Verkehrswissen-
schaftliches
Institut

RWTH AACHEN
UNIVERSITY

**Lehrstuhl für Flughafenwesen und Luftverkehr**
**Univ.-Prof. Dr. rer. nat. Johannes Reichmuth**
**Datum: 19.04.2022**

# BACHELOR THESIS

for

Mr/Mrs. **XXX**, Mart.-Nr: **xxx xxx**

## „Analysis of the impact of aircraft operations on local air quality in the vicinity of airports“

## „ Analyse der Auswirkungen des Luftverkehrs auf die lokale Luftqualität in der Nähe von Flughäfen“

The impacts of aviation to the environment are particularly noticeable in the initial and final stages of each flight, in the vicinity of airports, when aircrafts are flying at low altitude. In addition to the impacts observed when flying at higher altitudes, arriving, and departing aircraft have direct environmental impact in the form of both noise disturbance and deterioration of the local air quality around airports. In particular, the degradation of air quality can present a health risk, especially to the residents living near airports. The changes in local air quality around airports can be quantified through both measurements and estimations. This provides the basis to inform both decision making as well as regulation, with the objective mitigating the impact of aircraft operations to the environment.

This bachelor thesis shall provide an overview of the quantification, mitigation, and prevention of the degradation of air quality in the vicinity of airports due to aircraft operations. To begin with, a research will be conducted on the pollutants emitted to the atmosphere due to aircraft operations. A distinction shall be made regarding the relevance of each pollutant at the distinct stages of flight. Thereafter, a breakdown of the possible consequences of low air quality around airports shall be provided. This breakdown can be supported by practical examples or studies of observed impacts at different airports.

In a second part of the thesis, the state-of-the-art techniques to both measure and estimate the impact of aircraft operations on local air quality will be reviewed. Regarding the estimation of local air quality degradation, a reflection on the different levels of detail achieved and on the data background needed by each method shall be provided. Subsequently, an overview of the guidelines and laws that inform

and regulate the control of local air quality around airports shall be given. This overview shall include guidelines and laws ranging from an international level up to a national and regional level. A correlation shall be provided between the existing laws and the quantification methods previously identified.

Finally, practical examples of action taken to mitigate the degradation of local air quality due to aircraft operations shall be identified. This can include action at both airport as well as national or international level. For each example, a breakdown of involved stakeholders, the expected results and the legal framework of the taken action shall be provided. Concluding this work, an evaluation of the effectiveness of the measures taken to mitigate the degradation of local air quality around airports shall be conducted.

After handing in the bachelor thesis, the results and conclusions of the work will be presented at the Chair of Air Transport and Airport Research. The bachelor thesis will be supervised by Mr. Soares Roque (Chair of Air Transport and Airport Research, VIA).

First Examiner: Univ.-Prof. Dr. rer. nat. J. Reichmuth
Second Examiner: Dr.-Ing. Bastian Kogel

Univ.-Prof. Dr. rer. nat. J. Reichmuth