

**A CRITICAL ANALYSIS OF THE LEGAL AND POLICY FRAMEWORK  
GOVERNING AIRCRAFT NOISE IN SOUTH AFRICA WITH SPECIFIC  
REFERENCE TO KING SHAKA INTERNATIONAL AIRPORT**

**BY**

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Environmental Law Degree**

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## DECLARATION

I, Avisha Ramlall, do hereby declare that unless specifically indicated to the contrary in this text, this dissertation is my own original work and has not been submitted to any other university in full or partial fulfilment of the academic requirements of any other degree or other qualification.

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## TERMS, ACRONYMS AND DEFINITIONS

<b>ACSA</b>	Airports Company South Africa
<b>Altitude</b>	Aeronautical term referring to the height of aircraft above mean sea level.
<b>Ambient Noise Level</b>	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
<b>B&amp;K</b>	Bruel & Kjaer
<b>Height agl</b>	Height of the aircraft above the ground directly below.
<b>NMT</b>	Noise Monitoring Terminal.
<b>RoD</b>	Record of Decision.
<b>KSIA</b>	King Shaka International Airport.
<b>A-weighted sound level:</b>	A frequency weighting filter used for the measurement of sound pressure levels designed to reflect the acuity of the human ear, which does not respond equally to all frequencies.
<b>ATNS</b>	Air Traffic Navigation Services.

**Day-Night noise level, DNL, Ldn**

The average A-weighted noise level during a 24-hour day, obtained after the addition of 10 decibels to levels measured in the night between 22:00 and 06:00.

**dB(A):**

Unit of sound level. The weighted sound pressure level by the use of the A metering characteristic and weighting specified in the American National Standards Institute (ANSI) Specifications for Sound Level Meter.

**decibel (dB)**

A measure of sound. It is equal to 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference sound pressure. The reference sound pressure used is 20 micropascals, which is the lowest audible sound.

**DNL**

Day Night Level.

**EPNL**

Effective Perceived Noise Level.

**Equivalent A-weighted sound level (LAeq)**

A-weighted sound pressure level in decibels of continuous steady sound that within a specified interval has the same sound pressure as a sound that varies with time. This is an average sound level that would produce the same energy equivalence as the fluctuating sound level actually occurring.

<b>Equivalent continuous rating level (LReq,T)</b>	The equivalent continuous A-weighted sound level (LAeq,T), measured or calculated during a specified time interval T, to which adjustments are added for tonal character, impulsiveness of the sound and the time of day.
<b>FAA</b>	Federal Aviation Administration.
<b>ICAO</b>	International Civil Aviation Organization.
<b>Impulse time weighting</b>	A standard time constant weighting applied by the Sound Level Meter.
<b>INM</b>	Integrated Noise Model.
<b>Integrating averaging sound level meter</b>	A Sound Level Meter which accumulates the total sound energy over a measurement period and calculates an average.
<b>LAE</b>	Sound exposure level.
<b>Leq</b>	Equivalent continuous sound pressure level of a steady state sound that has the same sound energy as that contained in the actual time-varying sound being measured over a specific time, referenced to the sound pressure level of $2 \times 10^{-5}$ Pa.
<b>LRdn</b>	Equivalent continuous day-night rating level.

<b>LWA</b>	Sound power level in dB(A), referenced to the sound power of 10-12 Watt.
<b>NSR</b>	Noise-Sensitive Receivers.
<b>PWL</b>	Power level in dB(A).
<b>Residual noise</b>	Sound in a given situation at a given time that excludes the noise under investigation but encompasses all other sound sources, both near and far.
<b>SABS</b>	South African Bureau of Standards.
<b>SANS</b>	South African National Standard.
<b>SEL</b>	Sound Exposure Level.
<b>WHO</b>	World Health Organisation.

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## **ABSTRACT**

Airport operations have become a major public concern over the past few years due to the various negative impacts they have on the environment. One such impact that has been an outcry by communities living close to the airport precinct is the noise emissions. An increasingly vocal and influential public opposition calling for measures to limit aircraft operations poses a threat to the continued growth of the aviation industry in South Africa as well as globally. This study investigates the legislation that is in place internationally and locally and addresses how the South African aviation sector has embraced and implemented the global approach in terms of ICAO in addressing noise emissions from aircrafts and the impacts it has on the surrounding affected communities. The study focuses on the first “greenfield” airport in South Africa, King Shaka International Airport, which relocated to the northern suburb of La Mercy, Durban on 1 May 2010. The relocation of the airport was to accommodate the expanding traffic of passengers and in readiness for the World Cup 2010 soccer games that was hosted by most of the provinces in South Africa. The Airport is regulated by a Record Of Decision (the RoD) issued by the Municipality which requires that the Airport adopt the Civil Aviation Organization’s (ICAO) ‘Balanced approach” method to aircraft noise management. A discussion of the best practices that Airports Company South Africa have put in place to ensure adherence to international standards and in line with ICAO’s “balanced approach” method. The study reveals that despite South Africa not having any formal noise pollution legislation in place governing aircraft noise emissions, the practices applied is definitely of international standards. The study concludes by detailing various models as well as practices that can be put in place to ensure compliance to noise standards and keeping communities and affected parties informed and appeased as possible. It is no doubt that it is an important industry and is here to stay so the best would be to ensure that the necessary procedures and reporting mechanisms are in place to ensure compliance by airlines and airports respectively. The recommendations include the phasing out of certain noisier, older generation aircrafts, flight times, and penalties by offending operators, proper land use and planning, the possibility of relocating as well as insulating households or affected communities and enforcing international environmental regulations.

## CHAPTER 1: INTRODUCTION

*Indeed, unlike a Mozart's symphony, airplane noise is by far one of the most undesirable sounds to many that are affected by it.*<sup>1</sup>

### 1.1 Background

Since the dawn of the jet age in the late 1950s the aviation industry has grown in leaps and bounds and today it provides an efficient, fast and safe method of global transportation. An important consequence of the phenomenal growth in the aviation industry since the late 1950s is that it has irreversibly transformed our economic, political and social systems.<sup>2</sup> Despite the important role it plays in the modern world, however, the aviation industry makes a significant contribution to a variety of negative environmental impacts, one of which is noise pollution.<sup>3</sup> The very word “noise” itself derives from the Latin word “noxia”, which means injury or hurt.<sup>4</sup>

Noise is a form of pollution that is not only an annoyance, but also a health hazard. Depending on the duration and thresholds of sound that a person is exposed to, noise may be the cause of a wide range of illnesses.<sup>5</sup> Given its deleterious effects, it is not surprising that people living in the vicinity of airport flight paths have a strong interest in the noise emitted from aircrafts as they land or take off and that authorities around the world have attempted to reduce the negative impact of noise from these aircraft. At the same time, however, they have also attempted to ensure that noise reduction measures do not unfairly penalise aviation operations and thus threaten their financial viability.<sup>6</sup>

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<sup>1</sup> Airbus Flight Operations Support and Line Assistance *Getting to grips with aircraft noise* (December 2003) available at: [http://dream-air.ru/new/pilotam/AircraftNoise-copy\\_2-.pdf](http://dream-air.ru/new/pilotam/AircraftNoise-copy_2-.pdf), accessed 6 August 2015.

<sup>2</sup> J D Stilwell and R J Hansman *The Importance of Air Transportation to the U.S Economy: Analysis of Industry Use and Proximity to Airports* (May 2013) available at:

[https://dspace.mit.edu/bitstream/handle/1721.1/78908/ICAT\\_report\\_jstilwell\\_2013.pdf?sequence=1](https://dspace.mit.edu/bitstream/handle/1721.1/78908/ICAT_report_jstilwell_2013.pdf?sequence=1), accessed 6 August 2015.

<sup>3</sup> Ibid.

<sup>4</sup> R Scheer and D Moss ‘What are the health effects of airport noise and airport pollution’ 4 July 2006 *The Environmental Magazine* available at: <http://www.emagazine.com/earth-talk-archive/week-of-7-2-2006>, accessed 13 September 2015.

<sup>5</sup> S A Stanfield and M P Matheson “Noise pollution: non-auditory effects on health” (2003) 68 *British Medical Bulletin* 243.

<sup>6</sup> Ibid.

While there are different ways in which a balance between these competing interests may be struck, it is arguable that the most important is the so-called “Balanced Approach” adopted by the International Civil Aviation Organisation (the “ICAO”).

The ICAO is a specialized agency created in 1944 by the United Nations for the development of international civil aviation environmental and safety standards.<sup>7</sup> Prior to ICAO coming into existence there was the International Commission for Air Navigation (ICAN).<sup>8</sup> This agency was formed in 1903 to tackle aircraft and air transportation issues on a global level. In 1944 fifty two (52) countries signed the International Civil Aviation Convention which also known as the Chicago Convention.<sup>9</sup> The ICAO was born at the end of the Second World War during a time of social, political and technological advancement and was largely controlled by a few powerful states at the time.<sup>10</sup> The main purpose of forming the ICAO was to reestablish a regulatory system for international commercial aviation.<sup>11</sup>

The ICAO has its head office in Montreal, Canada. As of November 2011 there were 191 ICAO member states, consisting of 190 of the 193 United Nations members, excluding Dominica, Liechtenstein and Tuvalu. Some of the member states include Angola, Argentina, Australia, Austria, Bangladesh, Botswana, Brazil, Cambodia, Portugal, United States, Italy, France, Turkey, Vietnam, Greece, Switzerland and Zimbabwe to mention only a few.<sup>12</sup>

In order to address the adverse effects that the aviation industry has on the environment, the ICAO established a Committee on Aviation Environmental Protection (the “CAEP”) in 1983. The CAEP is a technical committee of the ICAO Council and it assists the Council in

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<sup>7</sup> S Steiner, B Galović, S Pavlin ‘Environmental Requirements of Aircraft Operations’ (1996) *Promet* 147 available at <http://www.fpz.unizg.hr/traffic/index.php/PROMTT/article/viewFile/832/683>, accessed 12 June 2015.

<sup>8</sup> UNESCO “International Civil Aviation Organisation” in *Guide to the Archives of International Organisations*, available at [http://www.unesco.org/archives/sio/Eng/presentation\\_short.php?idOrg=1015](http://www.unesco.org/archives/sio/Eng/presentation_short.php?idOrg=1015), accessed 12 June 2015.

<sup>9</sup> Wikipedia *International Civil Aviation Organization* available at [https://en.wikipedia.org/wiki/International\\_Civil\\_Aviation\\_Organization](https://en.wikipedia.org/wiki/International_Civil_Aviation_Organization), accessed on 12 June 2015.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> International Civil Aviation Organisation *Member States List* (2013) available at <http://www.icao.int/about-icao/Pages/member-states.aspx>, accessed 13 September 2015.

formulating policies and adopting standards and recommended practices related to aviation environmental impacts, in general, and to aircraft emissions and aircraft noise, in particular.

The ICAO has three environmental goals:

- to limit or reduce the number of people affected by significant aircraft noise;
- to limit or reduce the adverse impact of aircraft emissions on local air quality; and
- to limit or reduce the impact of aircraft greenhouse gas emissions on the global climate.

In an effort to limit or reduce the number of people affected by significant aircraft noise the ICAO adopted the concept of a “Balanced Approach to Aircraft Noise Management” at its 33<sup>rd</sup> Assembly in 2001.<sup>13</sup> The Balanced Approach was reaffirmed by the ICAO at its 38<sup>th</sup> Assembly in 2007. The Balanced Approach provides a standardised plan to address aircraft noise reduction at noise sensitive airports.

Although it is not legally binding on the member states of the ICAO, the Balanced Approach does encourage member states to identify the noise problem at an airport and then analyse the various measures available to reduce aircraft noise through four key principles, namely:

- (a) reduction at source by the use of quieter aircrafts;
- (b) land-use planning and management policies;
- (c) noise abatement operational procedures; and
- (d) operating restrictions, which are may be implemented only after of the benefits that would be gained from other elements of the balanced approach has been carefully considered and as a last resort.

The ICAO has developed policies on each of these principles and the recommended practices for a balanced approach which are set out in its *Guidance on the balanced approach to aircraft noise management*.

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<sup>13</sup> International Civil Aviation Organisation *Assembly Resolutions in Force* (5 October 2001) available at <http://www.icao.int/environmental-protection/Documents/STATEMENTS/A33-7.pdf>, accessed 13 September 2015.

The decision to adopt the Balanced Approach may be traced back to the need to replace the diverse and punitive noise control measures that were being adopted and implemented by individual airports and airport authorities towards the end of the twentieth century with a more standardised approach.<sup>14</sup>

The move towards a standardised approach to address aircraft noise reduction at noise sensitive airports began in the 1990s when the ICAO agreed to a global phase out of Chapter 2 Aircraft<sup>15</sup> at its 28<sup>th</sup> Assembly in 1990. In terms of this agreement all Chapter 2 aircrafts, which are characterised by the noisier, low bypass turbofan engine, had to be withdrawn from service by 31 March 2002. In the years that followed, the ICAO also attempted to reach agreement on the phasing out and removal of Chapter 3 aircraft. These aircraft are characterised by the modern, quieter, high bypass turbofan engine. Since 2006, aircrafts have been certified based on the standard in Chapter 4 which includes the Airbus A350 and the Boeing 787. Chapter 4 aircraft must be at least 10 decibels quieter than the previous generation Chapter 3 aircraft for them to be approved.<sup>16</sup>

At roughly the same time there was also a rise in the number of disputes amongst different stakeholders with respect to the implementation of curfews which limited the duration of noise after daylight hours in order to reduce aircraft noise. This added to the urgency to create a more common framework which could be implemented globally. The creation of different noise standards in different airports was a barrier for airport capacity expansion and diminished economic growth.

The need to unify the various codes, standards, solutions and practices that had been adopted to address local noise problems lead ultimately to the adoption of the Balanced Approach. As pointed out above, the main objective of this approach was to address the growing concern of

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<sup>14</sup> M Murphy, A Leipold, G Bischoff, N Radberg and N Ehmer *Institute of Air Transport and Airport Research Study on the Balanced Approach to Noise Management and its Influence on the Economic Impact of Air Transportation* (2011) available at [http://www.euroexpress.org/uploads/ELibrary/DLR\\_Study\\_Balanced\\_Approach\\_2011\\_final.pdf](http://www.euroexpress.org/uploads/ELibrary/DLR_Study_Balanced_Approach_2011_final.pdf) , accessed 17 June 2015.

<sup>15</sup> Ibid at 9.

<sup>16</sup> BDL *Aircraft Noise Report 2015* (2015) available at <http://www.bdl.aero/en/bdl-reports-en/aircraft-noise-report/> , accessed 3 September 2015.

noise related issues amongst communities that lie in close proximity to airport precincts in the most cost effective manner to ensure the growth and sustainability of the aviation industry.

King Shaka International Airport is a prime example of a new modern airport facility that has adopted the principles of the Balanced Approach to noise and airport management in developing and operating their facility. From the phasing out of Chapter 2 aircrafts to the installation of noise monitoring terminals, the institution of operating restrictions and the implementation of noise committees and forums as a platform for open and public communication, KSIA has come a long way in its five (5) years of operation.

## **1.2 The research question**

The aims and objects of this dissertation are to critically consider the manner in which South Africa has adopted and applied the ICAO's Balanced Approach to aircraft noise management from both a legal and a practical perspective. More specifically, the aims and objects of this dissertation are to:

- (a) set out and discuss the manner in which aircraft noise is regulated at an international level and particularly the Balanced Approach to aircraft noise adopted by the ICAO;
- (b) set out and discuss the legal and policy framework governing aircraft noise in South Africa in light of the recently published *White Paper on National Civil Aviation Policy*;<sup>17</sup>
- (c) critically examine the extent to which this legal framework complies with the Balanced Approach; and
- (d) critically examine the manner in which the legal framework has been implemented at King Shaka International Airport, which is South Africa's first "greenfield" airport.

## **1.3 The research methodology**

This is a desk-top study. It is based largely on primary and secondary legal materials. These materials include statutes, regulations and judgments. In addition, they also include textbooks, chapters in textbooks, journal articles and reports. The research will provide an overview of

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<sup>17</sup> Department of Transport *White Paper on National Civil Aviation Policy* (2015).

relevant legislation, standards, guidelines and policies including international standards and policies regarding the reduction of aircraft noise at source, noise surrounding airports, compatible land use planning and limitations on land use and requirements for noise mitigation (including aircraft noise abatement procedures) and compensation.

#### **1.4 The structure of the dissertation**

This dissertation is divided into 5 chapters.

##### *Chapter One: Introduction*

The aims and objects of the dissertation are set out in chapter one. Apart from the aims and objects, the background, the research methodology, the structure of the dissertation and the definition of key concepts and terms are also set out in chapter one. The impact of noise on human health and well-being is also discussed.

##### *Chapter Two: The international regulation of airport noise*

The manner in which aircraft noise is regulated at an international level is set out and discussed in Chapter Two. This chapter focuses particularly on the Balanced Approach to the regulation of aircraft noise adopted by the ICAO.

##### *Chapter Three: The South African legal and policy framework*

The manner in which aircraft noise is regulated in South Africa is set out and discussed in Chapter Three. This chapter focuses particularly on the extent to which the South African legal and policy framework is consistent with the Balanced Approach adopted by the ICAO.

##### *Chapter Four: The implementation of the balanced approach at KSIA*

The manner in which the Balanced Approach to regulating aircraft noise is applied in South Africa is set out and discussed in this chapter. This chapter focuses particularly on the manner in which the balanced-approach has been applied at King Shaka International Airport, which is South Africa's first "greenfield" airport.

### *Chapter Five: Recommendations and Conclusion*

This study concludes by discussing the efficacy of the current systems that King Shaka International Airport has put in place to abide by the international standards of the ICAO in dealing with noise pollution from aircrafts. Recommendations are also made on changes that may enhance the current legal and policy framework.

Before turning to discuss the manner in which aircraft noise is regulated at an international level, it will be helpful to define certain key terms and concepts and consider the impact of noise on human health and well-being.

## **1.5 Key terms and concepts**

### *1.5.1 Introduction*

Noise has been defined as an undesirable or unwanted sound. Even though noise is somewhat subjective, it affects the full range of human activities and must be considered in local and regional planning. Most of the sounds heard in the environment are not composed of a single frequency but a band of frequencies, each with a different intensity or level. Levels of noise are measured in units called decibels.<sup>18</sup>

The annoyance caused by a given noise source is perceived very differently from person to person. Since the human ear cannot perceive all pitches or frequencies equally, these

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<sup>18</sup> The decibel (dB) is a logarithmic unit of measurement that expresses the magnitude of a physical quantity (usually power) relative to a specified or implied reference level. Its logarithmic nature allows very large or very small ratios to be represented by a convenient number. Decibels are useful for a wide variety of measurements in acoustics, physics, electronics and other disciplines.

measurements are adjusted or weighted to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA. The A-weighted sound level (dBA) is useful for gauging and comparing the subjective loudness of sounds.<sup>19</sup>

The equivalent noise level, or Leq, is defined as the level of continuous sound containing the same amount of acoustical energy as the fluctuating sound over the same period.<sup>20</sup> Leq is increasingly recognized as an appropriate noise measure by national and international regulatory agencies. Generally the perceived noise level experienced with increase in decibel level can be presented as follows:<sup>21</sup>

Change in dB	Perception
2-3	Barely perceptible
5	Readily noticed
10	Doubling of noise level
20	Very noticeable
40	Dramatic

### 15.2 Noise measurement

Considering that each individual responds differently to sound, it has been difficult to describe, analyze and report in this regard. Due to the subjective nature of sound it has been problematic to devise the various sound rating scales and metrics for describing acoustic effects.<sup>22</sup> What is considered loud or noisy to one may not necessarily be loud or noisy to another.<sup>23</sup>

In this regards there are many rating scales that have formed to estimate how particular people respond and are affected to the loudness or noisiness of sound. Noise metrics can be categorized

<sup>19</sup> Brüel & Kjær *Measuring Sound* Revised Edition (1984) available at <http://www.bksv.com/doc/br0047.pdf>, accessed 3 July 2015.

<sup>20</sup> Brüel & Kjær *Environmental Noise* (2000) available at [http://www.bksv.com/doc/environmentalnoisebooklet\\_english.pdf](http://www.bksv.com/doc/environmentalnoisebooklet_english.pdf), accessed 3 July 2015.

<sup>21</sup> Table derived from *Noise Analysis* available at <http://www.nyc.gov/html/dep/pdf/shaft333b/presentation3.pdf>, accessed 3 September 2015.

<sup>22</sup> Brüel & Kjær *Measuring Sound* (note 19).

<sup>23</sup> MP Norton and DG Karczub *Fundamentals of Noise and Vibration Analysis for Engineers* 2ed (2003) 258.

as single-event metrics and cumulative metrics.<sup>24</sup> Single-event metrics describe the exposure to noise from a single event, such as an aircraft flyover. Cumulative metrics describe the total exposure to noise over a 24 hour period.<sup>25</sup>

(a) Single event metrics

Single event metrics are a convenient method for describing noise from individual aircraft events. The use of a single event metrics has been proposed to indicate the immediate impact on people of a single event, such as annoyance or interference with speech communication. However, the single event approach has been criticised on the grounds that it does not consider the cumulative effect of noise.<sup>26</sup>

(b) Maximum sound level

The Maximum Sound Level (the “Lmax”) is the maximum sound pressure level of an aircraft noise event, normally measured on an A-weighted decibel scale.<sup>27</sup> This method identifies the maximum sound level produced by a singular event.<sup>28</sup> The Maximum sound level does not take into consideration the duration of the event and, therefore, is not considered sufficient for the evaluation of the effect of aircraft noise on people that live close to airports.

(c) Sound exposure level

Both loudness and duration are included in the Sound Exposure Level (the “SEL”) method, which totals all sound occurring in a stated time period or during a specific event, integrating the total sound over one second duration.<sup>29</sup> The SEL is the quantity that best describes the total noise from an aircraft over flight. This method takes into account all of the sound energy emitted over

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<sup>24</sup> MJ Crocker *Handbook of Acoustics* (1998).

<sup>25</sup> Ibid.

<sup>26</sup> Brüel & Kjær *Measuring Sound* (note 19).

<sup>27</sup> Ibid.

<sup>28</sup> This method is usually expressed in A-weighted decibel (dBA) when measuring aircraft events.

<sup>29</sup> Brüel & Kjær *Leq, SEL, What? Why? When?* (date unknown) available at <http://www.bksv.com/doc/bo0051.pdf>, accessed on 3 July 2015.

the duration of the aircraft operation and produces the sound level that people are exposed to from that event. The SEL considers both the intensity and the duration of a single sound event.<sup>30</sup>

(d) Cumulative metrics

Cumulative noise metrics are established to assess how the community responds to the noise that is emitted. These prove useful as they attempt to include the “*loudness of the noise, the duration of the noise, the total number of noise events, and the time of day these events occur into one single number rating*”.<sup>31</sup>

(e) Equivalent noise level

The Equivalent Noise Level (the “Leq”) is the sound level corresponding to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given sample period. Leq is the “energy” average noise level during the time period of the sample. It is based on the observation that the potential for a noise to impact on people is dependent on the total acoustical energy content of the noise. It is the energy sum of all the sound that occurs during that time period. Leq is usually measured for 15 minutes, 1 hour, or 24 hours however it can be measured for any duration of time that one requires.<sup>32</sup>

(f) Day-night noise level

The Day-night Noise Level (the “Ldn”) index is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. This is a measurement of the overall noise experienced during a 24 hour period. The time-weighting takes into account the occurrence of noise during sensitive times of day and is penalised for so doing. Any noise occurring between 10 p.m. and 7

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<sup>30</sup> Based on numerous sound measurements, the SEL from a typical aircraft over flight is usually four to seven decibels higher than the Lmax for the event.

<sup>31</sup> JM Woodward, LL Briscoe and P Dunholter *Airport Cooperative Research Program, Aircraft Noise: A toolkit for managing community expectations* Report 15 (2009) available at [http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rpt\\_015.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_015.pdf), accessed 13 September 2015.

<sup>32</sup> Brüel & Kjær *Leq, SEL, What? Why? When?* (note 29).

a.m. is penalized by 10dB. This penalty is to allow for a reduction of nighttime noise occurrences which is regarded as a sensitive time and requires a decrease of background noise.<sup>33</sup>

(g) Supplemental noise metrics

A number of supplemental noise metrics have been developed in various parts of the world in response to criticism of the metrics discussed above to adequately describe the real and perceived impacts of aircraft noise.<sup>34</sup>

(h) Percent noise level

The Percent Noise Level (the “Ln”) takes into account intermittent or fluctuating noise. This is the level exceeded n% of the time during the measurement period. This is most often measured in dBA.<sup>35</sup>

## **1.6 The impact of noise on human health and well-being**

### *1.6.1 Introduction*

The effect of noise on humans has been the subject of extensive research for many years, producing a reasonable understanding of its damaging effect on human hearing at high energy levels, and its effects on human sleep, human communication, human mental activities and human well-being at lower energy levels.<sup>36</sup> Noise is a recognised as an environmental stressor and considerable effort has gone into quantifying the relationship between noise levels and human stress, and determining what might be “safe” levels of noise in different settings.<sup>37</sup>

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<sup>33</sup> Brüel & Kjær *Measuring Sound* (note 19).

<sup>34</sup> Brüel & Kjær *Leq, SEL, What? Why? When?* (note 29).

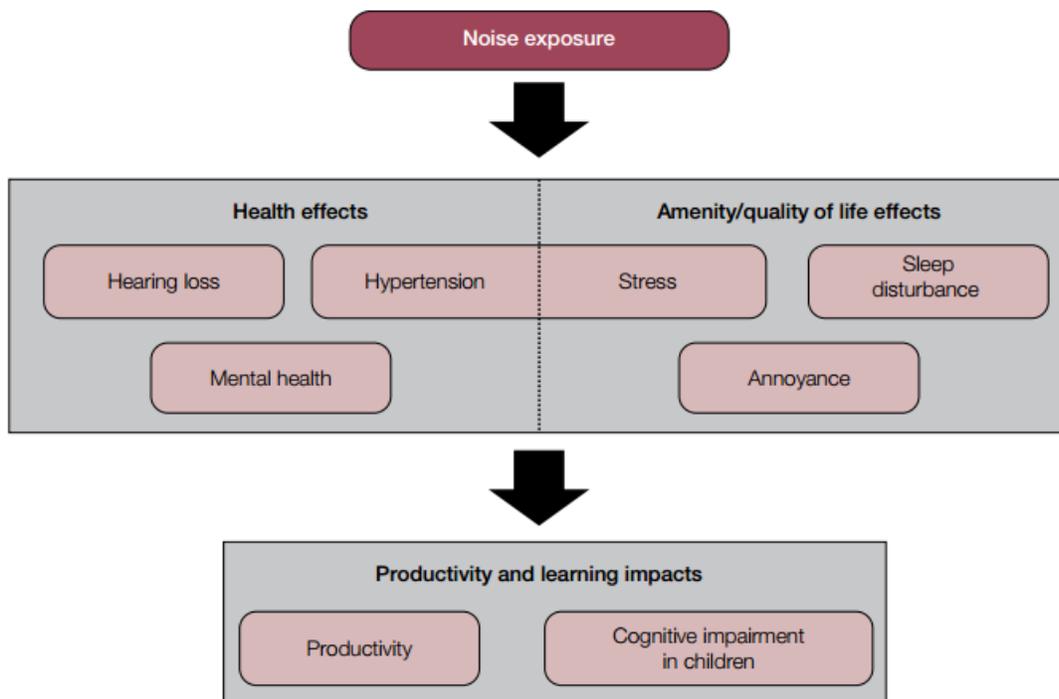
<sup>35</sup> LK Wang and NC Pereira, *Advanced Air and Noise Pollution Control, Handbook of Environmental Engineering*, Volume 2 (2005).

<sup>36</sup> Stanfield and Matheson (note 5) *British Medical Bulletin* 243-257.

<sup>37</sup> *Ibid.*

A study conducted by eNHealth in Australia identified the following groups of people as being particularly sensitive to noise:

- people with specific diseases or medical complications which includes high blood pressure, anxiousness etc.;
- people with existing mental health problems such as depression or anxiety;
- people in place of care which includes hospitals and rehabilitation homes;
- people dealing with complex mental issues;
- the blind;
- people with hearing impairment;
- babies in utero, babies and young children; and
- the elderly.<sup>38</sup>



Source: Airports Commission adapted using WHO (2011) and Moorhouse (2009)

Aircraft noise amongst others poses as the most common form of annoyance to many communities.<sup>39</sup> This is evident from the complaints received from communities situated near

<sup>38</sup> Environmental Health Australia available at <http://www.eh.org.au/resources/knowledge-centre/noise-pollution>, accessed 16 September 2015.

airports throughout the world. Noise and the way it is experienced are very subjective. Communities and individual's reactions to noise levels vary and some may be more reactive to being exposed to a certain sound in comparison to others. The reasons for these different reactions are multifaceted.

People are found to be bothered by a particular type of noise event and as the noise event increases in duration and consistency then the annoyance also increases. This is particularly the case for noise occurring during the late hours of the night.<sup>40</sup> Research has found that community reactions to noise are predictable as opposed to individual reactions. This is due to a larger extent of the population being involved.<sup>41</sup>

### 1.6.2 Hearing loss

Noise-induced hearing loss is one of the effects of human exposure to excessive dB noise. Occupational exposure limits in South Africa<sup>42</sup> allow for a time-average level of 85 dB over an 8-hour work period.<sup>43</sup> This allows for protection from hearing loss. In the United States, the Environmental Protection Agency (the "EPA") has recommended that an average equivalent noise level of 70 A-weighted decibels for a continuous 24-hour exposure is the maximum

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<sup>39</sup> K Hume et al. "Complaints caused by aircraft operations: an assessment of annoyance by noise level and time of day" (2003) 9 *Journal of Air Transport Management* 153. Noise annoyance is defined by the US EPA as any negative subjective reaction on the part of an individual or group.

<sup>40</sup> The increased sensitivity to noise at night has resulted in a number of noise metrics being developed to take this into account. The day-night noise level (DNL noise level or Ldn) has proved to be popular in many countries, where a correction factor of 10dB is factored into the noise level to take into account the increased sensitivity to noise at night. Generally the guidelines say that DNL levels between 55 and 65 dB indicate moderate exposure and are generally considered acceptable for residential use. Internationally the 55dB level seems to be favoured, with the United States FAA adopting a 65 dB level.

<sup>41</sup> United Kingdom Civil Aviation Authority *Aircraft Noise, Sleep Disturbance and Health Effects* (2014), available at [https://publicapps.caa.co.uk/docs/33/CAP%201164\\_Aircraft%20noise\\_and\\_health.pdf](https://publicapps.caa.co.uk/docs/33/CAP%201164_Aircraft%20noise_and_health.pdf), accessed 3 July 2015.

<sup>42</sup> Department of Labour *Workmen's Compensation Commission Internal instruction 168: Determination of disability in cases of noise induced hearing loss*. Pretoria (1995).

<sup>43</sup> South African National Standard, *The measurement and assessment of occupational noise for hearing conservation purposes* SANS 10083:2004.

exposure level to protect ones hearing.<sup>44</sup> The International Standards Organisation<sup>45</sup> states that long-term exposure of up to 70 dB(A) will not result in hearing impairment.<sup>46</sup>

### 1.6.3 Speech interference

Excessive exposure to noise can have a debilitating effect on one's speech and communication levels. Being in a noisy environment makes it difficult to comprehend and communicate effectively. Speech interference is defined as the masking process where background or interfering noise makes it difficult of being understood or likely misunderstood and hence hinders meaningful communications from occurring.

The World Health Organisation (the "WHO") indicates that the negative impact of noise on speech ranges from one experiencing problems with "concentration levels, fatigue, uncertainty and lack of self-confidence, irritation, misunderstandings, decreased working capacity, problems in human relations, and a number of stress reactions".<sup>47</sup> The WHO states that children who are beginning to learn languages, the elderly, those who are unfamiliar with certain languages and those that have hearing impediments are most vulnerable to speech interference.<sup>48</sup>

A person normally increases his or her voice to compensate for the increased sound levels that he or she is exposed to when trying to communicate in a noisy environment. This calls for more energy being needed and expended and the increasing of the pitch of ones voice to allow for the exchange of the message with the other to take place. As noise levels rise it sometimes calls for certain speakers to cease speech altogether as they are unable to compete with the loudness of the noise. If the speech source is a radio or television, the listener may need to increase the volume during the time of the noise interference which adds to the total volume of noise exposure that the individual is experiencing.<sup>49</sup>

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<sup>44</sup> United States Environmental Protection Agency available at <http://www3.epa.gov/>, accessed 15 July 2015.

<sup>45</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* ISO 1999:1990 available at [http://www.iso.org/iso/catalogue\\_detail.htm?csnumber=6759](http://www.iso.org/iso/catalogue_detail.htm?csnumber=6759), accessed 13 July 2015.

<sup>46</sup> World Health Organisation available at <http://www.who.int/publications/en/>, accessed 16 July 2015.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

<sup>49</sup> Ibid.

SANS 10103 contains recommendations regarding acceptable noise levels relating to speech communication. The table below, which is taken from SANS 10103, relates to the distance at which speech will be intelligible under specific sound levels. As can be seen from this table, speech intelligibility becomes difficult above 65 dB and voices have to be raised. This is of particular significance to teaching institutions where the spoken word is relied on as a mode of teaching.

**Rating levels for noise and intelligibility distances (Table 3 in SANS 10103)**

1	2	3
Equivalent continuous rating level (L <sub>req.T</sub> ,dBA)	Maximum Distance at which every day speech is intelligible (m)	Maximum distance at which raised speech is intelligible
<b>45</b>	<b>7</b>	<b>14</b>
<b>50</b>	<b>4</b>	<b>8</b>
<b>55</b>	<b>2.2</b>	<b>4.4</b>
<b>60</b>	<b>1.3</b>	<b>2.6</b>
<b>65</b>	<b>0.7</b>	<b>1.4</b>
<b>70</b>	<b>0.4</b>	<b>0.8</b>
<b>75</b>	<b>0.2</b>	<b>0.4</b>
<b>80</b>	<b>0.13</b>	<b>0.26</b>
<b>85</b>	<b>0.07</b>	<b>0.14</b>

Table 4 in SANS 10103 relates to the quality of telephone communication, which is an important communication mode, particularly in the business sector. At 70 dB telephone communication becomes difficult and above 80dB telephone communication is described as “unsatisfactory”.

**Quality of telephone communication (Table 4 in SANS 10103)**

1	2

Rating Level Lreq,T dBA	Quality of telephone Communication
55 or lower	Satisfactory
65	Slightly difficult
75	Difficult
80 or higher	Unsatisfactory

#### 1.6.4 Sleep disturbance

Sleep disturbance is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.<sup>50</sup>

Uninterrupted sleep is known to be a prerequisite for good physiological and mental functioning of healthy persons while sleep disturbance is considered to be a major environmental noise effect. Sleep interference can inhibit a number of beneficial effects associated with sleep, including the restorative processes of body organs, the recovery of the brain from “fatigue”, the consolidation into memory of the information gained during wakefulness, and, in children, the release of growth hormones.<sup>51</sup>

Exposure to night-time noise also induces secondary or after-effects. These are effects that can be measured the day following the night-time exposure, while the individual is awake. The secondary effects include reduced perceived sleep quality, increased fatigue, depressed mood or wellbeing, and decreased performance. Various studies have also shown that people living in areas exposed to nighttime noise have an increased use of sedatives or sleeping tablets.<sup>52</sup>

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<sup>50</sup> H Ising *Exposure and Effect Indicators of Environmental Noise* (date unknown) available at <http://dcnighlifenoise.com/effectindicatorsenvironoise/ising.pdf>, accessed 13 July 2015. Ising describes “sleep disturbance” as “the most obvious effect of noise exposure during the night”, which will possibly affect efficiency during the day and even result in long-term health impairment.

<sup>51</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* (note 45).

<sup>52</sup> Ibid.

SANS 10103 recommends a nighttime indoor level of 35 dBA for urban districts. The WHO reports that for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax more than 10–15 times per night.

### 1.6.5 Annoyance

Annoyance is probably the most significant effect of environmental noise. Annoyance relates directly to the effects discussed above, such as sleep disturbance and interference with speech communication. Annoyance in response to noise is described as a feeling of displeasure associated with the noise known or believed by an individual or a group to be adversely affecting them. Annoyance is generally associated with a disturbance of intended activities or discomfort and a feeling of being powerless to deal with the situation.<sup>53</sup> According to the WHO, aircraft noise affects a person by interfering with their rest and leisure time and whilst watching television whereas road traffic noise has an effect on the quality of sleep one has.<sup>54</sup> SANS 10103 estimates the expected community or group response to an increase in noise levels

#### Categories of community/ group response (Table 5 in SANS 10103)

Excess $\Delta L_{req}$ , T <sup>a</sup> dBA	Estimated Community/Group Response	
	Category	Description
0 – 10	Little	Sporadic complaints
5 – 15	Medium	Widespread complaints
10 – 20	Strong	Threats of community action
> 15	Very Strong	Vigorous community action

### 1.6.6 Physiological effects of noise

According to some studies carried out by the WHO on a group of children and workers that lived in noise prone areas, such as those close to airports, extremely noisy and busy streets as well as industrial zones, it was found that noise does indeed have an effect on the physiological

<sup>53</sup> World Health Organisation (note 46).

<sup>54</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* (note 45).

functions of people. It was further found that acute exposure to noise increases a person's blood pressure and heart rate. Prolonged exposure to excessive noise may lead to permanent effects which includes hypertension and ischemic heart disease.<sup>55</sup>

Scientific studies on adults have shown that short-term exposure to intense noise can cause temporary effects, including increases in heart rate and blood pressure. However, there is no consistent evidence that chronic noise leads to hypertension. In studies where such a link has been demonstrated, the effect may have been due to other factors that are known to be linked to high blood pressure, such as low economic status.<sup>56</sup> Studies conducted in both Los Angeles and Munich found that average blood pressure levels were slightly elevated in a group of school children exposed to aircraft noise. However, neither study provides conclusive proof that aircraft noise causes chronic stress in children.<sup>57</sup>

### **1.7 The impacts of aircraft noise on wildlife and domestic animals**

Animals rely on meaningful sounds for communication, navigation, avoiding danger and finding food against a background of noise. Man-made noise can mask these natural acoustical signals and can impair satisfactory performance in any of these functions. Other creatures have lower acceptance levels, as their survival is more reliant upon instinct and interpretation of unusual sounds as a source of danger.<sup>58</sup>

Very often animals have acute hearing abilities that form part of their survival mechanisms in the wild. This may make animals particularly sensitive to the effects of man-made noise and vibration. The level of disturbance from noise may be qualified as being damaging or harmful to

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<sup>55</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* (note 45).

<sup>56</sup> S Perron, L-F Tetreault, N King, C Plante and A Smargiassi "Review of the effect of aircraft noise on sleep disturbance in adults" (2012) 14 *Noise & Health* 58 available at <http://www.noiseandhealth.org/article.asp?issn=1463-1741;year=2012;volume=14;issue=57;spage=58;epage=67;aulast=Perron>, accessed 3 July 2015.

<sup>57</sup> Ibid.

<sup>58</sup> United States Department of Transportation *Noise Effects on Wildlife* (2011), available at [https://www.fhwa.dot.gov/environment/noise/noise\\_effect\\_on\\_wildlife/effects/wild04.cfm](https://www.fhwa.dot.gov/environment/noise/noise_effect_on_wildlife/effects/wild04.cfm), accessed 15 July 2015.

health, reproduction, habitat use, distribution, abundance or genetic distribution or may be disturbing and cause a detectable change in behaviour.<sup>59</sup>

It has been documented that elephants and possibly other larger terrestrial animals such as rhinoceros, hippopotamus and giraffes use infrasound for intra-species communication.<sup>60</sup> Crocodiles take advantage of the conductivity of water to send low frequency sounds to attract a mate and migrating birds use turbulent airflow from mountain ranges as navigational aids.<sup>61</sup>

It is possible that wildlife may be affected by infrasonic components of noise, both by direct response or damage to the ears by infrasound and by masking of biologically meaningful infrasound signals by infrasonic noise.<sup>62</sup> A phenomenon that has been observed in many studies is the habituation of wildlife to aircraft noise.<sup>63</sup> One such study is the migration and the seemingly disappearance of the barn swallow also known as the *hirundo rustica* that used to roost in the Mount Moreland area close to the King Shaka International Airport vicinity.<sup>64</sup>

## **1.8 International comparison of aircraft noise standards**

### *1.8.1 Introduction*

The World Health Organisation, the Organisation for Economic Co-ordination and Development (the “OECD”) and the World Bank have all adopted resolutions on the need to ensure a healthy environment for the well-being of individuals considering that noise is recognised as detrimental to one’s health and infringes on their privacy and leisure.<sup>65</sup>

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<sup>59</sup> Ibid

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

<sup>62</sup> RP Larkin *Effects of military noise on wildlife: a literature review* (date unknown), available at [http://nhsbig.inhs.uiuc.edu/bioacoustics/noise\\_and\\_wildlife.pdf](http://nhsbig.inhs.uiuc.edu/bioacoustics/noise_and_wildlife.pdf), accessed 5 July 2015.

<sup>63</sup> ‘Habituation’ is described as a kind of learning ubiquitous in the animal kingdom. A biologist’s definition is “the elimination of the organism’s response to often recurring, biologically irrelevant stimuli without impairment of its reaction to others”.

<sup>64</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* (note 45).

<sup>65</sup> Ibid.

The WHO has performed studies and taken a complex series of actions in formulating recommendations to ensure this goal. Similar tasks have been performed by several scientific organisations. Although they are not legally binding, all of these organisations have formulated recommendations on practices to be complied with that will help to decide levels, procedures, and so on to be included in a legally enforceable framework.<sup>66</sup>

The WHO has recommended a standard guideline value for average outdoor equivalent noise levels of not more than 55dB(A), applied during normal daytime in order to prevent significant interference with the normal activities of local communities.<sup>67</sup>

### 1.8.2 WHO and World Bank / International Finance Corporation Guidelines

Both the WHO and the OECD have established guidelines with regards to the effects of exposure to environmental noise. These guidelines prescribe ambient noise levels for different spaces such as homes, bedrooms and schools at specified times of day and night. The WHO stipulates a standard outdoor noise rating of 55 dB(A) is set to avoid interference with normal activities during the day.<sup>68</sup>

A nighttime noise level of 45 dB(A) is recommended. The WHO stipulates that no single event during the night exceeds 60 dB(A). This limit has been suggested so preserve the quality of ones sleep. The following table suggests the ambient noise levels for various areas of the environment. These levels are depicted in the table below.<sup>69</sup>

**Table 1-1 WHO Guidelines for Ambient Sound Levels**

Environments	Ambient Sound Level $L_{Aeq}$ (dB(A))			
	Daytime		Night-time	
	Indoor	Outdoor	Indoor	Outdoor
Dwellings	50	55	-	-

<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

<sup>69</sup> Ibid.

Bedrooms	-	-	30	45
Schools	35	55	-	-

It is stipulated by the WHO that prior to the implementation of any project that could have the effect of severely impacting the ambient noise levels of the surrounding communities then an environmental noise impact analyses must be conducted. Levels greater than 5 dB are considered to be a significant increase in the ambient noise levels.<sup>70</sup>

The German National Aeronautics and Space Research Centre “Strain” study has identified significant changes in sleep stages caused by aircraft noise, which over the long-term could lead to adverse health effects, even though the noise levels are insufficient to cause awakenings.<sup>71</sup> As a result WHO Europe issued new guidelines on night noise in 2009, for the long-term protection of public health.<sup>72</sup>

The WHO Europe guidance sets an interim maximum target for noise levels of 55 dB(A) LNIGHT, and a long-term maximum target of 40 dB(A) LNIGHT. In the first round of mapping of night noise under the Environmental Noise Directive it was estimated that 60,000 people were exposed to more than 55 dB(A) LNIGHT due to Heathrow airport (CAA, 2007).<sup>73</sup> This would mean that London would require a near complete closure of the transport system between the hours of 23:00 and 07:00 to achieve the WHO Europe interim target.

The World Bank Group (WBG) International Finance Corporation (IFC) has created a program in pollution management. This program ensures that the IFC finances and supports projects in developing countries that are environmentally sustainable which requires that noise pollutions is adhered to under their policy. There are specified noise levels that must be adhered to. These levels are measured at points outside of the project properties boundary. The noise levels must

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<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

<sup>72</sup> Ibid.

<sup>73</sup> Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise.

not exceed 3 dB(A) to the background noise levels of the surrounding environment. The noise levels are detailed in the Table 3-2 below.<sup>74</sup>

The WBG/IFC program makes reference to the WHO Guidelines for Community Noise (WHO, 1999). These guidelines are used by environmental health authorities and professionals to assist them in the protecting communities from the harmful effects of noise that emanate from non-industrial environments.

**Table 1-2 World Bank / IFC Ambient Noise Guidelines**

<b>Receptor</b>	<b>Maximum Allowable Ambient Noise Levels</b>	
	<b>1-hour L<sub>Aeq</sub> (dB(A))</b>	
	<b>Daytime</b>	<b>Night-time</b>
	<b>07:00 – 22:00</b>	<b>22:00 – 07:00</b>
Residential, institutional, educational	55	45
Industrial, commercial	70	70
Note: No L <sub>Aeq</sub> values are stipulated for rural areas		

The increased sensitivity to noise at night has resulted in a number of noise metrics being developed to take this into account. The day-night noise level (DNL noise level or L<sub>dn</sub>) has proved to be popular in many countries, where a correction factor of 10dB is factored into the noise level to take into account the increased sensitivity to noise at night. Noise Levels between 55 and 65 dB are considered acceptable levels for residential areas. Internationally the 55dB level seems to be favoured, with the United States FAA adopting a 65 dB level.<sup>75</sup>

<sup>74</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* (note 45).

<sup>75</sup> National Aviation Noise Policy (Section 9308 and 9309) and the creation of a passenger facility charge (Section 9110 and 9111). The well-established 65dB DNL threshold in the USA which establishes that people who live in areas subject to this level of noise or greater are entitled to some relief, usually in the form of compulsory property purchase or grants to cover building works and insulation.

## CHAPTER TWO: THE INTERNATIONAL REGULATION OF AIRCRAFT NOISE

### 2.1 Introduction

Given the growth in the air transportation industry, not only at a national, but also at an international level, it is not surprising that over the years a number of international regulatory frameworks have been put in place to address the adverse effects of aircraft noise. These include:

- the ICAO’s Balanced Approach to airport noise management;
- the Airports Council International (the “ACI”) policies and recommended practices;
- the European Commission’s Environmental Noise Directive; and
- the United States Airport Noise and Capacity Act of 1990.<sup>76</sup>

Out of all of these approaches, the ICAO’s Balanced Approach is arguably the most significant. Before turning to discuss this approach, however, it will be helpful to briefly examine the other three first.

### 2.2 The Airports Council International’s policies and recommended practices<sup>77</sup>

The ACI was formed in 1991. Prior to the establishment of ACI the airports of the world were represented by Airport Associations Coordinating Council (the “AACC”) on an international level. The AACC was created in 1970 and had at that time amalgamated three existing international airport associations which were the Airport Operators Council International (the “AOCI”), the International Civil Airports Association (the “ICAA”) and the Western European Airports Association (the “WEAA”).<sup>78</sup>

Due to these three associations representing their respective memberships separately, airport issues remained quite segmented. With times changing and the need for a more unified approach

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<sup>76</sup> The Airport Noise and Capacity Act of 1990 establishes procedures for airports which want to impose operating restrictions (Part 161) or which want to gain government grants to invest in noise mitigation (Part 150).

<sup>77</sup> Brüel & Kjær *Legislation, Regulation and Best Practice in Airport Noise Management White Paper* (2010), available at <http://www.bksv.com/doc/bn0800.pdf>, accessed 18 July 2015.

<sup>78</sup> Airports Council International *History of Airports Council International* (2014), available at <http://www.aci.aero/About-ACI/Overview/ACI-History>, accessed 13 July 2015.

to representing airport issues globally gave rise to the establishment of ACI which came into effect on the 1 January 1991.

The ACI is a non-profit organisation whose prime purpose is to promote excellence in airport operations and is the voice of airports globally as well as the communities that they serve.<sup>79</sup> In order to achieve its aims and goals the ACI has fostered harmonious relationships with aircraft manufacturers, airlines, airports and governments and by so doing is able to ensure that the air transportation system is “safe, secure, efficient and environmentally compatible”.<sup>80</sup> The ACI has 591 members operating 1861 airports in 177 countries.<sup>81</sup>

Apart from the aims and goals set out above, the ACI’s also strives to ensure that the aviation industry functions in a responsible and sustainable manner by promoting co-operation among regional and international governments. One of the ways in which the ACI seeks to promote such co-operation is by standardising the rules, practices, regulations and policies that govern aviation thus enabling business continuity and the expansion of airports.<sup>82</sup>

The ACI has established six specialized standing committees, each of which is responsible for a specific area of policy and competence. The Environment Standing Committee deals with all environmental issues which includes, but is not limited to, noise, engine emissions, air pollution as well as land use and planning in the vicinity of airports.<sup>83</sup> The other standing committees deal with, *inter alia*, information technology, economic, security and safety issues at airports.<sup>84</sup>

The Environment Standing Committee develops the ACI’s policies on global aviation environmental issues and advocates sound insulation as part of the solution for residences,

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<sup>79</sup> Airports Council International *Mission, Objectives and Structure* (2014), available at <http://www.aci.aero/About-ACI/Overview/Mission-Objectives-Structure>, accessed 13 July 2015.

<sup>80</sup> Ibid.

<sup>81</sup> Airports Council International available at <http://www.aci.aero/News/Releases/Most-Recent/2014/09/16/ACI-releases-2013-World-Airport-Traffic-Report-Airport-passenger-traffic-still-going-strong-air-cargo-inches-along-after-third-year-of-weak-growth>, accessed 18 July 2015.

<sup>82</sup> International Civil Aviation Organisation *Annual Report of the Council*, Doc 9898, 2007, available at [http://www.icao.int/publications/Documents/9898\\_en.pdf](http://www.icao.int/publications/Documents/9898_en.pdf), accessed 13 July 2015.

<sup>83</sup> Scheer and Moss ‘What are the health effects of airport noise and airport pollution’ 4 July 2006 *The Environmental Magazine* (note 4).

<sup>84</sup> Ibid.

classrooms, and other noise sensitive buildings that are affected by excessive noise. In addition, it also advocates the restriction of operations at night as well as the implementation of incentives for airlines to operate quieter fleets. The policy incorporates the use of noise metrics to be used as a valuable tool to ensure open and transparent communication with affected parties. Noise monitoring at airports is an important mechanism for understanding and addressing the impacts of aircraft noise. Land use planning and reduction of noise at source also form part of the policy's recommended practices.

### **2.3 The European Commission**

Noise pollution is a serious concern in Europe and remains a major health problem which is the reason why the European Commission has identified it as one of the priority issues to be dealt with. However, it is only recently that the EU has developed a noise policy dealing with environmental noise. Initially noise was controlled by prescribing maximum acceptable levels of noise for certain aircrafts and machinery.<sup>85</sup> At the European level noise was placed traditionally at the tail end as opposed to other environmental problems such as water and waste.<sup>86</sup>

The issue of environmental noise was first addressed by the European Commission when it published a Green Paper on Future Noise Policy in 1996.<sup>87</sup> This Green Paper was supported by the European Parliament in 1997 and the need was expressed to have comparable data that could be relied on that could describe the effects of environmental noise.<sup>88</sup> In pursuance of the Future Noise Policy the EU enacted the Environmental Noise Directive, more commonly referred to as the END 2002/49/EC. This Directive was drawn up and ultimately adopted by the European Parliament and the Council of the European Union on 25 June 2002.<sup>89</sup>

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<sup>85</sup> S Wolf and N Stanley *Wolf and Stanley on Environmental Law* 6ed (2014) 425-432.

<sup>86</sup> *Ibid.*

<sup>87</sup> *Ibid.*

<sup>88</sup> S Battersby *Clays Handbook of Environmental Health* 20ed (2011) 798-802.

<sup>89</sup> Wolf and Stanley *Wolf and Stanley on Environmental Law* (note 85).

The European Environmental Noise Directive (the “END”)<sup>90</sup> was adopted as part of a long-term strategy to reduce the number of people affected by noise by introducing legislation that relates to noise reception as opposed to noise sources for the first time ever.<sup>91</sup>

The END is considered to be one of the main EU legal instruments on noise which standardizes Member States efforts in addressing noise and is a piece of legislation that is not directly applicable in member states but has to be transposed into national legislation.<sup>92</sup> The END requires that member states designate the relevant competent authorities that are responsible in their country to implement the Directive accordingly.

The main aim and overall objective of the END is to identify and have a common approach across the EU in addressing and reducing the negative and harmful effects, including annoyance, caused by environmental noise exposure.<sup>93</sup>

The END requires that noise maps must be drawn up and corresponding action plans drafted to respond to noise issues. There is a further need to ensure that the public remains informed at all times and the use of harmonized noise indicators and computational measures to ensure that the data collected can be compared in a standardized way.<sup>94</sup>

A common noise indicator and a common methodology for noise calculation and measurement around airports were identified in the Commission Communication of 1 December 1999 on Air Transport and the Environment in the hope of making air transportation environmentally

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<sup>90</sup> END 2002/49/EC - The END requires Member States to monitor noise sources in their country, on a five-year rolling programme, through the production of strategic noise maps and action plans for major airports (more than 50,000 movements (ATM) per year) and agglomerations (more than 250,000 inhabitants). Directive 2002/30 established rules and procedures with regard to the introduction of noise-related operating restrictions specifically: (a) Lay down restrictions consistently at airport level to ensure that fewer people are affected by the harmful effects of noise. (b) To provide a framework which safeguards internal market requirements. (c) To promote development of airport capacity in harmony with the environment. (d) To facilitate the achievement of specific noise abatement objectives at the individual airports. (e) Enable measures to be chosen from those available with the aim of achieving maximum environmental benefit in the most cost effective manner.

<sup>91</sup> European Parliament, Policy Department *Economic and Scientific Policy: Towards a Comprehensive Noise Strategy* (November 2012).

<sup>92</sup> Wolf and Stanley *Wolf and Stanley on Environmental Law* (note 85).

<sup>93</sup> *Ibid.*

<sup>94</sup> *Ibid.*

sustainable.<sup>95</sup> The purpose of this communication was to provide a strategy to integrate environmental concerns into sectoral policies on air transportation to include improvement in technical environmental standards on noise and gaseous emissions as well as assisting airports in their environmental endeavors.

The END also makes provision for a day-evening-night noise indicator (Lden) for overall annoyance, a day-noise indicator (Lday) for annoyance during the day-time, and a night-time noise indicator (Lnight) for sleep disturbance. The END also calls for dose effect relations for noise exposures to be determined. This is whereby working groups were formed and studies conducted by member states of a very technical nature to evaluate noise situations in terms of affected populations. The study looked at the effect of noise on the quality of sleep, the number of awakenings caused by noise disturbance and the increase of medicinal use as noise exposure increased.<sup>96</sup>

The END also provides for the setting of noise limits. It is also useful to allow Member States to use supplementary indicators in order to monitor or control special noise situations.

Besides the END there are other directives such as EC Directive 92/14/EEC, which was replaced by Directive 2006/93/EC. These directives regulate the operation of chapter 3 certified civil subsonic jet airplanes by taking into account environmental, technical and economic factors.<sup>97</sup> Various Member States have established operating restrictions to assist in the reduction of the escalating noise problems in and around airport precincts. Noise abatement operational procedures are in force which includes the use of preferential runways as well as the use of specific routes.<sup>98</sup>

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<sup>95</sup> N Islam et al *Environmental Law in Developing Countries* (2001) 130-132.

<sup>96</sup> European Commission Working Group on Health and Socio-Economic Aspects *Position Paper on Dose-Effect Relationships for Night time Noise* (2004), available at <http://www.eukn.eu/fileadmin/Lib/files/EUKN2010/1710-dose-effect.pdf>, accessed 15 July 2015.

<sup>97</sup> EC Directive 2006/93 on the limitation of the operation of aeroplanes covered by Part II, Chapter 2, Volume 1 of Annex 16 to the Convention on International Civil Aviation, second edition (1988) – This directive banned Chapter 2 aircraft from landing in the EU from 1st April 2002.

<sup>98</sup> M Murphy et al, *Study on the Balanced Approach to Noise Management and its Influence on the Economic Impact of Air Transportation*, Institute of Air Transport and Airport Research, March 2011, available at [http://www.euroexpress.org/uploads/ELibrary/DLR\\_Study\\_Balanced\\_Approach\\_2011\\_final.pdf](http://www.euroexpress.org/uploads/ELibrary/DLR_Study_Balanced_Approach_2011_final.pdf), accessed 15 July 2015.

In March 2002 the EC adopted the Directive 2002/30/EC<sup>99</sup> that stipulated rules and procedures for noise related operating restrictions that could be adopted at individual airport levels in a consistent manner.<sup>100</sup> Although this Directive is legally binding for all 27 Member states within the EU, the legislation does provide for flexibility on how it can be incorporated into national law.<sup>101</sup>

This directive has various elements which includes that there must be an adoption of the balanced approach to noise management which includes the four basic elements as defined by ICAO, that there must be publication of noise objectives for the airport and lastly a discretionary interest to restrict marginally compliant Chapter 3 aircrafts from operating.<sup>102</sup> The UK incorporated the Directive into UK legislation by the Aerodromes (Noise Restrictions (Rules and Procedures) Regulations 2003.<sup>103</sup>

These three directives are the most relevant when it comes to aircraft noise and most EU member states have developed and aligned their noise laws with these directives and have started to compile their noise action plans accordingly.

The END and the Balanced Approach Regulation remain the key legislative instruments under which environmental noise is being monitored and actions taken by member states.

In terms of the END, noise maps are being produced using harmonised noise Lden (day-evening-night equivalent level) and Lnight (night equivalent level) indicators. These will be used to

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<sup>99</sup> Arpad Szakal, *Aircraft Noise – A Regulatory Overview*, available at <http://www.aviationlaw.eu/wp/wp-content/uploads/2013/09/Aircraft-Noise-A-Regulatory-Overview.pdf>, accessed 15 July 2015.

<sup>101</sup> Besides the Directive 2002/30/EC the European Commission introduced Directive 2002/49/EC regarding the assessment and management of environmental noise which obliges all community airports with greater than 50 000 movements to prepare strategic noise maps and action plans for the reduction of noise issues.

<sup>102</sup> Department of Environment, Food and Rural Affairs *Environmental Noise Directive: Noise Action Plan 2013-2018* (2014), available at [http://www.heathrow.com/file\\_source/HeathrowNoise/Static/Noise\\_Action\\_Plan.pdf](http://www.heathrow.com/file_source/HeathrowNoise/Static/Noise_Action_Plan.pdf), accessed 21 July 2015.

<sup>103</sup> Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations No. 1742 2003.

assess the numbers of people annoyed and sleep-disturbed due to noise throughout Europe.<sup>104</sup> The public is being consulted all times and informed about noise exposure, its effects, and any measures that will be taken to address the identified noise sources.<sup>105</sup> In England the Directive is implemented through a series of Regulations, led by the Department for Environment, Food and Rural Affairs.

Crucially, the END does not set any limit values, and leaves it to the discretion of the competent authorities as to whether or not to implement their action plans. For action plans relating to aviation noise sources, airport operators are the competent authorities.

Literally a decade after the approval of the END there are some huge successes which have managed to address the objectives that it sought out to address. Noise mapping has been able to identify the extent of the population affected by the noise and that live within the contours. By having this information relevant strategic noise action maps have been devised to address the problems. Of the 79 major airports in the EU, 28 of them have adopted action plans.<sup>106</sup>

In Germany the issue of public participation assisted vastly with the development of their noise action plans. This was done via a broad based campaign on noise on the internet, television, press, mail and ad-hoc flyers. This promoted citizens participation during the process.<sup>107</sup>

## **2.4 The United States of America**

The policy governing aviation noise in the United States of America differs from the approach adopted in the EU. The USA is based on a federal system of government and has implemented a number of different noise assessment standards throughout the country. The Federal Aviation

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<sup>104</sup> International Standards Organisation *Acoustics -- Determination of occupational noise exposure and estimation of noise-induced hearing impairment* (note 45).

<sup>105</sup> European Aviation Environmental Report available at <http://ec.europa.eu/transport/modes/air/aviation-strategy/documents/european-aviation-environmental-report-2016-72dpi.pdf>, accessed 2 February 2016.

<sup>106</sup> Ibid.

<sup>107</sup> H Brüning “Noise action plan-the strategic approach to advance sustainable transport. The example of ‘Quiet Norderstedt. Worth Living’” in W Gronau, K Reiter and R Pressl (eds) *Transport and Health Issues* (2011) 159-180.

Administration (the “FAA”) is the body that is responsible for managing aircraft operations throughout the USA.<sup>108</sup>

The FAA, which was established in 1966, is the national aviation authority and an agency of the United States department of Transportation overseeing all aspects of civil aviation in America.<sup>109</sup> With their headquarters in Washington DC, the FAA has many roles and one of them is to develop and carry out programs to control aircraft noise and other environmental effects of civil aviation.<sup>110</sup>

The FAA, noting that aircraft noise issues are highly complex and technical, has developed various programs to deal with the issues. This includes setting up the NoiseQuest website to understand the noise impacts, identify solutions to reduce those impacts as well as educating the public on the issues of noise and the strides made to reduce the impacts thereof.<sup>111</sup> The FAA works in controlling aviation noise with the cooperation of the aviation community.

Acting in accordance with the FAA’s noise control measures, airports in the United States try to reduce aircraft noise at the source. These measures include developing and using quieter aircrafts, soundproofing and purchasing of buildings near airports, operational flight control measures, and land use planning strategies. There are 290 airports in the US and five of them implement levy noise charges. Curfews, noise limits and quotas are other operating restrictions that are implemented. The proprietors of US airports use mechanisms such as the imposition of passenger facility charges which build on noise mitigation programmes.<sup>112</sup>

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<sup>108</sup> The Federal Aviation Act of 1958, as amended in 1968, gives the FAA the authority to regulate aircraft noise through an aircraft type certification process. The basic responsibilities of the FAA, under the U.S. Department of Transportation, are the regulation of civil aviation to promote safety, airspace and air traffic management; and the regulation of commercial space transportation.

<sup>109</sup> Federal Aviation Administration *A brief history of the FAA* (2015), available at <https://www.faa.gov/about/history/>, accessed 12 July 2015.

<sup>110</sup> Ibid.

<sup>111</sup> The Noise Quest website is available at <http://www.noisequest.psu.edu/noisebasics-noisemodels.html>, accessed 12 July 2015.

<sup>112</sup> Authorized by Airport and Airway Improvement Act, 49 U.S.C. §40117. For further details see also FAA (14 CFR Part 158 – Passenger Facility Charges (PFC’s).

The FAA issued a final ruling named 14CFR150, (Part 150), of the Federation Aviation Regulations (the “FAR”) entitled “Airport Noise Compatibility Planning”.<sup>113</sup> This final ruling incorporates new requirements as imposed by law and sets out the standards in terms of which airports must report on the noise being emitted from their operations as well as detailing methods that they have considered to reduce the impact on the surrounding land and affected areas. The FAA requires in terms of Part 150 that the Day-Night Average Sound Level (DNL) measurement be used to assess and describe aircraft noise impacts. This method combines the noise energy from all aircraft operations occurring from the events in one day into an average. There is a penalty implemented for nighttime events that occur between 10:00 pm and 7:00 am. It has been found that people are most negatively affected during these hours of the day.<sup>114</sup>

The Environmental Protection Agency (the “EPA”) was created in the 1970s and assists in the environmental issues ensuring that the American people have a healthier place to live in. Guidelines for community noise exposure were published by the EPA in 1974 as a follow up to the Noise Control Act of 1972.<sup>115</sup>

Regulations issued by the Department of Housing and Urban Development restrict housing development in certain areas. In terms of these regulations housing is not permitted in areas where noise levels exceed 80 dB(A) for 1 hour or more or 70 dB(A) for more than eight hours. It is normally unacceptable in terms of these regulations to build a house in an area where noise levels exceed 65 dBA for eight hours or more in a day, but this is discretionary.<sup>116</sup>

The FAA relies on the Schultz curve, which sets 65 dB(A) DNL as the contour level for significant annoyance. The EPA recommends the DNL metric of 55 dB as the “level requisite to

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<sup>113</sup> Federal Aviation Administration *Airport Noise Compatibility Planning: Final Rule 14 CFR Part 150* (2004), available at [http://www.faa.gov/airports/resources/publications/federal\\_register\\_notices/media/environmental\\_69fr57622.pdf](http://www.faa.gov/airports/resources/publications/federal_register_notices/media/environmental_69fr57622.pdf), accessed 15 July 2015.

<sup>114</sup> Harris Symphony EnvironmentalVue Portal *Noise Fundamentals*, available at [http://secure.symphonycdm.com/Help/Noise\\_Fundamentals.htm](http://secure.symphonycdm.com/Help/Noise_Fundamentals.htm), accessed 14 August 2015.

<sup>115</sup> Environmental Protection Agency *EPA History* (date unknown), available at <http://www.epa.gov/aboutepa/epa-history>, accessed 20 February 2016.

<sup>116</sup> U.S Department of Housing and Development *Environmental Criteria and Standards* (date unknown), available at <http://www.hudnoise.com/hudstandard.html>, accessed 15 July 2015.

protect health and welfare with an adequate margin of safety”. The EPA recommends the criterion level of 55 DNL to other federal agencies.<sup>117</sup>

All three frameworks have greatly contributed to the reduction of noise exposure and those affected to it. With the ACI forming of policies and committees promoting environmental issues and advocating restriction of operations at night as well as insulation of homes, classrooms and places of worship, the directives in place in the EU whereby data is being analysed from noise mapping to set appropriate noise limits and curb the amount of people exposed and finally the FAA placing restrictions on operations and managing development around airport precincts are just some of the issues discussed in preceding paragraphs. These efforts all align with the balanced approach as required of ICAO.

## **2.5 The ICAO guidance on the balanced approach to aircraft noise management**

The ICAO’s main function is to set international noise standards for aircrafts and their operations. The main purpose of having these guidelines and noise standards in place is to alleviate as much as possible the noise created by aircrafts. When implemented with other noise reduction strategies technologies, these standards can significantly reduce the number of people affected by aircraft noise. A new standard can only be implemented if it obtains a minimum of two-thirds vote from the members of ICAO’s Council. The standard is rejected if not being approved by a majority of ICAO’s members through the Assembly, one of which is the United States.<sup>118</sup>

After a new standard has received the endorsement of two-thirds of the members of the ICAO’s Council (and has not been objected to by a majority of the members through the Assembly), member states are then required to implement such new standards by means of their legal and political processes. International recognition of aircraft noise standards is one of the cornerstones of the international system of air travel. This enables airlines to plan and operate their business in

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<sup>117</sup> Federal Aviation Administration *A brief history of the FAA* (note 109).

<sup>118</sup> UNESCO “International Civil Aviation Organisation” in *Guide to the Archives of International Organisations* (note 8).

a much more efficient and robust manner as opposed to there being a patchwork of national noise standards or operating restrictions.<sup>119</sup>

The Balanced Approach has provided member states with an internationally agreed approach for addressing aircraft noise problems in a comprehensive and economically responsible way. The implementation of the various elements of the Balanced Approach is the responsibility of the individual member states. Each member state has to implement the four principles by developing appropriate solutions to the noise problem as experienced by each airport.<sup>120</sup>

The Balanced Approach encourages member states to identify the noise problem at an airport and then analyse the various measures available to reduce aircraft noise in a cost effective manner through four key principles, namely:

- (a) “reduction at source (quieter aircraft);
- (b) land-use planning and management policies;
- (c) noise abatement operational procedures; and
- (d) operating restrictions, but only after consideration of the benefits to be gained from other elements of the balanced approach”.<sup>121</sup>

Each of these principles will be discussed in turn.

### *2.5.1 Reduction of aircraft noise at source*

Much of ICAO's effort to address aircraft noise over the past 40 years has been aimed at reducing aircraft noise at source. Quite simply this means “reducing the noise emitted by the actual airplane”. The implementation of this principle depends on many factors, including the type of aircraft, the type of engine, the power of the engine, the type of flap and airspeed management procedures being used, weather conditions and flight paths.

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<sup>119</sup> Ibid.

<sup>120</sup> International Civil Aviation Organisation, *Guidance on the Balanced Approach to Aircraft Noise Management*, Doc 9829 AN/451, ed 2004.

<sup>121</sup> ICAO *Environmental Report* (2007).

The ICAO first developed a set of noise standards in 1971. These standards essentially provided that new aircrafts entering service were required make use of the best noise reduction technologies available at the time. The first standards became applicable in August 1973 and were contained in detail in ICAO Annex 16 titled *Environmental Protection, Volume 1 - Aircraft Noise*; which is applicable for aircrafts designed prior to 1977 regarded as Chapter 2 aircrafts.<sup>122</sup>

The second set of standards became applicable in October 1977. Since 1977, any new aircraft designs are required to meet stricter (Chapter 3) or later standards.<sup>123</sup> These standards apply to aircraft such as the Boeing 737-300/400, the Boeing 767 and the Airbus 319. From September 2001 ICAO implemented new and more stringent Chapter 4 requirements that will be applied to aircrafts certified for use after 1 January 2006. Currently all Chapters 2 aircrafts must be phased out by not later than 1 April 2002.<sup>124</sup> After this date aircrafts are required to meet Chapter 3 requirements. However social and economic conditions in developing countries allowed for concessions for certain types of aircrafts to continue operating. The ICAO did not adopt a phase out of Chapter 3 aircrafts instead the Balanced Approach is expected to deal with the issue of aircraft noise disturbance.<sup>125</sup>

## 2.5.2 Land-use planning and management

### (a) Introduction

It is important to make sure that all development and planned activities around airport precincts are compatible with aviation operations. The goal thereof is to minimise or reduce a significant portion of people that would be affected by aircraft noise. This is done by the introduction of land use and zoning procedures that are implemented around airports. The advantage of so doing will ensure that noise sensitive land uses are appropriately situated in and around the area.

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<sup>122</sup> UNESCO “International Civil Aviation Organisation” in *Guide to the Archives of International Organisations* (note 8).

<sup>123</sup> Ibid.

<sup>124</sup> Ibid.

<sup>125</sup> Ibid.

When considering the future development of an airport, it is imperative to consider noise sensitive areas such as residences, schools, hospitals and places of worship. In so doing one has to accept that each airport is different in their operational activities, as well as economic, social and political issues. The ICAO Airport Planning Manual provides guidance on land use and planning and management on areas close to the proximity of airports.

The Manual covers land-use, land-use planning and land-use management. The safety aspects are also taken into consideration when planning uses in the vicinity of airports. Land uses such as natural, agricultural and recreational, industrial and commercial are most compatible with noise as the activities are normally carried out during daylight working hours and night or sleep hours are not affected. Residential cluster, schools, hospitals and places of worship are discouraged for erection in close proximity to airports.

(b) Land-use planning

Benefits can be derived from proper land-use planning more especially with the development of new airports where the constraints could be limited. By having researched and gained data on the noise contours the planning and development around the precinct can be considered to ensure that community living and airport operations can be mutually compatible with minimal exposure to noise issues. This is the responsibility of local municipality hence airport authorities must work closely with them to ensure that the proper approvals and designs are implemented to take the issues of noise into account at planning stage.

(c) Land-use management

These are measures that can be implemented to achieve greater compatibility between airport precincts and its surrounds. They include planning instruments, mitigation instruments and financial instruments. Part of the planning instruments include comprehensive planning that rests with local government bodies to ensure that future development is considered in relation to noise exposure and goals of the area. The use of noise zoning allows areas to be earmarked specifically for certain land uses.

Mitigating instruments include the use of building codes to ensure that the building is adequately covered in terms of sound insulation. The use of proper noise insulation can suppress the exposure of some buildings such as office blocks and hotels to undesirable and unwanted effects of noise caused by aircrafts.

Financial relief in the form of tax incentives can be given to owners of land close to airports to encourage and assist with structural improvements that can lessen the noise exposure levels. Airports could levy a charge for non-conformance and adherence to noise regulations in order to recover costs to implement ways to reduce noise.

### *2.5.3 Noise abatement operational procedures*

Noise abatement operational procedures are implemented to provide noise relief to communities that lie in close proximity to airports.

This principle focuses on the procedures that can be adopted with respect to the approach and departure of aircrafts and the effect these events have on noise levels. In order to reduce the level of noise associated with these events, airports can insist that noise abatement departure procedures (“NADPs”) are implemented, taking into account the vicinity and ground path that is affected.

Noise abatement operational procedures are divided into three categories:

- noise abatement flight procedures, which detail the power output upon approach and the use of reverse thrust after landing,
- spatial management, which covers issues such as noise preferred arrival and departure routes and runways; and
- ground management, which includes towing and the taxi queue management with taxiing not having all engines in operation.<sup>126</sup>

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<sup>126</sup> ICAO *Review of Noise Abatement Procedure Research & Development and Implementation Results* (2007), available at <http://www.icao.int/environmental-protection/Documents/ReviewNADRD.pdf>, accessed 16 July 2015.

There are two types of Noise Abatement Departure Procedures namely NADP 1 which applies for areas more prone to noise sensitivity and closer to the airport and NADP 2 for areas more distant to the airport operations.

(a) Noise Abatement Departure Procedure 1 (NADP 1)

This procedure involves a power reduction at or above the prescribed minimum altitude and delaying the flap or slat retraction until the prescribed maximum altitude is reached.<sup>127</sup> This procedure is not initiated at less than 800 feet above ground level (“AGL”). At present KSIA implements NADP 1 as aircraft using KSIA require lifting quite quickly and reaching a higher altitude due to inhabited areas that lie in close proximity to the airport.

(b) Noise Abatement Departure Procedure 2 (NADP 2)

This procedure involves the initiation of the flaps/slats retraction on reaching the minimum prescribed altitude. The flaps/slats are retracted on schedule while maintaining a positive rate of climb. Once the 800 feet AGL is reached the aircraft body angle is decreased while maintaining a positive rate of climb. All other ACSA operated airports in South Africa make use of NADP 2 as inhabited areas are further away from the airport and the aircraft can reach altitude gradually.



<sup>127</sup> Ibid.

### **Figure 3.1 Noise Abatement Departure Procedures<sup>128</sup>**

Noise abatement procedures take into consideration the safety aspects as a priority when implementing any actions. The airports surrounding and physical layout must be considered when implementing any form of noise abatement procedures. These include restriction of certain types of aircrafts operating at certain times of the day or night by means of a curfew being applied as well as the use of preferred runways and routes for take-offs and landing.

#### *2.5.4 Aircraft operating restrictions*

This principle focuses on restricting or even prohibiting aircraft which are particularly noisy from operating at noise-sensitive airports, at least over certain time periods. Given the significant financial impact this principle could have on airlines and airports, especially in developing countries, the Balanced Approach states that operating restrictions should only be considered when other measures have proved to be inadequate.

This principle encompasses a wide range of restrictions. Air operating restrictions may apply, for example, to all airports, to specific airports, to specific aircraft and to specific periods of time during the day or night. Curfews may also apply to certain runways. A study conducted by Boeing found that 227 out of 610 airports globally had curfews in place.<sup>129</sup>

The ICAO started to address operating restrictions in the late 1980s with certain member states, mostly developed ones, wanting to ban the operation of certain noise aircrafts at noise sensitive airports. These have the potential to have fast and significant reduction in noise around airports however could impact other areas of the airport operations such as route changes and extra financial burden on airlines fleets.

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<sup>128</sup> Code 7700 *Noise Abatement Procedures* (2015), available at [http://code7700.com/noise\\_abatement.html#references](http://code7700.com/noise_abatement.html#references), accessed 18 August 2015.

<sup>129</sup> Boeing *Boeing Database on Airport Noise Regulations for Commercial Airplanes* (date unknown), available at <http://www.boeing.com/commercial/noise/index.html>, accessed 5 July 2015.

This is a particularly controversial issue in Africa as there are both social and economic conditions that do not allow a total phase out of Chapter 2 aircrafts from operation. Instead the Balanced Approach is being implemented to curb the exposure of noise disturbance. In South Africa aircrafts classified as Chapters 2's are only allowed to operate at particular time of the day and once the aircraft has reached its flight year's lifespan then they are removed from the fleet. It would be crippling to the South African economy and airlines as well as operators to implement a total restriction on Chapter 2 aircrafts.

## 2.6 Discussion on airports

Britain has a long history of dealing with environmental noise issues dating back to an extensive survey conducted in 1961. The British Parliament was presented with the findings of the Committee for the Problem of Noise (referred to as the Wilson Committee) in July 1963. Noise around airports was identified as a problem.

In September 1994 a Planning Policy Guidance Note was published, by the then Department of Environment, referred to as PPG 24 pertaining to planning and noise. This Planning Policy Guidance Notes lays out the government's policies on various aspects of planning. It required local authorities to take into account the content thereof when preparing their development plans.

PPG 24 states the recommended noise exposure categories of new dwellings near existing noise sources. These noise levels with regards to aircraft noise is reflected in Table 3.3 below.

<b>Noise Levels Corresponding To Noise Exposure Categories For New Dwellings (LAeq,T dB)</b>				
	<b>Noise Exposure Category</b>			
<b>Noise</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Air Traffic</b>				
7:00-23:00	<57	57-66	66-72	>72
23:00-7:00	<48	48-57	57-66	>66

**Table 3.3 Provisions in Policy Planning Guidance 24 for air traffic noise exposure categories for dwellings**

A comparison of International Noise standards, including those discussed above as well as additional information is summarized in the table below.

	Indoor				Outdoor			
	Day (L <sub>Aeq</sub> )	Night (L <sub>Aeg</sub> )	Day/Night (LDN)	L <sub>Amax</sub>	Day (L <sub>Aeg</sub> )	Night (L <sub>Aeg</sub> )	Day/Night (LDN)	L <sub>Amax</sub>
<b>World Health Organisation</b>								
Serious Annoyance (Day/Evening) 16 hr					55	45		
Moderate Annoyance (Day/Evening) 16 hr	35	30			50			
Sleep Disturbance (Night) 8 hr				45 (night)				60 (night)
<b>United States</b>								
US EPa			45				55	
Federal Aviation Administration							65	
Housing & Urban Development							55	
National Research							55	

	Indoor				Outdoor			
	Day (L <sub>Aeq</sub> )	Night (L <sub>Aeg</sub> )	Day/Night (LDN)	L <sub>Amax</sub>	Day (L <sub>Aeg</sub> )	Night (L <sub>Aeg</sub> )	Day/Night (LDN)	L <sub>Amax</sub>
Council (NRC)								
American National Standards Institute (ANSI)							55	
<b>United Kingdom</b>								
Policy Planning Guide 24:								
<i>Category A area with no restrictions</i>					<57	<48		
<i>Category B planning granted with restrictions</i>					57-66	48-57		
<i>Category C planning not normally granted</i>					66-72	57-66		
<i>Category D planning not granted (exception with commensurate protection)</i>					>76	>72		

	Indoor				Outdoor			
	Day (L <sub>Aeq</sub> )	Night (L <sub>Aeq</sub> )	Day/Night (LDN)	L <sub>Amax</sub>	Day (L <sub>Aeq</sub> )	Night (L <sub>Aeq</sub> )	Day/Night (LDN)	L <sub>Amax</sub>
Environmental Noise Regulations						50	55	
<b>Japan</b>								
Exclusively residential						≤55	≤45	
Exclusively residential on roads with 2 lanes or more						≤60	≤55	
Mainly residential						≤55	≤45	
Mainly residential on roads with 2 lanes or more						≤65	≤60	
<b>Pakistan</b>								
Residential						55	45	
<b>India</b>								
Residential						55	45	
<b>South Africa (SANS 10103) Urban Residential W.Cape Draft Noise Regs 2007 (Adopted</b>								

	Indoor				Outdoor			
	Day (L <sub>Aeq</sub> )	Night (L <sub>Aeg</sub> )	Day/Night (LDN)	L <sub>Amax</sub>	Day (L <sub>Aeq</sub> )	Night (L <sub>Aeg</sub> )	Day/Night (LDN)	L <sub>Amax</sub>
SANS 10103)								

**Table 3.4: Comparison of International Standards for Environmental Noise: Standards for Residential Land Use**

## 2.7 Conclusion

There is no doubt that the most developed countries have implemented support programs that manage and mitigate the noise impacts on the environment and surrounding communities. ICAO principles and recommended practices have been incorporated amongst the practices implemented globally to address noise issues emanating from aircraft noise. All these policies have a common thread and that is to ensure that compliance and frameworks are aligned to achieve maximum results.

## **CHAPTER THREE: THE SOUTH AFRICAN LEGAL AND POLICY FRAMEWORK**

### **3.1 Introduction**

As a member of ICAO, South Africa is required to implement the decisions and policies adopted by the Council, such as the Balanced Approach to airport noise. The purpose of this chapter, therefore, is to set out and discuss the legal and policy framework governing noise pollution in South Africa, and especially the legal and policy framework governing aircraft noise.

As this chapter will show, the legal and policy framework governing noise pollution in South Africa may be described as a fragmented one. This is because the authority to pass legislation regulating noise pollution is distributed among all three spheres of government. In addition, noise is also governed by the principles and rules of the common law.

Apart from being fragmented, the legal and policy framework governing noise pollution in South Africa may also be described as one that is in a process of transition. This is because the power and sometimes the obligation to pass legislation governing noise have not been exercised, especially by the national sphere of government.

### **3.2 The distribution of legislative authority**

#### *3.2.1 Introduction*

As pointed out above, the authority to pass legislation in respect of noise pollution is distributed among the three spheres of government. Section 44 of the Constitution provides that at a national level, legislative authority is vested in Parliament. At a provincial level, legislative authority is vested in the Provincial Legislatures in terms of section 104(1) of the Constitution. At a local level, legislative authority is vested in the Municipal Councils in terms of section 156(2) of the Constitution.

An important consequence of this division is that it imposes limits on the power of each legislature to pass legislation. This is because a statutory provision passed by a legislature that does not have the legislative authority to pass that provision will be invalid. This is sometimes referred to as a “federalism limit”.

### *3.2.2 The legislative authority of parliament*

At a national level the power to pass legislation is vested in Parliament. The legislative authority of Parliament is set out in section 44 of the Constitution. This section confers very wide legislative powers on Parliament. It provides in this respect that Parliament has the authority to pass legislation with regard to “any matter”, including those matters over which it shares concurrent legislative authority with the provinces (these are set out in Schedule 4), but excluding those matters over which the provinces have exclusive authority (these are set out in Schedule 5).<sup>130</sup>

### *3.2.3 The legislative authority of the provincial legislatures*

At a provincial level the power to pass legislation is vested in the provincial legislatures. The legislative authority of the provincial legislatures is set out in section 104 of the Constitution. Unlike section 44 which confers the authority on Parliament to pass legislation on “any matter”, this section does not confer such wide powers on the provincial legislatures. Instead, it provides that the provincial legislatures have the authority to pass legislation only on those matters set out in Schedule 4 and Schedule 5,<sup>131</sup> those matters that fall outside Schedules 4 and 5, but which have been assigned to the provinces by Parliament,<sup>132</sup> and those matters which have been assigned to the provinces by the Constitution.<sup>133</sup>

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<sup>130</sup> Section 44(1)(a)(ii). Section 44 provides that Parliament also has the authority to amend the Constitution (s 44(1)(a)(i)) and to assign any of its legislative powers, except the power to amend the Constitution, to any other legislative body (s 44(1)(a)(iii)).

<sup>131</sup> Section 104(1)(b)(i) and (ii).

<sup>132</sup> Section 104(1)(b)(iii).

<sup>133</sup> Section 104(1)(b)(iv). Section 104 provides that the provincial legislatures also have the authority to adopt a provincial constitution (s 104(1)(a)) and assign any of their legislative powers to a municipal council in the province concerned (s 104(1)(c)).

### *3.2.4 The legislative authority of the municipal councils*

At a local level the power to pass legislation is vested in the municipal councils. The legislative authority of the municipal councils is set out in section 156(2) of the Constitution. This section confers very narrow legislative powers on the municipal councils. It provides in this respect that they may adopt and administer by-laws for the effective administration of local government matters set out in Part b of Schedule 4 and Part B of Schedule 5.

### *3.2.5 Concurrent and exclusive matters*

As the discussion set out above indicates, the Constitution distinguishes between concurrent and exclusive matters.

Concurrent matters are those that are shared by more than one sphere of government. This means that more than one legislature may pass a statute on the subject matter in question. The concurrent matters are set out primarily in Schedule 4. Schedule 4 is divided into two parts, namely Part A and Part B. The subject matters set out in Part A are shared by Parliament and the provincial legislatures, while the subject matters set out in Part B are shared by Parliament, the provincial legislatures and the municipal councils.

Exclusive matters are those that are not shared by the different spheres of government. Instead, these matters are vested exclusively in one particular sphere of government. This means that only one legislature may pass a statute on the subject matter in question. The exclusive subject matters are set out primarily in Schedule 5. Like Schedule 4, Schedule 5 is divided into two parts, namely Part A and Part B. The subject matters set out in Part A are vested exclusively in the provincial legislatures, while the subject matters set out in Part B are vested exclusively in the provincial legislatures and municipal councils.

An important consequence of this division is that, in principle, Parliament is not authorised to pass legislation that falls within the scope and ambit of a matter listed in Schedule 5. There is, however, an exception to this principle. This exception is set out in section 44(2) of the

Constitution which provides that Parliament may intervene and pass a law dealing with a Schedule 5 matter if it is “necessary” to:

- (a) maintain national security;
- (b) maintain economic unity;
- (c) maintain essential national standards;
- (d) establish minimum standards required for the rendering of services; or
- (e) prevent unreasonable action taken by a province which is prejudicial to the interests of another province or to the country as a whole.

While the criteria set out in paragraphs (a) to (e) above appear to be very broad, it is important to note that Parliament may intervene only if it is “necessary” to achieve one of them and the Constitutional Court has interpreted this requirement very narrowly. In *Ex parte President of the RSA: In re Constitutionality of the Liquor Bill* (the *Liquor Bill* case),<sup>134</sup> for example, the Court explained that the mere fact that something is important does not mean it is necessary and in *Certification of the Amended Text of the Constitution of the Republic of South Africa, 1996* (the *Second Certification Judgment*),<sup>135</sup> the Court referred to the compelling importance of the matters referred to in section 44(2). These statements indicate that Parliament’s power to intervene in Schedule 5 is a very limited one.

### *3.2.6 The functional area of noise pollution*

Noise pollution is listed as one of the functional areas of exclusive provincial competence in Part B of Schedule 5 of the Constitution. Unless it can satisfy the requirements of section 44(2) of the Constitution, this means that Parliament may not pass a statute that falls into this functional area. Instead, the authority to pass statutes that fall into the functional area of “noise pollution” vests exclusively in the provincial legislatures and municipal councils.

It is important to note, however, that in its judgment in the *Liquor Bill* case, the Constitutional Court interpreted the matters set out in Schedule 5 very narrowly. In this case the Court held,

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<sup>134</sup> 2000 (1) SA 732 (CC).

<sup>135</sup> 1997 (2) SA 97 (CC) at para 106.

*inter alia*, that the matters set out in Schedule 5 encompass only those activities that take place within the boundaries of a province. As soon as an activity takes place across provincial boundaries it is no longer a Schedule 5 matter.

Insofar as noise pollution is concerned this means that while Parliament cannot pass a law regulating noise pollution that takes places within the boundaries of a province, it can still regulate noise pollution that takes place across provincial boundaries. Noise that takes place within the boundaries of a province include, for example, building, industrial and domestic noise, while notice that takes place across the boundaries of a province include, for example, transport (aircraft and train) noise.<sup>136</sup>

Having set out the manner in which the power to make laws is divided amongst the three spheres of government, we may now set out and discuss the statutory and common law provisions that regulate noise pollution in South Africa.

For the purposes of this dissertation the statutory framework governing noise pollution in South Africa may be divided into two categories, first, those laws that regulate noise pollution in general; and, second, those laws that regulate specific forms of noise pollution for example aircraft noise, traffic noise and workplace noise.

### **3.3 The statutory framework regulating noise pollution in general**

#### *3.3.1 The Constitution of the Republic of South Africa*

The aims and goals of the statutory framework governing noise pollution in South Africa today can be traced back to section 24 of the Constitution.<sup>137</sup> This section provides that “[e]veryone has the right to an environment that is not harmful to their health or well-being”.

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<sup>136</sup> I Currie and J de Waal *The New Constitutional & Administrative Law* (2001) 167-169.

<sup>137</sup> Constitution of the Republic of South Africa, 1996.

In addition, it also provides that “[e]veryone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: (a) prevent pollution and ecological degradation; (b) promote conservation; and (c) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.

Although the Constitution itself does not define the term “pollution”, this term is defined in the National Environmental Management Act (the “NEMA”),<sup>138</sup> which was passed to give effect to section 24. Pollution is defined in section 1 of NEMA as any change in the environment caused by, *inter alia*, noise, “where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people or will have such effect in the future”.<sup>139</sup>

Given this definition, it may be argued that section 24(2)(b) of the Constitution imposes an obligation on the state to take reasonable legislative and other measures to prevent noise pollution.

Section 24 must be read together with section 7(2) which provides that “the state must respect, protect, promote and fulfil the rights in the Bill of Rights”. Taken together it is quite clear that the obligation created by section 24(2)(b) to take reasonable legislative and other measures to prevent noise pollution is imposed not only on the national sphere of government, but on the provincial and local spheres of government as well.

Finally, it is important to note that while section 24(2)(b) imposes an obligation on all three spheres of government to take legislative and other measures to prevent noise pollution, this obligation is limited by the fact that these legislative and other measures simply have to be reasonable.

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<sup>138</sup> 107 of 1998.

<sup>139</sup> Pollution is defined in section 1 as “any change in the environment caused by: (a) substances; (b) radioactive or other words; (c) noise, odours, dust or hear, emitted from any activity, including the storage or treatment of waster or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people or will have such effect in the future”.

### 3.3.2 *The National Environmental Management Act (NEMA)*

As we have already seen, NEMA was passed in order to give effect to section 24 of the Constitution. According to its long title, the purpose of NEMA is “to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith”.<sup>140</sup>

In order to achieve this purpose, section 2 of NEMA contains a list of national environmental management principles, some of which are relevant to noise pollution. Although there are # principles, for the purposes of this dissertation only those principles that are directly relevant to the problem of aircraft noise and the Balanced Approach method will be discussed in detail.<sup>141</sup>

The balanced approach to managing aircraft noise requires that land use and planning is undertaken. If any development is to be taken in and around an airport precinct, the relevant environmental impacts and design configurations must be completed to ensure that exposure is abated. This is done by submission of plans to the local authorities and municipalities for approval. Glazed windows and building materials are some of the ways to curb noise exposure.

NEMA provides for this by stating that all developments must be socially and environmentally sustainable<sup>142</sup> and consideration must be given to any negative impacts that a development may have on people’s rights and preventing or minimising the effects thereof.<sup>143</sup> NEMA also provides that the public are entitled to a safe and healthy environment<sup>144</sup> and are empowered and

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<sup>140</sup> 107 of 1998.

<sup>141</sup> Ibid.

<sup>142</sup> Section 2 of NEMA.

<sup>143</sup> Section (4)(a)(viii). This section provides that “[s]ustainable development requires that consideration be given to the following ‘that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied’.”

<sup>144</sup> Section 4(e) of NEMA.

educated<sup>145</sup> on matters that affect them, such as noise exposure, in a way that is open and transparent<sup>146</sup> as well as information that is easily accessible by the public.

These principles clearly protect the public against noise exposure and call for transparency and public participation especially for those affected by noise exposure. The level of protection that is required depends on the level and degree of exposure to noise which can result in the sorts of health issues that have already been discussed. It is important that the relevant monitoring and penalty mechanisms are in place to address and adhere to the requirements of NEMA.

In this regard it is important to note that these principles are addressed under the Balanced Approach whereby airports must obtain all necessary approvals, they must conform to certain noise limits as well as protecting and ensuring that future construction and development around airport precincts take the necessary levels of exposures into account when zoning and designing around the area.

Apart from the principles discussed above, NEMA also creates a number of institutions, procedures, conflict management mechanisms and compliance and enforcement mechanisms. Insofar as pollution is concerned, perhaps the most significant compliance and enforcement mechanism may be found in section 28. This section imposes an obligation on every person who causes or who may cause pollution to take reasonable measures to prevent such pollution from occurring, continuing or recurring. This is done by conducting investigations, assessments and evaluations of the impacts on the environment. There is also a requirement that those affected are fully appraised and educated about the effects and what can be done to avoid such impacts from manifesting by placing controls and processes to cease such negative impacts from increasing.<sup>147</sup>

### *3.3.3 National Environmental Management: Air Quality Act*

The National Environmental Management Air Quality Act (the “NEM: AQA”)<sup>148</sup> is one of the

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<sup>145</sup> Sec 4(h) of NEMA.

<sup>146</sup> Sec 4(k) of NEMA.

<sup>147</sup> Section 28(3).

<sup>148</sup> 39 of 2004.

specific environmental management acts envisaged by NEMA and provides for the promulgation of new noise regulations.

In terms of section 34 of the NEM: AQA, the Minister of Environmental Affairs may make regulations and standards for the control of noise, determine a definition of noise and determining maximum levels of noise. Such standards bind the provincial and local spheres of government when making noise control measures. These standards and regulations will eventually replace the provisions for noise control in terms of the Environmental Conservation Act.<sup>149</sup>

Regulation 18 discusses noise pollution management and 18(1) prohibits a person from making, causing, or producing a disturbing noise by any animal, machine, device or apparatus or combination thereof.<sup>150</sup> It goes further to discuss land use in regulation 18(3) and requires that a noise impact assessment be undertaken in accordance with SANS 10328 when a township is established. According to regulation 18(3)(b) no building can be constructed in a neighbourhood that is not suitable for such dwelling unless it has been adequately insulated against external noise as set out in SANS 10103.

### *3.3.4 The Environment Conservation Act*

The purpose of the Environment Conservation Act (“the ECA”)<sup>151</sup> is, inter alia, to protect the environment against disturbance, deterioration, defacement, poisoning, pollution or destruction as a result of man-made structures, installations, processes or products or human activities.<sup>152</sup>

While most of this Act has been repealed by the NEMA, the provisions dealing with the regulation of noise pollution have not. The most significant provision in this respect is section 25. This section provides that the Minister of Environmental Affairs is empowered to make regulations aimed at controlling noise, vibration and shock.

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<sup>149</sup> 73 of 1989.

<sup>150</sup> Department of Environmental Affairs and Tourism Notice 964 of 2009, *Government Gazette* No. 32394.

<sup>151</sup> 73 of 1989.

<sup>152</sup> Environmental Conservation Act 73 of 1989.

Apart from delegating the power to the Minister to make regulations aimed at controlling noise, section 25 of the ECA further defines what is meant by noise; how to prevent, reduce or eliminate noise; vibration and shock by stipulating levels of noise, vibration and shock that may not be exceeded.

Although section 25 delegates the power to make noise regulations to the Minister, the concurrent administration of section 25 has been assigned to a “competent authority” in each provincial government.<sup>153</sup> This means that the power to make regulations is shared between the Minister and the competent authority in each provincial government.

### *3.3.5 The national and provincial Noise Control Regulations*

Acting in terms of section 25 of the ECA, the Minister promulgated a first set of national Noise Control Regulations in 1990,<sup>154</sup> a second set in 1991<sup>155</sup> and a third set in 1992.<sup>156</sup> Following amendments to the ECA in 1992, a new set of draft national Noise Control Regulations was also published in 1994.<sup>157</sup> These draft regulations, however, have never been formally promulgated.

Apart from these national Noise Control Regulations, provincial Noise Control Regulations have been promulgated in the Free State;<sup>158</sup> Gauteng;<sup>159</sup> and Western Cape.<sup>160</sup> The Western Cape Noise Control Regulations will be discussed in this dissertation as they are the most comprehensive and recent.

These provincial Noise Control Regulations are modeled on the draft national Noise Control Regulations and are similar to one another. The most significant feature of all of these

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<sup>153</sup> See GN R43 in *Government Gazette* No. 17354, dated 8 August 1996.

<sup>154</sup> GNR 2544, *Government Gazette* 12816, 2 November 1990.

<sup>155</sup> GNR 314, *Government Gazette* 13029, 22 February 1991.

<sup>156</sup> GNR 154, *Government Gazette* 13717, 10 January 1992.

<sup>157</sup> GN R. 55 of 14 January 1994.

<sup>158</sup> See PN 242 in *Free State Provincial Gazette* No. 35, dated 7 November 1997

<sup>159</sup> See PN 5479 in *Gauteng Provincial Gazette* No. 75(4), dated 20 August 1990.

<sup>160</sup> See PN 627 in *Western Cape Provincial Gazette* No. 5309, dated 20 November 1998. The 1998 Noise Control Regulations have been replaced by a new set of Noise Control Regulations promulgated in 2013 (see *Provincial Gazette* Number 7141, 10 January 2013).

regulations is that they draw a distinction between a “disturbing noise” and a “noise nuisance”. The regulations however prohibit ‘a disturbing noise’ in certain circumstances.

A “disturbing noise” is defined in the Western Cape Noise Control Regulations as “a noise, excluding the unamplified human voice, which:

- (a) “exceeds the rating level 2 by 7dBA;
- (b) exceeds the residual 3 noise level where the residual noise level is higher than the rating level;
- (c) exceeds the residual noise level by 3 dBA where the residual noise level is lower than the rating level; or
- (d) in the case of a low-frequency noise, exceeds the level specified in Annex B of SANS 10103”.

A “noise nuisance” is defined as “any sound which impairs or may impair the convenience or peace of a reasonable person”.

The difference between a “disturbing noise” and a “noise nuisance” was highlighted in *Nelson Mandela Metropolitan Municipality and Others v Greyvenouw CC*.<sup>161</sup> Very briefly the facts of the case were that a restaurant-bar named the Crazy Zebra in Port Elizabeth operated its facilities in such a manner that it disturbed the neighbours by playing loud music during the night and certain weekdays. The residents complained to the Municipality who then applied for an interdict requiring an abatement of the noise nuisance. After noise surveys were carried out it was found that the noise levels exceeded the ambient sound level by 7dB or more which was found to constitute a noise nuisance for the adjacent residential properties.

The court found in favour of the applicant that the noise made by the respondent did indeed amount to a noise nuisance. It found that the businesses had been conducted in contravention of the Noise Control Regulations and hence caused a noise nuisance on Friday and Saturday nights by allowing music to be played loudly. Playing music at unacceptably loud volumes constituted

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<sup>161</sup> Michael Kidd ‘Muzzling the Crazy Zebra: Noise Regulation in *Nelson Mandela Metropolitan Municipality v Greyvenouw CC* 2004 (2) SA 81 (E)’ 2005 *SAJELP* at 175.

“sound that disturbs or impairs ...the convenience or peace”.<sup>162</sup> This is an offence in terms of the regulations and hence unlawful. The decision reached in this case was that the noise emanating from the Crazy Zebra constituted a noise nuisance. However, the evidence accepted in the judgment also suggested that the noise was a “disturbing noise” in terms of the regulations.<sup>163</sup>

According to Kidd the regulations define “disturbing noise” as a noise level which exceeds the zone sound level which is a level that is derived by means of using a series of measurements, calculations and also designated by the local authorities for an area<sup>164</sup> and in the absence of a zone level then it is a noise level which exceeds the ambient sound level<sup>165</sup> at the same measuring point by 7dBA or more. The regulations further state that “no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof”.<sup>166</sup>

Hence a “disturbing noise” is ascertainable on the basis of a meter reading, whereas a “noise nuisance” is not determined by means of an objective method as is the case of the former, but is rather a subjective method of determining noise pollution in light of the relevant circumstance.<sup>167</sup> Kidd states that the reason the regulations have these two different standards is that while a noise may well be a noise nuisance it may not be a disturbing noise. The example he uses is that of playing loud music in the middle of the night in a residential area. While this noise will not be a disturbing noise if it is less than 7dBA more than the ambient sound level, it could still disturb or impair the convenience or peace of any person. In such a case it would be a noise nuisance, but not a disturbing noise.

In essence a disturbing noise would probably also be a noise nuisance but the opposite according to Kidd would not hold true in many instances. According to the regulations a noise nuisance

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<sup>162</sup> *Nelson Mandela Metropolitan Municipality v Greyvenouw CC* 2004 (2) SA 81 (SE) at para 89.

<sup>163</sup> Kidd 2005 SAJELP (note 161) at 174.

<sup>164</sup> Regulation 1.

<sup>165</sup> The ambient sound level is the reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes, after such meter has been put into operation (regulation 1).

<sup>166</sup> Regulation 4.

<sup>167</sup> Kidd 2005 SAJELP (note 161) at 175.

does not have to be a disturbing noise and if there is a dispute as to the measurement of the noise it is always possible to conclude that the noise constitutes a noise nuisance.<sup>168</sup>

Kidd goes further to address the issue as to whether the conduct complained of also constitutes a nuisance at common law. It is stated that in order for a nuisance to exist under the common law there must be an unreasonable interference with the physical comfort of human existence.<sup>169</sup> The question arises as to whether common law nuisance constituted by noise is any different from the concept of noise nuisance in the noise regulations. Kidd argues in this respect that the definition of a noise nuisance in the regulations is defective as it ought to contain the qualification “unreasonably” so in essence it should be: “a sound which *unreasonably* disturbs or impairs the convenience and peace of a person”.<sup>170</sup> The example of a neighbour mowing his garden on a weekend afternoon is disturbing but not unreasonable however had he conducted this late at night then it would be regarded as unreasonable.

Insofar as aircraft noise is concerned, the Western Cape Noise Control Regulations<sup>171</sup> contain a number of relevant provisions. Among these are the following.

First, regulations 2, 3 and 4 provide that a disturbing noise must not be “caused by any person, animal, machine, device, apparatus, vehicle, vessel or model aircraft, or any combination thereof”.

Second, Schedule 4(1) provides that all applications to the relevant local authorities for building license, planning approval or environmental authorisations must be supported by a noise impact assessment in accordance with SANS 10328. This is to establish whether the noise impacts from the proposed use is appropriate for the district as indicated in SANS 10103

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<sup>168</sup> Ibid at 176

<sup>169</sup> Ibid.

<sup>170</sup> Ibid.

<sup>171</sup> The Western Cape Regulations are the most recent set of regulations. The Department revised the existing Noise Control Regulations (P.N. 627/1998) for the Province and the revised Regulations (P.N. 200/2013) were approved by Minister Anton Bredell and published on 20 June 2013.

Third, Schedule 4(3) further discusses the requirement of a noise management plan where the results of such noise assessment revealed that the noise rating level will exceed or is likely to exceed the existing residual noise levels by 5dBA or more. In these circumstances a noise management plan must be prepared that will specify appropriate mitigation steps that will be taken that will satisfy the local authorities in deciding the application.

Last, Schedule 4(4) provides that a local authority may request that the applicant cease or reduce the noise level of any activity that does not comply with the plan to satisfactory levels of the local authority concerned.

### 3.4 The statutory framework regulating specific forms of noise pollution

#### 3.4.1 Introduction

Apart from the statutes and regulations discussed above, there are also a number of statutes that regulate specific forms of noise pollution. Aircraft noise, for example, is regulated by the Civil Aviation Act,<sup>172</sup> traffic noise by the National Road Traffic Act<sup>173</sup> and workplace noise by the Occupational Health and Safety Act.<sup>174</sup> For the purposes of this dissertation, however, this section will focus only on those statutes and regulations that regulate aircraft noise.

#### Brief History of Noise

1903	1911	1968	1969	1970
Wright Brothers First Flight	First editorial noise complaint at Princeton Airport New Jersey USA	Aircraft noise in the vicinity of airports Buenos Aires, Argentina, 16 <sup>th</sup> Session of the ICAO Assembly	Response to A16-3 Special meeting on aircraft noise in the vicinity of airports Montreal Canada	Establishment of Council Committee of Aircraft Noise (CAN)

<sup>172</sup> 74 of 1962.

<sup>173</sup> 93 of 1996.

<sup>174</sup> 85 of 1993.

1971	1972	1977	1980	1983
ICAO Council adopts the first Aircraft noise – Designated at Annexure 16 to the Convention	UN Conference on the Human Environment	Establishment of Committee on Aircraft Engine Emissions (CAEE)	Annex 16 retitled “Environmental Protection”	Committee on Aviation Environmental Protection (CAEP)

### 3.4.2 The Civil Aviation Act

This Act empowers the Minister of Transport to make regulations for the prevention of nuisances from air navigation, aerodromes and other aircraft establishments, including the prevention of nuisance due to noise and vibration. The Civil Aviation Act<sup>175</sup> also incorporates the Convention on International Civil Aviation into South African Law.<sup>176</sup> The Act gives effect to certain International Conventions to control and regulate aviation within South Africa.

The Act was enacted on 27 May 2009 and is divided into sixteen (16) chapters. Chapter 3 deals with the acquisition of land around the airport precincts and the relevant consultations with interested parties. Chapter 6 establishes the Civil Aviation Authority and Chapter 14 sets out the Regulations. Chapter 15 sets out how technical standards are set for aircrafts.

As we have already seen the International Civil Aviation Organisation (the “ICAO”) has identified and made policy on four aspects of aviation-related noise, namely:

- compliance by individual aircraft with noise certification standards;
- the operation of airports through the management of airport operations and appropriate land-use planning around the airport;
- noise abatement operational procedures by aircraft;
- the banning of certain noisy aircraft by individual airports.

The second edition of the International Standard Annex 16 (Environmental protection) Volume I (Aircraft noise) has been incorporated into the South African Civil Aviation Technical

<sup>175</sup> 13 of 2009.

<sup>176</sup> Jan Glazewski, *Environmental Law in South Africa*, 2000, Butterworths, Section 2(1).

Standards. The Director is the one that issues technical standards for civil aviation as prescribed by regulation.

The relevant Civil Aviation Regulations (the “CARs”) pertaining to noise standards are contained in Part 36: Noise Certification which details with highly technical aspects in certifying noise standards for different types of aircrafts.<sup>177</sup>

Annex 16<sup>178</sup> contains the international Standards and Recommended Practices (SARPS) with regard to aircraft noise, and classifies aircraft into different groups with regard to aircraft noise. In terms of ICAO resolution A35-5, the International Civil Aviation Organisation has adopted a Balanced Approach<sup>179</sup> to aircraft noise management based on land-use planning and control, reduction of noise at source, wider use of noise abatement operational procedures and operating restrictions, which in turn have been used to formulate the Department of Transport’s (the “DoT”) policy on aircraft noise.

The DoT policy refers particularly to the need for the assessment of noise problems at airports to be based on objective, measurable criteria and other relevant factors. The policy also dictates that operating restrictions should not be applied as a first resort, but only after consideration of other elements of the Balanced Approach. The policy requires the evaluation of the likely costs and benefits of the various measures available and based on that evaluation, measures must be selected to achieve maximum environmental benefit in the most cost effective manner. The policy also provides for the dissemination of the results of the evaluation for consultation with stakeholders and for dispute resolution.

### *3.4.3 The policy framework regulating aircraft noise*

#### (a) The White Paper on National Civil Aviation Policy

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<sup>177</sup> South African Civil Aviation Technical Standards SA CATS 36.

<sup>178</sup> International Civil Aviation Organisation *Environmental Protection* Volume 1, Aircraft Noise, Fourth Edition July 2005.

<sup>179</sup> **Op cit 17. [Avisha: This reference does not make any sense. What exactly are you referring to here?]**

The civil aviation service is a major catalyst for global economic activity and requires that South Africa deliver on a safe, efficient and secure air transportation system that will stimulate economic and social benefits for the country.

The need for South Africa to ensure that their policies are aligned to international standards and the continually changing global aero-political space was of paramount importance. This has led to the recent release of the *White Paper on National Civil Aviation Policy* (2015) which contains the policy on aircraft operations and the environment.<sup>180</sup>

The *White Paper on National Civil Aviation Policy* was published for public comment by the Department of Transport in September 2015.<sup>181</sup> The paper recognizes the importance of civil aviation in stimulating international trade; investment and tourism; including contribution to domestic transport; sports and recreation.

The objectives of the Civil Aviation Policy include the enhancement of safety and security in civil aviation as well as environmental compliance, facilitating the expansion of trade and tourism and promoting relations with other countries and organizations”.<sup>182</sup>

The *White Paper* has addressed the policy statement on phasing out of noisy aircrafts and preventing foreign airlines to increase such in line with international standards.<sup>183</sup> The *White Paper* is divided into six parts labeled A-F.

Part A sets the visions and objectives of the *White Paper* and also lays out the background to the civil aviation system.

Part B discusses international obligations and the different roles of the various institutions. Civil aviation security at airports as well as compliance with the Chicago Convention is discussed as well as issues surrounding aircraft accidents, investigations, flight inspections and so forth.<sup>184</sup>

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<sup>180</sup> Department of Transport *White Paper on National Civil Aviation Policy* (2015).

<sup>181</sup> Ibid.

<sup>182</sup> Ibid.

<sup>183</sup> Ibid.

Part C sets out the civil aviation infrastructure which covers the National Development Plan, airport development plans, environmental and financial sustainability issues which includes land use around airports. This Part links back to the Balanced Approach as detailed by the ICAO which requires that emphasis to be placed with regards to land uses and development around airport precincts.

Part D is important as it focuses on the civil airport operations. The *White Paper* sets out the establishment of environmental committees and the impacts and addressing of aircraft noise.

Part E focuses more on the future of aviation systems by making use of technology, innovation and transformation to enable future development and competitiveness of the industry.

Lastly, Part F is the implementation frameworks and the way forward by way of evaluation, review, communication and monitoring.

The *White Paper* makes reference to various policy statements that are important in respect of noise management. Airports are required to conduct regular monitoring so that aircraft noise can be calculated and predicted.<sup>185</sup> In this regards airports are required to procure, install, operate and maintain permanent noise monitoring equipment.<sup>186</sup>

An Airport Environmental Committee must be established which will form as part of an airport consultation forum to provide a communication link between various interested and affected parties whereby environmental impacts of aircraft operations are discussed. Chapter 2 aircrafts must be restricted from being added to the existing fleet.<sup>187</sup>

The *White Paper* addresses the requirement of the integration of an airport into its environment, the need for maintaining a balance between the airport's interests and those of the stakeholders in

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<sup>184</sup> Signatories to the Chicago Convention are obliged to adhere to aviation safety and security standards and to endeavor to follow recommendations.

<sup>185</sup> Policy Statement 77.

<sup>186</sup> Policy Statement 88.

<sup>187</sup> Policy Statement 80.

the vicinity of the airport is emphasised. This is further discussed briefly under the National Development Plan hereunder where the government is strategically planning expansions and impacts on environment and communities when it comes to expansion plans.

This balance is based on the following principles:

- an airport should fit into, and be in harmony, with its environment and also be integrated into its surroundings; and
- the authorities responsible for land-use developments close to the airport should help to integrate the airport into its environment, as well as support the airport's development and effective operation.

As discussed above, the *White Paper* specifically addresses environmental matters at source, relating to aircraft noise and engine emissions in accordance with the ICAO's environmental protection goals and the ICAO's Balanced Approach to aircraft noise management. The ICAO has played a leading role in dealing with the problem of aircraft noise and many governments worldwide have already initiated programmes based on these principles.

#### (b) The National Airport Development Plan

The Department of Transport is in the process of developing the National Airport Development Plan (the "NADP").<sup>188</sup> This plan seeks to provide support and guidance to the entire airport sector. It requires stakeholders, operators and planners to integrate and develop individual airports within their broader spatial transport context. This is done in consultation with the various parties.

As part of the five year plan (2015-2020) the NADP proposes various initiatives such as formalisation of selection processes for international, regional-international and national airports. These include pre-approval processes for green field airports. Other initiatives include the following:

- "Tools in place to assist in the reservation of land for key long-term airport requirements.

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<sup>188</sup> Department of Transport *National Airports Development Plan* (2015).

- To introduce preferred options such as introduction of non-scheduled flights, flying training as well as adventure aviation and non-commercial aviation within the national airport network.
- To create a knowledge management portal that will inform airport network planning.
- To ensure that the relevant skills are obtained from an airport planning perspective at both national and provincial government. This will provide support at the various levels of planning.
- The production of a guide that will support airport development and planning within their surroundings.
- Ways and means of getting the private sector involved in airport planning and design.
- The securing of funding to support airside safety and security compliance for airports in a viable approach.
- The creation of platforms for engagement with airport designers and planners.”<sup>189</sup>

The plan seeks to ensure that development and expansion in and around the airport precinct is supported by the appropriate buildings that would reduce the exposure to noise. This also includes the right discussions taking place between the public and stakeholders. When designing close to an airport precinct, plans must be approved and the correct building material must be procured for the development of buildings and homes.

### (c) The SANS Code of Practice and Guidelines

From the 1960s the SABS Code of Practice 0103 for the Measurement and Assessment of Environmental Noise with Respect to Annoyance and Speech Communication provided guidance in defining noise impact criteria limits and standards and was also used by local authorities in the control of environmental noise.

The standard has now been updated by the South African National Standard SANS 10103.<sup>190</sup> SANS 10103 is in line with international standards and practices and with the Department of

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<sup>189</sup> Department of Transport *White Paper on National Civil Aviation Policy* (2015).

Transport’s *White Paper on National Civil Aviation Policy*. Municipal bylaws and provincial legislation in South Africa have in most cases not been amended to allow SANS 10103 to be enforced or enforceable, with the result that SANS 10103 can only be seen as a guideline for assessing noise impact and for land use zoning.

The SANS 10103 Code of Practice provides typical ambient noise rating levels ( $L_{Req,T}$ ) in various districts. The outdoor ambient noise levels recommended for the districts are shown in Table 2-1 below.

It is probable that the noise is annoying or otherwise intrusive to the community or to a group of persons if the rating level of the ambient noise under investigation exceeds the applicable rating level of the residual noise (determined in the absence of the specific noise under investigation), or the typical rating level for the ambient noise for the applicable environment given in Table 2-1 (Table 2 of SANS 10103).

The expected response from the local community to the noise impact, i.e. the excessiveness of the noise over the acceptable rating level for the appropriate district, is primarily based on Table 5 of SANS Code of Practice 10103 (SANS 10103, 2008), but expressed in terms of the effects of impact, on a scale of NONE to VERY HIGH (see Table 2-2 below).

**Table 2-1. Typical Rating Levels for Ambient Noise**

Type of district	Equivalent continuous rating level ( $L_{Reg,T}$ ) for noise (dB(A))					
	Day-Night $L_{R,dn}^{1)}$	Day-time $L_{Reg,d}^{2)}$	Night-time $L_{Reg,n}^{2)}$	Day-Night $L_{R,d}^{1)}$	Day-time $L$	Night-time $L_{Reg,n}^{2)}$

<sup>190</sup> SANS 10103- The Measurement and Assessment of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication. The standard prescribes methods and gives guidelines for assessing working and living environments with respect to acoustic comfort, excellence, preservation of health, land use and possible annoyance by noise.

						Reg.dn <sup>2)</sup>	
a)	Rural districts	45	45	35	35	35	35
b)	Suburban districts with little road traffic	50	50	40	40	40	30
c)	Urban districts	55	55	45	45	45	35
d)	Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40
e)	Central business districts	65	65	55	55	55	45
f)	Industrial districts	70	70	60	60	60	50
Note: Daytime: 06:00 to 22:00, Night-time: 22:00 to 06:00							
1) Equivalent continuous rating levels that include corrections for tonal character and impulsiveness of the noise and the time of day.							
2) Equivalent continuous rating levels that include corrections for tonal character and impulsiveness of the noise.							

**Table 2-2. Response Intensity and Noise Impact for Increases of the Ambient Noise**

Increase (dB)	Response Intensity	Remarks	Noise Impact
0	None	Change not discernible by a person	None
3	None to little	Change just discernible	Very low
3 ≤ 5	Little	Change easily discernible	Low
5 ≤ 7	Little	Sporadic complaints	Moderate
7	Little	Defined by South African National Noise Regulations as being “disturbing:	Moderate
7 ≤ 10	Little – medium	Sporadic complaints	High
15 ≤ 20	Strong	Threats of community / group action	Very high

SANS 10117<sup>191</sup> is recognized as the standard governing aircraft noise around airports. This standard provides a method for calculating and predicting aircraft noise around airports for land use purposes and the methods described in this standard are applicable to conventional turbo-engine propeller-driven aircraft and jet-propelled aircraft that require a runway for take-off and landing.

The standard uses computer modeling developed by the United States Federal Aviation Administration to develop noise contours, which are formed by connecting points of equal noise levels that can be indicated on a map of the area. The noise levels are determined by calculating the equivalent continuous day/night rating level (L<sub>Rdn</sub>).

### **3.5 The common law principles and rules governing noise pollution**

An occupier or owner of land is required in terms of the common law of nuisance to exercise his rights over his land in a way that does not infringe on the rights of peace and enjoyment of his adjoining neighbours. This is a concept that is known as the reasonable neighbour or land user and requires that the land owner or occupier must adhere to the standard of the reasonable landowner in his or her use of the land and that “neighbours are required to tolerate a level of nuisance which the reasonable neighbour would tolerate”.<sup>192</sup>

This however proves to be difficult as the level of reasonableness can be a highly subjective matter. There is case law that deals with this point in law. In *Gien v Gien* where the court found that the SABS standards are helpful in determining reasonableness with regards to noise.<sup>193</sup>

A person affected by noise pollution may rely on the common law remedies to assist him/her. This includes administrative, criminal, delictual and property law remedies. For the purpose of this study we will concentrate on the law of property as this pertains to the persons affected by aircraft noise pollution living in the flight paths or in close proximity to the operations.

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<sup>191</sup> SANS 10117- Calculation and prediction of aircraft noise around airports for land use purposes.

<sup>192</sup> J Glazewski *Environmental Law in South Africa* 2ed ,2000 at 608.

<sup>193</sup> 1979 (2) SA 1113 (T).

A defendant could in certain circumstances raise the defence of statutory authority in a nuisance matter. One such example would be the “holder of an environmental authorisation to build and operate an airport may argue that the authorisation allows them to infringe on the interests of others with respect to noise. When relying on this defence the defendant will need to prove that the authorisation does indeed permit such particular infringements to occur and that the bounds of authority were never exceeded. If the plaintiff can prove that the harm could reasonably have been prevented or diminished, then the court will regard the bounds of the authority as having been surpassed”.<sup>194</sup>

Compliance with the relevant provisions of the Aviation Act with regards to noise is an added source of statutory authority for airports to conform to in respect of nuisance caused by such operations.

Noise generated by aircrafts can be regarded as a “nuisance”.<sup>195</sup> Due to the number of communities and people affected the concept of “nuisance” can be both wide and narrow and the health implication which were discussed in Chapter One. The other issues pertain to the discomfort levels and vibration of the windows of homes and reception received by homes affected by aircraft noise.<sup>196</sup>

When it comes to deciding whether a conduct is unlawful and constitutes a nuisance the court will consider the entitlement of a landowner to peaceful use and enjoyment of his or her property which is free from noise.<sup>197</sup>

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<sup>194</sup> Du Bois F, *Wille's Principle of South African Law* 8ed, 2007 at 662. See also *Diepsloot Residents and Landowners Association and Another v Administrator, Transvaal* 1994 (3) 336 (A) where the Appellate Division held that although there had been interference with the rights of the appellant caused by locating an informal settlement nearby, the “reasonably apprehended interference” with the appellant’s rights as a result of the proposed settlement had been authorized by statute and was not wrongful.

<sup>195</sup> The word nuisance is derived from the Latin word *nocere* which means hurt, harm or injury and is defined in modern English as that which causes annoyance, inconvenience, discomfort, vexation or harm. It encompasses both public and private nuisance.

<sup>196</sup> J Church and J Church “Nuisance” in WA Joubert (ed) *LAWSA Vol 19* 2ed (2006). A *public nuisance* is an act or omission or state of affairs that impedes, offends, endangers or inconveniences the public at large. A *private nuisance* is an act or omission or condition or state of affairs that materially inconveniences another in the ordinary comfortable use or enjoyment of land or premises.

<sup>197</sup> J Glazewski *Environmental Law in South Africa* 2ed, 2000 at 608.

There will be various considerations taken into account such as the extent of such interference, the location of the land and suitability of the plaintiffs use, the time that the incident took place, the extent of such interference taking place as well as the sensitivity of the plaintiff to the harm and if there was any possible means of mitigating the harm.<sup>198</sup>

There are several remedies available to the affected parties which include:

- An interdict, a court order instructing one to do something or refrain from doing something.
- An abatement order, these are conditions defined as nuisance by legislation. Public officers are duly authorised to order the person causing such nuisance to apply abatement measures from their side.
- An action for damages, this includes instances where actual loss has occurred due to the infringement. One can claim for expenses incurred as well as the depreciated value of their property.
- And of the most exceptional will include the self-help but this will only be justifiable in limited and exceptional cases whereby one takes matters to resolve into their own hands.<sup>199</sup>

### **3.6 Conclusion**

It is fairly evident that South Africa has refined and comprehensive statutory provisions in place to regulate noise pollution. This, however, seems to be a very fragmented approach due to all three sphere of government (national, provincial and local) having a hand at passing legislation pertaining to noise. Most of the provincial and local statutes are modelled on the National Noise Control Regulations.

The Minister of Environmental Affairs is empowered by virtue of section 25 of the ECA to regulate and control noise. There is a distinction between a noise nuisance and a disturbing noise and case law had to give guidance on how the distinction between them.

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<sup>198</sup> Refer footnote 192

<sup>199</sup> Ibid.

Noise pollution is a provincial function in terms of Schedule 5 of the Constitution of South Africa and the administration of these laws is assigned to local authorities.

The Noise Control Regulations in terms of the ECA give extensive powers to local authorities with regards to noise control. There is however uncertainty as to whether the regulations apply to a certain area as initially the Minister designated the local authorities to which the regulations applied and later allowed local authorities to choose whether they applied.<sup>200</sup>

Despite legislative provisions to deal with noise are in place, the challenge lies in the effective implementation of the legislation. Glazewski proposes that it is imperative to build local government capacity to deal with the implementation of noise control laws in South Africa.<sup>201</sup>

The use of the common law as a means of controlling noise pollution can be a long and drawn out, as well as a costly, process and cannot be dealt with adequately especially in today's times. Hence it is the responsibility of the Municipality to pursue an action against the entity or person creating the noise and removes the burden on the person affected thereby.

King Shaka International Airport has to ensure that they have implemented noise abatement strategies to curb the discomfort levels of noise exposure levels that the affected communities are exposed to.

The *White Paper on National Civil Aviation Policy* requires that the information is easily accessible to all those concerned and affected as well as the forums and committees are armored with the relevant manpower to ensure that the aims are enacted.

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<sup>200</sup> J Glazewski *Environmental Law in South Africa* 3ed (2000).

<sup>201</sup> *Ibid* at 754.

## **CHAPTER FOUR: THE IMPLEMENTATION OF THE BALANCED APPROACH AT KING SHAKA INTERNATIONAL AIRPORT**

### **4.1 Introduction**

The purpose of this chapter is to examine the manner in which the legal and policy framework governing aircraft noise has been implemented at King Shaka International Airport (“KSIA”), which is South Africa’s first “greenfield” airport.<sup>202</sup> This chapter will focus on the practical steps that KSIA has taken to achieve a balanced approach to aircraft noise. In addition, it will also focus on the extent to which it imposes a curfew on night-time flights, prohibits noisy aircraft and facilitates public participation in its noise reduction activities. Before turning to consider these issues, however, it will be useful to briefly set out the background to the establishment of KSIA.

### **4.2 The establishment of KSIA**

The site on which KSIA is located is described as the Farm La Mercy 15124 and measures 2060 hectares in extent. It is situated in the northern sector of the eThekweni Metropolitan Municipality in KwaZulu-Natal. KSIA is immediately bounded by Provincial Road R102 and agricultural land to the east, the N2 to the west, agricultural land to the north and the neighbourhoods of Herrwood and Mount Moreland together with agricultural land to the south. The towns of Verulam and Tongaat are located to the east of the site, the Mdloti River to the south, the Watson Highway and Tongaat River to the north and the neighbourhoods of Umdloti, La Mercy and Westbrook Beach as well as some agricultural land to the east of the N2.

The site was acquired by South African Transport Services in 1972 for the purposes of relocating the then Durban International Airport (DIA).<sup>203</sup> In order to create the site 74 independent

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<sup>202</sup> KIA is operated by Airports Company South Africa. Apart from KIA, Airports Company South Africa also operates eight other airports including OR Tambo in Johannesburg and Cape Town International in Cape Town.

<sup>203</sup> Durban International Airport formerly Louis Botha Airport was opened in 1951 and operated at the South basin Isipingo. The airport lost almost all its international traffic because the runway was too short to accommodate larger aircraft and because of the hub and spoke policy. Numerous attempts to move the airport north were shelved until the World Cup event was awarded to South Africa. This led to the construction in La Mercy.

properties and their 60 title deeds had to be tied together. After the site was consolidated it was transferred to the Airports Company South Africa (the “ACSA”) from the South African Transport Services.<sup>204</sup>

KSIA has a 3 700m runway that can accommodate the latest New Generation Large Aircrafts which are currently being introduced for international travel.<sup>205</sup> The passenger terminal is 60 000m<sup>2</sup> in size and in 2010 had the capacity to handle 7.5 million passengers per annum with the potential to expand to in excess of 25 million passengers per year. In 2010 it also had 32 aircraft stands with capacity to handle 100 000 tonnes of cargo per annum. Space has also been reserved to expand the cargo terminal facility up to 40 000m<sup>2</sup> which at full capacity will be able to handle 400 000 tonnes of cargo per annum.<sup>206</sup>

The airport consists of a single runway strip with the runway ends designated RW 06 and RW 24 respectively. Aircraft landing on RW 06 approach the airport from the southwest, while aircraft taking off from RW 06 depart to the northeast. Aircraft landing on RW 24 approach the airport from the northeast, while aircraft taking off from RW 24 depart to the southwest. The airport layout is illustrated in Figure 1 below as well as the location of the airport in relation to its surroundings is illustrated in Figure 2.<sup>207</sup>

In this respect, it is important to note that aircraft noise decreases with increasing distance from the airport but for several reasons it is not a uniform reduction with increased distance. Firstly, along the flight paths into and out of the airport where aircraft will regularly fly, the noise impact will be greater than to the sides of these flight paths. Secondly, aircraft which are taking off are almost always noisier than landing aircraft because their engines are being operated at higher power settings. Thirdly, local weather and topographical conditions can have an effect.<sup>208</sup>

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<sup>204</sup> Airports Company South Africa, available at <https://www.acsa.co.za>, accessed 15 July 2015.

<sup>205</sup> New generation large aircrafts include the BOEING 737 and the A380S. These aircraft are much more technologically advanced and quieter than previous generations.

<sup>206</sup> Refer Footnote 200.

<sup>207</sup> Refer Footnote 200.

<sup>208</sup> Refer footnote 1.

Prior to the development of KSIA only small single engine piston light aircraft operated from the site where an airstrip was in use for many years. With the development of KSIA noise from the operation of large jet aircrafts has been a new intrusion into the areas that surround the airport and that lie under the flight paths.

### **4.3 Compliance with legal and policy requirements**

King Shaka International Airport is the first greenfields airport in South Africa. “A ‘*Greenfield airport*’ is defined as one which is built from scratch on a new (undeveloped) site and thus it has no it has no constraints due prior work or existing infrastructure”.<sup>209</sup>

Apart from the general noise control measures contained in the Civil Aviation Act as well as ICAO and Department of Transport policies, the airport also has to comply with the specific noise control measures contained in the Environmental Authorisation Record of Decision (the “RoD”) issued by the Minister of Environmental Affairs and Tourism.

The RoD was issued in 2007 after an extensive Environmental Impact Assessment was conducted for the construction of the airport.<sup>210</sup> The RoD is a legal directive and imposes stringent and onerous conditions on the Airport. These conditions include, amongst others, noise management measures, which stipulate that:

- An ICAO Balanced Approach to noise management must be adopted, which includes reduction at source, land-use planning and noise abatement.
- KSIA must establish a noise management committee to discuss noise issues emanating from the airport.
- KSIA must install permanent continuous noise monitoring equipment within community areas that are affected by aircraft noise, i.e. areas falling with 55dbn (day and night average).

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<sup>209</sup> N Sukumar *What is meant by a greenfield airport* (2014) available at <https://www.quora.com/What-is-meant-by-Greenfield-Airport>, accessed on 2 February 2016.

<sup>210</sup> A Record of Decision includes various compliance issues. Noise has been listed as one of them. Extract from Record of Decision (Department of Environmental Affairs) RoD dated 23 August 2007).

- If the results from the continuous monitoring stations indicate that the 55dbn levels are being exceeded and cannot be mitigated by improving operational measures, the ACSA must either sound proof the affected houses or relocate affected residents.

The RoD voiced concerns regarding the impact of noise especially with regard to the high decibel noise caused by heavy aircraft taking off, the contribution of the airport to global climate change and global warming and certain biodiversity impacts. Concerns were also raised regarding the socio-economic impact on the Waterloo community.

An extract from the RoD dealing with noise is set out below:

#### **The impact of noise**

Various submissions were made under this heading, namely, that noise was not properly dealt with in the scoping report; that high decibel noise levels caused by heavy aircraft cannot be mitigated against; and that the EIA makes reference to average noise levels and that not enough consideration is given to maximum noise levels which were determined by studies around the DIA. Unfortunately, aircraft noise at and near an airport is unavoidable. However, I am satisfied that the noise related concerns were adequately addressed during the EIA process. I disagree with the allegation that the noise impact cannot be mitigated. The mitigation measures recommended by the International Civil Aviation Organisation (ICAO) must, *inter alia*, be implemented. In conclusion, it is important to note that the noise study in the EIA utilized the SANS10103:2004 and SANS 10117:2004 standards which stipulate the 55dB limit. I have also considered the supplementary submission on noise referred to in paragraph 3.3 above. I am of the view that the relevant standards have been adhered to but I have included, notwithstanding, additional mitigation measures in the ROD attached to this decision.

The RoD does not explain the purpose of noise monitoring, however, noise is monitored for a number of reasons which includes compliance with regulated or agreed limits, community noise measurement and information sharing and dealing with the noise complaints.

## **4.4 KSIA**

### *4.4.1 Introduction*

After live operations commenced at KSIA on the 1 May 2010 several complaints were received from surrounding community members in relation to noise generated by departing and arriving aircrafts at KSIA.

In order to address the complaints, the airport has implemented a number of noise abatement procedures. These procedures, which are based on the ICAO Balanced Approach in addressing reduction at source, are as follows:

- Prohibit intersection departures between 22h00-06h00 local time.
- Limit idle reverse thrust between 22h00-06h00 local time (unless operationally required).
- Adoption of Noise Abatement Procedure (NAP) 1 for all departing jet aircraft.
- Banning of Chapter 2 aircrafts and implementation of curfews.
- Installation of noise monitoring system.
- Airlines and aircraft type are monitored continuously for any deviation from published guidelines.
- Noise monitoring terminals have been erected at strategic locations.
- Formation of the Noise Committee to address aggrieved and affected person.
- A noise complaints hotline, e-mail address and help desk has been activated to deal with noise and environmental complaints.
- A register is retained to track all noise complaints.

Each of these procedures will be discussed in turn.

#### (a) Intersection take-off

In order to reduce aircraft noise no aircraft are permitted to use intersections for take-off from 22h00-06h00. This is because intersection take-offs use less runway length than is available and this means more thrust (power) is required for take-off. This equates to more power and more noise emissions. The shorter runway length means that a lower altitude overhead over sensitive receptors is achieved once take-off has occurred and this equates to a more severe impact on weighted noise average over a 24 hour period. Night time noise is weighted, so the higher noise levels during the night being weighted will increase the  $L_{r,dn}$ .

(b) Reverse thrust

In order to reduce aircraft noise pilots are advised to minimise the use of reverse thrust after touchdown. A runway length which is 3700 metres does not require excessive braking with reverse thrust.

(c) Noise Abatement Departure Procedure (NADP)

In order to reduce aircraft noise, the ICAO has adopted guidelines for the climb of an aircraft.<sup>211</sup> These are NADP 1 and NADP 2. NADP 1 is intended to describe one method, but not the only method, of providing noise reduction for noise-sensitive areas in close proximity to the departure end of the runway. NADP 2 similarly describes one method, but not the only method, of providing noise reduction to areas more distant from the runway end.

NADP 1 has been adopted as take-off procedure for KSIA. NADP 1 is reduced thrust take-off. Reduced thrust take-off minimises noise exposure to receptors closer to the airfield, contrary to initial thinking of using NADP 2 which is thought to be most effective in that it expedites separation of noise source and receptor. All other airports in South Africa use NADP 2 due to their location and that their sensitive receptor lies further in proximity to the airport precinct.

(d) Ban of Chapter 2 Aircrafts

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<sup>211</sup> South African Civil Aviation Authority *AIRAC AIP SUPPLEMENT S072/14* (24 July 2014).

In order to reduce aircraft noise, the CAA published phase out and non-acquisition regulations in July 2014. These regulations provide that no new chapter 2 aircraft will be able to be registered on the CAA registry (Non-acquisition). Existing chapter 2's will be phased out after the end of the useful life period.

(e) Noise monitoring system

In order to comply with the legal requirements imposed by the Civil Aviation Act, the Civil Aviation Regulations and the RoD, ACSA took a decision to install automated noise and flight track monitoring systems at KSIA. The same systems have also been installed by ACSA at OR Tambo and Cape Town International airports.<sup>212</sup>

Ambient noise measurements are currently carried out at five locations along the flights' take off (departure) and landing (approach) routes. The five noise and flight track monitoring systems that have been installed at KSIA forms part of an on-going process to develop a noise management program and improve communication with neighbouring communities by analysing the data to address noise complaints and information sharing with neighbouring communities.

Various studies were conducted to identify the ideal locations for the installation of noise monitoring equipment at KSIA. Strategic locations in the vicinity of the airport were identified and will be discussed in detail. The monitoring and tracking system data is used to assist with the measurement of aircraft noise and adherence of aircraft to flight procedures. Noise abatement operating procedures have been devised and continually reviewed, to reduce the impact of aircraft noise on communities, around the airports.<sup>213</sup>

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<sup>212</sup> Refer Footnote 200.

<sup>213</sup> Refer Footnote 200.

#### 4.4.2 Noise measurement locations

Five areas were selected for the installation of the noise monitoring terminals (“NMTs”) in the neighbourhoods surrounding King Shaka International Airport. These five sites are in Mount Moreland, Waterloo, Verulam, Herrwood, and Fairbreeze. Their selection was based on the following criteria:

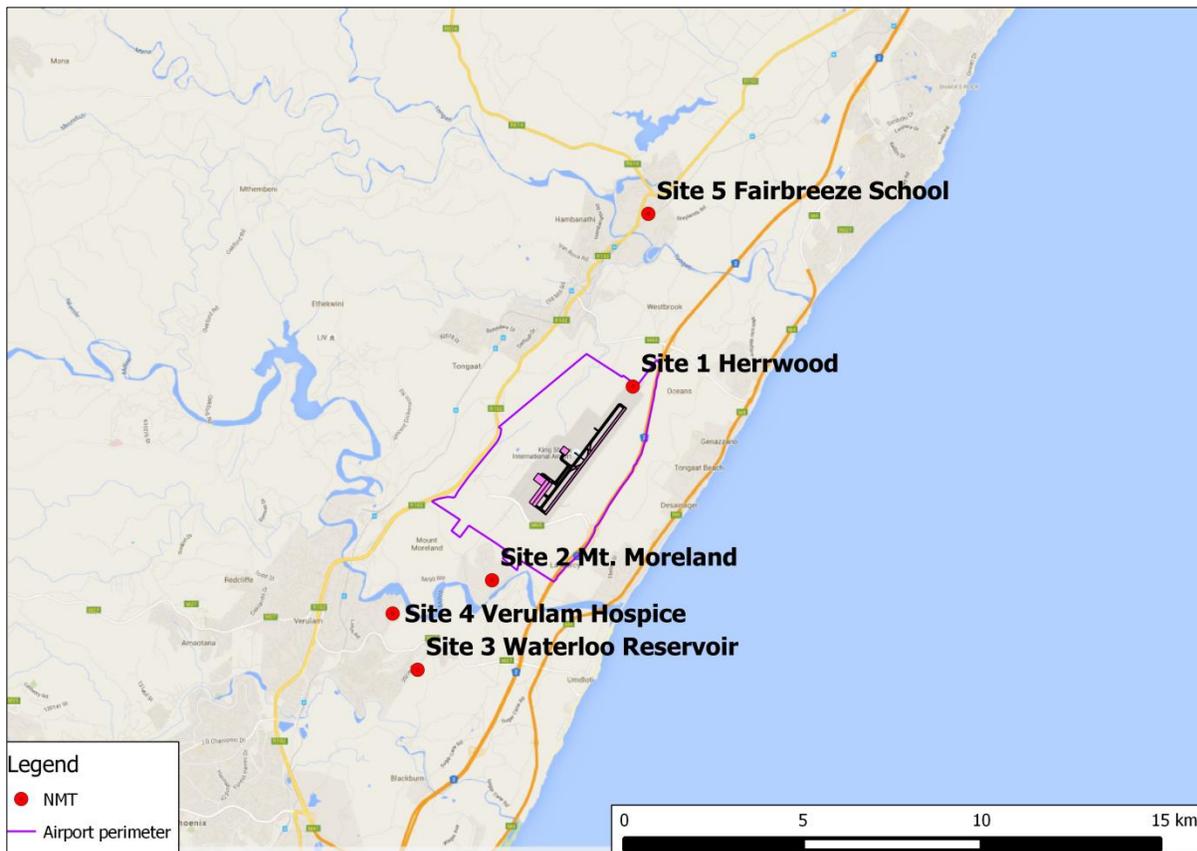
- Public owned buildings and spaces.
- Ease of access, security and availability of utility services.
- Proximity to aircraft operations and most frequently used flight paths.
- Proximity to residential areas and other noise-sensitive receptors.

The NMT locations’ coordinates, as well as the relevant SANS guidelines are shown in the table below.

No.	Monitoring Point	Location	Description	Coordinates
1	NMT1	Herrwood	Adjacent to Herrwood village, within the airport perimeter, about 190m from the approach path of RW24	29.593148° S 31.133082° E
2	NMT 2	Mount Moreland Village	Located in the Mount Moreland public park in Charles Street, approximately 2000m from the threshold of RW06	29.641787° S 31.092369° E
3	NMT 3	Waterloo Township	Situated at the Waterloo reservoir, on the eastern border of the existing residential area, approximately 5,500 m from the threshold of RW06	29.664346° S 31.070229° E

No.	Monitoring Point	Location	Description	Coordinates
4	NMT 4	Verulam Hospice	Located in the Waterloo-Verulam urban continuum, approximately 5,500 m from the airport	29.650252° S 31.063803° E
5	NMT 5	Fairbreeze School	Located in Tongaat-Maidstone, approximately 6,000 m from the threshold of RW24	29.549727° S 31.137546° E

**Table 4.1 Noise Monitoring Terminal Locations**



**Figure 4.1: King Shaka International Airport and Surrounding Areas**

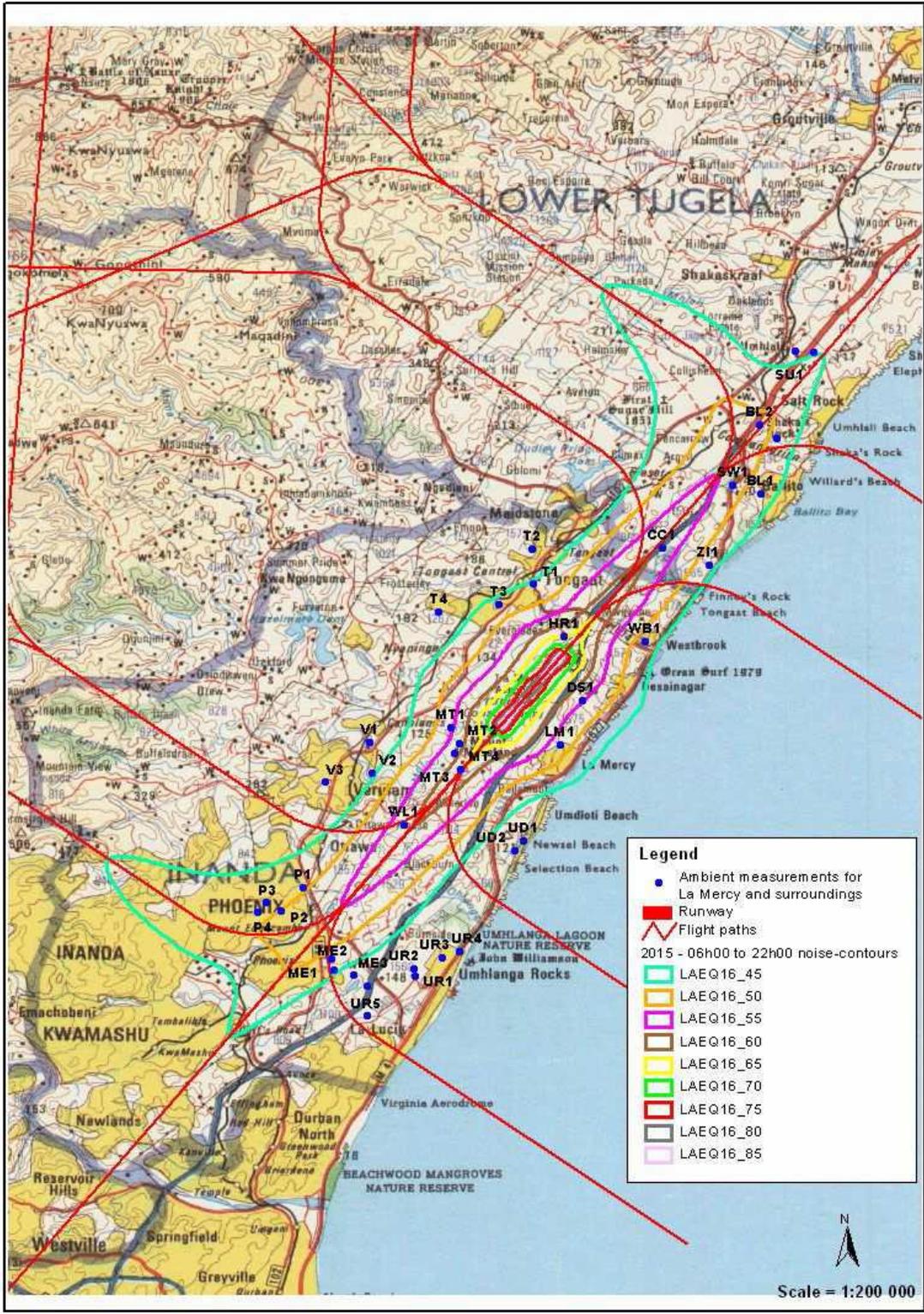


Figure 4.2: Ambient sound level monitoring points at King Shaka International Airport in relation to the predicted 2035 LAeq, 16Hr contours

#### 4.4.3 Site selection for noise monitoring equipment

##### (a) Terminal 1 (NMT 1): Herrwood

The first site is Herrwood which is a small village located on the north western boundary of the airport. At the closest point, houses in Herrwood lie about 250m from the final approach path. The residents in the village are exposed to noise from aircraft landing on RW24 and taking off from RW06.<sup>214</sup>

##### (b) Terminal 2 (NMT 2): Mount Moreland Village

The second site is Mount Moreland Village which is a village located to the southwest of the airport. At its closest point, houses in Mount Moreland lie about 2000m from the threshold of RW06. The residents in the village are exposed to noise from aircrafts landing on RW06 and taking off from RW24.

##### (c) Terminal 3 (NMT 3): Waterloo Township

The third site is Waterloo reservoir which is owned by eThekweni Municipality. Waterloo is a large residential township to the southwest of the airport. At its closest point, houses in Waterloo lie about 4 700m from the threshold of RW06. The residents in the township are exposed to noise from aircraft landing on RW06, and taking off from RW24 although not all departing aircraft overfly the township since they have started to disperse on their assigned flight routes. Aircraft taking off on RW24 either use the full runway length or make use of the HOTEL intersection. This factor, along with aircraft takeoff performance, results in height variations above the NMT. The height of aircraft above the NMT taking off from RW24 is generally between 2 500ft and 3 500ft.

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<sup>214</sup>Information obtained from The Airports Noise Committee, King Shaka International Airport.

(d) Terminal 4 (NMT 4): Verulam Hospice

The fourth is Verulam Hospice. Verulam Hospice is located in the Waterloo-Verulam urban continuum. At its closest point, the Verulam Hospice lies about 550m along an arcing track from the threshold of RW06. The residents in the township are exposed to noise from aircraft taking off from RW24 although not all departing aircraft overfly this site directly since they have started to disperse on their assigned flight routes. Aircraft taking off on RW24 either use the full runway length or make use of the HOTEL intersection. This factor, along with aircraft takeoff performance, results in height variations above the NMT. The height of aircraft above the NMT taking off from RW24 is generally between 2700ft and 3500ft.

(e) Terminal 5 (NMT 5): Fairbreeze School

The Fairbreeze NMT is located in the Tongaat-Maidstone area, approximately 6,000m from the threshold of RW24. NMT 5 is not close to any flight paths.

These noise monitoring terminals were installed by Brüel & Kjær and the NoiseDesk System is connected to the airports radar system, which provides a number of aircraft data, such as airline, aircraft, aircraft type, altitude as well as the coordinates of the flight path. The system has also embedded algorithms that go through a chain of checks before it makes the correlation of a specific noise event to a specific aircraft operation. In addition the NoiseDesk system provides a browser where it is possible to inspect any of the aircraft events and correlate it with an aircraft operation.<sup>215</sup>

#### *4.4.4 KSIA Aircraft Noise Consultative Committee*

Apart from installing noise monitoring terminals, KSIA has also established an Aircraft Noise Consultative Committee. The purpose of the Noise Consultative Committee is to provide a forum

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<sup>215</sup> Information derived from ACSA Noise Updates, available at Footnote 200.

for the discussion of matters concerning aircraft noise, which has an impact on the communities in the vicinity of KSIA.<sup>216</sup>

The Noise Consultative Committee is responsible for:

- Commenting on aircraft flight paths and noise abatement procedures
- Commenting on airport operational procedures
- Reviewing the noise and flight path monitoring programme
- Reviewing the noise monitoring results
- Reviewing noise complaints received and responses provided
- Reviewing the quarterly aircraft noise management reports
- Reviewing compliance with ICAO's Balanced Approach and the SANS standards
- Advising on ways of providing education and information to the community
- Commenting on land use planning surrounding the airport.<sup>217</sup>

The Committee meets quarterly and is constituted and chaired by ACSA thereby reporting directly to the KSIA Environment Committee. The Committee is comprised of representatives from:

- Local government – eThekweni Municipality, ILembe District Municipality, KwaDukuza Local Municipality.
- Aviation industry – Airports Company South Africa (ACSA), Department of Transport (DoT), South African Civil Aviation Authority (CAA), Air Traffic & Navigational Services (ATNS), Airlines Association of Southern Africa (AASA), Air Line Pilots' Association (ALPA), Board of Airline Representatives of South Africa (BARSAs).
- Community representation – 8 members elected to represent the aircraft noise affected communities.
- Adjacent Landowner – Tongaat-Hulett Development (THD), Dube TradePort Corporation (DTPC).<sup>218</sup>

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<sup>216</sup> Information derived from Terms of Reference of The King Shaka International Noise Committee.

<sup>217</sup> Ibid.

<sup>218</sup> Ibid.

The community representation consists of people who are interested and affected by the noise caused by aircrafts. The Committee acts as a voice for all those affected parties in the areas in close proximity to the airport precinct. The statistics thus far have shown that the platforms that have been put in place have assisted in reducing the number of complaints.

Some statistics obtained as detailed in the table below reflects that there is a reduction in aircraft noise complaints more especially at King Shaka International Airport. This has been the result of continued consultation with the interested and affected parties, more especially through the Noise Consultative Committee, which meets quarterly to discuss aircraft noise that was formed at King Shaka International Airport in 2010. The aircraft noise complaints received for the four major airports are detailed in the table below.<sup>219</sup>

**Table 4-2: Aircraft noise complaints**

<b>Noise complaints</b>				
<b>Airport</b>	<b>2013/14</b>	<b>2012/2013</b>	<b>2011/12</b>	<b>2010/11</b>
Cape Town International	1	0	4	0
O.R. Tambo International	0	2	1	0
King Shaka International	13	69	53	95
Port Elizabeth Airport	1	4	5	5

KSIA has realized many principles as defined by ICAO. This has been possible by the issue of the RoD to KSIA.

#### **4.5 Conclusion**

It is evident from that King Shaka International Airport has indeed come a long way since operations began in May 2010. The noise complaints at that time are far higher than those received at present.

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<sup>219</sup> Statistic obtained from Airports Company Noise Management.

Various studies continue to be implemented and audits are being carried out to ensure that KSIA remains at the forefront in addressing and resolving complaints and operating a green airport. The operating restrictions and mechanisms that are in place are in line with the requirements as required by the Balanced Approach.

The value of the information derived from the noise monitoring terminals has been able to allow the airport to monitor compliance to noise abatement procedures as well as differentiating between aircraft noise and ambient noise.

The data captured has allowed KSIA to continuously monitor and work from the information derived to better manage the noise issues. The contours are supplied to the Town Planning Division of the Municipality which assists them in planning how to zone effectively for the future land use around KSIA and how to treat homes that will be built within the contours in terms of acoustic treatments when plans are being approved.

## CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSION

### 5.1 Introduction

Aircraft noise remains a serious concern both locally and globally and has a direct impact on the growth and expansion of the aviation industry. The increasing demand for air transportation will continue as it is regarded as being a safe, efficient, reliable and rapid means of travel. Airports are an integral part of modern society and are important for trade and tourism and future economic prosperity. To ensure sustainability of the sector it is imperative that the relevant processes and procedures are implemented by all major stakeholders to ensure that we preserve the environment and see continuity and growth of this very important sector of business.

Throughout the world airports operate from busy cities and the aircraft noise impacts vary, depending on levels of management of aircraft noise and the implementation of mitigation measures. It has been one of ICAO's prime goals to limit or reduce the number of people affected by significant aircraft noise and in this regards the Balanced Approach method was adopted to be implemented by each airport based on their unique circumstances and operations.

The exploration of the four principles includes:

- “Reduction of noise at source;
- Land-use planning and management;
- Noise abatement operational procedures; and
- Operating restrictions.”<sup>220</sup>

This chapter will discuss how KSIA has adapted and aligned with the internationally recognised principles of the Balanced Approach method in mitigating and reducing their noise impacts on society and the environment.

Lastly the research will address some recommendations that could be implemented at KSIA to achieve optimum results in addressing, reducing and managing the noise from aircrafts.

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<sup>220</sup> Refer Footnote 118.

## 5.2 Mitigation, management and monitoring measures

ACSA has managed to adopt the recommendations as stipulated by ICAO's Balanced Approach requirements with the operation of KSIA. These include the consideration of the four principal elements namely, reduction at source (quieter aircrafts), land-use planning and management, noise abatement operational procedures and operating restrictions, with the goal of addressing the noise problem in the most cost effective manner possible.<sup>221</sup>

### (a) Reduction of noise at source

The requirement of the *White Paper on National Civil Aviation Policy* is to adopt the Balanced Approach by the phasing out of Chapter 2 aircrafts which are the older generation, louder aircrafts.

The *White Paper* refers to the acceptability of certain types of aircraft as follows: "South Africa should restrict air carriers from adding Chapter 2 aircraft to their existing fleets and foreign air carriers from increasing the number of flights with Chapter 2 aircraft with effect from a date to be prescribed in terms of the Civil Aviation Regulations." The new advanced fleet of aircraft use quieter engines and technology.

In this regard KSIA has presently placed restrictions on Chapter 2 aircrafts and once the aircraft has reached its lifespan then the aircraft must be removed from the fleet. The Department of Transport will no longer register Chapter 2 aircrafts from 15 January 2015.

Despite this having a financial impact on the industry it would reduce the noise emissions as well as ensuring that the latest technology in aircraft design is being filtered into the fleet.

### (b) Land-use and planning management

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<sup>221</sup> Refer Footnote 118.

Land-use planning and management provides an effective tool to ensure that development and activities planned close to an airport are compatible with the aviation sector. The goal is to reduce the number of people being affected by aircraft noise by introducing land-use zoning around airports. By ensuring that the right forms of development as well as materials used to erect such structures will alleviate issues at a later stage.

It is vital to plan appropriately by taking the relevant noise exposure levels into account. In development it would assist by ensuring that residential units are zoned accordingly and fitted with relevant materials and windows that will reduce exposure to noise significantly.<sup>222</sup>

By integrating the airport into its surroundings ensures that it harmoniously fits into environment with minimum impacts and meets the needs of all major roles players.<sup>223</sup> This implies taking advantage of available land-use control techniques to ensure that land surrounding the airport and major departure routes is used in a manner compatible with and in harmony with the airport environment and activities.<sup>224</sup>

Clearly defined land use planning policies will need to be developed and implemented as one of the most important mechanism to mitigate the impact of aircraft noise. Land use planning will have to be underpinned by a comprehensive legislative framework and informed by noise monitoring and mapping to identify noise sensitive areas.

Part C of the *White Paper*, inter alia, addresses the integration of an airport into its environment. As a fundamental premise, the need for balance between the interests of the airport and those of stakeholders near the airport should be considered in the land-use development allowed in the vicinity of airports. More specifically, land-use planning and control in and around airports should ensure that the future zoning of areas close to airports is compatible with airport development.

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<sup>222</sup> ICAO guidance on this subject is contained in Annex 16, Volume I, Part IV and in the Airport Planning Manual, Part 2-Land Use and Environmental Control (Doc 9184). The manual provides guidance on the use of various tools for the minimization, control or prevention of the impact of aircraft noise in the vicinity of airports and describes the practices adopted for land-use planning and management by some States.

<sup>223</sup> Department of Transport *White Paper on National Civil Aviation Policy* (2015) 5.2 and 7.2.

<sup>224</sup> *Ibid.*

This is currently being undertaken by the Noise Tracking and monitoring undertaken at strategic points at the airport. The information is audited to review results and measures to be taken to address the data being captured. KSIA is working very closely with the surrounding municipalities to ensure that zoning is carried out in accordance to the data that is produced. Plans must be submitted to the relevant institutional bodies for authorisation prior to any development being undertaken in and around an airport precinct to ensure that the relevant building standards are achieved and noise deterring materials are procured.

(c) Noise abatement operational procedures

Noise abatement procedures enable reduction of noise during aircraft operations to be achieved at comparatively low cost. There are several methods, including preferential runways and routes, as well as noise abatement procedures for take-off, approach and landing. The appropriateness of any of these measures depends on the physical lay-out of the airport and its surroundings, but in all cases the procedure must give priority to safety considerations.<sup>225</sup>

In this regard KSIA has developed operational procedures to manage aircraft movements, clearly defined flight paths, flight times, and restricted flight volumes over sensitive areas. This has been complimented by a permanent noise monitoring network that considers a number of noise parameters.

Noise levels are monitored at the five monitoring locations around the airport and via the flight path correlation of each aircraft to these noise levels. Non-adherence to the abatement procedures, which may result in abnormally high noise levels at the monitoring stations, is reported to the aircraft operator and the Director of Civil Aviation.

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<sup>225</sup> ICAO's noise abatement procedures are contained in Annex 16, Volume I, Part V and Procedures for Air Navigation Services-Aircraft Operations (PANS-OPS, Doc 8168), Volume I-Flight Procedures, Part V. On the basis of recommendations made by CAEP/5, new noise abatement take-off procedures became applicable in November 2001.

Pilots may disregard the use of noise abatement procedures in order to ensure the safe operation of the aeroplane and if instructed to do so by Air Traffic Navigation Control.

The ICAO has developed aircraft operating procedures, Noise Abatement Departure Procedure 1 (NADP1) and Noise Abatement Departure Procedure 2 (NADP2), for the take-off climb, in order to ensure that the necessary safety of flight operations is maintained whilst minimising exposure to noise on the ground.

As discussed in Chapter 2, the NADP 1 has been recommended for KSIA.<sup>226</sup> NADP1 is intended to provide noise reduction for noise sensitive areas in close proximity to the departure end of the runway.

(d) Operating restrictions

South Africa's *White Paper on National Civil Aviation Policy* refers to flight routes designed to take aircraft on tracks which have the lowest noise impact: "Departure and arrival routes are published for most medium to large airports. Usually applied to departures, noise preferential routes are designed in conjunction with Standard Instrument Departures to take aircraft over less densely populated areas, thus reducing the noise nuisance".<sup>227</sup>

It is recommended that in the development of the Noise Abatement Programme ACSA evaluates the benefits to be gained from making use of preferential runway take-offs to alleviate the impact on communities that are most affected. The other operating restrictions include restricting aircraft from using reverse thrust during take-off and intersection departure take-offs.

KSIA have implemented these two types of runway operations to reduce the impact of noise emitted from aircrafts.

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<sup>226</sup> Full details of NADP1 can be found in ICAO Procedures for Air Navigation Services – Aircraft Operations, Volume 1-Flight Procedures.

<sup>227</sup> Department of Transport *White Paper on National Civil Aviation Policy* (2015).

Reverse thrust is used to slow the aircraft after landing. The use of reverse thrust means that the aircraft is able to vacate the runway earlier, which may also shorten the distance to the terminal buildings. A significant reduction in noise can be achieved during the landing procedure if pilots are prohibited from using thrust reversers, except when there are no other adequate means available for slowing the aircraft. Reverse thrust is particularly disturbing at night because of the sudden increase in noise.

Intersection departures are not permissible at KSIA. This is usually used to save time and fuel, and provided it would not compromise flight safety, aircraft often begin their take-off run from an intersection and therefore do not use the full runway length. However, the further down the runway the take-off roll begins the further the distance of the noise disturbance beyond the airport. In this regard and taking cognizance that KSIA have communities that lie in close proximity thereof this would not be ideal as it would lead to greater power thrust on a shorter space of runway and louder emissions.

### **5.3 Noise monitoring**

The *White Paper* makes reference to aircraft noise monitoring and track keeping as follows: “International noise monitoring systems are widely used as powerful tools for controlling the impact of aircraft noise around airports and for developing databases on aircraft noise”.<sup>228</sup>

This can only be done effectively through permanently installed systems, which have been designed and dedicated to the task of monitoring aircraft noise and track conformance, further complemented by mobile/portable monitoring equipment for evaluating specific site impact.

King Shaka International Airport, Cape Town International Airport as well as OR Tambo International Airport have permanent noise monitoring terminals erected and are tracking and monitoring the sites.

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<sup>228</sup> Department of Transport *White Paper on National Civil Aviation Policy* (2015) 12.2.3.5. Noise and Track conformance monitoring notes that the requirements for permanently installed systems are set out in the international standard ISO 20906 “Acoustics – unattended monitoring of aircraft sound in the vicinity of airports”.

The impact of aircraft noise on the environment will depend on the frequency of flight events, the duration of the flight events and the time of day of these events. The impact on an individual will depend on their perception of the noise and the level of acceptance, the time of day and the type of activity engaged in at the time of the noise exposure. The health impacts typically associated with aircraft noise would be annoyance, sleep disturbance and interference with speech communication.

As detailed in chapter 4, the noise around KSIA is measured in five (5) locations, which have permanent noise monitoring terminals. The number of monitors is considered adequate for the verification of noise levels along the flight paths and verification of the estimated noise levels.

## **5.4 Recommendations**

Aircrafts are an integral part of modern society and are important for future economic prosperity as well as the promotion of trade and tourism globally. The environmental impact of airport related activities must be considered and managed by introducing mitigation measures that can effectively reduce the impacts on the surrounding land-uses.

The implementation of a penalty system whereby aircraft that exceed the airports departure noise limits at night would be required to pay a fine which could be used to invest in local community projects such as insulation of homes, schools and places of worship.<sup>229</sup>

There could be policies and frameworks drafted that can define and limit and where possible, reduce the number of people severely affected by aircraft noise.<sup>230</sup>

KSIA may implement an incentivised scheme that rewards airlines for using quieter more technologically advanced aircraft as well as those that operate early morning arrivals before

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<sup>229</sup> Airports Company South Africa's revenue is generated from aeronautical and non-aeronautical sources. The former is derived from government-regulated charges, or tariffs, paid by airlines, noting the airport infrastructure investment programme. Airport tariffs are adjusted annually. The tariff application is submitted to an independent Regulating Committee for approval after extensive consultation with airline stakeholders.

<sup>230</sup> Heathrow Airport Ltd *A Quieter Heathrow* (May 2013), available at [http://www.heathrow.com/file\\_source/HeathrowNoise/Static/a\\_quieter\\_heathrow\\_2013.pdf](http://www.heathrow.com/file_source/HeathrowNoise/Static/a_quieter_heathrow_2013.pdf), accessed 15 July 2015.

6am.<sup>231</sup> A varied landing fees structure can be introduced and quieter aircrafts can benefit from such fees arrangements.

At present it is quite difficult to completely phase out the noisiest aircrafts operating at KSIA and other airports in South Africa due to the economic benefits that will be lost as well as the routes strategy. Most of the fleet in developed countries such as United States of America and the European Union has phased out Chapter 1 and 2 aircraft and these have found themselves in poorer developing countries such as South Africa.<sup>232</sup> The phase out of Chapter 2 aircraft according to the *White Paper on National Civil Aviation Policy* was stalled due to economic reasons and there continued to be additions to the fleet.<sup>233</sup>

Despite the Department of Transport advising that from January 2015, Chapter 2 aircraft will not be allowed to operate in their airspace, this decision has still not been implemented.<sup>234</sup> There is pressure globally for compliance with standards and for the preservation of the environment considering the aviation sector is growing exponentially and is a significant contributor of noise pollution.<sup>235</sup>

## 5.5 Conclusion

It can be justly stated that South Africa has indeed excelled in terms of implementing international noise standards in terms of ICAO noting that had it not been for the issuance of RoD against KSIA, this would probably not have been done.

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<sup>231</sup> Ibid

<sup>232</sup> G Keizer *The Unwanted Sound of Everything We Want: A Book About Noise* (2010).

<sup>233</sup> Ibid.

<sup>234</sup> Department of Transport *Annual Performance Plan* (2014), available at <http://www.transport.gov.za/Portals/0/Annual%20Reports/DoT%20APP%202013-14%201.pdf>, accessed 15 July 2015.

<sup>235</sup> South African Civil Aviation Authority 26 July 2012, available at <http://www.caa.co.za/Corporate%20Publications/CAA%20Annual%20Report%202011-2012.pdf>, The South African Civil Aviation Authority (“CAA”) is a juristic body established in terms of the Civil Aviation Act 13 of 2009. The CAA is governed and controlled by the Civil Aviation Authority Board (“the Board”). In terms of its mandate, the CAA is tasked with promoting and maintaining a safe, secure and sustainable civil aviation environment, by regulating and overseeing the functioning and development of the industry in an efficient, cost-effective, and customer-friendly manner according to international standards.

The *White Paper on National Civil Aviation Policy* adopts these international requirements and this research has shown that the implementation at present aligns to the requirements of these standards. Moving forward there is much more that will need to take place in terms of ensuring that all airports have proper noise abatement plans drafted and submitted and that airport environmental committees, as required by the *White Paper*, are formed to ensure and maintain effective communication channels with the affected parties.

There is a long journey ahead in terms of implementing these noise management systems throughout all airports in the country. What can be said is that the few that have been installed must now put in place relevant plans and systems to address the data that emanates from the noise monitoring terminals. Models must be implemented to ensure that deviations and defaulting airlines are penalised and the funds can be used to address the needs of those affected.

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