

Case Study – Vienna Airport



Vienna Airport runways

(Source: flugspuren.at)

Background

Vienna Airport is the largest airport in Austria. It acts as a hub for Austrian Airlines, and in 2018 served a total of 27 million people (representing annual growth of 10.84%) and managed over 240,000 aircraft movements. The airport has two runways (29/11 and 16/34) that are able to operate with no restrictions in terms of aircraft size.

Located 17 km west of central Vienna, the airport is surrounded mostly by rural areas but there are a number of conurbations in the proximity of the airport, particularly Essling and Groß-Enzersdorf to the North, which are particularly relevant for the below described case study.

The airport was privatised in 1992. It is 20% owned by the Province of Lower Austria, 20% by the City of Vienna, 10% by an employee participation foundation, 39.8%, by Airports Group Europe and 10.2% as market free float. It is operated by Flughafen Wien AG and serves as an important airport both for Northern Austria, and also Bratislava, Slovakia, located just 40 km to the West. It is the largest Airport in Austria acting both as a hub for Austrian Airlines and Eurowings, but also as a base for several low-cost carriers.

The airport has three terminals and two runways which enable the airport to serve large aircraft up to the Airbus A380. Traffic at the airport is forecasted to increase, with current capacity expected to be reached in approximately 2025. In anticipation of growth, the 1998 Master Plan for 2015 was made, which detailed a number of expansion projects at the airport. Significantly this included plans for a third runway to help increase airport

capacity and to meet demand under the rationale that such growth has significant local socio-economic benefits.

Approach to the Balanced Approach

Noise is a very important issue for Vienna Airport, with the airport having a considerable noise footprint that includes over two million people. Noise has been of concern of the airport since the construction of its second runway in 1972 with opposition to aircraft noise reaching a critical point when the airport announced plans for the third runway – of which local communities were not consulted. This led to significant conflict with the airport and objections to the runway being approved. In response, the airport embarked on a mediation process with airport stakeholders in 2000 in order to re-establish trust with community members and to ensure that full consultation regarding future noise management interventions and re-assessing the location for the third runway.

As a result of this mediation process, the airport has a long-standing history of seeking to reduce its noise impact. Indeed, interviews conducted in ANIMA Project Task 2.1 identified that the Environmental Noise Directive (END) (Directive 2002/49/EC) and the ICAO Balanced Approach (EU Regulation 598/2014) had little influence on the airport, as the mediation contract went much further than the END did in terms of pro-active action to manage noise. The Balanced Approach came after the Mediation Process and was incorporated into airport’s decision making, however, it had little impact on airport activity due to these existing noise abatement measures and the extensive processes gone through in the mediation process and its subsequently created Dialogue Forum. The result being the successful decline in airport complaints and opposition. Today, changes regarding noise-induced operational restrictions require the involvement of the Dialogue Forum and its many members and can only be implemented after an established procedure has been followed. Existing balanced approach measures implemented by the airport are listed in Table 6.1. The airport follows a number of operational procedures designed to minimise noise impact, and these are particularly influenced by the Dialogue Forum. In terms of restrictions, these are typically imposed by the responsible administration and not by the airport, however discussions in the Dialogue Forum lead to restrictions in the number of flight movements during night that went beyond legal compliance. Significantly for land-use planning, the airport came to an agreement with local authorities and communities to limit the approval of and subsequent construction of new developments in the land surrounding the airport. This agreement was reached in return for a commitment to adhere to noise zone ceilings so that the noise zones would not increase.

Table 6.1 Overview of Balanced Approach in Vienna Airport

Operational Procedures	Land-Use Planning	Operating Restrictions
Noise mitigating descent and ascent techniques based on RNP	In the course of the mediation process, the Flughafen Wien AG (Airport Vienna AG) and the neighbouring communities agreed contractually on the abandonment of building land/housing area in areas, based on the predicted aircraft noise zone of a three runway system, with a	Night flight restrictions for single runway directions/ departure routes between 21:00h-07:00h

	L _{den} of 54 dB or 55 dB, respectively.	
CDO and CCO when possible	Areas subjected to more than 54 dB day and 45 dB night properties can receive between 50%-100% of insulation costs for windows and doors.	Limitation of the number of flight movements during core nighttime of 4.700/a since 2010. In case of the commencement of a possible 3 rd runway: 3.000/a.
Curved Approach on RWY 16 (testing phase)	Noise absorption measures.	Limitation of APU operating time of max. 30 min before take-off/after landing.
RF-Turns after take-off from RWY 16	Winter gardens constructed in highly noise exposed residences.	
Variable parking positions for engine test runs dependent on the wind		

Noise monitoring and data

There are 15 fixed and three mobile noise monitoring terminals in operation at Vienna which continuously record sound levels of overflights and from which day L_{EQ} (6:00-22h) and night L_{EQ} (22:00-6:00h) values are drawn. The fixed terminals are located based on political reasons – to measure noise at highly populated areas and those requested by mayors and communities who used their local expertise to suggest optimal locations. Most of these terminals have been in the same location since 1990. If/when the third runway is constructed, additional terminals will be placed to better monitor noise implications from the expansion.

The three mobile terminals are used to give people data for certain issues or when there is a lack of data regarding, for instance, a complaint or query from the community. They are often deployed linked to complaints or when flight track changes occur.

Modelling uses a wide range of data, including flight tracks, aircraft mix, environmental data, population data, topography and weather data (i.e. noise can reflect down from clouds for example in valleys). Temperature, wind and humidity are also considered. However, despite all of this the airport believes that the main thing that people care about and want is data on the numbers of aircraft overflying given communities, the length of peak/rush hours, and peak noise levels.

Since 1992, the aircraft noise monitoring system FANMOS has been measuring the noise levels of all flights. The radar and flight information required for the recording is provided by Austro Control. This cooperation is done on a voluntary basis in lieu of any national legislation relating to aviation noise management in Vienna. FANMOS merges this data with events registered on the ground by the noise monitoring terminals and is thus able to ensure compliance with prescribed approach and departure routes. Wind force, take-off weight and type of aircraft influence the actual flown route. The data is evaluated and

summarised in a measurement report published online for access by communities at <https://flugspuren.at>. The data made available via FANMOS is supplemented by an annually printed report on noise. The report is written by the Vienna Dialogue Forum¹. The report comes in two forms – a simplified report to communicate headline information and a more comprehensive data report. Noise maps published by the Dialogue Forum are based on the “Sydney Model” to show the regional distribution of overflights that produce peak noise levels above 65 dB, to better reflect the way in which noise is consciously perceived by inhabitants.

For annual calculations, an additional L_{DEN} value is recorded for air events in the evening (19:00h-22:00h) with a surcharge of 5 dB, and during 22:00h-06:00h with a 10 dB weighting.

Data is used to prove the adherence to minimum noise procedures, to analyse flight track data and to modify SIDs to reduce noise impact, to calculate noise zones, and to assist with land-use planning around the airport. Importantly, the airport uses data provided by Austro Control to respond directly to complaints and issues brought up by communities to the Dialogue Forum. Adherence to flight tracks is evaluated on a daily basis, and if there are violations, the airport approaches the ATC for justification – and if none is provided the airline and individual pilots may also be contacted for explanations of non-compliance.

Case Study: Curved Approach (via the Dialogue Forum)

This case study describes the ongoing implementation of the curved approach on a flight path into Vienna Airport to avoid the conurbation of Aspern. In doing so, the intervention would reduce the numbers of people exposed to noise but would also result in newly exposed people in the area of Groß-Enzersdorf. The case study considers aspects of noise-sharing, modelling, monitoring, trials and engagement processes all linked to this one operational procedure. The processes are embedded in the Vienna Dialogue Forum, which itself has roots dating back to a mediation process that began in 1998. The case study thus starts off with an introduction of the Dialogue Forum and its underpinning processes, before turning to the Curved Approach itself.

Vienna Airport Dialogue Forum

In 1998 Vienna Airport published their 2015 Master Plan. This document outlined the plans to turn the airport into a modern hub airport that would link Eastern and Western Europe, thus ushering in a new era of growth in terms of passenger and aircraft movements. To facilitate this growth a central component of the master plan was the construction of a new, third, runway. Shortly after its publication, however, residents expressed concerns about the runway, notably of its potential negative environmental impacts. Concerns lead to complaints and ultimately campaigns against this third runway and included a frustration that such communities had not be exposed to any substantial consultation. Trust in the airport took a significant hit and the airport and local authorities realised that the region could only develop and benefit through airport expansion if both the economic interests of the airport and its citizens were equally taken into account. Aware of the disconnection between resident concerns and the potentially significant benefits of expansion that would be afforded to the region, the airport set on conducting a period of mediation negotiations to find environmental, socially and economically desirable outcomes in the interests of the stakeholders.

¹ <https://www.Dialogue-Forum.at/oeffentlichkeitsarbeit/evaluierungsberichte>

At the time the mediation discussions represented the largest environmental mediation process in Europe. The process was structured in such a way that new emerging issues could be accommodated and that information could be communicated transparently, whilst also giving citizen groups an active role in engaging with aviation experts. Importantly, this included Austro Control – the air navigation services provider that controls Austrian airspace. An Austro Control representative took an active role in the mediation process, being able to explain complicated information about airport's operations (i.e. what is and what is not possible) to stakeholders, whilst also being able to respond to data requests and perform modelling and analysis as required – for instance, when determining the placement of flight tracks. In total, 50 different parties were included in the mediation process. These include the mayors of communities in the vicinity of the airport and of Vienna Districts (the *Neighbours Committee*); the mayors, some action groups, the federal states (the *Dialogue Forum*); the business community (the *Businessforum*); the public at large (the *Visitair Center*); the members of the R merland Carnuntum Region (27 communities between Vienna and Bratislava).

The mistrust that developed from the proposals for a third runway was an important stumbling block in reaching an initial compromise and so the first stages of the mediation process were to re-establish trust between the airport and its community stakeholders. This process was built on the sharing of knowledge through the airports flight track and monitoring system (FANMOS) and through an early agreement to follow the three pillars of sustainability in the mediation process – economy, environment and society. In doing so, the economic and social benefits of the airport were acknowledged by community members, as well as the environmental impacts of airport operations being taken into consideration. Following significant discussions, in 2003 a "partial contract" was agreed on, which outlined set measures to reduce the number of people affected by aircraft noise, and to relieve the burden of noise felt by those living in noise affected areas. Ultimately, this led to the final mediation contract being signed in 2005. The key, legally binding outcomes are:

1. 35 million euros for technical noise protection. The noise limits of the Vienna Airport noise protection programme are well below the statutory limits. Measures include insulation programmes, sound absorption measures and the building of winter gardens at certain residences;
2. Halving night flights. The number of over flights between 23:30h and 5:30h would be gradually reduced to 3,000 movements per year;
3. Limited airport growth due to "noise zone ceilings." Noise zones around the airport will not increase after the third runway is put into operation and the municipalities will not devote any new homes to the noise zone above 54 dB;
4. Longer overflow-free times at night for late aircraft;
5. Environmental Fund for Sustainable Development. Flughafen Wien AG pays 0.20 Euro per passenger per day and 0.60 Euro per passenger per night to a fund to support environmental initiatives in the region. In 2014 the environment fund raised 6.4 million euros;
6. Dialogue Forum Vienna Airport. The dialogue initiated in the mediation process will be continued through a multi-stakeholder Dialogue Forum that would ensure the established close working relationships could be maintained and that consultation with stakeholders would continue going forward.

Noise zones on which these agreements are based were determined in collaboration with local communities and other mediation members, with noise zones eventually being defined as a combination of average noise level contours (L_{EQ}) and number of events (N65). Defined corridors for landing and departure routes were determined with the

community, and an agreement was made so that any increases in aircraft movements would require a reduction in average noise levels for an individual aircraft.

The mediation process also saw the location of the third runway to be determined with the support of all members. It was agreed to place the runway parallel to the slope of existing runway 11/29, at a distance of 2,400 m to the south. This distance could have been smaller (and thus cheaper), however, by moving the runway to such a distance it was possible to avoid overflying nearby residential conurbations. A restriction on this runway was also agreed upon to limit its use in the direction 29L. Moreover, aircraft landing at this runway would be required to use the Curved Approach to avoid overflying the City of Vienna.

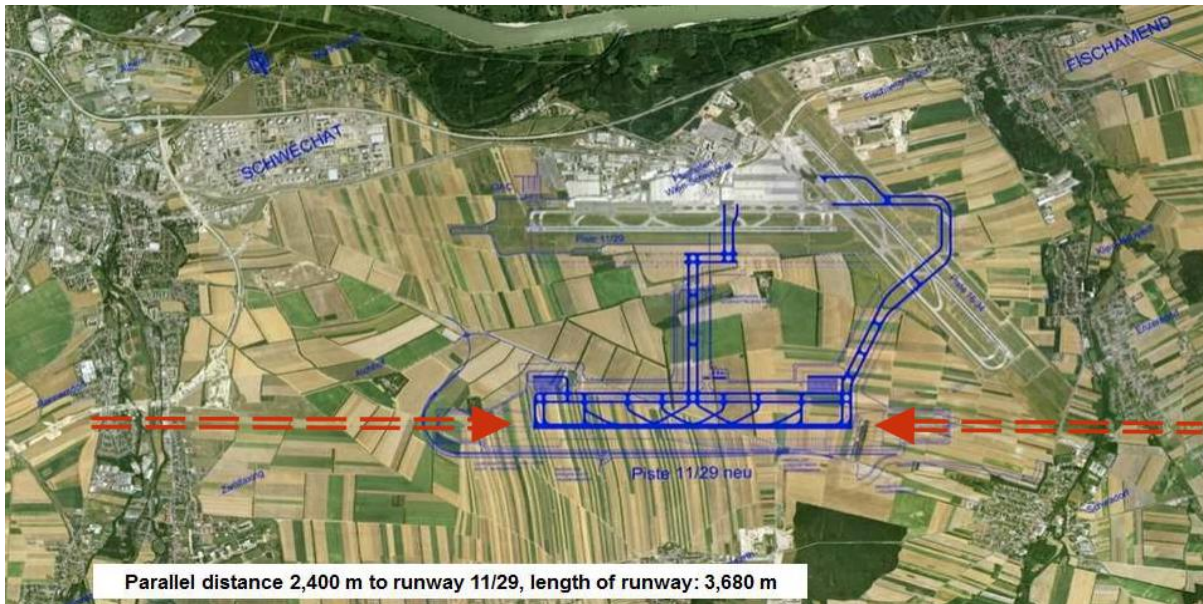


Figure 6.1 – Proposed location of the third runway (in blue)

In terms of operational procedures, several other agreements were made, notably minimum noise routes to avoid overflying communities, and improved flight track procedures, developed through cooperation between the ATC Austro Control and airlines. Such procedures are regularly reviewed by the Dialogue Forum, with any changes made to SIDs investigated with the airports flight track monitoring system (FANMOS) and results are used for further negotiation.

The airport is also subjected to a number of noise-based restrictions. Night flights are required to be gradually reduced to 3,000 movements per year, with night-time departures and arrivals in certain directions prohibited. Night runway closures (runways 11 and 34) have been implemented to avoid over flights of populated areas between the hours of 23:00h-06:00h and 21:00h and 06:00h respectively. Night departure routes have also been developed for all runways with westerly directions.

The Dialogue Forum

The key outcome of the mediation was the creation of the Dialogue Forum to continue the dialogue started in the mediation and that the today's airport believes is a best-in-class example of airport-community engagement. The forum is a non-profit organisation representing approximately 2 million people, across 120 municipalities, the provinces of Vienna, Lower Austria and Burgenland, as well as numerous citizens' action groups. The forum monitors compliance with the agreements made through the mediation process and deals with issues, questions and conflicts that arise on an on-going basis, that are related

to existing airport activity, and any proposals for future expansion. Members of the forum are:

- 14 citizen initiatives;
- 10 regional communities;
- 5 Vienna districts;
- 3 provinces;
- 8 provincial offices and other agencies;
- Airline representatives;
- Air Traffic Control;
- Vienna Airport.

The fact that so many of the stakeholders are present in the mediation process and are committed to forwarding the discussion via the dialogue forum, is a testament to success of this process and the commitment of all participants to continue effective communication and outcomes that benefit the entire region.

The forum meets four times per year and publishes annual documentation as a collaboration between stakeholders which presents annual noise data, explanations behind the figures and any future developments at the airport. This collaborative approach can be seen as unique from the approach taken at many airports, where such documentation is typically produced by airports for the benefit of communities.

The airport always communicates to communities via the Dialogue Forum before implementing any operational change. They believe that not following this process even once can lead to mistrust that can take many years to re-establish. Moreover, the airport tries to include all communities in discussions – not just those directly impacted by proposed changes. This is important as it can help to ensure that voices are heard, as well as limiting any unintended consequences, for example, by avoiding situations where there are “winners” and “losers” from a given operational change. In terms of new complaints or queries from community members, the following process is adhered to.

- 1) The Dialogue Forum call centre to takes initial calls and attempts to answer queries directly over the telephone;
- 2) For more complicated queries, a written response is provided by the forum which may go into more detail regarding airport operations, or to provide already available data;
- 3) In special cases, Austro Control are asked to respond (for example for a call for a new flight track) by looking into the data and performing new modelling. An Austro Control representative will then attend a Dialogue Forum meeting to explain the data and to respond directly and in person to relevant parties. This ensures rich contextual responses can be given with dialogue based on openness and transparency. Austro Control works closely with the Dialogue Forum and all data can be made available to the forum upon request, except confidential information that could, for example, have implications for safety. The appointed person to this task is typically called upon to provide data to help find solutions to challenges and debates regarding noise and to help find agreeable outcomes for all parties.

If an idea is proposed by the Dialogue Forum, it is communicated to Austro Control who checks these proposals in line with ICAO requirements and aircraft performance capabilities, before the performance of modelling. The results are given back to the Dialogue Forum members from the appointed representative directly to stakeholders to help ensure clarity of understanding, to answer and questions, and to learn about further requests for information if appropriate. Calculations and modelling also include carbon and air quality implications.

An environmental impact assessment on the third runway, as designed by the Dialogue Forum, showed that it offered a higher level of environmental protection than statutory compliance alone. Moreover, none of the citizens' initiatives negotiating at the Dialogue Forum appealed against the decision of the runway to obtain approval in the assessment of the runway being "sustainable".

The Curved Approach

As previously stated, one of the outcomes from the mediation process of the third runway was that it would only take landings arriving on a curved approach. Unlike a standard landing procedure where aircraft follow a long, straight-line landing, the curved approach is a satellite-controlled landing method that sees aircraft swivel in just before the runway and start its approach. The curved approach is a relatively new operational procedure available to the industry. In the case of Austria, it had been previously applied at Innsbruck Airport.

By including this procedure in the mediation contract, the concept of a curved approach gained much exposure and communities began to inquire whether such an approach could be used elsewhere to help avoid overflying currently exposed populations.

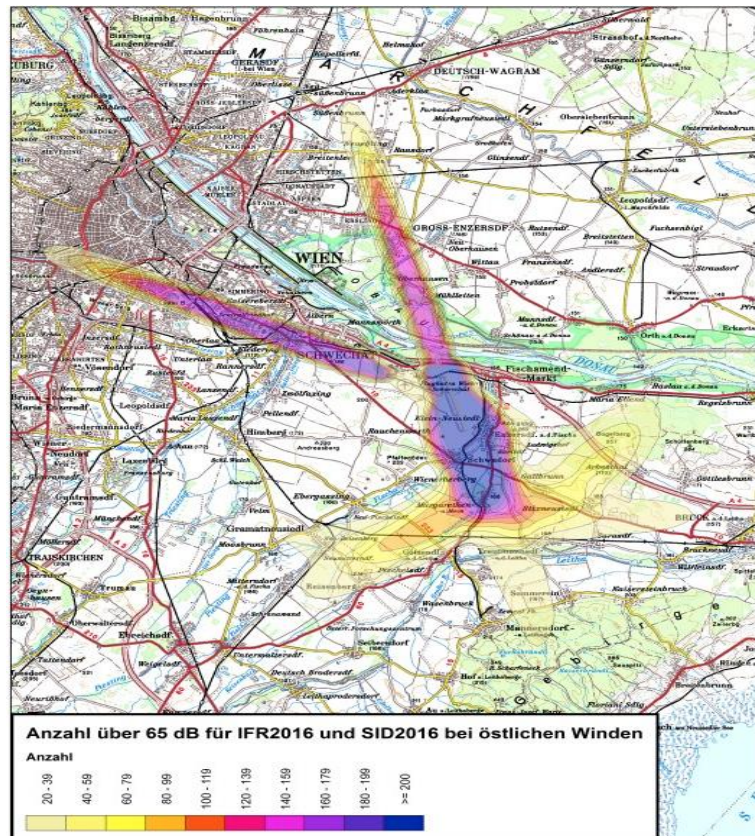


Figure 6.2 – Proposed curved approach

Examples of such communities are Aspern and Essling, located to the north of the airport, and currently being overflown by arrivals to runway 16 (see Figure 6.2). The community requested that a curved approach would be applied so that this large conurbation could

afford significant respite from noise exposure that it had been subjected to since that runway's construction.

The call for this operational change was raised to the Dialogue Forum and it was here that the multi-stakeholder background of the forum, in which proposals were reviewed by all communities, played a key role. The community of Groß-Enzersdorf (approximately 10,000 inhabitants) objected to these proposed changes as they were concerned that the curved approach would result in increased noise exposure in their community. Of three proposed routes they were only willing to accept one (the red route in Figure 6.3).

Community was concerned that the aircraft flying on a curved approach would see greater levels of noise produced on the inside of the curve, where aircraft engines would be pointed slightly closer to the ground. In response, the Dialogue Forum created the curved approach Working Group to find an outcome that would be best suited for all communities. A key consideration of the group is to not transfer the burdens of noise onto others. Thus, proposed flight paths were assessed on their ability to fly over uninhabited areas with the aim of noise delivering newly exposed populations.

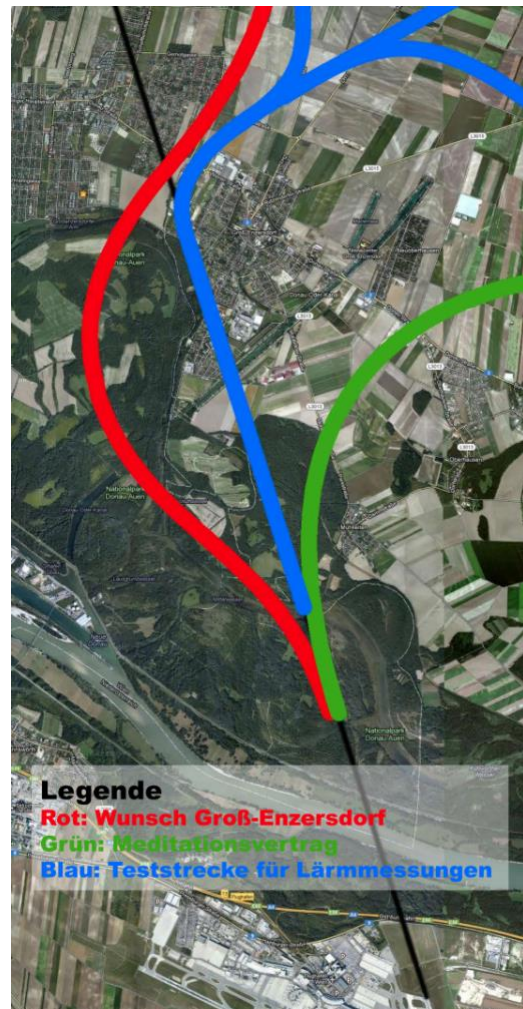


Figure 6.3 – Options for the proposed curved approach

Through discussions in the Dialogue Forum it was decided (in association with Austro Control) to commence trials to assess the impact of aircraft flying on the curved approach. Air quality and carbon emissions were not assessed as a priority in these trials as noise is the primary area of concern for communities.

Noise monitoring terminals were placed symmetrically along the new flight path to assess noise distribution on the ground with one noise monitor placed directly under the flight track and one to either side. Measurements were taken for over 2,5 years – with the time frame determined by obtaining an adequate sample. This required such a long trial as there are significant restrictions on how many aircraft are actually able to use the curved approach. The aircraft must have the technical prerequisites to do so. Secondly, pilots must have obtained the appropriate level of training in order to fly this special kind of route. Thirdly, the aircraft must be flying from an appropriate direction and with the appropriate winds.

In terms of technology, aircraft could easily be adapted to perform the landing, although at present not all are equipped to do so. The airport is considering differential landing charges for those who are not able to fly the curved approach in order to help with the transition to improved technology. The fact that the curved approach was used at Innsbruck meant that some pilots were appropriately trained to fly the new approach,

however, as most pilots were trained by Lufthansa and few airports in Germany use the curved approach, the required training was often lacking. The result was that only 30-40% of aircraft approaches are able to use the curved approach.

The results of these trials presented by the Dialogue Forum showed little change from noise exposure from the conventional straight-line approach to the runway.

Conclusions

Results from the trials also found that there was negligible difference (1,5 dB) between the “inside” and “outside” edges of the curve. This went some way to appeasing the concerns of the Groß-Enzersdorf. The provision of full data and cooperation with Austro Control helped to build trust between the community and the airport, however, concerns were still held about exposing new residents to noise. Such concerns were held both by community members and also other stakeholders (local politicians), who were worried that although the curved approach could potentially reduce the number of people exposed to significant levels of noise, the proposed changes would result in newly exposed people and thus be a difficult decision. At the time of conducting the case study, discussion on the approach have temporarily been suspended due to local governmental elections and the highly political nature of flight track changes, which have the potential to benefit some people, but to potentially leave others worse off in terms of noise exposure..

This case is an example of the complexities of noise sharing and how collaboration between stakeholders – including individual communities – is essential in ensuring that the optimal outcomes have been reached.