Meeting the Needs of the Alberta Oil Sands Industry
The Expansion of the Shell Albian Sands Aerodrome

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ABSTRACT

To accommodate passenger demands associated with the local Alberta oil sands industry, Shell Canada Ltd. is expanding the capacity of their Albian Sands Aerodrome. This aerodrome is a key transportation component for the accessing of oil sands developments to north of Fort McMurray and supports an industry that provides a major contribution to the Canadian economy. Over the last century, the Alberta oil sands industry has relied upon an evolving transportation system including river paddle-wheelers, float planes, roadway and more recently air. The provision of an efficient air service to this area is critical in the transportation of many thousands of industry employees to and from their homes located across Canada.

The existing aerodrome commenced operations in 2008 and is currently accommodating approximately 200,000 passengers annually. The aerodrome includes a 7500 foot runway; apron/parking stands to accommodate two Code C aircraft and two Code B aircraft, an air terminal building that accommodates approximately 120 people and various equipment facilities relating to emergency response, operations and maintenance.

Recent growth in passenger traffic has resulted in capacity issues on the terminal building apron, the terminal building itself, the groundside staging areas/access roads and the groundside facilities for maintenance equipment. The proposed expansion will increase the size of the apron to accommodate a total of five B737 Code C aircraft (including provision for collection of de-icing fluids), increase the size of the terminal building to accommodate 300 passengers, provide a groundside staging area for 20 highway buses and provide improved facilities for emergency services and maintenance equipment.

The expansion of the groundside staging area incorporates the existing operational procedure of limiting the use of private vehicles, with passengers arriving and leaving the aerodrome via highway buses. The new staging area will incorporate low energy LED illumination.

The expanded terminal building will be designed in accordance with the Canada Energy Code for Buildings with the intent of minimizing the electrical and thermal loads at this sub-arctic location. Design features such as heat recovery systems, occupancy sensor systems and the locating of windows and doors will assist in minimizing these loadings. The provision of low flow appliances and water-free urinals will reduce the costs of truck hauling both potable water and sanitary waste.

1. INTRODUCTION

The Shell Albian Sands Aerodrome is located to the north of the City of Fort McMurray in the Province of Alberta and, within the Athabasca Oil Sands Area (AOSA). This facility, in conjunction with several other aerodromes in the area, provides a key component of the transportation system that services local oil sands developments. These oil sands developments are part of an industry that provides a major contribution to the Canadian economy and has experienced unprecedented growth in recent years. This paper includes:

- Some history into the local oil sands industry
- The historical development of the transportation system in the area
- A description of the existing aerodrome facilities
- An overview of the proposed aerodrome improvements
- A “look to the future” as it relates to the anticipated continued growth in the area’s oil sands developments and related air transportation requirements.

2. OIL SANDS HISTORY

There is a long history to the Alberta oil sands industry. The first documentation of the oil sands was by Peter Pond in 1778. However, it is acknowledged that the area’s indigenous peoples previously knew of bitumen in the oil sands and used it for the waterproofing their canoes. In the late 1800’s, the Canadian government began geological surveys and experimentation related to the separation of the bitumen from the sands. In the early 1900’s, the province of Alberta began research in “hot-water separation” which

became the basis for today's thermal extraction processes. By the late 1940's, viable extraction and upgrading processes were being developed as were growing estimates of the available reserves. During the 1950's and 1960's, various companies pioneered serious exploration, development and production of the oil sands. These companies included the Great Canadian oil sands (Suncor), Royalite (Syncrude) and the Shell Oil Company of Canada. Since that time, numerous other companies have joined in this exploration, development and production in the Athabasca Oil Sands Area. It is estimated that production had grown to approximately 1.5 million barrels per day (bpd) by 2012. It is forecast that production will continue to increase to approximately 3.8 million bpd by 2022 and approximately 6.0 million bpd by 2045.

3. TRANSPORTATION SYSTEM HISTORY

Access to Fort McMurray and surrounding areas was initially via river transportation which included sternwheelers and barges. Fort McMurray operated for many years as a freight storage/warehouse and shipyard center. A good portion of the goods received from the south were river transported further north on the Athabasca River to Lake Athabasca, then on to the Mackenzie River and into the arctic. The early 1900's also saw the use of float airplane service although it was primarily for people transport and miscellaneous small cargo. In 1925, the Alberta and Great Western Waterways Railway reached Fort McMurray. The arrival and development of the railway signaled the start of the decline of river transportation. Fort McMurray's first airport was opened in 1943. That modest facility has since grown in importance to the area such that in 2013, the Fort McMurray airport experienced over 1.2 million passenger movements. Additionally, there are now four major aerodromes in the Fort McKay area to the north of Fort McMurray. These aerdromes include Albian Sands (Shell Canada), Mildred Lake (Syncrude Canada), Horizon (Canadian Natural Resources Ltd.) and Firebag (Suncor). Together, these aerodromes handled approximately 635,000 passenger movements in 2011.

These passenger movements are for the most part related to the large scale movement of personnel employed in the development of the various oil sands projects in the area. As production continues to increase, personnel requirements (construction, maintenance staff and permanent operators) will continue to put pressure on the capacity of existing aerodromes such as Shell Albian Sands. The remainder of this paper will focus on the proposed plans for infrastructure improvements at the Shell Albian Sands Aerodrome.

4. EXISTING AERODROME FACILITIES

The Albian Sands aerodrome is classified as a "registered aerodrome". By definition, a registered aerodrome has been designed as "certifiable" (which all airports must be). This means that provisions have been made for future upgrading to "certification" and "precision approach" is so desired. Some of the features of this particular registered aerodrome, originally commissioned in 2008, include:

- a paved runway 7,450 feet long by 148 feet wide
- Transport Canada Code: 4C Non-Precision Approach
- GPS Approach Procedures: Minimum ceiling visibility 250 feet
- Visual Aids: high intensity edge lights, PAPI, SSLAR approach lighting systems, illuminated windsocks, ARCAL, aerodrome beacon, pavement markings and airfield guidance signs
- Weather Observation System: Type III
- Estimate current annual passenger movement of 250,000

Note: The Transport Canada Code "4C" for the aerodrome indicates a field length in excess of 5900 feet (Code Number 4) and facilities capable of accommodating aircraft with wingspans between 118 and 170 feet and an outer main gear wheel span of between 30 and 46 feet (Code Letter C). For reference, aircraft accommodated within Code 4C include the Airbus A319/A320/A321 as well as the Boeing B737's.

The existing apron at the aerodrome has a capacity to park (3) Code C aircraft simultaneously. The original intent for apron operations was for aircraft to both "power in" and "power out" which, negated the need for aircraft tugs. Some of the shortcomings of the original operational plans include:

- The first plane “in” was required to be the first plane “out” as well
- Jet blast issues from departing aircraft on those parked behind it
- Taxiing and parking constraints created with more that (3) aircraft on the apron at the same time

The existing terminal building has had space limitations for some time – primarily for holding passengers awaiting their outbound flights (as arriving passengers typically exit the aircraft and secure airside area via a gate, directly the bus parking lot area). While the facility is capable of accommodating passengers for a single flight, there are frequent occasions where passengers are on site for awaiting multiple out bound flights. These occasions are increasing in frequency due to an increasing number of daily flights as well as the unavoidable delays in departing aircraft (weather, delays in arrival of transport buses, etc.). During these periods, it is common to have hundreds of passengers either waiting on the transport buses or walking around in the vehicle parking lot area.

Some details on the existing terminal building include:

- Consists of (5) - 12 foot x 60 foot modular units containing a lobby, check-in area, security/x-ray area, waiting area, washrooms and a radio operations office
- Waiting area accommodates 120 people
- Baggage Holding area – consists of a modular unit attached to the Terminal Building for temporary storage of departures baggage prior to loading onto the baggage tugs/carts

The existing vehicle drop-off and parking area is a gravel surfaced parking lot that primarily accommodates highway size passenger buses. The vast majority of air passengers arrive at the aerodrome via these passenger buses. This is an efficient way of moving personnel between the various work sites/accommodation camps and, provides a safety advantage by reducing the number of private/small vehicles off already busy local roads. While the existing parking lot is a gravel surfaced area with no real delineation or traffic control, it does function relatively well.

Other supporting facilities associated with the aerodrome include:

- Administration building (remote from the Terminal Building)
- ERT (Emergency Response Team) trailer
- ERT tent (houses two ARFF (aircraft rescue and firefighting) vehicles)
- FEC (Field Electric Centre) – main aerodrome electrical feed and transformer
- Bowser Tent (heated bowser storage)
- Fuel storage tanks

5. PROPOSED AERODROME IMPROVEMENTS

Shell Canada has identified the need for various aerodrome improvements. These improvements are intended to improve on the existing capacity problems and operation issues as well as to build in additional capacity to accommodate the anticipated growth in passenger traffic at the aerodrome in the years to come.

The main drivers for the Shell Albian Sands Aerodrome Infrastructure Improvements are the need for the following:

- Increased airside capacity to accommodate passenger aircraft by increasing the apron area by approximately 50%
- Increased Terminal Building capacity to accommodate 300 passengers at any given time (with consideration for additional expansion to accommodate future passenger growth)
- Provisions for future expandability of the Terminal Building departure lounge to accommodate a further 180 passengers
- Improved groundside parking/loading/unloading areas to accommodate 20 shuttle buses and 25 light duty vehicles.

One of the major expansion components will be the apron area. The chosen design aircraft for the apron expansion is the B737. The major change or modification to the existing apron operations plan will be that the current “power-in/power-out” operations will change to “power-in/push-out”. This change is significant in that the aerodrome will now require appropriate aircraft tugs as well as trained personnel.

Other notable features associated with the proposed apron expansion include:

- Accommodates (2) B737-700W or smaller and (3) B737 – 900W or smaller aircraft (with parking configured for all planes to arrive and depart at any time)
- The minimizing of passenger walking distances between the terminal building and the parked aircraft
- New pavements predominantly asphalt (with the exception of wheel stand areas which will be constructed in concrete)
- Improved apron lighting levels
- A power-in/power out de-icing area in the southwest corner of the apron area which can be operated while all (5) parking positions are occupied
- Mitigation or reduction of jet blast to velocities less than 56 km/hour in areas used by personnel and mobile equipment
- Incorporation of a 10,000 litre glycol storage tank (for truck haul removal and off-site treatment)
- Ground support vehicles capable of supplying aircraft with potable water and discharged aircraft wastewater
- Improvement of apron lighting levels to 20 lux at a height of 2 m above the apron with a uniformity ration (average to minimum) of not more than 4:1
- Relocation of the existing AWOS (Automated Weather Observing System)
- Conforms to Transport Canada recommendations

The other major expansion component of this project will be terminal building which as noted previously is significantly undersized for current operations. The new facilities are planned to be staged/phased such that the aerodrome is able to safely operate during construction.

The design of the new terminal building evolved from the following strategy:

- Taller forms/structures are to anchor the south-east corner against prevailing winds with covered canopies at entrances
- Building components that require natural light/glazing are to be located along the south-east, south and south-west to take advantage of summer and winter natural light – natural energy from the sun
- Building service components that require fewer windows are to anchor the opposite north-west corner against winter winds
- Service vehicle access/loading is to be located along the northwest side
- Use of prefabricated materials and finishes to lessen wastage and efficiency in construction

Some of the features of the new Terminal Building include:

- Capacity to accommodate 300 passengers at any given time (includes the existing Terminal Building
- Provisions for future expansion to departure lounge to accommodate a further 180 passengers
- Approximate total floor area (including arrival/departure baggage areas) of 1200 m2
- Improved baggage handling equipment (for both arriving and departing passengers)
- Improved passenger screening facilities

The existing vehicle drop-off and parking area will be re-designed to support the new Terminal Building and the design passenger volumes both arriving and departing the aerodrome. Angled bus parking will be provided between the Terminal Building and Airport Road. The buses will enter directly from Airport Road in a defined route and exit the aerodrome using a common route with that of the light vehicle passenger loading/unloading traffic. The new parking/staging area will accommodate parking of 20 highway buses simultaneously.

6. AIR TRANSPORTATON – A LOOK TO THE FUTURE

The various improvements to the Albian Sands aerodrome are considered to meet the needs of Shell Canada for their chosen design horizon. As it relates to the general area of the Athabasca Oil Sands, the Government of Alberta is taking a role in the coordination of infrastructure development – including aerodromes. The desire is that infrastructure development that reduces the oil sands industry's needs for specific infrastructure. Rather than specific infrastructure (ie. aerodromes and roads) for individual development projects, there would be a regional and integrated model that would minimize infrastructure development and the impacts that come with it.

As it relates to aerodromes to the north of Fort McMurray and the areas surrounding Shell Albian Sands, there are three other aerodromes that are capable of supporting a regional infrastructure model to support this predominantly open pit mine area. These aerodromes include Mildred Lake (Suncrude Canada), Horizon (Canadian Natural Resources Ltd.) and Firebag (Suncor). These four aerodromes are considered "primary" and well suited to provide air service to a number of oils sands developers, not just the aerodrome. It is noted that these four aerodromes handled approximately 635,000 passenger movements (2011) or, about 88% of the regional area. The remaining 12% of the passenger movements are associated with the remaining 43 active and public aerodromes in the Athabasca Oils Sands Area (which are generally noted as providing scheduled passenger services and supporting the oils sands industry, forestry, mining and private recreational activities.

Given the above, the Shell Albian Sands aerodrome has the ability to support this desired regional and integrated development model, which it currently does. As we look to the future and the completion of the currently proposed improvements, this facility will continue to be able to serve as a primary regional facility.

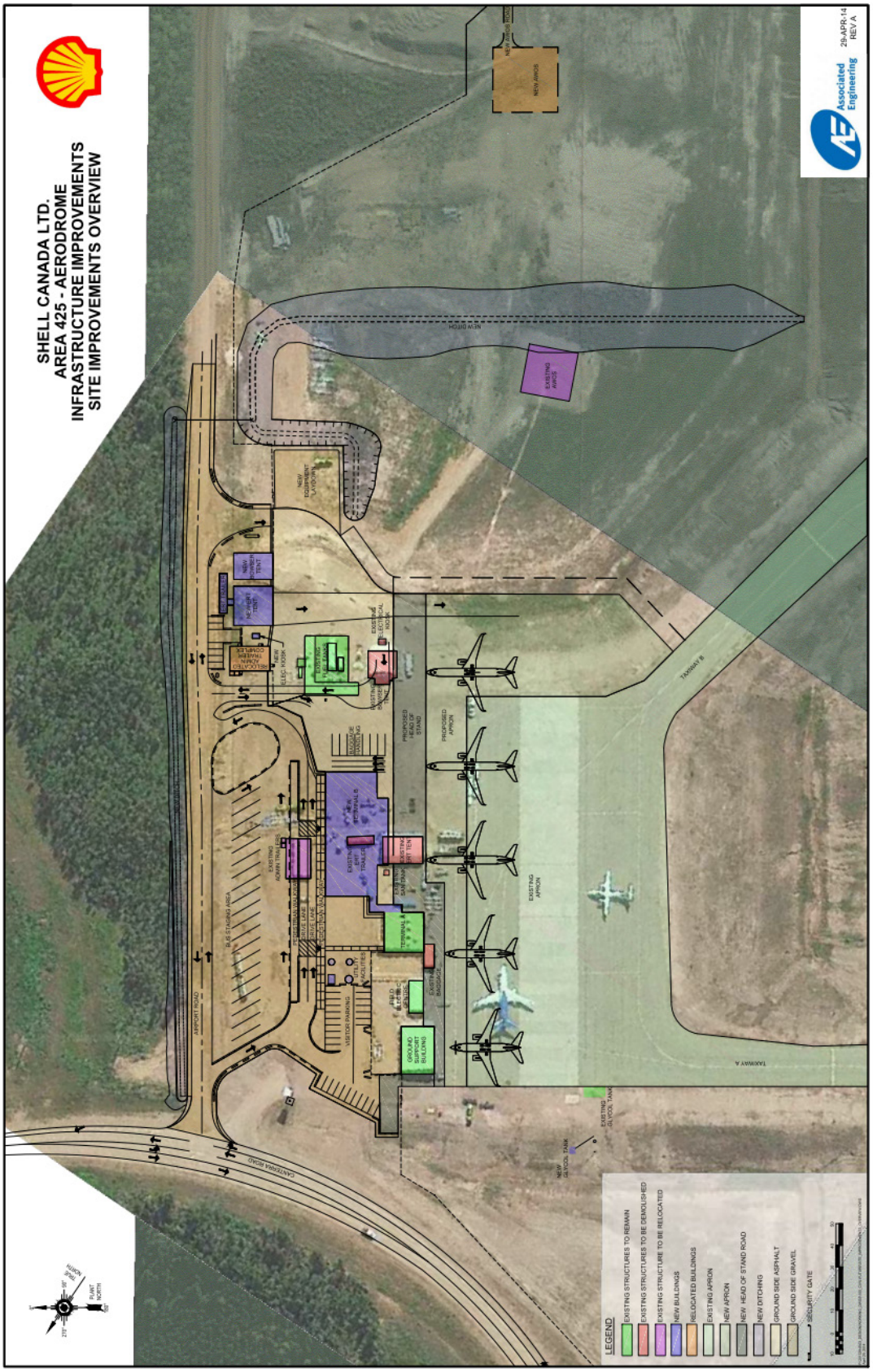

Figure 1: Area 425 – Aerodrome - Infrastructure Improvements - Site Improvements Overview

Figure 2: Athabasca Tar Sands in Alberta, c. 1900-1930
(Source: file from the Wikimedia Commons)

Figure 3: A geological Survey of Canada field party hauling a scow up the Athabasca River, 1914.
(Source: Historical Overview of the Fort McMurray Area and Oil Sands Industry in Northeast Alberta, Report, Alberta Energy and Utilities Board, May 2000)

Figure 4: Athabasca Oil Sands Map. The three oil sand deposits are known as the Athabasca Oil Sands, the Cold Lake Oil Sands, and the Peace River Oil Sands.

Photo: Rex Terpening

Canadian Airways Ltd. Junkers W34
at the dock in Fort McMurray - 1936

Photo Courtesy Rex Terpening

The Snye, Ft. McMurray, were it all began, circa 1936.
All of the aircraft shown were operated by Canadian Airways Ltd.
L to R: Fairchild 82, Two Fairchild 71s and two Junkers W-34s.

Figure 5: VES – Fort McMurray, Alberta (Source: NWT and Y History project - Fort McMurray, http://www.nwtandy.rcsigs.ca/stations/mcmurray.htm)

Figure 6: This aerial photo of Ft. McMurray from the 1940s.
http://www.nwtandy.rcsigs.ca/stations/mcmurray.htm)

Figure 7: Aerial photo of Ft. McMurray, date unknown.
http://www.nwtandy.rcsigs.ca/stations/mcmurray.htm

Figure 8: Aerial photo of Ft. McMurray, date unknown.
http://www.nwtandy.rcsigs.ca/stations/mcmurray.htm