

Best Practices in Noise Management

Executive Summary

Commissioned by the Greater Toronto Airports Authority (GTAA)

This report

This report summarises a study undertaken on behalf of the Greater Toronto Airports Authority (GTAA) to research noise management activities and best practices at 26 comparator airports worldwide. The output of the study is a set of potential new programmes and initiatives for GTAA to pursue that are aimed at mitigating the impacts of aircraft noise and/or enhancing community engagement.

Background

Toronto Pearson has the opportunity to become North America's next global hub airport. By 2037, it is expected that annual demand for the airport will reach 85 million passengers and approximately 630,000 aircraft movements. The GTAA understands that, while growth will provide economic benefits for the community and wider economy, it will also bring impacts, including aircraft noise. Therefore, GTAA recognises that any growth must be sustainable and in partnership with local communities. This will include noise mitigations that provide a material benefit for the community.

With this in mind, on the basis of best practice techniques used at other airports around the world, the GTAA wishes to understand how:

- Aircraft noise is managed and mitigated elsewhere in the world.
- Community engagement can be enhanced.

GTAA Noise Management Programme

The GTAA has a Noise Management Programme that follows the principles of the International Civil Aviation Organisation (ICAO) Balanced Approach to Aircraft Noise Management¹. The GTAA Noise Management Programme uses a mixture of elements to mitigate operational impacts, including:

- **Land Use Planning** which identifies an Airport Operating Area (AOA) to support municipalities in developing compatible land uses in the areas surrounding Toronto Pearson.
- **Noise Operating Restrictions** which includes a night flight programme and night-time preferential runway assignments.
- **Noise Abatement Procedures** to minimise the noise impacts on communities in the immediate vicinity of Toronto Pearson during take-off and landing.
- **Reduction of Noise at Source** through restrictions on older/noisier aircraft types.
- **An Enforcement Office** which investigates, audits, and reports on potential violations of the GTAA Noise Management Programme.
- **A Noise Management Office** which investigates complaints, monitors noise levels, and acts as an informational resource.
- **Consultation and Outreach** to engage with communities on concerns about aircraft noise, and build awareness and understanding about the airport's role in the community.

¹ The ICAO Balanced Approach to Aircraft Noise Management is based upon four principles - reduction of noise at source, land-use planning and management, noise abatement operational procedures and operating restrictions. Guidance is provided in ICAO Doc 9829, Guidance on the Balanced Approach to Aircraft Noise Management.

Objective of this study

The GTAA, has a Five-Year Noise Management Action Plan (2013-2017) aimed at reviewing, validating and updating the airport’s existing Noise Management Program.

One element of the current Action Plan is to review noise management programmes at other airports similar to Toronto Pearson, with the objective of identifying similarities and potential new programmes or initiatives for GTAA to pursue (this study). Any new programmes or initiatives should be viable within the existing regulatory and operational environment at Toronto Pearson, and aimed at mitigating the impacts of aircraft noise and/or enhancing community engagement.

The proposals for new programmes and initiatives will form the basis of the GTAA’s next Five-Year Noise Management Action Plan (2018-2022).

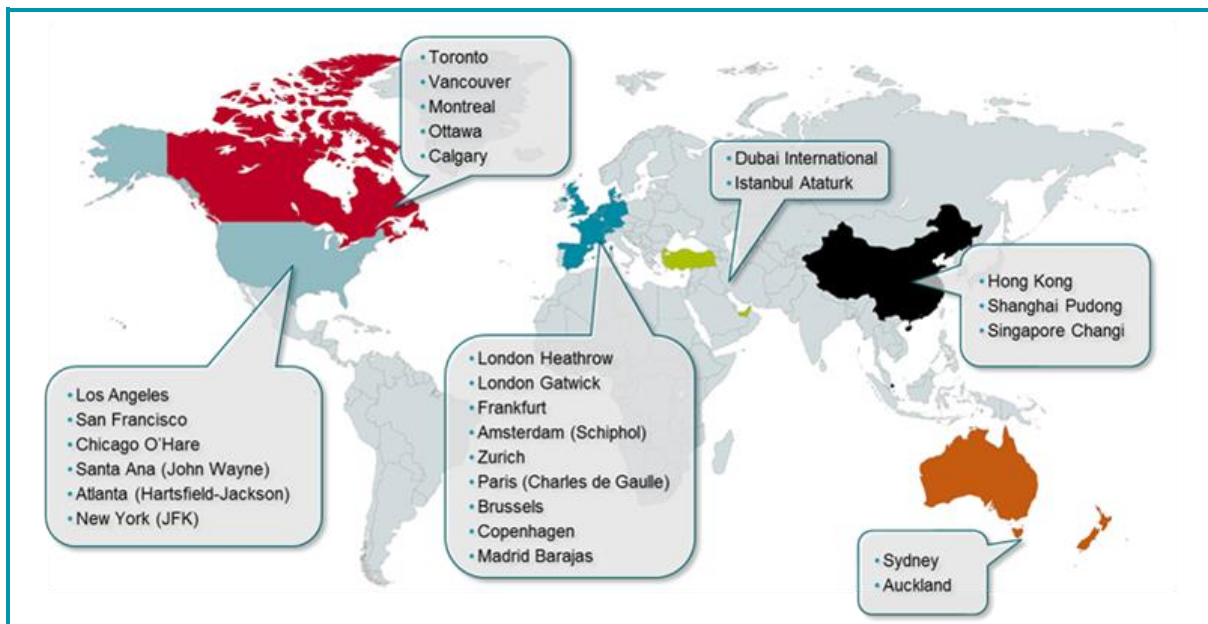
Overview of approach

The study has researched 11 areas of noise management at 26 comparator airports worldwide (see **Error! Reference source not found.**) using publicly available material. Using the information gathered and current/planned noise management activities at Toronto Pearson, potential new programmes and initiatives for GTAA to pursue have been proposed.

Identification of potential new programmes and initiatives for GTAA to pursue

The potential new programmes and initiatives presented in this report have primarily been developed on the basis of best practices in noise management at other comparator airports, the existing regulatory environment and operations at Toronto Pearson, and our best judgement as to which practices could provide a meaningful benefit to local communities and/or GTAA.

An assessment of the financial costs and resources associated with any potential new programmes or initiatives was not in the scope of this study.



Eleven areas of noise management investigated

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| • Quieter fleet initiatives | • Noise abatement procedures | • Independent noise ombudsman |
| • Runway schemes | • Fly Quiet programmes | • Community outreach |
| • Night flight restrictions | • Land use planning | • Noise reporting and metrics |
| • Ground and gate operations | • Noise complaints | |

Figure 1: Airports and areas of noise management researched by the study

Summary of potential new programmes and initiatives for GTAA to pursue

The potential new programmes and initiatives identified for GTAA to pursue are summarised below:

Quieter fleet initiatives

Most of the airports researched have measures to encourage airlines to use the quietest aircraft types in their fleet. It is proposed that GTAA work with airlines to encourage the use of the quietest fleet possible for a given operation (e.g. long-haul, short-haul, regional) through a combination of voluntary initiatives, operating restrictions and, as appropriate, financial mechanisms. Specifically, this should include, depending on the current/future fleet mix, more stringent restrictions on the noisiest aircraft types at night (for example Chapter 3 aircraft) and a programme to retrofit A320 family aircraft with wake vortex generators to reduce the noise generated by this type on approach.

A number of airports in Europe use financial mechanisms, in particular a noise charge added to the landing/take-off fee, to incentivise airlines to use the quietest aircraft types possible. The implementation of these mechanisms could take considerable time and consultation with airlines. Therefore, at this stage, it is proposed that GTAA establish a programme to determine how financial mechanisms could be used to incentivise the quietest aircraft types should they be required in the future.

Night flight restrictions

Over half of the airports researched have a defined night period where a more stringent set of operating rules is applied compared to the day-time. The intention of such restrictions is to reflect the need for a quieter airport operation during those hours where residents in affected local communities could be expected to be sleeping. Toronto Pearson has such a period; however, compared to other airports, it starts later, and with few exceptions, is shorter in duration. Therefore, it is proposed that the current night period is extended. Given that the current night flight regime at Toronto Pearson is regulated by Transport Canada, in the first instance it is proposed that GTAA work with industry and community stakeholders to agree to a separate set of rules in the hours adjacent to the night period.

Another practice is to manage the night flights in terms of number of take-offs/landings *and* overall aircraft noise. Toronto Pearson has an annual night-flight budget, albeit with a unique practice amongst other airports in this study with night-time movement limits of increasing in line with annual passenger growth. Assuming the continuation of this practice, it is proposed that GTAA implement a programme to ensure that the total amount of noise from aircraft at night does not increase – for example through a night quota scheme and/or night-time noise contours.

Runway schemes

Many of the airports researched operate runway schemes for noise purposes. Each scheme is broadly intended to provide some form of predictability of when communities will be overflown, focus aircraft on the least populated/unpopulated areas and/or share noise amongst those living under the flight paths. This practice is most common at night when traffic levels are lower and the runways can be operated flexibly.

The GTAA operates a night-time preferential runway scheme from midnight to 0630 each day. The scheme was designed to impact the fewest residential neighbourhoods. As part of their Noise Mitigation Initiatives Engagement Plan, GTAA and NAV CANADA are reviewing the existing night-time preferential runway scheme and exploring opportunities for a summer time weekend runway alternation scheme. These ideas are still under review and no decisions have been made. Any permanent changes to how the runways may be used would need to go through full public consultation before being implemented.

Research shows that it is not possible to provide 100 percent conformance with any runway scheme. For both the current night-time preferential runway scheme, and any future schemes, it is therefore

important that GTAA set stakeholder expectations by identifying expected levels of conformance. Achievement against these and reasons for non-conformance, should be reported regularly.

Ground and gate operations

It is understood that there are currently limited complaints about ground noise at Toronto Pearson. Therefore, initiatives have been proposed to align Toronto Pearson with typical best practice at other airports without being too onerous. These are to start night-time restrictions for ground running earlier and monitor compliance, and introduce time restrictions on the use of auxiliary power units (APUs) while parked at stands equipped with ground power units (GPU) and preconditioned air (PCA).

Noise Abatement Procedures

Airports operate noise abatement procedures to manage the noise generated from aircraft during the approach and departure phases of flight. Research identified some arrival noise abatement procedures with a proven noise benefit that could be investigated further by Toronto Pearson – (i) a voluntary agreement with airlines not to apply reverse thrust at night, (ii) Low Power Low Drag (LPLD) procedures which reduce noise by safely delaying the extension of flaps and undercarriage, and (iii) investigating options for Continuous Descent Approaches (CDA) which reduce noise by limiting the amount of time an aircraft remains in level flight while on approach. As CDAs can be difficult to implement, both in busy traffic and in terms of achieving limited amounts of level flight, in the first instance it is expected that they would be implemented at night.

Given the amount of land dedicated to industrial use around Toronto Pearson, there could be some merits in investigating if Noise Abatement Departure Procedure 2 (NADP2) provides greater noise benefits to residential communities than NADP1².

In addition to procedures, GTAA should ensure co-ordinated activity by all industry partners on noise activities at Toronto Pearson. This includes (i) forming a single industry body to be the focal point of the operational, policy and best practice aspects of all the programmes and initiatives identified in this report (including nominating one person from each industry stakeholder organisation to be responsible for oversight of noise related activities at Toronto Pearson), (ii) aligning and spreading best practice through a document similar to the voluntary industry code of practice developed in the UK and (iii) developing a standard methodology for future noise related trials.

Fly Quiet programmes

A small number of airports have Fly Quiet programmes. These are voluntary initiatives that publicly compare airline performance against a number of noise related metrics. It is proposed that GTAA establish its own Fly Quiet programme as one way of encouraging airlines to adopt new quieter aircraft, or fly existing aircraft in a manner which minimises their noise impact on the communities surrounding the airport. As a precursor to Fly Quiet, GTAA will need to establish a mature set of candidate metrics that are accepted by airline and community stakeholders. This will take time so, in the interim, GTAA could establish a Fly Quiet programme like that operated at Vancouver.

² NADP1 and NADP2 are guidance on departure procedures published by the International Civil Aviation Organisation (ICAO). NADP1 is intended to provide noise reduction for noise-sensitive areas in close proximity to the airport (but provides more for areas more distant from the airport than NADP2). NADP2 provides noise reduction to areas more distant from the airport (but provides more for areas in close proximity to the airport than NADP1).

Land use planning

Like many of the airports researched, Toronto Pearson has a defined noise contour within which no noise sensitive buildings (e.g. residential properties) should be built.

Like many of the airports researched, and in accordance with guidelines set by Transport Canada and outlined in TP1247E Land Use in The Vicinity of Aerodromes, Toronto Pearson has a defined noise contour within which noise sensitive land uses (e.g. residential properties) should not be located. Transport Canada's guidelines for development of compatible land uses in the areas surrounding airports use the Noise Exposure Forecast (NEF). It is Transport Canada's recommendation that areas within a 30 NEF contour or above should not be used for sensitive land use such as new residential development. Accordingly, Toronto Pearson has established an Airport Operating Area (AOA) which uses well-defined natural and manmade boundaries to approximate the 30 NEF contour on the ground. The Region of Peel, with the cities of Brampton and Mississauga, and the City of Toronto have included the AOA in their Official Plans and have approved associated policies that limit incompatible land uses within these areas for new developments. For infill developments, GTAA has worked with local and regional planning authorities to establish a voluntary compatible future land use plan, including the mitigation of noise impacts through appropriate building design features as well as ensuring notice to buyers of potential impacts is given. Additional schemes³, similar to the Part 150⁴ airport noise compatibility planning programmes undertaken in the United States, could be contemplated.

Noise Complaints

Like most of the airports researched, Toronto Pearson has a process for handling noise complaints. It is proposed that GTAA focus this on enabling tangible actions to improve the noise environment. The day-to-day investigation of complaints and any subsequent follow-up actions should be supported through closer working with operational staff in NAV CANADA and the main Toronto-based airlines.

It is also proposed that, using a combination of new material and material already published on the GTAA website, GTAA produce a formal policy. This should include (i) how to make a complaint, (ii) the information required for GTAA to make a thorough investigation of the complaint, (iii) complaints handling and use of personal data, (iv) how complaints are investigated, (v) how complaints will be responded to (including the type of information the airport will typically provide, what happens when no new information can be provided and how the airport responds to frequency complainants) and (vi) an explanation of how complaints are reported and used to investigate improvements to the noise environment.

In addition to the day-to-day review of individual complaints, it is proposed that GTAA undertake a quarterly review of complaints. The objective will be to identify and understand any patterns in complaints, identify any practicable follow-up actions and explain these to the public. A possible process is shown in Figure 2.

³ Any initiative would need to be voluntary as it would be outside of the current regulatory environment.

⁴ The Federal Aviation Administration Part 150 Airport Noise Compatibility study is a voluntary program under which airport operators can conduct an analysis of noise exposure associated with airport operations, identify land uses that are incompatible with specified noise levels, and recommend a program of alternatives for mitigating these impacts or eliminating incompatible land uses.

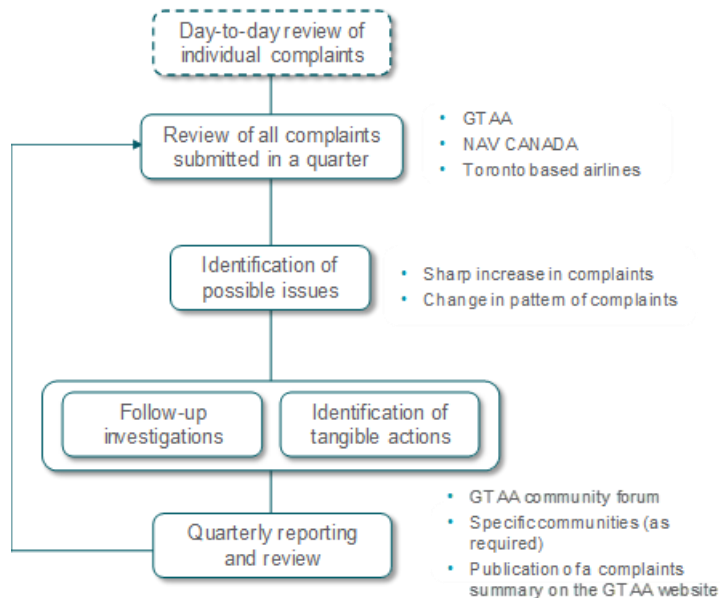


Figure 2: Proposed process for reviewing all complaints submitted in a quarter

Community outreach

Like many other airports, Toronto Pearson has a community forum; the Community Environment and Noise Advisory Committee (CENAC).

The overall aim of the initiatives proposed for this area is to ensure that, while people will continue to be overflowed and dislike aviation noise, CENAC is a truly representative body where all public concerns can be raised and turned into tangible actions to improve the noise environment. This will include CENAC developing its own noise work programme directly linked to community concerns. A considerable amount of forum activity will be orientated around the work plan and understanding/resolving issues.

It should be ensured that the wider community (presently non-CENAC members) is involved in identifying and resolving the concerns to be addressed in by the annual work programme. This could be achieved, for example, by giving the community members of CENAC a wider role in engagement with their communities or by expanding the membership to increase the representativeness of participants. This could be structured around meetings in their local communities (i) pre-CENAC meetings to identify concerns, and (ii) post-CENAC meetings to report back on what action is being taken to help. To be truly successful in achieving this aim, CENAC and the community noise groups in the Toronto area (e.g. T.A.N.G.) will also need to be actively engaged with one another. It is also noted that some airports have established new community forums when there has been a need to increase the level of involvement from communities or where the existing forum has not been perceived as effective or representative.

Over half of the community forums identified by the research are not chaired by the airport, while others operate with a degree of independence from the airport. For example, the San Francisco Airport/Community Round Table is a voluntary committee, and the Chicago O'Hare Noise Compatibility Commission (ONCC) is an inter-governmental agency. At Gatwick, the Noise Management Board has an independent Chairperson who works closely with both the community and industry, and as necessary, arbitrates between the two. Gatwick facilitates the Noise Management Board, with an independent secretariat and third party providing technical support. An additional independent consultant, paid by the airport, advises the community members. Accordingly, GTAA should consider if giving CENAC more independence would support one of the aims in the terms of reference of this study of enhancing community engagement. It is emphasised that in all the examples

cited above, both the airport and other industry stakeholders maintain a strong involvement in the forum and a commitment to progress agreed actions.

An indicative structure for the forum, taking account of the proposals above is shown in Figure 3. This includes working groups to deal with specific matters relating to the work programme and the suggestion for an executive of one community and one industry member to work closely with the Chairman.

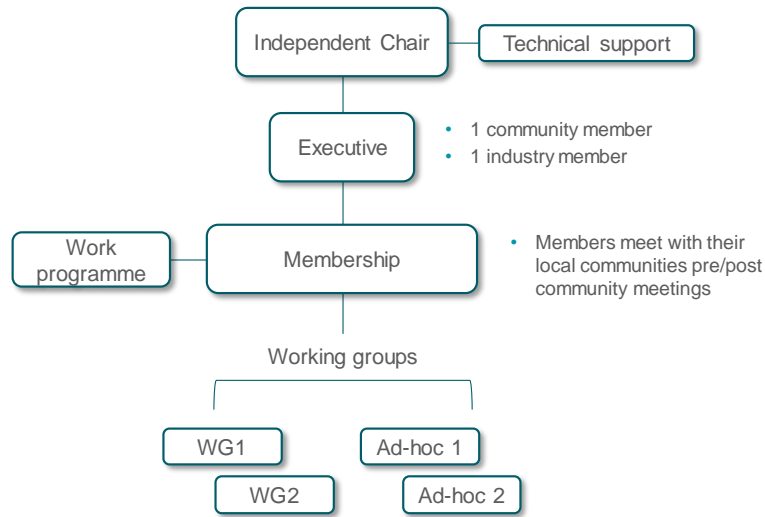


Figure 3: Indicative structure for the community forum

Independent noise ombudsman

A small number of countries researched have a noise ombudsman, an independent body or person responsible for oversight and intervention in noise activities. In the current regulatory environment, Transport Canada places an emphasis on an airport’s noise complaints process and community forum successfully resolving concerns about aircraft noise. When this does not occur, there is no third party with a statutory responsibility to arbitrate on the matter⁵. Instead individuals/communities raise the matter with Transport Canada, local politicians and/or to GTAA staff outside of the noise management office.

Ideally, the proposals made for CENAC earlier would ensure that all complaints that the community does not believe have been addressed correctly or completely by the GTAA process, would be addressed directly in the community forum. Transport Canada, community and industry participation in that potentially independent forum would help ensure that a reasoned collective decision can be taken on the merit of that complaint, and it could either result in a new noise work programme action, or else be rejected on the basis of a broad agreement. Nevertheless, it is therefore proposed that GTAA consider if, in addition to the proposals made in this report (and the joint NAV CANADA/Canadian Airports Council voluntary airspace change communications and consultation protocol), there is a current/future need for a formally designated independent third party to arbitrate between communities and the aviation industry when noise issues cannot be resolved locally. It is noted that it would not be in the control of GTAA to implement such a body. It would require discussion with Transport Canada, and possibly new rules/legislation.

⁵ By comparison, the Canada Transportation Act authorises the Canadian Transportation Agency to resolve complaints regarding noise and vibration caused by the construction and operation of railways under its jurisdiction as well as public passenger service providers.

Noise reporting and metrics

It is common practice to report on data from noise monitors. The challenge is to present this data in a way that is understandable to communities, leads to the identification of any issues and, as appropriate, the need for further action. GTAA has recently undertaken the review of locations for temporary noise monitoring terminals. These should be deployed when data is genuinely needed to support the understanding of issues.

Similar to the handling of noise complaints, it should be ensured that the reporting on noise monitor data is understandable to local communities and is focussed on identifying potential issues and tangible solutions. This includes agreeing with communities what outputs and metrics are meaningful to them, and a standard methodology for analysing noise monitor data (see Figure 4).

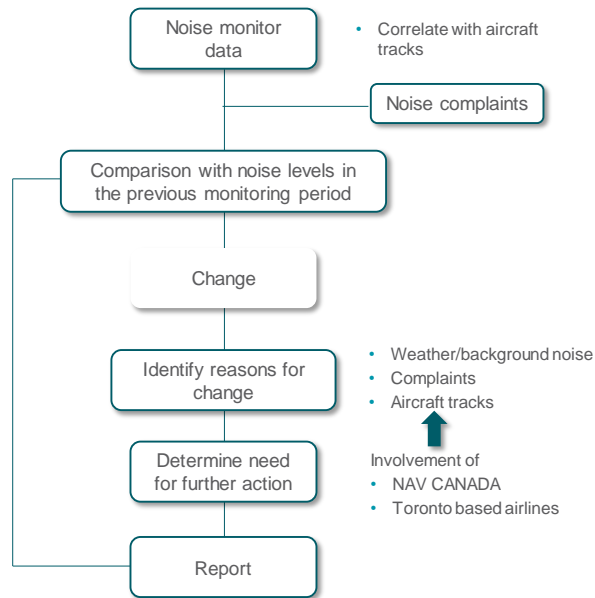


Figure 4: Example process for analysing data from noise monitors

Grouping of potential new programmes and initiatives for GTAA to pursue

The programmes and initiatives summarised above have been grouped into a manageable set of activities. The groupings are summarised in Figure 5. The rationale for the groupings is as follows:

Reducing the impact of aircraft noise: This group of activities aims to directly reduce the impact of aircraft noise – either by reducing the amount of noise generated by an aircraft, or providing some form of predictable break from aircraft noise through runway schemes. Short-term activities are either already underway or envisaged to be achievable/have significant progress made in the next 1-2 years. These are intended to provide ‘quick wins’ to improve the noise environment. Long-term proposals are more complex to implement, potentially requiring considerable investigation, new technology, consultations, trials and changes to existing operational procedures.

Managing night noise: The objectives of these activities are to ensure that the total amount of noise from aircraft at night does not increase and to extend the time during which night noise impacts are managed. Again, the short-term activities are intended to produce some small ‘quick wins’ in the next 1-2 years. The long-term activities are the main programmes/initiatives aimed at managing night-noise at Toronto Pearson. These will require considerable consultation with communities, investigations and changes to existing procedures.

Community & industry engagement: The main objective of these activities is to enhance community engagement, focus the work of CENAC on addressing community concerns about aircraft noise and involve the wider community (e.g. non-CENAC members) in understanding/resolving these concerns. Engagement with industry partners is another objective to ensure co-ordinated activity by all industry partners on noise activities at Toronto Pearson.

Data & reporting initiatives: These activities are aimed at putting structured, evidence based, approaches in place to address issues and enable ongoing improvement to the noise environment around Toronto Pearson. They include using operational data, noise complaints and measurements of aircraft noise to enable tangible improvements in the noise environment.

Examine voluntary initiatives: The objective of this grouping is to examine the need for voluntary initiatives outside of the current regulatory environment to leverage improvements in the noise environment. If taken forward, these activities will require considerable consultation with airlines, Transport Canada and local authorities. Therefore, the intention is to launch these programmes in the short-term so the concepts, and the understanding amongst the relevant stakeholders, are mature enough to progress these activities quickly should they be required in the future.

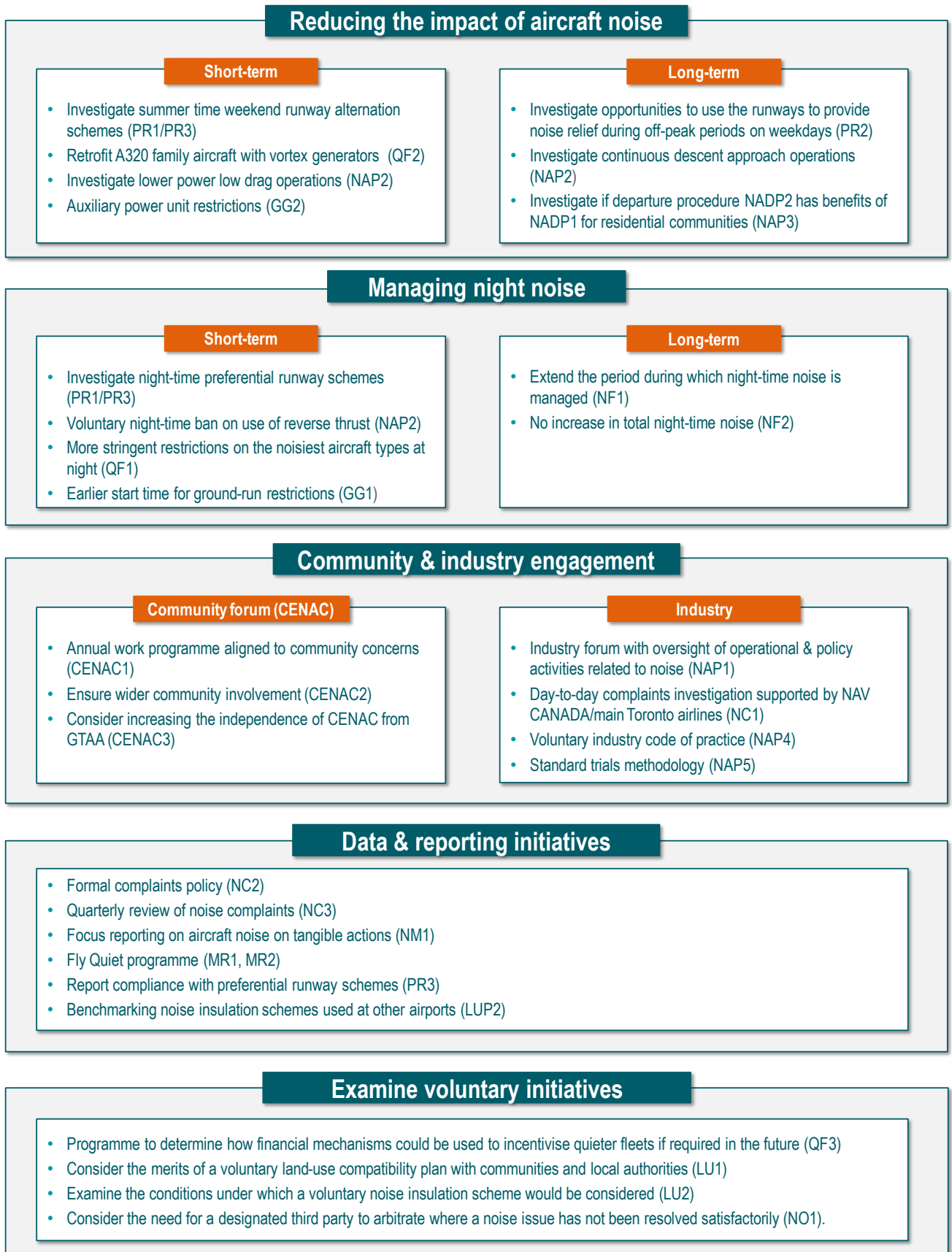


Figure 5: Grouping of potential new programmes and initiatives for GTAA to pursue