefore becomes used both day and night. |
| 56| 13/12/2012 | **Plan Wathelet Phase II**  
The second phase consists of a modification of the alignment of the DENUT Route used from RWY 19 with a right turn towards RBC. The night route to the... |

<sup>20</sup> Note to the Council of Ministers, Progress report on noise management at BRU and Proposed decision, 2010
South-West (CIV 6L) and the South-East (PITES 4N and ROUSY 4N) are deleted and transferred to the day routes.

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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>07/05/13</td>
<td>Arrêté royal renouvelant la licence d'exploitation de l'aéroport de Bruxelles-National et modifiant l'arrêté royal du 21 juin 2004 octroyant la licence d'exploitation de l'aéroport de Bruxelles-National à la société anonyme B.I.A.C. 21</td>
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<tr>
<td>11/07/13</td>
<td>Plan Wathelet Phase III</td>
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<tr>
<td>17/07/13</td>
<td>Lettre du directeur général de la Direction Générale Transport Aérien (DGTA) à l'administrateur-délégué de Belgocontrol</td>
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<tr>
<td>22/08/13</td>
<td>Change of the noise abatement departure procedure</td>
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<tr>
<td>19/09/13</td>
<td>Plan Wathelet Phase IV</td>
</tr>
<tr>
<td></td>
<td>• Revision of wind standards involving less use of RWY 01</td>
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<td></td>
<td>• Possibility of postponing some take-offs from RWY 19 to RWY 25R</td>
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<tr>
<td>09/01/14</td>
<td>Plan Wathelet Phase V</td>
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</table>

This phase consists of modifying two departure routes from the right turn from RWY 25R. Since the DENUT Route was moved to Neder-over-Heembeek, it crossed the CIV Route. The two routes are modified as follows:

- The DENUT Route is moved North (DENUT 5C)
- The CIV Route is close to RBC in the North and remote in the West (CIV 3C)

Plan Wathelet Phase VI

- Shifting the majority of flights from the left turn to the East-central part of RBC
- Significant increase in the use of the Canal Route

Plan Wathelet Phase VII

Modification of take-offs from RWY 07R (Leuven Rechtdoor)

Plan Wathelet Phase VI bis

This phase, not initially planned, consists of straightening the SOPOK-PITES-ROUSY Route somewhat, moving them somewhat eastward.

Decision of the Court of First Instance that confirms that the decree of 27 May 1999 is a valid legal basis for the demand of cessation (réf. 14/3600/A)

RBC requests to ‘freeze’ the 6th phase of the Wathelet plan, which was put in place on 6 February 2014. Since then, aircraft taking off from RWY 25R no longer had to take the short left turn, which resulted in the creation of:

- A wide left turn over RBC and more particularly Evere, Schaerbeek, Etterbeek and Boitsfort;
- New Canal routes since instead of following the same trajectory, aircraft were divided into seven different routes at Drogenbos.

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22 EU Regulation 598/2014
The order of 31 July 2014 (Annex 1) ordered a return to the situation before 6 February 2014. The President considered that the instructions given to Belgocontrol to modify the routes should be considered as ‘Plans’, according to the law of 13 February 2006, thus requiring prior public inquiry.

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| 68 | 10/10/2014 | **Accord du Gouvernement**

*Belgocontrol is instructed to prepare and implement a return to the situation prior to 6 February 2014. The routes that were put into service on 9 January 2014 and 6 March 2014 will be evaluated and, if necessary, modified as part of an acceptable solution. The airport agreements that were confirmed by the Council of Ministers on 19 December 2008 and 26 February 2010 will be the starting point for the policy to combat noise pollution and Preferential Runway System (PRS) will be maintained.*

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| 69 | 19/12/2014 | **Arrêté royal relatif aux règles de l’air et aux dispositions opérationnelles relatives aux services et procédures de navigation aérienne**

*The flight routes (and the PRS) are imposed by the minister in the form of an instruction, which is the decision as described in art. 2, § 2*

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| 70 | 07/05/2015 | Two judgments are pronounced by default against the Belgian State ordering the termination of the Leuven Rechtdoor procedure.

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| 71 | 06/04/2016 | **Leuven Rechtdoor case**

*The Court of First Instance completely retracts the two judgements of May 2015 rendered by default. The case is currently ongoing in appeal.*

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| 72 | 05/2016 | **Céline Fremault, Brussels Environment Minister introduces three prohibitory actions regarding environment before the Court of First Instance (RBC-WSP case)**

*• The cessation of the use of air routes over RBC territory during the 06:00-07:00 time slot, and the extension of BRU's night time definition from 06:00 to 07:00, so that it has a duration of 8 hours and is in...*  

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23 **Accord du Gouvernement de 10 octobre 2014**

24 **Arrêté royal relatif aux règles de l’air et dispositions opérationnelles relatives à la navigation aérienne de 19 décembre 2014**

25 **Arrêté Tribunal de Première Instance de 06 avril 2016**
### Study of the impacts on the environment with regard to noise pollution (BRU)

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<tr>
<th>Date</th>
<th>Event Description</th>
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<tr>
<td>06/06/2016</td>
<td><strong>Huldenberg case</strong>&lt;br&gt;The use of waypoint HUL can continue according to judgement of 6 June 2016</td>
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<tr>
<td>14/10/2016</td>
<td><strong>Conseil d’État, Section du Contentieux administratif, arrêt no. 236.128 du 14 octobre 2016</strong></td>
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<tr>
<td>10/11/2016</td>
<td><strong>Conseil d’État, Section du Contentieux administratif, arrêt no. 236.402 du 10 novembre 2016.</strong>&lt;br&gt;The application of the &quot;bruit des avions&quot; order has so far considered an excess noise tolerance of 9 dB at night and 6 dB at night. The offence then gives rise to a warning rather than a report. However, in May 2016, the Brussels Minister of the Environment C. Fremaut wrote to the Bruxelles Environnement - l’Institut Bruxellois pour la Gestion de l’Environnement (IBGE) inviting it to abolish this tolerance as from 1 January 2017. This decision is challenged by two requests for suspension addressed to the Council of State. One is submitted by airlines (EAT, a subsidiary of DHL, Brussels Airlines, TUI Airlines Belgium, TAP, Asiana, Lufthansa, Air Canada and Swiss) to the French-speaking chamber of the Council of State. The other is from Brussels Airport Company and has been filed with the Dutch-speaking chamber of the Council of State. On 14/10/2016, the Council of State rejected the airlines’ request.</td>
</tr>
<tr>
<td>22/05/2017</td>
<td><strong>Dismissal of appeals against the Wathelet plan</strong>&lt;br&gt;By two decisions No. 238.283 and No. 238.284 of 22 May 2017, the Council of State dismissed the appeals against the instructions concerning the dispersal of flights from Brussels National Airport, known as the Wathelet Plan.</td>
</tr>
<tr>
<td>19/07/2017</td>
<td><strong>Judgement of the Court of First Instance to respect the decree of 1999 and to conduct and environmental impact study within the next 12 months (RBC-WSP case)</strong>&lt;br&gt;- This judgement condemns the State to put an end to the violations of the &quot;arret bruit&quot; resulting from the use of the Canal Route (including the 23:00 – 07:00 slot) by modifying its conditions of use.&lt;br&gt;- This judgement condemns the State to put an end to the violations of the &quot;arret bruit&quot; resulting from the use of the Ring Route and landings on RWY 01 by modifying its conditions of use between 23:00 and 07:00.&lt;br&gt;- Within 4 months of the judgment being served, the State must inform RBC of the operational measures it intends to take and the deadlines</td>
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</table>
for implementing these measures without affecting the airport’s capacity (with a penalty payment of €100,000 per week). If no operational measures can be taken, the mail to RBC must contain a formal and sufficient motivation for doing so.

- This judgement sentences the State to communicate a monthly list to RBC that includes the aircraft which used the Canal Route the month before from 23:00 to 7:00 and their QC. The implementation must be within three months of the notification of the judgment (penalty payment of 2000€ per calendar day of delay).

### Hardy case

This is the ongoing judgement relative to the adoption of Plan Anciaux (prior to 2011). The Court of Appeal handed down a judgment on 31 March 2017 acknowledging the increased use of the runway 02 between February 2004 and 31 December 2011, and a fault on the part of the Head of State towards the inhabitants under this approach corridor.

Dispersion by the use of all runways, regardless of weather conditions, is condemned by several court decisions prohibiting any use of RWY 01 for arrivals without reason.

The Court stays the proceedings on damages and compensations for the period after December 2011 for the following reasons:

- As for damages: the plaintiffs must prove them individually, as well as the causal link between the State's fault and their damages.
- Concerning the period, the Court does not rule for the period after 31/12/2011 as the instructions of 15 March 2012, no longer appear in the file, due to the modification of the parameters for calculating wind limits.

For these two points, the Court reopens the debates.

### Noordrand case\(^{26}\)

The judgment orders the Belgian State to cease, within 90 weeks of the notification of the judgment, the subsequent phases or modifications of the flight procedures introduced by the instructions of 15 March 2012 and 21 June 2012 pursuant to the 2008 and 2010 airport agreements (Phases 6 and 7 phases of the Wathelet Plan) including Leuven Rechtdoor.

\(^{26}\) Arrêté Tribunal de Première Instance de 30 mai 2018
### 28/11/2018
**Judgement in the Servais case**

The judgment rejects all the claims of Mr. Servais et al. They had requested that:

- RWY 01 should be used on an exceptional basis because of the serious damage to their health.
- Belgocontrol comply with the ministerial instructions given, in particular those concerning admissible wind components on the 25R and 25L preferential runways, which local residents do not consider to be the case at the moment.

The judge referred to the 2017 and 2018 judgments, which declared the instructions illegal, and therefore concludes that the parties are making an illegitimate request by requesting compliance with illegal instructions.

### 01/02/2019
**Judgement of the 1st February 2019 (Second Brussels Region Case)**

The Federal Government is ordered to deliver the present an impact study by 3 June next year, failing which a penalty payment of 300,000 euros per month will be applicable.

The judge provisionally prohibits, in the context of the development of a waiting situation, the use of the Canal and Ring routes and landing routes on RWY 01, only in the case where its use would generate, for the period from 23:00 to 07:00, an increase in violations of the “arret bruit”, with regard to the violations observed for the same month in 2017, for a period of 18 months from the date of service of this judgment.

This prohibition is linked to a penalty payment of €10,000 per infringement greater than or equal to 5 dB (SEL) in relation to the number of infringements greater than or equal to 5 dB recorded in the month corresponding to the calendar year 2017.

The penalty payment shall begin to run on the first day of the month following the notification of the judgment.

On-call penalties are capped at a maximum of €3 million per route.

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27 [Arrêté Tribunal de Première Instance de 01 février 2019](#)
3 Impacted Communities

The purpose of this section of the report is to provide a place to capture the stated or published views of the impacted communities. The authors (Envisa) do not pass comment on these views in this section.

Our report is based on an independent scientific assessment of present impacts together with review of present governance and management practice. The gathering of different perspectives of stakeholders is useful in identifying perceived standpoints, in highlighting issues around the quality of communications and public engagement and in highlighting the perceived problems that we have investigated. Envisa has already taken into account stakeholder perspectives that were gathered in many face-to-face meetings.

Providing stakeholder perspectives verbatim in the report is therefore only being done for transparency purposes and to avoid any misrepresentation to the extent possible. Stakeholder verbatim statements are not central to the formulation of Envisa's advice in this Chapter 2 Report and are more important to be taken into account in the subsequent decision making processes to be progressed by Belgian Stakeholders (described in Section 7).

As summarised by the 2016 Annual Report of the airportmediation service, the region around Brussels Airport can be divided into the following groups that are impacted by aircraft noise:

- Noordrand (Diegem, Machelen, Haren, Strombeek-Bever, Grimbergen, Meise, Wemmel)
- Oostrand (Woluwe-Saint-Pierre, Stockel, Kraainem, Wezembeek-Oppem, Sterrebeek, Tervuren, Vossem, Duisburg, Huldenberg)
- Oostkant (Kortenberg, Erps-Kwerps, Herent, Leuven, Rotselaar, BerTEM, Winksele)
- Brussels-Capital Region (Haren, Evere, Schaerbeek, Woluwe Saint Lambert, Woluwe Saint Pierre, Jette, Laeken)
- Walloon Brabant (Waterloo, Braine L'Alleud, La Hulpe)

Starting during the Chapter 1 period and continuing into Chapter 2 phase, (right up to the end in fact), there have been many discussions with the associations and lobby groups that represent (either formally or informally) the interests of these communities.

Many groups provided information and took the time to explain their point of view and in many cases, also their ideas for how to resolve some, if not all the issues.

We note incidentally, that there are many common elements between the groups representing the communities impacted by the airport.

We note as well, one example where representatives from Brussels, Flanders and Walloon regions all coordinated on one issue, in 2017, when a joint statement was made on night noise.

But often it seems like a situation where it's “either us or them” regarding who gets impacted most, and too much Not In My Backyard (NIMBY) thinking.

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28 airportmediation, Annual Report, 2016
Every representative body has a valid point to make. Sometimes to be heard – it is necessary to think very hard about how to communicate those points. In a cacophony of voices – where everyone is shouting (complaining), the Communities need to think more innovatively about how to get their message across. Our observation as well, is that all communities have more in common than they have differences. A uniting of resources towards a common objective would deliver more results. Our framework in Section 7 offers some proposals on dissemination and discussion of ideas that could be better facilitated through the provision of a formal conduit.

Envisa heard many plausible suggestions for an improved future, but in many instances, these ideas were not published (referable) anywhere, or were only available in one language. The BRU noise problem is a French speaking/Dutch speaking problem and (in our opinion) all communications should be published in the two languages (or “neutral” English).

This section of the report acknowledges the time and effort spent by all the people that gave their time to make input to this report.

However, we did not want to misrepresent the ideas and we requested associations and groups to provide us with some succinct overview summarising the issues as they see them, and their proposed solutions.

Links to additional supporting material are also provided. In the cases where documents are not easily found on existing websites, we have published (on a “mini website”) all documents provided to us in the context of this study, with the objective of improving information exchange, and consequent mutual understanding.

Note that even for ideas which, independently we may consider are worthy of a 10/10 – it makes no sense to offer opinion on these as this would be contrary to the advice being provided elsewhere in this report.
3.1 **Actie Noordrand**

Actie Noordrand is an umbrella structure that reunites and delivers services to a number of action groups in the Noordrand: Actiegroep Grimbergen, Actie Strombeek, Actie Diegem, Actie Vilvoorde, Actie Meise and Actie Wemmel.

Since 2000 there is a continued, organized, systematic, politically driven and well documented shift of routes and flights from the Brussels Region (taking off from runways 25R/L) and the 'Oostrand' (taking off from runway 19 an 07R) to the 'Noordrand' (5 communes).

As of today, the Airport Mediation Service, the Flemish region and BAC systematically and repeatedly underestimate the noise and pollution impact of airplanes on the 'Noordrand' as airplanes landing over the 'Noordrand' are left out of the noise measurements and of all statistics. This is contrary to the reporting about other zones.

Contrary to the continuously repeated statement of the Airport Mediation Service that the take-off routes above the 'Noordrand' are dispersed, these take off routes are proven concentrated as they are captured by the same sonometers of the Flemish Region and the BAC.

Currently the - according to Stabel officially densely populated - 'Noordrand' is overflown:

- by departing flights to N / NW (Nicky, Helen) in function of destination,
- by politically diverted departing flights (without aeronautical need whatsoever), to the W / SW / S / SE / O (Denut, Koksy, Civ-ring, Zoulou-ring), while the zones that should normally be overflown to reach directly these destinations are safeguarded.
- with headwind AND with tailwind,
- over exactly same zone day AND night, week AND weekend,
- by -5000 ft diverted landings to 07 and 01 when the east wind configuration is flown, these landings being consistently absent from official statistics,
- by the heaviest cargo planes (such as 747)

**Improvement proposals**

1. Cap on the total number of flights
   - Taking into account the current and historical number of flights
   - Based on the growth in the number of day flights as an incentive for the phasing out night flights

2. Use of different runways
   - Maximum 25% of flights to be allocated per runway
   - Alternative runway use with no concentrations during the week, weekend or night for areas in the immediate vicinity of the airport
   - Noise distribution from aircraft taking off and landing and from ground noise
   - Runway use in function of wind (runway 01 only in use in the afternoon when exceeding ICAO wind standard 5 kts tailwind/15 kts crosswind gust included on runways 25R/L or 19)
In accordance with or based on the proposals of Belgocontrol (skeys)/BAC regarding possibilities for turnouts and capacity and effective flight lists

3. Use of different tracks

- Maximum direct routes in function of final destination from each runway
- Each track to be designed minimum 15° apart starting from the center of the airport
- Variable turning height in function of destination
- Maximum 10% of the take-offs per track from the runway in question
- Routes from other tracks to be placed over other zones
- Historical/existing/validated tracks by Belgocontrol (skeys) for proposed take-off routes as basis
- Areas in line with the axis of a runway to be used as a matter of priority for landings and, where possible, free from take-offs
- Priority of Brussels Airport over other Belgian airports aerodromes

The benefits of this option are:

- Provides maximum safety: flying against the wind, no crossing runway use, direct flight to destination, no unnecessary curves, no intersecting routes
- Runway and track usage are determined in such a way that the capacity of the used configuration is always higher than the one currently operational
- Allows the introduction of a modern route system (PBN used for systematic separation of routes)
- Medically responsible: rest periods and liveable frequency are available to residents
- Integrates ‘night extension’ as long as night flights are maintained
- Minimisation of expropriation and insulation costs
- Assigns the responsibility for the investments and their timing to the airport operator: either investing in infrastructure or fewer flights;
- Provides a stable legal framework for all parties involved: assumes equal maximum proportional load per inhabitant in function of distance and location of his residence in relation to the centre of the airport and the axis of the runways
- Provides the basis for harmonization of noise standards
- Provides the basis for an environmental permit and future land use planning
- Certain zones to give more departing movements and other zones to give more landing movements ("historical situation");
- Brussels is not impacted more than necessary and is ‘saved’ 5 hours a day from noise annoyance through the use of runway 19
• Responds to the "historical" overflight of Brussels: either all flights ascend straight ahead up to 3000 feet and then turn in function of their destination (for more than 20 years) or spread over Brussels territory (for more than 20 years)

• Can meet with Brussels requirement to respect the Brussels noise limits by limiting the use of take-off routes over Brussels to planes with QC \leq 4

• Responds to Oostrand requirement to use 01 only to land against the wind when exceeded of ICAO wind standard 5 kts tailwind/15 kts crosswind (gusts included) on the runways 25R/L or 19

• Responds to Oostrand requirement to land also on 07R/L when exceeded of ICAO wind standard 5 kts tailwind/15 kts crosswind (gusts included) on the runways 25R/L or 19

• Meets Oostrand requirement to take into account flights (over 55 dB LAmax) from/to various runways

• Meets the requirement to not tax runway 19 exclusively at weekends

• Meets the requirements of Wezembeek-Oppem, Tervuren and Huldenberg to spread the tracks and no longer maintain concentration on the left turn from 25R

• Responds to the demands of Vilvoorde, Grimbergen, Meise and Wemmel to spread the routes and no longer maintain concentration/deviation on the right turn from 25R

• Responds to the demand of Leuven-Recht door not to concentrate the take-offs to the S and SE in the axis of 07R when exceeded of ICAO wind standard 5 kts tailwind/15 kts crosswind (gusts included) on the runways 25R/L or 19

• Responds to the demand of Leuven-West not to re-concentrate the take-offs to the S and SE from 07R when exceeded of ICAO wind standard 5 kts tailwind/15 kts crosswind (gusts included) on the runways 25R/L or 19 over their villages

• When the option "staggered take-off" is selected, all residents living further then 5 km from the centre of the airport and out of the axis of a runway are subjected to not more than 50 take-off flights per day (cfr. Sydney airport) and not more than 2 take-off flights per night and all residents who are further than 10 km from the centre of the airport and out of the axis of a runway are guaranteed to have a maximum of 10% of the take-offs from the nearest runway

Relevant links

Presentation Ministre Bellot (2016)
www.actie-noordrand.be/Cijfers/Concentratienachten.doc
www.actie-noordrand.be/Metingen/GrafiekVluchtenBoven70dBA.xls
www.actie-noordrand.be/DeCijfers.xls
3.2 AWACSS

AWACSS est une association sous forme d'ASBL-VZW de riverains de l'aéroport fondée en 2002 à la suite de la mise en œuvre du plan politique ANCIAUX qui avait pour objectif de concentrer le maximum possible de décollages et d'atterrissages sur l'Est de Bruxelles et en particulier à Wezembeek-Oppem, commune résidentielle de 14.000 habitants dont la densité de population est de plus de 2.000 habitants par km² qui depuis souffrent jour et nuit du survol intensif de leurs habitations.

La commune est en effet bruyamment survolée de jour comme de nuit soit par les décollages en piste 25 R, Lou 19 ou encore, lorsque le PRS (Preferential Runway System) ne peut être appliqué, par les atterrissages en piste 01.

Statut de Bruxelles-National :

Cet aéroport urbain doit être réservé au seul trafic aérien passager de vols réguliers et de vols d'affaires, ouvert uniquement de jour entre 07 heures 00 du matin et 22 heures 00 du soir exclusivement, avec un maximum de 225.000 mouvements d'avions par année

Utilisation des pistes :

Les meilleures pistes parallèles 25R/L doivent être utilisées le plus régulièrement possible car à l'atterrissage elles ne survolent que des zones non construites comme des champs et des terres de culture, et au décollage elles permettent une répartition équitable des survols en fonction des destinations suivies par les avions. De plus la piste 25R est la meilleure piste au niveau des équipements d'approche et de sécurité (la plus longue, la mieux équipée, le meilleur I.L.S. et la seule à posséder des zones de sécurité à ses extrémités, et des sorties de piste à grande vitesse). Si les pistes 25R/L sont des pistes préférentielles céd la règle, l'utilisation des autres pistes 01, 07R, 07L et 19 qui doivent être strictement limitées aux conditions de vent et donc utilisées de façon exceptionnelle pour des raisons exclusives de sécurité des procédures aériennes.

Utilisation des procédures :

Les meilleurs axes de survol doivent être privilégiés, à savoir le survol des routes, autoroutes, lignes de chemins de fer ; mais aussi des zones industrielles ou d'équipement, des zonings industriels ou quartiers d'affaires peu habités; la répartition des couloirs doit se faire en fonction des balises de navigation suivies par les avions en fonction de leur destination finale.

Au niveau des routes aériennes :

Correction rapide de la route actuelle dite « IKEA » pour les décollages sur la piste 19 céd virage gauche sortie de piste à 700 pieds, 080° gauche pour aller intercepter la Radiale 334° HUL 154 inbound HUL (ce qui permet d'éviter toute zone urbanisée)
- Retirer les avions de plus de 136 tonnes de la route du virage à gauche en 25R.
- Weekend, la CIV Charlie par le Ring est maintenue en service de jour.

Equipement des pistes :

Comme exigé par l'OACI, toutes les pistes doivent être équipées en aide à la navigation de façon identique, soit la technologie PBN-GNSS permettant des approches RNP, toutes les approches pour toutes les pistes tant en PBN qu'en I.L.S. doivent se faire à 3.000 pieds pour toutes les pistes.
Normes de vent:

Aucune norme internationale stable ni imposable n'ayant été déterminée, il convient de définir une norme de vent de 8 nœuds sans comptabilisation ni des rafales ni du vent en altitude uniquement sur les pistes préférentielles 25R/L afin de permettre une utilisation maximale de ces meilleures pistes. En cas de dépassement de ces valeurs, il convient alors d'orienter le trafic uniquement sur la piste la mieux orientée dans le sens du vent soit la piste 01 par vent du Nord, la piste 07 par vent d'Est et la piste 19 par vent de Sud.

L'utilisation préférentielle des pistes 25R/L se fait du motif de capacité opérationnelle de l'aéroport, ces pistes ne sont pas utilisées dans le but de l'atténuation du bruit, de ce fait les recommandations ICAO de normes de vent maximales s'appliquent pour les pistes 01, 07 et 19 (maximum 3 nœuds selon les études de sécurité) et certainement pas pour les pistes 25R/L.

Quota individuel de bruit des avions :

QC 4,0 la nuit de 22 à 07 heures (en attendant la suppression définitive des vols de nuit)
QC 8,0 entre 07/08 heures et 20/22 heures QC 24,0 la journée entre 08 et 20 heures 00

Volume de trafic de jour:

Le trafic annuel à Bruxelles-National doit être limitée à un plafond obligatoire de maximum 225.000 mouvements par an

Heures d'ouverture:

L'aéroport de Bruxelles-National doit devenir un aéroport régional-urbain ouvert exclusivement en journée entre 07h00 et 22h00; et totalement fermé à tout trafic pendant la nuit, ce qui implique la suppression définitive et totale des vols de nuit.

Type de trafic :

Seul le trafic d'avions passagers de lignes régulières et d'aviation générale doit encore être admis de jour à Bruxelles-National.

Les autres types de trafic (charters, low cost, cargo, fret et intégrateurs de messagerie express) doivent être transférés vu leur spécificité défavorable en termes d'importante nuisance environnementale vers des aéroports qui ont eu le courage de prendre des initiatives durables en matière d'isolation ou d'expropriation de leurs couloirs finaux d'approche

Contrôle et sanction :

Le respect de toutes les procédures aéronautiques, et le strict contrôle de tous les acteurs aéroportuaires doit se faire en toute autonomie et indépendance fonctionnelle par un organe de contrôle totalement neutre et indépendant qui puisse poursuivre et sanctionner toutes les infractions constatées sans aucune intervention des divers Gouvernements (voir liste détaillée supra)

Information :

La transparence totale de toutes les informations doit être garantie et mise à disposition publiquement, afin que les partenaires et riverains concernés (administrations régionales, administrations communales,
associations de riverains et environnementales et citoyens) puissent à tout moment disposer des bonnes informations sur les conditions météorologiques relatives à l'utilisation des pistes et l'évolution des aéronefs dans l'atmosphère

Sonomètres :

Le contrôle de la charge environnementale endurée par les communes et les riverains doit pouvoir être objectivée par l'extension du réseau régional des sonomètres

Jugements :

Toutes les décisions de justice qui ont été validées par les Cours d'Appel et/ou de Cassation doivent être strictement respectées, comme l' Arrêt interdisant toute utilisation illicite et abusive de la piste d'atterrissage 01 ou l' Arrêt interdisant toute utilisation hors vent de la piste d'atterrissage 01 en reconnaissant la faute de l'Etat belge dans sa gestion du dossier.

Relevant links

Revendications AWACSS (original)
3.3 **Boreas**

There is a strong link between Actie Noordrand and Boreas, which is the one juridical structure (vzw/asbl) for any airport activist group in the Noordrand that needs a juridical structure.

**Statement**

1. It is important to know that concentration of runway/flight tracks has been tried several times around BRU, first in 1972 (without night flights and a relatively limited number of day flights) and then in 2002 (with about 30,000 night flights during the operational night 23 -06) with dramatic societal and political consequences ([Brief History of BA historical flight patterns](#));

2. It was realized that the frequency of overflights was the explanation for the unbearable situation under the concentrated flight paths although noise contours calculated for equivalent sound pressure level hardly changed or even shrank. The consequence of this ‘concentration experiment’ was the political decision taken by the three governments in mutual agreement on 23rd of January 2003 to disperse noise. This policy was taken over in every political agreement thereafter;

3. The Council of State validated the dispersion plan (by Anciaux) and thereby the dispersion policy in its decision of 17th November 2008 ([Arrêt CDE 187998 F validation plan dispersion Anciaux 2008-11-17](#));

4. In the political treaties of 2008, 2009 and 2010 one of the five principles for defining take-off or landing routes was that ‘concentration of flights on densely populated areas should be limited as much as possible’. This is not the same as ‘concentration should be applied on somewhat less densely populated areas’ or ‘flying over the most densely populated area in a non-concentrated way is forbidden’. ‘Densely populated’ according to Statbel is at least 500 inhabitants/km² or a contiguous area of 50 000 people. On the west side of BRU there aren’t any not-densely populated areas of sufficient width and/or length to create a corridor for take-off. Expropriation or insulation are impossible on the west side of the airport. These treaties are still the basis of the noise management strategy of the present government. Another adopted principle was ‘fly as directly as possible to destination for ecological and economical reasons’;

5. Red line in every court decision is prohibition to concentrate on residential areas and the respect for article 8 ETHR and articles 10, 11, 23§4 of the Belgian Constitution;

6. ‘Dispersed flight tracks’ are mentioned among the noise abatement operational procedures by ICAO: ‘6.3.3 Dispersed flight tracks. Successive departing aircraft may be dispersed on different flight tracks over wide-ranging areas. Dispersing flight tracks in this way tends to decrease the length of the noise exposure areas and to increase the width.’ ([ICAO Document 9829 Guidance on Balanced Approach](#)). Dispersed flight tracks fit in with the absence of land use planning around BRU, the absence of corridors on the west side (therefore contains the noise as close as possible to the runway), the importance of frequency of overflights on the impact on the environment and human health;

7. The importance of the frequency of overflights for the impact on health both during the day and during the night is underscored by numerous reports:

   a. WHO report on environmental noise (1999 p 43): ‘Noise measures (day and night!) based solely on LAeq values do not adequately characterize most noise environments and do not adequately assess the health impacts of noise on human well-being. It is also important to measure the maximum noise level and the number of noise events when deriving guideline values.’;
b. Elements for a position paper on night-time transportation noise and sleep disturbance (TNO 2002.59 p 32): ‘With a given L_{night} the worst case regarding the incidence of instantaneous effects occurs when the events cause indoor SEL values just above the effect threshold. Consequently, extra protection in addition to a limit in terms of L_{night} cannot be provided with limits of SEL but requires limits for the number of events.

c. Netherlands Health Council: The influence of Night-time noise on Health, 2004 (p 17): ‘At a given L_{night} value, the most unfavourable situation in terms of a particular direct biological effect of night-time noise is not, as might be supposed, one characterized by a few loud events per night. Rather the worst case scenario involves a number of noise events all of which are roughly 5 dBA above the threshold for the effect in question.’ (The influence of night-time noise on sleep disturbance NHC 2004);

d. There is no reason why during the day not the same criteria for noise impact shouldn't apply as during the night because according to WHO the same environmental noise guidelines apply for hospitals and classrooms as for sleeping rooms. The maximum noise event frequency of 50 overflights/day, applied around Sydney airport is based on WHO recommendations (Environmental Principles and Procedures for Minimising the Impact of Aircraft Noise, November 21st, 2002): it corresponds to a cumulative noise exposure of LAeq40 due to 50 landing aircraft;

8. Sound insulation, even with air conditioning (Okinawa report) does not protect against sleep disturbance nor number of complaints except close to end of runway;

9. Health assessment should be derived from measurements in dBC and not dBA: ‘If the noise includes a large proportion of low frequency components, values even lower than the guideline values will be needed, because low frequency components in noise may increase the adverse effects considerably. When prominent low frequency components are present, measures based on A-weighting are inappropriate.’ (WHO report on environmental noise, 1999 p 43);

10. In assessing environmental and health impact assessments one can no longer deny the paradigm shift from dose response curves between noise exposure and – subjective - sleep disturbance/annoyance into dose response curves between noise exposure and – objectively measured – morbidity and mortality, mostly cardiovascular. The former were based on a very limited number of studies, mostly published in’ not peer reviewed’ journals (for the Miedema Oudshoorn paper 9734 participants before 1986), the latter were based on at least 15 million people and were recently (> 2007) published in highly ranked peer reviewed medical journals (Greiser Cologne Aircraft Noise Study J Public Health 2007; Heathrow Aircraft Noise and CV risk BMI 2013; Correia et al Residential exposure to aircraft noise and hospital admissions BMI 2013, list is not exhaustive!);

11. The latest WHO paper on noise, allows for calculation of DALY's due to sleep disturbance and annoyance, such as calculated for greater Paris in the recent Bruitparif document, but even this does not take into account the dramatic effects on cardiovascular morbidity/mortality as demonstrated in the recent publications in medical journals;

12. According to WHO a DALY is valued in EU as 40,000 euro = 1 VOLY: value of life year lost. (Final report on the monetary valuation of mortality and mortality due to air pollution WHO 2007 Summary p 2)

Relevant links

Statement Boreas vzw
3.4 **Bruxelles Air Libre Brussel**

Bruxelles Air Libre Brussel a été créée en 1998 pour défendre spécifiquement les habitants de la région bruxelloise victimes des nuisances dues au survol tant à l'atterrissage qu'au décollage des vols opérant à Bruxelles National.

**Constatations sur les survols :**

Les statistiques différents sur le nombre de personnes survolées à Bruxelles (selon l'origine des études) allant de 250.000 selon l'agence environnementale européenne à plus du double selon certaines associations.

Ce qui est certain c'est le pourcentage de plus de 50% des vols sur le virage gauche vers la balise de Huldenberg, de 8 à 15% sur la route du canal et de 12% sur la route du ring qui passe sur le nord de Bruxelles avant de contourner la région. On voit donc que la région bruxelloise est de loin la zone la plus survolée. La perception du bruit est d'ailleurs aggravée par l'ampleur du cône de bruit qui est supérieur à 2km de part et d'autre de l'axe de la route. Il est donc très difficile de savoir exactement combien de personnes souffrent des survols.

Les atterrissages en piste 01 posent également un grave problème puisque 25.000 habitants de Woluwe St Pierre sont à la fois survolés par des décollages en 25R ou par des atterrissages en 01 ce qui contrairement aux autres ne leur laisse aucun répit.

**Propositions de Bruxelles Air Libre Brussel**

1) **Mesures à court terme :**

- Départ systématique depuis les seuils de piste.
- Optimisation des NADP (Noise Abatement Departure Procedures) en tenant compte de la situation particulière de l'aéroport.
- Resserrment drastique du virage gauche avec des points PRNAV évitant la région bruxelloise.
- Déplacement partiel des vols du virage gauche vers la piste 19 en fonction de périodes creuses permettant les croisements de pistes.
- Déplacement des vols de la route du canal sur la route du ring.
- Redéfinition de la route du ring afin de survoler les zones les moins peuplées.
- Allongement de la nuit de 23h à 7h.
- Déplacement des vols cargo de nuit sur d'autres aéroports régionaux (Liège, Charleroi).
- Création d'un organisme de contrôle indépendant chargé de surveiller en temps réel le respect des routes et des procédures.
2) Mesures à moyen terme :
- Arrêt complet des vols de nuit.
- Interdiction des avions dont le QC est supérieur à 5.
- Taxe sur chaque vol pour financer un fonds d'indemnisation des habitations qui seront le plus survolées.
- Installation d'un EMAS en piste 19 pour améliorer la sécurité de cette piste et pouvoir l'utiliser plus.
- Déplacement de 1800 m vers l'est de la piste 25L pour pouvoir l'utiliser plus pour les décollages vers l'est mais avec une procédure de virage à 700 pieds et la suppression de la procédure actuelle de «missed approach».
- Limitation à 250.000 mouvements par an pour l'aéroport.

Notre association recommande également que le gouvernement renégocie la licence d'exploitation de l'aéroport qui arrive à échéance et qu'il inclue dans cette licence certaines restrictions entre autres la limitation du nombre de mouvements, une taxe servant à l'indemnisation et une taxe sur le Kérosène.

Nous insistons aussi sur la dépolitisation de skeyes qui devrait employer en nombre égal des francophones et des néerlandophones et qui ne devrait pas être noyauté par des partis politiques ouvertement opposés à tout changement.

Relevant links

https://www.bruairlibre.be/
3.5 **Burgerforum Luchthavenregio**

Burgerforum Luchthavenregio (Brussels Airport/Zaventem) including Sterrebeek 2000 VZW, Decibel-25L and Zone-S, representing citizens from Zaventem (Sterrebeek, Zaventem, Nossegem, Sint-Stevens-Woluwe), Kortenberg including Erps-Kwerps, Meerbeek and Everberg, and Steenokkerzeel including Melsbroek en Perk.

We are striving for a more sustainable development of our airport(s) and aviation. Noise from aviation is an important element in this. Our attached PowerPoint summarizes our views and position on all the vital issues to achieve this, including noise-related issues. Regarding noise-related issues more specifically, we believe that the primary objective should be to control/reduce noise at the source. We are against spreading noise, which has disappointingly been the main practice at Brussels Airport. This has also fuelled NIMBY-based approaches and conflicts, which in turn have been politicized and caused endless legal battles. A fundamental principle, which is also backed by WHO, is that noise reduction measures in areas which are more heavily affected by noise disturbance should not increase noise in other areas. Indeed, the aim of noise measures should be to reduce airport noise in all affected areas. Something which the latest (draft) Flemish Government Noise Action Plan (2019-23) also fails to do.

**Improvement proposals**

We believe noise can and must be controlled and reduced by a number of policy measures. Our proposals to achieve this include:

(i) same noise norms for all citizens based on the new WHO guidelines for aviation of Oct 2018, i.e. Lnight 40 and Lden 45;

(ii) a scheme which taxes planes in function of their (engine) noise certificate;

(iii) legislation which accelerates transition to quieter planes through allowing landings/departures during particular time zones only to following QC certified planes: QC 3 from 23.00 - 6.00 hours; QC4 6.00 - 7.00 hours; QC12 from 7.00 – 23.00 hours;

(iv) test running of aircraft engines to be conducted inside a hangar and no longer in open air; (v) maintain current maximum of 74 flight movements/hour during peak periods;

(vi) A modest growth of flights movements to max. 250.000 in 2025 (from approx. 235.000 currently); in 2025 a new 10-year ceiling to be agreed in function of overall noise and emission reductions achieved by then;

(vii) night flight movements are reduced from 16.000 currently (of which max. 5.000 departures) to 10.000 (of which max 3.000 departures) by 2020, and eliminated by 2025; in the meantime, night flights are taxed more heavily;

(viii) historic preferential runway use is ‘locked’ based on wind norms, meaning use of runway 25R for takeoff in case of west/south-west wind (80% of the time), the 25L for landing and exceptionally the cross runway 01/19 for takeoff.
Relevant links

12 point plan presentation (EN)
12 puntenplan preentatie (NL)
https://www.facebook.com/groups/2249688818503435/
http://burgerforum-luchthavenregio.be/
www.sterrebeek2000.be
https://www.facebook.com/sterrebeek2000/
https://www.facebook.com/ZoneSteenokkerzeel/
3.6 Coeur Europe

Parmi les grands aéroports européens situés à moins 15 km des centres villes et éloignés de la mer (Berlin, Cologne, Dusseldorf, Francfort, Luxembourg, Madrid et Orly) Brussels Airport est l’un des rares à ne pas avoir mis en place de plan d’indemnisation des riverains, ni de concentration du trafic, ni d’investissement dans de nouvelles pistes, ni d’arrêt des vols de nuit. C’est d’ailleurs le seul aéroport à n’avoir mis en place aucune de ces mesures. C’est une honte car l’impact sur la santé de la population est énorme.

Un aéroport aussi proche de la ville doit se limiter à des vols de jours pour un service haut de gamme et sans activité de cargo pur (sans avions dédiés 100% cargo) car facile à délocaliser. DHL qui affrète 98% des avions cargo de nuit à Brussels Airport utilise partout ailleurs des pistes de nuit éloignées des centres urbains : Leipzig à 120 km de Berlin, Francfort-Hahn à 100 km de Francfort, Bergame à 50 km de Milan, Vitoria à 240 km de Madrid, et East-Midlands à 140 km de Londres.

Plus de 10% de la Population Belge, à la fois Flamande et Bruxelloise subit ainsi la pollution sonore de l’aéroport par faute d’investissements : Près de 120.000 personnes vivent à l’intérieur du contour de bruit 55 Lden, dont une courte majorité de Flamands et plus de 280.000 personnes à l’intérieur du contour de bruit 50 Lden dénoncé par l’OMS, dont trois fois plus de Bruxellois.

Improvement proposals

1ère proposition : Appliquer immédiatement le principe du pollueur payeur, avec une taxe de 6€ par passager et 0,12 € par Kg de fret pour financer sur 12 ans un programme d’indemnisation de 3 milliards d’euros et pour inciter les compagnies charter et les vols cargo à utiliser des pistes plus adaptées.

2ème proposition : Déplacer ses vols cargos vers Liège en conservant son centre de tri ne coûtera que 0,05 € par Kg de fret à DHL, ce qui est très économique.

3ème proposition : Fermer l’aéroport entre 22h30 et 6h30 et déplacer tous les vols de nuit vers des pistes plus adaptées à Liège, Ostende, ou Beauvechain.

4ème proposition : Il est souhaitable d’utiliser les pistes de Beauvechain pour les gros porteurs (avions cargo et passagers) sous le contrôle de skeyes.

5ème proposition : Concentrer les couloirs de décollage sur le plus petit nombre de riverains possible pour les indemniser correctement et leur offrir la chance d’une vie qui protégera leur santé, soit par des insonorisations massives ou des rachats d’habitations.

6ème proposition : Uniquement en complément des propositions précédentes, utilisation normale des pistes parallèles de Brussels Airport avec atterrissages en 07 dès que le vent passe à l’est pour minimiser globalement le nombre de survolés.

7ème proposition : Pas de renouvellement de la licence de l’aéroport cet été sans au minimum la mise en place des points 1 et 3.
Relevant links

20 Mesures pour Bellot
Bellot-denacht
PourBellot-LaNuit
White Paper 13 options for new runways
3.7 **Comité Tervueren-Montgomery**

Tervueren-Montgomery se joint et co-signe le 'statement' Coeur-Europe dans ce document.

**Relevant links**

[Email 1](#)

[Email 2](#)

[PLAİNTE AU PROCUREUR](#)
3.8 **Commune Woluwé-Saint-Lambert (conseil communal)**

Le Conseil communal de Woluwé-Saint-Lambert, réuni en séance publique (29 avril 2019),

Considérant la législation de l’Union européenne et la jurisprudence constante de la Cour européenne des droits de l’homme consacrant la protection de l’environnement et le droit à un environnement sain et de qualité ;

Considérant le règlement (UE) n° 598/2014 du Parlement européen et du Conseil du 16/04/2014 relatif à l’établissement de règles et de procédures concernant l’introduction de restrictions d’exploitation liées au bruit dans les aéroports de l’Union, dans le cadre d’une approche équilibrée, et abrogeant la directive 2002/30/CE, entré en vigueur le 13/06/2016 ;

Considérant les difficultés, résumées dans le rapport de l’ULB (ULB & IGEAT, Analyse ex post des nouvelles procédures aériennes mises en service le 06/02/2014 dans la région métropolitaine bruxelloise, Étude pour le SPF Mobilité et Transports, rapport final, Bruxelles, 07/05/2014, p. 9), de la mise en œuvre des mesures recommandées par l’approche équilibrée telle que définie dans le règlement n° 598/2014 ;

Considérant que le droit à la santé et à l’environnement sain pour les riverains constitue un droit inaliénable, prescrit par l’article 23 de la Constitution, qui ne porte nullement préjudice au développement économique de l’aéroport de Bruxelles-National ;

Considérant l’arrêté du gouvernement de la Région bruxelloise du 27/05/1999 relatif à la lutte contre le bruit généré par le trafic aérien ;

Considérant l’article 34 de l’arrêté royal octroyant la licence d’exploitation de l’aéroport de Bruxelles-National imposant au titulaire de l’exploitation le strict respect des normes acoustiques arrêtées par la Région bruxelloise et la Région flamande, après concertation avec l’Etat fédéral ;

Considérant que, selon la Directive 2002/49 du 25/06/2002 relative à l’évaluation et à la gestion du bruit dans l’environnement, la durée de la nuit européenne est fixée à 8 heures minimum ;

Considérant qu’un grand nombre d’aéroports européens disposent de réglementations strictes en matière de survol aérien de nuit, et ce, sans qu’une diminution de l’activité économique soit constatée ;

Considérant qu’un grand nombre d’aéroports européens, dont les avions survolent plus de 30.00 habitants, disposent d’une politique d’insonorisation visant à réduire les nuisances sonores et environnementales de la population survolée ;

Considérant que la correcte exécution des décisions de justice relève simplement d’un objectif légaliste de respect des décisions du pouvoir judiciaire, qui s’inspire du principe de loyauté fédérale, dans le souci d’assurer la sécurité juridique ;

Considérant la déclaration gouvernementale fédérale du 09/10/2014 qui annonce l’élaboration d’« une solution structurelle (…), en particulier dans les zones à forte densité de population » (Accord du gouvernement fédéral, 10/10/2014, p. 219) ;

Considérant la proposition du Gouvernement de la Région bruxelloise visant à concilier la qualité de vie des habitants de la Région bruxelloise et le développement économique de l’aéroport de Bruxelles-National ;
Considérant que l’Organisation mondiale de la Santé conclut que les troubles du sommeil constituent l’un des effets les plus graves du bruit dans l’environnement, causant à la fois des effets immédiats ainsi que des effets à long terme ;

Considérant que le bruit généré par le survol aérien entraîne des troubles de l’attention et de la concentration aux enfants en milieu scolaire ;

Considérant que les pollutions sonore et environnementale entraînent des problèmes de santé avec notamment des conséquences sur le système nerveux central et périphérique et sur le système cardiovasculaire ;

Considérant que la récurrence du survol aérien de la Région bruxelloise et de sa proche périphérie constitue une source constante de nuisances sonores et environnementales importantes.

DEMANDE A L’ACTUEL ET AU PROCHAIN GOUVERNEMENT FÉDÉRAL :

A. De considérer que l’aéroport de Bruxelles-National a prioritairement une vocation d’aéroport urbain dont les activités régulières sont diurnes ;

B. De conserver la limitation actuelle maximum de l’aéroport à 250.000 mouvements, en s’opposant au projet de doublement du trafic souhaité par Brussels Airport Company ;

C. De confirmer de manière absolue le principe du non-survol des zones densément peuplées afin de respecter l’intérêt général, la santé publique et la sécurité des populations ; et de considérer que tout le territoire de la Région bruxelloise, en ce compris la zone du Canal, est densément peuplé ;

D. D’adapter les procédures et routes aériennes dans le but de réduire les nuisances et de minimiser le nombre de personnes impactées par celles-ci ;

E. De fixer la période dite « de nuit » à l’aéroport de Bruxelles-National de 22h00 à 07h00, d’interdire les décollages et les atterrissages durant cette période, sauf les exceptions définies par la loi et dans le strict respect du quota annuel actuel des vols de nuit ;

F. De proposer la réalisation d’une étude indépendante sur l’impact des particules ultrafines émises par le trafic aérien sur l’ensemble des citoyens survolés ;

G. De veiller au strict respect des normes de vent applicables sur les pistes 01-19, 07-25 et de garantir la transparence totale à cet égard ;

H. D’exiger de l’exploitant de l’aéroport qu’il recule d’au moins 1.800 mètres et si nécessaire d’une distance encore plus longue le seuil de la piste 25L vers l’Est de manière à permettre les décollages par un virage à gauche sans survoler la Région bruxelloise et sa proche périphérie dont Kraainem et Wezembeek-Oppem ;

I. De développer une stratégie aéroportuaire nationale en vue d’une meilleure répartition, vers les aéroports régionaux, des activités de fret et de charter / low cost et d’étudier la décentralisation de certaines activités de l’aéroport dans le cadre d’une gestion concertée avec des aéroports belges visant à exploiter mieux leurs spécificités et leurs synergies éventuelles tout en évitant toute forme de concurrence déloyale entre eux.
J. D'instaurer, concomitamment au respect des normes ci-avant exposées, une autorité publique, indépendante et neutre, de contrôle des nuisances sonores aériennes autour de Bruxelles-National, et de favoriser les accords de coopération avec les différentes régions du pays ;

K. De respecter l'Arrêté bruit de la Région bruxelloise du 27/05/1999, entré en vigueur le 01/01/2000, ainsi que toutes les décisions de justice exécutoires ;

L. D'exiger que soit strictement sanctionné tout non-respect des routes aériennes ;

M. D'instaurer, en vue de lutter plus efficacement contre le réchauffement climatique et en collaboration avec les instances européennes, une taxation effective sur le kérosène des avions au départ ou à destination de l'Europe ;

N. D'étudier, dans le respect des principes énoncés ci-avant, l'ensemble des recommandations des associations représentatives dans la définition et l'organisation des routes aériennes ;

O. D'étudier, en collaboration avec les autorités régionales compétentes et les associations représentatives, la mise en place d'un plan d'insonorisation global des zones résiduellement survolées dont les effets ne pourront toutefois pas être considérés comme l'acceptation ultérieure d'une extension de l'aéroport non durable et non respectueuse de la santé des habitants de la Région bruxelloise et de sa proche périphérie ;

P. D'étudier le sujet de la restriction de l'exploitation de l'aéroport de Bruxelles-National, sans tabou et avec tous les acteurs de la mobilité ;

Q. D'interdire les avions les plus bruyants par une adaptation régulière des limites de bruit réglementaires (quotas de bruit autorisé par avion et par saison) et d'étudier la mise en place d'incitants financiers intégrés aux redevances de décollage et d'atterrissage. Nous plaident également pour que les dépassements des normes de bruit imposées par l'arrêté bruit de la Région bruxelloise fassent l'objet d'une sanction effective ;

R. D'utiliser une meilleure politique tarifaire comme l'un des leviers permettant d'assurer un meilleur équilibre des tarifs entre l'offre aérienne et l'offre ferroviaire ;

S. D'interdire les vols « sauts de puce » pour lesquels il existe généralement une alternative efficace en train (Bruxelles-Paris, Bruxelles-Amsterdam..) ;

T. D'investir massivement dans le développement du transport ferroviaire au niveau européen, dont celui des réseaux de train de nuit et de TGV fret ;

DEMANDE A L'ACTUEL ET AU PROCHAIN GOUVERNEMENT REGIONAL :

A. D'étudier la possibilité de rapprocher les normes de bruit des nouvelles lignes directrices liées au bruit aérien de l'OMS et du principe de récurrence du bruit ;

B. De poursuivre la parfaite perception des amendes administratives dues par les compagnies aériennes en infractions ;

C. De multiplier les sonomètres constatateurs en vue d'assurer une parfaite identification des compagnies aériennes en infraction ;
DEMANDE AUX COMMUNES BRUXELLOISES :

A. De faire sienne la présente motion.

Relevant links

Motion survol votée au conseil communal de ce lundi 29 avril 2019
Letter received 18032019
I. **CONTEXTE**

La Commune de WSP subit un survol particulièrement intensif de son territoire.

A titre d'exemple, durant l'année 2017, l'exploitation de l'aéroport de Bruxelles-National a généré 118.945 décollages et 117.658 atterrissages, soit un total de 236.603 mouvements aériens.

Parmi ceux-ci, pas moins de 56.657 mouvements aériens ont impliqué un survol de Woluwe-Saint-Pierre (soit 24% du total des mouvements aériens):
- 46.285 avions décollant depuis la piste 25R ont emprunté le virage à gauche, qui passe au-dessus de WSP ;
- 10.372 avions ont atterri sur la piste 01 en traversant WSP.

En d'autres termes, WSP subit un quart des mouvements aériens générés par l'exploitation de l'aéroport.

- A titre de comparaison, les habitants qui subissent les nuisances des décollages par la route du canal subissent en moyenne environ 7.500 mouvements par an.
- A cela, il faut ajouter le fait que les directives OMS sont constamment dépassées et que les normes bruxelloises le sont très régulièrement et surtout la nuit.
- Il faut également ajouter le fait que les habitants subissent de nombreuses nuisances pendant la nuit :
  - La piste 01 est régulièrement utilisée pendant plusieurs nuits consécutives ;
  - Les décollages par le double virage à gauche commencent dès 6h00 du matin.

II. **ATERRISSAGES EN PISTE 01**

Il nous semble nécessaire de réaffirmer et confirmer que la piste 01 doit demeurer une piste subsidiaire, ne pouvant être utilisée que lorsqu'il est objectivement justifié de ne pas utiliser la configuration des pistes préférentielles (le Preferential Runway System ou « PRS »).

Il convient, ensuite, de déterminer les normes de vent et leurs composantes qui vont constituer le cadre d'application de ce système de « PRS ».

III. **DÉCOLLAGES PAR LE DOUBLE VIRAGE GAUCHE**

1. La commune tient à attirer l'attention de l'auteur de l'étude sur le fait que le double virage à gauche qui survole notamment des habitants de la commune de WSP interpelle en raison du nombre et de la proportion de son utilisation :
- Le nombre : en 2018, 41.336 avions ont emprunté le double virage à gauche au décollage.

Cela représente, à titre d'exemple, environ 6,2 fois plus de mouvements que la route du Canal (6.589 mouvements).
- La proportion : en 2017, le double virage à gauche représente 36%12 du total des décollages et 46,75 % du total des décollages par la piste 25R13.

C'est de loin la route la plus utilisée au décollage. La route qui arrive en deuxième position est la route du Ring qui est utilisée dans des proportions incomparablement plus faibles (14% des décollages et 18,58% des décollages en piste 25R).

2. Ce constat est particulièrement interpelant dès lors que la politique actuellement menée concernant la gestion des nuisances sonores est dite de « dispersion ».

Or, dans les faits, 36% des décollages sont concentrés sur la même « route » qui survole des zones densément peuplées.

Dans le cadre d'une solution globale au problème des nuisances sonores générées par l'activité de l'aéroport de Bruxelles-National, il apparaît nécessaire à tout le moins de diminuer sensiblement l'utilisation de cette route pour la ramener dans des quantités et proportions raisonnables.

IV. LES VOLS DE NUIT ET LA DURÉE DE LA NUIT

1. Il est avéré que les vols de nuit constituent une source de nuisance sonore particulièrement grave pour les habitants survolés. Au-delà d'une question de bien-être, il s'agit d'une question de santé publique mise en évidence notamment par la récente étude de l'OMS.

Nous sommes d'avis que, jusqu'à ce jour, le développement des vols de nuit et de l'activité de frêt s'est fait au détriment des enjeux environnementaux et de santé publique et qu'il s'impose d'y remédier.

2. Il nous semble primordial que l'étude aborde pleinement la question des vols de nuit.

En effet, depuis l'apparition des vols de nuit, aucune étude complète et objective ne s'est intéressée à ce sujet.

3. Parmi les mesures qui doivent être examinées, je note notamment :
   - La suppression des vols de nuit depuis et vers l'aéroport de Bruxelles-National : le fait que cette activité se soit développée de la sorte ne permet pas de partir du postulat qu'elle devrait nécessairement être maintenue. La question de sa suppression, en vue d'un déplacement vers d'autres aéroports doit être examinée, s'agissant d'un aéroport situé à proximité immédiate de zones densément peuplées ;
   - Réduction des vols de nuit en diminuant le plafond actuel de 16.000 mouvements/an : ce plafond a été établi sans justification objective et rien ne permet d'exclure de le revoir et ce d'autant qu'il est haut.
   - Collaborations entre aéroports pour assurer une gestion optimale et cohérente de l'activité de frêt
   - Extension de la durée de la nuit à la période 6/7h00 : d'autres aéroports prévoient une durée de nuit d'exploitation qui inclut la période 6/7h00 qui, selon l'OMS correspond à une période de nuit pour les habitants.
   - Il serait justifié que la durée de nuit d'exploitation soit étendue à la période 6/7h00. Cela ne signifie pas que les avions ne pourront pas voler à ce moment mais que le quota maximum de vols de
nuit devra comprendre les vols de la période 6/7h00. Cela permettra de soulager les riverains, sans empêcher l'exploitation de l'aéroport.

A mon sens, l'activité actuelle de l'aéroport pendant la nuit n'est pas tenable et doit faire l'objet de mesures, de sorte que toutes les mesures ne peuvent pas être cumulativement rejetées.

V. LE NIVEAU D'EXPLOITATION DE L'AÉROPORT

La licence d'exploitation concédée par l'État belge à BAC prévoit un nombre de 74 mouvements par heure (cela ferait près de 650.000 mouvements par an).

Dans son plan Bruxelles 2040, BAC envisage d'augmenter sensiblement ce nombre de mouvements, laissant craindre une augmentation des nuisances sans même envisager de contrepartie environnementale, ce qui, dans le contexte actuel est inadmissible

Relevant links

Full Statement

Jugement de Cessation du 1er février 2019

Données relatives au survol de WSP

Présentation faite par le Service de Médiation du Gouvernement fédéral pour l'aéroport de Bruxelles-National à la Conférence des Bourgmestre du 30 mai 2018

Proportions d'utilisation de différentes des pistes de 1995 à 2015

Relevés de BATC entre août 2017 et juillet 2018 concernant l'utilisation des pistes

Relevés du sonomètre WSP_Corn en Lden – mai à septembre 2018 - Outil WEBNOISE

Relevés du sonomètre WSP_Corn en LNight – mai à septembre 2018 - Outil WEBNOISE

Relevés du sonomètre WSP_Corn en Lden et LNight– moyennes annuelles 2017 - Outil WEBNOISE

Evènements sonores en piste 01 :

IBGE - Statistiques des violations à 'arrêté bruit – période 25/07/2017-01/05/2018

IBGE - Tableau de synthèse 2018 par mois des infractions « bruit-avions »

Mesures de bruit BATC – sonomètre MT 11-02 – www.batc.be

Divers

Interpellation du Ministre en Commission de l'Infrastructure du 6 juin 2018 (après-midi)

BAC – Vision stratégique 2040

2013 – Etude EGIS-AVIS SOFREAVIA sur l'utilisation de la piste 20 (19)

2016 – Airport Médiation – Rapport annuel
3.10 **Flemish Brabant Airport Region Platform**

Airport Region Platform Flemish Brabant (‘Platform Luchthavenregio Vlaams-Brabant’) is a temporary assembly of the mayors of all municipalities and the governor and vice-governors of the province, working together on a joint strategy aiming following objectives:

- improving quality of life in airport region
- lobbying for sustainable and balanced aviation policy
- improving dialogue with all stakeholders
- valuing economy, ecology, quality of life
- realizing balanced share of advantages and disadvantages between the regions
- creating common ground for sustainable development of the airport

Airport Region Platform Flemish Brabant aims:

- achieving an aviation law establishing flight procedures and runway use based on principles of balanced distribution of aircraft noise and aeronautics,
- consultation and dialogue of all government authorities involved to achieve a global (political) agreement,
- drafting of an ambitious action plan to maximally reduce aircraft noise and emissions at source,
- determination and application of strict and uniform environmental norms to protect health and life quality of (local) residents,
- development of a consistent land-use planning framework,
- policy development accelerating more sustainable aviation measures,
- future airport development and operations based on the existing airport infrastructure, no runway extension.

**Improvement proposals**

Noise assessment, health effects:

- Objectification by scientific research and transparent data publication, extension of monitoring stations
- Importance of frequency of noise events (sleep disturbance)
- Calculating cost-benefit analysis
- Impact of updated WHO recommendations

Importance of night flights impact on resident’s health and life quality:

- Gradual increase of night flights (since 2010)
- Unfavourable growth of the share of not-coordinated night flights (1.469 in 2017, 2.088 in 2018)
- Further limitation of hazardous night flights needed

Dispersion vs. concentration

- No common definitions of acceptable dispersion or concentration: criteria needed
- Importance of the principles of the ‘cabinet decisions 2010’: *avoid concentration of flight routes in densely populated areas*
- PRS is common ground for balanced solution
- More dispersion needed for high concentration routes (e.g. Noordrand, Huldenberg,...)
- More possibilities to use military airspace by civil aviation to avoid concentration (e.g. Huldenberg VOR station)
Advantages of performance based navigation on aircraft noise reduction
- Installation of ILS on runways 07L/R
- Permanent implementation of RNP approach procedures

Ground noise assessment
- Efficient measures for the reduction of aircraft ground noise
- Engine test runs in noise protection hall

Need for consultative committee and transparency
- Exchange of data about aircraft noise
- Establishment of permanent dialogue forum

Relevant links
- Full Statement
- Presentation

All information about the Airport Region Platform and its initiatives is publicly available on http://www.toekomstforum.be/uitdaging-luchthaven.

3.11 FreeAirSchaerbeekEvere

FreeAirSchaerbeekEvere (FASE, 261 membres, avril 2019) est une plateforme de comités de quartiers schaerbeekois et everois (communes bruxelloises du Nord de la RBC) qui s’est constituée en janvier 2019 suite au survol subit et intensif de novembre 2018 par les routes d’atterrissage 07L et 07R. Nous partageons entièrement les revendications de la plupart des associations de riverains. Cependant, aucune d’elles ne s’oppose clairement au projet de transférer un maximum d’atterrissages sur les 07 survolant ainsi plus de 350.000 personnes (chiffres d’un rapport de l’ULB/IGEAT dont les références sont données à la fin de ce document).

C’est à ce titre que FASE s’est constitué pour :

- Lutter contre la menace d’une éventuelle officialisation et donc pérennisation de ces routes 07
- Dévoiler les ‘manoeuvres’ des autorités politiques fédérales qui visent à déplacer définitivement et en catimini 20.000 atterrissages de la piste 01 (périphérie flamande et WSP) sur les pistes 07. Un tel déplacement a pour effet, toujours sur base de l’étude ULB/IGEAT, de multiplier par sept les personnes survolées, en soulageant les 55.000 personnes survolées lors des atterrissages en 01 aux dépens des 350.000 personnes de condition plus modeste qui sont survolées lors des atterrissages en 07 ;
- Signaler/dénoncer la partialité du service de médiation, au travers de Philippe Touwaide, en faveur de l’Est de la RBC survolée par la 01.

Pendant des dizaines d’années, les 07 n’ont pas été utilisées et ce, quels que soient les gradients de vent alors que les vents d’Est existent depuis l’aube de la Création !

I. Depuis des années, la 07L VOR (2005) (procédure visuelle courbe passant au bas du domaine royal) et la 07R (1958) (à haute fréquence du coucher du soleil jusqu’à 1h30, à basse fréquence à partir d’1h30), n’étaient utilisées qu’en cas de « circonstances exceptionnelles ». La 07R (1958) n’était utilisée depuis 1996 jusqu’aujourd’hui qu’entre 0% pour la plupart des années à 0,29% en 2009, cette route est utilisée à partir du coucher du soleil, jusque 1h30 du matin avec toutefois une diminution de fréquence de 1h30 à 6h du matin

II. Est apparue ensuite l’idée que la 07 mais aussi la 01 devait être utilisée en cas de circonstances exceptionnelles (selon des sources sûres, il parait que c’est le Service de Médiation qui était à la manœuvre), cette manipulation brise évidemment le fait que la 07 était un cas exceptionnel (sous-entendu par rapport à 01 en cas de vent d’est)

III. En février 2014, sous la tutelle de la Ministre Galant, la mention ‘conditions exceptionnelles’ a disparu mystérieusement des AIP, impactant donc les 07 mais aussi la 01. Le mystère de cette disparition est reconnu par le Service de Médiation lui-même et par l’UBCNA (qui défend essentiellement l’Est de la RBC et la périphérie flamande sous la 01) qui a introduit une action en justice à ce sujet auprès de la juge d’instruction Laurence Heusghem. Nous avons demandé les références de cette instruction et le médiateur refuse de les donner, prétendant qu’il est ‘témoin protégé’. Actuellement les 07 sont donc passées du statut de route d’« exception » à un usage conditionné à une certaine force de vent d’E-SE lorsque les atterrissages ne peuvent plus s’effectuer en 01.

IV. Aujourd’hui, d’une trajectoire courbe avec procédure visuelle VOR, la 07L et la 07R sont en passe de se transformer définitivement et de façon permanente en une trajectoire rectiligne avec procédure satellitaire en mode RNP, peu importe la force du vent, survolant nos
quartiers à très basse altitude et faisant primer les bienfaits de la technologie au détriment d'une population très dense.

Il faut savoir que ces trois routes survolent respectivement :

- 200.000 personnes pour la 07L courbe qui date de 2005 (Jette, Ganshoren, Schaerbeek, Evere)
- 320.000 personnes pour la 07L rectiligne qui risque de passer en mode satellitaire RNP = nouvelle route dite Galant, illégale en vertu de la loi de 2006 pour non-respect de la clause relative à la concertation préalable nécessaire et la nécessité d'une étude d'impact (Molenbeek, Schaerbeek, Evere)
- 370.000 personnes pour la 07R (soirée et nuit) (Bruxelles, Schaerbeek, Evere)

**Quelles justifications/explications sont avancées pour augmenter l'utilisation de ces routes 07 ?**

- Le mode satellitaire est présenté comme plus sûr (faux, notamment en raison de la densité de population survolée), moins bruyant (faux), plus environnemental à cause des non reprise de gaz (effet marginal) ; mais nuit à la santé de 350.000 personnes !
- L'accroissement du survol aux atterrissages par les 07 s'explique, selon le service Médiation de l'Aéroport, par la fréquence accrue des vents d'Est, ce qui n'est qu'une toute petite part de la raison par rapport à l'augmentation exponentielle de la fréquence des vols.

**Quelles sont les explications cachées de ces changements récents ?**

- Soulager la piste 01 (55.000 personnes survolées en périphérie de la RBC) : voir ci-dessous les le rapport officiel qui le dit clairement (Egis Avia, SPF Mobilité, 2013)
- La disparition mystérieuse de la mention 'conditions exceptionnelles' pour l'utilisation des pistes 07 : (voir ci-dessous l'étude de l'ULB), (cette disparition est sous instruction judiciaire pour corruption de fonctionnaires)
- Le changement de calcul des normes de vent pour changer de piste
- Le doublement de l'exploitation de l'aéroport alors que les nuisances que subit la Région Bruxelloise sont déjà insupportables dans l'état.

**Il est injustifiable, dangereux, et nocif :**

- de survoler à très basse altitude une telle densité de population à cette fréquence soutenue durant des heures et des heures (cône de bruit d’1 km de chaque côté de la trajectoire + effet caisse de résonance en raison de la densité de l'habitat)
- Que le critère de densité de population pour le choix des pistes ne soit pas pris en compte comme l'impose l'OACI.
- Un récent courriel de Monsieur L. Ledoux, ancien directeur du SPF Mobilité confirme d'ailleurs l'effet catastrophique dans la réalité de l'utilisation de ces routes (voir ci-dessous)

**Improvement proposals**

S'il n'est pas mis un arrêt ferme et décisif aux actions masquées et probablement illégales menées par certains représentants de l'ordre public pour augmenter les atterrissages en 07 (faisant en sorte que les atterrissages en 07 ne soient même plus conditionnés à une certaine force du vent), Schaerbeek et Evere n'auront plus jamais de répit (survol par vent d'ouest : la route du canal, la route Delta et le virage gauche et par vent d'est : les routes 07)
Nos recommandations sont donc les suivantes :

1. **Imposer le critère de densité de population** pour le choix des routes en vertu de la réglementation de l'OACI
2. **Refuser l'équipement d'ILS sur les 07 et en imposer sur la 01**
3. **Imposer** que l'affaire de la disparition de la mention 'conditions exceptionnelles' pour l'utilisation des 07' soit éclaircie dans l'année et que cette mention soit réintroduite immédiatement dans les AIP.
4. **Imposer un recul de piste de la 25L de 1800 m au moins** et le décollage en seuil de piste
5. **Imposer à l'aéroport un quota de jour limité à 200.000 mouvements** maximum (comme il existe un quota de nuit)
6. **Le découplage des normes de bruit** (Arrêté Gosuin) des compétences environnementales en cas de refédéralisation de celles-ci; les normes de bruit sont la seule arme dont la RBC dispose pour lutter contre les nuisances sonores ; en effet, s'il est exact que l'environnement dépasse les frontières, le bruit, lui, est géographiquement localisable.
7. **Veiller au respect des décisions de Justice**, notamment en ce qui concerne la route du Canal, tout en veillant à ce qu'elle ne soit pas remplacée par une route plus à l'intérieur de la RBC (route Chabert par ex) ce qui aggraverait encore la situation.

**Relevant links**

**Full Statement**

Pour comprendre notre problématique, voici deux documents majeurs. Ils sont synthétiques, clairs, brefs et illustrés :


Pour plus de détails :

- **Le Rapport EGIS – AVIA de 2013, p. 52** sur lequel s'est appuyée Madame Galant; au point 10.1.3, ce rapport « prévoit à terme de supprimer la piste 19/01, et de transférer plus de 20.000 atterrissages par an sur les pistes 07L et 07R, en plein centre de Bruxelles ». Ce rapport dit aussi explicitement qu'aucune norme de vitesse de vent ne leur sera applicable. Ce qui veut clairement dire que l'ensemble des atterrissages de la 01 (55.000 pers. survolées) seront transférés sur la 07L (320.000 pers. survolées) et 07R (370.000 pers. survolées) peu importe la force du vent. (Rapport Égis Avia : C2745 Etude Piste 20 EBBR v2 1 FINAL Égis Avia 2013 pdf : Voir pièce attachée dans notre mail 1er mai 2019).

- **3 documents** (à disposition si nécessaire) reprenant les questions de la Ministre Galant (2016) portant sur la possibilité d'installer une procédure permanente RNP en 07L sans tenir compte de la loi du 13 février 2006 ainsi que les réponses de Monsieur L. Ledoux directeur général du SPF Mobilité :
  - Position DGTA sur loi 13022016 (rendue en urgence), le document est à lire en entier mais voici déjà un extrait significatif : « Le président du tribunal de 1ère instance de Bruxelles par ordonnance du 31 juillet 2014 « s'est limité » à constater la violation de la loi du 13 février 2006
en raison de l'absence de consultation du public ». (Document 26-20012016, à disposition si nécessaire);

- Position de la DGTA concernant le champ d'application de la loi du 13 février 2006, le document est à lire en entier. Voici déjà un extrait important p.10 : « Il en résulte, selon la DGTA, que les procédures aériennes adoptées après l'entrée en vigueur de la loi de 2006, et que le Gouvernement entendraient annexer à la « Vliegwet » devrait faire l'objet par précaution d'une concertation publique préalable, et le cas échéant d'une étude d'impact environnemental ». (Document 27-22012016 à disposition si nécessaire);

- Analyse d'un projet d'instruction, le document est à lire en entier. Cependant, voici déjà un extrait de la conclusion : « La procédure RNP en piste 07L consiste à créer une nouvelle route aérienne et doit donc être soumise aux règles prescrites par la loi de 2006 (concertation publique préalable et étude d'impact). (...) A défaut, il existe un risque majeur de contestations et donc de recours et une faiblesse manifeste de la position de l'Etat et de Madame la Ministre. La mise en œuvre d'une procédure RNP permanente en piste 07L, impliquerait quant à elle un processus plus long, répondant à des conditions telles que concertation avec les Régions (normes de bruit de la RBC), consultation des populations, etc..., pour lesquelles la DGTA est bien entendu prête à assister la Ministre ». (Document 30-08032016, à disposition si nécessaire).

- L'article du Vif l'Express du 18 mars 2016 avec carte illustrative résume bien la problématique et la tentative de mise en place en catimini de ces routes d'atterrissages par la Ministre Galant (Document 32-18032016, voir pièce attachée dans notre mail 1/5/19)

- Sur la suppression de la mention : « circonstances exceptionnelles » : voir l'excellente étude de l'ULB/IGEAT, Historique du survol de la Région de Bruxelles Capitale, 30/11/2016, p.161 dans laquelle il est clairement indiqué que « les conditions exceptionnelles » pour l'utilisation de la 07 ont été supprimées en 2014 de façon inaperçue ! Extrait p. 161 : « 2. Atterrissages sur les pistes 07. La présente étude a révélé une modification passée inaperçue des AIP (à partir du 6/2/2014) et consistant à supprimer la mention du caractère subsidiaire et exceptionnel des atterrissages sur les pistes 07. Cette mention faisait primer l'utilisation de la piste 01 sur les pistes 07 en cas de vents d'est/nord-est. L'atterrissage sur les pistes 07 demeure à ce jour une procédure rare. Cependant, cette modification s'inscrit dans le contexte plus large de tentatives de transfert des atterrissages de la piste01 vers la piste 07L, lesquelles pourraient aboutir : ✷ par simple modification des normes de vent, dont l'étude a montré l'évolution au gré des décisions politiques; ✷ par l'installation d'un ILS ou approche par navigation satellite sur la piste 07L (ou 07R) afin de parvenir à une procédure plus efficace que l'actuelle approche courbée sur la piste 07L. Le déplacement des atterrissages de la piste 01 vers la/les piste(s) 07 serait au bénéfice des habitants des marges est de la Région bruxelloise et de la proche périphérie est, mais au prix du survol accru de quelques centaines de milliers d'habitants (Molenbeek, Jette, Laeken, Schaerbeek, Evere et Haren) (voir tableau ci-dessous) »...

(http://document.environnement.brussels/opac_css/elecfile/STUD_20161130_HistoSurvolRBC_Final.pdf)

- A entendre Mr Bellot en 2018, il s'agit bien de rendre ces nouvelles routes définitives, car pilotée par satellite, elles seraient plus sécurisées, moins bruyantes et survoleraient moins de personnes. Ce discours, d'ailleurs repris par Monsieur Touwaide, sous-entend que la précision technologique supprimerait les effets néfastes du survol... Ce discours purement théorique ne tient absolument pas compte du cône de bruit estimé à un km de chaque côté de la trajectoire, de l'effet résonnance des îlots et de la compensation de dérive par vents d'E-SE.
• A propos de la nécessité d'une étude d'impact nécessaire à la légalisation de la nouvelle route 07L en procédure satellitaire, voici ce que Mr Touwaide écrit ce 14 décembre 2018 : « cette nouvelle technologie porte ses fruits dans tous les aéroports du monde entier et sera le nouveau standard de définition des procédures partout ». Il mentionne également : « Au niveau des zones survolées et des densités de population, il convient d'attendre la réalisation (par qui ?) de la cartographie qui sera présentée en 2019 ».

• Sur la densité de population dans le bas de Schaerbeek, voir le jugement 1er février 2019, p61, note 28
  « Le jugement du 19 juillet 2017 précise à cet égard : « 149. Or, l'étude dressée par l'ULB en 2014 relève que les quartiers les plus densément habités de la RBC sont situés aux abords de la route du Canal (étude déposée en pièce 5.2 par la RBC, p.36,44 « Les densités de population des quartiers concernés par les routes survolant les marges ou périphéries nord et est de Bruxelles se situent souvent en deçà des 2.000 hab./km2 et dépassent rarement les 5.000 hab./km2. À contrario les abords de la route Canal dépassent souvent les 16.000 hab./km2 voire même le seuil de 30.000 hab./km2 »). (Voir le jugement en pièce attachée dans notre mail du 1er mai 2019).

• Un extrait tout récent d'un courriel de Monsieur L. Ledoux :
  De : Laurent Ledoux <laurent.ledoux@phusis-partners.com>
  À : Ghislaine Weissgerber <gweissgerber@yahoo.com>
  Cc : Laurent Ledoux <ledoux.laurent@gmail.com>
  Envoyé le : Samedi 23 mars 2019 10h01
  « Je vous confirme que selon les informations dont je dispose les nouvelles procédures 07L et 07R seraient en effet catastrophiques ».

• Suspension provisoire de la 07L rectiligne par décision ministérielle de Mr Bellot en décembre 2018
  Le 31 janvier 2019, on apprenait par Matthieu Colleyn, journaliste à l'Echo que :
  « Le guidage satellitaire pour les atterrissages au-dessus de Bruxelles a été suspendu. Il s'agit pourtant d'une procédure plus sûre, moins bruyante et moins polluante. Attaqué par la commune de Crainhem, le ministre fédéral de la Mobilité, François Bellot, assure que cela ne modifie pas l'usage des routes aériennes.
  La commune de Crainhem s'en inquiète ouvertement. Mardi, son conseil communal votait à l'unanimité une motion condamnant une décision prise au mois de décembre par le ministre fédéral de la Mobilité, François Bellot (MR). Le 13, en effet, il suspendait une instruction visant à utiliser un guidage satellitaire pour atterrir sur les pistes 07 (...) ».

3.12 Leuven Rechtdoor vzw

For a long time, the region ‘Leuven Rechtdoor’ (communities Wijgmaal, Haacht, Rotselaar, Holsbeek, Lubbeek) are familiar with the noise of landing planes. But in March 2014 the situation changed fundamentally. During decades planes have been taking off west of Leuven in case of wind from the east or north in a non-preferential scheme (red arrows in figure 1, communities of Bertem, Oud-Heverlee and south of Herent). Suddenly a new departure flight path was introduced in which planes take off to the north of Leuven (black arrows in Figure 1). Never before in the history of the airport, planes have been taking off above this region and by doing so bewildered its inhabitants.

As a result, the region west of Leuven became a total no-fly zone without any plane landing or taking off (see Figure 2). The noise disturbance was relocated and concentrated above the region ‘Leuven Rechtdoor’ that already experiences considerable noise disturbance from landing planes. As such this has become the only region around the airport that never enjoys any rest period from either landing or departing planes (figure 2).
This change towards a concentration of noise disturbance is in total contrast with the stated policy aim of a ‘fair dispersion’ of noise from planes at the federal as well as at the regional level. The current federal coalition agreement provides for an evaluation of the new ‘Leuven Rechtdoor’ path. This evaluation was delivered by Belgocontrol (currently skeyes) on June 26\textsuperscript{th}, 2015 and confirms what was already feared for before the introduction of the new flight path. In particular, the flight path ‘Leuven Rechtdoor’, in comparison to the previous historical flight route west of Leuven, causes more noise nuisance, impedes the capacity of the airport, produces more CO2 and pollutant emissions and is also a complete operational and technical blunder for air traffic control, with greater security risks. The latter is confirmed by the near collision on February 23\textsuperscript{th} 2018 between two aircraft that followed the ‘Leuven Rechtdoor’ path. Due to the operational problems, the planned route is also frequently deviated from, so that densely populated municipalities such as Wilsele and Kessel-Lo are also confronted with noise nuisance (see green radar tracks on figure 1). We must conclude that the introduction and enforcement of this flight path is not supported by any objective criterion and is a purely political decision. In doing so, these politicians undermine the support of local residents for the economically important Brussels airport.

**Improvement proposals**

Too often wind criteria for landing and taking-off in certain directions are tinkered with to change the burden in specific regions. We believe such changes in wind criteria must be avoided. Wind criteria are a technical issue, not a tool for noise dispersion, so wind criteria have no place in any improvement proposal. Moreover, for the ‘Leuven Rechtdoor’ region, changing wind criteria only modifies the ratio...
landing / departing planes and does not bring back the resting periods the region enjoyed before the introduction of the 'Leuven Rechtdoor' path.

1/ We believe that all regions around the airport should contribute to bearing the burden of noise disturbance. A fair dispersion of noise disturbance is essential for a broader acceptance of the airport by neighboring communities. We are aware that the concrete elaboration of ‘fair’ is discussion material, but it is totally unacceptable that a region west of Leuven and close to the airport refuses to accept any noise disturbance and is declared a no-fly zone. Especially when this region has known a flight path since decades. Creating no-fly zones equals a “nimby” attitude that cannot be rewarded in a fair society.

2/ For the improvement of noise burden, we believe the communities affected must be given periodic relief. A concentration of the burden with – depending on the wind direction - planes either taking-off or landing above the same region must be avoided. All regions around the airport need some rest periods during which planes follow alternative paths allowing inhabitants to enjoy pauses from airplane noise.

3/ Great caution must be taken in changing or creating new flight paths. The region ‘Leuven Rechtdoor’ has never before been confronted with departing planes, no wonder the new flight path causes anger among its inhabitants. New paths should only be considered when sound objective criteria are available. However, as the independent study from Belgocontrol on ‘Leuven Rechtdoor’ shows, this is not at all the case. We believe more importance should be given to technical and operational evaluations in the choice of flight paths instead of merely political considerations as is the case with the ‘Leuven Rechtdoor’ flight path. This will increase the support in the neighboring communities to accept some of the burden from noise pollution.

4/ In addition, a judge has ruled on May 30th, 2018 that all remaining points of the “plan Wathelet”, including the 7th point, the Leuven Rechtdoor procedure, have to be abandoned. The Belgian government has not appealed this decision.

What matters is a fair distribution of the burden, in function of historical flight paths, population density, safety and operational complexity of flight procedures. ‘Leuven Rechtdoor’ does not qualify under any of these criteria. We therefore request that the ‘Leuven Rechtdoor’ flight path be abandoned. A return to the historical equilibrium in the Leuven region is necessary, whereby the area west of Leuven also assumes at least part of the noise burden, just as the ‘Leuven Rechtdoor’ region has been willing and continues to be willing to do so.

Relevant links

Full Statement
*Uitvoering luchthavenakkoorden in strijd met eigen principes*, 25-10-2013, persbericht Belgian Guild of Air Traffic Controllers en ACV Transcom.
*Memorandum: Terug naar een billijke spreiding*, 15-8-2014, vzw Leuven Rechtdoor
*Bijkomende geluidshinder onder Leuven Rechtdoor regio sinds 6 maart 2014*, 7-11-2014, vzw Leuven Rechtdoor
*Overvlogen bevolking door nieuwe route Leuven Rechtdoor versus historische route Leuven West*, 20-6-2016, www.leuvenrechtdoor.be
3.13 **Milieusteunpunt Huldenberg/Hart voor Huldenberg**

Noise issues as we see them and proposals for improvement (not really distinguishable)

A. **Centre of concentric Brussels noise limits is NOT centre of airport**

As the limitations that are imposed by Brussels are more or less at the core of the noise problems around EBBR (since impossible to fly without infraction), it seemed interesting to start there.

These noise limits are conceived as three concentric circles, each with their own limit. Since flights come and go in every direction, one would expect the centre point of these circles to be the geographical centre of the airport or the runways.

This is however not the case. The centre of these circles is at the utmost east of RWY 25R, rather than in the middle. When these circles are thus 'completed' it becomes clear that with a centre point completely off centre, all advantage goes to some of the richest Brussels communes, whereas the disadvantaged area is to the south-east of Brussels, more specifically towards Huldenberg. This can be no coincidence as these noise limits were introduced after the airport started using SiDs and after HUL was built – which was then put to illegal use (see further).
B. Growth of movements not evenly spread over area around airport

The number of movements evolved from 108.000 in 1984 (building of HUL) over 326.000 movements in 2000 to 237.888 in 2017. But this climb in movements was not evenly spread over all destinations.

The start of cheap flights by regular airlines, the arrival of several low cost airlines and the opening up of the former East Block countries means that nearly all growth in movements is directed to south and south-east. Therefore the worst effects of it were and are felt in the area of Huldenberg.

C. Lden, Lday, Lnight and relation to number of events (but no relation to annoyance)

Studies show that equivalent noise measures have a correlation of 0.3 at best with annoyance (health effect). If the correlation between taking a pill and being cured from any ailment would be 0.3, the sale of that drug would be forbidden! Not so in the airport business.

For example: an Lday of 53,4 dB(A) – close enough to what was measured in Huldenberg - 12-hour period - can be created by 3 flights with SEL 95, but also with 300 flights with SEL 75 and even with 948 (!) flights with a SEL of 70 (= night noise limit Brussels), a lot louder than the background noise in Huldenberg (around 40).

948 flights which are audible for even only a minute (not reality, especially outside) equals 15,8 hours of noise per 12 hours – read constant noise. Even at 300 flights with a SEL of 75 the amount of time with noise equals 300*2 minutes (reality outside) per flight or 600 minutes, which is 10 hours of noise in a 12-hour-period!

Therefore we are happy that the WHO is finally recognising that the number of events is a more suitable measurement to rate annoyance than any of the equivalent measures that have been used up till now.

D. Need for silent periods to recuperate

This follows logically from C.

E. WHO-guidelines

Noise measurements show values for Huldenberg far above the guidelines of the WHO, day and night. Therefore contours should be realised up to these guidelines, which means up to 45 Lden and up to 40 Lnight.

To incorporate the number of events, a serious determining factor in annoyance, maps should be drawn up for number of events without restriction to a certain LAmx-level. This could also in part compensate for the use of dB(A) rather than dB(C), where the last would be a lot more suitable for airplane noise as this contains a lot of low frequency waves.

F. Illegal use (abuse) of exit point HUL and super-concentration of routes from ALL runways

There should be special attention for the complete abuse (legally permission only for en-route) of exit point HUL, situated at less than 20 kilometres from the airport, which generates massive concentration. With current technology there is absolutely no need to fly over HUL and entirely different routes can be developed (and were developed in collaboration with Staatssecretaris Etienne Schouppe).

The number of take offs towards HUL or over Huldenberg without going over HUL (Lno and Spi) attains about 50% of all take offs, irrespective of RWY in use (according to PRS 25R or 19). In case of re-use of RWY...
Study of the impacts on the environment with regard to noise pollution (BRU)

07 as in Plan Anciaux, the Civ-route is added to that, which means that approximately 70% of all take offs are led over Huldenberg and/or toward HUL.

We refer to radar tracks, SIDs in use and listings in noise measurement reports.

To the north a similar number of take offs is spread out over five really differential routes (with a max of 9% of all take-offs), that even vary from week to weekend and that differ according to which runway is in use.

G. Use of RWY 19, 25L and 07

There can be no question of using RWY 25L with the SIDs as they are now. Not only would each aircraft make a lot more noise (turning at 700 feet rather than 1700 feet), the concentration on the Huldenberg area would be exactly the same but with even more noise per plane (and even higher Lden, Lday and Leve). The area would become completely inhitable. Simulations of noise effects up to WHO-guidelines should precede ANY change to 25L-use.

There can be no question of using RWY 19 any longer. It was Anciaux who introduced the weekend-take-offs on that RWY towards Huldenberg. Noise per plane more than 10dB(A) extra, which worsened the pre-existing situation in Huldenberg considerably. Above that and supported by noise measurements, even flights to the north are then measured in Huldenberg !

Return to use of RWY 07 for take-off as used by Anciaux is absolutely unacceptable. Again, super concentrated flights, very low altitude, really high noise levels.

H. General issues with reference to noise and health impact evaluation

Huldenberg is overflown every night at levels that generate a night value (Lnight) far above what is recommended by the recent WHO guidelines (cf. noise measurements).

In judging the health effects, the % A(nnoyed) should be calculated rather than just % HA. This is the recommendation of the European Position Paper (2002). To calculate % A contours up to 45 Lden and 40 Lnight (WHO) should be used.

Since dB(A) is hardly suitable to measure aeroplane noise because it filters out the very prominent base tones, it is definitely necessary to compensate for this lack of reflecting reality by using all other measures that can give a clearer image of the real noise situation. This includes presenting contours up to the latest WHO guidelines (Lnight and Lden) and mapping the number of events without limitation to flights which reach a certain LAmx.

It needs to be checked whether the computation programs for the noise exposure around EBBR take into account the different take-off procedure used at EBBR, which is not the standard NAPD 1 or NAPD2.

Relevant links

- Noise measurement report A0401
- Noise measurement report A0601
- Radar tracks
  - 2012 08 05 – RWY 20
Study of the impacts on the environment with regard to noise pollution (BRU)

2013 08 09 – RWY 20
2015 06 19 – RWYs 20, 25R and 07
2015 06 20 – RWYs 19 and 25R
2015 06 21 – RWYs 19 and 25R
2015 07 23 – RWY 19
2015 05 22 – RWY 25R
2015 07 24 – RWYs 19, 07R and 25R
2015 06 24 – RWY 19
2015 06 – Number of flights per route
2015 06 18 – RWY 19
2015 07 21 – RWY 19
2015 07 23 – RWY 19
2015 06 23 – RWY 19
2015 06 24 – RWY 19
2015 06 25 – RWY 19

Presentation for Minister Bellot
3.14 **Pas Question**

Pour Pas Question, la problématique de Brussels airport est double :

1. d’une part, les vols de nuit, installés à Bruxelles depuis la fin des années 1980, causent des nuisances graves aux populations survolées, et n’ont pas leur place dans un aéroport situé aussi proche des zones densément peuplées ;

2. d’autre part, sous la pression de lobbys politiques et économiques flamands, on a abouti à une situation où le choix des routes aériennes implique que l’on survole délibérément les zones les plus densément peuplées du pays - et notamment le centre de Bruxelles - alors que des alternatives existent. A titre d’exemple, la route du canal, qui traverse Bruxelles de part en part, est un scandale de santé publique, qui affecte plus de 400.000 personnes. La route du virage à gauche affecte plus de 280.000 personnes...

**Improvement proposals**

Pas Question a élaboré un plan durable qui repose sur 2 types de mesures :

1. Une suppression progressive des vols de nuit à Bruxelles, pour permettre à l’ensemble de la population survolée d’avoir une vraie nuit de sommeil de 8 heures.

2. La modification des routes aériennes et des changements d’infrastructure, pour diminuer par plus de 8 le nombre de personnes survolées à Bruxelles Airport, et mettre réellement en place une approche équilibrée dans la gestion des nuisances aériennes (avec entre autres une indemnisation des victimes résiduelles). Concrètement, à moyen terme, nous demandons principalement la suppression de la route du canal, l’utilisation accrue de la piste 19 au décollage, la modification du tracé de la route du ring. Notons aussi que nous sommes opposés à l’utilisation accrue des pistes 07 à l’atterrissage, qui survolent plus de 300.000 personnes en plein centre de Bruxelles. A plus long terme, le recul de la piste 25L de 1800 mètres, doit permettre de diminuer radicalement le nombre de personnes survolées par les décollages.

**Relevant links**

[Pass Question - Plan Durable - 13-10-2015](#)
3.15 **Piste 01 ça suffit**

Piste 01 ça suffit ASBL est la principale association de riverains du Brabant Wallon

L'Aéroport n'est plus adapté à sa configuration ancienne et inchangée depuis 1958 au centre de zones urbaines, aucune piste n'a été modifiée ou prolongée, et certaines pistes ne sont toujours pas équipées ni en ILS ni en PBN-GNSS.

Nous estimons que toutes les pistes doivent être équipées à l'identique et comparables, étant entendu que les pistes 25 les plus longues et rassurantes doivent rester la règle, les autres pistes l'exception (NORD=01/EST=07/SUD=19).

Nous demandons que les définitions suivantes respectent les règlements ICAO :
- vitesse moyenne du vent
- vitesse maximale du vent
- rafales de vent (intensité de 5 nœuds de 3s au cours des 2 dernières minutes)

Pendant 30 ans la norme de vent fut à Bruxelles de 8 nœuds sans rafales (comme à Charleroi actuellement), pourquoi tout à coup tenir compte des rafales de vent ?

Nous vous faisons remarquer que la définition exacte ICAO d'une piste destinée à l'atténuation du bruit correspond uniquement aux autres pistes mais certainement pas à la piste 25R/L, donc la norme de vent sur la piste 25R/L peut être largement supérieure aux recommandations ICAO, puisque ce sont les autres pistes qui servent à l'atténuation du bruit et pas les pistes 25.

Nous estimons que les normes de vent doivent être clarifiées, car actuellement on comptabilise des rafales d’1 nœud, sur base de prévisions et anticipations météo, avec un changement de piste en anticipation entre 3 et 6 heures avant l'éventuelle montée en intensité du vent.

Le changement de piste doit s'opérer avec maximum 30 minutes d'avance sur base des données réelles des anéomètres en temps réel, sans anticipation et sans se baser sur des prévisions météo.

Aucune décision politique n'évoque de comptabiliser le vent en altitude, pourtant à Bruxelles ce critère du vent en altitude intervient dans le processus de sélection des pistes.

Nous confirmons que les seuls jugements qui n'ont pas été réformés ni en Appel ni en Cassation sont deux jugements relatifs à la piste 01, soit celui interdisant toute utilisation illicite de la piste 01 sans vent et celui qui condamne l'Etat belge pour faute d'avoir mis la piste 01 en service dans le cadre d'un plan avec calendrier.

Pour le reste, nous soutenons la fin des vols de nuit avec une période sans trafic entre 22.00 et 07.00 du matin, la limitation du trafic aérien de jour à maximum 225.000 mouvements, la diminution des niveaux de bruit tolérés pour les avions (Q.C.), le retrait des avions de type Boeing 747-400, la création d'une autorité type ACNUSA qui soit vraiment autonome et indépendante, et l'utilisation maximale des pistes 25R/L puisqu'en atterrissage les pistes 25R/L sont les seules à survoler des champs et des prairies, soit des zones sans habitation.
Enfin, nous signalons que la piste 01 à l'atterrissage n'est pas une solution idéale :

- l'interception se fait à 2000 pieds (les autres pistes à 3000)
- les atterrissages 01 croisent et coupent au sol les décollages 07R/L
- la piste 01 est la plus courte, en pente, et la moins bien équipée ILS CAT I
- la piste 01 en approche finale survole des quartiers anciens, densément peuplés et aux habitations construites bien avant l'aéroport
- la piste 01 ne doit pas être utilisée avec du vent latéral d'Est, ce qui impose une remise des gaz des avions en alignement avant le touchdown de piste
3.16 **UBCNA – BUTV**

**Statut de Bruxelles-National**

Aéroport urbain réservé au seul trafic aérien passager de vols réguliers et de vols d’affaires, ouvert uniquement de jour entre 07 heures 00 du matin et 22 heures 00 du soir exclusivement, avec un maximum de 225.000 mouvements d’avions par année

**Utilisation des pistes**

Les meilleures pistes parallèles 25R/L doivent être utilisées le plus régulièrement possible car à l’atterrissage elles ne survolent que des zones non construites comme des champs et des terres de culture, et au décollage elles permettent une répartition équitable des survols en fonction des destinations suivies par les avions. De plus la piste 25R est la meilleure piste au niveau des équipements d’approche et de sécurité (la plus longue, la mieux équipée, le meilleur I.L.S. et la seule à posséder des zones de sécurité à ses extrémités, et des sorties de piste à grande vitesse). Si les pistes 25R/L sont la règle, l’utilisation des autres pistes 01, 07R, 07L et 19 doivent être strictement limitées aux conditions de vent et donc exceptionnelles

**Utilisation des procédures**

Les meilleurs axes de survol doivent être privilégiés, à savoir le survol des routes, autoroutes, lignes de chemins de fer ; mais aussi des zones industrielles ou d’équipement, des zonings industriels ou quartiers d’affaires peu habités ; la répartition des couloirs doit se faire en fonction des balises de navigation suivies par les avions en fonction de leur destination finale

**Au niveau des routes aériennes :**

- **Correction rapide de la route IKEA décollage 19 : virage gauche sortie de piste à 700 pieds, 080° gauche pour aller intercepter Radiale 334° HUL 154 inbound HUL (ce qui permet d’éviter toute zone urbanisée )**
- **Virage 25R vers la gauche, les avions de plus de 136 tonnes doivent être retirés de cette route de décollage**
- **Tous les gros porteurs de plus de 136 tonnes passent sur Delta en décollages 25R**
- **Weekend, la CIV Charlie par le Ring est maintenue en service de jour**

**Equipement des pistes**

Toutes les pistes doivent être équipées en aide à la navigation de façon identique, soit la technologie PBN-GNSS permettant des approches RNP, toutes les approches pour toutes les pistes tant en PBN qu’en I.L.S. doivent se faire à 3.000 pieds pour toutes les pistes

**Normes de vent**

Aucune norme internationale stable ni imposable n’ayant été déterminée, il convient de définir une norme de vent de 8 nœuds sans comptabilisation ni des rafales ni du vent en altitude uniquement sur les pistes préférentielles 25R/L afin de permettre une utilisation maximale de ces meilleures pistes. En cas de dépassement de ces valeurs, il convient alors d’orienter le trafic uniquement sur la piste la mieux orientée dans le sens du vent soit 01 par vent du Nord, 07 par vent d’Est et 19 par vent de Sud
L'utilisation préférentielle des pistes 25R/L se fait des motifs de capacité opérationnelle de l’aéroport, ces pistes ne sont pas utilisées dans le but de l’atténuation du bruit, de ce fait les recommandations ICAO de normes de vent maximales s’appliquent pour les pistes 01, 07 et 19 (maximum 3 nœuds selon les études de sécurité) et certainement pas pour les pistes 25R/L

**Quota individuel de bruit des avions**

QC 4,0 la nuit de 22 à 07 heures
QC 8,0 entre 07/08 heures et 20/22 heures
QC 24,0 la journée entre 08 et 20 heures 00

**Volume de trafic de jour**

Le trafic annuel à Bruxelles-National doit être limitée à un plafond obligatoire de maximum 225.000 mouvements par an

**Heures d’ouverture**

L’aéroport de Bruxelles-National doit devenir un aéroport régional-urbain ouvert exclusivement en journée entre 07h00 et 22h00 ; et totalement fermé à tout trafic pendant la nuit

**Type de trafic**

Seul le trafic d’avions passagers de lignes régulières et d’aviation générale doit encore être admis de jour à Bruxelles-National.

Les autres types de trafic (charters, low cost, cargo, fret et intégrateurs de messagerie express) doivent être transférés vu leur spécificité défavorable en en terme d’importante nuisance environnementale vers des aéroports qui ont eu le courage de prendre des initiatives durables en matière d’isolation ou d’expropriation de leurs couloirs finaux d’approche

**Contrôle et sanction**

Le respect de toutes les procédures aéronautiques, et le strict contrôle de tous les acteurs aéroportuaires doit se faire en toute autonomie et indépendance fonctionnelle par un organe de contrôle totalement neutre et indépendant qui puisse poursuivre et sanctionner toutes les infractions constatées sans aucune intervention des divers Gouvernements (voir liste détaillée supra)

**Information**

La transparence totale de toutes les informations doit être garantie et mise à disposition publiquement, afin que les partenaires et riverains concernés (administrations régionales, administrations communales, associations de riverains et environnementales et citoyens) puissent à tout moment disposer des bonnes informations sur les conditions météorologiques relatives à l’utilisation des pistes et l’évolution des aéronefs dans l’atmosphère

**Sonomètres**

Le contrôle de la charge environnementale endurée par les communes et les riverains doit pouvoir être objectivée par l’extension du réseau régional des sonomètres
Jugements

Toutes les décisions de justice qui ont été validées par les Cours d'Appel et/ou de Cassation doivent être strictement respectées, comme l'Arrêt interdisant toute utilisation illicite et abusive de la piste d'atterrissage 01 ou l'Arrêt interdisant toute utilisation hors vent de la piste d'atterrissage 01 en reconnaissant la faute de l'Etat belge dans sa gestion du dossier.

Relevant links

Revendications UBCNA 2019 - ENVISA - Mars 2019
3.17 **Wake-Up Kraainem**

WAKE UP KRAAINEM est une association sans but lucratif qui défend les habitants de Kraainem spécifiquement contre les nuisances aériennes qu'ils subissent.

Kraainem est une commune qui fait partie de la périphérie Est de Bruxelles à la frontière entre Bruxelles et la Flandre. Elle subit une concentration de décollages par les pistes 25 et 19 et d'atterrissages par la piste 01, résultat de volontés politiques manifestes.

**Atterrissages :**

L'Etat a été sévèrement condamné par les Cours et Tribunaux, et ce à plusieurs reprises, en raison d'une utilisation abusive de la piste 01 à l'atterrissage et a reçu l'ordre :

- de cesser de l'utiliser abusivement pour raison d'atteinte grave à la santé des riverains. (14 décembre 2004, 17 mars 2005, 14 septembre 2006)
- de dédommager les riverains (14 avril 2011) et
- de cesser les infractions aux normes de bruit, la nuit (juillet 2017).

Il faut savoir que la piste 01 reçoit tous les atterrissages de l'aéroport à basse altitude, jour et nuit.

Suite à l'arrêt de la Cour d'appel du 17 mars 2005, le Conseil des Ministres a obligé BELGOCONTROL à rétablir le caractère secondaire de l'utilisation de cette piste 01 et maintenir, pour les atterrissages, l'utilisation des deux pistes prioritaires 25 (dont les couloirs d'approche survolent quant à eux des zones non aedificandi) aussi longtemps que la composante de vent arrière sur ces pistes ne dépasse pas 7 nœuds

Or cette composante de vent arrière n'est toujours pas appliquée correctement rendant ainsi l'utilisation de la piste 01 toujours abusive jour et nuit.

- **Wake Up Kraainem réclame donc une correcte application de cette composante de vent arrière de 7 nœuds.**

En juillet 2017 le Tribunal de première instance de Bruxelles demande la cessation des violations des normes de bruit pour les atterrissages en piste 01 entre 23h et 7h du matin. Or nous constatons que ces infractions continuent.

- **Wake Up Kraainem demande la cessation de ces infractions qui empêchent les habitants de dormir, droit le plus élémentaire** (ex : la nuit du 13 avril 2019, 33 avions ont atteint entre 75 et 80 db, et 4 avions entre 80 et 85 db !– voir en annexe 1 et 2 les mesures sonométriques du sonomètre Bali où les pics de bruit sont clairement établis en cas d'utilisation de la piste 01)

**Décollages**

En juillet 2015, la Région bruxelloise a obtenu de la justice que **tous les décollages par la piste 25 droite virage gauche court soient** remis sur l'Est de Bruxelles que le Ministre Wathelet avait voulu décharger en exécutant les décisions de justice obtenues ordonnant de soulager ces riverains.
• Wake Up Kraainem demande donc une meilleure répartition des décollages pour soulager sa zone qui est déjà matraquée.

• Wake Up Kraainem refuse toute solution de nouveaux décollages sur sa zone qui aurait pour but d'éviter au décollage la Région bruxelloise, en faisant virer les avions plus tôt à basse altitude sur Kraainem.

• Wake Up Kraainem demande de relever les altitudes d'accélération des décollages sur sa zone (NAPD – jusqu'à 6000 pieds au lieu de 3200 pieds)

• Elle refuse catégoriquement le projet de rallongement de la piste 25L qui ne fera qu'augmenter les décollages sur sa zone et demande instamment de procéder à une étude des particules ultrafines sur sa zone de survol.

Wake Up Kraainem est d'accord que Kraainem prenne sa part de nuisances mais que les autres zones qui l'entourent prennent la leur. Elle ne peut pas accepter le matraquage d'atterrissages et décollages qu'elle subit, c'est une question de santé publique reconnue par les Cours et Tribunaux !

La concentration des vols sur une zone densément peuplée, comme l'est Kraainem qui est l'une des plus densément peuplée du Brabant flamand doit cesser.

• Wake Up Kraainem demande que l'utilisation des pistes soit faite en fonction des exigences de sécurité qui requièrent sur toutes les pistes l'équipement d'une procédure RNP (Required Navigation Performance) sur injonction de l'OACI, et que l'on vole en fonction de la meilleure orientation au vent (compte tenu de la tolérance des avions quant au vent arrière) et non en fonction de volontés politiques.

Relevant links

Annex 1
Annex 2
WerkGroepLeuven (WGL)


WGL was established in 2005 and has been assisting the community associations of Leuven, Kortenberg, Herent, Bertem and Oud-Heverlee, as well as the municipal government (college van burgemeester en schepenen, college communal) of Leuven, Kortenberg, Herent, Bertem and Oud-Heverlee, during the development and implementation of the Leuven 07-Rechtdoor.

WGL has also been acting as an adviser to these and other communities, municipal governments and entities.

Statement on Issues

1. The advocating of populistic solutions based on dispersion of the air traffic when noise impact is still above the WHO noise limits, since it does increase the number of diseases and victims, as is well known (to experts).

2. The apparent unwillingness of the Government to have Brussels Airport pay for the damages due to adverse noise effects.

3. The Government’s inability to learn from the three most fatal government decisions in the past:
   a. the construction in 1956-1959 of a second runway, headed straight to the center of Brussels (25L/07R), followed by the massive development of housing in the ‘19-Corridor’ in the axe of runway 19 back in the fifties and the sixties;
   b. the permission of starting night hub operations in 1988 by DHL in the densely-populated region;
   c. the suppression of the decennia-old wind criteria on runways 25R/L in 2000-2005;

4. The unilateral decision by the Brussels Capital Region to introducing and enforcing noise limits. Single noise events by aircraft are limited at night 23-07h by $L_{\text{max}}$ 57, converted from $L_{\text{eqv}}$ 70, as opposed to WHO guideline $L_{\text{max}}$ 60, and during the day 07-23h by $L_{\text{max}}$ 69, converted from $L_{\text{eqv}}$ 80, where the WHO does not impose a limit at all. The average-noise limits are $L_{\text{night}}$ 45 and $L_{\text{day-evening}}$ Combined 55, are not as severe as the $L_{\text{night}}$ 40 and $L_{\text{den}}$ 45 currently imposed by the WHO.

5. The lack of high-quality scientific noise studies: for instance, the refusal by the Government of using the noise limits and the exposure response function (ERF) recommended by the European Environment Agency for producing noise maps and for estimating the number of highly annoyed persons. While the Netherlands has been using $L_{\text{den}}$ 48 and an updated ERF for more than a decade,
Flanders is still reporting on an L_{den} 55 basis using an obsolete ERF. See more infra.

6. **The lack of high-quality studies on wind criteria and safety:** There is, for instance, no impact analysis made of potential casualties on the ground among inhabitants while changing the decennia-old wind criteria in 2003.

7. **The lack of high-quality studies on the economic return of Brussels Airport:** There is, for instance, no decent analysis of the economic plus-value of having waking up tens of thousands of inhabitants in the early morning by charters carrying passengers who fly for only “30 euro” to the Mediterranean. See more infra.

8. **The lack of land use planning, except in some communities east of the Airport,** such as Kortenberg, Herent and Leuven. These communities, unlike many others e.g. in the Noordrand, followed conscientiously the guidelines of Flanders’ land use plan, ‘Ruimtelijk Structuurplan Vlaanderen’, and did not develop housing in the so called 07-Corridor, the 20-25 km long land corridor in the axe of runways 07R/L, that has been used quasi permanently for aircraft arrivals since the start of commercial air traffic more than 50 years ago.

**Improvement proposals**

The proposal of WerkGroepLeuven (WGL) consists of 4 parts:

1. **Noise compensation program,** to be funded by retributions from Brussels Airport Company, aircraft operators and passengers. Inhabitants/Owners will receive full compensation for the insulation, hygienic ventilation and cooling of their houses (note: cooling is necessary since the windows must be closed for noise insulation, while the climate is warming-up). The compensation is however limited by the relative depreciation value of the house due to the aviation noise impact deterioration since the time of domiciliation by the current inhabitant, supplemented by the moving costs. Typically, the depreciation due to an L_{den} 50 level by air traffic is 15%.

2. **Application of the WHO 2018 guidelines for noise limits and exposure response function:** After achieving worldwide top scientific consensus in 2018, the WHO published its new guidelines and strongly recommends L_{den} 45 and L_{night} 40 limits as aircraft noise above this level is associated with adverse health effects.

WGL estimates that the total number of persons living around Brussels Airport and within the L_{den} 45 contour is more than one million, of which 190 thousand highly annoyed persons (details in annex). ENVISA reported in its ‘Chapter One Report v1.0’ 9 times less (persons within L_{den} 55 contour) and the UGent reported 14 times less (HA persons). Not using the WHO guidelines is deceiving and misleading the public, in breach of the Court’s Judgement and is preventing any long-term solution to the noise problems at Brussels Airport;
3. **Application of the WHO 2018 implementation principle** (citation, p.105): «The first [implementation] principle is to **reduce exposure to noise**, while conserving quiet areas…. **noise exposure reduction in one area should not come at the expense of an increase in noise elsewhere; existing large quiet outdoor areas should be pre-served**». Obviously, the correct reference date should be used, i.e. before the structural modification of the decennia-old wind criteria, which occurred in 2000-2003 on request by Brussels and the Noordrand (infra). Moreover, the relevant factor is the noise impact, not the specific route nor the type (arriving, departing…).

4. **Reduction by 20% of the total number of highly annoyed persons**: WGL estimates that such a 20% reduction can be achieved by two measures. Firstly, the current limit on flights during the ‘operational’ night 23-06h i.e. 16000 movements of which 5000 departures – should be imposed on the ‘European’ 8 hour night 23-07h, thereby prohibiting mainly the tourist charters that takeoff between 6 and 7h. Secondly, the current noise quota count (QC) limits, imposed on each aircraft, for both day and for night operations, should be strengthened gradually over time so as to ban the 10% noisiest aircraft.

Such a reduction is by far more than any ‘spredingsplan’ that was realized in the last 20 years, ceteris paribus. Charter and low-cost flights in the 6-7h period increase the noise impact considerably without significant contribution to the economy, certainly when compared to the damage and loss of productivity in this densely-populated area. The job employment multiplier for these operations is significantly (5x) lower than the typical scheduled flights and business traffic operations by Brussels Airlines at Brussels Airport.

**Relevant links**

- [WGL notes2 to ENVI/SA on issues proposals corrections](https://example.com) (2019-05-01)
- Eurocontrol 2003-10-01 Document7
- LNE nmt0218 geselecteerde periode (annotated WGL studie 1)
- RSV 1997 (uittreksels luchthaven Zaventem)
- WGL Brussels Airport & Leuven - Presentatie 2015D - Gewestplan
- WGL Brussels Airport & Leuven - Presentatie 2015D - Windnorm simulatie
- WGL Studie Geluidbelasting in de 07-Corridor te Tildonk

Klatte 2016: ‘Effects of Aircraft Noise on Reading and Quality of Life in Primary School Children in


On the basis of these NBB data, WGL calculated the ‘job multiplier’ as the number of direct and indirect jobs in FTE (full-time-equivalent) divided by the number of thousands WLU (Work Load Units = 1 passenger or 100 kg cargo), which is a quite useful indicator in the Aviation Industry. In 2015, this job multiplier was 1.24 for Brussels Airport compared to only 0.23 for Charleroi Airport. Thus five times less jobs are created by low-cost and charter operations at Charleroi, than by the operations that are conducted by Brussels Airlines at Brussels Airport with emphasis on scheduled flights and business traffic.
4 Airport and its Stakeholders

The purpose of this section of the report is to provide a place to capture the stated or published views of the Airport and its stakeholders. The authors (Envisa) do not pass comment on these views in this section.

Our report is based on an independent scientific assessment of present impacts together with review of present governance and management practice. The gathering of different perspectives of stakeholders is useful in identifying perceived standpoints, in highlighting issues around the quality of communications and public engagement and in highlighting the perceived problems that we have investigated. Envisa has already taken into account stakeholder perspectives that were gathered in many face-to-face meetings.

Providing stakeholder perspectives verbatim in the report is therefore only being done for transparency purposes and to avoid any misrepresentation to the extent possible. Stakeholder verbatim statements are not central to the formulation of Envisa’s advice in this Chapter 2 Report and are more important to be taken into account in the subsequent decision making processes to be progressed by Belgian Stakeholders (described in Section 7).

In addition to statements published in this section, meetings or interviews were also held with the following organisations and their points of view taken into account in this report. They declined however to provide a formal statement:

- Walloon Government
- Société Wallonne des Aéroports (SOWAER)
- Belgian Civil Aviation Authority (BCAA)
- Ryan Air
- Belgian Guild of Air Traffic Controllers (BGATC)
- Flemish Government
- Flemish Environment Department
- Federal Government (Mobility and Transport)
4.1 Brussels Airport Company (BAC)

[NL]

Brussels Airport Company vraagt aan alle betrokken beleidsniveaus een stabiel, coherent en rechtzeker wettelijk kader dat de duurzame ontwikkeling van Brussels Airport mogelijk maakt.

Als luchthavenoperator heeft Brussels Airport Company geen enkele bevoegdheid over vliegroutes of vliegprocedures. Rechtsonzekerheid en conflicterende regelgeving op gewestelijk en federaal vlak hebben de voorbije jaren niet alleen een rem gezet op de ontwikkeling van de luchthaven, maar ook het draagvlak in de omgeving sterk aangetast. Zo jaagt de verstrenging van de Brusselse geluidsnormen luchtvaartmaatschappijen naar het buitenland zonder een duurzame en werkbare oplossingen te brengen: zelfs de dagvluchten met de modernste, meest milieu-efficiënte passagierstoestellen worden er door getroffen. De gebruikers van de luchthaven, de luchtvaartmaatschappijen, de omwonenden en de luchthaven zelf hebben belang bij een stabiel, coherente en rechtzeker wettelijk kader.

Deze rechtzekerheid is de basis voor alle betrokken overheden om te komen tot een gedegen beleid dat de belangen van de omwonenden en de duurzame ontwikkeling van de luchthaven met elkaar verzoent. In haar Strategische Visie 2040 (www.brusselsairport2040.be) heeft Brussels Airport aangegeven hoe zij tot een duurzame verdere ontwikkeling kan komen, inclusief een nieuwe halvering van de geluidslast.

Onze vragen om tot een duurzame ontwikkeling van de luchthaven te komen zijn ondermeer:

- Een stabiel en coherente wettelijk kader voor de vliegroutes, de geluidsreglementering en de exploitatie- en ontwikkelingsmogelijkheden van Brussels Airport
- Rechtzekerheid over de vliegroutes om een veilige en duurzame werking van de luchthaven te garanderen
- De aanpassing van de vliegprocedures met veiligheid, capaciteit en milieu-efficiëntie als leidende criteria, inclusief een beperkt redesign van het Belgisch luchtruim, waarbij bepaalde delen van het militair luchtruim kunnen worden gebruikt voor burgerluchtvaart, wat leidt tot positieve gevolgen op vlak van geluid, CO₂-efficiëntie en andere milieu-efficiëntie.
- De implementatie van moderne technologie voor luchtverkeernavigatie (zoals precisienavigatie (PBN), Instrumental Landing System (ILS), ...) op alle start- en landingsbanen zodat er, binnen het gegeven van veiligheid en capaciteit, op de meest milieuvriendelijke wijze kan worden gevolgen.
- Een coherente geluidsreglementering gebaseerd op het principe van emissie en niet geluidsimmissie om objectiviteit en rechtzekerheid te garanderen
- Institutionele coherente door het aannemen van het principe dat vliegbewegingen die worden uitgevoerd conform aan de federale regelgeving, niet kunnen worden gesanctioneerd op basis van andere regels
- Het kunnen inzetten van voldoende luchthaveninfrastructuur en baancapaciteit, gelijk in alle weersomstandigheden, om te kunnen beantwoorden aan de toenemende vraag in de piekuren
Brussels Airport Company demande à tous les niveaux de pouvoir concernés un cadre légal stable, cohérent et juridiquement sûr qui rend possible le développement durable de Brussels Airport.

En tant qu'opérateur de l'aéroport, Brussels Airport Company n'a aucune compétence en matière des routes ou procédures aériennes. Cependant, l'insécurité juridique et les réglementations concurrentes aux niveaux régional et fédéral ont, ces dernières années, freiné non seulement le développement de l'aéroport, mais ont aussi gravement porté atteinte au soutien dont l'aéroport bénéficiait dans la région environnante.

Le durcissement des normes de bruit Bruxelloises chasse les compagnies aériennes vers l'étranger, sans apporter de solutions durables et praticables : même les avions passagers les plus modernes et les plus efficaces au niveau environnemental pour les vols en journée sont touchés. Les utilisateurs de l'aéroport, tout comme les compagnies aériennes, les riverains et l'aéroport lui-même ont intérêt à la création d'un cadre légal stable, cohérent et juridiquement sûr.

Cette sécurité juridique constitue pour toutes les autorités concernées la base pour arriver à une politique de bonne gouvernance qui concilie les intérêts des riverains et le développement durable de l'aéroport. Brussels Airport a indiqué dans sa Vision Stratégique 2040 (www.brusselsairport2040.be) comment elle peut poursuivre son développement de façon durable, ce qui comprend notamment une nouvelle réduction de moitié de la charge sonore.

Nos principales demandes aux autorités pour arriver à un développement durable de l'aéroport sont les suivantes :

- Un cadre légal stable et cohérent pour les routes aériennes, la réglementation en matière de bruit, les conditions d'exploitation et les possibilités de développement de Brussels Airport
- Des routes aériennes sûres, offrant suffisamment de sécurité juridique pour garantir une exploitation sûre et durable de l'aéroport
- L'adaptation des procédures de vol, avec comme principaux critères de choix : la sécurité, la capacité et l'efficacité environnementale. Un redesign limité de l'espace aérien belge, dans le cadre duquel certaines parties de l'espace aérien militaire pourraient être utilisées par l'aviation civile, en fait partie. Cette mesure aurait un impact positif du point de vue des performances en matière d'émissions sonores et de CO2, ainsi que sur d'autres facteurs environnementaux
- L'installation sur toutes les pistes d'atterrissage et de décollage, de technologies modernes de navigation aérienne (comme la navigation de précision « PBN », le système d'atterrissage aux instruments « ILS », ...) pour que, tout en respectant les principes de sécurité et de capacité, l'on vole de la façon la plus respectueuse possible de l'environnement
- Une réglementation cohérente en matière de bruit, fondée sur le principe des émissions plutôt que des immissions, afin de garantir l'objectivité et la sécurité juridique
- Une cohérence institutionnelle garantie par l'adoption du principe selon lequel les mouvements aériens effectués conformément à la réglementation fédérale ne peuvent pas être sanctionnés sur la base d'autres règles
- La possibilité d'utiliser l'infrastructure aéroportuaire et une capacité de piste suffisante et stable dans toutes les conditions météorologiques, afin de pouvoir répondre à la demande croissante aux heures de pointe.
4.2 *skeyes (Belgocontrol)*

[EN]

skeyes' mission is to ensure the safety of air navigation. The company does not have any regulatory or decision-making power regarding the fight against environmental pollution caused by aircraft. The regulatory power of the public company with regard to air traffic noise hindrance management is limited to providing expertise on flight procedures to the public authorities and information on traffic flows to local residents.

Thanks to operational and technological advances, new concepts and techniques can be put to use for air navigation. Those developments improve the safety of air navigation, increase airport capacity so as to meet the rise in traffic, but also mitigate the environmental impact for people living in the proximity of airports.

The main obstacle thwarting the implementation of those developments at Brussels Airport is the absence of a solid legal framework. The past couple of years, flight procedures have been modified several times based on political or legal decisions without any clear criteria for evaluating the impact or consulting the public. Those successive modifications are harmful for both local residents and the air industry due to the lingering uncertainty and operational instability that ensues. On the other hand, because there is no legal framework, any implementation of a sustainable noise hindrance management policy for air traffic is doomed to fail.

That is why skeyes asks the public authorities to determine a coherent policy and a solid legal framework so that the operational actors can develop the Belgian airspace so as to better address the economic, social and environmental challenges, while at the same time keeping the safety of air traffic at the top of its list of priorities.

That legal framework should also define appropriate governance structures, making a clear distinction between the regulatory missions and the operational actors' tasks.

[FR]

La mission de skeyes est d'assurer la sécurité de la navigation aérienne. skeyes ne possède aucun pouvoir réglementaire ou décisionnel en matière de lutte contre les nuisances environnementales causées par les avions. Les compétences réglementaires de l'entreprise publique en matière de gestion des nuisances sonores du trafic aérien se limitent à un rôle d'expertise en matière de procédures de vol pour les autorités publiques et d'information des riverains sur les flux de trafic.

Grâce aux progrès opérationnels et technologiques, de nouveaux concepts et techniques peuvent être mis en œuvre pour la navigation aérienne. Ces avancées permettent d'améliorer la sécurité de la navigation aérienne, d'accroître la capacité des aéroports pour répondre à l'accroissement de trafic mais également d'atténuer l'impact environnemental pour les riverains des aéroports.

Le principal obstacle à la mise en œuvre de ces évolutions à l'aéroport de Bruxelles-National réside dans l'absence de cadre juridique robuste. Ces dernières années, les procédures de vol ont été modifiées à plusieurs reprises sur la base de décisions politiques ou judiciaires sans critères clairs pour l'évaluation des impacts ou pour la consultation du public. Ces modifications successives sont dommageables tant pour les riverains que pour le secteur aérien en raison de l'incertitude et de l'instabilité opérationnelle.
qu'elles entraînent. D'autre part, l'absence de cadre juridique rend toute mise en œuvre de politique de gestion durable des nuisances sonores du trafic aérien vouée à l'échec.

Pour ces raisons, skeyes demande aux autorités publiques de définir une politique cohérente et un cadre juridique stable pour permettre aux acteurs opérationnels de faire évoluer l'espace aérien belge afin de mieux répondre aux enjeux économiques, sociaux et environnementaux, tout en gardant la sécurité du trafic aérien comme première priorité absolue.

Ce cadre juridique devrait également définir des structures de gouvernance appropriées, avec une claire distinction entre les missions réglementaires et les missions relevant des acteurs opérationnels.

[NL]

skeyes heeft als opdracht om de veiligheid van de luchtvaartnavigatie te verzekeren. Het bedrijf heeft geen enkele regelgevende of besluitvormingsbevoegdheid inzake de strijd tegen de door vliegtuigen veroorzaakte milieuhinder. De regelgevende bevoegdheden van het overheidsbedrijf inzake het beheer van geluidshinder afkomstig van het luchtverkeer beperken zich tot het ter beschikking stellen van expertise inzake vliegprocedures voor de overheidsinstanties en het informeren van de omwonenden over de verkeersstromen.

Dankzij de operationele en technologische vooruitgang kunnen nieuwe concepten en technieken worden aangewend voor de luchtvaartnavigatie. Daardoor kan de veiligheid van het luchtverkeer worden verbeterd, de capaciteit van de luchthavens worden verhoogd om tegemoet te komen aan de groei van het verkeer, maar ook de milieueffecten voor de omwonenden van de luchthavens worden vermindert.

Het voornaamste struikelblok voor de implementatie van die evoluties op de luchthaven van Brussel-Nationaal vormt het gebrek aan een gedegen rechtskader. De laatste jaren werd er al herhaaldelijk gesleuteld aan de vliegprocedures op basis van politieke of rechterlijke beslissingen zonder duidelijke criteria voor de beoordeling van de impact ervan, noch voor de raadpleging van het publiek. Die opeenvolgende wijzigingen zijn schadelijk voor zowel de omwonenden als voor de luchtvaartsector omwille van de onzekerheid en de operationele instabiliteit die ze met zich meebrengen. Anderzijds is elke implementatie van een duurzaam beleid voor het beheer van de geluidshinder van het luchtverkeer tot mislukken gedoemd doordat er geen rechtskader voorhanden is.

Om die redenen vraagt skeyes aan de overheidsinstanties om een coherent beleid en een stabiel rechtskader te bepalen opdat de operationele actoren het Belgische luchtruim kunnen doen evolueren om de economische, sociale en ecologische uitdagingen beter aan te gaan, waarbij de veiligheid van het luchtverkeer als absolute topprioriteit zal gelden.

Dat rechtskader zal ook geschikte governancestructuren vastleggen, met een duidelijk onderscheid tussen de voorgeschreven opdrachten en de opdrachten die onder de verantwoordelijkheid van de operationele actoren vallen.
4.3 airportmediation

The following text is from a Press Release published 25th April 2019.


En 17 années de fonctionnement, le Service de Médiation reste le plus important Service de Médiation de Belgique en volume de dossiers traités mais malheureusement le plus petit en terme de personnel. Ce service a ainsi géré un total cumulé de 14.455.684 plaintes en 17 années.

Pour l’année 2018, la Médiation Aérienne du Gouvernement a traité 94.374 dossiers émanant de 1.552 requérants (soit une diminution de – 28 % du volume des plaintes par rapport à 2017 – en 2017 on recensait un total 131.260 plaintes par 1.5xx personnes); toutes ces requêtes ont reçu une réponse explicative de la situation des survols de et vers l’Aéroport de Bruxelles-National.

Tout au long de son Rapport Annuel 2018 de 175 pages, le Service de Médiation détaille l'histoire des procédures aériennes à Bruxelles, les cartes et statistiques d'utilisation des différentes pistes, les diverses décisions politiques et dresse une cartographie de la densité de population des communes survolées et des procédures aériennes de survol.

Comme il est difficile de faire de la Médiation sur un dossier émotionnel, sensible, où la sécurité du trafic aérien est prioritaire d'autant que toute décision à prendre est avant tout politique, le Médiateur Aérien du Gouvernement et ses adjoints, ont adressé au Ministre de Référence une analyse détaillée du contenu des plaintes et suggestions émises par les riverains de l’Aéroport de Bruxelles-National, avec un inventaire des propositions et un examen des principales zones d’origine des plaintes et des griefs émis en termes de procédures aériennes qui font l'objet des principales nuisances.

Le Médiateur Aérien avance 5 propositions concrètes pour un aéroport durable respectant l'équilibre entre environnement et économie, étant bien entendu qu’il n’existe aucune solution miracle dans la question des survols autour de l’Aéroport de Bruxelles-National :

1. Diminuer le niveau de bruit admis des avions jour et nuit
2. Prendre des mesures concrètes pour limiter les évolutions d'avions gros porteurs entre 20H00 et 08H00
3. Réacter le Fonds financier FANVA d'isolation et d'expropriation géré par B.A.C.
4. Poursuivre la construction complète du mur anti-bruit et d'un hall d'essai pour les réacteurs (promis depuis 1984)
5. Respecter toutes les décisions de justice non sujettes à Appel ainsi que toutes les Lois et Règlements (cas du Boeing 777 utilisé illégalement et en infraction de nuit)

Le Médiateur Aérien relaie – en les citant - les 5 revendications prioritaires contenues dans les plaintes et émises par les requérants qui se sont adressés en 2018 au Service de Médiation.

ATTENTION ces 5 réflexions n'émanent PAS du Médiateur Aérien mais des riverains :

 ATTENTION ces 5 réflexions n'émanent PAS du Médiateur Aérien mais des riverains :
Study of the impacts on the environment with regard to noise pollution (BRU)

a) Appliquer une nuit environnementale européenne de 22H00 à 07H00 sans aucun vol d'avion pendant la nuit

b) Clarifier les normes de vent et stabiliser l'usage des pistes

c) Supprimer les Boeing 747 et mieux gérer le trafic et les procédures des avions gros porteurs (Boeing 767-777-787, Airbus A-330 et A-340)

d) Plafonner et contrôler le volume annuel de trafic de jour

e) Etablir un cadastre objectif du bruit et des communes survolées, quartier par quartier, avec les pointes de bruit, les niveaux de bruit, la fréquence des survols et le nombre de survols, jour et nuit (promis depuis 2003)

Relevant links

Rapport Annuel 2018 NL
Rapport Annuel 2018 FR

Press Release 250419 FR
Press Release 250419 NL
4.4 Governments and Administrations

4.4.1 Brussels-Capital Region (RBC) Government

[FR]

Le Gouvernement bruxellois se réfère à son accord de Gouvernement comme déclaration :

"Les Bruxellois souffrent des nuisances liées au survol de Bruxelles. Le Gouvernement ne peut rester indifférent à cette situation.

Il n’entend pas entrer dans une logique qui opposerait les Bruxellois entre eux. Il prône donc une solution durable et équilibrée.

Le Gouvernement est également conscient de la nécessité de traiter la problématique du survol dans un esprit de concertation et de partenariat avec les autres niveaux de pouvoir.

C’est pourquoi le Gouvernement exigera une réduction significative des nuisances dues au survol aérien du territoire bruxellois et entend faire respecter l’arrêté relatif à la lutte contre le bruit des avions, entré en vigueur le 1er janvier 2000. Dès la mise en place du Gouvernement, la perception effective des amendes à l’arrêté bruit sera exigée par toutes les voies juridiques possibles vis-à-vis des compagnies aériennes.

De plus, vu la politique de dispersion mise en œuvre au-dessus des zones densément peuplées, le réseau de sonomètres sera étendu pour couvrir l’ensemble des routes aériennes au-dessus du territoire régional.

Le Gouvernement entend par ailleurs que les éléments suivants guident le Gouvernement fédéral dans sa politique en la matière, avec les 2 priorités suivantes :

- la suppression des dernières routes mises en œuvre le 6 février

- la définition des nouvelles routes sur base des critères suivants :
  - l’évitement des zones les plus densément peuplées ainsi que la sécurité aérienne comme critères prioritaires dans la définition des nouvelles routes ;
  - la création d’une Autorité de contrôle, incluant des représentants régionaux, et la définition de procédures aéronautiques objectives et transparentes (avec notamment l’obligation d’une étude de sécurité, de capacité et d’impact environnemental) ;
  - la modification des horaires de l’aéroport pour étendre, sur Bruxelles, la nuit de 22h à 7h ainsi que l’instauration d’une limite du tonnage des avions autorisés à survoler le territoire bruxellois et la définition et mise en œuvre de « quota count » pour le respect des normes de bruit (maximum 200 tonnes entre 22h et 7h) ;
  - un accord sur la fin progressive des vols de nuit, dans un cadre européen.

Dans ce cadre, le Gouvernement bruxellois veut être un partenaire pour contribuer à trouver une solution globale et durable. Il s’engage à agir en concertation avec les associations de riverains. Par ailleurs, en termes de diminution du nombre de vols au-dessus de Bruxelles, le Gouvernement demandera à la Région flamande la fixation définitive des plafonds de trafic à maximum 15.000 vols de nuit par an (10.000 atterrissages et 5.000 décollages admis de nuit).
De plus, toujours dans la perspective de réduire les nuisances, le Gouvernement souhaite, autant que faire se peut, que soit modifiée l’infrastructure de Bruxelles-National (par exemple l’allongement de la piste) si une étude indépendante en confirme l’opportunité."

Improvement proposals

Outre les demandes qui figurent dans son accord de Gouvernement, le Gouvernement bruxellois demande également les éléments suivants :

- Le respect permanent de l’arrêté du Gouvernement de la Région de Bruxelles-Capitale du 27 mai 1999 relatif à la lutte contre le bruit généré par le trafic aérien
- Le respect, tant dans la forme que sur le fond, de TOUTES les décisions de justice initiées par la Région bruxelloise
- La mise en œuvre des propositions faites par le Gouvernement bruxellois le 16 février 2017 :
  - Suppression des vols sur la route du Canal
  - Suppression des vols sur le virage à gauche entre 06h00 et 07h00 du matin
  - Respect strict des normes de vent (principalement pour les atterrissages en 01)
  - Organisation de concertations pour arriver à une solution durable qui portera sur
    - L’allongement de la nuit
    - La définition des routes aériennes sur les zones les moins densément peuplées
    - La mise en place d’une autorité de contrôle indépendante
    - L’allongement de 1800 m de la piste 25L
    - La création d’un fond d’indemnisation
- La mise en œuvre des solutions à court terme proposées à travers la note de l’IGEAT déposées dans le cadre de la dernière action en cessation intentée par la Région Bruxelles Capitale et reprises en annexe.

[NL]

De Brusselse Regering verwijst bij wijze van verklaaring naar het Regeerakkoord:

De Brusselaars hebben te lijden onder de hinder die veroorzaakt wordt door het luchtverkeer boven Brussel. De Regering kan hier niet onverschillig voor blijven.

Zij heeft geen zin in een logica waarbij de Brusselaars tegen elkaar worden uitgespeeld. Daarom pleit zij voor een duurzame en evenwichtige oplossing.

De Regering is er zich tevens van bewust dat het nodig is de problematiek van het luchtverkeer aan te pakken in overleg en in samenwerking met de andere beleidsniveaus.

De Regering zal derhalve eisen om de hinder die te wijten is aan het luchtverkeer boven Brussel aanzienlijk te verminderen. Eveneens beoogt zij het besluit betreffende de strijd tegen de lawaaihinder veroorzaakt door vliegtuigen, dat in voege is getreden op 1 januari 2000, te doen naleven. De Regering zal van bij haar aantreden via alle mogelijke juridische wegen van de luchtvaartmaatschappijen de effectieve inning vorderen van de boetes waarin voorzien is door het lawaaibesluit.

Daarenboven zal in het licht van het spreidingsbeleid dat van toepassing is boven de dichtbevolkte gebieden, het aantal geluidsmeters worden uitgebreid, zodat deze alle vliegroutes boven het gewestelijk grondgebied bestrijken.
Verder wil de Brusselse Regering dat de federale Regering haar beleid ter zake stoelt op de volgende elementen, uitgaande van de volgende 2 prioriteiten:
- de afschaffing van de recentste route die op 6 februari zijn ingevoerd
- de bepaling van de nieuwe routes op basis van de volgende criteria:
  - het ontzien van de dichtst bevolkte gebieden en de veiligheid van het luchtverkeer moeten gelden als prioritaire criteria bij het uittekenen van de nieuwe routes;
  - een controlearoangaan oprichten, waarin ook het Gewest vertegenwoordigd is, en objectieve en transparante luchtvaartprocedures vastleggen (met onder meer een verplichte veiligheids-, capaciteits- en milieu-effectenstudie);
  - de wijziging van de uittatssuren van de luchthaven om de nachtperiode, boven Brussel, uit te breiden van 22u tot 7u, een begrenzing instellen van de tonnages van de vliegtuigen die toelating krijgen boven Brussel te vliegen en "quota counts " vastleggen en toepassen met het oog op de naleving in de geluidsnormen (maximum 200 ton tussen 22u en 7u);
  - een akkoord over de geleidelijke beëindiging van de nachtvluchten in een Europees kader.

In dit verband wil de Brusselse Regering zich opstellen als partner om mee te helpen zoeken naar een globale en duurzame oplossing. Zij verbindt er zich toe te handelen in overleg met de verenigingen van buurtbewoners. In het kader van een vermindering van het aantal vluchten boven Brussel zal de Regering daarenboven het Vlaams Gewest verzoeken het plafond voor het aantal nachtvluchten definitief vast te leggen op 15.000 per jaar (10.000 landingen en 5.000 opstijgbewegingen toegestaan tijdens de nacht).

De Regering wenst verder dat de infrastructuur van Brussel-Nationaal, eveneens met het oog op een beperking van de hinder, zoveel mogelijk zou worden aangepast (bijvoorbeeld de verlenging van een baan), indien een onafhankelijke studie bevestigt dat zulks opportuun is.

Improvement proposals

Naast de eisen die in haar Regeerakkoord opgenomen zijn, eist de Brusselse Regering ook de volgende elementen:
- De permanente naleving van het besluit van de Brusselse Hoofdstedelijke Regering van 27 mei 1999 betreffende de bestrijding van de geluidshinder voortgebracht door het luchtverkeer
- De naleving, zowel vormelijk als inhoudelijk, van ALLE gerechtelijke uitspraken van de procedures die het Gewest heeft opgestart
- De uitvoering van alle voorstellen die op 16 februari 2017 door de Regering zijn gedaan:
  - Schrapping van de vluchten boven de Kanaalroute
  - Schrapping van de vluchten met de bocht naar links tussen 06u00 en 07u00 uur ‘s morgens
  - Strikte naleving van de windnormen (hoofdzakelijk voor de landingen op 01.
  - Organiseren van overleg om tot een duurzame oplossing te komen met betrekking tot
    - De verlenging van de nacht
    - De definitie van de luchtvaartroutes over de minst bevolkte zones
    - De invoering een onafhankelijke controllerende overheid
    - De verlenging met 1800 m van baan 25L
    - De oprichting van een schadeloosstellingsfonds
De uitvoering van kortetermijnoplossingen die via de nota van het IGEAT voorgesteld zijn, zoals bepaald in de laatste stakingsvordering die door het Brussels Hoofdstedelijk Gewest is ingediend. Deze oplossingen zijn in bijlage bijgevoegd.

**Relevant links**

1. L’arrêté bruxellois contre le bruit des avions
2. Bellot Proposition 16022017
3. L’étude Benchmarking réalisée par Bruxelles-Environnement qui démontre le non-respect de l’approche équilibrée par l’aéroport.
4. Toutes les études et documents réalisés par Bruxelles-Environnement :
   - https://environnement.brussels/thematiques/bruit/la-situation-bruxelles/cartographie-et-exposition-de-la-population/bruit-des
   - https://environnement.brussels/thematiques/bruit/laction-de-la-region/lutte-par-cible/bruit-des-avions
7. RBC Position Paper 2nd May 2019 (Full version in FR/NL)
4.4.2 Bruxelles Environnement

Constats
En matière de bruit du trafic aérien, la Région de Bruxelles-Capitale subit l’impact de l’aéroport « Brussels Airport ». Compte tenu de leur localisation (au nord-est de la Région bruxelloise), de l’orientation des vents dominants (ouest et sud-ouest) et de leur proximité avec la Région bruxelloise, les activités aéroportuaires liées au trafic aérien engendrent en Région bruxelloise une charge sonore importante liée aux décollages depuis les pistes 25 R/L, aux décollages depuis la piste 19 avec virage à droite vers le nord, aux atterrissages sur la piste 01 et aux atterrissages sur les pistes 07R/L.


Selon la cartographie du bruit, les tendances générales observées pour l’indicateur L_{den} montrent que près de deux tiers du territoire bruxellois subissent l’influence des activités de l’aéroport. En 2016, ce sont 61.300 bruxellois qui étaient exposés à des niveaux sonores L_{den} > 55 dB(A), et 103.700 bruxellois qui vivaient au-dessus des niveaux de bruit L_0 > 45 dB(A) en raison des nuisances sonores liés au bruit du trafic aérien. Les communes du Nord et de l’Est de la Région bruxelloise (Bruxelles-Ville, Evere, Woluwe-Saint-Pierre, Woluwe-Saint-Lambert) subissent les nuisances les plus importantes, en partie supérieures à 55 dB(A) L_{den}.

Enfin, au-delà de ces indicateurs moyens calculés pour des périodes annuelles, les sonomètres du réseau de mesures bruxellois montrent que la situation réelle sur le terrain peut encore être plus problématique à certains moments de la journée, de la nuit ou de la semaine, en fonction des fréquences et des horaires ; le bruit individuel de chaque passage d’avion étant à ce moment bien plus élevé que celui représenté sur les cartes.

Organisation mondiale de la santé
Bruxelles Environnement rappelle qu’il est internationalement reconnu que les populations soumises à des niveaux de bruit inférieurs à 55 dB(A) le jour et 45 dB(A) la nuit (A l’échelle européenne, la directive 2002/49/CE préconise de faire les cartes de bruit à partir de 55 dB(A) pour le L_{den} et 45 dB(A) pour le L_{night}) ont également le droit à des mesures d’assainissement. En effet, en octobre 2018, le Bureau régional de l’OMS pour l’Europe publiait de nouvelles recommandations selon lesquelles le bruit dû au trafic des avions devrait être limité à 45 dB L_{den} et 40 dB L_{night}. Selon ces dernières recommandations, pour l’année 2016, 749.600 bruxellois étaient exposés au-delà des limites acceptables en termes de santé publique pour l’indicateur L_{den} (soit près de 64% de la population bruxelloise).

Compétences
En Belgique, ce sont les Régions qui sont compétentes pour la mise en œuvre de la directive 2002/49 relative à l’évaluation et à la gestion du bruit dans l’environnement. C’est donc en vertu de cette directive que le plan quiet.brussels prévoit des mesures de protection des populations vivant sur son territoire, relatives au bruit du trafic aérien.

Actions en justice
L’arrêté « Bruit des avions » constitue la législation bruxelloise relative à la lutte contre le bruit généré par le trafic aérien en vertu de l’ordonnance du 17 juillet 1997 relative à la lutte contre le bruit en milieu urbain.
Cet arrêté a été maintes fois attaqué juridiquement et autant de fois confirmé par la justice. De plus, cet arrêté ne constitue pas une restriction d'exploitation (confirmé dernièrement dans le jugement du 1er février 2019 reprenant le jugement du 19 juillet 2017) et les valeurs limites restent bien supérieures aux valeurs de l'OMS.

En outre, les récentes décisions de justice (dont la dernière date du 1er février 2019) confirment la validité du réseau de sonomètres bruxellois et le droit des bruxellois à jouir d'un environnement sonore sain.

**Improvement proposals**

**Plan de prévention et de lutte contre le bruit (quiet.brussels) adopté le 28/02/2019**

Un des 9 thèmes du plan quiet.brussels se focalise sur le bruit des avions et se résume comme suit : « Encadrer le bruit des avions, en prônant la recherche de solutions durables et équilibrées en concertation avec les autorités fédérales et les gestionnaires de l'aéroport et en poursuivant les actions précédemment menées, notamment la protection des zones densément bâties et des périodes nocturnes. »

Le plan quiet.brussels confirme ainsi la volonté de la Région de Bruxelles-Capitale de parvenir à un accord de coopération équilibré relatif au problème des nuisances sonores provoquées par les vols liés à l'aéroport de Brussels Airport (accord également repris par la Région flamande dans son projet de plan d'actions sur le bruit autour de Brussels Airport 2019-2023). Cet accord devrait permettre d'aboutir à un cadre d'exploitation stable et équilibré de l'aéroport, et de déboucher sur des actions coordonnées pour la mise en œuvre de la directive 2002/49 pour laquelle les Régions sont compétentes et le règlement 598/2014 pour lequel l'Etat fédéral est compétent ; ces actions reposant sur le principe d'approche équilibrée de la gestion du bruit (référence OACI).

Cette demande a par ailleurs été confirmée par les résultats de l'enquête publique du plan.

Pour rappel, 5 mesures du plan concernent la problématique du bruit des avions :

- **Mesure 12.** Faire respecter l'arrêté bruit des avions
- **Mesure 13.** Contribuer à l'élaboration d'un accord de coopération pour le bruit des avions
- **Mesure 14.** Soutenir un accord sur la fin des vols de nuit au-dessus des agglomérations
- **Mesure 15.** Evaluer les mesures de gestion foncière des territoires survolés
- **Mesure 16.** Accompagner les citoyens par rapport au bruit des avions

**Nuit environnementale**

Bruxelles Environnement soutient le principe d'une nuit d'exploitation égale à la nuit environnementale, d'une durée de 8 heures, et s'étendant à priori de 23h00 à 07h00. Pour rappel, cet horaire a été choisi de commun accord par les 3 Régions du pays.

De plus, l'OMS abonde dans le sens d'une durée nocturne minimale de 8 heures (voire plus durant les week-ends).

Le dernier jugement du 1er février 2019 interdit d'ailleurs à l'Etat belge de dégrader la situation nocturne (23h-07h) par rapport à la situation de 2017 (année de référence pour l'action en justice) pour 3 ensembles de routes aériennes (Canal, Ring et ARR01).
Approche équilibrée et densité de la population

Bruxelles Environnement soutient l'application de l'approche équilibrée dans la diminution et la gestion des nuisances sonores de Brussels Airport et défend le principe de survoler le moins d'habitants possible, où qu'ils soient localisés, conformément aux conclusions de l'étude Benchmarking réalisée en 2015 (voir ci-dessous).

Pour bien gérer les nuisances sonores, il est nécessaire d'optimiser les combinaisons de mesures pouvant être appliquées afin de prévenir ou de réduire le bruit suivant une approche multicritères, de prévoir et prévenir toute évolution, d'éviter des possibles problèmes futurs, de vouloir vraiment solutionner les problèmes dans une approche scientifique, environnementale et consensuelle intégrant tous les intervenants.

Dans cet objectif, il est souhaitable d'améliorer l'intégration des mesures décrites dans l'approche équilibrée, notamment par des procédures opérationnelles permettant de réduire l'exposition, telles qu'une utilisation plus performante des pistes (notamment via l'utilisation de la longueur totale des pistes, voire d'un allongement de piste), la détermination de routes et de de procédures de vol optimales tenant compte de la densité de population et de l'arrêté « Bruit des avions », puis par les mesures d'aménagement du territoire et d'insonorisation correspondant à ces procédures.

Les décisions d'aménagement du territoire et d'isolation des bâtiments sensibles seront dès lors prises en fonction d'un schéma d'exploitation équilibré et stable et de l'établissement de compensation selon le principe du pollueur-payeur (alimentation du Fonds pour l'Atténuation des Nuisances dans le Voisinage de l'Aéroport Bruxelles-National (FANVA) notamment par les taxes environnementales bruit existantes et attribution du fonds à l'insonorisation correspondant à ces procédures).

Relevant links

Liens vers les fiches documentées Bruit de l'état de l'environnement bruxellois concernant la problématique du bruit des avions en Région de Bruxelles-Capitale
- Perception des nuisances acoustiques en Région de Bruxelles-Capitale [http://document.environnement.brussels/opac_css/elecfile/Bru%20201](http://document.environnement.brussels/opac_css/elecfile/Bru%20201)

Plan quiet.brussels :

[https://environnement.brussels/quietbrussels](https://environnement.brussels/quietbrussels)

Déclaration environnementale du plan quiet.brussels :

Rapport complet Cartographie du bruit des avions (2016)


Et pour les autres années :

https://environnement.brussels/thematiques/bruit/la-situation-bruxelles/cartographie-et-exposition-de-la-population/bruit-des

Rapport Benchmarking


Rapport Etude Historique du survol


Note de Bruxelles Environnement 2nd May 2019
4.5 **Belgium Slot Coordination**

Belgium Slot Coordination (BSC) is responsible for the allocation of available slots at the only coordinated airport in Belgium, namely Brussels National Airport. It is a non-profit organisation in accordance with Belgian Law. The ownership of the company is shared between the airport and airlines.

Slot allocation is an instrument developed to match demand for slots from the air carriers and general aviation to the supply of airport capacity.

It works according to the rules that are imposed through the European Regulation EC Reg.95/93, IATA Worldwide Slots Guidelines (WSG) and the federal decrees of 21 January and 06 April 2009.

As a result, by avoiding congestion and delays, implementing slot allocation brings economical as well as environmental benefits. In allocating, coordinating and monitoring slots in conformity with the relevant rules, BSC provides services to the aviation industry that contribute to make optimal use of scarce resources.

More details are available on the BSC website: [https://www.brucoord.org/](https://www.brucoord.org/)
4.6 **The Airlines**

4.6.1 **BATA**

The Belgian Air Transport Association (BATA) represents BRU home based carriers: Brussels Airlines, TUIFly Benelux and DHL (European Air Transport).

1. **Introduction**

Together with the Belgian seaports, Brussels airport and its airlines users are crucial for our country’s economic future. The national airport is a strategic gateway in the spatial and economic structure of Belgium because of the scale, concentration and dynamics of its activities.

The impact on the Belgian economy of Brussels Airport is substantial. Its value added adds up to 6 billion € (i.e. 1.5 % of the Belgian GDP) with the indirect economic effects. Direct and indirect employment amounts to over 63,000 jobs. Over 75 carriers operate at Brussels Airport.

2. **Background on noise measurement and management**

The regulatory environment applicable to aircraft noise is complex.

The noise produced by an aircraft (“emission”) is measured and certified in accordance with international standards adopted by the International Civil Aviation Organization (ICAO). In particular, the international standards of Annex 16, volume I, to the Chicago Convention set maximum levels of noise (produced at source) that aircraft cannot exceed during landing and take-off.

ICAO also recommends standard procedures for landing and take-off which all airports abide by to define local operational requirements. These procedures are recorded in the Aeronautical Information Publication (AIP) and in the aircraft navigation systems and are implemented by the air traffic controllers such as skeyes (formerly Belgocontrol).

In addition to these international rules, local authorities may adopt noise-related measures in accordance with the ICAO Balanced Approach. This may include noise quota regulations, such as the one in place at Brussels Airport.

It is important to know that aircraft are operating in a continuously changing atmosphere environment. Their flight and noise performance are directly influenced by the prevailing atmospheric conditions, such as wind direction and force, air pressure and humidity.

3. **The balanced approach**

The balanced approach was unanimously adopted by Governments in ICAO. In Europe, it is implemented through EU Regulation 598/2014, which provides in its article 5, paragraph 3 that:

Member States shall ensure that, when noise-related action is taken, the following combination of available measures is considered, with a view to determining the most cost-effective measure or combination of measures:

(1) the foreseeable effect of a reduction of aircraft noise at source;

(2) land-use planning and management
(3) noise abatement operational procedures;

(4) not applying operating restrictions as a first resort, but only after consideration of the other measures of the Balanced Approach.

3.1 Reduction at source

Much is being done on the operators' side to reduce the impact of their activities through more efficiency (e.g. better seat utilization factor, cargo intermodality) and major fleet renewal investments.

The Brussels Airport-based Brussels Airlines, TUI and DHL have replaced over 120 aircraft over the period 2010-2018.

The airlines' investment in fleet renewal has contributed to shrink the noise contours around Brussels airport by 60% between 2000 and 2017: the number of persons potentially severely impacted within a noise contour of 55 dB (A) has been reduced from 33 889 in 2012 to 13 575 in 2017.

3.2 Land-use planning and management

As land-use planning has a direct effect on the number of people affected by aircraft noise, proper land-use planning policies are critical to preserve the noise reductions achieved through the introduction of quieter aircraft.

Unfortunately, there are no clear land-use planning measures around Brussels airport, as they exist around many airports in Europe.

3.3 Noise abatement operational procedures

There is a preferential runway scheme (PRS) consistent with the ICAO recommendations.

3.4 Restrictions

3.4.1 The current Federal legislation (6) provides for:

- a ban on night flight departures during week-ends (Friday, Saturday and Sunday nights);
- an airport quota count system providing for a maximum noise quota for the airport per IATA season;
- the application of a quota count of 8 per aircraft movement for the night flights;
- a ceiling of 16,000 night movements per year with a maximum of 5,000 departures;

3.4.2 The Flemish Region's environmental permit for the airport provides, among others for the same movement ceiling as mentioned above under point 4 here above.

4. The issues

4.1 The limit of the number of night (22-6 o'clock) slots.

The figures from Brussels Airport Company (BAC) show that the abovementioned ceiling of 16,000 slots is reached, as 15 832 flights were operated in 2017.

Failing any action, the economic and employment growth at the airport is in jeopardy, notably in the area of the growing e-commerce sector.
We consider that a limitation on the number of movements is actually a market access restriction, not an environmental measure.

And it is also a false good idea: it is damaging the economy in general and the employment in particular, as it prevents economic growth.

4.2 **The Brussels Noise legislation**

- The Brussels Region applies immission noise limits (i.e. noise measured on the ground) which leads to airlines being fined for noise infringements despite complying with the international aircraft emission norms (i.e. noise measured at source). The rules of the Brussels Region have even been further restricted with the abolition as of January 1 2017 (with effective implementation on February 22 2017) of the noise limit tolerance which was effectively applied since 1999.

The airlines are not aware of any other airport applying immission limits in the same way as in Brussels to regulate aircraft noise.

In Brussels, the noise limits result in airlines being fined in situations where they comply with:

- all airport (AIP) and air traffic control instructions; and
- the ICAO noise standards ("ICAO chapters"); and
- the BRU airport noise quota count regulation; and
- alt other Federal or international legislation.

This is due to the fact (i) that the Brussels Region's norms are unreasonably demanding (as among others evidenced by the required past tolerance) and (ii) that the noise measured on the ground is influenced, as explained above, by many external factors such as the meteorological conditions.

- The current Brussels Noise Legislation is so strict and costly for operators that it amounts to a severe restriction of access to the Brussels airport.

- The EU Commission considers that Belgium could be infringing EU Directive 2002/49 relating to the assessment and management of environmental noise, which requires a concerted action among the Belgian authorities. The Commission does not exclude starting an infringement procedure.

5. **The proposal**

In order to heed the EU Commission call for concerted action among Belgian authorities, we suggest that the Federal, the Flemish Region and the Brussels Region conclude a Cooperation Agreement.

The Cooperation Agreement would include the following items which meet the balanced approach required by European legislation:

1. The modification of the Brussels Noise legislation in a way which would exempt from any fines aircraft complying with (i) ICAO norms of Annex 16 Chapter III, (ii) individual noise quota and (iii) ATC flight instructions.

2. The existing Federal rules on (i) week-end night flights ban and (ii) aircraft QC 8 limits at night during the week.
3. The replacement of the number of night movements limits (which is in fact a market restriction) by an airport total quota count system (which is an efficient environmental measure).

4. A sensible flight path route system which is accompanied by a real land use planning and management and other operational measures or investments aimed at reducing the impact on the surrounding communities.

We are convinced that such a cooperation agreement would achieve a real balance between sustainable economic and employment growth and environmental protection of communities.

Relevant links

Original Statement

BATA comments on Chapter 1
IATA (The International Air Transport Association) recommends the initiation of a complete redesign of the Brussels Terminal Area (TMA) to be implemented by 2024 latest.

The redesign of Brussels Airport departure and arrival procedures should commensurate with the European Commissions’ Balanced Approach to Noise Measurement Regulation (Regulation (EU) 598/2014) and Pilot Common Project (Regulation (EU) 719/2014).

A number of best and common practices, already in place at most international airports, should be implemented ahead of 2024:

- Performance Based Navigation Specifications (PBN) as an enabler for direct and indirect environmental benefits through continuous climb/descent operations and reduced flight variance resulting in lower noise operations and aircraft emissions.
- PBN also generates increased opportunity for placement of flight paths over less-noise sensitive areas and optimum drag profiles.
- The structural implementation of respite routes alleviating the noise burden and assuring a sound airport capacity development in line with future traffic demand.

It is also the view of IATA that ICAO’s guidelines such as collaboration between all stakeholders through transparent open dialogue and the implementation of ICAO’s Balanced Approach to Aircraft Noise Management, amongst others, should be complied with more thoroughly.

From our IATA members operating at Brussels Airport we receive the message that Brussels Airport is a unique case where noise regulations are not aligned with recommended ICAO procedures. Operations of aircraft that are fully compliant with Belgian and international air legislations and strictly adhere to the prescribed departure and arrival procedures at Brussels Airport result in noise infractions.

The common view is that the current fining practice should be replaced by a fair system in which only non-compliance with the prescribed procedures and/or ATC instructions might lead to a potential fine after the concerned airline received opportunity for defence.
4.7 Belgian Cockpit Association (BeCA)

The following text is from a letter sent by BeCA to Minister Bellot in March 2017:

La BeCA est l'association professionnelle représentant les pilotes de lignes en Belgique. Elle est apolitique et représente la profession auprès des autorités fédérales et de l'administration de l'aéronautique (DGTA/DGLV). Elle compte des membres résidant dans les trois régions et travaillant depuis les différents aéroports belges, ainsi qu'à l'étranger. Elle est membre fondatrice d'IFALPA (International Federation of Air Line Pilot Associations), de l'ECA (European Cockpit Association) et est aussi membre de la Flight Safety Foundation (FSF).

Ces dernières semaines, l'épineux dossier du survol de Bruxelles s'est à nouveau retrouvé au cœur des débats politiques. Depuis près de vingt ans, notre organisation est le témoin des errements politiques à ce sujet. La question « qui faut-il survoler ? » est logiquement réponse par le choix des routes aériennes latérales. Les ministres de la Mobilité successifs se sont donc focalisés sur des rapports de force et des compromis politiques dans une approche « NIMBY » (« Not In My Backyard »), définissant et redéfinissant sans fin les trajectoires horizontales.

En tant que professionnels de l'aviation, nous avons observé quantité d'inconsistances et de contradictions dans la gestion des autres aspects de ce dossier par nos ministres fédéraux et régionaux.

1. Une comparaison avec certains pays voisins et leurs « meilleures pratiques » dans la gestion des profils verticaux (montée et descente), de jour comme de nuit, aiderait sans aucun doute à réduire la masse totale de nuisances. Ce qui ne peut que bénéficier à l'ensemble des citoyens de notre pays en minimisant les temps de survol à basse altitude. Comment expliquer qu'aucun effort continu sur ces sujets n'ait été fait par les responsables politiques successifs ?

2. La BeCA a été invitée sporadiquement comme « expert technique » par certains ministres, trop souvent dans le but de faire valider des décisions avant tout politiques. Il est intéressant de noter que les diverses études techniques sur le sujet, commandées par les ministres successifs sont très difficilement disponibles aujourd'hui voire introuvables. Même si elles ont été réalisées avec l'argent des contribuables. Ceci démontre selon nous l'absolue nécessité d'une autorité de contrôle apolitique, indépendante de pressions et copinages et compétente en matière aéronautique. Ainsi, un des derniers ministres de la Mobilité avait nommé comme conseiller aéronautique fédéral un lobbyist actif de longue date au sein d'un groupe de riverains. Comment prétendre gérer sainement une matière fédérale dans ces conditions ? Comment être ensuite surpris de l'état actuel du dossier ?

La question du survol de Bruxelles nécessite à la fois une approche globale transparente et une analyse technique complète. Rien ne sert de se focaliser sur le vent de travers sur une piste, ou sur les critères de vent arrière sur une autre, dans l'espoir de rejeter le trafic sur son/ses voisin(s) si les options à choisir ne sont pas mises clairement sur la table.

L'aéroport de Bruxelles National/Zaventem apporte beaucoup de facilités en termes de mobilité ainsi que de très importants apports d'emplois, qualifiés et moins qualifiés. Les demandes des riverains sont légitimes, tout comme les inquiétudes des 20.000 travailleurs de l'aéroport. La BeCA ne prétend pas résoudre l'entièreté des problèmes liés à l'exploitation de l'aéroport de Zaventem et une telle activité économique générera toujours une certaine quantité de nuisances. Mais mélangé gestion ultra
politisée et désintérêt pour les aspects techniques ne servira personne dans le long terme. La crise actuelle le démontre une fois de plus.

Dans ces conditions, la BeCA exhorte la classe politique belge (et plus particulièrement les responsables politiques flamands et bruxellois) à prendre enfin la seule décision rationnelle et objective pour garantir une situation stable dans le long terme: la mise en place immédiate d'une autorité de contrôle indépendante et apolitique, au sein de laquelle siègeraient les experts concernés, y compris les pilotes.

Lorsque nos responsables politiques seront prêts à lancer cette initiative, la BeCA sera disposée à y participer pleinement et à y apporter son expertise technique en la matière, en tant que représentante d'un des principaux usagers de l'aéroport et des routes aériennes.

**Relevant links**

2017 03 09 FR - Letter Min Bellot re EBBR and Brussels

2017 03 09 NL - Letter Min Bellot re EBBR and Brussels

2017 03 09 Response Letter Min Bellot re EBBR and Brussels
5 Health Impact Considerations

The impact and importance of aircraft noise, and crucially its perception by surrounding communities and individuals is very different for every airport. Tolerance of aircraft noise (or lack of it) can vary according to various factors including but not limited to (in no particular order):

- Proximity of population centres to noise and its loudness, duration and frequency
- The noisiness of individual aircraft, effectiveness of abatement procedures and the operations being performed
- The numbers and timing of flights
- Departure versus arrival noise
- Compliance with agreed rules
- The nature of ambient noise or tranquillity in the affected area
- The effectiveness of historic and current land use planning around the airport
- Transparency and consultation
- Aircraft height, weight and thrust
- Predictability of aircraft position
- Availability of respite periods
- Ownership of the airport and perceived distribution of its economic and social benefits
- The relative age, wealth and employment levels of affected communities
- The number of changes or announcement of change - to where aircraft fly
- How recent changes were made (people get used to change in time)
- Quality of information and communications
- The degree of expectations raised by promises of change
- Ability of stakeholders to affect outcomes and decisions
- Tonality (turbo props can be more annoying than jets for some people)
- Attenuation and reflection of noise
- Season (warm weather means more leisure, garden-time and more open windows)
- Building standards and insulation
- Personal perception of noise (every individual is different)
- The Accommodation of nimbyism – setting one community against another

In terms of quality of life, many individuals further away from an airport than where these significant noise levels occur, some individuals may still find aircraft noise and aircraft overflight to be of unacceptably significance and seek to get it removed from where they live. These individuals may represent the majority or a minority of their communities. It is important to understand how representative this significant disturbance is before action is taken that could have a disproportionate impact by sending aircraft over another community.

5.1 Evidences on Health Impacts from Aviation

The impact of environmental noise on health has been growing in importance over the last few years. Nowadays, various international research studies are available that establish key observations on the health impacts from environmental noise.

Noise events not only cause annoyance, but long-term and consistent exposure to high noise levels also lead to auditory system deterioration, hearing loss, sleep disturbance, cardiovascular disease and diminished learning capacity. Widely adopted advice on the levels of aircraft noise where the onset of
significant adverse impacts arise is available, and the EU requires major airports such as BRU to report on the extent of these and numbers of people affected.

The World Health Organisation (WHO) also undertake international research into this topic and from time to time publish new science on these impacts, which usually finds its way into international and ultimately national rules and legislation.

Perhaps the most important evidence on health impacts due to noise comes from WHO. A 2011 report on the burden of disease from environmental noise evaluated the correlation between environmental noise, including that from road, railways and aircrafts and cardiovascular disease, cognitive impairment in children, sleep disturbance and tinnitus. This study showed that there is certainly growing evidence from epidemiological studies that noise does indeed impact health conditions. The data on the association between exposure to aircraft noise and hypertension, high blood pressure and ischaemic heart disease has increased during recent years. In particular for aircraft noise, because of its intensity, the location of the source, and its variability and unpredictability, it is likely to have a greater effect on children's cognition and reading comprehension than for example, road traffic noise, which might be of a more constant intensity.

There have been other studies that have investigated the effects of aircraft noise on health. For instance, it has been shown that, night-time noise from transportation produces both instantaneous and long-term health effects, due to the alteration of sleep, leading to arousal and awakening. The arousal involves neural and hormonal activity and may be reflected in cardiovascular changes and motor activity (motility). Moreover, it was proved that insomnia, which can be originated by the effects of night noise coming from aircraft, has a negative effect on quality of life. It is linked to less work performance, memory and concentration problems, depression, obesity, cardiovascular disease, hypertension and to the increase of occupational accidents. It was also found that aircraft noise during sleep results in increased probability of motility during these and events and increases the number of awakenings.

Another evidence was found in a study near Heathrow Airport. Their results suggest that high levels of aircraft noise are associated with an increased risk of stroke, coronary heart disease, and cardiovascular disease. In this regard, a multi-airport retrospective study found a statistically significant association between exposure to aircraft noise and risk of hospitalization for cardiovascular diseases among older people living near airports. Furthermore, night-time aircraft noise was found to increase the prevalence

29 World Health Organisation, Burden of disease from environmental noise, 2011
30 TNO Inro, Elements for a position paper on night-time transportation noise and sleep disturbance, 2003
31 Health Council of the Netherlands, The Influence of Night-time Noise on Sleep and Health, 2004
32 TNO, Sleep disturbance and aircraft noise exposure. Exposure-effect relationships, 2002
33 Hansell et al., Aircraft noise and cardiovascular disease near Heathrow airport in London: small area study, 2013
34 Correia et al., Residential exposure to aircraft noise and hospital admissions for cardiovascular diseases: multi-airport retrospective study, 2013
of prescriptions for antihypertensive and cardiovascular drugs, especially when prescribed combined and in conjunction with anxiolytic drugs.\textsuperscript{35}

Another important finding was obtained in the Hypertension and Exposure to Noise Near Airports (HYENA) study.\textsuperscript{36} In this research project it was found that excess risks of hypertension are related to long-term noise exposure, primarily for night-time aircraft noise and daily average road traffic noise. As a continuation study to this research project, it was observed that annoyance due to aircraft noise has increased throughout the recent years, and that the current EU prediction curve for aircraft noise annoyance should be modified.\textsuperscript{37}

Ultra-fine particulate matter specifically can lead to severe respiratory effects due to their smaller size (less than 1 micron) that can enter deep into the bronchi and settle on the alveolar walls.

All the studies conducted over the past several years on fine particles estimate that the annual mortality increases at 0.5% per 10 micro grams of particles per m\textsuperscript{3}. Given the higher toxicity of ultra-fine particles, the air pollution impacts from BRU also need to be taken into consideration for future policies and regulations.

### 5.2 WHO Guidelines

The 2018 WHO guidelines\textsuperscript{38} concerning aircraft noise strongly recommend reducing exposure to below 45 dB(A) for Lden and 40 dB(A) for Lnight. WHO also recommends using the DALY (Disability Adjusted Life Years, DALY) metric to quantify the deterioration of populations' health due to disease or by exposure to environmental factors. WHO estimates that the health deterioration coefficient (also called disability weight) for noise annoyance is about 0.02, and 0.07 for sleep disturbance, where the scale varies from 0 (undeteriorated health) to 1 (death).

Based on these recommendations, a February 2019 report by Bruitparif\textsuperscript{39} evaluated the healthy life-years lost due to annoyance and sleep disturbance caused by transport noise from road, rail and aircraft within the densely populated zone of Ile-de-France. The study found that 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. 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.

\textsuperscript{35} Greiser et al., \textit{Night-time aircraft noise increases prevalence of prescriptions of antihypertensive and cardiovascular drugs irrespective of social class—the Cologne-Bonn Airport study, 2007}

\textsuperscript{36} Jarup et al., \textit{Hypertension and Exposure to Noise Near Airports: the HYENA Study, 2008}

\textsuperscript{37} Babisch et al., \textit{Annoyance due to aircraft noise has increased over the years—Results of the HYENA study, 2009}

\textsuperscript{38} WHO, \textit{Environmental Noise Guidelines, 2018}

\textsuperscript{39} Bruitparif, \textit{Health impact of transport noise in the densely populated zone of Ile de France, 2019}
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).

A similar study to the one carried out by Bruitparif was performed for RBC by Bruxelles Environnement in 2016.\(^4^0\) In this report, the proportion of DALYs generated in RBC by the 224,000 aircraft movements in Brussels Airport in 2011 was larger than that of the Parisian region, which nevertheless has two international airports (Paris Charles de Gaulle and Paris-Orly, which together account for nearly 735,000 movements) and 25 other aerodromes.

- The DALY related to annoyance due to air traffic noise was twice as high in RBC (32%) as compared to Paris (15%)
- The DALY related to sleep disorder due to air traffic was 18 times higher in RBC (18%) as compared to Paris (1%)

This is no doubt due to a higher percentage of the population overflown and thus strongly impacted by aircraft noise in RBC.

### 5.3 Aviation’s Response and the Way Forward

However, the implementation of the 2018 WHO guidelines might take a while to be completely enforced as there is a large gap between the current noise limits set by noise policies today and the limits recommended by the International Civil Aviation Organisation (ICAO). The recommendation given by WHO to reduce exposure to below 45 dB(A) for \(L_{den}\) and 40 dB(A) for \(L_{night}\) can be a strong change to the methodology applied so far, as it is a big jump from 55 \(L_{den}\) and 40-45 \(L_{night}\).

The Netherlands Health Council also stated that limiting the SEL inside the bedroom to less than the biological effect threshold levels was not a technically realistic option at the present time.\(^4^1\) Given that aircraft noise is mainly composed of low frequencies, sufficient soundproofing would require substantial thickness of insulating material.

Historically, the aviation industry did not pay too much attention to the health effects caused by their activity, although due to all the research carried out recently, this attitude has changed. Nowadays, the aviation industry has acknowledged the detrimental health impacts that aircraft noise can have on human health and has made efforts to actively tackle these issues. The ICAO Balanced Approach\(^4^2\), European Union Aviation Safety Agency (EASA) certification noise levels and EU regulations on aircraft noise address all aspects of controlling aircraft noise impacts starting from technological innovations for quieter aircrafts, stringent aircraft certification process to changing flight procedures, operating restrictions and managing land usage.

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\(^{4^0}\) Bruxelles Environnement, *Assessment of the health and economic impacts of transport noise in the RBC*, 2016

\(^{4^1}\) Netherlands Health Council, *The Influence of Night-time Noise on Sleep and Health*, 2004

\(^{4^2}\) ICAO Balanced Approach
For night noise especially, a relevant metric that quantifies the health of residents living around the airport is the risk of awakening. The same Netherlands Health Council 2004 paper on the influence of night time noise on sleep and health stated that “At a given Lnight value, the most unfavourable situation in terms of a particular direct biological effect of night-time noise is not, as might be supposed, one characterised by a few loud events per night. Rather, the worst case scenario involves a number of noise events all of which are roughly 5 dBA above the threshold for the effect in question.”

Hence, depending on how Lnight is regulated, the most effective option as of today would be to limit the number of night noise events and larger (and heavier) aircrafts.

Traditional noise contour maps that are produced represent the area under a specific noise level. Hence larger noise contours do not represent more intense noise impacts, they are simply a reflection of increase or decrease in the area under a certain noise level. The size of the graphics and contours do not have a direct correlation with the density of people impacted and hence the total amount of annoyance to population caused. A better standardised method of representing this information graphically for easier comprehension should also be developed in the future.

Furthermore, the use of new metrics like Number of Events above a certain noise value are being pushed forward. As it is indicated in the 2018 Environmental Noise Guidelines for the European Region “There is additional uncertainty when characterizing exposure using the acoustical description of aircraft noise by means of Lden or Lnight. Use of these average noise indicators may limit the ability to observe associations between exposure to aircraft noise and some health outcomes (such as awakening reactions); as such, noise indicators based on the number of events (such as the frequency distribution of LA,max) may be better suited. However, such indicators are not widely used”.

There is, therefore, the proposal to start giving more priority to other noise indicators (in particular frequency metrics) as well as to lower noise levels to calculate noise exposure, which is a challenging modification considering the way the noise effects have been studied until now.

It is not however the role of Belgian aviation stakeholders to unilaterally solve the health impacts of human activities for the world or to unilaterally fund the research required to solve such issues for mankind. Whilst fulfilling its stewardship obligations in safeguarding the health of its people therefore, Belgian governance must also take account of implications for state competitiveness and wider state sustainability, in any decision making on this topic.

Note: Such emerging science is not just a matter for BRU, but may have implications for all Belgian airports, other modes of transport or Belgian industry generally. The most appropriate processes to cover health matters for BRU, may therefore lie outside of the purview of any single Belgian airport and may lie outside of Belgium aviation as a whole. The most appropriate processes and conduits should therefore be used to bring such science and aviation response back to BRU.

There are also international aviation processes and bodies in place that will consider new and emerging science on the health impacts caused by aviation and will determine the most appropriate response, whether through standards, limits or regulations. The UN and the EU fund major international research in this area and facilitate and participate in the processes to develop aviation responses. Such processes rely in part on participation by states and aviation stakeholders including manufacturers and operational associations. It is anticipated that Belgium and Belgian stakeholders already actively engage in such
international processes and already support and engage in the international development of technical, operational and rule-making responses to these health challenges.

An advisory body, via appropriate health bodies, should maintain a science watch on emerging science concerning the health impacts of aviation noise as these become accepted by international health and/or aviation bodies. Stakeholders should take these issues into account in their forward planning. It is recommended therefore, that the proposed Advisory Body (see section 7 of this report), should:

- **maintain a science watch, via existing public health bodies and established health science engagement conduits, concerning the health impacts of aviation noise and other related health impacts - and especially as new scientific findings become accepted by international health or aviation bodies; or, where new standards or regulations are produced elsewhere.**
- **make use of existing engagement processes or establish new engagement processes, to monitor and participate in the development of the technical and operational mitigation response to new science on aviation health impacts. Usually however, such emerging issues are covered by international health and aviation bodies and regulators and they produce advice on how to address these in state regulations and standards. The advisory body should then collaboratively agree how to progress in Belgium.**

The recommended structures and processes as described in this report should then take these issues into account in rule-making and forward planning for all Belgian airports and for BRU in particular (given its size and proximity to major populations centres). The aim should be to ensure that emerging health impact science and operational responses are identified and understood by Belgian Stakeholders in good time and that these are taken account of in any planning that can affect such impacts or their management. It is essential that any decisions concerning these topics are considered transparently and in a wider sustainability context and not just considered as a single impact topic.

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6 Wind Criteria and Preferential Runway System (PRS)

6.1 Introduction

A Preferential Runway System (PRS) is effectively a mechanism for distributing overflight and hence noise, using several runway configurations on a time-rota basis. Any risk of unsafe operations due to excessive tail-wind, cross winds or gusts will mean therefore, that the PRS may, from time to time, be unachievable whilst adverse wind conditions prevail.

The operational interpretation and implementation of PRS is often undertaken by operational stakeholder with little direct oversight. The application of such rules is very technical, and the public often do not understand them unless significant effort is given to providing non-technical explanation. Public distrust of the veracity of their application is not uncommon. It should therefore be an important task for any state aircraft noise regulator (e.g. CAA), airport noise competent authority (e.g. ACNUSA), or recognised external agency (e.g. EUROCONTROL), to regularly and independently review the extent to which wind-based procedures remain fit for purpose, the effectiveness of their implementation (training etc.) and to verify and report compliance. This verification is essential to retain public trust.

Historically airfields were built close to towns and cities, and at many airports residential development has also been allowed to encroach towards airfields. For many decades therefore, the use of noise preferred runway configurations, that allow the overflight of the least population is a commonplace aircraft noise mitigation mechanism. The maximum use of the noise preferred runway configuration has been optimised by specifying a maximum tailwind component (in wind speed Knots), below which the preferred runway is always to be used. The tailwind component selected varies between airports but is typically between 3 and 7 knots. Some airports have the same tailwind component specified for every runway configuration where there is no noise or capacity preferred runway configuration required. Varying according to many factors such as the prevailing wind variation, there are examples of where a 7 Knot tailwind component specification has generated around 70-80% achievement of the preferred runway configuration.

Because of the significant prevalence of movements using the noise preferred runway when using high tailwind components, this can make infrastructure capacity enhancements such as ILS provision or Rapid Exit Taxiways more cost effective, than it does for the non-preferred runway configuration. Over time therefore, this means that at many airports, the noise preferred runway configuration also becomes the runway configuration that is also optimised for capacity. Any subsequent changes to preferred runway configuration, therefore, could conceivably require additional changes to airfield infrastructure for such new preferred runway policies to become fully effective, and until this is addressed, could generate an increased risk of delays as demand increases. Additionally, if land-use planning has permitted development in areas not previously overflown, such a change may result in more people being affected. This could take a long time and much investment to rectify.

It varies between airports, but typically maximum tailwind component values for noise preferred runway configuration selection criteria are around 3-7 knots. Thus, when tailwind component is above the maximum permitted value, a runway configuration will be selected to operate into the wind, regardless of noise impact. When tailwind is below the stated maximum value for any runway configuration, then the planned noise preferred configuration can be safely selected. It should be borne in mind however, that actual wind speed and direction can vary dramatically with height above the ground and it is not
uncommon for pilots to request a change to runway configuration for safety reasons, even if the monitored wind components appear to be acceptable. In such circumstances, safety will always remain paramount.

### 6.2 Basic Concepts and definitions

The Annex 3 of ICAO on Meteorological Service for International Air Navigation\(^{43}\) provides definitions of the various weather recordings and wind speeds.

METAR weather reports are compiled every 30 mins, or at shorter time intervals when the weather is changing rapidly. The mean surface wind speed given in the METAR reports, is measured over a 10 minute period preceding the given observation time. **Gusts are defined as significant deviations of the mean wind speed over a time period and are equal to a 3 seconds moving average over a time period of 10 minutes (METAR/ATIS).**

ATIS (Automatic Terminal Information Service) reports are similar to METAR reports and are used by pilots while landing or taking-off. These are also compiled every 30 minutes and based on 10 minute period unless significant changes occur. The wind data in ATIS is used to calculate the crosswind and tailwind for the runway on which the pilot will land.

However, ICAO Annex 3 states that for both take-off and landing, the wind conditions should be based on a two minutes sample timeframe. This therefore means that the METAR and ATIS wind data should not be used for take-off and landing. Pilots then use Tower Wind reports based on real time weather conditions. **Gusts are included in the Tower Wind and reported to the pilot when it exceeds the mean wind by 10 kt or more.** These help the pilot to judge the actual wind conditions at the runway while landing or taking-off.

The Brussels Airport Traffic Control (BATC) website\(^{44}\) displays real time information on wind speeds and components and are the same as those to the Air Traffic Control (ATC). Crosswind and tailwind components are calculated using the four anemometers that are located near the runways. Readings for individual runways are obtained from the anemometer located closest to it.

- Every 3 seconds, the ‘average’ (during the past 3 seconds) wind speed/direction is determined (per anemometer)
- Using these wind vectors (4 anemometers), the wind components (per runway) are calculated (every 3 seconds)
- Thus, every 3 seconds, a crosswind and head/tail component per runway is obtained.
- Next the maximum component of all the 3 second readings with a time period of 10 minutes is considered.

Note: The maximum calculated crosswind for a runway can (and will) occur at a different time than the maximum calculated tailwind for that particular runway due to the fact that these two components are

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\(^{43}\)ICAO Annex 3 Meteorological Service for International Air Navigation

\(^{44}\)BATC - Meteo readings
based on entirely different wind vectors. Gusts are taken into account in the calculation as they are a part of all the 3 second average wind vectors.

The average wind speed on the other hand is based on the 10 minute average value of speed, direction and range.

The next phase involves the calculation of crosswind and tailwind components. Headwind (winds facing the aircraft) or tailwind (winds blowing from the back of the aircraft) is defined as the wind component that has the same direction as the runway and as such is parallel to it. Crosswind is defined as the wind component that is perpendicular to the direction of the runway.

Figure 6-1 Headwind and tailwind

Every wind direction can be broken down into headwind (or tailwind) and crosswind components where Theta $\theta$ is the angle of the wind from direction of travel. As wind direction as well as runway direction is measured in terms of degrees from the North, i.e. North is 0 degrees, angle Theta $\theta$ is calculated as:

$$\text{Angle } \theta = \text{Headwind direction (same as the runway use direction)} - \text{Wind direction}$$

$$\text{Headwind} = \text{Wind speed} \times \cos \theta$$

$$\text{Crosswind} = \text{Wind speed} \times \sin \theta$$

**Note:** In the above formula, negative headwind is equivalent to the tailwind and negative crosswind is equivalent to crosswind from the right side of the aircraft.

As an illustrative example, in the case of BRU, and in the PRS configuration, with arrivals and departures on RWY 25R, let the average wind speed (over the last 3 seconds) be 7 kt with direction 190 degrees.

$$\text{Angle } \theta = \text{Angle of Runway (250)} - \text{Angle of wind direction (190)}$$

$$\text{Angle } \theta = 60 \text{ degrees}$$
Study of the impacts on the environment with regard to noise pollution (BRU)

Headwind = 7 x cos 60
Headwind = 3.5 kt
Crosswind = 7 x sin 60
Crosswind = 6.06 kt

Figure 6-2 Wind components

The ICAO Annex 14 Vol 1 Aerodromes\textsuperscript{45} provides recommendations and limits for the wind criteria whereas the ICAO PANS-OPS and PANS-ATM state provisions concerning the selection of preferential runways for noise reduction when in use.

Under these wind limits, runway selection will no longer be based on noise abatement. Once the headwind (or tailwind) and crosswind components have been calculated, then the following criteria for runway selection come into play:

- Maximum permitted tailwind limit for take-off and landing: 10 kt for aircrafts with reference field length less than 1200 m (average wind or gusts not specified)
- Maximum tailwind for runway selection (PRS): 5 kt (including gusts)
- Maximum crosswind for runway selection (PRS): 15 kt (including gusts)

Thus, when wind criteria are exceeded, alternate runway configurations are put into operation by the air traffic controller.

6.3  Preferential Runway System (PRS)

A significant factor governing the selection of a runway for operation is the prevailing wind speeds. A PRS is defined as a runway combination that is used for environmental reasons, such as limiting the noise impact on surrounding residents. In case of a PRS, the selection is limited by maximum crosswind and

\textsuperscript{45} ICAO Annex 14 Vol 1 Aerodromes
tailwind speeds. When the crosswind and tailwind components exceed the specified limits, the runway in use must be switched to another for safety related reasons.

The runways at BRU are 25R/L, 07L/R, 01 and 19. Various equipment are configured for each runway resulting in some operational restrictions and inefficiencies. 

![Runways at BRU](image)

**Figure 6-3 Runways at BRU**

- **Precision approach**
  
  Runways 25L, 25R, 19 and 01 are equipped with an ILS (Instrument Landing System). This technology provides lateral and vertical guidance to the pilots and allows approach and landing operations in low visibility (and low cloud ceiling) conditions.

- **Approach procedure with vertical guidance (APV)**
  
  These procedures provide lateral and vertical guidance to all aircraft. The operational minimum visibility and/or ceiling requirements however, are higher than those applicable for precision approaches.

- **Non-precision approach**
  
  For runways 07L and 07R, being not fitted with an ILS installation, so-called non-precision approaches are published, relying on a radio navigational aid called VOR/DME. This technology

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46 **BATC - Runways in use**
provides lateral guidance only to the pilot, and the distance of the aircraft to the beacon, but not to the runway threshold. Due to these limitations, the operational minima (visibility and/or ceiling) for these approach procedures are higher than those applicable for precision and APV approaches.

The VOR/DME beacon is not located in the extended axis of RWY 07L. Therefore, an offset VOR approach is published, which requires arriving aircraft to make a final turn just before landing. This procedure is not allowed to be flown at night and, in case of strong easterly winds, RWY 07R should then be used for arrivals.

- **Taxiways**

RWY 07R, however, has no rapid exit taxiway. Moreover, on the last part of the runway, there is not even any exit taxiway. The aircraft then has to make a U-turn at the end in order to return to the last exit.

The table below presents the runways and their characteristics:

<table>
<thead>
<tr>
<th>Runway</th>
<th>ILS</th>
<th>Fast exit taxiways</th>
</tr>
</thead>
<tbody>
<tr>
<td>07L</td>
<td>No</td>
<td>Yes (2)</td>
</tr>
<tr>
<td>07R</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>25R</td>
<td>Yes</td>
<td>Yes (3)</td>
</tr>
<tr>
<td>25L</td>
<td>Yes</td>
<td>Yes (3)</td>
</tr>
<tr>
<td>19</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>01</td>
<td>Yes</td>
<td>Yes (2)</td>
</tr>
</tbody>
</table>

Based on these details, the PRS at BRU has been defined as shown in the following table. As can be seen, the night movements at BRU over the weekends have been limited to a single runway. Note that times are expressed in UTC:

<table>
<thead>
<tr>
<th>Weekdays (Mon-Thu)</th>
<th>Departures</th>
<th>Arrivals</th>
</tr>
</thead>
<tbody>
<tr>
<td>05h – 21h59</td>
<td>25R</td>
<td>25R / 25L</td>
</tr>
<tr>
<td>22h – 04h59</td>
<td>25R / 19</td>
<td>25R / 25L</td>
</tr>
<tr>
<td><strong>Friday</strong></td>
<td><strong>Departures</strong></td>
<td><strong>Arrivals</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

47 EBBR AIP
Study of the impacts on the environment with regard to noise pollution (BRU)

<table>
<thead>
<tr>
<th>Times</th>
<th>Departures</th>
<th>Arrivals</th>
</tr>
</thead>
<tbody>
<tr>
<td>05h – 21h59</td>
<td>25R</td>
<td>25R / 25L</td>
</tr>
<tr>
<td>22h – 04h59</td>
<td>25R</td>
<td>25R</td>
</tr>
<tr>
<td><strong>Saturday</strong></td>
<td><strong>Departures</strong></td>
<td><strong>Arrivals</strong></td>
</tr>
<tr>
<td>05h – 14h59</td>
<td>25R</td>
<td>25R / 25L</td>
</tr>
<tr>
<td>15h – 21h59</td>
<td>25R / 19</td>
<td>25R / 25L</td>
</tr>
<tr>
<td>22h – 04h59</td>
<td>25L</td>
<td>25L</td>
</tr>
<tr>
<td><strong>Sunday</strong></td>
<td><strong>Departures</strong></td>
<td><strong>Arrivals</strong></td>
</tr>
<tr>
<td>05h – 14h59</td>
<td>25R / 19</td>
<td>25R / 25L</td>
</tr>
<tr>
<td>15h – 21h59</td>
<td>25R</td>
<td>25R / 25L</td>
</tr>
<tr>
<td>22h – 04h59</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

When the PRS is not available, the alternate runway combinations at BRU are as shown in Figure 6-4. This preference also takes into account the infrastructural limitations at each airport runway. It is important to note that crossing runways have significantly less capacity and thus are preferably avoided.

In general then, factors that can affect the use of PRS and may result in the use of the alternate runways, can include:

- Associated wind thresholds
- Meteorological conditions (forecast and actual)
- Available length and condition of the runway (braking action, contamination, reduced lengths, etc.)
- Approach and landing aids available (ILS, VOR, PAPI’s, stopbars, etc.)
- Traffic (demand, complexity, safety)
- Airport constraints (de-icing, etc.)

**Thus, it is not only the wind criteria that impact the PRS use.**
6.4 Wind Roses at BRU

The following figure presents the weather statistics at BRU based on observations taken between 08/2002 - 02/2019 daily from 07:00 to 19:00 local time. As can be seen from the figure, the predominant winds at Brussels Airport are the westerlies from the South-West with an average wind speed of 8 kt.

---

[BRU wind statistics]
Figure 6-5 Weather statistics at BRU for 2002-2019 (07:00 to 19:00)

The following figures also present the wind roses developed for BRU from 2008 to 2018. The different colour scales represent the wind speed strengths with blue being slower and red being stronger wind speeds. The concentric circles represent the percentage of time over the year when the wind speeds reached a certain direction and strength.

For example, in 2010, the winds from the North-East were blowing close to 7% of the time that year whereas in 2012, the North-East winds were slower and as little as over 2.9% of the annual recordings.

By visually comparing the wind roses over the past 10 years, it can clearly be seen that the winds speeds and directions in 2010 (strong easterlies), 2012, 2014 and 2017 (weak easterlies) were extremely different.

The years 2014 and 2018 were also different with respect to the strength of the westerly winds.

As can be seen from the figures below, the dominant winds at BRU blow from the South-West sector which result in the use of the main runways of 25R and 25L. However, in 2017 there were less frequent North-East sector winds, whose intensity maintained the use of PRS and lowered the use of the alternate runway configuration 01/07R.\textsuperscript{49}

\textsuperscript{49} Skeyes, \textit{Increased Preferential Runway Use at BRU in 2017, 2018}
Study of the impacts on the environment with regard to noise pollution (BRU)
Study of the impacts on the environment with regard to noise pollution (BRU)
Study of the impacts on the environment with regard to noise pollution (BRU)

Chapter 2

6.5 Runway use and PRS statistics

The table below shows the PRS and alternate runway statistics at BRU. The majority of the factors that affected PRS use were meteorological conditions at or in the vicinity of the airport. However, non-availability of the runways or taxiways (7.63% in 2018) and cases where demand exceeded capacity (3.51% in 2018) were also causes to switch from PRS.

Figure 6-6 Wind roses for BRU from 2008 - 2018
Another point to consider during the interpretation of this table is that the wind criteria were legally changed constantly over the last 10 years or more and thus the percentage use of PRS and alternate runways cannot be directly related to the intensity of wind speeds as shown in the wind roses above.

<table>
<thead>
<tr>
<th>Year</th>
<th>PRS</th>
<th>Alternate runway</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018^50</td>
<td>75.53%</td>
<td>27.47%</td>
</tr>
<tr>
<td>2017^49</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td>2016</td>
<td>74%</td>
<td>26%</td>
</tr>
</tbody>
</table>

Figure 6-7 Percentage of PRS usage - 2018

^50 BATC - PRS statistics
6.6 **Legal Context**

6.6.1 **Modification History at BRU**

The wind criteria for PRS selection at BRU has undergone several modifications since 1980. The table below summarises these changes.

<table>
<thead>
<tr>
<th>Year</th>
<th>Crosswind</th>
<th>Tailwind</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>15 kt</td>
<td>6 kt (excluding gusts)</td>
</tr>
<tr>
<td>1980</td>
<td>15 kt</td>
<td>8 kt (excluding gusts)</td>
</tr>
<tr>
<td>12/06/2003</td>
<td>25 kt</td>
<td>10 kt (including gusts)</td>
</tr>
<tr>
<td>19/02/2004 (AIP</td>
<td>15 kt</td>
<td>5 kt (including gusts)</td>
</tr>
<tr>
<td>amendment 02/2004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19/02/2004 (NOTAM</td>
<td>25 kt</td>
<td>10 kt (including gusts)</td>
</tr>
<tr>
<td>A244/2004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04/03/2004</td>
<td>15 kt</td>
<td>10 kt (including gusts)</td>
</tr>
<tr>
<td>05/03/2004 (NOTAM</td>
<td>15 kt</td>
<td>8 kt (including gusts)</td>
</tr>
<tr>
<td>A291/2004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22/03/2004</td>
<td>15 kt – Rwy 25L/R and 07R/L</td>
<td>5 kt (including gusts) – Rwy 25L/R and 07R/L</td>
</tr>
<tr>
<td></td>
<td>15 kt – Rwy 02 and 20</td>
<td>0 kt (including gusts) – Rwy 01 and 19</td>
</tr>
<tr>
<td>27/05/2004</td>
<td>15 kt – Rwy 25L/R and 07R/L</td>
<td>5 kt (including gusts) – Rwy 25L/R and 07R/L</td>
</tr>
<tr>
<td></td>
<td>15 kt – Rwy 02 and 20</td>
<td>5 kt (including gusts) – Rwy 01 and 19 (day and night arrivals and night take-offs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 kt (including gusts) – Rwy 01 and 19 (day take-offs)</td>
</tr>
<tr>
<td>17/03/2005</td>
<td>20 kt – Rwy 25L/R and 07R/L</td>
<td>7 kt (including gusts) – Rwy 25L/R and 07L/R</td>
</tr>
<tr>
<td></td>
<td>15 kt – Rwy 02 and 20</td>
<td>5 kt (including gusts) – Rwy 01 and 19 (day and night arrivals and night take-offs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 kt (including gusts) – Rwy 01 and 19 (day take-offs)</td>
</tr>
</tbody>
</table>
On 19 December 2008, the Council of Ministers decided to consult international experts to analyse the impact of changes in wind criteria and their impact on the safety, capacity, use of tracks and noise pollution at Brussels Airport in more detail.

This resulted in the airsight Gmbh study\textsuperscript{51} and the final report was published on 24 September 2009. The main conclusions of the airsight study were as follows:

Based on risk analysis and study of best practices at European airports, the following wind criteria had to be applied at BRU:

- A maximum tailwind of 5 kt (including gusts)
- A maximum crosswind of 15 kt (including gusts)

These limits were applicable to both arrivals and departures, on all runways and at all times of the day. Additionally, in order for skeyes to perform smooth runway changes, wind speed tolerance values were defined as follows:

- 2 kt tailwind component (including gusts)
- 5 kt crosswind component (including gusts)

These limits would not have resulted in any significant changes in equivalent noise levels, noise levels and the areas affected by noise. The effect of these transfers on capacity was also expected to be small.

Meanwhile, between 2009 and 2010, ICAO circulated a proposal to amend the recommended limits for wind components for the use of a PRS. It was widely considered to increase the tailwind limits to 7 kt and crosswind limits to 20 kt (including gusts).

During the period of this discussion, the State Secretary instructed skeyes (Belgocontrol) to increase the maximum tailwind limit to 7 kt, including the 2 kt tolerance and a crosswind limit of 20 kt (both including gusts) and a tolerance 2 kt).

<table>
<thead>
<tr>
<th>Date</th>
<th>Tailwind</th>
<th>Crosswind</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/07/2010</td>
<td>15 kt</td>
<td>7 kt (including gusts) and a tolerance 2 kt)</td>
</tr>
<tr>
<td>19/09/2013</td>
<td>15 kt – 20 kt</td>
<td>0 kt – 5 kt (including gusts) - RWY 01, 07R/L and 19 (landings and take-offs) 7 kt - 12 kt (maximum gusts of 12 kt) - RWY 19 (take-off only) and 25L/R</td>
</tr>
<tr>
<td>06/02/2014</td>
<td>20 kt</td>
<td>0 kt – 3 kt (including gusts) - RWY 01, 07R/L and 19 (landings and take-offs) 7 kt (including gusts) - RWY 19 (take-off only) and 25L/R</td>
</tr>
</tbody>
</table>

\textsuperscript{51} Airsight, Study on maximum wind component limits applicable at BRU, 2009
gusts) in order for Belgocontrol to make a smooth transition to other runways. This decision was made despite the airsight Gmbh study recommendations.

This can also be seen in the current EBBR AIP which states different wind speed limits compared to ICAO recommendations. Specifically, the PRS selection limits for tailwind were raised to 7 kt (including gusts) for BRU, while ICAO recommendations are 5 kt (including gusts). Similarly, the crosswind limits are stated as 20 kt (including gusts) in the EBBR AIP, while ICAO recommends 15 kt (including gusts).

<table>
<thead>
<tr>
<th>RWY 25L/R</th>
<th>RWY 19 (TKOF only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailwind MAX</td>
<td>7 kt</td>
</tr>
<tr>
<td>Crosswind MAX</td>
<td>20 kt</td>
</tr>
</tbody>
</table>

Table 6-5 Current BRU AIP

<table>
<thead>
<tr>
<th>RWY 01</th>
<th>RWY 07L/R</th>
<th>RWY 19 (TKOF and ARR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailwind MAX</td>
<td>0 kt - 3 kt (incl)</td>
<td>0 kt - 3 kt (incl)</td>
</tr>
<tr>
<td>Crosswind MAX</td>
<td>20 kt</td>
<td>20 kt</td>
</tr>
</tbody>
</table>

In 2013, the pilots’ association in Belgium, the Belgian Cockpit Association (BeCA) met at the office of the Federal Minister of Transport in response to the large number of inaccuracies in the State Secretary’s decision regarding the change in wind standards at BRU.52

In the airport agreement concluded under Mr. Schouppe the maximum tailwind limit was 7 kt (including gusts) before another runway had to be taken into use. For air traffic controllers, there was also a margin of 2 kt (from 5 kt to 7 kt) within which they could decide to use another runway. In the new text by Mr. Wathelet, the preferential runway had to be used until the wind exceeds 7 kt, (excluding gusts) with a limit of 5 kt for gusts.

This resulted in the minimum limit of 12 kt tailwind (7 kt + 5 kt gusts), while the maximum permitted tailwind as recommended by ICAO while landing for almost all commercial aircraft is 10 kt. This in turn translated into situations in which pilots were legally not allowed to land because the tailwind limitations of the aircraft were exceeded and on the other hand the air traffic controllers were not allowed to use another runway.

52 BeCA, Letter to the Transport Committee, 2013
## 6.6.2 Legal timeline

<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
<th>Regulation</th>
</tr>
</thead>
</table>
| 1      | 17/12/2008 | Note au Conseil des Ministres, Gestion des nuisances sonores de l’aéroport de Bruxelles-National  
Repeal of Minister Anciaux’s dispersion plan with regard to the use of runways; wind standards to be reviewed by international experts, preferential use of runways 25 during the day and 25/19 at night is re-established |
| 2      | 25/02/2010 | Note to the Council of Ministers - Progress report on noise management at Brussels Airport and Proposed decision  
Governmental airport agreement of 2010 repeating the principle of ‘repartition equitable’ and adoption of 5 principles for SIDs and STARs and determining wind criteria |
| 3      | 15/03/2012 | Instruction ministérielle du Secrétaires d’Etat aux Transports adressées à l’administrateur-délégué de Belgocontrol  
Note related to the increase in the maximum tailwind speed to 7 kt is sent to Belgocontrol |
| 4      | 15/03/2013 | Lettre du directeur général de la DGTA à l’administrateur-délégué de Belgocontrol  
Aircraft with a total take-off weight (MTOW) between 80 and 200 tonnes may, at the pilot’s request, use runway 25R regardless of their destination, when both runways 19 and 25R are operational for take-offs.  
The wind standards are changed once again in order to increase the permissible rear winds, thus giving priority once again to the use of runways 25R rather than the 01/07R configuration in the event of North-East winds. |
| 5      | 19/09/2013 | Plan Wathelet Phase IV  
- Revision of wind standards involving less use of runway 01  
- Possibility of postponing some take-offs from runway 19 to runway 25R |
| 6      | 10/10/2014 | Accord du Gouvernement  
Belgocontrol is instructed to prepare and implement a return to the situation prior to 6 February 2014. The routes that were put into service on |
9 January 2014 and 6 March 2014 will be evaluated and, if necessary, modified as part of an acceptable solution. The airport agreements that were confirmed by the Council of Ministers on 19 December 2008 and 26 February 2010 will be the starting point for the policy to combat noise pollution and PRS will be maintained.

Arrêté royal relatif aux règles de l’air et aux dispositions opérationnelles relatives aux services et procédures de navigation aérienne

The flight routes (and the PRS) are imposed by the minister in the form of an instruction, which is the “decision” as described in art. 2, § 2

Servais case

The judgment rejects all the claims of Mr. Servais et al. They had requested that:

- RWY 01 should be used on an exceptional basis because of the serious damage to their health.
- Belgocontrol comply with the ministerial instructions given, in particular those concerning admissible wind components on the 25R and 25L preferential runways, which local residents do not consider to be the case at the moment.

The judge referred to the 2017 and 2018 judgments, which declared the instructions illegal, and therefore concludes that the parties are making an illegitimate request by requesting compliance with illegal instructions.

6.7 Environmental Impact of Wind Component Speeds

The effect of wind speeds on the landing and take-off effort and skill required are summarised in BeCA's 2013 letter to the Transport Ministry. Additionally, the complexity of parallel environmental impacts in terms of noise and emissions have been highlighted. The points are summarised here and should be taken into account in any future review of the wind criteria at BRU. Safety and capacity factors are an important consideration.

Take-off

- Aircrafts fly at a certain speed relative to the surrounding air, i.e. airspeed (depending on the length of the runway, the weight of the aircraft, the temperature and air pressure), and not relative to the ground speed. While taking off with tailwind, aircrafts require a higher power of the engines as they need to reach a higher ground speed with respect to the available runway length. This in turn results in higher fuel burn.
Aircrafts are able to climb less strongly while taking off with a tailwind and will therefore fly over a larger area lower to the ground. This results in more noise impact. The sound is also blown further away from the airport with tailwind in contrast to headwind, where the noise of the engines is blown back to the airport itself.

**Approach/Landing**

- Knowing that the winds at a higher altitudes are increasingly stronger than those closer to the ground, pilots have to bring their aircrafts into landing configuration in tailwind earlier, which also generates more noise. The stronger the tailwind, the more difficult it becomes to slow down an aircraft and the more time and distance it takes to configure the landing.

- With an increase in the tailwind, the number of unstabilised approaches increase. Aircrafts that are not stabilised at 1,000 ft (general rule for all airlines to avoid the risk of runway excursions), must make a go-around and start a new approach. In addition, most aircraft have a maximum tailwind limit of 10 kt for take-off and landing. Even if the pilots manage to be stabilized at 1000 ft, they are obliged to perform a go-around if the tailwind (average wind or gusts, here the manufacturer makes no distinction) is above the maximum limits of the aircraft. These additional go-arounds also impact the fuel efficiency of the aircraft (and the capacity of the airport).

- In cases where aircrafts perform a go-around and explicitly ask for a different runway due to weather conditions, air traffic controllers generally need at least 20 to 30 minutes before the runways can be effectively changed. Fuel for these extra 20 to 30 minutes is often not available for many flights (also considering the minimum fuel policy in aviation), which are then forced to relocate to other airports, resulting in poor fuel efficiency as well.

- Because runways have a limited length and aircrafts also have limited braking capacity, the aircraft has to move as slow as possible relative to the ground (i.e. have a low ground speed) in order not to overshoot the runway. A difference of 10 kt headwind and 10 kt tailwind gives a total difference of 20 kt ground speed. Knowing that the energy needed to stop an aircraft depends on the square of the ground speed, a difference of 20 kt gives a huge difference in the braking energy (by means of braking and thrust reverse) needed to stop the aircraft. Increasing the tailwind limits will only result in increased breaking power needed.
6.8 Wind Criteria Examples from other Airports

This section provides an overview, for comparison purposes, of the wind criteria stated in the AIPs of some major European airports.53

6.8.1 Amsterdam Airport Schiphol

In selecting the runway combination to be used from the preferential runway system, ATC in the Netherlands also applies wind speed criteria. In applying these wind criteria, gusts below 10 kt shall not be taken into account.

6.8.2 Barcelona El Prat Airport

ATC shall maintain the preferential configurations described below up to wind components of 10 kt tailwind, gusts included, and/or 20 kt crosswind.

6.8.3 Brussels South Charleroi Airport

RWY 24 will be assigned for take-off and landing, provided the runway is dry and the cross or tailwind component does not exceed 10 or 8 kt respectively. When the runway is wet or covered with snow or slush, the tailwind component is 5 kt MAX.

Noise abatement descent and approach procedures using continuous descent and reduced power/reduced drag techniques should be used when following conditions apply:

- Cross wind component lower than 15 kt (gusts incl)
- Tail wind component lower than 5 kt (gusts incl)

6.8.4 Budapest Ferenc Liszt International Airport

Deviation from the basic rules on RWY use is only possible under the following circumstances:

- When the crosswind component exceeds 15 kt or more (gusts included)
- When the tailwind component exceeds 5 kt or more (gusts included)

6.8.5 Copenhagen Airport

RWY 04L/R and 22L/R are preferential runways. RWY 12 and RWY 30 may be used when one or both of the preferential runways cannot be used due to the crosswind component on the preferential runways exceeding 15 kt.

6.8.6 Dublin Airport

Runway 10 or 28 is the required Runway between 0600 and 2300HR Local Time when the crosswind component is 20 kt or less. Runway 28 will be the preferential Runway when the tailwind component is 10 kt or less and braking action is assessed as good.

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53 EUROCONTROL - AIPs for European airports
6.8.7 Frankfurt am Main Airport

Landing direction 25 is the preferred direction to be assigned to landing aircraft, provided the tailwind component does not exceed 5 kt.

For departures to the South-West and South-East and East, runway 18 with the relevant standard departure route is preferred, provided the tailwind component for runway 18 is not greater than 15 kt.

6.8.8 Helsinki Airport

In applying these wind criteria, gusts below 10 kt shall not be taken into account.

Table 6-6 Wind criteria at HEL

<table>
<thead>
<tr>
<th>Runway conditions</th>
<th>Runway</th>
<th>Max Crosswind</th>
<th>Max Tailwind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway is clear, dry or damp</td>
<td>04L/22R</td>
<td>20 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td></td>
<td>04R/22L</td>
<td>20 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td></td>
<td>15/33</td>
<td>20 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td>Runway is wet and braking action is medium to good or better</td>
<td>04L/22R</td>
<td>20 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td></td>
<td>04R/22L</td>
<td>20 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td></td>
<td>15/33</td>
<td>15 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td>Runway is contaminated and braking action is medium to good or better</td>
<td>04L/22R</td>
<td>15 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td></td>
<td>04R/22L</td>
<td>15 kt</td>
<td>5 kt</td>
</tr>
<tr>
<td></td>
<td>15/33</td>
<td>15 kt</td>
<td>5 kt</td>
</tr>
</tbody>
</table>

6.8.9 Istanbul Sabiha Gokcen International Airport

Unless otherwise notified by ATC, PRS Operations shall be used in compliance with the conditions stated below.

- When the preferred RWY is dry and tailwind component is not greater than (does not exceed) 10 kt
- When the preferred RWY is wet and tailwind component is not greater than (does not exceed) 5 kt

6.8.10 London Heathrow Airport

In weather conditions when the tail wind component is no greater than 5 kt on the main Runway 27R and 27L, these runways will normally be used in preference to Runways 09R and 09L, provided the runway(s) surface is dry.

For the purpose of determining an infringement of the noise limits specified, if the aircraft was required to take-off with a tailwind, an amount of up to 2 dB of the noise recorded at the noise monitor should be disregarded. The amount to be disregarded shall be:

- 0.4 dB for a tailwind of up to 1 knot
- 0.8 dB for a tailwind exceeding 1 knot but not exceeding 2 kt
- 1.2 dB for a tailwind exceeding 2 kt but not exceeding 3 kt
• 1.6 dB for a tailwind exceeding 3 kt but not exceeding 4 kt
• 2.0 dB for a tailwind exceeding 4 kt

6.8.11 **Madrid Barajas Adolfo Suárez Airport**
The preferential configurations will be maintained until wind components are produced, including 10 kt gusts of tailwind and/or 20 kt crosswind.

6.8.12 **Manchester Airport**
Unless otherwise required by ATC, Runway 23R/23L shall be used for all movements when there is a head wind component and when a tail wind component is not greater than 5 kt on either runway or at 2000 FT.

6.8.13 **Milan Linate Airport**
ATC will use the above preferential runway provided that:

• If the runway is dry, the tailwind component is not greater than 7 kt
• If the runway is wet, the tailwind component is not greater than 5 kt

6.8.14 **Milan Malpensa Airport**
Taking into account provisions related to: Radial/Track Departure Scheme and Noise Abatement Procedures, RWY utilisation will be selected by ATS according to the following wind components:

• MAX 10 kt steady and measured tail wind component

6.8.15 **Paris Charles de Gaulle Airport**
All take-offs between 0000 and 0500 (local time of brake release) will be performed westward, provided the ground tail-wind component is not more than 1 kt. All landings between 0000 and 0500 (local time of touchdown) will be performed westward, provided the ground tail-wind component is not more than 1 kt.

6.8.16 **Paris Orly Airport**
All take-offs between 2330 and 0600 (local time of brake release) will be performed westward either on RWY 26 or on RWY 24, according to the runway availability, and with a tail-wind component not more than 5 kt (gust included).

All landings between 2330 and 0600 (local time of touchdown) will be performed eastward, either on RWY 08, or on RWY 06, according to the runway availability, and with a tail-wind component not more than 8 kt as far as the operating conditions (wind gusts, runway adhesion) are practicable.

Between 2330 and 0600 local time, as far as the tail wind component does not exceed 5 kt (gust included) and there is no technical reason against it, all aircraft will take off to West direction and land to East direction.

6.8.17 **Rome Fiumicino International Airport "Leonardo da Vinci"**
In order to change RWY configuration from the preferential one, ATC will consider the following items:

Wind components if steadily exceeding following speed measured on RWY 16L/34R (or RWY 25 in case of anemometer failure), which are not to be intended as an operational limitation but as a guideline for ATC
when selecting RWY in use: 30 kt steady cross wind component (gusts included) and 10 kt steady tail wind component (gusts excluded).

6.8.18 **Václav Havel Airport Prague**

Exceptions for determination of RWY in use

- Cross-wind component, including gusts, exceeds 15 kt (28 km/h)
- Tail-wind component, including gusts, exceeds 5 kt (9 km/h)

Reduced runway separation minima shall only be applied if tail wind component shall not exceed 5 kt.

6.8.19 **Vienna International Airport**

ATC will assign the runway in use for departing and arriving aircraft according to the preferential runway system. Pilots that cannot accept a cross wind component of maximum 25 kt (mean wind) or 30 kt (gusts) on a dry runway (no contamination) or a cross wind component of maximum 20 kt (mean wind) or 25 kt (gusts) on a wet runway, at the following conditions, shall advise ATC as soon as practicable and have to prepare for delays up to 25 minutes due to re-sequencing process.

1. Precision IAP available (ILS)
2. Braking action good/coefficient 0.4 or higher
3. Current surface wind reported by ATC after the arriving aircraft passed the outer marker
4. Wind information for the runway in use is included in ATIS
5. If cross wind component of the mean wind is greater than 15 KT, ATC includes variations in wind speeds of more than 5 KT between mean wind and gusts in the landing/take-off clearance

6.8.20 **Warsaw Chopin Airport**

Noise abatement shall not be the determining factor in runway nomination under the following circumstances:

- When the cross-wind component, including gusts, exceeds 28 km/h (approx. 15 kt)
- When the tail-wind component, including gusts, exceeds 9 km/h (approx. 5 kt)
7 Structural Improvements

7.1 Section Overview

This section of the report provides suggestions and options for addressing the issues found by this study as set out in Chapter 1 and elaborated further in the earlier sections of this Chapter 2 report. The example options provide here are based on tried and tested good practice employed in other states, to address noise management at airports of a similar scale and with similar noise problems to BRU. The good-practice structures and processes employed in other states have been modified in this report to reflect the complex governance found in Belgium.

BRU is located close to a major capital city, and the runway orientations mean that some overflight of densely populated areas is unavoidable. Additionally, BRU is located close to the boundaries between different Belgian Regions, having a transboundary impact across different political and regulatory areas. Thus, it is a single point of origin for significant and widely dispersed social and environmental impacts. These impacts directly and significantly affect the quality of life of local people and are therefore of high public and political importance.

Belgium has complex political and regulatory processes and structures. Each Region has individual regulatory powers on environmental impacts including aircraft noise. The Flemish Region has Competent Authority status on aircraft noise and in accordance with EU directive 2002/49/EC, has developed Noise Action Plans for BRU and surrounding airspace. This plan mentions in some detail how cooperation between stakeholders is being achieved and will be enhanced, but Envisa could find little evidence that such stated joined up thinking is fully effective in practice. For example, the draft update to the action plan, presently available for consultation is currently only produced in Flemish language and few people Envisa spoke to were aware of its contents.

This does not mean that good practice in noise management is not being achieved at BRU, by both governance and operational stakeholders. Aircraft noise is taken seriously by stakeholders and best endeavours are being made to minimise noise impact. However, this practice is not always fully effective and is hampered by less than effective co-operation and lack of joined-up thinking and actions.

Over the past two decades or so, relatively frequent changes to aircraft flight paths and procedures, presumably done out of good intentions to protect local communities, have not minimised the noise impact for the entire affected population. It is true that as a result more people have been and are presently affected by aircraft noise around BRU than need to be. These frequent attempts to protect local communities by passing the noise impact around, and the use of aircraft noise for political leverage by elected officials, has raised aircraft noise as a key matter of public concern and one of intense media interest. The judiciary, also acting from the perspective of protecting human rights, have also served to drive changes to the noise climate in attempts to protect some communities, but this has shifted impacts onto other communities and has made aircraft noise impact less predictable.

54 Departement Omgeving, Noise Action Plan 2019-2023 for Brussels National Airport, 2018
This situation is exacerbated by lack of clarity on some operational rules, fragmented regulation, lack of adequate performance monitoring and inadequate public information, consultation and engagement. Understandably therefore, all affected populations, local authorities and Regional Governments have realised that they must fight to protect their own individual interests and that winning this fight will usually trigger decisions to move noise away from their locality. This situation makes the implementation of an overall equitable solution difficult. The processes, structures, policy and regulations to address this situation are either not in place or are not fully effective. It is a widely held view that BRU noise has become a ‘political football’ and is not effectively controlled. This has led to multiple legal actions that seek to impose sanctions and/or solutions.

It is not possible for any external agency to solve these structural and process problems, since each player would resist any attempt to reduce their ability to control aircraft noise impact on their communities.

Nor is it possible for any scientific study to propose an operational or infrastructure solution that would be universally accepted in such a sensitive and charged political, cultural and legal situation. Some solutions that work at other airports may be replicable for BRU but no entire model solution package can be picked up and dropped onto the Brussels situation.

Ask any scientist from a pure noise perspective what is the best aircraft noise solution and they will say that it is to close BRU and not replace it. Of course, from an economic, human rights and social perspective this would have severe implications and would not be achievable overnight - the present problems would still exist for some time and still need to be addressed. It is also true that the demand would be served elsewhere, and the adverse impacts including from ground transport and from communities close to the recipient airports would also be significant and could outweigh any benefits achieved around BRU.

It is not likely that any single solution could be ‘dropped’ into the BRU situation and be expected to be universally accepted and implemented. It is essential therefore that BRU stakeholders work together to establish the processes, structures, policies and rules required to facilitate a fair and equitable solution to the present noise turmoil surrounding BRU. This will require common understanding, common agreement, transparency, compromise, and effective and honest internal and public communications. It may require radical solutions to be planned for the longer-term. This does not absolve stakeholders from the responsibilities to find short-term and medium-term solutions to the immediate problems. Stakeholders must buy into this process for the long-term.

In this section, Envisa offers some candidate processes, structures and policies that could, if implemented properly, start the transition to a more sustainable aircraft noise management situation. These are options only and it is up to local stakeholder to decide what will work for BRU. Some structures and processes may already theoretically exist. In which case, their effectiveness needs to be reviewed and where necessary changes may be needed to make them fully effective. This is a matter for federal led collaboration with all relevant stakeholders engaged. Retaining the present regional approach, without harmonisation, will only prolong the present situation. Regions however will still have a pivotal role in developing, implementing and monitoring the agreed plan.

If the correct structures and processes are not in place and functioning effectively, then the present turmoil and in-fighting will continue, operational solutions will neither be optimised nor settled, and public mistrust and unrest will remain high. It is also likely that legal challenges will escalate. More specific
operational solutions for consideration through the agreed structures and processes are provided in section 11.

What follows are suggestions based on general good practice at other airports. It is up to Belgian stakeholders to decide what structures, processes and roles are needed for their situation. It is essential that stakeholders start by honestly acknowledging basic facts and by ensuring that the public understand what is being considered.

Limitations of this report:

This report is a starting point and not a silver-bullet solution. It is important not to raise unrealistic public expectations of this report. This report will achieve nothing unless stakeholders act effectively and in the overall Belgian public interest – and not just from the perspective of their local remit. The general public should be made aware of this from the outset.

7.2 Preparation

It is essential to have the following in place to allow the aircraft noise management process to be commonly agreed, to allow dispute resolution and to ensure transparency:

- The correct structures in place to allow cross-party discussion – this may require new legal agreements to allow these to be established.
- Agreed initial roles, powers and responsibilities for the main stakeholders with an acknowledgement that new or changed roles, powers or responsibilities may emerge as the noise management discussion progresses.
- An agreed process and sequence to facilitate common agreement.
- Effective two-way consultation processes are established with key stakeholders and with the general public.

Suggestions for each of these components is offered in this document. It is hoped that this document will offer the basis for stakeholder engagement in establishing the process to address the present situation.

It should be acknowledged at the outset that the process to arrive at a commonly agreed holistic plan will take time, but that short-term improvements will be progressed more rapidly, where common agreement can be reached quickly. Present planning and arrangements should continue until a way forward is commonly-agreed. It should also be acknowledged at the outset that it is impossible to protect everyone and that some people will suffer more noise and/or overflight than others when solutions are implemented. It is essential to make people aware of the limitations of any noise mitigation solution package; and, that it may not always be possible to achieve the plan despite best endeavours. Defending one community at the expense of another, without adequate and independently verified justification, will only prolong the present turmoil. Honest and effective communications with all affected parties, will be essential to regaining lost trust and this will take time.

7.3 Announcing Commitment

The overall philosophy for handling this report should be one of honesty and transparency. It would be a useful starting point for stakeholders to publicly admit that they have collectively made mistakes in the past and are jointly committed to finding solutions.
Stakeholders should **jointly and publicly** commit to working together to address the present and historic failings in noise management of BRU. They should **jointly and publicly** commit to transparency and honesty in dealing effectively with this topic in the future. They should **jointly and publicly** commit to treating aircraft noise as a common priority, and will seek short-term, medium-term and longer-term solutions to minimise aircraft noise impact, whilst underpinning the successful and sustainable development of BRU and for Belgian air-transport mobility needs.

**It will be important not to raise unrealistic public expectations.** Envisa believes for example that because of media treatment of this report, public expectations have already been raised that this report will solve all existing issues upon publications. Some communities close to the airport are likely to be hoping that this report will force changes to where aircraft will fly and that they may be alleviated or impacted soon after publication. Whereas depending on what is agreed by Belgian stakeholders, the total short-term effect of this report may be small.

Any announcement of commitment should cover **commonly-agreed** facts such as:

- BRU is an economic and global mobility asset of national importance; and, its development must be sustainable, if it is to continue to deliver its benefits to the Belgian People.
- Aircraft noise, and its mismanagement, are putting the sustainability benefit potential from BRU at risk.
- BRU is located very close to a major capital city and the runways are oriented to mean that frequent overflight of densely populated areas is unavoidable.
- Rules and regulation are presently unclear and fragmented – and this must change.
- Present Noise Action Plans are well-meaning and propose good solutions but are not effective in practice partly because of poor cooperation between decision makers.
- Well-meaning politicians and judiciary have exacerbated the situation by imposing frequent changes to where, when and how aircraft fly, sometimes without adequate impact assessment.
- **Whatever solution is adopted, many people living in the vicinity of such a large airport will continue to be subject to severe noise impact and many more will be annoyed.**
- **There are no unpopulated areas of Belgium large enough to accommodate a major airport without some people being affected.**
- **Whilst some short-term fixes to the present performance may be implemented, that the eventual solution for the present infrastructure may not be radically different from the present situation.**
- **If significant changes are agreed (for example to airport infrastructure) it may take some time for these to be implemented.**

### 7.4 Governance Structures and Roles

#### 7.4.1 Governance Overview

In the context of this report, governance structures are taken to mean the entities and processes that are required for reaching common agreement for aircraft noise management policy and regulation - and for good noise management oversight, review and enforcement/improvement. The scope of governance as used in this report covers all decision-making management layers from federal to operational and even the general public.

Governance arrangements in Belgium are particularly complex with some devolution of environmental regulation powers to individual regions, to cover what is in fact a single trans-regional-boundary source of
adverse impact. Additionally, local decisions on how BRU is operated can have trans-state-boundary implications. For example, where non-optimal runway configurations for capacity are imposed that produce Air Traffic Flow Management (ATFM) delay affecting BRU city-pair airports in other countries with implications for the efficiency of the international Air Transport Management (ATM) system as a whole.

Some decisions taken as a result of this report may also have implications for other Belgian airports from a level-playing-field or best practice sharing perspective, and so the scope of governance for BRU noise may be wider than just the areas in and around Brussels City. Joined-up thinking, planning and action is therefore needed at all levels of Belgian governance, if existing aircraft noise from BRU is to be effectively managed and especially if significant longer-term solutions are to be implemented. Because of the transboundary implications of aircraft noise and its regulation and management, coupled with the need for stability and predictability in the noise climate, harmonised rules will be needed that include prevention of arbitrary decisions being taken that change how and where aircraft fly. This joined-up thinking and harmonisation will require multi-party structures to allow common agreement to be reached. Clarity on rules, roles and responsibilities will also be needed as will effective engagement of all affected parties including operational communities, local amenity groups and the general public.

Envisa are not experts in Belgian governance or judicial and legal processes and structures, but Envisa does understand how these structures function effectively in other states and at other airports. Some initial moves towards the required structures and processes have already been undertaken or are planned according to the previous and current draft of the Noise Action Plan for BRU that is being prepared by the Flemish Region. There is evidence however, that the plan has not been fully effective and that more sophisticated governance structures and a more complete suite of noise management processes are needed. It will be up to Belgian stakeholders however, to organise themselves into those structures that work in Belgium. This may require changes to primary legislation or new cross-party agreements, but again these are matters for Belgian stakeholders. Whilst a federal approach is ideal when dealing with regulation and management of transboundary impacts, it may be inevitable that this is not practicable in Belgium. One solution to this could be that a commonly agreed and harmonising federal framework aircraft noise policy is then regulated Regional Government level. This report however, recommends federal facilitation, implement and regulate commonly-agreed solutions.

The fact is that it is not possible for aircraft to moderate their flight when they cross local boundaries. Moreover, the agencies that control where and how aircraft fly are not governed at regional levels but at the national and international levels. It is also true that presently decisions affecting aircraft noise distribution in one or more Regions are ultimately approved by a single Region. This can lead to breakdown of trust between governments and local communities. Additionally, not all pillars of the ICAO Balanced Approach can be controlled by a single Regional Government, for example, land-use planning around the airport and noise abatement operating procedures, which can be influenced by differing regulation in each Region. A regional approach to such rulemaking may make the breaching of rules inevitable, even by approved aircraft that are operating in accordance with published procedures.

What follows is a description of potential structures and processes that Envisa recommends for joint and transparent consideration by stakeholders. Much of what is required in terms of regulation and functions already exists. It is the effectiveness of the existing allocation of competences and accountabilities that is questionable – especially where adequate specialist skills do not yet exist. The focus of this section
therefore is to describe structures and their remits as they exist elsewhere and that should be considered for adoption in Belgium.
7.4.2 Structures Overview

The following diagram provides a summary of recommended governance structures:

(* = new or changed role/function)

![Diagram of governance structures](image)

**Figure 7-1 Recommended governance structures**

7.4.3 The State’s Role

Envisa strongly believes that because of the transboundary nature of aircraft noise and its management, that the optimum solution for the majority of affected populations will require some degree of greater federal involvement in noise management governance and harmonisation. This is true even if the enactment of harmonised rules is taken at regional level.

Typically, the State both directly and through its regulators and independent judiciary, is the ultimate arbiter and decision-maker for aircraft noise management for all airports in the state. For efficiency it typically sets noise related policy and regulations and empowers regulators and nominates competent authorities to oversee their implementation. Such rules would typically cover all pillars of the ICAO Balanced Approach but may be enacted through different legal instruments (e.g. both land-use planning and aviation law). States then typically only become active where a significant dispute is notified for state intervention, or when a major change to airport infrastructure or airspace is being proposed. For major capital city airports however, some States (e.g. the U.K) may take a more active role, for example,
coordinating and approving public engagement processes and facilitating noise management related
dialogue between communes – seeking to harmonise and helping spread good practice.

The State enacts policy, regulations relating to aircraft or airport noise management plans and any
associated topic such as land-use planning. The State tends to concern itself with mechanisms with
potential implications at an international, national and multi-regional level. For example, the State could
intervene where any regional or local policy or decision has potential implications for communities outside
of the boundaries of the authority making that decision. In practice, such state intervention is not normally
required if state regulation requires consultation prior to such decisions and where a fully competent state
regulator has oversight of such decision processes.

The State establishes the governance framework to ensure that approved regulations and decision-
making affecting the noise climate are delivered and delegates authority for implementing and enforcing
such policy regulation or plans. The State will seek to establish a policy, regulatory and decision-making
framework designed to achieve the best sustainability balance from major airport development and
operations taking into account it’s international obligations and national social, environmental and
economic imperatives. The State would take into account the suggestions and concerns of all stakeholders
including local and Regional Government – but would be the ultimate arbiter of the required policy and
regulation.

The State often establishes public legally constituted decision-making processes for any proposals plans
that can change the noise climate around a major airport. These processes usually allow the concerns and
opinions of all affected parties to be taken into account before such decisions are taken.

Taking account of the advice of its advisory body and through its agencies, the Federal Government could
undertake executive harmonisation functions such as:

- Enacting applicable international law and overseeing compliance
- Establishing a harmonising aircraft noise policy for BRU (and possibly for all airports nationally)
- Including harmonising methodologies and standards for noise enforcement practices and
  requiring that noise penalty levels are agreed by all regulators representing areas affected by such
- Establishing consultation processes to facilitate transparent and open dialogue with stakeholders
  - and to facilitate debate and as much consensus as possible before decision-making
- Approving major airspace and the use of new navigation technologies. This would be developed
  and proposed through consultation processes as described in the process section of this report.
- Preventing arbitrary decisions or judgements being taken that change how and where aircraft fly,
  without adequate independent assessment or consultation with those affected
- Land-use planning policy and guidance around the airport(s)

### 7.4.4 State Independent Government Advisory Body

Because of the complexities of Belgian governance, consideration should be given to the establishment of
a multi-party independent advisory body to advise the Federal Government and to facilitate
harmonisation and common agreement between stakeholders. This should be the main body where
consensus is sought and from where the detailed research, planning and implementation activities are
overseen.

This body could include (not limited to):
Study of the impacts on the environment with regard to noise pollution (BRU)

- State Mobility (Chair)
- State planning
- Regions
- Regulator(s)
- Airport Consultative Committee Chair (CC)
- Operational stakeholders
- Others by invitation as required .. (e.g. Local Authorities, amenity group federation representative, Mediator etc.)

The Belgian constitution may require State and Regions to enter into multi-party formal agreements before they can collaborate. Indeed, this requirement is mentioned in the latest draft BRU Noise Action Plan. Such agreements however need structures and processes to ensure that they are enacted. It may be that a suitable collaborative structure that can provide a forum to allow the required oversight and dialogue between the key stakeholders already exists. But it is recommended that a specific body is established to ensure that sufficient importance is given to aircraft noise and that this is demonstrated publicly. The work of the advisory body should be transparent and made public and key decisions should be the subject of comprehensive assessment and consultation to best practice standards.

It is a key role for all such governance and operation collaborative bodies (e.g. the proposed BRU CC, and the BRU Collaborative Environmental Management (CEM) group) to produce coherent and commonly agreed public information. It is impossible to completely eliminate rumour and mis-information from being generated but having trusted and commonly agreed sources of information is one cornerstone of public trust. This will need effective coordination between such bodies, and it will also require independent verification of information, and possibly a single source, which could be a task for a State Regulator.

### 7.4.5 State Regulator

It is normal for a suitably skilled State Regulator to be established, outside of normal government executive processes, to have overall regulatory powers on aircraft noise within established policy and agreed regulations. This regulator tends to have authority over all the airports of a state. The regulator could be a specific Competent Authority (to work closely with the aviation regulator), solely dealing with aircraft and environmental impact (including noise) (eg: ACNUSA in France). More frequently it is the aviation regulator (CAA) that is given this regulatory role. The regulator role (in this topic) is to enact and enforce agreed noise related rules and regulation with powers to take punitive action where necessary (through due legal process). The regulator would normally have a very strong competence in aircraft noise assessment and control - often establishing a centre of excellence in this subject. They would normally represent the state in international policy discussions and consultations.

The regulator would provide advice on aircraft noise policy and regulation to the Government including advice on noise limits and the penalties to be applied for breaches. Depending on the precise set-up and allocation of powers between the regulator and the judiciary, the judiciary sometimes only have a role in regulation where there is a dispute. In other example regimes, the judiciary have the role of deciding guilt or innocence and the penalties to be applied (within agreed guidance) when the regulator prosecutes a stakeholder for non-compliance.

The regulator would have oversight of consultation processes and could stop proposals where he was not satisfied that regulations have been complied with to their satisfaction. The regulator would normally be the main enforcer of agreed regulations with the Judiciary only becoming involved where a dispute,
injustice or unlawful act is reported or suspected. For example, the mission of ACNUSA in France is: “As the principal independent administrative authority concerned with the environment, ACNUSA’s main missions are to reopen communication channels, rebuild trust, and ensure that the development of air transport does not penalise residents”. This offers residents some reassurance that aircraft noise is independently treated.

At present in Belgium, aircraft noise regulation (like most environmental regulation of geographically located pollution sources) is handled by the Regions. This means that one Region can regulate a source in another Region and that a Region with ownership of an airport self-regulates. In addition, Regulation 2014/598 requires the Competent Authority for the regulation, to be separate from the airport operator. This may not be the case where a Region has any form of ownership in an airport for which it is the 2014/598 Competent Authority.

It is understood that the Belgian Constitution establishes regulatory powers for aircraft noise at regional level and this may prove difficult to change since the Regions will wish to have power to protect their citizens. If it proves impossible to establish a federal regulator for aircraft noise, then their needs to be mechanisms in place to ensure that action plans are delivered, that local regulations do not inadvertently distort aircraft flight patterns from the commonly agreed least harmful operations or that national economic harm is not inadvertently caused. This will entail mechanisms such as harmonising policy, common agreements and overarching forums for ongoing discussion and improvements. Developing multiple regulations for a single airport is not cost effective and some level fragmentation (e.g. different interpretation of law) may ensue. If sufficient trust and agreement can be engendered, then coherent regulation could be commonly agreed through overarching structures and then regionally enacted.

A more potentially difficult, but ultimately more efficient route, would be to establish a single overarching regulator for aircraft noise, which could cover all Belgian airports. Local stakeholders could then develop airport noise plans through collaborative structures to meet local objectives with the national regulator ensuring international and national regulations are met (such as assessment and consultation obligations) but would otherwise not become involved unless a major change required approval, or a local dispute required external adjudication. The national regulator could then call in the judiciary where needed.

7.4.6 Judicialiy

The judiciary enforce established rules and regulations as these lie within their powers and normally where the regulator has no delegated powers, or where there is a dispute. The judiciary would normally work closely with the regulator before starting a judgement process. The main instrument for the judiciary to resolve disputes is a public Judicial Review. The judiciary would normally publish the basis for their findings and can also recommend changes required to enable a blocked proposal to be made lawful. They do not normally impose judgments that result in a change to an agreed policy, rule or regulation that affects directly or indirectly where, when or how aircraft fly. That is not normally their function. The judiciary may make a case for the involvement of the regulator. There is normally an appeal process set in place to ensure justice is seen to be done – typically by referring disputed judgements to a higher court.

The role of the ‘Judiciary’ in exercising their ‘local’ power on a matter of national importance should be reviewed. If it is decided to establish a regulator, it will be essential to clarify the relationship between the regulator and the judiciary. It is essential that the judiciary does not directly impose judgements that can affect where, how or when aircraft fly. That is a matter for State policy.

It is essential that whilst the powers of the judiciary to uphold the law and human rights must be maintained, because of the transboundary implications of decisions and the risk that arbitrary decisions may increase overall impacts or may stimulate public unrest however, clear processes and rules need to
be established to ensure that judgments do not have unexpected or deleterious effects on the noise climate or on compliance with international rules. Judgements should uphold commonly agreed noise action plans and not change them. Judgements may oblige decision-making structures to treat an issue where it is decided an injustice is occurring.

7.4.7 Regional Governments

Given the establishment of the national advisory body and the regulator, the regulatory powers of Regional Government should be reviewed. It is not normal for uncoordinated regional regulation of a capital city airport, which can result in the transposition of noise or changes to aircraft overflight in other Regions. Whilst it is understood that Regions have a responsibility to protect their citizens, the imposition of local rules by one Region that are designed to move aircraft over other Regions is not sustainable. Consideration should be given to establishing a holistic perspective, policy and decision-making process and this will require State decision-making and coordinated regulation. It is however essential that Regional Governments can input their requirements and citizen's concerns and requirements through established channels including through the independent Advisory Body. It may also be a requirement for Regional Governments to be the bodies responsible for enacting common agreed rules or enforcement regimes.

A key driver of the holistic regulation should be the agreement of guiding principles and published national policy on this topic; and subsequently a supporting plan can be established that can provide significant roles for Regional Government.

7.4.8 Local Authorities

The local authorities around BRU are a key stakeholder for noise management with particular competence in land-use planning around the airport. This planning process should be harmonised with the Noise Action Plan and will comply with state planning law including all specific prohibitions, requirements and standards with relevance to aircraft noise.

In representing their communities, the Local Authorities would normally send a representative to the Airport Consultative Committee, which would be their main communication conduit with the operational community.

Local Authorities would send make representations to the BRU Advisory Body either directly or via Regional Governments. They would also have a responsibility to support public communications of noise related performance, progress and plans in coordination with the Mediation Service and if requested by the Consultative Committee.

NOTE: It may prove useful if local authorities covering all those areas significantly affected by aircraft noise from BRU, could arrange to meet each other periodically, to agree and promote common objectives and positions, where this is possible. This would help to share experiences, foster understanding and to streamline consultation processes.
7.4.9 **Airport Consultative Committee (CC)**

In line with good practice at many airports, an airport CC should be established. This will be an independent advisory body for the airport operational stakeholders that will officially represent the concerns and views of the wider community and provide a conduit to provide airport information to the public. Consensus will need to be reached as far as possible – it will also provide a mechanism for making people aware of technical limitations, etc. of operational measures. The CC can also help to shape and check communications on airport matters since representatives of the public can help to design reports, etc. The CC may establish long-term or task oriented working arrangements such as technical working groups or advisory panels. The CC should be a public meeting open to public and media – minutes should be published too. Contact details of members should also be published so that the public can raise specific concerns for discussion/follow-up. The operational stakeholder CC should comprise of:

a. Independent chair from outside of the noise affected area  
b. State P.O.C.  
c. Regional Governments  
d. Local Authorities of affected communes – as elected representatives and as required, specialist officers (e.g. technicians, planners, etc.)  
e. Amenity groups  
f. Mediation Service  
g. Passenger representatives  
h. skeyes  
i. BAC operatives  
j. BAC shareholders  
k. The Airport Operational Committee (airlines)  
l. Union representatives  
m. BATA  
n. Others as determined.

It may be prudent for a small delegation of key BRU stakeholders to observe one or more well established consultative committees at notable airports (London Heathrow and Manchester airports have active CCs). They may also obtain their terms of reference. The value of such CCs and how such could be adapted for BRU would be evident.

Note: This is one suggestion that may be replicated at other airports and could be made mandatory by regulation.

7.4.10 **Amenity Group Federation**

Local Amenity Groups would typically act in their own interests and engage with other structures as they see fit. Potentially however, a federation of amenity groups could be established and formally recognised as a key stakeholder. This would help to streamline consultation since where there is consensus this can be developed at this level. It may be impossible to achieve consensus on particular topics because of local interests (nimbyism) – but a common community voice would help to streamline, harmonise and coordinate communication to the public.
7.4.11 Operational Stakeholders

- **Airport Operator**

  The airport operator is the team appointed by the airport owners to develop and operate the airport and its infrastructure. Normally the airport service partners (e.g. aircraft operators, concessions, tenants handling agents, etc) would be selected by the airport operator and operate within rules and agreement set by the airport operator within a regulatory framework. Aircraft noise and noise from ground operations can provide a significant cost burden and potential constraint on an airport and hence the airport business. Decisions taken by the airport operator on route development, operational marketing, airport infrastructure, etc. can all have significant noise implications. At many airports (but not all) the air navigation service provider service for an airport is funded by the airport and thus aircraft operations, and navigation and surveillance technologies are specified by the airport.

  For all or any of the above reasons, the airport operator is usually the lead entity for the airport operational community when it comes to noise (and other widespread impacts). It is the airport operator that proactively implement, encourage or require:

  - Liability for any planning conditions concerning noise
  - Minimising noise in its decision-making processes and infrastructure development
  - Encouraging (or demanding) good noise management practice through:
    - Operator selection
    - Runway and taxiway design, configuration and operation
    - Ground noise management and infrastructure
    - Voluntary curfews
    - Noise related charges
    - Penalties
    - Establishing collaborative operational processes to jointly manage noise
    - Agreeing mitigation procedures with the Air Navigation Service Provider (ANSP)
  - Monitoring and modelling of noise and overflight
  - Noise performance reporting
  - Public engagement and communications
  - Public consultation
  - Mitigation and compensation funding and facilitation (e.g. sound insulation schemes, engine test facilities, etc.)

  The role of the airport operator in noise management is set out in the Aerodrome Operating Licence provided by the Federal Government. **It may be prudent to review existing performance of the present airport operator against these obligations and to seek to enhance these requirements when the licence is next open for negotiation.**

- **Air Navigation Service Provider (ANSP)**

  The main role of the ANSP is to ensure the safe and expeditious movement of aircraft. This is carried out by services such as airspace and procedure design, tactical air traffic control, flow management, provision and development of simulation, navigational and surveillance technologies and so on. The ANSP has a crucial role therefore in facilitating where and how aircraft operate on and around an airport – and hence on the noise climate. The service that the ANSP
provides for an airport is sometimes funded and covered by a contract with the airport operator and hence their role may be dictated to some degree by the airport operator. The ANSP's role and the required obligations and targets for noise should however be set out in rules and regulations. According to such agreed rules and regulations, the ANSP is usually also required to facilitate or implement noise mitigation and management routes, procedures and techniques and to comply with requirements on stakeholder consultation and engagement including with the public. For proposals that affect operations on or around an airport, consultation is usually designed and conducted by in conjunction with the airport operator and any involved services partners. Ultimately, as a service provider, the ANSP may propose noise performance improvements, but their main role is to ensure agreed air navigation rules and regulations are implemented – including any agreed noise management measures.

• **Aircraft Operators/Pilots**

Aircraft operators select the equipment to be flown in accordance with noise restrictions. A pilot's main obligation is ensuring the safety of their aircraft, passengers and third parties. A key safety requirement as encouraged by ICAO is to avoid the unnecessary proliferation of local rules. This is because pilots operate into multiple airports and changing their standard operation procedures to accommodate local rules can erode safety. However, pilots and aircraft operators often proactively seek to accommodate specific and significant noise requirements where safety is not compromised.

Within constraints therefore aircraft operators and pilots often strive to achieve noise performance requirements including:

- Accurately following preferred noise routes and altitude requirements
- Implementing noise abatement departure procedures or Continuous Descent Operations (CDO) to the extent that operational requirements allow
- Fulfilling curfew obligations to the extent possible (within the rules applied and exemptions permitted)

• **Slot Coordinator**

The slot coordinator is an independently constituted authority whose main role is to oversee the use of runway slots that have been allocated to aircraft operators and to ensure that abuse (e.g. any avoidable off-slot operations) do not occur. The slot coordinator has various powers available to sanction regular slot mis-use and often conducts regular meetings with operations stakeholders and the aviation regulator to review and improve slot adherence performance. The slot coordinator has a key role in ensuring that any night curfew and QC systems are operated correctly.

• **Collaborative Environmental Management (CEM) Group**

This is an on-airport operational group comprising airport service partners. Typically, the core CEM stakeholders are the airport operator (lead), Aircraft Operator and Air Navigation Service Provider – with secondary stakeholders, according to topics, that may include the regulator(s), slot coordinator, handling agents, etc. The group should follow the CEM guidance produced by
EUROCONTROL. CEM’s main objectives are paraphrased here – but explained in more detail in official CEM guidance:

- To improve understanding of the shared environmental priorities facing the whole airport community
- To consider candidate operational improvements suggested by external stakeholders via the Consultative Committee and to inform and consult with external stakeholders on planned improvements, where these may influence impacts beyond the boundaries of the airport
- To collaboratively agree and target areas for improvement including noise management
- To collaborate on public communications and when providing input into external consultation and planning processes

Note: CEM has only very recently been adopted at BRU.

7.4.12 The Mediation Service

The mediation service is an independent body that acts as a conduit and independent investigator on behalf of airport neighbours. The mediation service receives, investigates and responds to complaints and queries form the public and produces detailed reports on the performance of published aviation operational rules that can affect surrounding communities, especially aviation noise. The mediation service can offer advice to operational stakeholders on how operations are affecting communities and liaises with noise related community lobby groups. The mediation service also provides public explanations for operational matters seeking to make these understandable by lay-people.

The independence of the mediation service is essential to its proper function. Presently, oversight of the performance of its duties lies with the Federal Government. It may be prudent to establish a periodic review process to be conducted by the government or its agencies (if established), such that the independence of the mediation service is validated. It may also be prudent for the mediation service to attend the proposed Airport CC as a useful and efficient forum to explore emerging community needs and to receive suggestions for future mediation developments.

Note: These structures and processes would also engage with sensitive receptors (schools, hospitals and public amenities) as required – it is not anticipated that such entities would be regularly engaged with aircraft noise management structures and processes. They would however be key consultees for noise management plans and proposed solutions.

Note: It will also be important to take the media along with the strategy. You can’t control the media message – but information provided to the media should be consistent and coordinated to the extent possible.

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55 EUROCONTROL, Specification for Collaborative Environmental Management (CEM), Edition 2018
7.5 **Noise Governance and Management Processes**

7.5.1 **Process Overview**

The overall proposed multi-stakeholder process is summarised as reaching agreement in sequenced-stages towards a commonly agreed holistic solution as follows:

![Multi-stakeholder process overview](image)

**Figure 7-2 Multi-stakeholder process overview**

The noise management process components are not presently entirely in the purview of any single stakeholder although the Flemish Region are the Competent Authority under national transposition of EU directive 2002/49/EC.

It will be essential to ensure that future influences on noise climate are considered and factored into decision-making. This will avoid changes to noise climate from external factors producing ongoing uncertainty and public concern. Decision-making should therefore consider and accommodate potential future influences and the likely impacts should be honestly and publicly acknowledged (examples only):

- **Growth in demand**

  For example, presently the operating rules (AIP) governing decision-making for selection of RWY 01 and RWY 07L for aircraft landings during easterly operations is deliberately vague. Using RWY 01 allows overflight of less densely populated areas to the South of BRU rather than more densely populated city areas. Using RWY 01 however reduces airfield operational capacity. This is leading to ATFM delay, active vectoring of aircraft to balance throughput which makes overflight patterns less certain, and a situation where aircraft are flying level at relatively low altitude making more noise on the ground than for normal operations incorporating Continuous Descent Operations (CDO). This is covered in more detail in Section 11. It is likely that unless technology keeps pace with demand, the need to shift arrivals onto RWY 07 will increase over time.

- **Performance Based Navigation (PBN)**

  PBN uses satellite-based navigation and aircraft onboard navigation systems to more accurately guide the flight of suitably equipped aircraft than the present reliance on ground-based navigation. It offers safety improvements and can offer more certain 4D repeatability, which can aid flight efficiency and more sophisticated airspace and procedure design. Issues such as controlled airspace availability, aircraft operational and safety limitations (e.g. max climb, descent and turn performance), the need for safe separation and maintaining safety in abnormal conditions will limit the possible degree of flexibility available. Additionally, PBN can only be used by aircraft that
are equipped to make use of satellite-based guidance to the appropriate standard. However, the proportion of such aircraft in the global commercial fleet is increasing all the time.

PBN reduces the reliance on less accurate and less reliable ground-based navigation aids. PBN allows more complex and greater flexibility in departure and arrival/approach procedures. It can facilitate more accurate track-keeping where concentration is required. PBN can also be used to provide more flexible distribution of overflight and can offer some degree of more predictable respite periods for more severely affected areas. When coupled with effective controller decision support tools, PBN will eventually be able to facilitate more sophisticated tracks over the ground closer to an airport. Thus eventually, PBN will be able to facilitate some degree of tailoring of noise impact within constraints of capacity, safety and the needs of aircraft that cannot use PBN navigation. It will be up to local stakeholders, through established consultation and decision-making processes to decide how PBN is to be deployed and used. There is no one-size-fits-all solution using PBN.

There are however limitations on degree of noise impact tailoring that PBN can offer. It must be borne in mind that noise disperses laterally from an aircraft and this dispersion increases with altitude. People will hear aircraft even if they are not directly underneath its flight track. Closer to a runway, the degree of flexibility reduces since aircraft separation must be retained. Aircraft have safety and passenger comfort limitations on how tightly they can turn. Interactions between arrivals and departures, obstacles and the accommodation of recovery procedures such as decision height minima and go-around procedures may limit flexibility of procedure complexity. Pilot workload and the need to avoid rushed-approaches means that they need to be lined up with runways on approach. So even the option to use curved approaches, which PBN may help to facilitate, will need to allow some degree of stable flight in-line with the runway closer-in. It is essential that pilots can land safely and feel confident that they have control of the aircraft at all times. This is especially true to account for the possible risk of sudden loss of PBN navigation systems. Options for flexibility in flight paths very close to the runways (i.e. within the important noise contours) may also be limited by the need to maintain separation, obstacle clearance limitations, missed approach procedures or international rules of flying that limit altitudes below which turns are not permitted.

Trade-offs may be required further from an airport, for example between noise impact and atmospheric emissions. The option to use some PBN procedures may reduce in non-standard conditions such as severe weather or low visibility. Aircraft that cannot use PBN will still be legally entitled to fly and gain access to airports for some time after PBN is implemented.

It is now ICAO and EU policy to implement PBN in coming years. Belgium will be expected to do so too and should be planning this now. PBN will eventually be introduced into airspace around all major Belgian airports including BRU. PBN will allow more tailoring of aircraft flightpaths around airports with greater certainty of where and how aircraft will fly. Within the above operational limitations, PBN can aid noise distribution or concentration or respite policy according to locally agreed objectives and policy. If desired PBN could be designed to replicate the present conventional-ground-based operations at BRU. It is essential that processes are established in good time to agree PBN design and to optimise the environmental improvements that PBN could bring, including for aircraft noise management. These processes should ensure that the public are
consulted and are aware of planned changes, their timing, impacts and limitations. This consultation and communication activity should be undertaken in accordance with need of Belgian PBN implementation planning. PBN will underpin many of the operational mitigation options selected by local stakeholders and therefore the capabilities of PBN should be factored into such decision-making.

**Note:** It will be important to factor into BRU noise planning any national or international PBN implementation rules or plans. Accommodation of PBN will need to be considered and shaped through the recommended structures and processes described herein and ensuring that it’s potential for noise mitigation is exploited in a commonly-agreed way.

- **Climate Change**

  The effects of Climate Change are not yet fully understood, but understanding is growing. The effects that may affect noise climate may include (as examples):
  - Higher temperature affecting aircraft engine and climb performance
  - More severe weather which may affect operations in various ways, making the timing or location of overflight less certain
  - Change to prevailing wind direction which may change the ability to follow PRS
  - Flooding could affect coastal or low-lying airfields

  Like many countries, Belgium has a National Adaptation Plan\(^{56}\), which seeks to predict and plan for climate change impacts. Aviation and its impacts should also be covered in this, and aviation decision-making including for noise management at Belgian Airports including BRU should take account of potential influences.

### 7.5.2 Principles

As an early step in forging common agreement on noise policy, regulation and planning it is useful to formally agree and adopt the core principles to be applied when developing policy, regulations and action plans. The Principles would be a simple list of commonly-agreed desirable outcomes that will provide a framework within which policy and strategy can be forged. It is often easier to start aircraft noise planning by agreeing general principles, since these are not geographically specific. Discussion to arrive at common agreement on principles will highlight the ‘issues of principle’ that need resolution. It is better to seek solutions to these high-level issues in the early stages of development of a total noise management package than to have them emerge in latter stages. It is also essential to undertake all stages of the entire noise management process transparently and with adequate stakeholder engagement.

Crucially, public acceptance of general principles on noise management is likely to be less problematic than it is for them to agree to a detailed noise plan where there are no options or consultation. Especially where inevitably, there will be winners and losers.

It is important that once set, the principles are not changed frequently unless a significant change to the situation occurs or becomes unavoidable. Ideally, the principles should be agreed by all stakeholders, but

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\(^{56}\) National Climate Commission, Belgian National Adaptation Plan 2017-2020
where this is not possible, a federal view should be taken such that transboundary impacts are coherently addressed. It is anticipated that the principles would apply to BRU alone, but it may be that these can be adopted or provided for other airports to maintain a level playing field. Alternatively, BRU could be given specific designated status that puts it under the auspices of federal control, or joint control by a collaborative process. The principles will set the framework for a federal aircraft noise policy that may apply solely to BRU or to all Belgian airports. The principles should be consistent with international directives, rules and regulations.

Candidate principles must be agreed by Belgian stakeholders, they could include, but are not limited to, the following example candidate principles (in no particular order):

- Safety will always remain paramount.
- National and international rules covering impact assessment, consultation and transboundary effects should be seen to be applied. This should include The ICAO Balanced Approach including EU regulation 598/2014 on aircraft noise restrictions.
- The status and importance of BRU itself as a strategic national asset and its contribution to national and regional sustainability should be formally reflected in policy and decision-making processes including those applying to aircraft noise.
- To be honest to affected communities about the limitations of aircraft noise management to solve their problems – and about the fact that not all communities can be equally protected.
- Whilst every person affected by noise is important, the needs of the majority will outweigh the needs of the minority.
- Change in noise climate is generally to be avoided - stability will be a key aim and this is especially important around BRU where several changes have been implemented in a short period. A key aim therefore will be to model the future stability of operational mitigation options to ensure politicians agree that aircraft noise and its management transcend party politics and are not to be used in political campaigning. They may however press for commonly agreed solutions to problems within their constituencies, through established channels and processes.
- To recognise that wide differences of noise tolerance exist between different individuals and to ensure to understand the risk that complaints, on their own, may give an unrepresentative impression of impact and about the level of true annoyance caused to the general population. Social surveys and public consultations will also be used to inform the decision-making.
- Studies will be undertaken into major long-term solutions such as changing the infrastructure to alleviate noise impact over the most densely populated communities affected by noise.
- Longer-term solutions such a relocating BRU will also be studied taking into account funding.
- The overall lead on day-to-day management of all aircraft noise, within the established regulation framework will be assigned to the airport operator and will be introduced into the BRU operating licence at the first opportunity.
- Noise regulation will be harmonised in all Regions.
- A key aim will be to minimise the number of people living in areas most severely affected by aircraft noise according to accepted impact metrics and modelling.
- A further key aim will be to offer respite periods to those people most affected, whilst maintaining agreed operational capacity, where this does not unacceptably increase the number people subjected to severe noise.
- For people residing outside of the agreed critical noise contours, the key aim will be to overfly the least number of people with aircraft as high as possible and deploying quiet operational procedures.
• Account will be taken in policy, of sensitive receptors such as schools, hospitals, tranquil areas and areas where aircraft noise may have significant ecological impacts. National guidance will be developed to inform this policy.
• A single and suitably skilled regulator for aircraft noise will be appointed (e.g. BCAA) to be overseen by a collaborative regional/federal body. This will reduce costs by avoiding skills and technology duplications and allow a centre of excellence in noise assessment and regulation to be developed. This service could also extend to other Belgian airports to allow independent audit and review of performance and compliance.
• Emerging scientific information on aircraft noise health impacts, assessment methods and mitigation will be studied by the national competent authority/regulator and will be raised with international forums/bodies. Where necessary, once agreement is reached through established processes, or where new international rules are enacted, Belgian policy, regulation and action plans will be adjusted accordingly.
• The Federal and Regional Governments will enter into a binding cooperation agreement to support/oversee the development and implementation of BRU Noise Action Plan by the Flemish Region.
• It will be a requirement for the airport operator to establish and facilitate an independently chaired Consultative Committee at BRU (or all airports above 50,000 annual movements)
• Aircraft noise policy (which may be part of a wider airport policy) and associated regulations should have clearly stated scope, purpose, objectives and enforcement processes.
• Changes to noise distribution should not be undertaken unless there is an agreed, significant, deliverable and worthwhile benefit on the context of the overall noise climate. These will require approval through established processes.
• Decisions with the potential for significant changes to noise impact or distribution should be taken in the light of a comprehensive impact assessment with a sustainability scope.
• Impact assessments should also ensure that they include an assessment of the future situation including airport development plans, new technologies and changes to the environment (e.g. changes to weather patterns due to climate change). It would be counter-productive to implement a major change to noise patterns with a relatively short life.
• For aircraft operating below xxxx ft (e.g. 4,000 ft) above ground level and where significant population density is being overflown (to be defined), noise shall be the main environmental impact to be accommodated by route and procedure design, but notwithstanding safety or agreed airport operational capacity needs.
• For aircraft operating above xxxx ft (e.g. 7,000 ft) flight efficiency and carbon emissions shall be the main environmental impact to be accommodated by route and procedure design, but not withstanding safety or agreed airport operational capacity needs.
• Major decisions concerning BRU should be taken at the federal level. These should include anything that can affect re-distribution of aircraft noise, airport development or capacity.
• Operational, local and regional stakeholders should be provided with working arrangements and mechanisms to ensure that their views and concerns taken into account.
• Mitigation of noise for one population should not provide a greater adverse result for a larger population or a community suffering a more significant noise impact.
• A holistic perspective should be maintained for the entire noise climate. A local issue should not drive the overall policy, regulation or legal sanctions, unless it results in a definite overall, significant and worthwhile benefit. A mechanism is needed to oversee and coordinate this process.
• Whilst reasonable steps will be taken to alleviate noise from communities at distance from the airport, a sense of perspective should be maintained. Such measures should not disadvantage
communities closer to the airport, nor should they generate disproportionate adverse effects in other impacts and interdependencies.

- The judiciary should not be permitted to impose rules where an overall and significant benefit does not arise. Such judgements must be informed by a comprehensive sustainability impact assessment. It may be prudent to only allow such powers as being subject to approval by the Federal Government.
- Performance against agreed rules should be transparently tested and publicly reported upon. Processes to ensure continual improvement should be put in place.
- The community should be involved in the design of the information provided to them.
- All aircraft noise related decision-making processes should be transparent to the public.

### 7.5.3 Policy

Policy enshrines the agreed principles into a short legal high-level statement of commonly agreed specific aims or objectives. Policy provides the harmonising framework within which the relevant stakeholders will establish the legal and governance framework and details of the noise management plan.

*It is impossible for any Belgian or independent agency to determine the optimum noise management solution for BRU, without a formally agreed policy describing what such a solution should achieve.*

Policy may nominate lead authorities for the achievement of specific objectives. It may require the establishment of specific new structures designed to deliver these objectives or entrust existing structures with new responsibilities. It does not necessarily provide detailed timeframes or specific actions required to deliver the stated policy aims or objectives, that is for the planning phase. Ideally all stakeholders should agree to the policy, but again for the good of the wider public this is basically a federal instrument.

The aim of this policy is to set a high-level coordinating framework within which specific actions will take place. It may have some more area-specific applications of the principles but should remain a high-level instrument operating at federal level. Policy may establish the basis for new structures, regulations, regulators or new regulatory powers in existing regulators. Policy does not normally change frequently except where a significant new understanding is reached. Policy should last longer than party political election time-frames. It is essential the policy is transparent and is seen to be based on independent assessment of the whole aircraft noise climate, takes account of interdependencies (such as safety, capacity or other environmental impact) and is not subject to political bias or local noise problems.

It will take time to establish the roles and processes required to move towards a more sustainable and less fragmented approach for noise management of flights on and around BRU. It will then require more time to agree the governing policy and the long-term noise management plan. This is because this should be done transparently and in the light of adequate impact assessment and consultation. The State may wish to consider applying the Strategic Environmental Assessment (SEA) Directive⁷ in arriving at the ultimate policy and plan, since this will have significant implications in all aspects of sustainability, nationally, regionally and locally. Decisions may also have international implications and this wider-perspective should form the back-drop for decision-making.

In addition to the long-term planning processes, there are some issues that need addressing in the shorter-term and solutions should not be delayed while long-term decision-making progresses. It is advisable therefore that the decision-making processes agree both long term planning and short-term actions in parallel.
Once established the agreed processes should be used by the State to:

- Ensure that the existing rules are being correctly applied
- Agree and implement shorter-term improvements to the existing noise management regime
- Develop an agreed noise plan for BRU. A key in step in the long-term planning process that will move away from the present fragmented decision-making process will be for the State to agree an Airport Noise Policy that covers BRU. This will set the principles to be achieved eventually.

BRU should be formally recognised as a key national strategic and economic asset for the whole of Belgium. In addition, the operation of BRU has transboundary impacts, affecting not just the various airports, communes and regions within Belgium, but potentially in international terms – for example any delay at BRU that is triggered by adopting non-optimal configurations for noise reasons could potentially affect the entire ATM system and other BRU route-pair airports.

BRU should be operated and developed in the national interest and in a way that supports the social, economic and environmental pillars of sustainability. Ultimately major decisions that can affect the future of BRU should be taken at federal level but transparently taking account of the aspirations and concerns of BRU stakeholders. The decisions required may be difficult and some communities may have to take their share of the burden. Processes should be set in place to minimise adverse and optimise positive impacts from the success of BRU.

This policy could be national in scope and could form part of a broader policy implement. The policy should be formulated as a long-term implementation and should not subject to the whims of party politics. It should clearly set out its objectives, priorities, scope, structures, role, responsibilities and delegated powers. Policy usually extends beyond election timeframes and is reviewed infrequently, whereas strategy and plans should be continually reviewed against the agreed policy and updated as required.

### 7.5.4 Plan

#### Context

The Flemish Region is appointed as the Competent Authority for Brussels Airport noise management assessment and planning under the EU directive 2001/49/EC "The Environmental Noise Directive (ENDs)". ENDs require the production and reporting to the EU of aircraft noise maps and where there is a noise problem for the inclusive production of five year noise action plans designed to meet a locally agreed noise objective(s).

Presently the 3rd generation of BRU Noise Management Plan has been drafted and is under consultation. The Envisa report is independent from this plan and the processes it entails. The need for effective cooperation and joint decision-making processes are theoretically covered in the BRU Noise Action Plan. It is not clear reading the BRU Noise Action Plan however, to what extent such processes are existent, planned, active or effective. The BRU Noise Action Plan has been in place for around 10 years now and evidence should be apparent that would prove its effectiveness.

In one year of investigation, Envisa has found little evidence of the kind of joined-up thinking and collaborative planning as stated in the BRU Noise Action Plan. Evidence for this is that the draft plan is only published in Flemish which severely limits the extent to which is can be consulted and commented upon. Envisa has also found major failings in public awareness, understanding,
communications, trust and engagement, which would not have been found if the previous versions of the BRU Noise Action Plan had been fully effective. Envisa also found weaknesses in ownership, regulation, the scope and clarity of operational rules, operational practice against the rules and lack of adequate performance management that are not adequately delivered by the BRU Noise Action Plan so far.

A detailed review of the BRU Noise Action Plan is not included in the scope of the Envisa study and in any case the 3rd version of the BRU Noise Action Plan is presently in draft form and therefore Envisa cannot know how it will evolve. It is not Envisa's role to ensure the effectiveness of the implementation of BRU Noise Action Plan since that is a matter for Belgian stakeholders.

The Envisa study provides advice that is wholly independent from the BRU Noise Action Plan covering consultation, cooperation, processes, community engagement and operational practice, etc. It will then be the responsibility of our Client and affected stakeholders to measure BRU Noise Action Plan scope and effectiveness against the Envisa report in terms of:

- Issues and weaknesses presently found (as per Ch1); and,
- Recommendations for improvements (as per Ch2);

The stakeholders can then collaboratively determine if, when and how the BRU Noise Action Plan requires improvement and if it requires additional support to ensure that it delivers its stated aims. Envisa also provides wider governance and regulatory advice in this report, which if acted upon should assist in this process.

**Plan Overview**

In terms of day-to-day operations, the principle of continual improvement in aircraft noise performance **within existing and agreed** texts should be embedded in airport business and operational decision-making and collaborative processes. This may lead to a gradual change in noise climate, but only in so far as compliance with agreed plans or rules is being increased.

It is absolutely crucial that as far as is practically possible, the precise nature and triggers of changes to overflight patterns, or easement of rules or curfews, are published and are clearly understood by all affected stakeholders including the general public. Similarly, any exemption of rules and their application that allow temporary operations outside of agreed rules, are also clearly defined and robust checks are set in place to ensure that these are not abused.

There is some evidence that present rules, such as the factors determining the use of RWY 01 for landing are vague and open to interpretation. This may be to allow a degree of flexibility and practicality, but some reference of benchmark should be established against which performance can be measured. Where practicable it is desirable to have clear and unambiguous rules.

**Planning Consideration**

This section builds on the policy options outlined earlier in this report and proposes practical candidate solutions for consideration. More details for candidate solutions including assessment of potential changes to noise impact are given in section 11. It would neither be possible nor desirable to map and assess every possible operational, regulation or policy option in this report. If the process sequence that is recommended in this report is followed, then the process of reaching common agreement on principles and policy will start to indicate the most viable
operational solutions to be considered. Additionally, establishing the kind of structures and regulatory oversight also as recommended in this report will provide the correct forums and accountabilities to allow such options to be considered, selected and refined.

Whilst some potential improvements proposed herein could be implemented in the short-term (such as improved implementation of existing rules), much of what is proposed in this report will require full consultation and where possible, collaboration. It is also recommended that adequate research and assessment is provided to ensure that decisions are taken with the best possible information.

Where possible, consensus should be reached before decisions are implemented. It is likely however that when it comes to noise distribution, this may not always be possible. Progress should not be delayed where consensus is not possible in a reasonable timeframe. An ultimate executive decision-making authority should therefore be retained at federal level. This decision-making authority may need to make difficult decisions in-line with the commonly-agreed principles and policies. This federal overview is essential for control of transboundary implications. It is also important that adequate assessment and justification of decisions in layman’s language is made available to those affected and in good time before decisions are enacted.

It may be that once the new noise regime is finally implemented, some of the previously described structures and processes can be discontinued until needed again. It should also be borne in mind that, given the difficulties experienced, when change to the noise climate is proposed or implemented, the ‘do-nothing’ option should be considered alongside the proposed improvements suggested in this report (or locally derived). Change should only be considered where a clear, demonstrable and significant benefit will be realised. This kind of decision cannot be taken by Envisa and needs the appropriate processes and structures to be in place.

The authors of this report are not the sole source of suggested improvements. In the course of conducting this study, Envisa has noted numerous suggestions by various parties both professional and by lay-people. There will be others that emerge after this study is completed. Since it is impossible for Envisa to capture all of these, it is advised that any of these with potential merit should be considered through the recommended consultation processes and feedback given as to the outcomes.

Lack of effective public communications concerning BRU noise impact is a clear and significant finding in Chapter 1 of this report. This situation needs urgent attention as an early action in any plan. It is also essential however not to trigger uncertainty or blight (e.g. house price reduction and investment delay) by announcing potential changes before it is known if these are practical or desirable. A balance will therefore need to be achieved as to when options are published, and clear description of their status should always accompany them.

- **Plan Options**

  The airport operator relies on minimum constraint for its success. Thus, noise is a direct concern for them. To an extent, skeyes is a mere service provider to BAC needs and the airlines are customers. skeyes implements agreed rules and their business is not directly affected by noise constraints. Additionally, aircraft noise is a key business risk to the airport operator. The airport operator’s provision of ground infrastructure and operation of curfews via the slot coordinator
have a major influence on the noise climate around the airport. So as at most airports, it is the
airport operator that has ‘ownership’ of noise (and other environmental matters of public interest).

Thus, consideration should be given to formally nominating the airport operator as the lead in dayto-day noise management at the airport, operating under the auspice of the Noise Action Plan as agreed by the competent authority and in accordance with regulations to be developed.

The options offered for consideration herein are a simple checklist and have no status. It is up to the stakeholders to consider them through agreed structures and processes. Envisa cannot know what, if any, will be seriously considered by BRU stakeholders. Options for consideration could include but are not limited to:

**Shorter-Term Candidate Example Solutions:**

- Commence parallel short-term actions to eventually feedback into the overall plan
  - Prepare a single unifying BRU airport noise regulation (e.g. as the Irish Republic are doing for Dublin Airport)
  - Establish a single competent authority for oversight and regulation of aircraft noise – either just for BRU or for all Belgian Airports (preferred)
  - Commence a detailed review of operational practice at BRU and implement quickwins to ensure existing rules are implemented effectively (refer to section 11 for some ideas on this)
  - Commence a detailed review of land-use planning processes and effectiveness and take steps to ensure:
    - No further encroachment of inappropriate development (residential or noise sensitive receptors) into those areas most severely affected (to be defined nationally). Where this ban is overturned on appeal the authorising authority take responsibility for all future noise implications and the costs and the construction must meet adequate sound insulation standards.
    - Standards of construction are established for new developments in areas where inappropriate is inadvisable but permitted.
    - People purchasing existing properties in these areas are made aware of and formally accept the implications of their choice.
    - Other aspects such as compulsory purchase and demolition or noise insulation are taken onboard as they are agreed.
    - Planning policy in this should accommodate forecast noise impact and not just existing impact.
    - Provision for compensation is made for cases where the noise climate is changed by agreed operational change but not for meeting forecast demand.
    - Define and agree principles and policy
  - Ensure all interested/affected parties are aware of these processes and the routes to get their voices heard.
  - Undertake targeted research to identify and prioritise key concerns and areas to be considered. This to include social surveys to ensure the views of the majority are taken into account and not overridden by a vociferous minority. It is not possible to please all the people all of the time.
  - Capture and filter possible operational improvements and assess these for sustainability impacts. Selecting a coherent and optimum portfolio of those that deliver the policy (some potential options are offered in Section 11)
• Ensure that the implications on the future development of the airport and the agreed policy are understood
• Arrive at an agreed consensus on the best compromise portfolio of these, taking into account the wider implications and the sustainability assessment
• Formulate an implementation plan, to include investment and phasing and consult interested and affected parties, or possibly, review the existing draft BRU Noise Action Plan produced by the Flemish Government in the light of this report
• Establish an approval process to accommodate established planning processes. This should seriously consider declaring the proposal as a ‘programme’ under existing Belgian regulations.
• Implement the plan ensuring ongoing oversight and supervision to ensure objectives are met
• In parallel, ensure that the public are informed and have the opportunity to voice their opinions as the plan is implemented.
• BRU CEM (Operational) group (recently established) to provide a unified operational body for the community and CC to be established as per EUROCONTROL guidance to implement, optimise and report on mitigation development and operation
• Communications need to be coordinated and made much more transparent. Reports should be designed by the public through the CC. These should be independently audited with the audit overseen by the CC or the competent authority BCAA (or carried out by them). A single CEM shared source of public information needs to be established. Conduits should include newsletters, publications, web-sites, educations packs for schools and perhaps a community relations centre at the airport with interactive exhibits as a forum for publishing plans and seeking feedback. In support of this outreach, activities should be established such that experts hold regular ‘surgeries’ located in the affected communes - so that local people can come and learn/discuss.
• Engagement in the governance framework both to provide expert opinion, to suggest and to jointly develop good practice, and to consider solutions from outside.

Longer-term Candidate Example Solutions:

This section offers some examples for long-term operational options that could be considered by the previously recommended framework decision-making process outlined earlier in this document. There are many combinations of such options and it would be impossible to evaluate in detail all of these. Additionally, this study covers aircraft related noise from BRU, and such options would need to be considered in the light of financial cost, budget and other social, economic and environmental impacts which is beyond the scope of this study. This section must therefore be viewed as a limited shopping-list of illustrative solutions.

Additionally, before such long terms options can be selected, it would be essential to have an agreed policy to fulfil. Whilst some detailed rules on runway use exist the overarching policy objectives of noise management at BRU does not yet exist and will take time to forge assuming proper consultation.

Consideration of relocating the airport itself or shifting night-time flights to other airports are beyond the scope of this study into noise impact and management practice at BRU (this is explained in Chapter 1 of this report). The framework processes proposed in this report would also serve to progress consideration of such solutions.
As advised earlier in this report, change in aircraft overflight patterns and noise is a highly controversial and emotive topic. Previous land-use planning decisions can be undermined and one community can be set against another. Newly overflown less populated area may have tranquillity eroded with a consequently larger change to quality of life. Thus, any decisions on potential candidates need to demonstrate a clear and significant benefit before raising public concern and/or blight by its announcement. This is a further reason to establish the correct decision-making processes before candidates under serious consideration are announced. Finally, this list of candidates is not exhaustive, and it is likely that solutions not covered in this section will be more suitable for local conditions.

A key consideration should be the longevity of the selected solution(s). It is pointless to select a solution that will not be sustainable, for example if increasing demand is met. Thus, it may be that development of the airport infrastructure is required at some point and this may offer opportunities to implement significant changes to airport infrastructure which are not yet known (see Strategic Vision 2040\(^57\)). Conversely such plans may be constrained or changed to accommodate agreed noise policy. At this stage such events cannot be fully forecast by Envisa but will need to be processed methodically through proper processes.

Some candidate longer-term solutions are offered as a checklist here, but others may emerge through the policy development stage. Some options are examined in greater detail in Section 11.

- Do nothing – this is not a viable option, but it may be prudent to explore why this is the case. In any case, this option will require assessment to provide a base-case against which to compare candidate longer-term solutions.
- Do nothing but ensure that compliance with existing regulations is optimised and proven – this would accommodate shorter term improvements, some of which are covered in more detail in Section 11.
- Close BRU
- Relocate BRU
- Relocate all flights to other airports
- Relocate night flights to other airports
- Invest in reoriented runways at BRU to reduce the noise affected populations
- Close the crossing RWY 01/19 and adopt a concentration policy on the remaining runways seeking to minimise the population overflown
- Adopt no-fly zones over the most densely populated areas
- Adopt a full dispersion policy on the existing runways
- Implement a more equitable sharing of noise using new PBN based departure and arrival procedures with respite periods for those communities most affected
- Use curved approaches to avoid communities under the arrival/approach paths
- Adopt a hybrid solution where concentration is used close in to the airport and dispersion or distribution further out from the airport
- Extend both runways to the East and provide a parallel taxiway for the full length of the southern (07R/25L) runway to the East allowing compass mode operations turning South

\(^{57}\) Brussels Airport, Strategic Vision 2040
• Reconsider the Canal and Ring departure procedures to minimise their impacts over the city and nights and weekends
• Define dispersion tolerance standards on either side of the nominal centrelines for departure procedures. These should take account of Standard Instrument Departure (SID) complexity and navigational aid provision. There are many examples of this in Europe including U.K airports who originated this concept.
• Cease the practice of tactical vectoring of aircraft on approach in favour of greater utilisation of the existing holding stacks
• Adoption of technological solutions such as E-AMAN and PBN – this may be required by international obligations in the next few years. It would be better to plan how these could be used to optimise noise management well in advance. It may be prudent to establish a technical subgroup of the proposed Advisory Body, to examine the potential role of PBN and Controller Tools in aircraft noise management as an early action.
• Greater stringency to prevent inappropriate development in the worst affected areas and more rigorous building standards in areas badly affected
• Noise insulation scheme
• Noise related charges used to fund mitigation
• Compulsory purchase and demolition of inappropriately sited residential structures
• Extend provision of pre-conditioned air and Fixed Electrical Ground Power (FEGP) with adequate monitoring and enforcement
• Enhancing CDO and Continuous Climb Operation (CCO) performance, for example by offering Distance-to-Go estimations to pilots
• Build an engine-test hush-house to mitigate engine testing and ban all testing at night
• Define, monitor and enforce navigational accuracy standards for following noise preferred routes
• Different solutions are more suitable in different areas around the airport and so a zonal approach could be considered, and a hybrid and more tailored solution achieved.
ISO14001 Perspective

ISO14001, as all quality standards, has at its core, the notion of Plan-Do-Check-Act (PDCA) as a paradigm for continuous improvement.

This section offers an alternative perspective on recommendations to ‘fix’ the BRU problems

It is complementary to the rest of the report and is more pedagogical in nature helping to explain how different parts of these proposals can act together to make a tightly controlled ‘self-regulating’ system.

At its base, the concept is nothing more than having a good plan, then putting it into practice and checking that it is applied.

**Figure 8-1 PDCA Cycle**

It should be noted that some individual BRU operational stakeholders are certified to ISO14001. But these individual ISO 14001 systems covers a relatively small part of the multi-stakeholder management system that would be required for the overall effective management of BRU aircraft noise. Such an overall management system should also cover governance, regulation, transparency and external oversight management processes. These ‘framework’ structures and processes lie outside of the individual BRU stakeholder environmental management systems.

The recently established BRU CEM group would fulfil some requirements for overall operational management system for aircraft noise – but at the time of writing aircraft noise has not been considered by BRU CEM. Additionally, CEM does not cover noise management conducted by external non-operational bodies. A more integrated, holistic and inclusive management process is required than is presently covered by the existing separate ISO14001 certifications.
8.1 Plan

The first, and perhaps the most important part of the cycle, is the “Plan”. In this context, by “Plan” we mean all aspects of the AIP that define how, when and where the aircraft fly. It is, in effect, the system objective which has been carefully designed to meet all the required criteria as best as possible. Many criteria will be set for the “system” to achieve, including (for example) safety and capacity as well as environmental (noise and emissions) goals. Safety of course, cannot be compromised, but in reality, other factors will need to be compromised to some extent, in order to deliver a workable system. This process of designing a system that responds to multiple factors and criteria, requires a high degree of professional expertise and many iterations involving testing and modelling to assure that the “Plan” will deliver what is set as its objective. Primordial for its success, are clearly stated design factors and criteria. We would expect these to be developed through processes as described in Section 7.5.1.

Before any Plan is approved for implementation, it should have passed through a full impact assessment process to demonstrate that it will deliver against its objectives.

The situation in Belgium is made more complex because of the multiple stakeholders involved in both setting, delivering and checking the ‘commonly-agreed’ agreed plan. The complexity of situation is amplified by the trans-boundary nature of the key impacts to be covered by the plan, such that decisions made on airport operations will affect the nature of impacts at some distance from the originating source. The situation is also made complex by the present dispersed regulation powers in each region and the lack of a harmonising policy – and thereby, the highly political nature of decision changing distribution of these impacts. Finally, uncertainty in how the aircraft noise impact is distributed on a day-to-day basis is influenced significantly by wind strength and direction – which is beyond human control. These factors make more difficult the public communication of the plan itself, and the reasons for variance against the plan. The relative lack of public awareness and understanding of the rules, their application and performance is not unexpected.

It is a clear imperative therefore for Belgian stakeholders to agree a transparent unified plan, covering regulation, operational rules, day-to-day management and regular review, revision and public reporting is set in place as an essential first step towards resolving the problems of aircraft noise around BRU. Theoretically, this common agreement should already be achieved in the latest draft update to the BRU Aircraft Noise Action Plan under Directive 2002/49/EC. But in practice this is not fully effective and is not adequately understood.

There is not commonly agreed overarching policy to give direction to present planning on aircraft noise. Also, there is no existing body to facilitate common agreement for the national-good. New collaboration structures, processes and governance instruments are therefore required to fulfil the planning requirement of ISO14001 and for good-practice BRU aircraft noise management.

8.2 Do

The “Do” part is where the “Plan” is implemented. It is essentially the day to day operations, conducted in accordance with the procedures and instructions defined in the Plan. The expectation is, that if the procedures and instructions are followed correctly, then the objectives of the Plan will be achieved.

The operational and regulatory rules presently in place to manage aircraft noise around BRU are sometimes vague to allow tactical operational responses to variances in factors such as wind, demand,
delay and separation. The regulation is also presently fragmented and is not based on widely accepted practice. There is not an overarching regulator to ensure harmonisation of regulation.

8.3 **Check**

In order to assure that the day to day operations are conducted in accordance with the Plan, it is necessary to put in place a system that monitors adherence. In fact, this system already exists. The Noise and Track keeping (NTK) system is jointly managed by the Airport and skyes. It was recently (2018) updated with a new system from Topsonic. As well as reporting on noise levels from the NMT around the vicinity of the airport, these types of system can also automatically monitor how well the aircraft fly the published procedures. Flying the published procedures should be the desired outcome. It creates less controller workload and produces a more predictable and efficient traffic pattern. Tactical intervention of controllers on a regular basis is less desirable but in some cases is necessary. The NTK system can be set up to monitor all flights to check how closely they follow the published procedures. Acceptable tolerances will of course need to be defined. Any deviations from the published procedures should be investigated by skyes, and the reason established for the deviation.

Deviations may occur for a number of reasons. Weather and in particular wind, in certain conditions can be a cause. The way the aircraft is flown as well as the weight of the aircraft are also significant factors. ATC may sometimes intervene for tactical reasons. In all cases, the reasons for deviation should be analysed and understood.

At present however, there is not a complete and commonly-agreed set of performance benchmarks (such as acceptability of navigational accuracy) against which to measure performance. Some degree of independent review of performance does take place – but regular public reporting of independently verified performance is inadequate.

8.4 **Act**

In the final step of the cycle, depending on the analysis of any deviation, actions are planned in order to reduce, as far as is possible, repeated infractions. In this way, systematic issues will, over time be eliminated. It may well be, that some actions will result in updating the Plan. In other cases, the Plan (defined in this case as the overall system design, flight procedure and processes) will remain stable and other actions may be taken. These actions in turn, will become part of the continually improving “Plan” through updated and refined system design, procedures and processes. Poor adherence due to pilot error (for example), can also be addressed through constructive feedback so that future performance can be improved.

There is presently no overarching collaborative review process to check the effectiveness of BRU aircraft noise management or to identify and plan the implementation of any required improvements.
Chapter 2

9 Good Practice Examples

This section looks at how noise is managed at a number of airports around the world, particularly at European airports where similarities may be drawn. They illustrate how, with similar challenges, solutions have been developed that help to mitigate the noise problems. The ideas that are presented here, could be looked at in more detail for application at BRU. They should be considered within the framework put forward in Section 7.

9.1 Introduction

9.1.1 The Noise Problematic

During the last decades, a significant reduction in aircraft noise has been achieved by the aviation industry, although noise has remained as a source of complaints for the communities around airports. This situation can be explained due to the subjective nature of noise perception: the number of people annoyed by aircraft noise comes from a range of different variables which combine with each other and which make its estimation quite challenging. Examples of these variables are58: the volume of the noise event, the duration, the pitch and tone, the frequency, the time of the day, the density of the population or the weather conditions.

In the European Union, there are two important documents that aim to promote effective management techniques to deal with noise pollution around airports and that are complementary to the use of local and national initiatives: the EU Environmental Noise Directive 2002/49/EC and Regulation 598/2014.

9.1.2 The European Environmental Noise Directive

The EU directive 2002/49/EC relating to the assessment and management of environmental noise (the Environmental Noise Directive) is the principal instrument created by the European Union to locate noise pollution levels and to carry out necessary actions at both the Member State and EU level. This Directive focuses on three main action areas: the determination of noise exposure, the availability of environmental noise information to the public and the prevention and reduction of environmental noise.

The Directive requires Member States to prepare and publish every five years noise maps and noise management plans for major airports, which are the those having more than 50,000 movements per year. The noise action plans are based on the strategic noise-mapping results and aim to prevent and reduce environmental noise where necessary, particularly where exposure levels can induce harmful effects on human health. The action plans also target keeping the environmental noise quality at locations where it is good and include airports surroundings.

In the case of BRU, as indicated in the Noise Action Plan 2019-2023, the EU directive 2002/49/EC falls under the regional competences and was transposed to the Flemish law by the Decree of the Flemish Government of 22 July 2005 on the assessment and management of environmental noise, and amends the Decree of the Flemish Government of 1 June 1995 containing the general and sectoral provisions on environmental hygiene. The provisions of the Directive were registered in the Flemish regulation on the

58 Sustainable Aviation, The SA noise road-map
Environmental permit (VLAREM) under VLAREM Title II, part 2, 2.2: “Environmental quality standards and policy tasks relating”. Furthermore, in the Decree of the Flemish Government of 16 December 2016 amending various decrees on the environment, the terminology and scope of Directive 2002/49/EC in VLAREM II was adapted so that it is more in line with the definitions and provisions contained in the Directive.

The following bodies were designated as competent to draw up and collect action plans for BRU (as referred to in the article 8 of the Directive 2002/49/EC):

- The ‘board’ acts after a mandatory request for advice to the airport manager: BAC.

Cooperation with other entities (both within and outside the Flemish government) for the implementation of the European Environmental Noise Directive takes place in structural consultation bodies, such as the Working Group on the Implementation of Environmental Noise Directive (WUROL) and the Coordination Committee on International Environmental Policy (CCIM).

The CCIM Noise Steering Group meets approximately twice a year and monitors all European noise files, including the implementation of RL 2002/49/EC in the three Regions. The following bodies are represented in the CCIM Sound Steering Group:

- Flemish Region - Environment Department
- Brussels-Capital Region - Bruxelles Environnement
- Waals Gewest - Operational Directorate General for Agriculture, Natural Resources and Environment
- Walloon Region - Direction L’expertise Des Ouvrage
- FPS - Environment
- FPS - Mobility and Transport

### 9.1.3 The Balanced Approach

Even with the noise reduction achieved for individual aircraft due to technology improvements during the last decades, the growing amount of traffic exposes EU citizens to high noise levels. In order to try to solve the balance between the sustainability of aviation and the overall capacity of airports, the European Community adopted the Regulation (EU) No 598/2014 on the procedures concerning the introduction of noise-related operating restrictions at Union airports within a Balanced Approach.

This Regulation is compliant with the international Guidance on the Balanced approach to Aircraft Noise Management, the so-called Balanced Approach (ICAO Doc 9829 AN/451), which corresponds to a list of principles that can help airports to improve their management of the ground noise impacts. The Balanced Approach has the following four pillars: reduction of noise at source, planning and management, noise abatement operational procedures and operating restrictions (Figure 9-1).

The first pillar: reduction of noise at source, is achieved through research studies, technology programmes and standard setting. Because this pillar is limited to the adoption and implementation of certification standards, it is not under the direct control of individual airports. However, the ICAO Assembly encourages the elaboration of studies and research programmes aimed at reducing noise at source.
Land-use planning and management involve measures like zoning of the areas around the airport and legislation-related measures. In high noise areas, no incompatible activities should be permitted. In moderate noise areas, some authorities permit this development together with the installation of sound insulation and ventilation systems. It can also refer to any sound insulation, noise compensation or relocation schemes. This pillar is usually the responsibility of local and municipal governments.

![Balanced Approach pillars](image)

**Figure 9-1 Balanced Approach pillars**

Noise abatement operational procedures include the use of preferential runways, preferential routes, use of Precision Area Navigation, respite periods, flight procedures, quota counts, noise emissions trade-off, etc. Despite noise reductions and proper land use planning, noise complaints at airports are increasing from residents outside of the traditionally recognised as high noise contours. The management of aircraft operations is the main way to address these issues. Noise abatement procedures modify aircraft operations to avoid or reduce noise over populated areas.

Examples of operational restrictions could be phase-out of certain aircraft types, curfews, operating quota and fines, use of Auxiliary Power Unit (APU), etc. These restrictions can have an important economic impact. Because of this reason, ICAO recommends avoiding them as much as possible and only use them when all other possibilities have been employed.

Other additional examples of noise management strategies that are advised by the Balanced Approach are the use of noise monitoring systems and the community outreach. The regulation 598/2014 demands technical cooperation between operators, ground handlers and air navigation services to study ways to mitigate noise. Furthermore, it is also indicated that local representatives and local authorities must be

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59 EASA, European Aviation Environmental Report, 2019
consulted and provided with the technical information on noise mitigation measures. Due to this reason, airports and other operational stakeholders need to collaborate to address local concerns. EUROCONTROL’s CEM Specification explains the process through which these stakeholders can group and assess the environmental concerns affecting the airport, as well as finding solutions for them. The meeting of stakeholders is denominated as a CEM Working Arrangement.

These principles suggested by the Balanced Approach could help airports to mitigate their ground noise impacts. However, following their own needs, airports can apply either all or only some parts of this list. Depending on each individual airport’s characteristics, the success of implementing the suggested measures will differ. This is indicated in the section 1.2.5 of the Guidance document, which states the goal of the Balanced-Approach: "The goal is to address noise problems on an individual airport basis and to identify the noise-related measures that achieve maximum environmental benefit most cost-effectively using objective measurable criteria". Furthermore, in section 1.4.5 it is indicated that the Guidance is expected to be shaped to the specific circumstances (legal, technical or political) at the localities where it is employed.

A fundamental part of the Balanced Approach is the identification of the noise problem at an airport and the set of the noise objective to be achieved. In the Guidance document it is stated that a noise problem exists if there is any difference between the defined objective and the assessed evolution of noise climate. Moreover, it is also explained that different airports may have different standards and policies regarding what constitutes a noise problem, how these are assessed and what objectives are set in airport noise programmes.

Regarding the way to assess the noise surrounding an airport, the ICAO Assembly urges that it must be based on objective and measurable criteria for the purposes of the Balanced Approach. A common metric in this regard is the number of people encompassed within a noise contour established under a specified noise index (for instance 65-Lden). A reduction in the number of people may indicate benefits for all (like replacing an aircraft type by a quieter one), but also this reduction may be obtained by concentrating more noise on a smaller number of people. In this latter case, there might be people getting benefit at the expense of others, which must be considered in the context of the Balanced Approach.

The Balanced Approach Guidance also has a glossary in which the concepts used are defined. In this glossary, the concept of noise-sensitive area is defined as “An area where aircraft noise may interfere with existing or planned use of the land. Whether noise interferes with a particular use depends upon the level of noise exposure and the types of activities that are involved. Residential neighbourhoods and educational, health and religious structures and sites as well as outdoor recreational, cultural and historic sites may be noise-sensitive areas”.

### 9.1.4 BRU Balanced Approach Measures

BRU has implemented some measures following Balanced Approach principles:

- Regarding the first pillar, reduction of noise at source, the airport has in place a tariff structure that makes noisier aircraft pay more than the quieter ones, therefore encouraging airlines to use low noise aircraft. In addition, if the flight takes place during the night, the airlines must pay three times more for departures and 2.25 times more for landings. These measures are discussed further in the section (10.2.2) about the Quota Count System in BRU.
• In terms of land-use planning and management, the airport states that it intends to collaborate with the competent regional and municipal authorities on an active town and country policy on additional homes in the zones that experience most of the noise pollution. However, there is little evidence of any effective land use planning. Furthermore, the structure for a fund to compensate residents severely impacted, is believed to have been established, but no budget has been allocated.

• Some operational measures are also included in the air (with the use of CDO) and on the ground (carrying out engine tests as far as possible from populated areas, limiting taxiing time, limiting the use of auxiliary engines and making aircraft switch to the 400 Hz power supply provided by the airport). In addition, except for safety reasons, reverse thrust shall not be used at other than idle power. On the aprons, it is prohibited at any time.

• In terms of community outreach, the airport use various channels:
  o Letters to residents living in the immediate vicinity
  o Magazine Connect for those living further away
  o The website www.batc.be, which shows traffic information of the Airport, such as the runways in use, the meteorological information, noise measurements, statistics, etc.
  o The airport’s website
  o The Forum 2040, in relation to the airport’s Strategic Vision

However, these measures have not been applied systematically, nor in a coordinated way. Thus, this situation has led to the politicisation and non-optimal performance of noise management at BRU.

### 9.2 Examples of Noise Management Practices

In this section, good practices from selected airports will be described, so they can serve as examples to improve noise management at BRU. We have grouped noise management practices into five categories: operational procedures, noise monitoring and reporting, community outreach, operating restrictions and land-use planning and noise mitigation.

#### 9.2.1 Operational Procedures

These procedures can be used to redistribute noise, minimising it during ground operations or during flight near the airport at arrivals and departures. In this section, examples from Heathrow, Manchester and Sydney airports are provided as cases of good noise management practices.

• **Arrivals Management**

  A good example of the management of arrival procedures is Heathrow Airport.\(^{60}\) Because of the many flights arriving at Heathrow, the aircraft are usually held in holding stacks. The aircraft come usually into a holding stack where they fly in an oval pattern while they wait for a landing slot. From these stacks, the pilots follow the instructions given by ATC, which direct the aircraft to the final approach.

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\(^{60}\) [Heathrow arrival flight paths](#)
The aircraft circle at different levels within the stacks until they can get a space to land into Heathrow. The different levels are separated by 1000 ft and the lowest level is approximately at 7000 ft.

There are four holding stacks at Heathrow: known as Bovingdon, Lambourne, Ockham and Biggin. Aircraft enter in the stack, circle and descend until they are authorised to leave the stack and are directed by ATC onto the final approach to Heathrow (Figure 9-2).

![Figure 9-2 Holding stacks at LHR](image)

There are no set routes for the planes moving from the holding stacks to the final approach. The overall patterns have remained similar over the years, although the position of aircraft in the skies varies with each flight each day.

In this airport as well as in other British ones, there was a campaign, as indicated in the best practice guide “Managing the Impacts of Aviation Noise”\(^6\), to promote the use of CDO. This type of operations mean that the aircraft remains in a smooth descent profile, instead of having a series of steps. This kind of descent makes the aircraft have a higher altitude over the ground, which helps to mitigate the noise exposure to communities near the airport. This procedure is more fuel and environmentally friendly than a traditional stepped descent. The collaborative cross industry campaign promoting CDO involved: the distribution of 10000 campaign booklets to pilots and controllers, the production of a campaign video, the use of campaign posters in crew rooms and the briefing of over 500 National Authorities and 7000 pilots on the CDO techniques.

The specific CDO profile for Heathrow is a 3 degree descent from 6,000 ft. On average, 87 % of aircraft arriving at Heathrow employ the CDO. From transition altitude, an arrival containing no level flight, or one phase of level flight not longer than 2.5 nm is classified as a CDO.

Aircraft landing at Heathrow follow a radio system called ILS in order to align directly with the runway. In the latest version of the Heathrow Airport noise action plan draft, the approaches have been suggested to be slightly stepper, so aircraft on final approach should descend at an angle of 3.2 degrees instead of the standard 3 degrees (Figure 9-3).

The minimum height at which aircraft can join the ILS during the day (between 06:00 and 23:00) is 2,500ft which is approximately 7.5 nautical miles (around 8.5 miles) from Heathrow. At night (between 23:00 and 06:00) an aircraft must be no lower than 3,000 ft which is approximately 10 nautical miles (around 11.5 miles) from Heathrow.

Another initiative taken forward in Heathrow Airport was the noise respite trials for people living under the airport early morning arrival flight paths, as indicated in “Managing the Impacts of Aviation Noise”. This was a project made in collaboration by the National Authority, British Airways and the community group HACAN (Heathrow Association for Control of Aircraft Noise). Air traffic controllers instructed pilots to avoid flying over specific respite boxes on alternate weeks. However, this control also resulted in an increase in early morning overflights in other areas of London. Noise respite is a relevant concept that will be further developed with the example of Sydney Airport Long-Term Operating Plan and in the case of the runway alternation in Heathrow. The Respite Working Group, created to provide advice to the Heathrow Noise Forum on the management and assessment of respite from aircraft noise, proposes the following definition for respite: “scheduled relief from aircraft noise for a period of time”, differentiating it from relief, which is defined as: “a break from or a reduction in aircraft noise”.62

Manchester Airport has also implemented several initiatives regarding the management of arrivals.63 One of its main actions is the use of low power/low drag procedures for approaches, which keep noise disturbance to a minimum. This action includes work with operators to improve the compliance with the measure, as well as agreeing on a related metric that can be measured and reported.

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62 Anderson Acoustics, A review on the state of the art on respite. Prepared for Heathrow Airport Ltd., 2016
CDO (as described earlier for the case of Heathrow) are also being used in Manchester. Aircraft approaching the airport between 22:00 and 06:00 are required to use these kind of procedures. This requirement will be extended to be used 24 hours, with a set target of achieving better than 90% 24 hour CDO use.

Furthermore, Manchester Airport has proposed to elaborate a “Low Noise Arrival” study, which further reviews operating instructions for the actions aimed to decrease the noise produced by arrivals at the airports.

- **Departures Management**

  Heathrow Airport has developed several operational practices to reduce noise originated from departures, as it is shown in their Noise Action Plan\(^64\):

  - Noise limits at fixed noise monitors and fines applied to breaching aircraft
  - 1,000 ft rule: aircraft are enforced to be at height of not less than 1,000 ft above aerodrome level at 6.5 km from the start of the roll
  - Noise Preferential Routes (NPRs): specific paths for departures up to an altitude of 4,000 ft
  - 4% minimum climb gradient

  In the case of Manchester Airport, different actions regarding departures have been proposed in their latest Noise Action Plan. For instance, there are penalties when airlines consistently fail to keep on the Preferred Noise Routes and a 5% annual limit for Non-Standard departures.

- **Runway Alternation**

  Another important measure taken by Heathrow to reduce the negative effects of aircraft noise is the Runway alternation\(^65\), a system that tries to better distribute the impact and to reduce the annoyance among the nearby residents.

  During the day, when aircraft are landing and taking off to the West, the use of the two runways is alternated to provide local communities with respite. The alternation pattern indicates that, during part of the day, Heathrow Airport uses one runway for landings and the other for take-offs. Afterwards, halfway through the day (at 15:00), the situation switches over. This way, some communities get approximately 8 hours respite a day.

  At the end of each week, the Airport completely switches the runways. This means that the runway set up used during the evening during the previous week is done in the morning and the other way around. Therefore, communities get respite from planes in the morning in one week and in the evening in the following one (Figure 9-4).

  The previous explanation is a simplified example. In practice, the choice of runway and flight direction also has to take into account the following factors: differences between daytime and night-time patterns, wind direction, local government policy which favours taking off towards the


\(^{65}\) Heathrow Runway Alternation
West, a historical restriction that makes aircraft not take off towards the East from the northern runway, occasional disruptions due to bad-weather, runway maintenance, etc. For instance, runway alternation during the day is not possible when the wind blows from the East.

![Runway alternation Week 1](image1)

**Figure 9-4 LHR runway alternation**

During the night-time, since there are very few aircraft taking off or landing, there is more scope to alternate runways. Heathrow has a four-weekly cycle for night-time runway alternation:

- Week 1: Aircraft fly in from the West to land onto the southern runway
- Week 2: Aircraft fly in from the East to land on the northern runway
- Week 3: Aircraft fly in from the West to land on the northern runway
- Week 4: Aircraft fly in from the East to land on the southern runway

- **Sydney Airport Long-Term Operating Plan (LTOP)**

This Plan combines the concepts of runway use and the management of departures to decrease the negative impacts of aircraft noise. Noise sharing is the key aim of Sydney’s Airport LTOP, and it is designed to maximise the over water and non-residential areas movements, therefore decreasing the population noise exposure. When overflight of residential areas cannot be avoided, then the plan aims to share the noise among the communities.

The LTOP has different noise sharing targets for aircraft movements depending on the area surrounding the airport: 17% of movements to the North, 13% of movements to the East, 15% to the West and 55% to the South. These targets cannot always be achieved due to meteorological or

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66 [Australian Government, Department of Infrastructure and Regional Development, Sydney's Long Term Operating Plan, General Information](/site/).
safety reasons. The idea behind them is to try to place as many flights as possible over water (55% to the South) and for the others try to distribute them among the three other directions in an equal and feasible way.

Under this plan, the aircraft departing from the airport to the South fly over the areas of Botany Bay or Kurnell Sandhills, therefore avoiding residential zones. The departure flight paths off the other runways are separated to try to concentrate the noise over a small number of populated areas that were already affected from previous path schemes.

An important characteristic of the Plan is the use of a runway rotation system. This system has different combinations of runways (runway modes) that are used at different times of each day to try to provide areas with respite from the noise coming from aircraft. These modes must be used at the airport (except in the case of emergencies, unusual traffic conditions or when weather conditions do not allow this system) during the following time periods on weekdays:

- 06:00 to 07:00
- 11:00 to 15:00
- 20:00 to curfew

![Figure 9-5 Runway modes of operation at Sydney Airport](image)

During the weekends, longer noise sharing is applied. If the conditions permit, the noise sharing modes are recommended to be used.
The LTOP puts in place noise sharing arrangements that were created in collaboration with the Sydney Community. The basis for these arrangements comes from a set of options developed by AirServices Australia to try to distribute the noise in an as fair as possible way.

The LTOP has 10 different ways of combining the three runways of the airport and the associated flight paths. These combinations are known as Runway Modes of Operation (Figure 9-5).

Furthermore, there is an Implementation and Monitoring Committee that also has community representation which reports through the AirServices and to the Federal Minister on how the system is implemented.

Monthly reports are prepared by AirServices Australia, providing information about the daily runway usage, flight paths and respite for residents, among other data (Figure 9-6).

![Figure 9-6 Sydney Airport daily mode usage](image)

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67 [Airservices, Sydney Airport Operational Statistics](#)
• **Ground Noise Management**

As indicated in their Noise Action Plan, At Heathrow, APUs, Ground Power Units (GPUs), Pre-Conditioned Air (PCA) usage and engine testing, especially at sensitive times, when air noise is less dominant, are controlled through operational safety instructions. In addition, regular audits are undertaken to monitor compliance.

This airport also has a ground noise management plan, which controls the major noise making ground-based activities, which include aircraft taxiing, engine ground runs and the operation of APU. Even though these operations do not have to be included in the noise action plans, they are of concern for residents, so they have been addressed. Heathrow has tightened their operating rules, improved the record-keeping, pre-approval processes and implemented a ground noise monitoring trial.

Manchester Airport is committed to develop a better understanding of the impediments to reduce engine taxiing at Manchester and assess, promote and monitor take-up. Furthermore, they plan to do a revision of the Departure and Ground Operations Code of Practice which encourages the use of reduced engine taxi when possible.

They also aim to restrict the use of non-essential APU units, which are a main source of ground noise, as well as to collaborate with airlines and group handling partners to increase the use of FEGP Points.

This airport also has actions to control and mitigate the noise coming from engine testing. In this regard, all engine tests above idle power must start in a specific engine test bay. When tests cannot be carried out inside the test bay due to operational or safety reasons, they are placed in two designated locations on the open airfield.

• **Quieter Flight Project at Heathrow**

In Heathrow, Airbus, British Airways and the National Air Traffic Services, together with the airport authorities, launched a partnership to create operational procedures that reduced the number of people affected by noise around the airport. In this project, the considered aircraft model was the British Airways A380, which is recognised as one of the quietest aircraft of its size. This is an example of how to develop and test new procedures to help to reduce the number of people affected by aircraft noise.

The project had three stages, as indicated in “Managing the Impacts of Aviation Noise“:

• During the first stage, possible operational improvements, such as reducing thrust on departure and optimising the height at which the aircraft is flown were identified.
• The second stage evaluated these procedures in a British Airways flight simulator.
• The third stage consisted of demonstration and evaluation flights. After this trial, the procedures were shared with other operators and airports where the A380 operates.

9.2.2 **Noise Monitoring and Reporting**

The monitoring of aircraft noise levels in community areas is an important element of the airport noise management. Even though it does not directly reduce noise exposure, it can be an integral part of noise and community management.
• **Monitoring Tools**

Heathrow has a dedicated noise website\(^68\) with several online tools accessible to the public and other stakeholder groups. The information in the website includes:

- Heathrow's operations: arrivals, departures, wind information, night flights, etc.
- Monthly and daily statistics based on the operational data and complaints
- WebTrak\(^69\), a single aircraft monitoring system, which enables the public to get information about the movements that happen at a certain airport. The noise data registered by noise monitors in the area are also shown. The users can register their complaints directly from the platform, having the advantage that the flight causing the problem is identified. Webtrak also shows statistics for the common paths and patterns over time. This online platform is a good example of well implemented aircraft noise information.
- WebTrak My Neighbourhood, which provides a view of how often particular flight paths are used on a monthly, quarterly or yearly basis
- xPlane, a tool that allows residents to carry out their own analysis of Heathrow flights and obtain data such as height, position and types of aircraft over a historic period
- Reports, HCNF (Heathrow Community Noise Forum) meeting notes and presentations, annual and quarterly performance reports
- Twitter account to provide real-time runway updates so that local communities affected by noise know what runways are being used for landings and departures each day, and the reasons for a change throughout the day

Manchester Airport has several actions in place also indicated in their Noise Action Plan with the aim of improving their monitoring and reporting. For instance, noise monitoring systems are accessed by the Manchester Airport Consultative Committee, who independently checks them. This Committee draws its membership from local authorities (15 members), amenity groups (4 members), passengers and business users, airport staff and independent bodies such as the National Trust (11 members).

The airport also elaborates noise maps that are published in a yearly basis. A new initiative in this regard is to include extra metrics, like Number Above, which are better understood by non-experts, compared to more standard metrics like Lden. In addition, the details of the noise complaints received are indicated to be published. Furthermore, monthly reports of the noise levels on take-off and the number of flights out of the preferred noise routes are specified in the new Noise Action Plan, as well as a revision of the current CDO reporting procedures.

Another interesting initiative in the area of noise monitoring and reporting proposed by Manchester Airport is the creation and introduction of a new Environmental Performance Indicator of airlines. After talking to stakeholders and agreeing on what measures they find the most valuable regarding environmental performance, a new performance indicator will be

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\(^68\) Heathrow Aircraft Noise

\(^69\) Webtrak
created. This will be used in a league table report and there will be an annual award for the highest performing airline. The concept of the League Table will be further commented below, with an example from Heathrow.

At Vienna Airport, the noise generated by all starting and landing aircraft is measured by the FANOMOS\textsuperscript{70} system, that consists of 14 stationary and four mobile recording stations that monitor all flight movements based on the flight information data provided by Austro Control. The recorded flight tracks are used to map actual noise zones and is also used to monitor compliance with prescribed approach and departure paths. In addition, the captured noise data are linked to the flight path records of the RAFIC (Radar and Flight Information Capture) system, so the information can be used to optimise flight paths and to identify deviations from the paths and the aircraft which caused them.

In the case of Sydney Airport, Australian AirServices has also established a Noise and Flight Path Monitoring System (NFPMS). This system monitors aircraft operations and their environmental effects, such as movement statistics, runway usage by aircraft and movement profiles. The data obtained by this monitoring system is included in their Noise Information Reports.\textsuperscript{71}

- **Fly Quiet and Green Programme Heathrow - The League Table**

This programme encourages airlines to use quieter aircraft and to fly them in the quietest way. It also includes a league table that ranks airlines according to their noise performance (Figure 9-7).

\textsuperscript{70} Vienna Airport FANOMOS

\textsuperscript{71} Airservices, Noise and Flight Path Monitoring System Reports – archive
The league table is published every quarter comparing the first 50 airlines (according to the number of operations for that quarter) across seven metrics. Each metric gets a red, amber or green status, depending on performance bands calculated for each indicator. Operators at the top of the list will have more green scores than those at the bottom of the table.

From the metrics considered by this system, two of them are noise-related (the chapter number and the QC per seat and movement), other two refer to emissions (CAEP standard and NOx emissions per seat and movement) and the last three are operational: continuous descend approach violations, track keeping and Late or early movement. Each metric has a different weighting. The overall score is a number between 0 and 1,000 and it is calculated by adding up combinations of an airline’s ranking position for each individual metric, and the weighting set for the given metric. This means that, in order to get the best score (1,000), the airline would have to rank first in all metrics.

### 9.2.3 Community Outreach

Community engagement is a crucial link between taking care of the environment and providing the case for growth. In most cases, airport operators would take the lead role in community engagements to implement collaborative working relationships related to environmental challenges around airports. In this context, it is important to be able to listen to the different opinions and to find effective ways of

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72 Heathrow Fly Quiet and Green
communicating. In the following subsections, examples of ways to foster communication and stakeholder’s collaboration are given.

- **Vienna Airport**

  The airport of Vienna is considered a best practice case in terms of efforts on mediation and community engagement and it has developed different paths to dialogue with residents.

  One of the mediation and community engagement tools they have is the Neighbourhood Committee, which provides communication with the local residents. This committee was established in 1989 and is composed of the airport managing director and the mayors and district heads of the surrounding neighbourhoods: Schwechat, Fischamend, Kleinneusiedl, Enzersdorf a.d. Fischa, Schwadorf, Grossenzersdorf and Rauchenwarth, Zwölftaxing and Himberg, and the districts of Donaustadt and Simmering.

  Another way of dialogue is the Verein Dialogforum (Dialogue Forum). This is a non-profit organisation financed by the airport and functioning as an information and communication platform. It continues the dialogue inaugurated during the mediation process that was made for the third runway project with 120 municipalities, the provinces of Vienna, Lower Austria and Burgenland, and citizens’ action groups. Its members represent around 2 million people. The Vienna Airport mediation process and Verein Dialogforum Flughafen Wien are regarded worldwide as examples of best practice in open, fair and transparent public participation.

  The Dialogforum monitors the compliance with the agreements concluded during the above-mentioned mediation process and deals with issues, questions and conflicts arising through the development of air traffic and enlargement of the airport. The mediation agreement handles several important topics, like the position of a possible third runway, night flight restrictions, noise caps, an environment fund and noise prevention programmes. The Forum discusses all these topics in order to reduce the nuisance from air traffic to a minimum. Municipalities and citizens had with it the possibility of putting in place actions that go much further than the measures indicated in the law. Furthermore, the Forum is continuously opened to all measures and ideas that may lead to decrease the negative effects of air traffic. The volunteer members work constructively to balance the legitimate and sometimes diverging interests of the aviation industry and the region (Figure 9-8).

  In addition to the Mediation agreement, Vienna Airport has created the hotline Umwelt und Luftfahrt, which deals with environmental and aviation issues. They also have a website: [www.vie-umwelt.at](http://www.vie-umwelt.at) which provides comprehensive information about environmental issues. Furthermore, it provides information on flight movements on the individual runways, the results of the noise measurements, a section with environmental lexicon, publications and e-mail contact links.

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73 [Vienna Airport - Dialogue with residents](#)

74 [Dialogue Forum](#)
feedback obtained through the hotline or through email is used as input for the work done by the Dialogue Forum.

![Vienna Airport Dialogue Forum](image)

**Figure 9-8 Dialogue Forum for Stakeholders and Interests**

Vienna Airport has as well a visitor centre, the so called VISITAIR, in which information about the airport's functioning can be obtained. One of the sections of VISITAIR is the Sound Station, which explains the phenomenon of noise and provides technical information. It also has samples of different noises from different sources, so the visitors can experience the subjective nature of noise perception.

- **Heathrow Airport**

Heathrow airport has put in place various stakeholder engagement forums and industry groups. One of the key forums is the Heathrow Community Noise Forum (HCNF). The HCNF was established in 2015 and has representatives from local authorities, community representatives from around the airport, as well as industry representatives from National Air Traffic Services, British Airways, Virgin, Department for Transport, Civil Aviation Authority and Heathrow Airport. The goal of the forum is to have a common level of understanding of the airport operations amongst community representatives and stakeholders, and to seek members' inputs into the planning and preparation of Heathrow's future airspace design. The HCNF meets every two months and there are also two working groups which feed the main forum: one for Monitoring, Research and Policy and one for Operating Procedures.

Other examples of Heathrow forums are Heathrow Airport Consultative Committee (HACC), Heathrow Community Engagement Board, Aircraft Noise Monitoring Advisory Committee,

Heathrow provides a noise complaints service as well that provides a full and comprehensive information to residents on how they are affected by the Airport operations. Complaints can be made by phone, mail or form and the goal is to respond them in less than five days. Furthermore, quarterly noise complaints reports are published on the Heathrow noise website with data on the number of people and complaints received, as well as the locations from which the complaints come from.

- **Sydney Airport**

In Sydney Airport, the local population is integrated in the decision process. The airport collaborates with the community, aviation industry, and the Australian New South Wales (NSW) and local governments to manage the impacts of aviation noise. This airport has an important way of engaging with the Community: The Sydney Airport Community Forum (SACF). The Forum gives representation to the communities living around the airport, the three levels of government and the aviation industry. SACF’s role is to provide advice to the Minister for Infrastructure and Transport, to Sydney Airport Corporation and to the aviation authorities on the abatement of aircraft noise and related environmental issues at the airport, as well as providing advice to aviation authorities to improve the consultation and information flows to the community about the airport’s operations. This body meets in a no-less than quarterly basis.

This airport also has a noise enquiries system, managed by AirServices Australia: The Noise Complaints and Information Service\(^\text{75}\), that can provide information about current and past aircraft movements and give explanations about why aircraft fly where they do.

- **Manchester Airport**

In Manchester airport, there is a community relations team to keep in touch with local people to respond to community concerns has been created. Furthermore, they run community outreach centres in areas around the airport.

In addition, this airport facilitates the paths for people to make their enquiries or complaints about aircraft noise, having planned a range of tools to engage with a wide number of stakeholders, like for instance: postcard correspondence with locals as an alert system, a page on the website with bulletin data, a range of data sheets available showing interviews with pilots, runway staff and ATC, or a community trust fund funded by the airport.

### 9.2.4 Operating restrictions

Operating restrictions are noise-related actions that limit the use of an airport by aircraft. This kind of restrictions should be applied as a last resort measure and they include several actions, like limits on total

\(^{75}\) [Airservices, Noise Complaints and Information Service (NCIS)](http://www.airservices.gov.au)
movements, noise quotas, night time restrictions and curfews. The restrictions can be applied to specific runways, flight tracks, aircraft types, specific operations or to time periods.

- **Night Time Restrictions**

In Heathrow airport, together with Gatwick and Stansted, a QC System was implemented. This system started in 1993 and limits the total amount of noise generated by aircraft movements at night. Each aircraft type is assigned a landing and take-off QC value based on noise certification data. There are seven QC bands from 0.25 to 16. The quieter the aircraft, the smaller the QC value, therefore allowing more operations per period. For instance, a QC of 0.5 allows twice as many operations as a QC rating of 1. Each airport has a fixed quota for summer and winter seasons. The night time aircraft movements use a fraction of the airport's quota depending on the aircraft's QC and, when the quota is consumed, then no more night-time movements are allowed during that season. Furthermore, the quotas of each airport can be adjusted following the improvement of aircraft technology. In the case of Heathrow, aircraft noisier than QC/2 may not be scheduled for night operations, becoming a de facto standard.

Limits and restrictions in force in Heathrow (in particular for night flights) are seen by engine manufacturers as important tests for new aircraft to meet over and above those required internationally. Heathrow provides financial incentives for airlines to use the quietest aircraft through the application of variable landing charges, which promotes the use of best in class aircraft by charging more for the noisiest and less for the quietest aircraft in relation to the ICAO standards.

From October 2018, a new QC/0.125 category was introduced to reduce the number of aircraft exempt from the noise quota, so all aircraft now count towards the airport's movement limits. Also, a commitment with airlines was reached in order to not to schedule aircraft to arrive before 04:30, except in case of emergency. Furthermore, there is a voluntary agreement of not scheduling cargo flights to operate between 23:30 and 06:00 local time, as well as a Quiet Night Charter (QNC)\(^7\) aimed to provide and support predictable operations, fewer off-schedule movements, greater transparency and quieter operations. Six initiatives have been developed to support the implementation of the Charter in Heathrow for five years, as explained in their Noise Action Plan:

- Avoid and mitigate flights operating after 23:30
- Closer monitoring from ATC to try to avoid flights that may take place later than 23:30
- Noise exempt flight schedule constraints
- Investing in a ‘quieter night’: support quieter, on time operations, focus on the expanded balanced approach principles, increase investment in training, information technology (IT), changing operating procedures, etc.
- Influence the use of quieter aircraft in the night period
- Operating protocols for late arrivals to avoid later departures in the night quota period

Manchester Airport has a Night Noise Policy in order to minimise the effects of night time operations. The 2019-2023 version of the Policy is currently in consultation period, as well as the

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\(^7\) [Heathrow Airport, Heathrow Quiet Night Charter](#)
draft Noise Action Plan 2019-2023. In the Night Noise Policy document, various policies affecting night-noise management are elaborated. For instance, the commitment to maintain the 60 dB Laeq noise contour smaller than in 2001, the application of night noise surcharges and use of seasonal QC point noise budgets, a night flight limit stating that no more than 7% of the total flights can be scheduled to take off or land between 23:30 and 06:00. Furthermore, nonstandard departures will not normally be issued between 23:00 and 07:00 and Runway 2 will not be used between 23:00 and 06:00 unless it is unsafe to use Runway 1.

In the case of Sydney Airport, it was decided to establish a curfew.\textsuperscript{77} The goal of this action is to balance the need to reduce night-time aircraft noise for nearby communities with the airport commercial operations. At night-time, the curfew limits flights between 23:00 and 06:00 by restricting:

- The aircraft types that can operate
- The runways that can be used
- The number of flights allowed

Usually, passenger jets are not allowed to depart from or arrive to Sydney Airport overnight. A small number of international passenger jet movements can be approved between 05:00 and 06:00 to cover time differences associated with northern hemisphere summer scheduling season. During the curfew aircraft must fly over the Botany Bay. If the curfew is breached, fines up to $850,000 can be applied. Deviations from this rule are allowed only in case of exceptional circumstances.

Vienna Airport has night time restrictions as well, since one of the points agreed during the mediation process of the third runway in Vienna Airport was the introduction of a limit on flight movements during night-time. Under this agreement the flight movements between 23:30 and 05:30 must be gradually decreased until a maximum of 3,000 flight movements per year (an average of four landings and four take-offs per night) when the third runway becomes operational. Additionally, the use of approach and departure paths is regulated during night hours, existing only restricted flight paths that can be used during those periods.

9.2.5 Land Use Planning and Noise Mitigation

Land use planning is an important mechanism to prevent the disturbance of residential communities by aircraft noise. However, the zoning of areas and the residential development is under the domain of local or municipal authorities, so airports cannot directly modify this. What airports can do is to participate and collaborate with other stakeholders to support this type of initiatives, ensuring that land use compatible with areas affected by aircraft noise is approved.

London, as many other big cities, has the need of building many more homes, that in some cases are projected in areas affected by aircraft noise. Noise footprints extend within big areas around the airport, making difficult to avoid that new properties are built under the flight paths. In this regard, it is essential to bring all parties together. In order to achieve an acceptable situation in the future, an overall strategy

\textsuperscript{77} Australian Government, Departure of Infrastructure and Transport, Curfew at Sydney Airport
is needed: local authorities need to know where they can permit residential housing, the airport needs to be able to plan future noise contours, the developers will need to know what mitigation actions will be required and the community will need to be informed about the noise impact.\(^7\)

Heathrow Airport works in this kind of initiatives with local authorities, government and local community groups on local plans, promoting actions to develop a local planning guidance and a joint position paper on encroachment. In the case of the community of Hounslow, nearby Heathrow Airport, they have developed a local plan with the aim of avoiding sensitive uses inside high noise contours – for example, it does not allow noise sensitive developments above 69 Leq, more than 1 bed dwellings in 63-69 Leq, and requires insulation and ventilation systems for areas with above 57 Leq noise levels.\(^7\)

Regarding noise insulation and mitigation schemes, Heathrow has proposed several initiatives, indicated in their latest noise action plan. Examples are the community buildings noise insulation scheme, the Home relocation assistance scheme, the Night noise insulation scheme, the Residential day noise insulation scheme or the Quieter homes scheme.

The areas surrounding the airport of Schiphol are also a good example of the dilemma between the air traffic evolution and the demand for housing. In the western part of the Netherlands there is a huge demand for residences, with high prices and with the national government pushing for new housing development. In this area, 80,000 new residences are planned until 2050 within and close to the 48 Lden contour. It is important to note that the new WHO guidelines are up to 45 Lden, which, if applied, could have a big impact on land use planning. This will lead to almost 173,000 new residents and 15,000 heavily annoyed people, reducing the future room for growth of Schiphol. This situation formulates the questions of how to cope with scarce space and with the challenges of housing and mobility. A possibility for these areas could be using them for student accommodations, since the stays would have a temporary purpose and the young population is less annoyed by noise. In addition, Schiphol is collaborating with the local community towards a joint approach including clean up, renovation and temporary housing for these areas.\(^7\)

The local authorities around Schiphol have demands to try to mitigate these issues:

- Clear and stable noise contours and constrained zones
- Space for new housing development
- Compensation, moving fees and purchase of areas close to the airport
- Clear information to the new citizens
- Ways to relieve the populated areas (runways and routes usage)

In the case of Manchester Airport, several mitigation and compensation schemes are indicated in the new noise action plan:

- A sound insulation grant scheme, which aims to help people with the cost of insulating their homes against aircraft noise.

\(^7\) ANIMA – ARC, Land-use planning and Heathrow, 2019

\(^7\) Schiphol Group, Case: Schiphol, Spatial planning framework, current challenges and possible solutions, 2019
- Grants for noise sensitive buildings, like schools and hospitals in order to obtain sound insulation.
- Home relocation assistance scheme
- Property purchase offer at highest noise levels
- Vortex damage repair scheme
- Community trust fund: all money raised from environmental penalties will be donated to the Airport Community Trust Fund. On top of that, the airport will continue to donate £100,000 to the fund each year.

Sydney Airport has provided guidance to the Government and Councils to make informed planning and development decisions in areas around the airport. Concerning noise mitigation, this airport also supported the Australian Government's aircraft noise insulation program to fund the insulation of 4,083 homes and 99 public buildings and to voluntarily acquire 147 residences to create a new park.

In the case of Vienna Airport, the noise protection programme was largely extended in 2007 in response to the demands of the ARGE citizen's group in the Dialogforum and the mayors of neighbouring municipalities to include citizens who can expect relief under the three runway system but still suffer under the two runway system. This programme extension is being paid by the Flughafen Wien environment fund. The noise protection programme has more strict thresholds than the standards, since it elaborates action plans at night for areas starting at 45 dB, while the Federal Ambient Noise Regulation states 55 dB.

The Flughafen Wien AG noise protection programme is designed to protect the health and wellbeing of the residents that live nearby the airport. For instance, for those households which have a permanent noise level of over 54 dB during the day and 45 dB at night, Vienna airport assumes from 50 to 100 % of the costs of the installation of soundproof windows and doors. Furthermore, in some cases the construction of winter gardens is also subsidised.
Chapter 2

10 Sustainable Operations

This section reviews the concept of sustainable airports and sustainable operations, which is a challenge for airports all over the world, not only BRU.

10.1 Overview

10.1.1 Aviation Growth and Environmental Problems

Commercial aviation has become one of the fastest growing sectors in the current economy. Since 1970, the world aviation industry has shown an annual average growth rate of flight traffic of nearly 5%. This rapid growth affects the environment in different aspects: climate change, waste production, air and noise pollution, etc. Due to this high growth rate, airport infrastructure faces problems to be upgraded simultaneously, leading to negative impacts to airport users, like flight delays, baggage problems, low service quality and customer dissatisfaction. Furthermore, the construction of extra airport units like terminals and runways to try to solve these problems, also has the side-effect of increasing the already mentioned negative impacts.\(^\text{80}\) From these impacts, aircraft noise is probably the most relevant, primarily due to be the one with the largest geographical extension, affecting operations and development of airports around the world. Because of this situation, many airports show operational constraints or capacity limits based on noise.\(^\text{81}\)

10.1.2 Society’s Changing Attitude Towards Aviation

The has long been a public fascination with aviation and airports, having been positively viewed for a long time, due to the novelty and interest created around air transportation in its early days. However, that was when traffic and its impacts were low. However nowadays, airports are perceived to have associated problems and burdens for society, as well as the evident advantages. Although there have been voices raised against airports since the beginning of commercial aviation, the major shift regarding their perception by society happened afterwards, as there has been a transition from a new and unusual way of transport to a more routine mode, with massive number of passengers now being transport. Impact almost everywhere has been compounded by territorial encroachment around airports, which has increased this controversy.\(^\text{82}\)

Currently, even the concept of “the shame of flying” is gaining prominence in some sectors of society, often related to perceived views on the sector’s contribution to Climate Change. For example, in Sweden, more and more passengers are turning to the use of the train rather than air transportation, in order to reduce

\(^{80}\) Koç and Durmaz, *Airport Corporate Sustainability: An Analysis of Indicators Reported in the Sustainability Practices*, 2015

\(^{81}\) Elena Konovalova, *Environmental capacity of an airport as an element of balanced approach to aircraft noise control*, 2010

\(^{82}\) Nathalie Roseau, *Learning from Airport's history. Mobility in History*, 2013
the greenhouse emissions, pollute the atmosphere less, and therefore shifting to a more sustainable way of travelling.\textsuperscript{83}

10.1.3 Historical Context of Airports

Initially, many airports were in areas next to the cities, which have been progressively surrounded by the cities’ expansion, leading to encroachment and a limit to their operations.

In contrast with the encroachment situation faced by some airports, there is the concept of greenfield airports. Greenfield projects can be defined as those that lack constraints imposed by prior infrastructure. In this regard, greenfield airports projects have two goals, the first is to increase capacity in the dynamic aviation market (which is set to grow in the foreseeable future) and the second is to double as a strategy for large-scale urban developments.

Airports have evolved from simple grass and gravel airfields to so-called airport cities (Aerotropolis) worldwide, which have large scale infrastructure in order to handle aircraft movements, passenger and cargo traffic. Building these major infrastructure projects like greenfield airports is a way to expand the cities beyond their current boundaries and releasing some pressure from the historical city centres, as indicated in the ICAO and United Nations (UN) - Habitat Report about Airports and Sustainable Development.\textsuperscript{84}

It is important to note that, although the benefits of the growth and development of an airport affect a large area, the negative impacts are received by the residents of the neighbouring communities. This way, the local opposition can constrain growth and influence future developments. The usual reasons for complaints include noise, local air quality, congestions and accidents on local roads and fear of air accidents.

Metropolitan areas show a concentration of populations, economical activities, as well as social and cultural interactions. All these have a potential positive implication on the growth and development of air transport and cities. At the same time, these opportunities may face major sustainability challenges that need to be addressed in a coordinated management system.

There is a correlation, indicated by the already mentioned ICAO and UN report, between the growth of urban settlements and the projection by ICAO that worldwide aircraft movements and passengers’ volumes will double by 2030. Due to this situation, States will have to invest in infrastructure to meet the needs of the global growing demand, and it is important that this growth is sustainable.

10.1.4 Airports’ Sustainability Challenges

EUROCONTROL forecasted that by 2040, the European aviation traffic is expected to grow to just over 16 million flights under the most-likely scenario. That means a total growth of 53% compared to 2017. This growth is slower than before 2008, during which the number of flights in Europe doubled from 5 million

\textsuperscript{83} Franceinfo, La honte de prendre l’avion, 2019

\textsuperscript{84} ICAO – UN, Promoting synergy between cities and airports for sustainable development, 2018
in 1988 to 10 million in 2008. The reasons behind this deceleration are the slower rates of economic growth, the increasing fuel prices and the increasing congestion at airports and ATC infrastructure.

In response to the forecast increasing traffic, airports are planning to expand their capacity plans again. However, even if these plans can be delivered, they are not enough, since it has been forecasted that there will be 1.5 million flights more in demand than the total number of them that can be accommodated. In addition, even with this number of unaccommodated flights, it is expected that the number of airports operating near capacity for much of the day climbs from 6 in summer 2016 to 16 in 2040, resulting in more delays.

There are three main difficulties predicted by the Challenges to Growth EUROCONTROL’S report are:

- Delivering the current airport capacity plans, which already fall 1.5 million flights short of demand. Therefore, more capacity is needed from the airports in 17 different States.
- To provide an adequate quality of service, considering the expected network delays due to the airports' congestions
- The adaptation to climate change, which will damage aviation infrastructure, alter patterns of passenger demand, and lead to more disruption of daily operations

Apart from building additional runways, airport capacity can be delivered through other ways, including technology innovation, schedule smoothing, using larger aircraft and multi-modal approaches.

Due to the continuous traffic growth and the pressure from airport neighbours, there is a growing demand of imposing operating restrictions on night flights in some regions of the world. This pressure is high for airports that are in very densely populated areas, such as the case of BRU. As the number of flights increase, the population in the nearby areas becomes more concerned about health problems, especially regarding airport noise. In addition, exposure to aircraft noise produces annoyance to the population, which can also be increased by factors that are not directly linked to it, such as congestion produced by road traffic, fear of air accidents, or financial concerns about the value of property around the airport, as shown in the ICAO working paper on night flight restrictions.

10.2 **Night Noise at BRU**

Night flights are an issue at BRU, as well as in other airports worldwide. BRU has measures in place to mitigate the effects of aircraft night noise, namely, the use of a QC system, as well as limits to night slots and flights.

10.2.1 **Night Slots and Flights**

There are two different legal levels regarding the operating conditions of night flights at BRU. There is the federal level, which sets the ceiling of maximum allocated night slots, and the provincial level, which concerns the number of night movements.

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85 EUROCONTROL, *European aviation in 2040. Challenges of growth*, 2018

At the federal level, the regulation in the matter is the **Ministerial Decree of 21 January 2009, amending the Ministerial Decree of 3 May 2004 on the management of noise pollution at Brussels Airport**. This regulation establishes that the coordinator of BRU, in accordance with the Council Regulation (EEC) No. 95/93 of 18 January 1993 on common rules for the allocation of slots at community airports, shall authorise the use of all the infrastructure necessary for the operation of an air service at BRU on a specific date and time of landing or take-off during the night. In the second article, as amended by the Ministerial Order of 27 November 2007, a Chapter IVb is included, which states that the coordinator of BRU may allocate a maximum of 16,000 night slots per calendar year, of which a maximum of 5,000 slots may be allocated for departing night flights.

Slots are authorisations to land at or to take off from the airport. Additionally, slots are not allocated to departing aircraft between 01:00 and 06:00 on Fridays nor between 00:00 and 06:00 on Saturdays and Sundays.

The **Decision of 11 September 2008 of the Permanent Deputation of the Province of Flemish Brabant** regulates the number of movements at the regional level. The Province has the power to amend the conditions of existing environmental permits and decided to reconsider the conditions regarding the number of night flights. Therefore, it was decided to reduce the maximum number of licensed night flight movements from 25,000 to 16,000, decreasing also the number of departing flights from 10,000 to 5,000. These limits are specified in the second article of the above-mentioned regulation.

Sometimes, the terms night slot and night flight are confused. For instance, there can be cases in which more than 16,000 night movements (in the sense of all flights operated at Brussels between 23:00 and 05:59) take place during a year in Brussels, but this does not mean necessarily that the legislation was not respected. As it is stated in the Federal Law, there is a limit of 16,000 night slots to be allocated per year. However, it can happen that flights with night slots end up not using them, or that flights with day slots will leave at night due to delays if it is unintentional and non-repetitive. Furthermore, there can be a significant number of flights with military or diplomatic status and helicopter flights, which are exempted from slot coordination. From the total number of night slots, not all of them take place during the night. These other flights correspond to those which had a slot but were cancelled at the very last moment or to flights ultimately performed outside the night hours.

In the following figure\(^87\), the total numbers of night slots and night movements from previous years at BRU is shown.

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\(^87\) [Brussels Airport, Environmental Report 2018](#)
In addition, in order to reduce night noise, there are in place taxi restrictions between 22:00 and 04:59. In this regard, a maximum number of four aircraft are authorized to taxi simultaneously to the holding position(s) of the runway(s) in use. Moreover, only three aircraft can await take-off clearance at the holding position at the same time.

Another measure taken as well is the restriction of engine tests, which are only allowed between 06:00 and 21:00.

**10.2.2 The Quota Count (QC) System**

The QC was a system created in the airport sector with the goal of helping to manage the night noise generated by aircraft. Every aircraft type is assigned a QC value which depends on its certified noise levels. Smaller QC values are given to quieter aircraft and they are classified separately for landing and take-off.

The QC values were introduced in BRU through the government agreement of 11 February 2000, which provided the introduction of reduction measures to noise pollution that directly affected aircraft. This agreement intended to systematically reduce the number of people who are exposed to night noise.

The proposed reduction measures had three different types:

- Bans on aircraft access to BRU for instance, by means of a maximum noise quota per movement
- The introduction of an overall noise quota per season
- The use of incentives

After the above-mentioned agreement, the Ministerial Decree of 26 October 2000 introduced seasonal noise quotas for take-offs:

- Winter 2000/2001: 44,500 (21 weeks)
- Summer 2001: 68,500 (31 weeks)
The Ministerial Order of May 2004 on the management of noise pollution at the Airport of Brussels-National supplements these provisions. It fixed the QC per aircraft movement during the night and early morning periods, as well as overall noise quotas for the winter and summer periods.

In addition to an individual limitation on the QC per aircraft, limits were also introduced for the night departures for the overall QC per season. These limits were originally set for the 2004 summer season (31 weeks) at 49,000 and 33,600 for the 2004/2005 winter season (21 weeks). These season limits are still in place, but given the strict limitation on the QC of individual aircraft and the limitation of the availability of night slots for departures during the night period, this condition is currently almost automatically met.

The Ministerial Order of July 2009, amending the Ministerial Order of the 3rd of May 2004 on the Management of noise pollution at BRU, established the noise limits per take-off for civil aircraft.

As indicated on the skeways website, the following noise restrictions are in place in BRU:

Movements of jet aircraft with MTOW ≥ 34 T or with a capacity of more than 19 seats (crew-only seats excl) are restricted:

- Take-off or landing with QC > 8.0 is forbidden between 22:00 and 04:59 (21:00 and 03:59)
- Take-off or landing with QC > 12.0 is forbidden between 05:00 and 05:59 (04:00 and 04:59)
- Take-off with QC > 48.0 is forbidden between 06:00 and 19:59 (05:00 and 18:59)
- Landing with QC > 24.0 is forbidden between 06:00 and 19:59 (05:00 and 18:59)
- Take-off with QC > 24.0 is forbidden between 20:00 and 21:59 (19:00 and 20:59)
- Landing with QC > 12.0 is forbidden between 20:00 and 21:59 (19:00 and 20:59)

Exemptions may be granted for:

- Take-off between 20:00 and 21:59 (19:00 and 20:59) with QC ≤ 26.0 (with a maximum of 3% of the number of take-offs per year for this time period)
- Take-off between 22:00 and 04:59 (21:00 and 03:59) with QC ≤ 12.0 (with a maximum of 200 take-offs per year only for aircraft that operated at EBBR between 25 October 2008 and 24 October 2009)
- Landing between 22:00 and 04:59 (21:00 and 03:59) with QC ≤ 12.0 (with a maximum of 300 exemptions per year)

Exemptions shall be requested from the CAA in advance.

Furthermore, take-off or landing of marginally compliant aircraft is forbidden between 22:00 and 04:59.

These limits imply that certain types of aircraft equipped with obsolete technology or with take-off weights well above average, are not allowed at BRU. This binding measure can be respected in two ways:

- In most cases (like in the case of the Boeing 727 hush-kitted), the operator must renew its fleet, something already done by most of the companies that operate at night in Brussels-National.
In the case of a few recent aircraft with a high capacity (Boeing 747, DC-10 and MD-11), operators must either use smaller replacement aircraft or adapt their schedules.

Since spring 2009, the federal authority has also imposed periods in the night during which no take-offs can be scheduled:

- From Friday to Saturday (from 01:00 to 06:00);
- From Saturday to Sunday (from 00:00 to 05:59);
- From Sunday to Monday (from 00:00 to 05:59).

While this measure offers three quiet night shifts to some residents, it does not apply to landings.

For each aircraft, the QC is calculated at take-off and landing based on the EPN dB (Effective Perceptible Noise Decibel of the Total Noise) noise levels provided by its noise certificate. Each aircraft type can have different values corresponding to the diversity of sub-models (particularly according to engine type) and to the time of aircraft certification.

To calculate the QC per movement, the following formula is used:

\[ QC = 10^{\left(\frac{G-85}{10}\right)} \]

where G equals:

- For take-off: half the sum of the certified flyover and lateral noise levels in EPN dB of the aircraft at its MTOW
- For landing: the certified approach noise level in EPN dB of the aircraft at its maximum landing weight, minus 9 EPN dB

The following flights are exceptions for the noise quota system:

- Flights carrying members of the Belgian Royal Family, the Federal Government, regional or community governments or foreign royal families, foreign heads of state or government leaders, the President or members of the European Commission on official mission
- Missions in case of disaster or medical urgency
- Military missions
- Take-off or landing performed in exceptional conditions (flights on which an immediate threat exists to the health of people or animals, diverted flights, etc.)

Furthermore, it is also indicated that, in case of circumstances beyond the operator’s control, a non-compliant flight may be exceptionally allowed, provided that proper justification is sent to the Director-General of the CAA within two working days after the flight. In the case of marginally compliant aircraft, an authorization of temporary use may be delivered by the Minister of Transport or his representative, if the aircraft is operated exceptionally or in non-commercial flights for modifications, repairs or maintenance.

The QC also influences the price that airline companies pay for the use of the runways at BRU. In this regard, noisy aircraft pay more than quieter planes, and flights during the night are also more expensive than day flights. The formula to obtain the charge is the following:

\[ (U)*(W)*(E)*(D) \]

where:

- (U) is the Unit Tariff
- (W) is the Maximum Take-Off Weight (MTOW)
• (E) is the Environmental Factor
• (D) is the Day/Night Factor

The Environmental Factor depends on the aircraft noise categories, ranging from R1 to R8 and being applied to aircraft certified under ICAO Annex 16 Chapters 2, 3, 4 and 5, using corresponding noise certification data. The calculation of the factor depends on the noise reduction of the aircraft at the ICAO Annex 16 measurement points: flyover, lateral and approach. The less noisy the aircraft is (or the higher the margin to the limits is), the lower the Environmental Factor will be, therefore resulting in a cheaper fee.

The Day/Night Factor depends on the actual landing or take-off time and the QC\(^88\)

<table>
<thead>
<tr>
<th>Local Time</th>
<th>QC</th>
<th>Movement</th>
<th>[D]</th>
</tr>
</thead>
<tbody>
<tr>
<td>06:00 – 07:59</td>
<td>QC &lt; 12</td>
<td>Dep</td>
<td>Arr</td>
</tr>
<tr>
<td>08:00 – 20:59</td>
<td>QC &gt;= 12</td>
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<td>21:00 – 22:59</td>
<td>QC &lt; 12</td>
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### DHL Situation at BRU

Whilst DHL is not the only company with night time operations, it has attracted significant comment from representatives of the surrounding communities, so we felt it appropriate to pass some comment here.

In 1985, the express courier and supply chain management company DHL first established its European logistics centre at BRU. There has been a history of moving operations to Leipzig for a while, but now there seems to be a strategy to grow capacity and infrastructure at BRU. As recently as last year (Feb 2018), a new 36,500sqm regional logistics hub was opened.

E-commerce is driving massive growth in the express logistics sector. The new hub facilitates continental collection of shipments until the end of the day and delivery the next morning. However, this means that night flights are an essential part of this business model. Flights converge on BRU at the beginning of the night, which is followed by a period of unloading, sorting and reloading of the aircraft, which then take off.

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\(^{88}\) Brussels Airport, Charges and fees at Brussels Airport, 2018
from BRU in the middle or late night. This activity clearly has an economic interest and creates a significant number of jobs. However, there is a negative consequence for the region as it creates additional night traffic to the detriment of the inhabitants overflown. Statements are provided elsewhere in this report (sections 3 & 4) from both the impacted communities and from DHL and other operators at BRU.

We will not comment on the specifics of this development and the impact it has on the noise landscape around BRU. We believe these kind of decisions are rightly political (yes, there is a place for political decisions!). However, these decisions should be made after transparent assessment and comprehensive consultation setting out the benefits and disbenefits. This “assess and consult” approach would be in line with the requirements of the EIA Directive for larger infrastructure projects and the SEA Directive for less tangible ‘programmes’ such a changes to noise policy. This justified and inclusive approach seems not to have been achieved, and it is illustrative of the arbitrary nature of historical decisions that have been taken on BRU operations affecting noise impact.

Given the recent history of BRU and the problems of noise, the commercial decision for DHL to resume investment in this hub, is, in many ways surprising to us, as outside observers.

We believe that more could have been done by DHL itself to communicate and reach out to all communities, setting out their plans and mitigation strategies that presumably they must have to respond to the increased noise burden. We believe that such collaborative and transparent assessment and consultation processes, led by the Aircraft Operator who is the proposer for such developments, and in line with EIA or SEA good-practice, should take place whenever developments with the potential to significantly affect the noise climate around BRU are being seriously considered.

In our view, retrospective work is needed to explore and address the overall question of “sustainable operations” in a meaningful and equitable way and the outcomes taken into account in the proposed commonly agreed BRU aircraft noise policy. Any future operational or infrastructure proposals that could significantly affect the noise climate around BRU should be subject to an independently verified, collaborative and transparent assessment, justification and consultation process that follows best practice principles of the relevant EIA/SEA Directives.

10.3 Delivering Sustainability

10.3.1 General Approaches

The concept of Green Transport\textsuperscript{89} is an initiative to support sustainable economic development without sacrificing the local and global environment. It aims to provide society with a transportation system that produces a smaller physical carbon footprint, uses less energy and produces less carbon dioxide and other pollutants. This concept involves the elements of careful planning to decrease land use, energy efficiency and socially responsible economic assessment of alternatives.

In order to achieve sustainable development, the airport’s capacity must be optimised. The capacity of an airport depends on many different factors, like the number of runways, extension of the taxiways, number

\textsuperscript{89} Asian Development Bank, Green Transport, Resource Optimization in the Road Sector in People’s Republic of China, 2009
and size of the terminals, landside facilities and ease of access. However, there are also environmental factors that can produce constraints to airport’s growth and development through community opposition and regulatory standards. Airport developers may invest in new infrastructures but lack the environmental capacity (for instance the willingness to accept noise) that allows its full use, as it has been the case in airports like Amsterdam Schiphol or Düsseldorf.

Maximising the environmental capacity of an airport requires to bring environmental management to the main corporate business planning process. It is also important to keep in mind that the creation of new infrastructure may need several years for its approval and result therefore in environmental limits for future operations. Thus, airport operators need to begin to plan now for the long term and visualize the infrastructure needed for the anticipated demand, as well as to address the current and forthcoming environmental issues. In addition, operators need to work together with their service partners, airlines in particular, in order to ensure that environmental targets are met. In this regard, airlines should be proactive to secure their own future, as it is of the interests of all parties to increase the environmental performance of the airports.

In order to work to achieve sustainability, it is important that airports take a ‘good neighbour’ strategy that acts against the principal problems while meeting the commercial and economical objectives. It is also important that residents are informed about the problems and proposed solutions as well as provided with systems of public consultation and transparent noise monitoring, as indicated in Upham et al. (2003)⁹⁰.

Being an airport close to a major European capital, BRU must face restrictions to mitigate the negative environmental effects to its surrounding, especially regarding noise. Therefore, one of the most important issues that must be dealt with is the night noise. People are usually more sensitive to noise during night times, with night flights having on average five times the number of complaints compared to day flights. One of the social demands regarding night noise from airports is the introduction of night curfews. In this regard, ICAO suggests that States should deal with these issues using consultation and settlement mechanisms, as well as respecting and following the ICAO Balanced Approach principles, as indicated in their Night Flight restrictions Working Paper⁸⁶.

### 10.3.2 Frankfurt Area Example

Frankfurt Airport is one of the busiest in Europe and a large commercial international airport in Germany. It serves as the main hub for Lufthansa and handles a high number of passengers and cargo operations. In 2012/2013 the airport had the highest number of international destinations from all airports worldwide, and for 2020, there are predictions of 701,000 movements (88 million passengers and more than 3 million tons of cargo). In order to manage this traffic growth, the airport constructed a new fourth runway to increase its capacity in terms of flight movements per hour.

Frankfurt Airport has the goal of combining noise reduction with the high forecasted growth, as indicated in their Sustainability Reports.⁹¹ The airport, together with partners like Deutsche Flugsicherung, Deutsche

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⁹⁰ Paul Upham et al., *Environmental capacity and airport operations: current issues and future prospects*, 2003

⁹¹ Fraport Sustainability Reports
Lufthansa and other stakeholders have made many efforts in noise abatement. Nowadays, Frankfurt Airport is equipped with state-of-the-art navigation technology in all its runways supports approach procedures that lead to noise reduction at the areas that are more affected by the landing noise.

This airport also integrates its economic, environmental and societal goals into a sustainable program, which has the objective of making the growth of the airport to not negatively impact the wellbeing of the local communities as well as the surrounding environment. By having this policy, the airport has achieved to keep growing while still dealing with the associated problems (like noise, for example). The airport is committed to the objectives of the Agenda 2030 and the sustainable development goals. The Agenda 2030 is a tool for sustainable development created by the international community, which was adopted by all member states at a United Nations Summit in September 2015. The Agenda has 17 Sustainable Development Goals, giving equal weight to social, environmental and economic dimensions. From these goals, Frankfurt Airport focuses on 11, which are within their scope.

Furthermore, the area around the airport is subject to continuous monitoring and reports are produced and published at their website, as well as more details are given to the municipalities that demand them. Frankfurt Airport also provides the information system FRA.Map, which allows residents and interested parties to find information about noise issues for their location, as well as the areas targeted by noise abatement measures or compensation payments.

Regarding active noise abatement procedures, the airport has in place noise reducing operating concepts, like for instance the commissioning of the Ground Based Augmentation System (GBAS), which hopes to increase efficiency and to produce less noise at landings with an approach degree of 3.2 degrees. Furthermore, they also have in place a noise-dependent charging system, which serves as well as an active noise abatement measure.

In addition, since May 2016, a noise absence model has been applied at night for flights that operate to the West of the airport, which is the main direction of the airport's movements. This model implies that in the early morning (from 05:00 to 06:00) and late evening (from 22:00 to 23:00) individual runways are not used alternatively. This method intends to extend the night time quiet period by 1 hour. This night-time curfew was admitted in the court in 2012, closing the airport from 23:00 to 05:00 due to complaints by residents.

Another voluntary measure in place is the partnership for a noise emission ceiling, which has the goal of ensuring that, even with a rise in aircraft movements, the daytime noise impact does not increase. Fraport has chosen a Key Performance Indicator of Leq per day = 55 dB(A) for the noise area that must be determined annually. The aim is that the figure for this area does not increase above 22,293 ha. If the limit is surpassed, then the airport and the airlines must implement further noise abatement measures. The objective indicated by Frankfurt Airport is to keep the area affected by aircraft noise below the noise ceiling during the day.

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92 FRA.Map
Concerning passive noise abatement, Fraport has taken measures in approximately 86,000 households close to the airport, in which structural modifications have been carried out to reduce the noise impacts. Furthermore, roof protection against the gusts of wind caused by wake turbulence has been carried out.

Apart from all the measures taken by Frankfurt Airport in order to achieve sustainability, there is also another important factor that helps in this regard. In the area of influence there is also the international airport of Frankfurt-Hahn, situated between the cities of Frankfurt and Luxembourg and not far from Koblenz and Mainz. This airport hosts low-cost carriers (Ryanair and Wizzair) as well as a prominent cargo activity, releasing pressure from Frankfurt Airport and allowing night flights, since the area around the airport has a way lower population density. In this manner, Frankfurt-Hahn helps Frankfurt Airport in its target of achieving a sustainable development, since it provides with additional cargo and night time services that would be problematic for the second.

10.3.3 Paris Airports Example

An example of an airport that can still develop without night flights and with a cap on total number of movements is Orly. The International Airport Paris-Orly serves now as a secondary hub for domestic and overseas territories flights of Air France. It used to be the main airport of the city of Paris until the opening of Charles de Gaulle Airport in 1974. This opening made most of the international traffic to shift to Charles de Gaulle, although Orly stays as the busiest French airport for domestic traffic and the second busiest French airport overall in passenger traffic, with 33.1 million passengers in 2018, just behind Paris-Charles de Gaulle, which had 72.2 million passengers. Paris-Charles de Gaulle Airport stays as the largest international airport of the city, serving as the principal hub for Air France, as a focus-city for low-cost carriers and handling an important amount of cargo traffic. Other airports in the region are Le Bourget Airport, which hosts mostly general aviation and private jets, and Beauvais-Tillé Airport, which is mostly used by charter and low-cost airlines.

This setup and share of ‘specialities’ among the airports of the region facilitates the expansion and sustainable development of each of them. For instance, Paris-Orly Airport has experienced lately several developments, creating road access works, an international jetty to accommodate wide-body aircraft on long-haul routes and a new project of a ‘junction building’: Orly 3. This building will connect the two old terminals, and should accommodate 8 million passengers, which will be added as traffic grows to the 33.1 million counted in 2018. Furthermore, the airport has become more international and has a growing number of low-cost airlines, which increased from 23% in 2010 to 40% in 2018. The transformation will be completed in 2024 with the commissioning of a multimodal station that will connect the airport to the tram, metro and train. All these efforts destined to the airport’s growth do not intend to reduce the curfew (From 23:30 to 06:00) or to increase the number of aircraft movements, which has a threshold of 250,000 movements per year. In order to balance the traffic increase with the restrictions, this airport relies on the increase in the aircraft carrying capacity (from an average of 114 passengers per aircraft in 2009, it increased to 145 in 2018), as well as in the share of traffic between the airports of the region.

94 Le Figaro, Orly fait sa mue pour accueillir 41 millions de passagers, 2019
10.3.4 **Istanbul Area Example**

In the area of Istanbul, there are three main international airports: Istanbul Airport, Istanbul Atatürk Airport (which will be replaced by Istanbul Airport) and Istanbul Sabiha Gökçen International Airport.

Atatürk, surrounded by the urban area of Istanbul, has been the main airport of the city. Due to the city growth which encircled the airport, there is no room to create an additional runway. This airport is one of the busiest in Europe and faces traffic congestion problems due to the limitation to its growth. The limited capacity is alleviated by the airport of Sabiha Gökçen, which serves as the hub for some airlines as well as a secondary base for Turkish Airlines, and the new Istanbul Airport.

Istanbul Airport is the third international airport to be built in Istanbul after Atatürk and Sabiha Gökçen and will become the main international airport serving the city. It is planned that Atatürk Airport will be closed for scheduled passenger flights by 6 April 2019, 02:00 and the service will be transferred to Istanbul Airport, commencing its operations for all scheduled flights by 6 April 2019, 14:00. Atatürk airport will transition to other uses, such as training activities, aviation fairs and civil use. Istanbul Sabiha Gökçen Airport will continue functioning normally.

Therefore, Istanbul provides an example of how an area can adapt to be able to satisfy the demand of an increasing number of flights when an airport does not have room to continue increasing its capacity.
11 Illustrative Data Analysis

ICAO Doc 9911 Recommended Method for Computing Noise Contours Around Airports (Doc 9911) describes the methodology used to calculate noise contours around airports, based on the most up-to-date computation procedures, and the most recent aircraft noise and performance information available. This methodology, however, is intended to estimate long-term average noise exposure, and should not be used to predict, with any accuracy, the absolute level of noise from individual aircraft movements. Noise contours generated based on the Doc 9911 methodology, are intended, primarily, for long range land use planning purposes, to inform policy decisions, to provide average impact assessment for development proposal approval processes and for operational option selection. ECAC.CEAC Doc 29 Report on Standard Method of Computing Noise Contours around Civil Airports indicates that, although the use of noise contours is a standard and established practice for depicting the extent and the severity of the aircraft noise impact, this practice may not reveal the levels, number of noise events, and geographical distribution across hours of the day, evening, and night. Typically, therefore, when major decisions are being taken where aircraft noise impact will change, modelled average noise information is also accompanied with other noise information such as peak noise events, sleep disturbance criteria and overflight altitude and frequency data. This section of the report attempts to further analyse in detail, beyond the noise contour methodology, and for areas lying outside of the critical noise contours, the potential noise impact of selected aircraft operations patterns. In addition, this section of the report also describes illustrative operational patterns that may reduce noise level and overflights over affected areas in close-in proximity to the airport.

CAVEAT: The illustrative alternative operational patterns that are provided in this section, are, as the name suggests, for illustration purposes only. They are simply initial suggestions of how traffic flows may be reorganised to some extent in order to reduce overall noise burden. The suggestions are neither exhaustive nor presented in any particular order. Their inclusion in this section does not imply that these alternatives are endorsed by the authors. These ideas however may be explored in the context of the structures and processes recommended elsewhere in this document.

In this section, the terms west flow and east flow are used to indicate:

- **West flow (conditions)** - when runways 25L, 25R, 19 can be active
- **East flow (conditions)** - for when runways 07L, 07R, 01 can be active

The existing conditions are analysed based on 24 hours of actual movement that were selected to represent a series of scenarios. The year 2017 radar data was analysed to determine a potential ‘worst case’ scenario from a noise impact perspective (according to discussion with affected parties). Four worst case scenarios were identified:

- West flow aircraft departures utilizing RWY 25R
- East flow aircraft arrivals utilizing RWY 01
- East flow aircraft arrivals utilizing RWY 07L and RWY 07R
- East flow aircraft departures utilizing RWY 07L and RWY 07R
Each worst-case scenario was analysed in relation to the three operational periods (day, evening, and night) associated with the Lden metric. Note that in the analysis, for clarity, some military aircraft operations have been removed from figures shown in this section.

In year 2017, on average the split between East flow and West flow conditions was approximately 89% West flow and 11% East flow. The radar data used was that used by skyeyes for actual operational surveillance and control. Envisa independently specified the period selected for analysis and correlated the radar track data to actual traffic data to ensure completeness. Envisa is therefore satisfied that the data is accurate and complete. This is standard practice in other investigations of this nature. The data indicated that the month of May was the month with the highest number of operations in East flow, and the month of October had the highest number of operations in West flow. For this analysis, May 5th (Friday) and October 20th (Friday) were selected to represent the ‘worst case’ East and West flow conditions respectively. Because RWY 07L and RWY 07R were not used as often in year 2017, two days, March 22 and 27 were combined to illustrate the aircraft arrivals utilizing RWY 07L and RWY 07R.

The recommended operational patterns presented in this section are for illustration purposes and consider potential aircraft noise reduction improvements only. Approach and departure procedure design requires the analysis of other elements such as obstructions that may be a potential hazard to navigation, airspace conflicts, airport/airspace capacity, and the design standards described in ICAO Doc 9868 - Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS).

It must be clearly stated that such choices and options are purely for illustration of what may be possible. Envisa cannot and should not try to impose solutions on BRU. These must be decided within an effective and transparent process established and overseen at the federal level, but under principles and policies forged through consultation with all affected stakeholders. Difficult decisions will be required and not every stakeholder can be protected. This is covered in more depth in other sections of this report.

### 11.1 West Flow Departures RWY 25R

In the current airfield layout, RWY 25L does not have a full-length parallel taxiway. This requires aircraft departing from RWY 25L to back taxi on the runway to the take-off position. This increases runway occupancy, reduces runway capacity, and increases delay. In addition, back taxi operations may also be a safety issue, particularly during low visibility operations. Therefore, RWY 25L is generally not used by departing aircraft. This causes a higher concentration of departing aircraft on RWY 25R, including those aircraft departing to the South. In this operational pattern, RWY 25L primarily accommodates arriving aircraft.

#### 11.1.1 Existing Operational Pattern

Figure 11-1, Figure 11-2, and Figure 11-3 show West flow operations for each of the three Lden time periods. Notice that the aircraft follow the established standard instrument departure procedures. However, notice that the aircraft do not exactly follow the procedure tracks depicted on the instrument procedure. This flight track dispersion is due to the nature of VOR/DME based instrument procedures. For example, aircraft departing to the South-West must fly the runway heading until reaching 1,700 ft, which is the safe altitude to clear the 438 ft close-in obstacle. Once 1,700 ft level is reached, aircraft can proceed directly to Huldenberg VOR. The departure procedures are designed to guide aircraft operations away from close-in obstacles and obstructions that may be considered a hazard to air navigation. In addition,
the departure procedures are designed to avoid the densely populated areas to the immediate South-West of the airport.

### 11.1.2 Illustrative Alternative Operational Pattern

In general, operations to the West are significantly constrained by close-in obstructions and densely populated areas. The most recent master plan proposes future developments that include the construction of a full-length parallel taxiway for RWY 07R/25L. This taxiway extension would facilitate departures from RWY 25L and would allow air traffic control to actively distribute the departing traffic across both runways. Another development alternative described in the master plan, is the extension of RWY 07R/25L to the North-East. In conjunction with the full-length parallel taxiway, aircraft departing to the South-East would be able to start the left turn sooner and avoid the obstacles and densely populated areas sooner. The utilization of PBN would also allow aircraft to make precise turns along defined flight paths, including turning flight paths. The increased precision of the PBN procedures would certainly increase the concentration of flight tracks. However, more routes could be developed, and departing aircraft could be actively distributed over the different departing routes to provide respite to some of the areas impacted by aircraft noise.

### 11.2 East Flow Arrivals RWY 01

RWY 01/19 is the North-South crosswind runway. RWY 01 is primarily used for aircraft arrivals during East flow conditions. The approach procedure to RWY 01 is designed to avoid close-in obstacles, as well as reduce the number of flights over densely populated areas. Based on the analysis of the year 2017, aircraft appear to be vectored by air traffic control instead of following the instrument approach procedure as published. This is likely due to runway capacity issues, as RWY 01 must handle all the arriving traffic over certain time periods.

#### 11.2.1 Existing Operational Pattern

Figure 11-5, Figure 11-6, and Figure 11-7 show the East flow operations for the three Lden time periods. The figures show that majority of the aircraft do not follow the published instrument approach chart (IAC). Most of the aircraft are vectored from the FLORA VOR to intercept the final approach course to RWY 01. In this example, there were no arrivals to RWY 07L or RWY 07R. The flight track points show that aircraft overfly densely populated areas at altitudes of more than 8,000 ft. Noise impact from aircraft at this altitude is generally not considered to be significant by the vast majority of people being overflown. Given the flight numbers involved and the altitude of this overflight, operations at such altitudes would only be considered in noise management policy if the tranquillity of the area affected was of special significant value. This would be a rare occurrence and the area would usually by specifically in law. Such tranquillity designation would not normally apply to residential areas. A small proportion of people living in those areas, however, may see aircraft flying overhead during clear weather conditions and may therefore report a noise complaint. This is especially true where such individuals are not accustomed to such events, perceive the events as abnormal, or, are particularly sensitive to relatively less significant aircraft aural and visual impacts.

The procedure depicted in the figures is VOR/DME/ILS based. However, a PBN RNAV procedure to RWY 01 is available. Area navigation (RNAV) legacy systems make use of ground-based facilities such as VOR/DME. Self-contained systems such as inertial navigation systems are RNAV legacy systems that do not require
ground-based facilities. Modern RNAV systems make use of the Global Navigation Satellite System (GNSS). Flight Management Systems (FMS) use an integrated suite of sensors, receivers, and computers to determine the position of the aircraft. FMS utilizes multiple sources including ground-based facilities, such as VOR/DME, and GNSS. The FMS is typically coupled with a navigation database and provides RNAV guidance to cockpit displays and automatic flight controls systems. Under the umbrella of RNAV, in addition to legacy systems, RNAV systems and RNAV based procedures are classified as subsets of PBN components. The difference between the legacy RNAV systems and PBN RNAV system, is that PBN systems are required to meet a minimum level of accuracy. In order to fly the RNAV procedure, the aircraft must be able to maintain RNP APCH performance along the segments of the approach (See Section 2.3.1.3 Path Terminators of the AIP Belgium Luxembourg). RNP Approach (RNP APCH) are procedures that have a lateral accuracy of one nautical mile in the terminal segments and between one and 0.3 nautical miles in the final approach segment.

Therefore, the RNAV procedure may be limited to aircraft equipped with the appropriate navigational equipment and operated by a qualified crew. This means that aircraft that do not meet the requirements to fly such procedures would have to rely on ground based or pilot defined navigation guidance parameters.

In Figure 11-8, which shows a three-dimensional representation of the track points, a significant number of aircraft maintain level flight at or just above 2,000 ft until the glideslope is intercepted. According to the procedure, aircraft must not descend below 2,000 ft between the Intermediate Fix (IF) and the Final Approach Fix (FAF). There are approximately five nautical miles between the IF and the FAF. Even though descending to 2,000 ft is allowed in the procedure, from an aircraft noise perspective, it is not an optimum condition since pilots need to increase the engine power settings to maintain level flight. More importantly, because noise impact increases as the distance between source and receptor reduces the noise impact on the ground will be significantly higher for aircraft in level-flight at lower heights above ground level than it would be for the same aircraft operated higher with reduced power because it is descending. In Figure 11-8, three flight profile patterns seem to emerge. The first one shows aircraft maintaining level flight at 2,000 ft. The second pattern shows aircraft flying level flight at a higher altitude. The third pattern shows aircraft in a continuous descent until the interception of the glideslope. The attitude patterns shown in Figure 11-8 may be explained by the capability of the aircraft and flight crews typically operating at the airport. Aircraft equipped with modern FMS and qualified flight crew may be capable of flying a continuous glidespath along the final approach course without the need to level off at any point. Such capabilities could also be augmented by the provision of 'Distance-to-Go' estimate information provided to the pilot by the controller. This is common practice at U.K airports where it is used to facilitate 'pilot flight technique' based CDO (also covered in ICAO 9931).

11.2.2 **Illustrative Alternative Operational Pattern**

Instrument approach procedures typically provide approximately 10 nautical miles (approximately 18 km) to stabilize the aircraft into a final approach course and glidespath. Current research and future aircraft navigation technologies and air traffic controls technologies would instrument procedures to be designed with a shorter distance for the final approach course, as well as curved final approach course. This would allow procedure designers to design multiple approach routes to better distribute arriving aircraft, therefore reducing noise impact by providing enough respite over noise impacted areas.
As an immediate solution, aircraft could fly the procedure as published. Air traffic control would make use of the holding patterns to sequence aircraft as needed. The potential benefit of this option is the reduction of the size of the impacted area. This may reduce the number of overflights over populated areas. Also, the profile of the approach may be reconsidered to reduce the distance at which aircraft may fly at level flight. However, this option may be constraint due to fact that all the arriving traffic would be handled by a single runway.

Figure 11-9 shows a theoretical approach procedure based on VOR/DME. A new intersection defined based on radials from Huldenberg VOR and/or Affligem VOR/DME could be established to provide an approach route to the East of the final approach course. By providing two alternatives to line-up aircraft with the final approach course, the number of aircraft arrivals could be divided to provide enough respite to the communities located below the flight tracks. This procedure could be further refined using PBN capabilities.

It is understood that close-in areas will be impacted by aircraft noise due to the fact that aircraft need to be aligned with the runway and in a stabilized approach condition. Therefore, arriving aircraft should be distributed over the available runways as much as possible, while maintaining operational safety.

11.3 East Flow Arrivals RWY 07L and RWY 07R

Aircraft arrival operations to RWY 07L and RWY 07R are constrained by the following factors:

- Close-in obstacles
- Densely populated areas located under the final approach course
- Availability of navigations aids (ILS and approach lighting system)

These constraining factors increase the minimum weather visibility requirements and minimum descent altitude required to safely operate aircraft on these runways. For example, the instrument procedure for RWY 07L provides a minimum descent altitude of 590 ft, where the instrument procedure for RWY 01 provides a minimum descent altitude of 383 ft. During East flow and low could ceiling conditions, arrivals operations would be constrained to RWY 01.

11.3.1 Existing Operational Pattern

Figure 11-10 shows an example of typical arrival operations on RWY 07L. Because the total number of aircraft operations on RWY 07L and RWY 07R was low in year 2017, data from two different days (Mach 22 and 27) was utilized to generate the flight tracks shown in the figure. There were no arrival operations on RWY 07L during the evening and night period. Figure 11-11 shows a three-dimensional representation of the flight tracks from the final approach course perspective.

Figure 11-13 shows that for the selected days, there were only two operations on RWY 07R during the Lden day period. However, Figure 11-14 shows that the remaining operations occurred during the Lden evening period. There were no arrival operations on RWY 07R during the Lden night period. Notice that Figure 11-15 shows the three-dimensional representation of the operations in the Lden evening period. The three-dimensional views of both runways clearly show a pattern of aircraft flying a continuous descent operation and aircraft flying a stepped profile.

According to the instrument procedure, aircraft are allowed to descend to 2,000 ft at approximately 13 nautical miles (approximately 24 km) from the Brussels VOR and must remain at or above 2,000 ft until
reaching the FAF at approximately 8 nautical miles (approximately 14 km) from the Brussels VOR. After reaching the FAF, aircraft are allowed to descend to 660 ft when approaching RWY 07L and 590 ft when approaching RWY 07R. Notice that this procedure design requires aircraft to fly at a relatively low altitude (2,000 ft) for approximately 7 nautical miles (approximately 12 km) before reaching the FAF. Aircraft are not allowed to descend to a lower minimum due to close-in obstacles and the lack of an approach lighting system. Noticed that portions of the final approach course traverses densely populated areas, as well as a restricted area (EBR01) with airspace limits from the ground to unlimited ceiling. Aircraft need air traffic control authorization to fly through the restricted area. When the EBBR1 restricted area is active, the only option for arriving aircraft during East flow conditions is to utilize RWY 01, which reduces the airport's capacity to handle arriving aircraft to a single runway, which in turn may require air traffic control to vector aircraft around the available airspace to sequence aircraft and to minimize delay.

11.3.2 Illustrative Alternative Operational Pattern

Because of the requirements of a stabilized final approach course and glide path, alternative procedure design options are limited. Even existing and future PBN would still require a segment in which aircraft must maintain a stabilized final approach course. However, the implementation of CDOs would eliminate the need of a final approach segment at a constant low altitude. In CDO, aircraft could begin the descent as far out as the initial approach fix and maintain a continuous descent until reaching the minimum descent altitude. As shown in Figure 11-16, in the future a curved final approach course could be designed to avoid densely populated areas. In the meantime, a runway utilization strategy could be implemented to distribute aircraft arrivals over the three available runways.

11.4 East Flow Departures RWY 07L and RWY 07R

During East flow conditions, both runways, RWY 07L an RWY 07R are used to accommodate aircraft departures. The selection of the runway may depend on factors such as shortest distance between the aircraft stand and the take-off point in the runway, runway length requirements, and taxiway/runway closures due to maintenance. In additional, the overall aircraft circulation on the taxiway system and the runway in use for arriving aircraft, also define the pattern of operation. For example, when RWY 01 is used for arrivals, departures from RWY 07L and RWY 07R cannot be performed until the arriving aircraft on RWY 01 has completed the approach and landing. This is due to the fact that that RWY 01 intersects both RWY 07L and RWY 07R.

11.4.1 Existing Operational Pattern

Figure 11-17, Figure 11-18, and Figure 11-19 show the East flow departure flight tracks from RWY 07L. for the Lden day, evening, and night periods. Figure 11-21, Figure 11-22, and Figure 11-23 show the East flow departure flight tracks from RWY 07L. for the Lden day, evening, and night periods.

In figures, it is observed that most of the aircraft departing from RWY 07L follow the departure route to REMBA intersection. From REMBA intersection, departing aircraft continue to the desired transition (LNO 5H, SPI 6H, PITES 7H, and ROUSY 7H). As shown in Figure 11-17 a lower number of aircraft departing from RWY 07L use the departure routes leading to the North-West. From an intuitive perspective, it seems more logical for aircraft departing to the North-West to utilize the RWY 07L instead of RWY 07R. It is understood that the selection of the departing runway is dependent on factors such as the required take-off runway
length, distance from the terminal to the runway, and operational restrictions such as runway/taxiway maintenance, as well as other conditions.

As shown in Figure 11-21 departures from RWY 07R, show a more even split between the aircraft departing to the South-East and South-West (via REMBA intersection), and the aircraft departing to the North-West via DENUT 2J, HELEN 2J, and NIK 2J transitions. For the selected day, it appears that the ELSIK 2J transition was not used. It appears that a significant number of aircraft do not follow the radials (R-140 Antwerpen VOR, and R-174 Bruno VOR) to REMBA intersection. In addition, some aircraft seem to fly directly to Chievres VOR instead of following the radial designated by the procedure. This causes significant flight track dispersion to the North-East/South-East of the airport. Flight track dispersion reduces the levels of annual average noise, that is, size and shape of the annual average contours. However, dispersion causes a larger land area to be overflown by aircraft. People seeing aircraft flying overhead may report a noise complaint even when aircraft is at an altitude where noise impact is insignificant, because they are not expecting to see aircraft or be overflown. It would be good practice to examine the operational causes for this practice and to compare individual and shift ATC performance to see if it’s use is consistent deployed.

Departures tend to generate more noise than arrivals, due to the simple fact that engines are operating at higher power settings and airspeed is increasing. The noise impact on the ground is also closer to the airport because of the higher thrust, but because climb is typically much steeper than arrival/approach descent angle, the impact of departures reduces more rapidly with distance flown. Further from the airport, even though generating less noise because of lower thrust, arriving aircraft may produce a relatively greater impact because of their closer proximity to the ground. This is because of the inverse relationship between noise and distance between the source and receptor. It is also true that arriving aircraft are generally less dispersed along the procedure routes especially once established on an ILS. This effectively concentrates arrivals more than departures. Therefore, the impact of arrivals should not be underestimated. This is especially true further out from the airport, or under the ILS approach, where they can be perceived as being more significant than departures.

11.4.2 Illustrative Alternative Operational Pattern

Figure 11-20 and Figure 11-24 show some potential improvements utilizing PBN. Multiple minimum noise routes could be designed, and operations could be actively distributed based on established performance metrics. The benefits of concentrating versus dispersing flight tracks should be evaluated by modelling specific scenarios.

11.5 Example Performance Metrics

Due to the nature of the aviation system, it should be clear that proposed mitigation strategies, such as a PRS, and other operating restrictions cannot not be implemented 100% of the time. Controlled events such as planned maintenance, may affect, for example, the implementation of a PRS because of the closure of a runway and/or taxiway. In addition, uncontrolled events, such as weather conditions or unplanned repairs, may also affect the implementation of a preferential runway system. Implementation of mitigation strategies without establishing reasonable and achievable metrics causes significant frustration and mistrust in the communities surrounding the airport. Airport staff, air traffic control staff, and regulators are also under stress because constant complaints about the established mitigation strategies not being implemented as described.
Table 11-1 shows some examples of noise related metrics, as well as example targets for these metrics. The targets shown in the table are for illustration purposes only. Appropriate analysis, including, for example, computer simulations should be performed to establish appropriate targets. Performance metrics are only useful when the information is accessible to the decision makers, and the decision makes as the authority to act and resolved the situation. For example, air traffic control, may actively manage the runway and the airspace system to meet the established targets.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Definition</th>
<th>Example Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Night operations using preferential runways</td>
<td>This metric is defined as the percent of time preferential runways are used during night operations. A preferential runway is defined as the runway, that when used, would have the lease noise impact on the surrounding communities</td>
<td>Minimize impact on surrounding communities using preferential runways for at least 75% of the night operations at the airport.</td>
</tr>
<tr>
<td>% Compliance of established noise abatement procedures</td>
<td>This metric is defined as the percent of operations that comply with established noise abatement procedures</td>
<td>Implement noise abatement procedures for at least 50% of the time.</td>
</tr>
<tr>
<td>% Minimum noise routes utilization</td>
<td>This metric is defined as the percent of operations that flow established routes to minimize noise impact on the communities overflown by arriving and departing aircraft.</td>
<td>Maintain minimum noise routes utilization at least 65%</td>
</tr>
<tr>
<td>% of operations on noise sensitive routes</td>
<td>This metric is defined as the as the percent of aircraft operations following arriving and departing routes over noise sensitive areas</td>
<td>Maintain the percent of operations over sensitive areas below 20%</td>
</tr>
</tbody>
</table>

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96 Example targets for illustration purposes only
Note: Figures are published in Appendix E. They are listed here for convenience:

Figure 11-1 - West Flow Departures RWY 25R – Day
Figure 11-2 - West Flow Departures RWY 25R - Evening
Figure 11-3 - West Flow Departures RWY 25R - Night
Figure 11-4 - West Flow Departures RWY 25R - Proposed

Figure 11-5 - East Flow Arrivals RWY 01 - Day
Figure 11-6 - East Flow Arrivals RWY 01 - Evening
Figure 11-7 - East Flow Arrivals RWY 01 - Night
Figure 11-8 - East Flow Arrivals RWY 01 - Day - Three-Dimensions
Figure 11-9 - East Flow Arrivals RWY 01 - Proposed
Figure 11-10 - East Flow Arrivals RWY 07L - Day
Figure 11-11 - East Flow Arrivals RWY 07L - Day - 3D
Figure 11-12 - East Flow Arrivals RWY 07L - Proposed
Figure 11-13 - East Flow Arrivals RWY 07R - Day
Figure 11-14 - East Flow Arrivals RWY 07R - Evening
Figure 11-15 - East Flow Arrivals RWY 07R - Evening - Three-Dimensions
Figure 11-16 - East Flow Arrivals RWY 07R - Proposed

Figure 11-17 - East Flow Departures RWY 07L - Day
Figure 11-18 - East Flow Departures RWY 07L - Evening
Figure 11-19 - East Flow Departures RWY 07L - Night
Figure 11-20 - East Flow Departures RWY 07L – Proposed

Figure 11-21 - East Flow Departures RWY 07R - Day
Figure 11-22 - East Flow Departures RWY 07R - Evening
Figure 11-23 - East Flow Departures RWY 07R - Night
Figure 11-24 - East Flow Departures RWY 07R - Proposed
12 Conclusions and Recommendations

This section contains a summary of our main conclusions and recommendations. The supporting basis for these recommendations, coupled with more detailed practical advice, is given throughout the body of this document, and for brevity is not repeated here.

Generally, the option to concentrate flights over less populated areas will result in the fewest number of people overflown but will impose a greater burden on those most severely affected. Because of the unfortunate location and orientation of BRU coupled with the historic failure to adequately prevent residential encroachment, the options for concentrating flights over less populated areas are more limited at BRU than at many other airports.

Additionally, as a general trend, whilst aircraft have become quieter, aircraft numbers have increased significantly at many other airports (not so much at BRU). At many airports, this means that the frequency of noise events further away from airports is becoming more significant in recent years, compared to the erstwhile importance of less frequent but noisier events significantly affecting populations closer to airports.

These factors mean that alternative solutions including the sharing of overflight (dispersion) and distribution of overflight (providing more predictable periods of overflight coupled with respite periods) are becoming more widely adopted. Thus, depending on population proximity and density to any airport and associated flightpaths; coupled with low availability of less densely populated areas that could be overflown, these alternatives to ‘noise concentration’ may prove to be the most equitable solutions at BRU, despite the fact that they may result in more people being affected by what is perceived as being significant levels of aircraft noise.

Choices such as “is it better to put all of the noise over a smaller population, or more equitably share noise over a larger population” and on what basis, are however political matters and cannot be decided by scientific means. Similarly, the degree to which flight efficiency can be sacrificed to accommodate an improvement in the noise levels on the ground - is again an economic and political matter and cannot be scientifically determined. Factors such as the degree to which existing housing may be purchased and demolished or planning law effectively enforced in the future to limit population exposure, is also an economic and political matter and not a scientific topic. Finally, the advent of new technology and navigation standards such as A-MAN and PBN may offer new noise distribution solutions, but how these are used and for what purpose is again political and not scientific.

Envisa can therefore, only point out where the existing governance and oversight is not fully effective and where existing rules are not being effectively implemented. Envisa can describe the general pros and cons for different political options and recommend the structures and processes required to collaboratively arrive at the commonly-agreed policy and objectives for operational delivery. Envisa can also propose how to try and re-establish lost public trust and what pitfalls to avoid in decision making.

It is up to Belgian stakeholders however, to collaboratively make the political decisions on what the policy and objectives that the eventual noise management regime and operational solutions should deliver. If the aim is to more effectively deliver what is presently agreed as objectives for the noise regime, then there is sufficient advice on improved monitoring, review and stakeholder public engagement contained in the Envisa report to produce a more transparent and fully effective implementation of present rules. If the objective is to find new solutions, then these need to be collaboratively agreed and covered by an
effective and harmonised regulatory system, subject to effective and transparent verification and public reporting.

A clear and significant problem in governance, oversight and management of the present BRU noise regime, that is in part resulting in so many legal claims and significant public dissatisfaction is the opaque, arbitrary, uncoordinated, fragmented and partisan nature of the regulation and governance of this problem. Envisa is proposing tried and tested solutions to these issues, that will ultimately lead to a more stable noise situation, but it is up to Belgian stakeholders to put the wider common-good before local or regional politics and before the welfare of any individual population, where the majority benefits. Noise will continue to be an issue around BRU for the foreseeable future and it is impossible to protect every individual or to perfectly allocate impact such that no single community bears the brunt of the noise burden. There will always be winners and losers. Public expectation should be to expect some degree of aircraft noise if they live in the vicinity of the airport, even if this is unpalatable to them as individuals. This impact however should be made as predictable as possible within the agreed policy, taking account of clearly explained limitations of safety, capacity and uncontrollable influences such as weather. Honesty and transparency on this truth is essential if trust and acceptance is to be recovered to any degree.

12.1 Managing Public Expectations for this Report

As a first step in rebuilding public trust, key Belgian political stakeholders should prepare a joint public statement of commitment to seek the best possible solution to the present Brussels National Airport, aircraft noise management situation. This statement should manage public expectations which may have been unrealistically raised by the treatment of this report by the media.

In addition to the planned presentations of this report by Envisa, the Federal Government should facilitate an early collaborative discussion process to review this report will all key stakeholders singly and collectively to seek common agreement to the present failures identified in Chapter 1 of this report and to consider the recommended improvements in Chapter 2.

No single agency can solve BRU noise and public trust problems that have been generated over the last 20 years. No ideal ultimate solution can be scientifically determined without a clear objective to achieve – such a noise objective does not yet exist. Major solutions will need to be developed collaboratively and inclusively with agreed roles, ownership and accountabilities. Stakeholders should therefore acknowledge that whilst short-term improvements mentioned in this report (for example in the application of existing rules and procedures) may be possible, finding collaborative significant solutions will take time and will need to be developed to meet jointly agreed objectives.

This report will be public but contains multiple and sometimes mutually exclusive options. It will be essential therefore to explain that options in this report have no status until they are assessed, discussed and agreed so as not to engender community beliefs that a particular option in this report will definitely happen.

Given the considerable public interest in this report, consideration should be given to establishing a new or nominating an existing conduit for public comments and concerns, to allow these to be understood – this will probably need to be augmented with more direct discussion.

The Federal Government should consider to what extent the noise issues or their solutions explained in this report can be applied to other Belgian Airports or apply uniquely to Brussels National Airport.
12.2 Airport Responsibilities

As captured in recent Environmental Reports (2017, 2018) published by the airport, there are many environmental initiatives and actions for which the airport can be rightly proud. More focussed on sustainability but almost sidestepping the issue of noise impact, it could be argued, that by ignoring the risks created by the mismanagement (or lack of management) of noise issues, one could conclude that the airport does not manage itself in a sustainable way. We would recommend that the airport takes the lead in managing the problems arising from noise generated by the aircraft taking off and landing at their airport. Even though the business of managing the airborne operations is effectively undertaken by skeyes and the Federal Government, it would be in the airport’s own interest to take a more proactive approach to the problem. It is entirely conceivable that the regional political protection that it enjoys today, will not last for ever, and that sooner or later, it will be held to account for the environmental impact that its business generates.

Part of the reflection that the airport should consider, in a sustainability context, should be about the type of operations that it looks to develop in future, and how these should be coherent with the character of the airport, in particular taking into account its close proximity to densely populated areas. We do not believe that night-time operations are coherent with this airport. Eliminating or significantly reducing night-time operations over time, would, in our opinion, go a long way towards re-establishing trust and respect between the airport and its surrounding community. Many airports around Europe of a similar character, ban night-time flights completely. There is much opportunity to develop an excellent business based on demand for access to the Belgian and EU Capital. Ultimately however, this is a political decision.

The infrastructure of the airport could be improved to facilitate more noise friendly departures and arrivals. Why are these investments not made? (Compared to significant investment in commercial outlets at the airport for example). Infrastructural changes to runways such as creating more taxiways and installing new equipment would lead to more flexibility in handling traffic demand, accommodating all weather operations, increasing capacity and safety and could also decrease the noise impact.

Although the airport/skeyes has a sophisticated noise and track keeping system, this is not exploited to its full potential. Much more could be done such as tracking trajectories flown (against planned) and monitoring consequent noise levels.

Meaningful performance indicators need to be developed for noise impact and targets set for future improvement.

12.3 Belgian Stakeholders Commitments

The RBC Noise Law (1999) creates an uneven playing field and is not constructive in finding a global solution for all inhabitants around the airport. It has survived many legal challenges over the years and remains in place today. We believe that the way forward is through an intergovernmental and harmonising agreement which agrees a universal (or state level) noise law which defines the same standards for all.

Belgian stakeholders should agree to the establishment of:

- A federal advisory body on coherent aircraft noise strategy, policy, regulation and planning designed
• A suitably skilled and resourced federal aircraft noise regulator or assigning the duties to an existing regulator (Note: effective and strong regulation is needed. Regulation should not be in the hands of the cabinet of a Minister). Consideration should be given to extending the scope of the noise regulator to cover other airports in order to maintain a level commercial playing field. Existing organisational examples such as ACNUSA (France) could be taken as a good example for Belgium to adopt. (This could cover all environmental impacts of aircraft, not only noise).

NOTE: A less effective and more costly, but perhaps more deliverable solution would be to jointly agree a Federal BRU (or national) aircraft noise regulation and nominate the Regions as regulators. The Regions would however need to have adequately skilled expertise to perform this function and would need to be seen to follow the commonly agreed policy and regulation. Additionally, there would always remain a risk that the public would not trust the impartiality of regulators in neighbouring Regions, prolonging present public unrest.

• Multi-party collaborative agreements to heal the present fragmentation in governance and regulations and to underpin a review of the latest draft proposed update Noise Action Plan97
• A commonly agreed set of guiding principles on aircraft noise management that combine to optimise the noise climate around BRU taking account of the 4 pillars of the ICAO Balanced Approach and meeting commonly-agreed sustainability imperatives. The principles should establish a joint approach to noise management for the benefit of the wider common-good and not from a local-partisan perspective.
• Jointly, enshrining these principles into a long-term and stable commonly-agreed Federal BRU noise policy designed to deliver these principles. This policy to be designed to provide a harmonising framework for subsequent short-term noise action planning and harmonised regulation.
• An independently chaired and publicly transparent Airport Consultative Committee to cover airport issues of public interest including day-to-day noise management aspects.
• Significantly improved, honest, verified and coordinated public information on the policy and rules to be applied, limitations to these rules and performance reporting. The regulator can have a role here. Existing monitoring and information systems should be more effectively used in this regard.
• The embryonic collaborative processes between operational stakeholders at BRU should cover aircraft noise as a priority for continual improvement; and, the operational stakeholders should jointly engage with external consultative and governance processes to provide technical advice and support.

There is a perverse truth in the fact that, because of the airport’s geographic placement, that all people living in the general vicinity of BRU will hear aircraft noise to varying degrees. Noise from aircraft operating at BRU is a transboundary impact and should not be subject to inconsistent or fragmented regulation or management. It seems therefore logical that any future solution to the problem would be based on a fair and equitable distribution of the noise load and of respite from that.

97 As the development of any actions arising from this report matures, this Noise Action Plan may need interim review. It may be prudent to acknowledge this situation in the plan itself at this stage.
To achieve a fair and equitable solution, it is essential that there is one noise law applicable for the whole of Belgium. Notwithstanding the constraints of the Belgian Constitution, this could effectively be implemented through the willingness of parties on all sides, through an intergovernmental agreement. Accountability pressure should be brought to bear upon those responsible, to demand why, despite past declared intentions, this has not yet been implemented.

Aircraft do not fly the published procedures. There is an over reliance on vectoring which leads to unpredictable and highly dispersed distribution of overflying. Clear guidance and criteria are needed (in the form of a national noise or aviation law) in order to allow skeyes do their job professionally, from procedure design to tactical delivery.

12.4 Agreeing New Structures

Through the structures agreed above, we recommend that stakeholders collaboratively review the effectiveness of the application of each of the pillars of the ICAO Balanced Approach to aircraft noise management. This should include a special focus on land use planning and management effectiveness to ensure that inappropriate development is not permitted in zones affected by aircraft noise and that appropriate building standards are mandated and verified.

A process should be established to discuss and to seek common agreement on the problems identified in Chapter 1 of this report and commonly agreed principles and government policy need to be forged to provide a harmonising framework for subsequent aircraft noise regulation, planning and management.

12.5 Review of Roles, Responsibilities and Oversight Processes

Consideration should be given to formally nominating the airport operator as the lead operational authority for all aspects of aircraft noise. This is justified because it is the airport operator that decides the aircraft that operate and when, and it is their business most significantly at risk from any unsustainable noise impacts. This may need formal service level agreements between operational stakeholders.

Politics needs to be removed from the day to day operations of the airport. Political interference in the past has led to technical/safety issues with changes being introduced without full impact assessments.

Full impact assessments with a sustainability scope and effective jointly conducted public consultation should be a prerequisite of any future changes. It must be acknowledged that it is impossible to protect all neighbouring communities from aircraft noise and that difficult decisions will need to be taken. The greater-good should not normally be put at risk by any stakeholder in any attempt to protect a minority, unless it is commonly-agreed through established processes, that there is clear justification for such action. Such decisions must be fully and transparently assessed and justified prior to implementation.

Both skeyes and the airport are widely perceived as being primarily Flemish companies. As the national airport, this is wrong and for a quasi-public Belgian organisation, skeyes should do more to address this issue. It is not helped by the fact that the appointment of the Chief Executive Officer (CEO) of skeyes is seen to be an essentially political one.

The BRU Aerodrome Licence should be reviewed in the light of this report and amended accordingly, ready for enactment at the earliest contractual opportunity.
Once BRU stakeholders have selected and fully established the solutions advised in this report, it is recommended that consideration is given to appointing an ISO14001 accredited consultant to independently measure the effectiveness of the new BRU noise governance and management structures and processes. The ISO14001 standard would offer a useful benchmark against which to measure the effectiveness and performance of the new system.

12.6 Belgian Airports Strategic Plan

There are examples within this report of how other regions allocate different functions or how they distribute operations among different airports within an area. Brussels Airport is accumulating maybe too many aspects (international airport/hub, low-cost, cargo operations). Could the State integrate the different airports of the region (Liège, Charleroi and Brussels) into a national plan that would help to achieve sustainability?

12.7 Wind Criteria and PRS

There has been much controversy and mistrust about the application of the wind criteria and PRS at BRU. Our recommendations stop short of recommending any change to the current criteria. This would be a matter to be addressed through the recommended established structures and processes, noting nevertheless, the tendencies of criteria used at many other European airports and the recommendations of ICAO.

Our study finds, within the limits of access to publicly available data, that the application and calculation of the wind data on the public information website (batc.be) is correct but would recommend more transparency and explanation being provided, so that the public can understand what is being presented.

We would also recommend a full independent and public audit of the application and calculation of the wind data to provide public assurance that they are compliant with the ICAO guidance and AIP.

We believe as well that there is perhaps a perception that these rules are manipulated as a way to defend use of an alternate runway and that de-facto dispersion (or distribution) of noise is being imposed. We found no evidence of this. But we would recommend that all instances where the planned PRS cannot be implemented should be documented along with justifying reasons (including the numerical values of the wind components).

Additionally, regular independent and public audits of the application of the PRS should be made in order to rebuild public trust. Although it is understood that some audits are carried out on an annual basis by EUROCONTROL, the results of these audits are currently not made public.

12.8 Operational Improvements

We recommend that the issues raised in this report about present operations and associated rules and their implementation and particularly those raised in Chapters 9 & 11, are collaboratively considered and where feasible, short-term solutions implemented.

Many, if not all of these suggestions could be facilitated through the existing CEM framework.
With the understanding that other factors must be taken into consideration, the following may be potential aircraft noise reduction strategies:

- Implementation of a segregated parallel runway operations. Distributing arrival operations over all three runways (RWY 07L, 07R, and 01) would reduce the number of overflights over the impacted areas and therefore increase the levels of respite for the populated areas located below the approach flight paths.
- Better utilize SID03 and SID3a to distribute the departing traffic and provide respite to the affected areas.
- Development of minimum noise routings and of flight deviation tolerances to describe expected accuracy by which these will be followed. Airports such as Manchester in the U.K have widely copied approaches to track-keeping management including facilitating sharing of good practice, penalties, awards and incentives. Such exemplars could offer a model approach to such a track-keeping regime at BRU.
- Application of holding stacks in high traffic conditions
- Time based arrival sequencing rather than distance
- Develop performance indicators and targets to reduce noise impact and better inform the public about how the defined targets are being met.
- CDO and CCO definition, monitoring and optimisation
- NADP and LPLD enhancement
- Ground noise mitigation
- Good practice and FMS bug-fix sharing – including research and visits to best practice exemplar practitioners
- Investigate whether steeper approaches could offer noise benefits
- Joint ATC and flight simulation exercises to test opportunities
- Joint assessment and optimisation of emerging technology optimisation
- Track adherence accuracy optimisation
- Reduction in tactical vectoring
- Airspace and ground infrastructure improvements to be progressed through established governance structures
- Joint improvements to transparent performance reporting

12.9 **PBN**

It is recommended that at an early stage, the governance, community and operational stakeholders collaboratively review existing national plans for implementing PBN and specifically at BRU as PBN applies to SIDS and STARS. This should also consider any plans for upgraded controller tools. The opportunities and risks arising from PBN implementation should be jointly analysed against the commonly-agreed noise policy for BRU and the potential for noise mitigation, impact footprint tailoring and respite is exploited in a commonly-agreed way and in accordance within agreed policy.

12.10 **Community and Sustainable Operations**

The Federal Government or their agencies as overseen by established structures and processes, should fund social surveys on aircraft noise to elucidate public opinion on such matters as aircraft noise, its management, their disturbance/annoyance and their needs and expectations. The studies should cover
community relations and communications and how these can be improved. This information can be used to augment complaints data and information on economic impact of aviation to build a completer and more accurate picture of aircraft noise disturbance especially the importance placed on it by society and what measures they expect.

In our view, retrospective work is needed to explore and address the overall question of “sustainable operations” in a meaningful and equitable way and the outcomes taken into account in the proposed commonly agreed BRU aircraft noise policy. Any future operational or infrastructure proposals that could significantly affect the noise climate around BRU should be subject to an independently verified, collaborative and transparent assessment, justification and consultation process that follows best practice principles of the relevant EIA/SEA Directives.

Recognising that, due to historical non-existent or ineffective land-use planning around the airport, most areas overflown can now be considered to have significant populations living beneath any flight routes.

It is neither helpful nor informative to talk about “densely populated areas” as this is merely a relative term. A fair and equitable system which offers periodic respite to all, should be possible. This will imply a review of the current PRS and the wind criteria that are part of it, as well as a fresh look at the design of the departure and arrival procedures (SIDS and STARS). All this should be done within the structures and processes recommended to be put in place by this report.

12.11 **Health**

It is recommended that the proposed Advisory Body (see section 7 of this report), should:

- maintain a science watch, via existing public health bodies and established health science engagement conduits, concerning the health impacts of aviation noise and other related health impacts - and especially as new scientific findings become accepted by international health or aviation bodies; or, where new standards or regulations are produced elsewhere.
- make use of existing engagement processes or establish new engagement processes, to monitor and participate in the development of the technical and operational mitigation response to new science on aviation health impacts. Usually however, such emerging issues are covered by international health and aviation bodies and regulators and they produce advice on how to address these in state regulations and standards. The advisory body should then collaboratively agree how to progress in Belgium.

The QC system which currently permits operations of some heavy, old aircraft, particularly during the night, should be reviewed.
It seems evident, that for some stakeholders, the current dysfunctional arrangements governing the management of aircraft noise around BRU, suits their political objectives. But chaos should not be seen as a ladder (to misquote a recent HBO TV phenomenon). Politics needs to be removed from the day to day business of running the National airport of Belgium. Application of the structures and processes advised here, need to be embraced by everyone. All political leaders should be seen to stand behind the recommendations of this report. It has been worked upon with honest intentions to deliver independent recommendations, which if implemented, we believe will deliver tangible benefits for everyone compared with the situation of today.

Any mistakes or misunderstanding should not be taken as reason to dismiss the report and its recommendations, out of hand,

Comments and dialogue should continue following the publication of this report.

It is a start, not an end.
Appendix A  Bibliography

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## Appendix B  Abbreviations and Acronyms

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<td>Aeronautical Information Publication</td>
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<td>ANS</td>
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<td>Air Navigation Service Provider</td>
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<td>APU</td>
<td>Auxiliary Power Unit</td>
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<td>Approach Procedure Vertical Guidance</td>
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<td>Airport Reference Point</td>
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<td>Air Traffic Control</td>
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<td>Air Traffic Flow Management</td>
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<td>Coordination Committee on International Environmental Policy</td>
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<td>CCO</td>
<td>Continuous Climb Operations</td>
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<td>CDO</td>
<td>Continuous Descent Operations</td>
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<td>CEO</td>
<td>Chief Operating Officer</td>
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<td>Definition</td>
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<td>CSV</td>
<td>Comma Separated Values</td>
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<td>Disability Adjusted Life Years</td>
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<td>Distance Measuring Equipment</td>
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<td>EPN</td>
<td>Effective Perceptible Noise Decibel</td>
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<td>Federal Aviation Administration</td>
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<td>Final Approach Fix</td>
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<td>Fonds pour l’atténuation des nuisances au voisinage de l’aéroport</td>
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<td>Fixed Electrical Ground Power</td>
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<td>Flight Management System</td>
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<td>GBAS</td>
<td>Ground Based Augmentation System</td>
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<td>Global Human Settlement</td>
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<td>Global Navigation Satellite System</td>
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<td>Ground Power Unit</td>
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<td>Hypertension and Exposure to Noise Near Airports</td>
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<td>IATA</td>
<td>International Air Transport Association</td>
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<td>Abbreviation</td>
<td>Full Form</td>
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<td>IBGE</td>
<td>Bruxelles Environnement - l'Institut Bruxellois pour la Gestion de l'Environnement</td>
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<td>ICAO</td>
<td>International Civil Aviation Organisation</td>
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<td>IF</td>
<td>Intermediate Fix</td>
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<td>ILS</td>
<td>Instrument Landing System</td>
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<td>Integrated Noise Model</td>
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<td>Information Technology</td>
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<td>LDG</td>
<td>Landing</td>
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<td>LPLD</td>
<td>Low Power/Low Drag</td>
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<td>LTOP</td>
<td>Long-Term Operating Plan</td>
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<td>M</td>
<td>Metres</td>
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<td>MTOW</td>
<td>Maximum Take-off Weight</td>
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<td>NADP</td>
<td>Noise Abatement Departure Procedure</td>
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<td>NIMBY</td>
<td>Not In My Back Yard</td>
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<td>NTK</td>
<td>Noise Monitoring and Track Keeping</td>
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<td>Performance Based Navigation</td>
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<td>Pre-Conditioned Air</td>
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<td>Preferential Runway System</td>
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<td>RBC</td>
<td>Region of Brussels-Capital</td>
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<td>SAE-ARP</td>
<td>Society of Automotive Engineers - Aerospace Recommended Practice</td>
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<td>SEA</td>
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<td>SEL</td>
<td>Sound Exposure Level</td>
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<td>Single European Sky</td>
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<td>TKOF</td>
<td>Take-off</td>
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<td>UBCNA - BUTV</td>
<td>Union Belge Contre les Nuisances Aériennes - Belgische Unie Tegen Vliegtuighinder</td>
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<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
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<td>VLAREM</td>
<td>Vlaams Reglement betreffende de Milieuvergunning</td>
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<td>Werkgroep Leuven</td>
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<td>World Health Organisation</td>
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<td>Woluwe-Saint-Pierre</td>
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Appendix C  Comments and Feedback on Chapter 1

Envisa has compiled all comments received on Chapter 1 in a separate document (as it is too big to conveniently fit within this report).

A final version of the Chapter 1 report with some acknowledged corrections and presentation/layout improvements, is also published separately.
Appendix D  Model Policy Example

This appendix offers illustrative contents for a national policy on aircraft noise. The detailed policy itself will need to be crafted to meet Belgian rules and conventions etc. The intention is to provide illustrative policy content to facilitate discussion by Belgian stakeholders through established structures and processes, in order to develop a Belgian State policy on aircraft noise. The eventual policy could be specific to a specially designated airport (BRU) or more broadly applicable to all airports. The eventual policy should provide a high-level only harmonising framework within which subsequent processes, regulation, noise action plans and public communications should be formulated and enacted.

The policy should not change frequently and should extend beyond political/election timeframes. Stability in noise climate and the avoidance of change for political purposes should be avoided. This is one reason why the establishment of a national aircraft noise regulator should be considered – to give stable oversight. The policy would operate at a federal level (i.e.: cross-Regional) so that it can cover what is essentially a transboundary aircraft impact. The existence of a specific policy gives a clear signal as to the importance of the subject being covered. It is essential that the policy is developed through collaborative structures and processes, comprehensive assessment with a full sustainability impact scope and is the subject of adequate consultation. The policy should provide clear and unambiguous objectives for achievement via established processes and regulations.

The language used in the following illustrative content is not legalese or meant to meet Belgian legal tests. It is meant to allow discussion. This is not meant to be a complete list of policy options.
D-1 Definitions and References

In the final policy it is assumed that there will be a section defining terms, actors, etc. and a section with references to relationships to established policies and laws (Whereas...’ etc.).

These are not specified in this report but may be expected to include (for example):

- ICAO resolution A/37 on the Balanced Approach to Noise Management
- Belgian implementation of the latest version of EU Directives:
  - 2001/49/EC on the assessment and management of aircraft noise
  - The existing BRU aircraft noise management plan as required by 2001/49/EC
  - The Strategic Environmental Assessment Directive (2001/42/EC) covering ‘programmes’
  - The Environmental Impact Assessment Directive (85/337/EEC) covering infrastructure developments
  - Others
- The EU Better Airports Regulation 598/2014 covering the ICAO Balanced Approach and specifically aircraft noise restrictions

D-2 Policy Preamble

This noise policy applies to the management of noise from aircraft operating in the vicinity of Brussels National Airport (EBBR), hereinafter referred to as BRU, and to noise caused by operations on the BRU airfield.

Note: it may be prudent to broaden this to cover all airports with more than 50,000 movements per annum, with reference to the local processes and structures required and/or with the broadening of scope of structures and processes for BRU to encompass relevant airports.

This policy will be reviewed in the light of significant change such as new aviation technologies, new health science that has been internationally endorsed, new international rules and major changes such as to ambient conditions.

This policy will be reviewed not less frequently than quinquennially (every five years)

The policy will not be changed unless a clear, significant, worthwhile and deliverable reduction in aircraft noise impact will result taking account of wider sustainability implications

All changes to this policy will be subject to adequate public consultation with all interested parties and stakeholders.

D-3 Illustrative Policy Decision(s)

- BRU is designated as a key national strategic asset (this may require another legal instrument) and all noise policy and regulation that may affect its development and operation are to be approved at the Federal Government level only. This could be expanded to all airports above 50,000 movements per annum.

- The Federal Government will establish consultative and advisory processes that are designed to ensure that affected stakeholders and interest parties are fully involved in the development of this
policy, subsequent regulations and plans. (The advisory body and state regulator could be nominated here).

- A national aircraft noise regulation will be developed through agreed processes that is designed to enact this policy.

- The BCAA (or specific body or Regions) which would then require text covering harmonisation) is designated as the regulator under this policy with powers to draft regulation for approval by the State and to implement and enforce the approved regulation. The regulator will be charged with approving proposed aircraft noise action plans, proposed consultation processes and to ensure that agreed operational noise rules are being correctly implemented.

- In accordance with EU regulations, a noise action plan for BRU, all airports with 50,000 movements per annum or more will be developed and reviewed. Formal agreements to collaboratively agree the noise action plans will be entered into by all Regions affected by noise from aircraft operating on or near the airport concerned.

- The relative relationships between proposed noise regulator and the Belgian judiciary will be determined as the proposed policy and regulation is developed.

- All new decisions, new judgements or any new flight rules from the date of approval of this policy, that can affect where, how or when aircraft fly, that operate on or around BRU (or airports with 50,000 movements per annum or more), will be required approval by the Belgian Federal Government and its agencies (e.g. the BCAA or aircraft noise regulator).

- The Federal Government recognises that because of the proximity of BRU to long-established residential development, and the existing encroachment of residential development since the airport was established, that it is impossible to protect all neighbouring communities from some degree of aircraft noise. Noise action plan(s) must therefore seek a fair balance of impact distribution based on the best possible information.

- This policy will be delivered through the following mechanisms (here state commonly agreed structures and processes):
  - The airport operator(s) will act as the lead authority on day-to-day implementation of the agreed noise action plan for their airport.
  - The airport operator will ensure that a collaborative arrangement is established at their airport to involve operational stakeholders to cover environmental topics including aircraft noise. This group will implement the agreed noise action plan and associated operational rules, to review and correct aircraft noise performance and to propose noise improvements through established decision-making channels
  - Each airport (with 50,000 movements per annum or more) will have an independently chaired Airport Consultative Committee to cover such topics that it collectively decides are of public interest including aircraft noise. The Consultative Committee shall comprise representatives of key stakeholders, authorities and community groups that can influence aircraft noise impact or that are affected by aircraft noise. The Consultative Committee will
be open to the public and the press on application. The proposed aircraft noise regulation will establish outline terms of the reference for the Consultative Committee.

- The mediation service will engage with the Airport Consultative Committee reporting on complaints, issues for discussion and considering committee advice.

**D-4 Illustrative Policy Requirements**

*Regulation, Enforcement and Action plans will be collaboratively and transparently developed through established processes for approval by the Federal State, that shall ensure measures are established to deliver:*

**D-4-1 Policy Noise Climate Requirements**

- **(Clause X)** - Minimise the number of people most significantly affected by aircraft noise or by airport ground operations as assessed in compliance with 2002/49/EC or its replacement.

- Overfly the least number of people possible and avoid overflight of sensitive receptors (e.g. hospitals, schools etc.) to the extent possible notwithstanding clause X, by aircraft operating below 4,000 ft/5,000 ft/7,000 ft above ground level.

Note: There will need to be a limit on the range of this policy otherwise the demands of further out communities may drive flight patterns affecting more severely affected communities closer-in.

- Ensure that aircraft rules are developed, applied and verified such that the agreed noise distribution patterns and timings are achieved to the extent possible within agreed limitations (such as weather or emergencies etc.). The intention will be to continually improve flight predictability within agreed noise affected areas.

- Offer respite for those regularly overflown where there is a significant noise impact.

- Avoid the overflight of areas of dense residential development close to BRU to the extent possible.

- Ensure that where aircraft overfly residential areas in the vicinity of BRU, they do not operate at lower than necessary heights above ground level.

- Ensure that as far as possible, the flight patterns, especially of the noisier aircraft, are as consistent and predictable as possible and that this is transparently seen to be achieved.

- In the light of the above, a policy statement should be formulated to enshrine which aim of flight concentration, dispersion or distribution is to be adopted. In reality, it is likely that a hybrid selection of these for individual procedures will offer the best option especially with the advent of PBN. But it may be prudent to offer policy guidance on how these will be locally selected and applied. This is already covered in previous judgments and existing rules. Envisa cannot recommend what this policy should be or to what extent existing rules should be changed (if at all). This is one reason why it is advisable to firstly agree principles then to select policy options to deliver these.
- Ensure that any approved plan is future-proofed to the extent possible taking into account potential influencing factors such as airport demand forecasts and predicted changes to ambient conditions such as climate.

- Minimise sleep disturbance by restricting the total permitted night noise impact and to prevent unacceptably noisy aircraft from operating from BRU.

- Noise penalties based on commonly agreed dB LAmax limits, using purpose designed NMTs that are located in suitable sites and close to aircraft noise certification locations will be used to encourage good flight practice. The noise limits should be set to capture the noisiest operations only (for example where unnecessary noise is generated). They will not be used as de-facto for noise related charges or noise-based restrictions.

- Any noise based charges or restrictions will be based on aircraft noise certification values. Where non-compliance with claim noise certification values is suspected, the regulator will verify compliance in terms of actual aircraft weight, engine type or noise level checks.

- Night noise curfews and restrictions will be collaboratively agreed and will be periodically reviewed as the average noise performance of the aircraft fleet improves. Compliance with the stated policies on night noise will be monitored by the slot coordinator and verified by the regulator.

**D-4-2 Policy Operational Requirements**

- The airport operator is designated as the lead stakeholder for managing noise created by ground operations and by aircraft operating into and out of BRU while operating below 7,000 ft above ground level in the vicinity of BRU.

- The airport(s) will have a CEM group to cover environment topics including noise, ensuring that regulations are complied with, that the agreed noise management plan is delivered, that continual improvement in noise management is fostered and the new practice proposals for operational noise improvements are submitted for consideration through appropriate decision-making and consultation channels.

- The airport(s) will have a Consultative Committee (BCC) to advise on noise related proposals, public concerns and emerging issues. BCC will also act as a conduit between the public and the airport operational community. BCC will be independently chaired by a non-operational individual. The public and press will be able to attend BCC meetings. BCC membership will comprise of a reasonable cross section of external interested parties (to be approved by the State) together with representatives of BRU operational stakeholders. The regulator will be a BCC member. To aid efficiency, subgroups and sub-advisory panels may be constituted. BCC may also cover non-noise topics as it decides. More details of this group will be specified in the subsequent regulation.

- The ANSP will be accountable to the airport operator for ensuring that the noise management plan is supported and fulfilled on a day-to-day basis.

- The airport operator will fund a noise insulation scheme, to be approved by Federal Government that is designed to provide insulation for affected properties over an agreed period. Insulation trigger levels, eligibility and design are to be agreed.
• The airport operator will fund the provision of suitably designed NMTs to be located under departure flightpaths as close to where noise certification microphone would be placed. These will be used to:
  
  o Monitor and report aircraft noise events
  o To help respond to complaints
  o To discourage poor flying practice by the applications of commonly agreed penalties at approved noise levels

• The airport operator will keep detailed records of such penalties and publish regular reports on these. The regulator will audit performance of the noise monitoring system as appropriate, taking enforcement actions where necessary.

• All money raised by such penalties and charges will be transparently hypothecated to be used for noise mitigation purposes. The use of these funds is to be advised by the Airport Consultative Committee.

• No other entity may use microphones for the purpose of penalising flights, but Regional Governments may use suitably designed and installed NMTs to fine aircraft operating away from approved routes, unless these operations have been instructed to do so by air traffic for safety reasons or they meet an approved exemption criterion.

• Ensure that changes to flight patterns and procedures are only accepted where a clear, significant, worthwhile and practical noise benefit will be delivered and where any sustainability disbenefits will not outweigh the predicted benefits. Such proposals will be subject to approval by the regulator.

• Avoid causing ATFM delay due to operational noise rules, to the extent possible given the aims of this policy.

• Clearly define and publish the criteria for selecting the operational procedures to be used on a day-to-day basis.

• Clearly define the acceptability and accuracy of aircraft navigation and acceptable deviation from the nominal centrelines of published navigation procedures and routeings. The regulator has to approve such deviation tolerances.

• Ensure that opportunities to improve noise management by using advanced technologies such as PBN are optimised through established decision-making channels and as approved by the regulator.

• Clearly define the limited acceptable exceptions and exemptions from published rules and procedures and to ensure such exceptions and exemptions are not abused.
• Ensure that all operational stakeholders are jointly and severally liable, responsible and accountable to the designated regulator for compliance with the regulation and delivery of the agreed Noise Management Plan.

• The ANSP shall maintain and publish detailed data on non-standard operations (e.g. tactical deviations from published procedures) including the reason such decisions were taken.

• The aircraft operator will implement a noise related charge scheme based on noise certification designed to discourage noisy aircraft and to encourage quieter aircraft. This scheme is to be fiscally neutral over the entire BRU aircraft fleet.

• Noise abatement techniques and procedures will be clearly defined in the plan and their achievement and performance will be monitored, reported and audited. These may include CDO, CCO, NADP and Low Power/Low Drag (LPLD).

• Measures will be established to ensure that extended segments of level flight below 4,000 ft (or other greater height) in the vicinity of BRU are avoided to the extent possible. Performance of this policy will be monitored, reported and audited.

**D-4-3 Policy Planning Requirements**

• Ensure that Airport Noise Action Plan(s) are collaboratively agreed through established structures and processes and are produced in all national languages and English.

• Avoid blight (e.g. house price collapse) by ensuring timely and expeditious decision-making concerning any regulation, plan development or proposed changes to noise routes etc.

• Ensure that where harm is done to an individual resident, that there is adequate compensation provided to address this.

• Allocate significance to noise from aircraft in the air as follows:
  - Below 4,000 ft above ground level, noise will be given very significant weight in decision-making.
  - Between 4,000 ft and 7,000 ft, decisions are to be taken on a case by case basis.
  - Above 7,000 ft, noise is not normally to be given significant weight and other impacts such as flight efficiency would normally outweigh noise.

• Ensure that existing residential properties in zones unacceptably affected by aircraft noise are offered the opportunity to have their properties purchased at independently agreed market rates. These properties will either be demolished or used for appropriate use.

• Ensure that inappropriate development does not take place in areas significantly affected by existing aircraft noise levels or in areas that will become so affected given approached airport development plans or airspace changes.

• Ensure that new properties permitted in areas of existing or planned significant aircraft noise meet adequate insulations and ventilation standards.
- Ensure that tranquil areas will receive special consideration concerning decisions on how, when and where aircraft fly. The criteria for this will be defined in the regulations.

**D-4-4 General Policy Requirements**

- Structures and processes maintaining awareness of developments in science concerning the effects of aircraft noise on human health and good practice at other airports and emerging international aircraft noise mitigation guidance.

- Proactively engage in international processes to review safe or desirable noise levels.

- Periodically and independently audit and report fulfilment of this policy, enforcing compliance as necessary.
Appendix E  Graphical Charts and Maps

Graphical Charts and Maps referred to in this document are published in a separate document (Appendix E) to this report.