1. BACKGROUND

1.1. Airport development timeline

The Red Deer Airport was built during World War II with the purpose to train Allied forces as part of the British Commonwealth Air Training Plan (BCATP) and was known as #36 SFTS (Service Flight Training School). When it re-opened in 1950 it was known as #4 FTS (Flying Training School) and was part of NATO training during the Cold War and eventually became CFB Penhold (Canadian Forces Base).

The City of Red Deer took over operation of the airport in 1965 and the Province extended the main runway 16/34 to 5,528 feet in 1980. The ownership of the airport was taken over on September 1, 1999 by the Red Deer Regional Airport Authority (RDRAA), which includes The City of Red Deer and Red Deer County as stakeholders.

The RDRAA assumed ownership from the Province of Alberta and operation of the airport from The City of Red Deer on September 1, 1999. Where it was previously considered an industrial airport, today the Airport Authority has taken initiatives to attract scheduled airline services and to create a ‘centre of excellence’ for general aviation-related business in the region.

Over the summer and fall of 2016 the primary runway was extended to 7500 feet to better accommodate scheduled commercial flights and charter aircraft.

1.2. Airport users and traffic volumes

Red Deer Airport is home to a wide variety of aircraft and aviation businesses. With over 50 hangars and 250 employees based at the airport, it’s not uncommon to see scheduled commercial flights, maintenance test flights, recreational flights, flight training day and night, and commercial flight operations within a week period. As a centralized airport to many popular locations, Red Deer sees visitors from across Canada and North America.

Every airport has a theoretical capacity limit, in other words, how many takeoffs and landings could be done in one year under perfect conditions. For Red Deer Airport that limit is one quarter of a million movements. Weather, time of day, and market demands result in a much lower number. For the past decade, Red Deer Airport has had anywhere from 37,000 to 50,000 movements per year. With expansion of the airport business the average is expected to rise to 80,000 movements per year. This increase will support the aviation industry and help to diversify the local economy in Red Deer and Central Alberta.
2. NOISE INFORMATION

2.1. General

2.1.1. What is noise?

Noise is a sound that is typically loud or unpleasant or that causes a disturbance. Sound is a pressure wave that travels through the air and is interpreted by the ear drum as a vibration. That vibration then registers in the brain as sound.

2.1.2. How is noise measured?

Noise is measured like a radio wave it has an amplitude (height of the wave) and a frequency (how many waves in a given timeframe) we commonly refer to these measurements as Decibels (dB) and Hertz (Hz). Although frequency is sometimes references when discussing aircraft noise, it is often overshadowed by the amplitude (intensity) of the sound. Most commercial sound level meters will record readings in Decibels using a logarithmic scale. This means that doubling the measurement will more than double the intensity of the noise.

2.1.3. How is noise perceived?

Noise perception is a psychological factor. With any repetitious noise people can, in most cases, become accustomed to it. Many people living near railroads or highways will fail to identify a passing train or heavy traffic after a period of consistent exposure. Aviation noise is typically distinct from other noises and therefore is more difficult to become acclimatised to. When assessing different types of noise a common factor in tolerance is the perceived usefulness of the aircraft that is generating the noise. A loud medical helicopter flying to a hospital in the middle of the city will typically receive fewer complaints than a training aircraft flying circuits at a small airport. The helicopter is also less likely to get complaints about low flying than a small aircraft flying at twice the height above ground.

2.1.4. When is noise a problem?

Most noise is tolerable at various levels for a short period of time as a nuisance. Noise becomes a problem for a community or a business when it classifies as a Hazard, or Annoyance.

2.1.4.1. Hazard

Hazardous Noise has the potential to cause long-term hearing loss. This is identified by the Government of Canada as continuous exposure to sound levels in excess of 84dB. Above this point hearing protection must be provided and below this point (down to 74dB) an investigation should determine any need for hearing protection. Exposure to levels above 87dB requires limits to the length of time that employees can be exposed to the noise. For reference, a Cessna 172 at full throttle produces approximately 86dB at ground level when flying at 150 feet above ground. All circuits are conducted at 1000 feet above ground.
2.1.4.2. Annoyance

An annoying sound can be counted as several instances where nuisance sound was present. That requires repeated exposure to the noise but may not constitute hazardous noise to anyone nearby. This is the most common type of noise that is reported to airports.

2.1.4.3. Nuisance

Nuisance noise is typically a short term or single event that is non-repetitious in nature. It is rare that this type of noise is reported but not unheard of as large or particularly noisy aircraft at low level may spur the reporting of these one-off events.

2.2. Aviation Noise

2.2.1. Sources

Aircraft noise is most commonly generated by 3 primary sources, Propellers, Engines, and Rotor blades. Propellers and rotor blades function in much the same way by displacing air to produce lift or thrust. As the blades travel through the air they create a wake or turbulent air, the creation of this wake is what will be heard on the ground. A similar phenomenon can be experienced with a pleasure craft on the water. Most aircraft that are considered very loud will have propellers or rotor blades that are approaching the speed of sound at the tips as they rotate. A sonic wave will be created similar to the sonic wave that travelled behind the Concord during its supersonic flights and gave the aircraft its unique sound signature. Engine exhaust is the third source of noise that receives frequent attention. As with any fuel burning engine, noise is a by-product of the power generation cycle. Piston engines in aircraft operate similar to a car in that the exhaust travels through a muffler to reduce the noise prior to exiting the engine compartment. Turbo-prop, Turbo-fan, and Turbo-jet engines have no such muffler system but individual engine designs use sound reduction strategies to continue improving the sound levels produced. Secondary noise is frequently generated by aircraft parts. Landing gear, Flaps, Spoilers, and Fairings will alter the flow of air around the aircraft. As the air is compressed or accelerated it will generate medium to high-frequency noise. Although usually less intense than most other aircraft noises there may be a noticeable pitch to these secondary sounds making them more obvious to observers.

2.2.2. Regulations

Aircraft noise is regulated by Transport Canada only for transport category aircraft. These aircraft must meet stringent noise limits that have been established by the international aviation community. Aircraft that don’t meet these standards are restricted from going to many large airports that are vital to most airline and cargo operations. Airports can specify specific certification levels for aircraft that wish to use their airport. At present the Red Deer Airport does not restrict operations nor do they have any operators that would be affected by the most common restrictions.
2.2.3. Existing Mitigation

Red Deer Airport works with its partners to ensure safe and efficient operations. This includes developing and promoting neighbourhood friendly flight paths and advise our neighbours when frequent off hours operations are planned. Many local operators have also identified internal procedures that they use to reduce noise exposure when near the airport.

2.2.3.1. Airspace Design

NavCanada has designed approaches that allow most scheduled flights into and out of the airport to operate with very little overflight of residential areas. Processes are in motion to develop similar procedures for all aircraft flying through the Red Deer Airport control zone.

2.2.3.2. Local Procedures

In addition to the airspace design features implemented by NavCanada, Red Deer Airport has designated circuit patterns for all runways that prevent aircraft from flying over local municipalities during normal operations. Some local operators have taken a step further by conducting risk assessments that will allow them to modify their circuit pattern to avoid overflight of most houses near the airport while still complying with the technical requirements in the aviation regulations. Due to the varied types of aircraft that operate at the airport, this kind of customization would be impossible to safely implement for all airport users.

2.2.3.3. Operational Restrictions

It is possible for airports to place restriction on the types of operations that occur at their airport. When implemented, operational restrictions will commonly identify times during which specific types of aircraft cannot use the airport surfaces. This is effective in preventing aircraft based at the airport from arriving or departing but does not prevent training aircraft of all types and kinds from using the airspace above the airport to practice circuits and other procedures. Progressive restriction on how many aircraft can use the runways can also be implemented but typically have very little effect on the noise exposure level. At present Red Deer Airport does not have any operational restriction in place.

2.2.4. Process for Additional Mitigation

Making a change at an airport can have many cascading impacts as a result of the change. To account for the risks that are presented, a thorough process has been developed by the Airport that attempts to account for all factors that would impact additional noise mitigation.

1. Existing vs. Desired Condition Analysis: The initial phase of change management. This is where a deficiency or potential improvement is identified and the scope of the change is assessed. The desired condition could be as simple as reducing the number of aircrews on the airport frequency by providing a separate frequency for coordinating movements on the ground. That condition would result in many changes to the operation of the airport. Those changes must be identified...
and a plan developed to identify how the change would take place and what risks would present during and after the transition.

2. Stakeholders: Fully identifying the scope of the change allows for the identification of persons and organization that would be impacted by the operation. These people and organizations are the stakeholders in this change.

3. Consultation: Consultation is the process of presenting the plan to the stakeholders. This is where critical input will be received that could identify flaws in the plan or improvements that could be made. During the consultation process, all the factors that were used for the risk assessment process must be reassessed. This process continues until the risk assessment provides a low risk scenario and satisfies the needs of the airport.

4. Approvals: Many changes in aviation require approval from various organizations and levels of management. Each organization has their own processing and approval timelines. Approving a small change following consultations can take several weeks, larger changes can take several months to process through the approvals necessary.

5. Implementation: Once approval is obtained for the change implementation can begin. This should follow the plan that was identified in step 1. Based on the scope of the change and number of stakeholders that must be notified or educated this step can take several months to complete. While expediency is always the goal in aviation, adequate care and concern to smooth transition can slow down processes when necessary to ensure continued safety.

3. OPERATIONAL INFORMATION

3.1. Airport design

3.1.1. Weather

Airports are designed using criteria that account for typical wind directions, atmospheric pressures, and ambient temperatures along with local topography. These factors have an impact on the noise that is projected during airport operations.

3.1.2. Safety standards

There are physical limits present in all aspects of aviation. For airports, there are physical standards put in place for infrastructure around the runway. Included in those standards are approach and departure surfaces that provide a sloped imaginary surface through which obstacles are not allowed to penetrate. The approach and departure surface can extend up to 15 kilometers from the airport along the runway centreline. This is theoretically the lowest that any aircraft will fly when near the airport.

3.1.3. Aircraft operations

Most aircraft operate in a standard fashion with some changes due to restrictions placed on them during the certification process. The standard procedures for aircraft before takeoff involves several checklists
that verify the functioning of their systems. Some aircraft have propellers that can be adjusted in flight. These systems must be cycled through several settings that will make it seem like high power settings are being applied. Similar sound effects are found on takeoff when maximum power is required. This means that most aircraft will climb to gain as much altitude as possible in the least amount of time. Some aircraft will reduce their power setting after a certain altitude for various operational reasons. In some cases, aircraft will require the entire length of a runway to take off while other times they will only need a fraction of that length. This can vary how high an aircraft is when it crosses the airport boundary.

3.1.4. Level of service

Airports are intended for the regular movement of aircraft between geographic locations. To enable free movement under any conditions, several studies are required to determine the optimal orientation for the runways. The orientation will be linked to the prevailing wind direction. This allows aircraft to takeoff into the wind, which is the safest practice for any aircraft operation. Once the runway direction is established there are very few instances where the orientation can be effectively changed.

3.2. NavCanada

3.2.1. Role

NavCanada provides Air Navigation Services for all civil air traffic in Canada. This includes the establishment of routes between airports, known as airways, development of instrument based approaches to airports, and providing navigation and weather services to aircrews. At Red Deer Airport NavCanada provides traffic advisory and weather services to local aircraft. They do not control the movements of aircraft and cannot provide instructions to aircrew.

3.2.2. Capabilities

NavCanada conducts regular reviews of airspace and procedures to determine how best to use the area that is available by maximizing occupancy without contravening the regulations that they must abide by. They can conduct consultations with local user groups to determine the most effective way to move aircraft through the air.

3.2.3. Restrictions

NavCanada cannot change any existing regulations established by the Government of Canada pertaining to aircraft or aircraft operations. They are also restricted in their ability to impact airport operations as they must comply with any restrictions or operating procedures that have been put in place by the Airport Operator and approved by Transport Canada.

3.2.4. Process

Review and change of procedures can be initiated by NavCanada at the Local, Regional, or National level. Typically, a deficiency or potential improvement will be identified in the existing system to provide an issue to be resolved through the change process. Internal assessments will be conducted to determine
potential course of action to arrive at a solution. These options are then developed to provide detailed analysis of the manpower that would be required to implement them and the risk that would be realised during and after implementation. The assessments are forwarded to upper management at the National level for final review and consideration before an option is picked for final development. Following final development, the plan is released to the public for consultation. These consultations allow affected parties such as airlines, airports, and private operators to assess the impact of the change on their operation and provide feedback or requests for change based on their review. Following the consultation process minor changes may be done based on the feedback received. The change will then be submitted to Transport Canada for approval. Once approval is obtained the change will be published in accordance with the international standards for aviation information.

### 3.3. Transport Canada

#### 3.3.1. Role

Transport Canada regulates all civil aviation activities in Canada. All airports, airlines, pilots, and NavCanada must follow all Transport Canada regulations. Transport Canada will enforce all existing regulations and through the Civil Aviation Regulatory Advisory Council (CARAC) process will add/delete/amend regulations as appropriate.

#### 3.3.2. Responsibility

Transport Canada is responsible for investigations into regulatory infractions. These infractions are related to the certification of any aircraft that are required to meet specified noise limits. These limits on noise are internationally recognized and have been in place for several decades. Most small aircraft are incapable of reaching a noise level anywhere near the maximum permitted for most airports.

#### 3.3.3. Level of Involvement

Transport Canada will investigate regulatory and procedural infractions. As noise is regulated through aircraft certification there is little that can change the sound signature of any given aircraft. When a noise complaint is escalated to Transport Canada they are limited to investigating whether all procedures were followed appropriately by the flight crews. Transport Canada will not typically mandate specific noise mitigation measures for an airport but may encourage their development is extreme cases.

### 4. DOCUMENT ENQUIRIES

Enquiries or questions related to this document may be directed to:

Graham St. Thomas  
Manager, Safety and Security  
Red Deer Airport  
Phone: 403-886-4388  
Cell: 403-350-6766  
g.stthomas@flyreddeer.com