

The logo for the Vernon Regional Airport Master Plan. It features a stylized graphic of four vertical bars in blue, green, and orange. To the right of the graphic, the text "VERNON" is in a large, bold, blue sans-serif font. Below "VERNON", the words "Regional Airport" are in a smaller, blue sans-serif font. A horizontal line separates this from the words "MASTER PLAN" which are in a grey sans-serif font.

VERNON
Regional Airport
MASTER PLAN



October 2016

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1.0 SUMMARY AND PLANNING CONTEXT

The Airport Master Plan is the City's vision for the future development of the Vernon Regional Airport. The plan provides guidance for decisions related to land use, maintenance and new capital investments to accommodate anticipated growth over the next 20 years.

Significant changes have occurred in the aviation industry and in the community over the last several years. Economic growth in Vernon and in the Okanagan has significantly impacted city development and its employment base. This growth changed the level and the type of the airport's usage for personal and corporate users. This new Airport Master Plan has been developed in order to respond to those changes.

The goals of the plan is to ensure that the existing assets at the airport are maintained in a sustainable manner, the investment in new facilities are made with a clear understanding of the outcomes and that the area can continue to develop into a thriving employment hub for Vernon. Most importantly, the Airport Master Plan aims to ensure that the Vernon Regional Airport is able to continue operating safely.

This plan aims to accomplish the following objectives:

- Identify the state of existing airport assets, including required short term maintenance and repair work
- Identify anticipated demand at the airport over the next 20 years
- Identify required projects to meet this anticipated demand
- Provide a strategy to complete those projects

The plan achieves this by proposing the following major initiatives:

- Rehabilitating, but not extending, the runway length
- Upgrading and improving the terminal building to a permanent structure
- Constructing new apron, tie down areas and a new taxiway
- Constructing a dedicated helipad
- Completing upgrade, maintenance, and safety projects to improve airport operations
- Providing a leasable area for new aircraft hangar space
- Initiating discussion with the Agricultural Land Commission (ALC) to explore development opportunities for related employment lands along Tronson Road, north of the airport

The following chapters present the technical analysis to address the initiatives outlined above.



Much of the discussion surrounding the airport in recent years has been with regard to an extension of the runway to allow new users and aircraft type to access the airport. However, a runway extension is not recommended as part of this plan. At an estimated \$5.2 million, the runway extension represents a very large investment for the community, and such an investment should provide a very clear benefit. Currently, the runway length meets the needs of approximately 97% of aircraft movements at the airport. Based on the economic impact analysis for various development scenarios, the runway extension offers only a marginal increase in economic activity and would have a detrimental impact on surrounding neighbourhoods, particularly with regard to noise and development potential. Transport Canada new edition of Aerodrome Standards and Recommendation Practices (TP312 5th Edition), also determined that, due to the airport's location and the location of existing buildings, future extension of the runway is not possible under the 5th Edition without considerable costs associated, if it is not fully operational by September, 2017.

1.1 PLANNING CONTEXT

Vernon Regional Airport is much more than simply a facility for planes to land and take off. It is also an emerging economic hub in the city. There are many small and locally owned companies that operate out of the airport, including those in the business of aircraft construction and repair, tourism and post secondary education. A well run, well maintained airport would allow those businesses to grow and prosper, contributing to Vernon's economy and quality of life. This activity does, however, take place in a relatively unique context. Vernon Regional Airport is surrounded by residential development, as the city has continued to grow around the airport lands. Care must be taken to minimize the impact of the airport operations on surrounding residents and to ensure that future growth in the surrounding area considers the impact of the airport.

Three key City of Vernon plans have guided the decision making during the development of the Airport Master Plan: the Official Community Plan, the Economic Development Strategic Action Plan and the previous 2000-2010 Airport Master Plan.

Official Community Plan

Vernon's Official Community Plan is the guiding document for growth and development in the City. It is based on the community's vision of what kind of place Vernon will be in the future – a vision developed as part of an extensive public engagement process. The community's vision is encapsulated in the OCP's Guiding Principles:



- Foster prosperity for people, business and government
- Protect and preserve green spaces and sensitive areas
- Ensure housing meets the needs of the whole community
- Create a culture of sustainability
- Protect agricultural land
- Create strong, compact and complete neighbourhoods
- Provide alternative transportation
- Revitalize the Downtown
- Create a youth friendly city

The Airport Master Plan is consistent with these guiding principles.

Vernon Regional Airport is located adjacent to the Waterfront Neighbourhood Centre Plan, a supplementary document to the OCP that provides additional detailed policies for that neighbourhood. The Waterfront Neighbourhood Centre is envisioned as a village centre along Okanagan Lake that is characterized by a mix of shops, restaurants, apartments, townhomes, a new lakeshore park and other amenities. As much of the neighbourhood centre is impacted by the activity at the airport, careful consideration must be given to how these two areas interact.

Economic Development Strategic Action Plan

The Economic Development Strategic Action Plan outlines a series of actions that the City, in partnership with other partners and stakeholders in Vernon, would undertake to position Vernon as a diverse, resilient, attractive community where existing business can grow and flourish while attracting new investment. The Airport Master Plan has a role to play in implementing this plan, particularly with its focus on the airport as an emerging employment hub. By leveraging the airport lands as employment lands, and providing the framework for business to grow, the Airport Master Plan can contribute to a more diversified economy that attracts a skilled workforce and young families – a key component to the Economic Development Strategic Action Plan.

2000-2010 Vernon Regional Airport Master Plan

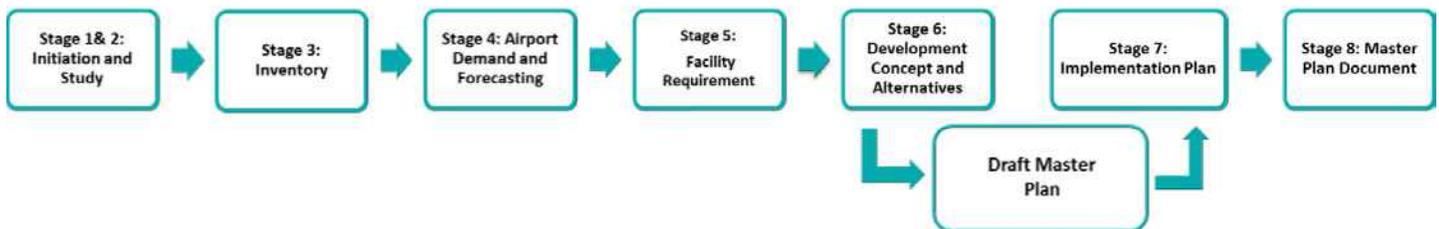
The 2000-2010 Vernon Regional Airport Master Plan proposed several development projects at the airport to enhance the ability to accommodate activity and future demand. Some of the projects proposed in that plan have been implemented, but several others were not, and have been addressed in this Airport Master Plan, such as property acquisition, apron expansion and the construction of a permanent terminal building.



1.2 THE AIRPORT MASTER PLAN PROCESS

Vernon’s Airport Master Plan was developed through a combination of professional studies, data collection, demand evaluations and public and aviation stakeholder involvement. All these elements have been used to create the vision and the development framework for the Vernon Regional Airport for the next 20 years. The planning process had eight stages, as presented in Figure 2.1.

Figure 1.1: Vernon Regional Airport Master Plan Planning Process



Stage 1 and 2: Initiation and Study

The process began by defining the scope of the study and identifying the Airport Master Plan parameters. The public engagement process included the establishment of a Staff Advisory Committee and an Airport Technical Advisory Committee (ATAC) at the beginning of the process to help determine the goals and objectives of the plan.

Stage 3: Inventory

Stage 3 focused on collecting and assembling relevant data pertaining to the airport and the region it serves. Information was collected on the airport’s physical parameters (location, climate and environment), existing facilities and operations. The results of the inventory can be found in Chapter 2. This information was used to delineate the airport’s Development Concept and Alternatives (Appendix A in the Draft Vernon Regional Airport Master Plan).

Stage 4: Airport Demand and Forecasting

The demands and forecasting are the main drivers of airport development. This stage examined the potential demand for aviation activity at the airport, using an analysis of local socioeconomic information, aviation trends and airport performance, which can reasonably be expected to occur at the Vernon Regional Airport over a 20 year planning period. The results of the demand and forecasting were used to determine the types and sizes of facilities which will be required to meet the airport future demands. The results of this exercise can be found in Chapter 3.



Stage 5: Facility Requirements

This stage presents the specific types of facilities needed to serve the airport's future demand. The size and type of new facilities required, as well as outdated infrastructure and new land requirements are provided, based on the airport demand forecast (Stage 4) and Transport Canada requirements. The results of this stage are summarized in Chapter 4.

Stage 6: Development Concept and Alternatives

The Airport Development Concept and Alternatives Stage considered a variety of solutions to accommodate the projected facility needs. Four development alternatives for the airport were proposed and brought to the advisory committees and Vernon residents for discussion and feedback. The strengths and weaknesses of each proposed development alternative were examined. The various development options considered and the analysis comparing them can be found in Appendix A in the Draft Vernon Regional Airport Master Plan.

Following the completion of Stage 6, a draft of the Vernon Regional Airport Master Plan, with the recommended development alternative was developed and presented to City Council for consideration.

Stage 7: Implementation Plan

This stage was developed following Council endorsement of the preferred development alternative for the draft Airport Master Plan. The Implementation Plan includes the Project Phasing Plan and the Capital Improvement Strategy, which comprised from the Airport Facility and Development Plan and provides the recommended schedule for implementing the proposed improvements for Vernon Regional Airport over the next 20 years.

Stage 8: Master Plan Document

The Airport Master Plan document is the culmination of the process and provides a vision for the airport for the next 20 years, as well as the necessary steps required to achieve that vision.

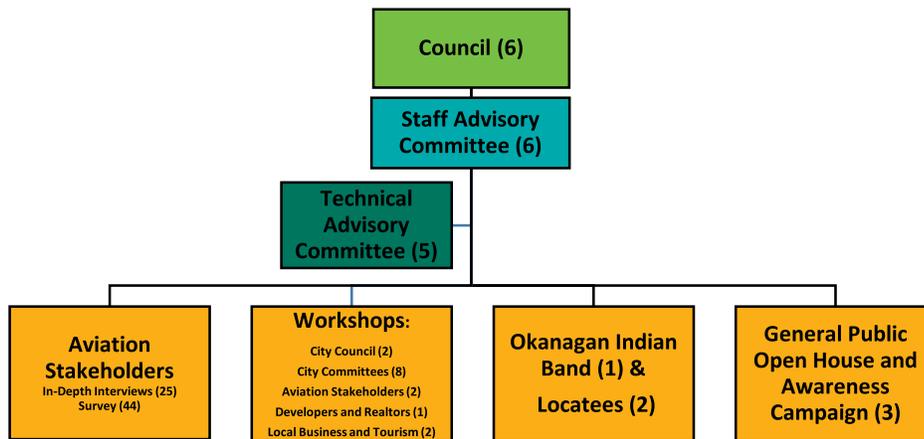
1.3 CONSULTATION AND PUBLIC PARTICIPATION

Stakeholder involvement and public participation (P2) are key elements throughout the planning process. The consultation process, as illustrated in Figure 1.2, provided an environment for a wide range of knowledge, opinions and interests. The consultation process included close coordination with the staff advisory committee and a technical advisory committee, workshops with different



stakeholder groups, in-depth interviews, surveys, an open house for the general public and media awareness campaign. Appendix B in the Draft Vernon Regional Airport Master Plan provides a review and results of the consultation process.

Figure 1.2: Vernon Regional Airport Master Plan Consultation Process



(#) Number of Meetings

2.0 INVENTORY

2.0 INTRODUCTION

Chapter 2 outlines the existing conditions at the Vernon Regional Airport, including its location, access and the meteorological conditions, as well as the facilities currently in place at the location. This chapter also provides background on the existing user groups at the airport and trends in flight activity in recent years.

2.1 AIRPORT BACKGROUND

2.1.1 Airport History

The City of Vernon has a rich aviation history. Since the early 20th century, airplanes have used Vernon as a landing spot in the Okanagan Valley and as a launching point for the northern frontier. The airport was originally located in the south of the city, west of the Army Camp. At the time, the airport was a stop on the route to Alaska and Alberta, and was also an active centre for airshows. The airport was used for military training during the Second World War. Following the war, the airport was relocated to its current location in the Okanagan Landing neighbourhood.

Since 1946, the Vernon Regional Airport (YVK) has been operated by the City of Vernon and, for a brief period, by the Regional District of North Okanagan (RDNO). Today, the airport provides a variety of aviation services and constitutes a centre of airside manufacturing for the North Okanagan. It is a commercial airport that houses industrial based businesses focusing on aircraft manufacturing and maintenance, as well as a base for corporate, commercial, and general aviation. The City of Vernon intends to maintain this commercial base and operate as a self-sustaining airport that creates opportunities for aviation related businesses for the benefit of the community.

2.1.2 Airport Administration

The airport is operated directly by the City of Vernon under Operation Services through an Airport Manager. The City is responsible for the construction of the 'in-house' capital projects as well as the operation and maintenance of the airport. This includes the paved maneuvering areas, terminal building, equipment storage hangar, electrical systems and lighting, automated weather systems, navigational aids, fuel services, landscaping, wildlife control, snow and ice control, and safety management systems.



2.1.3 Location and Access

Vernon Regional Airport is located approximately five kilometers southwest of Vernon’s City Centre, between Okanagan Landing Road to the south and Tronson Road from the north (Map 2.1). The airport is approximately 90 acres in size (Map 2.2). It is surrounded by a number of residential neighbourhoods, including the Waterfront Neighbourhood Centre, a planned Neighbourhood Centre with a mix of commercial and residential uses, as well as a new park and other amenities along Okanagan Lake.

To the west and north of the airport is Indian Reserve #6 (IR#6) (Priest Valley). 2.83 hectares of these lands are leased to the City of Vernon and are essential for airport operation as the centre portion of the runway spans the lands. There are 43 years remaining on the current lease.

Vernon Regional Airport is approximately four kilometres from the intersection of Highway 97 and Highway 6, which provide easy access from other parts of the Thompson Okanagan and Kootenay regions, respectively. BC Transit serves the airport and the Okanagan Landing area by scheduled Route 7, providing direct access to the City Centre and to other transit routes via the Downtown Transit Terminus. The airport is also connected by Vernon’s bicycle routes system.

The airport’s location has made it attractive to a wide variety of user groups in the area, including general aviation, tourism and businesses who take advantage of the airport’s location within the city. At the same time, this proximity to both existing and emerging residential neighbourhoods has presented a number of challenges.



Map 2.1: Vernon Regional Airport Location

As both surrounding neighbourhoods and activity at the airport has grown, concerns about aircraft noise have emerged, while restrictions on building and tree heights have impacted development opportunities, primarily in the Waterfront Neighbourhood Centre, but also in other parts of the city.

Map 2.2: Vernon Regional Airport Overview Map



2.1.4 Airport Classification

Based on the Vernon Regional Airport runway length and the types of aircraft operating at the airport, Transport Canada classified the runway as Code 2B. This primary designation is based on previous Transport Canada Aerodrome Standards and Recommended Practices manual TP312 4th Edition, which relates to aircraft wing span and wheelbase. Code 2B runway allows for aircraft with a wing span up to but not including 24.1 metres and a runway length up to but not including 1,200 metres.

Transport Canada Aerodrome Standards TP312 5th Edition

During the production of the Master Plan, the 5th Edition of the Transport Canada Aerodrome Standards and Recommended Practices manual TP312 was published, with an effective date of September 15, 2015. It is an operational document rather than a Design document and, as such, is a substantial change to how standards are applied. An initial assessment of the changes brought to the new TP312 document include the application of the standards to what is defined by aircraft group numbers (AGN), obstacles and how they are handled (obstacle free zones, OLS, obstacle identification surfaces), taxiways, runway strips, runway safety area, aerodrome data, declared distances, runway width and slopes and lighting systems.

The main impact of the TP312 5th Edition on Vernon Regional Airport are:

- Runway length is no longer the determining factor for runway strip width standards.
- Runway Strip width increases from 30 metre to minimum 40 metre (AGN II).
- Runway to taxiway centreline distance in 5th Edition increase from 42 metres to 52 metres.
- OLS approach surfaces are independent from take-off surfaces depending on obstacles and/or provision of clearways.
- Declared Distances are calculated differently for runways with displaced thresholds and clearways due to the new Take-Off Surface.

The new edition of Transport Canada TP312 has a major impact on future development opportunities at Vernon Regional Airport. However, Transport Canada stated that any proposed development airport plans may use the standards contained in TP312 4th edition, be completed in full and affected areas fully operational not later than September 15, 2017. Transport Canada has also indicated that TP312 5th Edition is enacted via Canadian Aviation Regulations (CARs) Section 302.07, which is commonly referred to as the “grandfather clause”, as follows:

“302.07 (1) The operator of an airport shall

a) comply

- i. subject to subparagraph (ii) with the standards set out in the aerodrome standards and recommendation practices publications, as they read on the date on which the airport certificate was issued,*



- ii. *in respect of any part or facility of the airport that has been replaced or improved, with the standards set out in the aerodrome standards and recommended practices publications, as they read on the date on which the part or facility was returned to service, and*
- iii. *with any conditions specified in the airport certificate by the Minister pursuant to subsection 302.03(3)”.*

2.1.5 Meteorological Conditions

Vernon, along with the rest of the Okanagan Valley, is characterized by four pronounced seasons, including a mild winter and warm, dry summer. Participation in Vernon averages 337.1 mm annually. Weather events that impact operations and activity at the airport most are fog and snow. Fog alerts can often occur due to the moderating effects of the lakes when the temperature is below 0 degrees Celsius and can delay or cancel flights. Flying through the winter months can also be limited by snow and blizzard conditions. The average annual snowfall in the airport is approximately 91cm, which requires frequent snow clearing from the runway. Table 2.1 provides a summary of average weather conditions for the Vernon Regional Airport throughout the year.

Table 2.1: Vernon’s Weather Summary

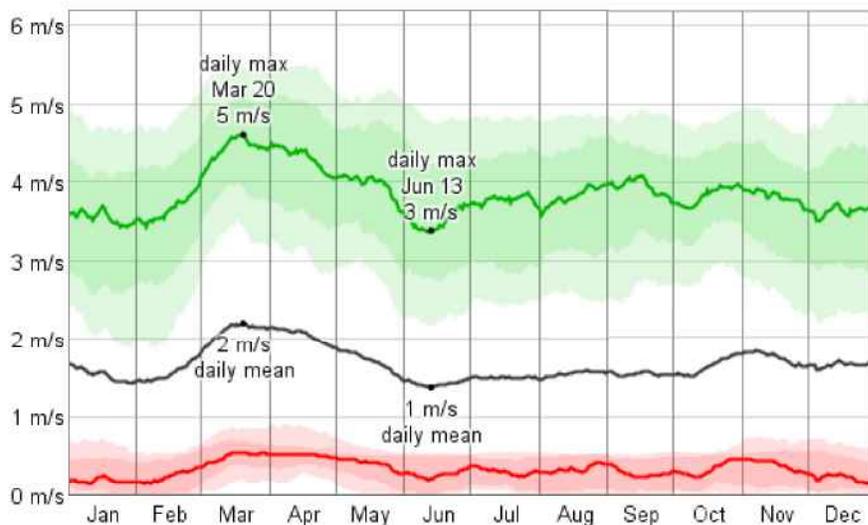
Month	Average Daily Max Temp.(°C)	Average Daily Min Temp.(°C)	Average Temp.(°C)	Total Percip. (mm)	Snowfall (cm)
January	0.8	-5	-2.1	12.5	26
February	3.5	-4.1	-0.3	12.4	12
March	9.6	-0.7	4.5	17.6	5
April	15.8	3.3	9.6	28.3	0
May	20.4	7.1	13.8	41.7	0
June	24.4	10.6	17.5	47.4	0
July	28.2	12.6	20.5	33.6	0
August	27.6	11.6	19.7	29	0
September	21.8	7.4	14.7	34.1	0
October	13.2	2.9	8.1	35.2	0
November	5.2	-1.3	2	32.2	16
December	1.1	-4.2	-1.6	13.3	31
Annual	14.3	3.4	8.9	337.1	91

Source: Environment Canada, Canadian Climate Normals 1981-2010 Station Data



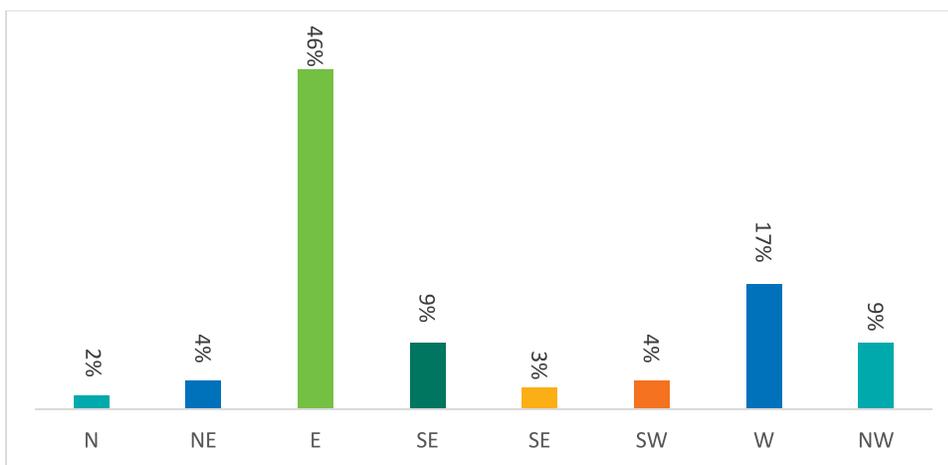
Wind also impacts activity at the airport. Based on data from 2003 – 2012, the typical wind speed over the course of year in Vernon varies from 0 metres per second to 5 metres per second. The highest average wind speed of 2 m/s (light breeze) occurs around March 20, at which time the average daily maximum wind speed is 5 m/s (gentle breeze). The lowest average wind speed of 1 m/s (light air) occurs around June 13, at which time the average daily maximum wind speed is 3 m/s (light breeze).

Graph 2.1: Vernon’s Typical Wind Speed



As shown in Graph 2.2, the wind direction is most often the east (46% of the time) and west (17% of the time). The wind is least often out of north (2%), or south (3%).

Graph 2.2: Vernon’s Wind Direction



Source: www.weatherspark.com/averages/27809/Vernon-British-Columbia-Canada



2.2 AIRSIDE FACILITIES

This section provides an inventory of the airside physical facilities. Airside facilities include runway, taxiways, airport lighting, and navigational aids. A depiction of airside facilities at the Airport is provided on Map 2.3.

Map 2.3: Vernon Regional Airport Airside Facilities



2.2.1 Runway 05-23

The airport is served by one asphalt runway. Runway 05-23 was constructed in 1986, measures 1,070 metres (3,510 feet) long and 23 metres (75 feet) wide and is oriented east to west. The overall surface is in fair condition and the upper layer requires rehabilitation in the next three years. Runway 23-05 is a non-instrument runway, therefore it has non-instrument runway marking, is equipped with medium intensity lights and has a runway strip of 30 metres.

The current Pavement Loading Ratio (PLR) of the Runway is estimated at 7,4 based on available data on pavement structure composition and SNC-Lavalin’s assessment of the structural integrity

of the asphalt pavement. The taxiways and aprons which have the same Equivalent Granular Thickness also have a PLR of 7,4. Due to the limited asphalt thickness and base course thickness, the tire pressure restriction of 0,5 MPa should be maintained as a general rule. However, there are no defects which could be attributed to loads even though aircrafts such as the Citation and King Air have regularly landed at the airport over the last 15 years. Therefore, these aircrafts at the current volume of operation can be tolerated until the pavements are rehabilitated and reinforced. If traffic was to increase significantly, then the tire pressure restriction should be reconsidered.

2.2.2 Taxiways

The taxiway system, as illustrated on Map 2.3, consists of parallel, connecting, access and entrance/exit taxiways. Table 2.2 presents a summary and condition of the airport’s taxiways.

Table 2.2: Vernon Regional Airport Taxiways

Taxiway	Code	Size (sq.m.)	Edge Lighting	Constructed Year	Condition
Alpha	C	1,321	Yes	1986	Poor
Bravo	B	2,033	Yes	1996	Fair- Good
Charlie	A	2,603	No	1998	Good
Delta	B	3,658	Yes	2001	Fair-Good

2.2.3 Drop Zone

Vernon Regional Airport is also an operating base for skydiving adventures. The airport provides a recreational drop zone place for parachutists to land on the north west side of the runway, as illustrated on Map 2.3.

2.2.4 Airfield Lighting and Marking

Airfield lighting systems extend an airport’s usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport for this purpose. A pilot can



activate the lighting system by utilizing their radio transmitter through aircraft radio controlled lighting (ARCAL). These lighting systems, categorized by function, are summarized below.

Runway and Taxiway Lighting/Marking

Runway and taxiway edge lighting utilizes light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runways and aircraft parking areas.

Runway 05-23 is equipped with medium intensity edge lighting on either side of the runway. Both runway sides are equipped with Precision Approach Path Indicators (PAPI). PAPIs provide visual descent information to the pilot and help to determine whether the approach is on target while descending toward the runway threshold.

Taxiways Alpha, Bravo and Delta are equipped with medium intensity taxiway edge lighting (MITL). The taxiway edge lighting is blue in color and mounted on frangible bases. Taxiway Charlie is not lighted and is only available for day use. The airport also has a runway/taxiway signage system. The presence of runway/taxiway signage is an essential component of a surface movement guidance control system necessary for the safe and efficient operation of the airport. The signage system installed at the airport includes runway and taxiway designations, holding positions, routing/directional, runway end and exits.

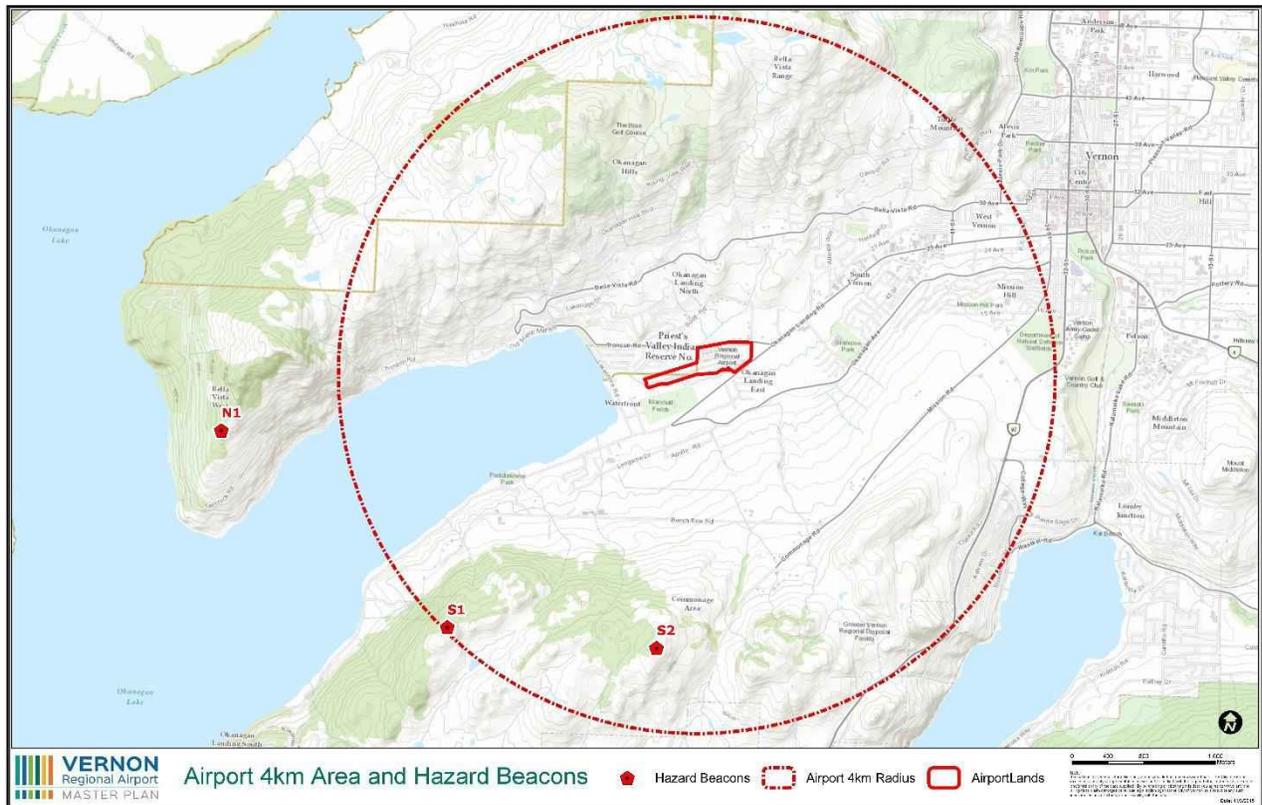
The rotating beacon identifies the location and presence of the airport. The beacon is equipped with an optical system that projects two beams of light, both white, 180 degrees apart. The beacon is located adjacent to the private hangars.

Obstruction Lighting

Surrounding hills may pose a hazard to approaching aircraft at night or times of low visibility. Vernon Regional Airport has three flashing red hazard beacons to alert incoming aircraft of the highest peaks in the area, as shown on Map 2.4.



Map 2.4: Vernon Regional Airport 4 kilometer Area and Beacon Locations



2.2.5 Weather and Navigational Aids

The airport is equipped with two wind socks. The wind socks provide information to pilots regarding wind conditions, such as direction and intensity.

The airport is also equipped with a Limited Weather Information System (LWIS) which broadcasts temperature, wind speed and direction and altimeter reading to pilots in the vicinity.

Airport navigational aids are equipment installed on or near the airport to provide pilots with electronic guidance and visual references.

A Non-Directional Beacon (NDB) is a low frequency radio beacon that allows the pilot of an aircraft equipped with directional finding equipment to find the NDB until visual contact is made with the airport or they are free of clouds, then enter the air traffic pattern and proceed with an approach. The NDB is monitored by a local telecommunication company with regular maintenance checks.



2.2.6 Airspace and Air Traffic Procedures

The airspace in the Vernon area is uncontrolled. Uncontrolled airspace is defined as all airspace that has not been designated as controlled, and which Air Traffic Control (ATC) has neither the authority nor responsibility for control. Controlled airspace on the other hand, is supported by ground/air communications, navigational aids and air traffic services.

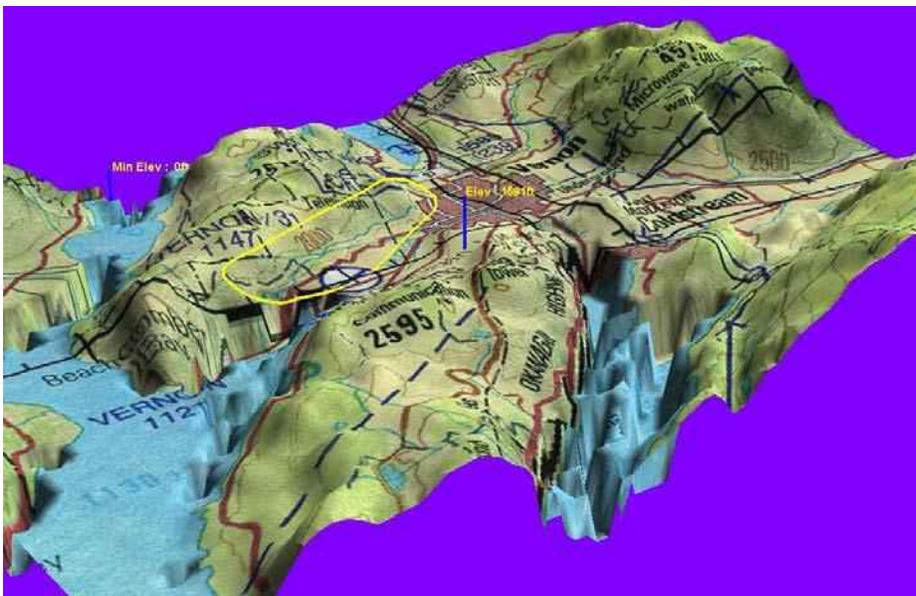
The airspace to the south and west of Vernon is controlled by Kelowna ATC and is deemed Mode C to the west is the Witman intersection, a major air highway intersection that is the beginning of the approach into Kelowna International Airport (YLW).

Vernon airspace reaches a five nautical mile radius from the geometric centre of the facility to an altitude of 4,100 ft. above sea level (ASL). It has a designated Air Traffic Frequency and a private Universal Communications (UNICOM) that operates on frequency 122.8 Mhz AM VHF. The UNICOM has limited hours and gives pilots an indication of wind direction and low priority aerodrome information.

Pilots are expected to operate using standards for uncontrolled aerodrome procedures as indicated in the Canadian Air Regulations (CARS).

The Vernon Regional Airport elevation is 1,140 ft. ASL. The circuit altitude is 2,400 ft. ASL with a night circuit of 3,000 ft. ASL. Runway 05 reverts to a right hand circuit for night operations (Maps 2.5-2.8).

Map 2.5: Runway 05 Day Circuit Procedure



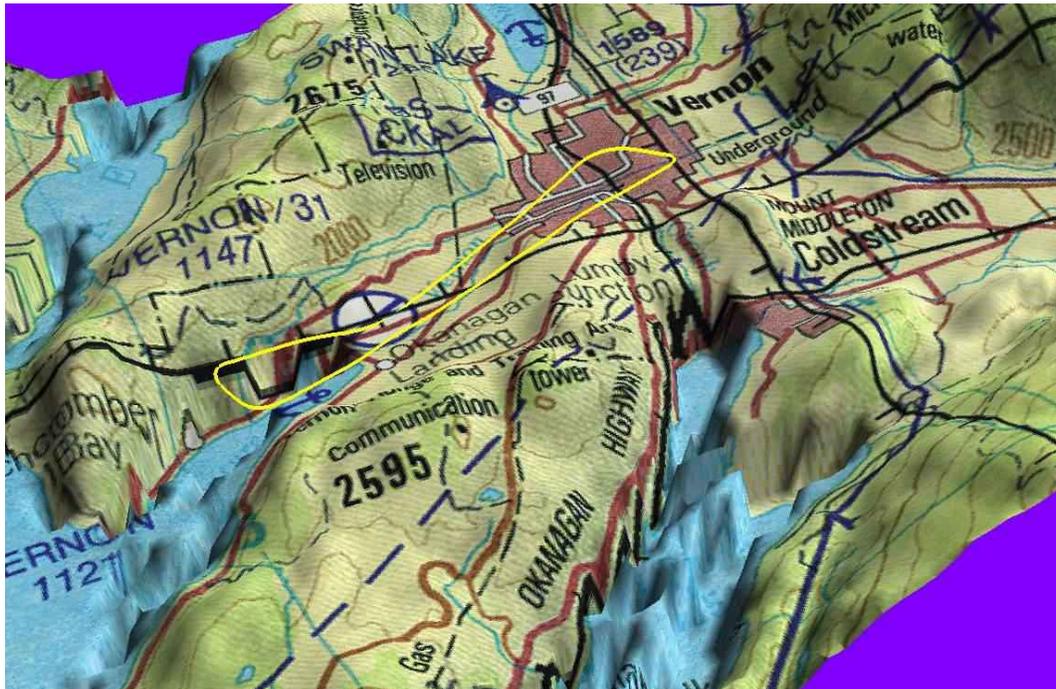
Map 2.6: Runway 05 Night Circuit Procedure



Map 2.7: Runway 23 Day Circuit Procedure



Map 2.8: Runway 23 Night Circuit Procedure



2.2.7 Airport Obstacle Management

The airport obstacle management system relates to the physical layout of the airfield, the runway approach requirements and approach take off surfaces required by Transport Canada Aerodrome Standards and Recommended Practices TP312E. Map 2.9 illustrates the Vernon Regional Airport Obstacle Limitation Surface (OLS), as regulated in the Regional Airport Zoning Regulations Bylaw #4578B.

Obstacle Limitation Surfaces (OLS)

Airports must ensure that the surrounding airspace is free and clear of obstructions that could be hazardous to aircraft on takeoff or approach paths or when operating in the airport vicinity. It is therefore necessary to maintain the surrounding airspace free from obstacles by preventing the installation, development, or growth of obstructions to airspace that could cause the airport to become unusable. The OLS is governed by regulations in the Transport Canada manual TP312E. Maps 2.9-2.10 illustrated the Vernon Regional Airport OLS area.

Approach and Transition Surface

The approach surface is a horizontal plane established from the airport elevation at the threshold of each runway. The plane extends from the threshold out along the extended centerline of the runway for 2500m at a 25:1 climb with a 10% divergence.

Runway Safety Area

The runway safety area is an area on the ground around the runway that is specifically designed for the safe operation of aircraft. The code of the airport determines the size of this area. The runway strip extends off the end of each runway and off the side of the centerline. Table 2.3 identifies the dimensions of runways strip associated with Runway 05-23 at Vernon Regional Airport.

Table 2.3: Vernon Regional Airport Runway 05-23 Protection Zone

Runway	Approach	Strip Length	Strip Width (from centerline)
05	Non-Instrument	60m	30m
23	Non-Instrument	60m	30m

Transitional Surface

Transition Surface is an inclined plane with a slope of 5:1 extending upward and outward from the approach surfaces, terminating at the point where they intersect with a horizontal surface or any other surface where more critical restrictions apply.

Table 2.4 identifies the approach surface and transition surface at Vernon Regional Airport.

Table 2.4: Vernon Regional Airport Approach and Transition Surface

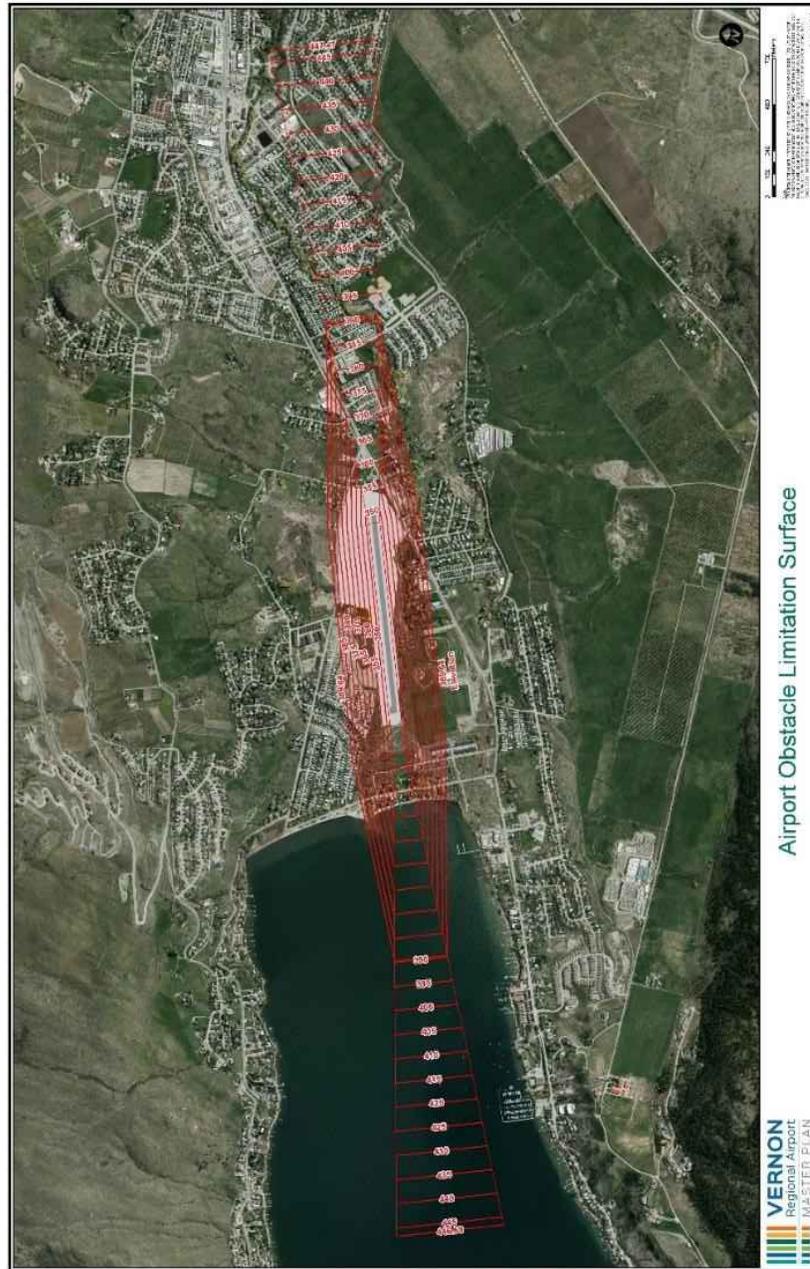
Runway	Approach	Approach Slope	Length	Transition Slope	Length
05	Visual	1:25	2,500m	1:5	216m
23	Visual	1:25	2,500m	1:5	216m



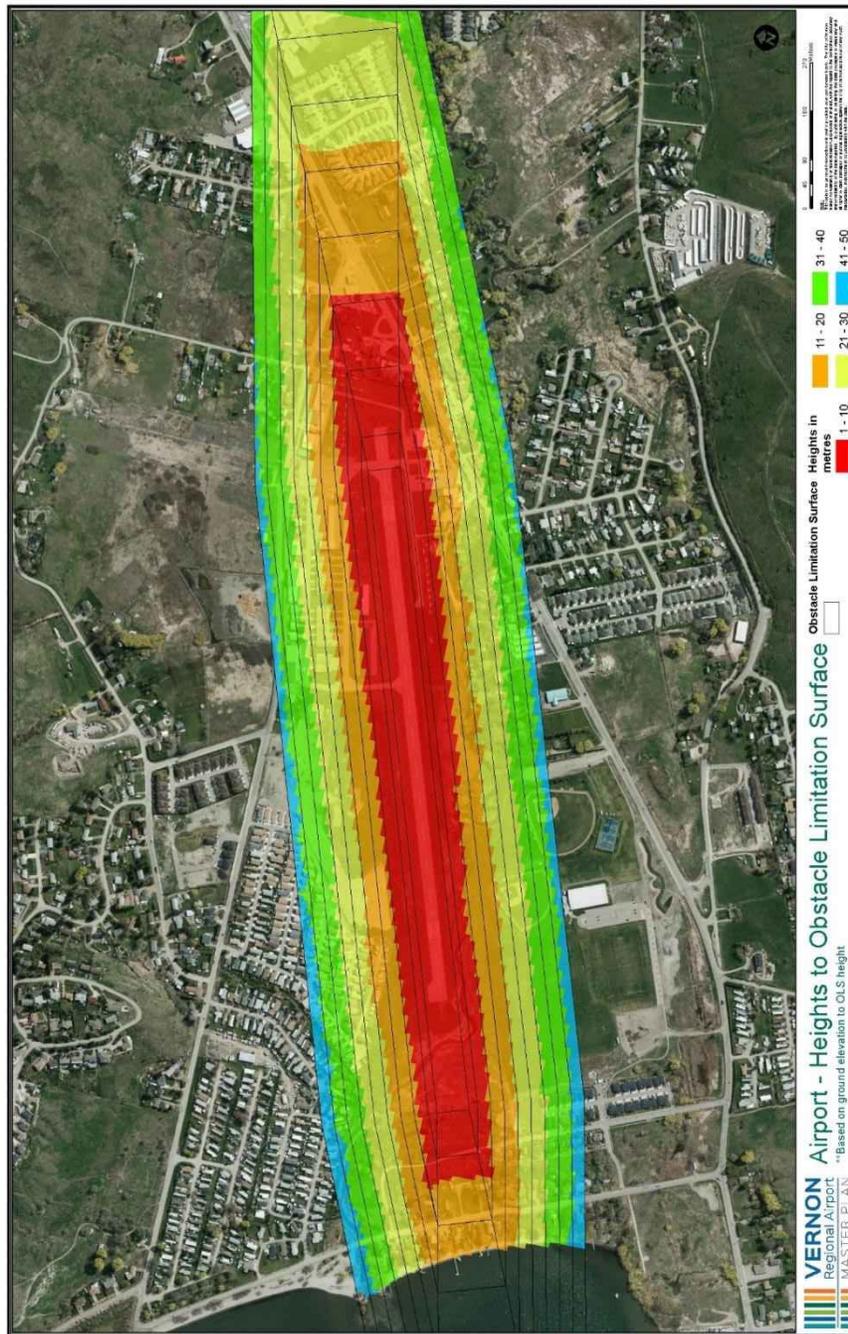
Outer Surface

The outer surface is a radius from the airport reference point extending out 4000m at a height of 45m. This surface increases or decreases with the ground elevation inside the surface. The purpose is to limit objects in this area to ensure the safe airspace for aircraft operating above.

Map 2.9: Vernon Regional Airport Obstacle Limitation Surface



Map 2.10: Vernon Regional Airport Heights to a Partial Section of the Obstacle Limitation Surface (OLS)



* The OLS map is for general information only. A BC Land Surveyor (BCLS) is required to determine a specific height limitation on the property.

2.3 GROUND FACILITIES

Ground facilities are those that support the aircraft, pilot and passenger handling functions as well as other non-aviation facilities typically providing a revenue stream to the airport. These facilities include the terminal, parking aprons, aircraft tie-downs, general aviation and commercial/industrial hangars, and support facilities such as fuel storage, vehicle parking, roadway access, and aircraft rescue and firefighting. The primary landside facilities at the airport are identified on Map 2.11.

Map 2.11 Vernon Regional Airport Ground Facilities



2.3.1 Terminal

The Vernon Regional Airport has one public terminal building, operated by the City. The public terminal is located beside the airport front gate. The terminal is a modular building without concrete foundations, and has a passenger waiting area, washrooms, small kitchen, flight planning desk, and offices for the Airport Supervisor and for other airport users.

2.3.2 Aprons and Tie-Downs

The airport has two aircraft parking aprons: Apron 1 and Apron 2, for a total of 9,818 square metres (Map 2.11). The apron area is used by all transient aircraft for day and overnight parking, medivac aircraft and federal/provincial aircraft operations.

Apron 1

The 6,029 square metres Apron 1 was originally paved in 1960s and only a small area of this old pavement remains today. The older Apron 1 section is in extremely poor condition and requires rehabilitation. Other sections of Apron 1 are in fair condition.

Apron 2

Apron 2 was constructed in 2005 at 3,789 square metres. Apron 2 is in very good condition with no visible defects.

Tie-Downs

Currently, there are 44 outdoor aircraft tie-downs spots at two grassed areas in the airport. The main tie-down area is to the east of Apron 1, and a second area is to the south of Taxiway Charlie.

2.3.3 Airport Buildings

The Vernon Regional Airport is home to a wide variety of aviation related tenants in several sectors, including private and commercial users, industrial, corporate and institutional organizations. The availability of leasable aircraft hangar space is important if the airport is to satisfy future demand for such space. Currently, there are a variety of building types at the airport, including, T-hangars, box hangars, and conventional hangars, which accommodate a mix of aircraft and aviation uses as required by the airport tenants. The leases are intended to keep commercial uses on the outside of the airport so businesses have access from the frontage roads. Private hangars are accommodated on the in-field of the airside as the private users do not require continued direct road access. Map 2.11 and Table 2.5 illustrate the ancillary buildings within the airport boundaries.

Most of the buildings at the airport were developed by the private sector through lease agreements. Under this model, the developer leases the land from the City of Vernon, and is responsible for the design, construction, operation and management of the building under the airport bylaws.



Table 2.5: Vernon Regional Airport Buildings and Tenants Summary, 2015

Building	Address	Size (sq.m.) with SRWO	Tenant
Institutional			
Terminal	6300 Tronson Rd.	1,963.4	City of Vernon
Airport Operations	6530 Tronson Rd.	749.8	City of Vernon
Flying Club	6210 Tronson Rd.	802.5	Vernon Flying Club
Corporate Aviation			
Hangar and Flight Departments	6550 Tronson Rd.	4,017.9	Kal Aviation
Commercial and Industrial			
Hangar	6110-55/56	1,158.76	Skytek Aircraft Systems Ltd.
Hangar	6110-57/58/59	1,675.3	Relay Enterprises Ltd.
Hangar	6110-60	555.6	Private
Hangar	6120 Tronson Rd.	750.65	Private
Hangar	6200 Tronson Rd.	1,311.79	Coldstream Helicopters
Office	6300 Tronson Rd.	11.24	Full Moon Air Services
Hangar	6320 Tronson Rd.	666.9	LB Chapman Construction
Hangar	6330 Tronson Rd.	2,293.2	0857403 BC Ltd.
Hangar	6340 Tronson Rd.		
Hangar	6400 Tronson Rd.	4,480.0	Seaplanes West Inc.
Hangar	6410 Tronson Rd.		

Hangar	6516 Tronson Rd.	626.2	Capricorn Upholstery
Hangar	6520 Tronson Rd.	750.7	Private
Hangar	6215 Okanagan Landing Rd.	1,789.4	West Central Air
Hangar	6235 Okanagan Landing Rd.	2,200.04	Rotech Research Can. Ltd
Hangar	6255 Okanagan Landing Rd.	2,464.10	Okanagan College
Hangar	6301 Okanagan Landing Rd.	2,429.97	Advantage Helicopters Inc.

General Aviation

In-Field Hangars	106-500/6250 Tronson Rd.	8,552.7	
Seven Units Hangar	24-50/6250 Tronson Rd.	1,429.5	
T-Hangars	400-411/6250 Tronson Rd.	3,903.0	Vernon T-Hangars Ltd.

Educational

Aerospace Campus	6225 Okanagan Landing Rd.	937.67	Okanagan College
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2.3.4 Fueling

The City purchases fuel through a bulk supplier and stores it on site at the airport. Two systems are utilized to sell and dispense the fuel to public and commercial users of the airport: an automated 24hr self-serve Aviation Gasoline (100LL) system, and a Jet A1 fuel truck.

Fuel products are stored in a tank compound located in the center of the airport. Inside the tank compound are two fuel storage tanks, a 50000L AvGas100LL tank and a 75000L Jet A1 tank. There is also a storage shed containing fueling supplies, two 45 gallon waste fuel drums (one for 100LL and one for Jet A1), and a 45 gallon drum of Fuel System Icing Inhibitor (FSII). Unit 70 Jet Fuel Truck has a tank capable of holding 20000L of Jet A1, and 10 gallons of Fuel System Icing FSII.

During business hours the fueling is provided by the Airport Supervisor or by Airport Assistant. During extended business hours fueling is provided by the City of Vernon shop staff, and after



hour fueling is provided by the on call fueler. Table 2.6 shows the Airport fuel sales of avgas and jet fuel over the last 8 years.

Table 2.6: Vernon Regional Airport Fuel Sales by Type 2006-2014

Year	Avgas 100/LL	Jet Fuel	Total
2006	114,992	271,665	386,657
2007	133,263	290,736	423,999
2008	Missing data	318,110	Missing data
2010	153,509	345,876	499,385
2011	151,830	334,643	486,473
2012	165,283	404,093	569,376
2013	181,859	366,510	548,369
2014	220,479	354,044	574,523

2.3.5 Vehicle Parking

14 paved parking spots are located in the front of the terminal building, and as part of the lease agreements between the City of Vernon and the airport commercial/industrial users, each business is required to provide parking on site for their customers and employees, as per parking regulations in Zoning Bylaw #5000.

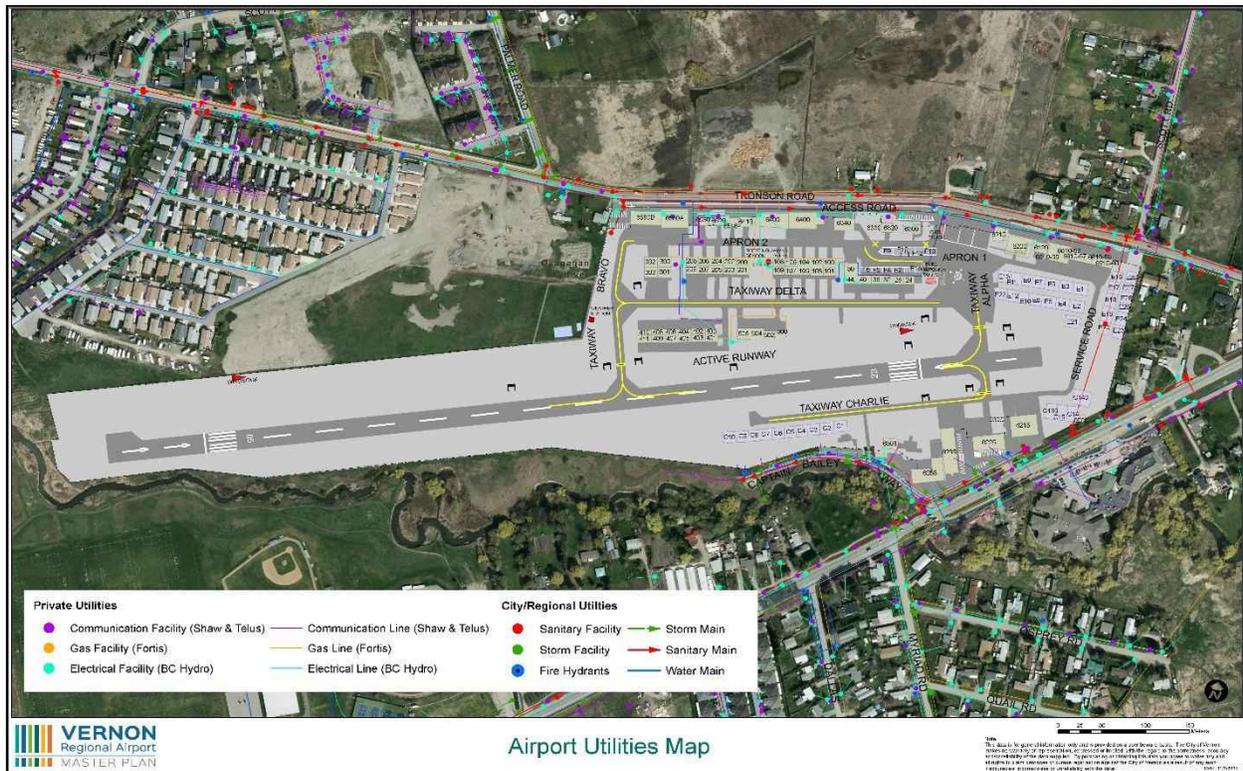
The main parking challenge is in the south side of the airport, along Okanagan Landing Road. There is a shortage of parking as a result of the growing number of students in the Okanagan College programs. People often park their cars on the Okanagan Landing Road shoulders, which is becoming a hazard for pedestrians and impacting traffic flow. Map 2.11 illustrates the location of the designated airport vehicle parking area.



2.3.6 Utilities

Utility services at the airport include power, water, sanitary, storm, gas, telephone and cable. All the private hangars on the airport infield have power and gas, but water and sanitary services are limited only to the T hangar. Map 2.12 shows the utilities at the airport area.

Map 2.12: Vernon Regional Airport Utilities



2.3.7 Airport Safety and Security

The entire airport perimeter is fenced by a two metre high chain link fence preventing easy access to the facilities and the runway. The airport does not have on-site emergency response, nor a 24 hour per day presence. As such, in most situations, the initial call for medical emergencies is handled by 911.

The Vernon Regional Airport has a Risk Assessment and Wildlife Management Plan which defines the practices for habitat management and wildlife control. The plan is approved by and issued under the authority of the Airport Manager in accordance with the Canadian Aviation Regulations. All changes are submitted to Transport Canada for approval. All operators and airport users are expected to assist in reporting and discouraging animal intrusions on the airside area. Any animal strikes or intrusions should be reported directly to the Airport Manager.



Snow Removal

Airport Operation is responsible for snow and ice maintenance of runways, taxiways, the aprons and service road using an on site snow removal truck. The airport is also responsible for clearing the vehicle parking area. Snow removal from private hangars and aprons are the responsibility of the leasee.

2.4 LAND USE

Land use on the airport lands and surrounding neighbourhoods impacts airport operations and the economic activity within the community. The following section identifies baseline information relating to existing zoning and future land uses in the vicinity of the airport. By understanding the land use issues surrounding the airport, more appropriate recommendations can be made for the future use of the airport and its surrounding lands, both to ensure that the economic potential of the airport can be realized while avoiding land use conflicts in the area.

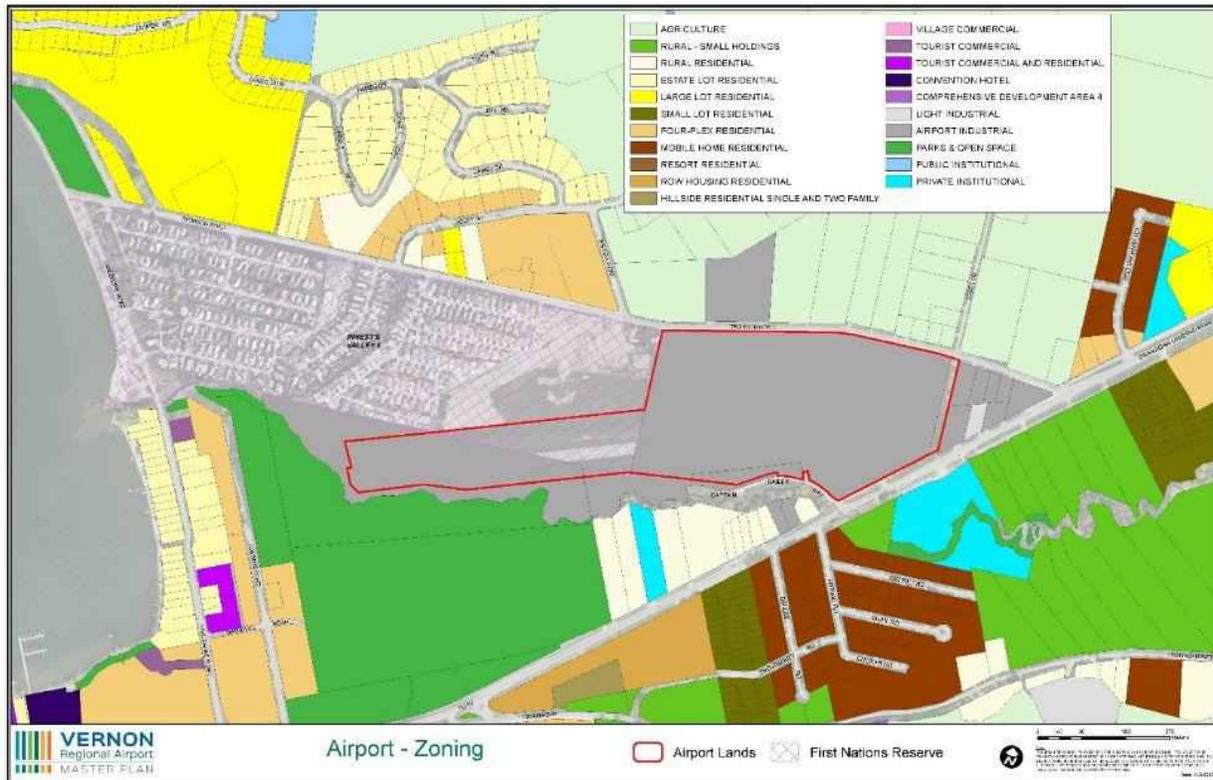
Zoning

Zoning Bylaw #5000 has created a unique zoning district for Vernon Regional Airport. I2 - Airport Industrial provides a designated area for development and operation of an airport and associated industrial services. The airport lands and a number of properties have been zoned I2.

Zoning in nearby areas encompasses a variety of uses from agriculture to residential. Generally, areas north of the airport fall under Agriculture within the ALR zoning district, and, as the name suggests, these properties are in the ALR. To the south, Captain Bailey Way lots are generally Rural Residential and Airport Industrial. On the south, across Okanagan Landing Road, properties are mostly zoned as Residential, Mobile Home Residential and Institutional, used for senior care home. The lands to the west of the airport are zoned Parks and Open Space. Map 2.13 illustrates the zoning of the airport and adjacent lands.



Map 2.13: Vernon Regional Airport and Adjacent Lands Zoning

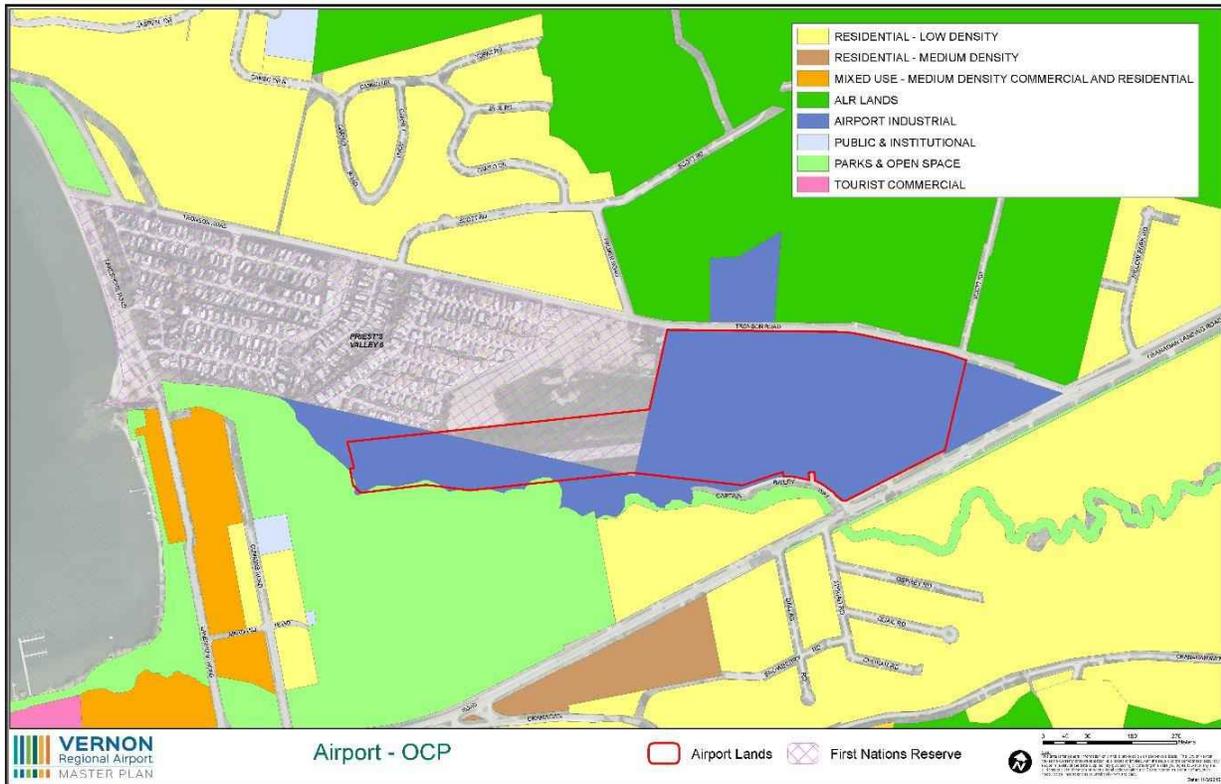


Official Community Plan (OCP)

Vernon’s Official Community Plan (OCP) is the guiding document for growth and development in the city. It is based on the community’s vision of what kind of place Vernon will be in the future – a vision developed as part of an extensive public engagement process.

The OCP designates the Vernon Regional Airport and several surrounding properties as “Airport Industrial”, in keeping with the importance of the airport to the local economy. The OCP also acknowledges that the airport is located adjacent to the Waterfront Neighbourhood Centre, which is envisioned as a village centre along Okanagan Lake that is characterized by a mix of shops, restaurants, apartments, townhomes, a new lakeshore park and other amenities. As much of the neighbourhood centre is impacted by activity at the airport, careful consideration must be given to how these two areas interact. The Waterfront Neighbourhood Centre Plan acknowledges the impact of the airport on the development potential of many properties in the plan area. Map 2.14 depicts the Official Community Plan designations for the airport and adjacent lands.

Map 2.14: Official Community Plan Land Uses Around Vernon Regional Airport



Okanagan Indian Band (OKIB) and Locatee Lands

To the west of the Vernon Regional Airport lies the Indian Reserve #6 (IR#6) (Priest Valley). A portion of these lands are leased to the City of Vernon and used for the airport airside facilities. Currently, most of the Indian Reserve area is used as mobile home residential. A frequent dialog with OKIB and the Locatees prior to approving land use changes in the vicinity of the airport is essential for airport operation.

2.5 AIRPORT ACTIVITY

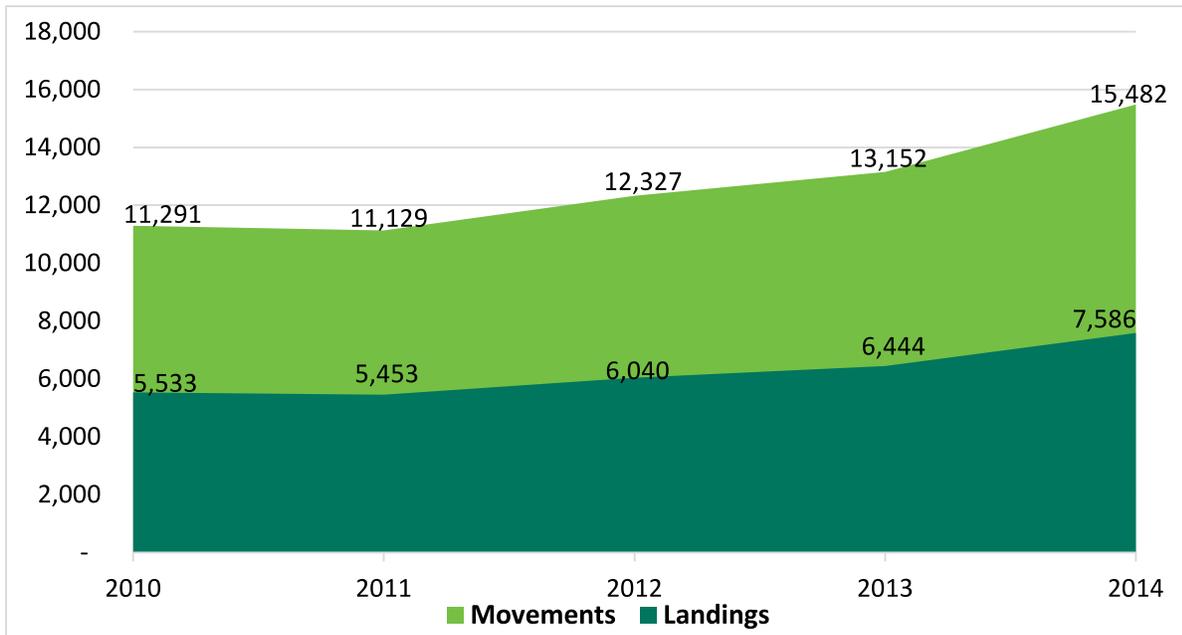
2.5.1 Operational Activity

Records of airport activity are a key factor in determining the future demand and associated facilities. As a small scale airport, Vernon Regional Airport is open 24 hours a day without an operation tower, which makes the data collection a more complicated task. During Spring 2015,



cameras were installed on the taxiways, and together with fuel sales data, it is now possible to estimate the airport activity of the airport from previous years. Graph 2.2 presents the estimated activity at the airport over the last five years. In 2014, the movement activity was 15,482, which is 37% higher from 2010.

Graph 2.2: Vernon Regional Airport Movements Estimation, 2010-2014



2.5.2 Based Aircraft

Based aircraft are the total number of aircrafts that use, or may be expected to use Vernon airport as a home base, usually by agreement between the aircraft owner and airport management. The number of based aircraft in Vernon is an important factor for the future demand, and mainly impacted by general aviation trends. Table 2.7 shows, in 2014 there were 130 based aircraft at the airport. Most of Vernon based aircraft are single engine, general aviation private users. Within the commercial use aircraft, Kal Aviation operates two turbo jet aircrafts, Okanagan Skydive operates two aircraft, and Coldstream Helicopters and Advantage Helicopters operates fleets of three helicopters each.



Table 2.7: Vernon Regional Airport Based Aircraft 2005-2014

Year	Small Aircraft Single/ Twin Engine	Corporate / Turbo Jet	Helicopter	Total
2005	102	2	1	105
2006	103	2	1	106
2007	112	2	1	115
2008	113	2	1	116
2009	108	2	1	111
2010	112	3	1	116
2011	116	2	3	121
2012	120	2	8	130
2013	121	3	9	133
2014	119	4	7	130



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3.0 AIRPORT DEMAND AND FORECASTING

3.0 INTRODUCTION

Forecasting airport demand in the next 20 years is a key factor in the planning process. Future demand is developed based on multiple needs and changes in airport activity and the region. This chapter documents the factors which will likely impact demand at the airport, forecasts air movements and projects future activity.

The aviation demand forecast serves four purposes in the development of this master plan. Specifically, they provide the basis for:

- Determining the necessary capacity of the airfield, passenger terminal area, general aviation area, and ground access system serving the airport.
- Determining the airport's future facility needs, size and type.
- Evaluating potential environmental effects of alternative airport development layouts.
- Evaluating the financial feasibility of alternative airport development scenarios.

3.1 METHODOLOGY

Airport demand and forecasts can be developed using many different factors, including airport type, location and use. For the Vernon Regional Airport, there are five main elements that have a direct impact on the airport's future demand:

- Socioeconomic Trends
- Land Demand
- Based Aircraft Operation
- Aircraft Tie-Downs
- Fuel Sales

A twenty year forecast carries inherent uncertainties, and these uncertainties about the future grow as the timeframe extends. For this reason, a number of projections were developed that used different methods of prediction. If demand estimates from these different methods were within a reasonable range, an average of these projections is used to develop a consensus forecast.

Table 3.1 presents the estimated data used in the forecast of activity. As described in Chapter 2, the estimated movement data have been collected through historical fuel sales information, airspace records for IFR flights and the airport's detection camera on taxi Alpha. The movement estimates also include touch and go traffic, mainly generated by flying schools in the region.

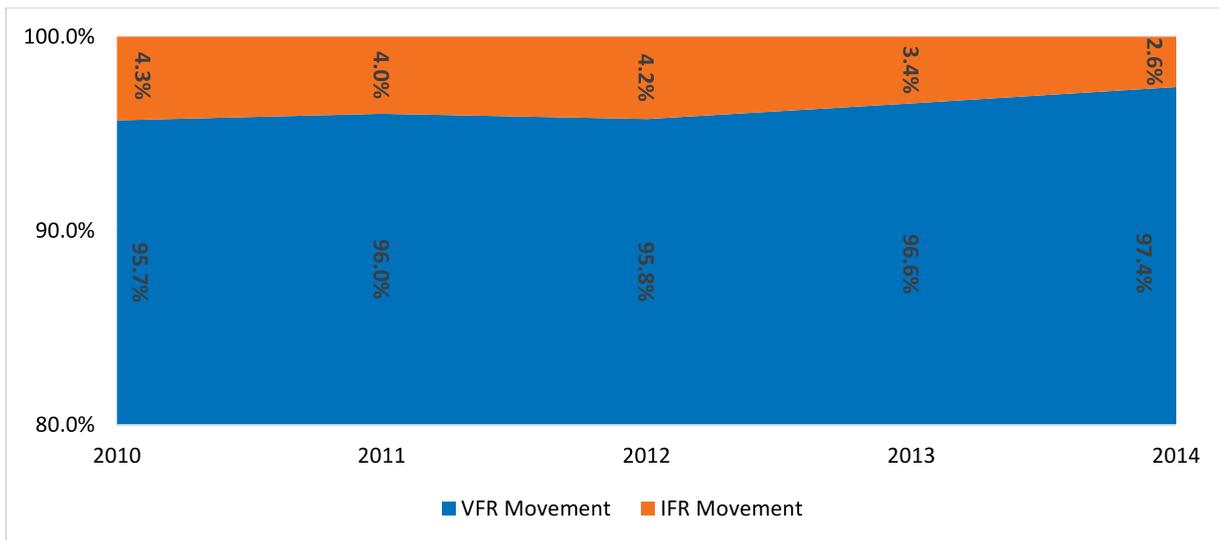


The estimated movement activity in Table 3.1 and Graph 3.1 are divisible by two different flying rules: VFR and IFR. Visual Flight Rules (VFR) are a set of regulations under which a pilot operates an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going. In general, VFR rules are used by general aviation and other light aircraft. Instrument flight rules (IFR) are the other set of rules and regulations governing flight under conditions in which flight by outside visual reference is not safe. In this case, operation of the aircraft will primarily be through referencing the instruments rather than visual reference.

Table 3.1: Vernon Regional Airport Estimated VFR and IFR Movement

Year	VFR Movement	IFR Movement	Total Movement	% Change
2010	10,805	486	11,291	
2011	10,688	441	11,129	-1.4%
2012	11,805	522	12,327	10.8%
2013	12,701	451	13,152	6.7%
2014	15,082	400	15,482	17.7%

Graph 3.1: Vernon Regional Airport Estimated % of VFR and IFR Movement



3.2 SOCIOECONOMIC TRENDS

The socioeconomic review provides an important base line for preparing an aviation demand forecast. Local socioeconomic variables, such as population, employment, and income are indicators for understanding the dynamics and trends of the city and region. The socioeconomic

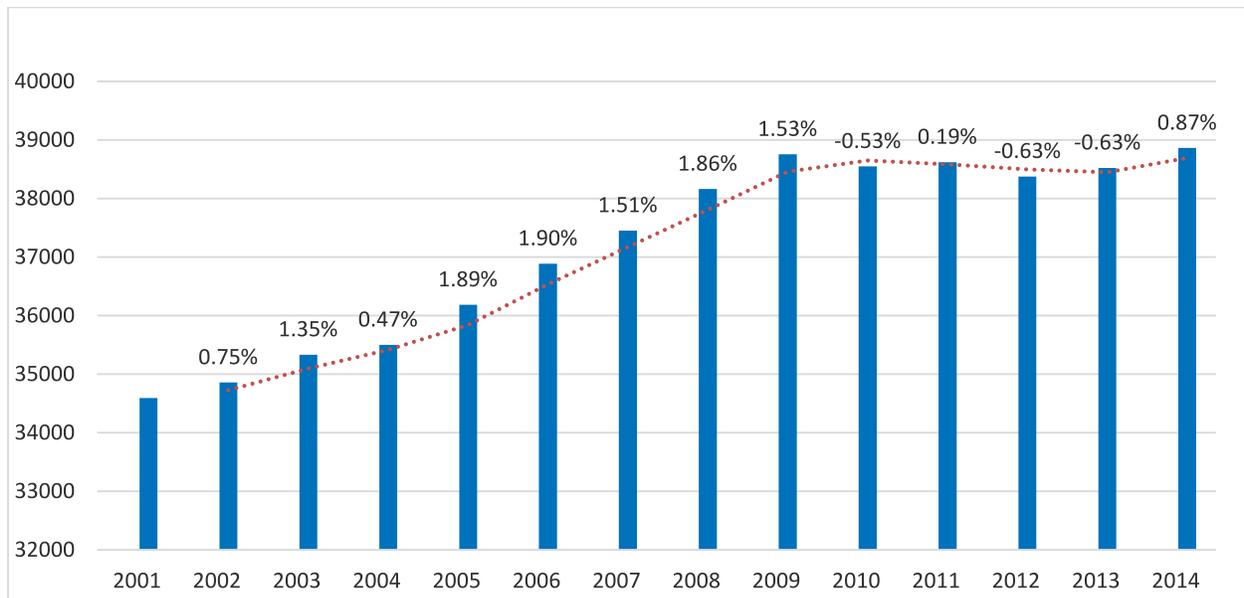


data have been utilized through statistical analyses to develop the Vernon Regional Airport future demand and forecast.

3.2.1 Population 2001 – 2014

Vernon’s population was estimated at 38,861 in 2014 (Graph 3.2). The average annual population growth between the years 2001 – 2014 was 0.9%, with an approximate addition of 4,266 people. However, much of that growth took place between 2005 – 2008. From 2011-2013, the population showed a slight decline of 0.6% per year. This trend started to reverse in 2014.

Graph 3.2: Vernon Population 2001-2014



Source: *Population Estimates in Municipalities, Regional Districts and Development Regions, BC Stats (2015).*

Table 3.2 shows the estimated population in Greater Vernon and the North Okanagan for 2001, 2006 and 2011 (Statistics Canada). The 2011 Census showed an estimated Greater Vernon population of 58,055, which reflects an 11.16% growth rate since 2001. In 2011, the Regional District of North Okanagan population was estimated at 81,237, with a growth rate between 2001 – 2011 of 9.86%.



Table 3.2: Greater Vernon and North Okanagan Population Growth 2001, 2006, 2011

Jurisdiction	2001 Census	2006 Census	2011 Census	% Change
City of Vernon	33,542	35,944	38,150	12.08%
District of Coldstream	9,106	9,471	10,314	11.71%
Electoral Areas B & C	6,694	7,158	6,918	3.24%
Okanagan Indian Band Reserve No. 1 & No. 6	2,236	2,845	2,673	16.35%
Total Greater Vernon	51,578	55,418	58,055	11.16%
Regional District of North Okanagan	73,227	77,301	81,237	9.86%

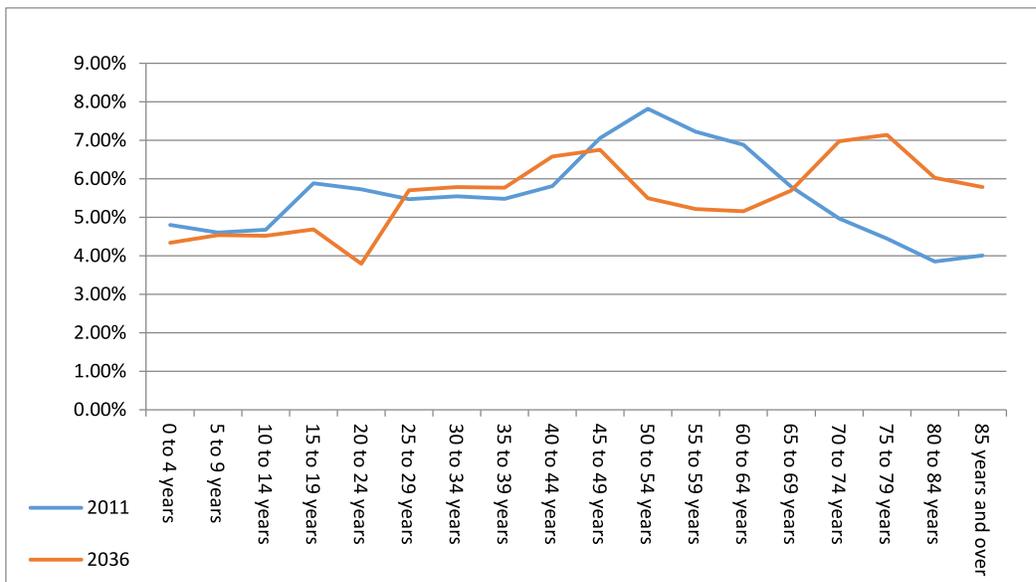
Source: 2001, 2006, 2011 Census Profiles, Statistics Canada.

3.2.2 Population Projections to 2036

According to population projections, an average growth rate of 1% a year is expected also for the next 25 years, and by 2036 the population is projected to increase by 9,850 people to approximately 48,000.

As indicated in Graph 3.3, during the next 25 years the city’s population will become increasingly older. Seniors aged 65 and above are expected to increase dramatically, and the youngest age groups will rapidly decline. This is due to the effect of the Baby Boomer generation moving into the senior stages of life, as it reflects such a significant portion of the population. It is also anticipated that age groups between 15-24 will shrink as result of a negative migration.

Graph 3.3: City of Vernon Population by Age: 2011 and 2036 in Medium Growth (1%/year)



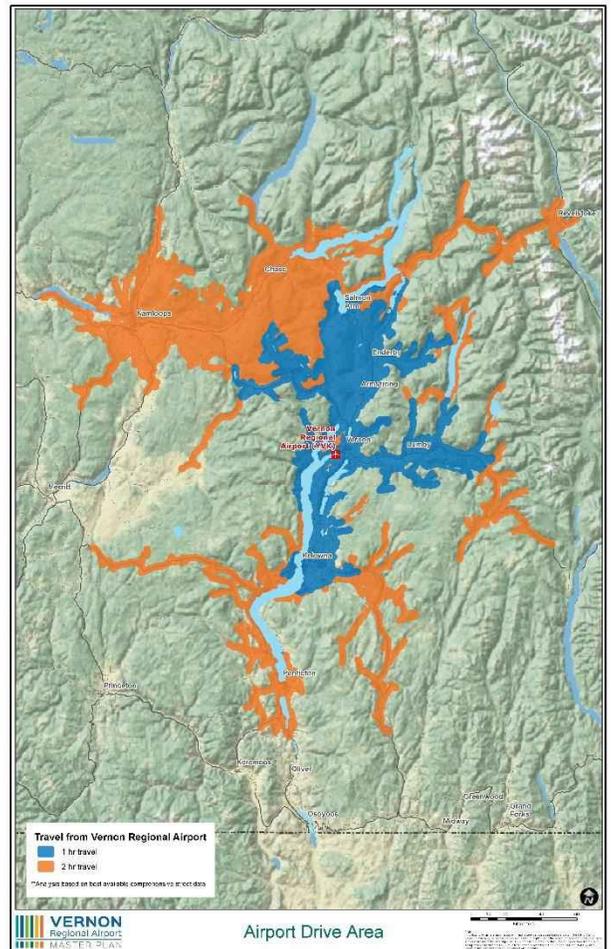
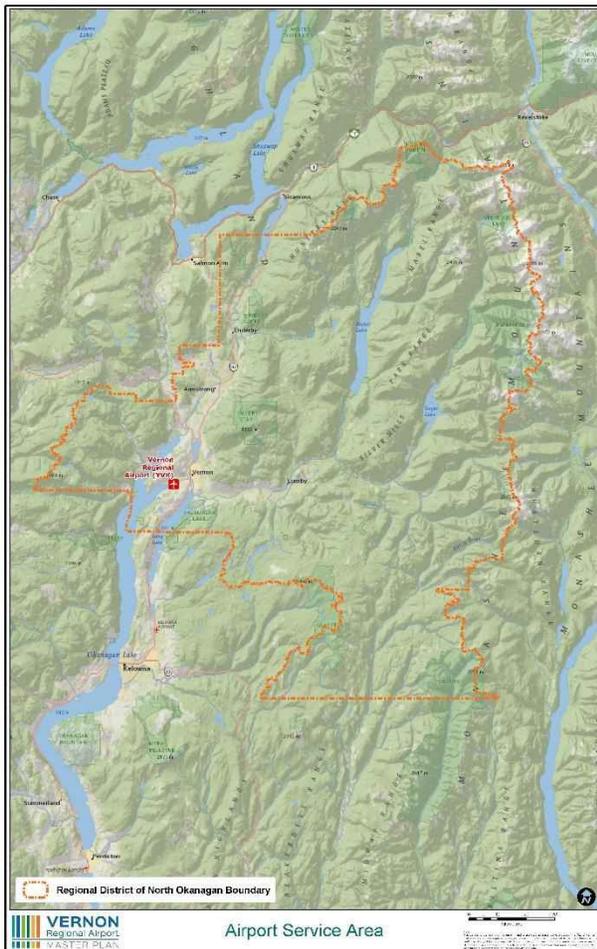
3.3 LAND DEMAND

3.3.1 Airport Service Area

The service area for the Vernon Regional Airport is mainly defined by the boundaries of the Regional District of North Okanagan, which include six municipalities - Armstrong, Coldstream, Enderby, Lumby, Spallumcheen, and Vernon, and the five electoral areas (see Map 3.1).

In addition to the Regional District of North Okanagan boundaries, Vernon Regional Airport also serves and functions as a centre for general aviation users from Kelowna to and Revelstoke. Map 3.2 shows the one and two hour drive time from the airport. Within a one hour drive, the airport could serve users from West Kelowna, Kelowna, Central Okanagan throughout Salmon Arm.

Maps 3.1, 3.2: Vernon Regional Airport Service Area and One and Two Hour Drive Time



3.3.2 Nearby Airports

The demand usage for the airport is affected by other aviation options in the area. There are two major commercial and international airports located within 125 kilometres of Vernon: Kelowna International Airport (YLW) and Kamloops Airport (YKA). The region also has four smaller airports in Salmon Arm, Penticton, Osoyoos and Oliver (Table 3.3).

As a result of the distance between Vernon and other local airports, Vernon’s main share of the aviation market is shared with Kelowna International Airport in the south and Salmon Arm Regional Airport in the north.

Kelowna International Airport (YLW)

Kelowna International Airport (YLW) is the closest airport to the Vernon Regional Airport, located 37km away. YLW serves 1.6 million passengers annually, and offers both domestic and international flights.



Between 2010 and 2020 YLW will invest \$92 million including the International Arrivals Hall, apron 1 expansion, baggage hall expansion, an airline office, departure lounge enhancements, and a concourse and airport plaza. YLW development plans are focused on commercial aviation rather than general and corporate aviation demands. As a result of the growth at YLW in commercial or passenger activities, the Vernon Regional Airport is in a position to attract some of the general and corporate users and to accommodate their future requirements.

Kamloops Airport (YKA)

Kamloops Airport is located 125km from Vernon, serving 290,394 passengers annually and offering regular flights to Vancouver, Prince George and Calgary and seasonal flights to Mexico and US. The airport handles air cargo traffic and is home to a number of aviation-related industrial operations including the Provincial Wildfire Command Headquarters for BC Forest Service. The Kamloops Airport infrastructure includes two asphalt runways measuring 8,000ft and 2,040 ft. The airport also houses industrial operations including small airplane repair, engine rebuilding and aircraft salvage facilities, avionics specialists, charter operations, a flying school, an air tanker base and a forest fire control centre.

Penticton Regional Airport (YVF)

Penticton Regional Airport is located 120km south of Vernon and is served by a 6,000ft runway. The airport is federally owned and managed by Transport Canada, and the federal government invested additional funds in the runway and taxiways during 2014. Commercial flights to Vancouver and Calgary are available with Air Canada Express (Jazz Air) and Westjet Encore. Air training and charter services are provided by Canadian Helicopters (HNZ) and Eclipse Helicopters.

Shuswap Regional Airport (YSN)

Shuswap Regional Airport in Salmon Arm is located 55km north of Vernon. The airport has 4,500ft of paved runway which supports a variety of personal and charter aircraft. Salmon

Arm provides a variety of amenities, a terminal building, flying club space, private hangars, fuel sales and services for the provincial Rapattack Program base.

Map 3.3: Vernon Regional Airport Nearby Airports

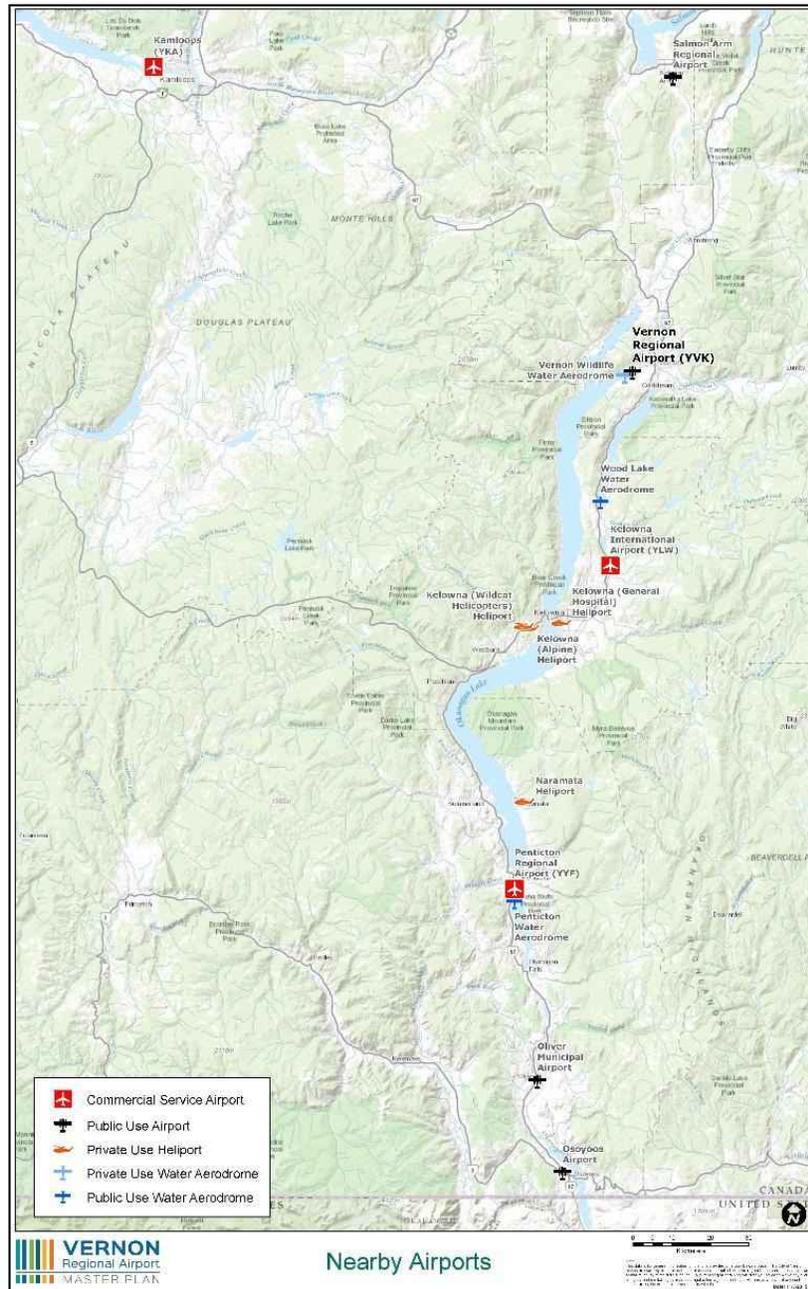


Table 3.3: Nearby Airports

Airport	Community	Runway Length (metres)	Annual Operations (passengers)	Distance to YVK (km)
Commercial Service Airports				
Kelowna International Airport (YLW)	Kelowna	2,713/61	1,440,000	40
Kamloops (YKA)	Kamloops	2,438/45	290,394	130
		847/15		
Penticton Regional Airport (YYF)	Penticton	1,829 / 45	100,000	120
Public Use Airports				
Vernon Regional Airport (YVK)	Vernon	1072/23		0
Oliver Municipal Airport	Oliver	975/15		156
Osoyoos Airport	Osoyoos	755/23		176
Salmon Arm Regional Airport	Salmon Arm	1,300/23		55
Public Use Water Aerodrome				
Penticton Water Aerodrome	Penticton			115
Wood Lake Water Aerodrome	Wood Lake			24
Private Use Water Aerodrome				
Vernon Wildlife Water Aerodrome	Vernon			0
Private Use Heliports				
Kelowna (Alpine) Heliport	West Kelowna			62
Kelowna (Wildcat Helicopters) Heliport	West Kelowna			62
Kelowna (General Hospital) Heliport	Kelowna			54
Naramata Heliport	Naramata			130

3.3.3 Land Demand Forecast

In 2015, the Vernon Regional Airport consisted of 30 buildings with a total floor space of 45,137 m². The users at the airport represent several aviation sectors: airport operations, commercial aviation, industrial businesses and private general aviation. Currently, 70% of the space is used by commercial and industrial businesses and airport operations, with the remainder of the space used by general aviation for private aircraft hangar storage and maintenance.

In the last few years there has been high interest from local interests and airport users to develop more land and hangar space at the airport, and there is currently very limited hangar space available for long term and transient use.

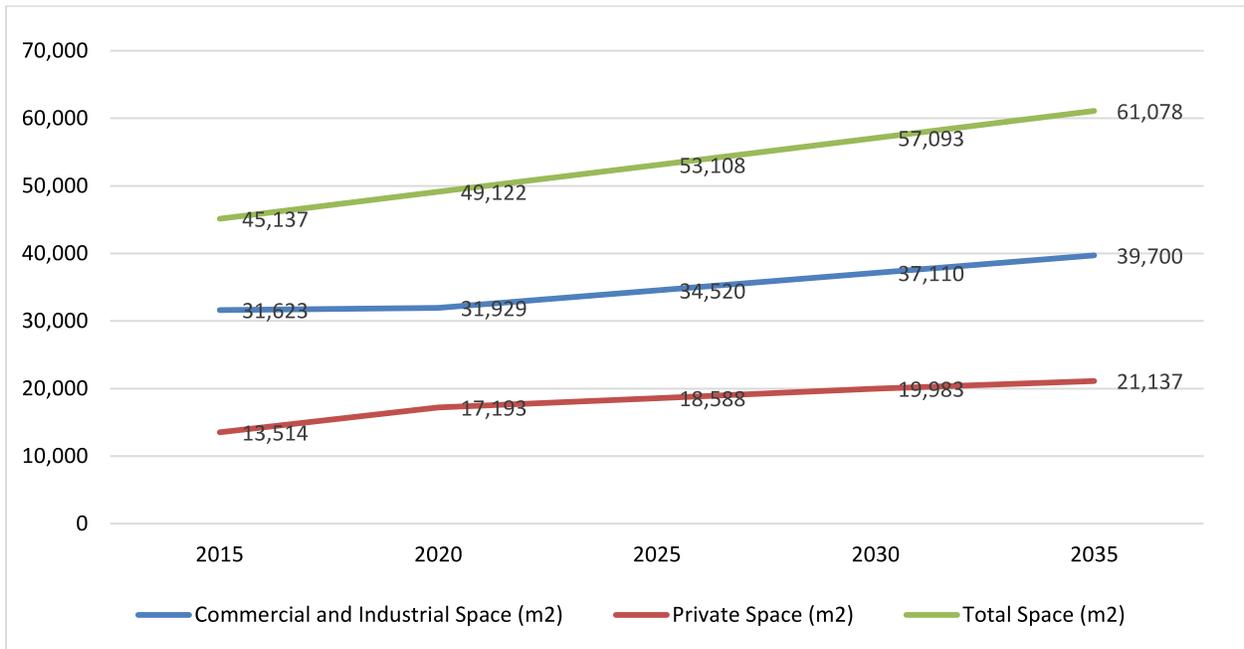
As presented in Table 3.4 and Graph 3.4, the demand for hangar space in the airport can expect to grow by 35% in the next 20 years. The demand for indoor space is driven by all aviation sectors in the airport, and would be driven by growth in the economy, market changes and the increasing cost of aircraft (leading increasingly to a desire for indoor aircraft storage).

Table 3.4: Lease Area Demand Forecast 2015-2035

Year	Commercial and Industrial Floor Space (m ²)	Private Floor Space (m ²)	Total Floor Space (m ²)	% Change from 2015
2015	31,623	13,514	45,137	0%
2020	31,929	17,193	49,122	8.83%
2025	34,520	18,588	53,108	17.66%
2030	37,110	19,983	57,093	26.49%
2035	39,700	21,137	61,078	35.31%



Graph 3.4: Floor Space Demand Trend-Line



3.4 BASED AIRCRAFT OPERATION

3.4.1 Design Aircraft

Aircraft design is the main parameter used by Transport Canada to establish airport design criteria and to define the airport classification and operation code. The design aircraft for the Vernon Regional Airport is a Beechcraft 1900D, which is the largest aircraft using the airport. Table 3.5 shows the most common aircraft using the airport.

Table 3.5: Common Aircraft Fleet at Vernon Regional Airport

Aircraft	Max Takeoff Weight	Take-off Distance Required (ft.) Dry Runway 15°C @ 1000' ASL	Use	~Annual Landing
Fixed-Wing				



	Cessna 172	2,450 lbs (1,111 kg)	1,730	Private	4,500
	Cessna Citation V	16,630 lbs (7,544 kg)	3,670	Private	365
	Cessna Citation CJ4	17,110 lbs (7,761 kg)	3,513	Private	50
	Beechcraft King Air 200	12,500 lbs (5,670 kg)	3,500	Private/Charter /Medivac	40-60
	Socata TBM 700-850	7,943 lb (3,553 kg)	2,300	Private	40-50
	Pilatus PC-12	10,450 lbs (4,740 kg)	2,850	Private/Charter	365
	de Havilland Canada DHC-5 Buffalo	49,201 lbs (22,317 kg)	3,300	Federal	2

	Beechcraft 1900D	17,600 lbs (7,982 kg)	3,737	Charter/ Commercial	1
Rotary					
	Bell 212	11,199 lbs (5,080 kg)	N/A	Commercial	200
	Robinson R-44	2,500 lbs (1,134 kg)	N/A	Private/ Commercial	100
	Bell 206	3,200 lbs (1,451 kg)	N/A	Private/ Commercial	100
	Eurocopter EC135	6,415 lbs (2,910 kg)	N/A	Commercial	80
	Bell 204/205	9,500 lbs (4,309 kg)	N/A	Commercial	50

3.4.2 General Aviation Demands

General aviation comprises the majority of the airport’s based aircraft (91%) and movements (97.4%). General aviation includes a large range of aviation activity, including the Vernon Flying Club, flying schools, light recreation aircraft and gliders. The typical general aviation aircraft at the Vernon Regional Airport is a Cessna 172. As shown in Table 3.6, the current airport airside facilities fully meet the design criteria for general aviation.

Table 3.6: Vernon Regional Airport Typical General Aviation Aircraft (Cessna 172) Performance

Temperature	Gross	Runway Length Required	Runway Length Required (50ft Obstacle)
10° C	Max Loaded	930 ft.	1670 ft.
20° C	Max Loaded	1000 ft.	1790 ft.
30° C	Max Loaded	1075 ft.	1915 ft.

3.4.3 Corporate Aviation Demands

Vernon has a number of large businesses in the community, some of whom require air travel on a regular basis. Corporate flights can be economical and convenient form of travel for businesses that have significant travel requirements. One corporate flight department currently operates at the airport. Other corporate users include charter companies, medical evacuation services, commercial and federal air services. As shows in Graph 3.1 and Table 3.1, in 2014 3.6% of the based aircraft and 2.6% of the movements at the airport belonged to corporate aviation.

The typical corporate aircraft type for the Vernon Regional Airport is a Cessna Citation V. Table 3.7 illustrates the Citation’s performance and runway length requirements. The current airport runway length of 3,512 feet can accommodate corporate flights only under specific weather and loading conditions. To fully accommodate typical corporate aircraft used at the airport, a runway extension would be required.



Table 3.7: Vernon Regional Airport Typical Corporate Aviation Aircraft (Cessna Citation V) Performance

Operation Class	Temperature	Gross	Runway Required For Take-off	Runway Required For Landing
Private	15° C	Max Loaded	3,670 ft.	2,850 ft.
Private	30° C	Max Loaded	4,410 ft.	2,990 ft.
Commercial	15° C	Max Loaded	3,670 ft.	4,560 ft.
Commercial	30° C	Max Loaded	4,410 ft.	4,784 ft.

3.4.4 Based Aircraft Demand Forecast

The long term outlook for the based aircraft mix at the Vernon Regional Airport is dependent on traffic growth and additional technological advancements. Currently, there are 130 based aircraft at the airport, and the inputs previously discussed help project future demand. Table 3.8 depicts the resulting based aircraft forecast for the airport and the aircraft mix for the next 20 years.

Table 3.8: Vernon Regional Airport Based Aircraft Demand

Year	Small Aircraft Single/ Twin Engine	Corporate / Turbo Jet	Helicopter	Total	% Change from 2015
2015	119	4	7	130	0%
2020	127	5	10	142	9.2%
2025	135	6	13	154	18.5%
2030	143	7	16	166	27.7%
2035	151	8	19	178	36.9%
% Change from 2015	26.9%	100%	171.4%	36.9%	

3.5 AIRCRAFT TIE-DOWNS

Currently, there are 44 outdoor aircraft tie-down spots in the airport. The future demand for tie-downs is related to the change of the based aircraft number in the next 20 years. By using the trend line analysis method, the demand for tie-down spots for the Vernon Regional Airport is an average of a two new spaces per year. Table 3.9 shows the projected tie-down demand for the next 20 years. The projected demand for tie-downs include a mix of aircraft, such as fixed-wings, helicopters and gliders.

Table 3.9: Vernon Regional Airport Aircraft Tie-Down Demand

Year	Tie-down Demand	% Change from 2015
2015	44	0%
2020	54	22.7%
2025	64	45.4%
2030	74	68.2%
2035	84	90.1%

3.6 FUEL SERVICES

The demand for fuel at the Vernon Regional Airport has been on a steady increase as a result of projected new tenants, businesses and aircraft. The increased demand for fuel is also a result of the level of services provided at the airport and our competitive fuel cost. The majority of fuel goes to the corporate and commercial users and the local flying schools. Table 3.10 and Graph 3.5 present the trend-line fuel sales forecast for avgas and jet fuel for the next 2035 based on projected aircraft demand. As a result of frequently changing fuel prices, it is difficult to accurately project fuel sales revenue.

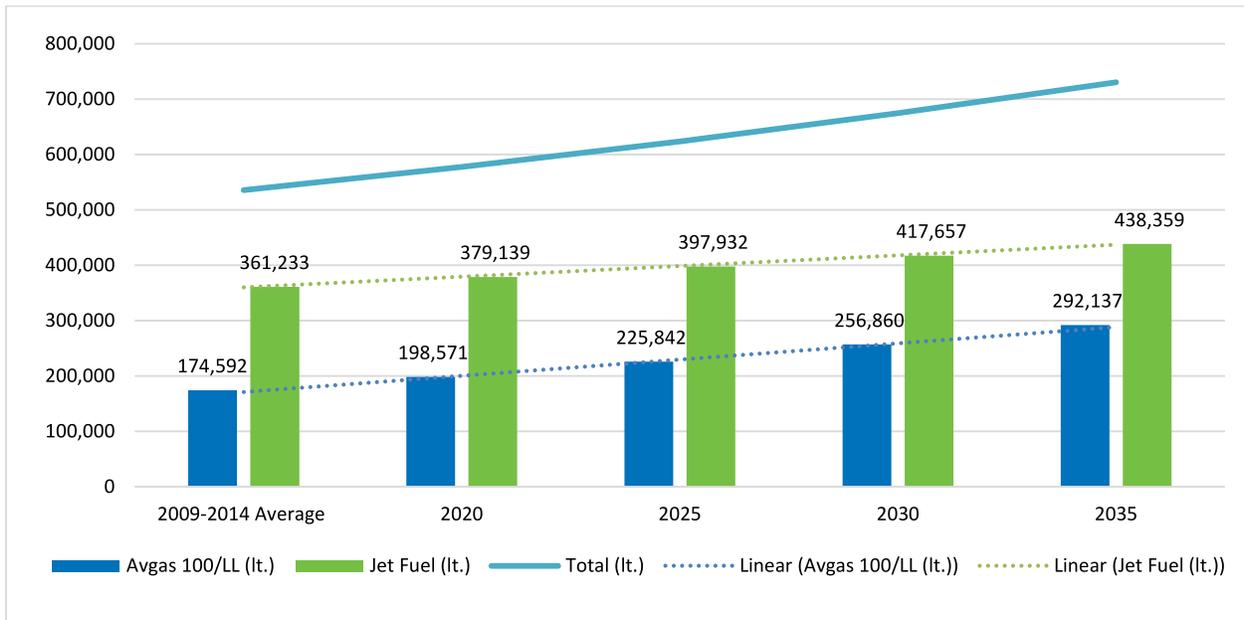
Two types of fuel are provided: **100LL avgas** is used for propeller aircraft, and is used primarily by the general aviation users; **Jet fuel** is used by gas turbine aircraft and is the most common fuel for commercial aviation and corporate aviation.

Table 3.10: Fuel Sales Forecast in Litre

Year	Avgas 100/LL (lt.)	Jet Fuel (lt.)	Total (lt.)	% Change
2009-2014 Average	174,592	361,233	535,825	
2020	198,571	379,139	577,709	7.8%
2025	225,842	397,932	623,774	16.4%
2030	256,860	417,657	674,516	25.9%
2035	292,137	438,359	730,496	36.3%



Graph 3.5: Fuel Sales Trend-Line Forecast



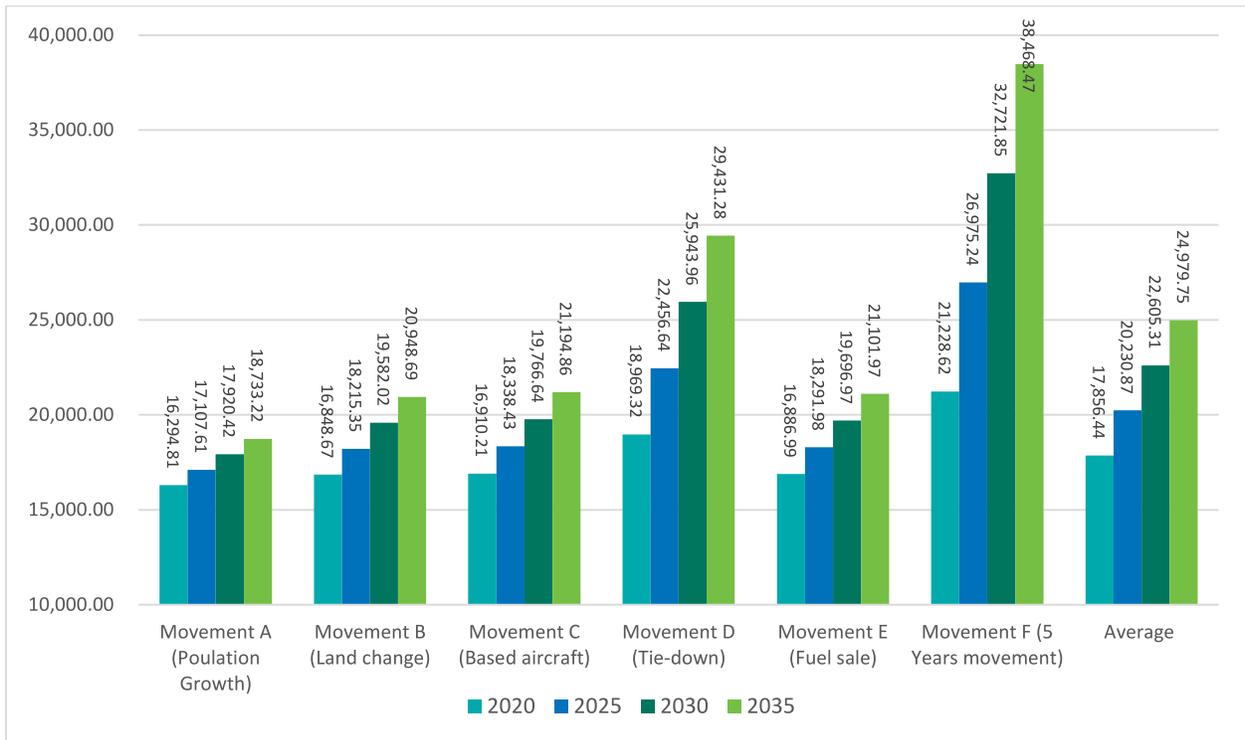
3.7 PROJECTED MOVEMENTS

The Vernon Regional Airport movement forecast was developed utilizing the five demand elements as described above: socioeconomic trends, land demand, based aircraft, tie-downs and fuel sales. Each forecast analysis element showed some level of growth for the next 20 years. The forecast creates a reasonable envelope to determine future movements at the airport. As illustrated in Graph 3.6, the selected forecast in the short, medium and long term consider the average growth of all demand elements together.

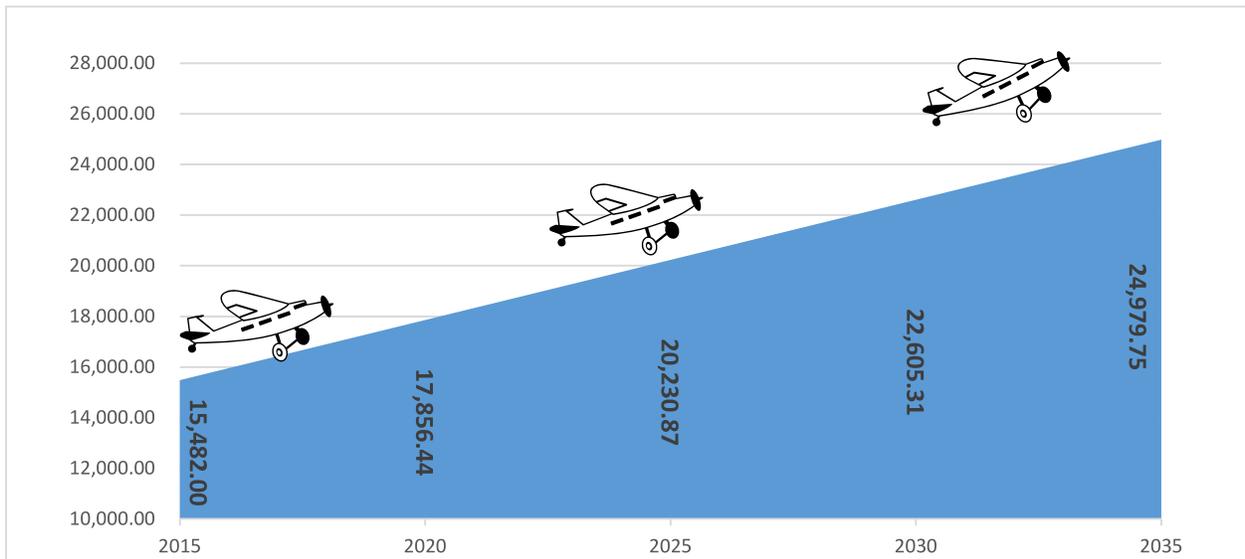
After reviewing forecasts and taking survey results into consideration, the projected movements for the Vernon Regional Airport are expected to grow from 15,482 in 2015 to 24,980 in 2035 (Graph 3.7). This number is predicated on the ability of having additional land to accommodate the expected growth.



Graph 3.6: Vernon Regional Airport Movement Projection Based on Demand



Graph 3.7: Vernon Regional Airport Movement Projection 2015-2035



3.8 AVIATION DEMAND FORECAST SUMMARY

Table 3.11 presents a summary of the aviation demand forecast for Vernon Regional Airport. The forecast is considered reasonable and achievable and was used throughout the master plan to help in the development of facility requirements and the identification of development alternatives.

Generally, the airport can expect to see a greater number of movements and a larger and more diverse based aircraft mix over the forecast period.

Table 3.11: Aviation Demand Forecast Summary

Component	Actual	2020	2025	2030	2035	% Change
Vernon Population	38,861	40,804	42,844	44,986	47,235	21%
Floor Space (m ²)	45,137	49,122	53,108	57,093	61,078	35.31%
Based Aircraft	130	142	154	166	178	36.9%
Tie-Downs	44	54	64	74	84	90.1%
Fuel Sales (litres)	535,825	577,709	623,774	674,516	730,496	36.3%
Movement	15,482	17,856.44	20,230.87	22,605.31	24,979.75	61.3%



4.0 FACILITY AND DEVELOPMENT PLAN

4.0 INTRODUCTION

Based on the anticipated demand in airport activity and the preferred development alternative from the Draft Vernon Regional Airport Master Plan, the following plan for facilities and future development of the airport and surrounding lands over the next 20 years has been identified. The plan below addresses the following:

- **Land requirements:** this includes City-owned airport lands that would be required to accommodate airport expansion and is identified for significant new development.
- **Facility requirements:** this includes new facilities and improvements to the existing facilities such as the runway, taxiways, aprons, terminal building and navigational aids, for example.
- **Other development considerations:** other aspects of development at the airport, such as parking, design guidelines, branding, signage and land use considerations are also addressed in this chapter.

4.1 FACILITY AND DEVELOPMENT PLAN

The facility and development plan for the airport includes the following, as illustrated on Map 4.1.

- Provide more hangar and tie down areas along Captain Bailey Way
- Rehabilitate, but do not extend the runway length
- Construct a holding bay (Turning D) on the end of Runway 23
- Relocate the visual guidance indicators and threshold markings
- Construct Taxiway Echo and rehabilitate Taxiways Alpha and Bravo
- Construct a new apron and rehabilitate existing aprons
- Provide more tie-down areas
- Construct a paved helipad
- Improve lighting and marking
- Upgrade and improve the terminal building to a permanent structure
- Construct a new airport operations shop and vehicle storage building
- Improve perimeter security
- Implement an aircraft movement monitoring system
- Construct a new parking area for General Aviation users
- Develop an airport landscaping plan



- Develop a new Vernon Regional Airport brand and directional signage
- Incorporate design guidelines for new development into the Official Community Plan
- Explore the potential for employment lands north of the airport



MAP 4.1: VERNON REGIONAL AIRPORT MASTER PLAN DEVELOPMENT PLAN



Legend - Proposed Changes/Additions

- PAPI LIGHTS
- END LIGHT (RED)
- VIEWING PLATFORM
- HELIPAD
- NEW HANGAR
- TIE-DOWN LEASE
- PAVED ASPHALT
- LANDSCAPE
- SHORT TERM PARKING
- REHABILITATION AREA

Existing Airfield Structures

- ▲ ROTATING BEACON
- WINDSOCK
- SIGN
- WEATHER STATION

VERNON Regional Airport MASTER PLAN

Scale: 0 50 100 200 Meters

Date: 9/20/2016

Notes: This map is for general reference only and is not intended for use in any other way. The City of Vernon is not responsible for any errors or omissions on this map. It is the user's responsibility to verify the accuracy of the information shown on this map. The City of Vernon is not responsible for any damages or liabilities arising from the use of this map. The City of Vernon is not responsible for any damages or liabilities arising from the use of this map.

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4.2 LAND REQUIREMENTS

The plan recommends developing the airport within existing City-owned airport lands, including those along the southern boundary of the airport. No additional land acquisition is proposed in this plan.

4.2.2 Provide more Hangar and Tie Down Areas Along Captain Bailey Way

The Captain Bailey Way property along the southern boundary of the airport is the only remaining City-owned land for airport expansion south of the runway. The high demand for hangar and tie-down space for commercial and private users at the Vernon Regional Airport will require expansion of these uses along Captain Bailey Way. Party wall hangars are encouraged to make efficient use of the land.

The City of Vernon has explored the feasibility of hangar and residential units along Captain Bailey Way. As assessed in Chapter 3, currently there is little demand for the residential component of the proposed development and, as such, the residential component is not included in the plan.

Map 4.2: Vernon Regional Airport Land Requirements



4.3 FACILITY REQUIREMENTS

4.3.1 Rehabilitate and Improve, But Do Not Extend the Runway Length

Runway Surface Remediation and Optional Grooving

The airport's runway (Runway 23-05) was built in 1986 and requires a major rehabilitation to restore its functionality and reduce maintenance costs. A Pavement Feasibility Study for the Vernon Regional Airport was completed in 2013, including a full assessment of the airside restoration requirements (Appendix E in the Vernon Regional Airport Master Plan).

It is recommended that the feasibility of grooving the runway during the surface remediation works be explored. As per Transport Canada Advisory Circular (AC) No. 300-008, runway grooving consists of providing parallel transverse channels (grooves) in the pavement surface. Grooving improves the macro-texture of the pavement surface, reduces water film thicknesses during rainfall and provides an escape channel for water that may become trapped between the pavement surface and an aircraft tire. These effects reduce the potential for aircraft hydroplaning under wet conditions. Grooving may also improve aircraft braking performance on a wet runway as compared to a wet non-grooved runway.

Runway Length Requirements

Runway length is generally a function of the design aircraft performance and site conditions at the airport. Runway length requirements are determined by three main site conditions:

- Elevation: elevation contributes to air density. At higher elevations, the air has less density, requiring faster aircraft movement and a longer runway.
- Temperature: high temperature decreases the performance of aircraft, increasing the amount of runway requiring to safely land.
- Surface conditions: during wet conditions, the useful load of the runway is shorter by up to 40%, and a longer runway is required.

In 2014, a Runway Feasibility Study for the airport was done by Tetra Tech EBD Inc. Consulting. Four potential runway extension options were explored to serve business and general aviation aircraft in the airport (Appendix D in the Vernon Regional Airport Master Plan).

The previous Transport Canada Aerodrome Standards and Recommendation Practices, TP312 4th Edition, classified the Vernon Regional Airport runway as code 2B, which allows for a wing span up to but not including 24.1 metres, and a runway length up to but not including 1200m (3937 ft). Increasing the runway beyond 1200m would change the runway to Code 3 and would require a wider runway separation distance and a wider wing span, which is not feasible for the Vernon

Regional Airport site. Under the 4th Edition regulations, and given the airport’s location, extending the runway length from 3,512 feet to 4,000 feet for Vernon Regional Airport is achievable. The new TP312 5th Edition has a direct impact on the feasibility of the runway extension at the Vernon Regional Airport. Transport Canada has stated that any airport development plans using TP312 4th Edition, need to be fully completed by September 2017. Due to the airport’s location and the location of existing buildings, future extension of the runway is not possible under the 5th Edition regulations without considerable costs.

At an estimated \$5.2 million, the runway extension represents a very large investment for the community, and such an investment should provide a very clear benefit. Based on the economic impact analysis for various development scenarios, the runway extension offers only a marginal increase in economic activity and would have a detrimental impact on surrounding neighbourhoods, particularly with regard to noise and development potential. The current runway length also meets the needs of approximately 97% of aircraft movements at the airport, and would fulfil most of the airport’s needs for the next 20 years.

Runway Holding Bay (Turning D)

Construction of an holding bay (turning “D”) on the end of Runway 23 will provide a turnaround bay for increased aircraft movement and service vehicle maneuverability and safety.

4.3.2 Construct Taxiway Echo and Rehabilitate Taxiways Alpha and Bravo

Taxiway Surface Remediation

Taxiways are one of the most critical areas in the airport and should be constructed to the same quality and pavement strength of the runway. Based on the Pavement Facility Study (Appendix E), taxiway Alpha and Bravo require some rehabilitation work in the next 10 years (Table 4.1).



Table 4.1: Existing Vernon Regional Airport Taxiways Conditions and Requirements

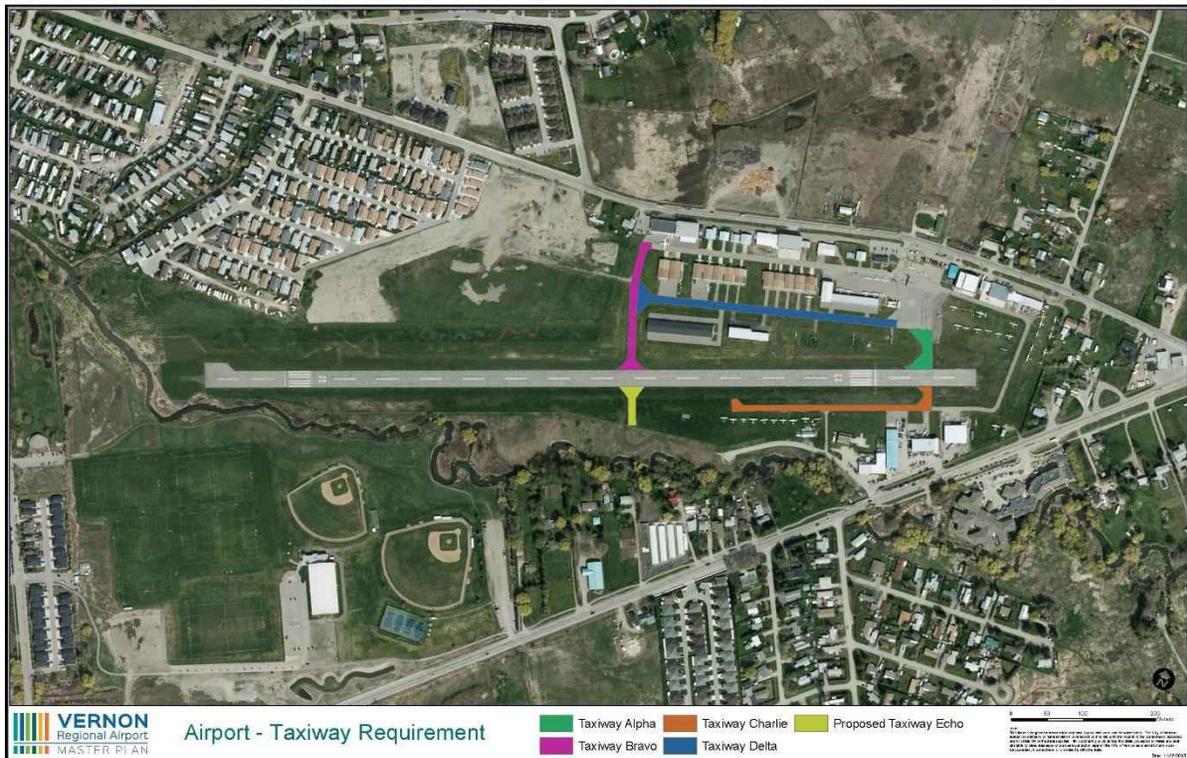
Taxiway	Conditions	Requirements
Alpha	Extensive block cracking	Rehabilitation required in the next 2-3 years
Bravo	Some longitudinal and transverse cracks	Rehabilitation required in the next 8-10 years
Charlie	Excellent condition	None
Delta	Good condition	None

Source: SNC-Lavalin, Pavement Facility Study for Vernon Airport (2013).

Taxiway Echo

Based on anticipated activity, a new taxiway (Echo) connecting the proposed new Apron 3 (see Apron Requirements, below) with Taxiway Charlie and the runway is required (Map 4.3).

Map 4.3: Vernon Regional Airport Taxiway Requirements



4.3.3 Construct a New Apron and Rehabilitate Existing Apron 1

Apron 1 and 2 Surface Remediation and Maintenance

The existing 6,029 sq.m. commercial Apron 1 is designed to accommodate a mix of aircraft sizes. Originally paved in 1960s, and subsequently extended over a few phases, Apron 1 requires rehabilitation work in some sections. The existing Apron 1 can be considered in five sub-sections, as mentioned in the Pavement Study (Appendix E). Table 4.2 presents the current conditions and requirements of each section.

Table 4.2: Apron 1 Sub-Sections Existing Condition and Requirements

Apron 1 Sub Section	Conditions	Requirements
4A	Bad condition; Severe block cracking on 80% of the surface	Immediate rehabilitation
4B-4D	Satisfactory	Regular maintenance and crack sealing
4E	Extensive block cracking	Medium term rehabilitation

The existing Apron 2 is in good condition, and no rehabilitation is expected to be required in the next 20 years.

Apron Requirements

Apron 1 Expansion: During spring and summer, the activity level at the airport increases dramatically and a larger Apron 1 is required. Expanding the Apron 1 ramp east, through a service road, would provide more parking spaces for a mix of different sized aircraft throughout the year, and would also create an accessible paved maintenance area for the airport east wing commercial/industrial businesses.

New Apron 3: As activity increases at the airport, the development of a new apron is required. Proposed Apron 3 would connect the existing Taxiway Charlie, which is a Transport Canada grandfathered non-conforming taxiway, with the proposed new taxiway Echo on the south side of the airport. Apron 3 would provide an access, parking and maintenance area for the proposed south Captain Bailey Way commercial/industrial hangar area.



Map 4.4: Vernon Regional Airport Existing and New Apron Requirements



4.3.4 Provide More Tie-Down Areas

Based on anticipated demand, 40 new tie-down spaces for a mix of aircraft types are required in addition to the 44 already existing at the airport. With limited land base for expansion, a shortage of tie-downs is expected.

Short Term 24 Hour Aircraft Parking

Vernon and the North Okanagan are attractive destinations for many of the West Coast general aviation users. 24 hour, short term designated tie-down space would provide a desirable addition and would accommodate anticipated need, as identified in the Airport Master Plan Survey.

The proposed location for five short term tie-downs is on the paved area of Apron 2, in front of the terminal building, as illustrated on Map 4.1.

Tie Down Location

The new tie-down locations would be distributed in several locations throughout the airport. The proposed locations have been identified based on aircraft type, usage level and tie-down duration, and would require a location based variable tie-down fee (Table 4.3; Map 4.1).

Table 4.3: Proposed Tie-Downs Location

Proposed Tie-Down Location	Aircraft Type	Users	Tie-Down Duration
Apron 1 expansion	General aviation Corporate aviation Helicopters	Private and Commercial	Short to long term
Apron 2	General aviation Corporate aviation	Private and Commercial	24 Hours
Apron 2	General aviation Corporate aviation	Private and Commercial	Short to long term
West end of taxiway Echo	General Aviation	Private	Long term

4.3.5 Construct a Paved Helipad

Vernon Regional Airport is the main helicopter service provider in the North Okanagan. Helicopters use the airport for a variety of services, such as helicopter tourism adventures, emergency, commercial and industrial services. Currently, helicopters are using the gravel area between the runway and Taxiway Delta as a landing and tie-down area. To accommodate the expected future growth in helicopter use, a paved helipad is required for the airport and is recommended for construction in the short term.

4.3.6 Improve Lighting and Marking

Runway Lighting

Runway edge lighting is the standard lighting system used to define the lateral and longitudinal limits of the usable landing area. The existing edge lighting systems at the airport are adequate throughout the planning period.



Taxiway Lighting

Taxiway edge lights emit blue light and are used to outline the edges of the taxiway system. The existing taxiway lighting at the airport is adequate throughout the planning period. Additional taxiway edge lights for the new Taxiway Echo are required.

Visual Guidance Indicators

Precision Approach Path Indicators (PAPI) are a system of lights, normally installed on the left side of the runway, which provide continuous visual descent guidance information during a visual or instrument approach to the runway.

It is recommended that the existing PAPI system on Runway 05 and threshold marking be relocated to the end of the runway strip. This change will maximize the declared runway length by an additional 110m (360 feet) using the existing asphalt surface.

Obstruction Lighting

In order to improve the short lifespan of the beacons, it is recommended that the three airport flashing red hazard beacons on the surrounding hills be replaced with high power red LED units.

4.3.7 Construct a New Permanent Terminal Building

Airport terminal facilities are often the first impression of a community that visitors encounter. Terminals at an airport provide space for passenger waiting, pilots' lounge, pilot flight planning, concession areas, administration, storage, and various other needs.

The current terminal facility at the Vernon Regional Airport provides an efficient space and basic services for airport users and management. Constructed in 2006, the modular terminal building was built with a temporary building permit, which expired in August 2016. After 2016, a permanent building will be required.

The location of the terminal facility, along Apron 1, should be kept during the life of the Master Plan. An optional relocation of the Vernon Flying Club and flying school to the terminal building should be explored based on future demand. The terminal building requires upgrading, as described below:

Requirements:

- Concrete foundation
- Terminal observation deck



- Passengers and pilots lounge
- Future Flying Club venue (optional)
- Future Flying School office and class (optional)

4.3.8 Construct a New Airport Operations Shop and Vehicle Storage Building

A single maintenance facility building is required. Currently, the maintenance buildings are in three locations: the terminal, electrical room and snow truck hangar. Consolidation of these functions would save maintenance time and costs and also free up valuable space for future hangar development along Tronson Road.

4.3.9 Improve Perimeter Security

Perimeter security is used at airports primarily to secure the aircraft operation area. The airport has a perimeter security plan and perimeter fencing that meets small regional airport standards. The fencing should be maintained and improved for crime prevention, with higher fencing sections, lighting, signage and security cameras. The main airport gate should be replaced and new gates for the south entrance to the airport are required.

4.3.10 Implement an Aircraft Movement Monitoring System

Tracking the air movements (landings and take-offs) provides important and valuable data for airport operations. A permanent aircraft Movement Monitoring System would allow the City to track aircraft movement more accurately, providing more data for future decision making.

4.3.11 Construct a New Parking Area for General Aviation Users

Parking needs are attributable to visitors, employees, locally based users, and aviation business. Locally based users primarily include those attending to their based aircraft. Airport businesses need parking to accommodate employees and customers.

Currently, airport parking is located beside the terminal building, the gravel area along Tronson Road and on the south side of the airport, along Okanagan Landing Road and Captain Bailey Way. All parking requirements for airport businesses are accommodated through the Parking Schedule of Zoning Bylaw #5000. The main parking challenge at the airport is related to general aviation users, as their vehicle parking should be in close proximity to airport services or to an aircraft owner's hangar. However, some users must drive on the secure side of the airfield, particularly to access their hangar. In an effort to limit the amount of vehicle traffic in the aircraft movement areas, and as a result of the expected projected growth, a new parking area for general aviation is necessary, and is identified on Map 4.1.

4.4 OTHER DEVELOPMENT CONSIDERATIONS

4.4.1 Develop an Airport Landscaping Plan

The Vernon Regional Airport is located in a unique setting. The airport is adjacent to a large open space and agricultural meadows to the north. Vernon Creek flows along the west and southern boundaries and contains sensitive habitat. Marshall Fields Park is also south of the airport. Given the airport activity projected to grow, a key priority for any future development is ensuring a balance between the built area and surrounding natural landscape and users.

A landscape plan for the airport is required, focused on the public areas, on the internal and external areas and to enhance scenic open space. Any landscape features should provide an opportunity to showcase the airport and promote aviation activity and the airport's relationship with the community.

4.4.2 Develop a New Vernon Regional Airport Brand and Directional Signage

As a service provider in a competitive market and to attract new customers and aviation activity, a branding plan for the Vernon Regional Airport is required. A new logo and directional signs that are consistent with the City of Vernon brand would promote recognition and help position Vernon better in the target market.

4.4.3 Incorporate Design Guidelines for New Airport Development into the Official Community Plan

Vernon's Official Community Plan (OCP) includes design guidelines that apply to new development in different areas in the city, including Development Permit Area 2 – Neighbourhood District, which includes the airport lands. In addition to those existing guidelines, the following policies aim to ensure new development and redevelopment enhance the form and character of the Vernon Regional Airport, both internally and externally. The following design guidelines apply for all properties designated as Airport Industrial in the OCP:

- The visual appeal of development at the airport shall be considered both from an internal and an external perspective. Design of all buildings, both new and those being redeveloped, should consider site lines from within the airport facility, and externally from public roadways adjacent development, including development uphill from the airport and adjacent parklands.
- Increasing building articulation, such as windows and entryways, are encouraged where feasible.



- A variety of material treatments and colour choices shall be used to break up the massing of buildings and large blank walls.
- Encourage the use of natural accent materials, such as wood and stone, for building and hangar features including windows, entryways and doors.
- Signage placement, materials and design shall complement, and be consistent with, the design of the building. Considering surrounding land uses, backlit signs are not permitted.
- Fencing is encouraged to be decorative where feasible. Where chainlink fencing is unavoidable, it should be colour treated.
- Safety is considered paramount, both inside and outside the airport. Impacts on adjacent lands should be considered when reviewing lighting choices, installations and upgrades. All facility, building and signage lighting should be downcast and non-polluting.
- Landscaping shall be used to soften and screen buildings, wall faces and parking areas, especially when visible from public roadways, adjacent development and parkland.

4.4.4 Explore the Potential for Employment Lands North of the Airport

While not included in the airport lands, and not required for the operations of the airport, a number of properties north of the airport along Tronson Road were identified as having potential for development as employment lands during the planning process. Several of these properties had been identified for future airport uses as part of the previous Airport Master Plan, and one was acquired by the City and is designated as Airport Industrial in the OCP. As all but the City owned property are in the Agricultural Land Reserve (ALR), the desirability and feasibility of possible exclusion of the properties from the ALR will be explored, with due consideration for the OCP policies related to agricultural lands.

4.5 SUMMARY

This chapter has outlined the facilities required to meet the potential aviation demand projected for the Vernon Regional Airport over the next 20 years. Table 4.4 below presents a summary of facility requirements for 2015-2035 and their development priority. The development priority varies from high (0-5 years) to moderate (5-10 years) and low (10-20 years).



Table 4.4: Vernon Regional Airport Master Plan Facility Requirements

Facility Requirements	Development Priority
Runway 23-05 Runway Surface Remediation	High
Runway Holding Bay (Turning D)	High
Visual Guidance Indicators (PAPI Relocation) and Threshold Marking	High
Terminal Building	High
Aircraft Movement Monitoring System	High
Branding and Signage	High
Apron 1 Surface Remediation and Maintenance	Moderate - High
Tie-Downs	Moderate - High
Obstruction Lighting	Moderate - High
Airport Operations Shop and Vehicle Storage	Moderate - Low
Vehicle Parking Requirements	Moderate - Low
Taxiway Echo	Moderate
Apron 1 Expansion	Moderate
Apron 3	Moderate
Helipad	Moderate
Fencing and Gates	Low - High
Commercial and Industrial Hangar	Low - High
General Aviation Hangar	Low - High
Landscaping	Low - High
Taxiway Surface Remediation	Low



5.0 AIRPORT PHASING PLAN AND CAPITAL IMPROVEMENT STRATEGY

5.0 INTRODUCTION

This chapter presents the Project Phasing Plan and the Capital Improvement Strategy, as developed from the Airport Facility and Development Plan (Chapter 4). The Project Phasing Plan provides the recommended schedule for implementing the proposed improvements for the Vernon Regional Airport over the next 20 years. The Capital Improvement Strategy specifies the funding strategy in order to realize the implementation of the plan within a sustainable time frame.

5.1 PROJECT PHASING PLAN

The project phasing recommendations have been developed based on the airport's demand and forecasts presented in Chapter 3. Some of the projects were identified based on the current condition and life expectancy of the airport's facilities and are necessary for regular maintenance as per Transport Canada's safety requirements. Table 5.1 presents the project list over the life of the plan, which has been divided into three phases, as follows:

- **Phase I: Short Term 2015 to 2020**

As illustrated in Map 5.1, Phase I includes the immediate projects that are required in the short term, between one to five years. Phase I focuses primarily on existing airport assets, with improvements to address the safety and security of the airport. Key projects include rehabilitation and improvements to the runway and Apron 1, a new hangar space at the southern of the airport along Captain Bailey Way, permanent terminal building, paved helipad, new gate and fencing, branding and landscape beautification.

- **Phase II: Mid Term 2020 to 2025**

As illustrated in Map 5.2, Phase II includes projects that are necessary between years five and ten. These projects include construction of a new apron and taxiway at the southern of the airport, along Captain Bailey Way which would accommodate more hangar space, a new airport operations shop and vehicle storage and taxiway remediation.

- **Phase III: Long Term 2025 to 2035**

As illustrated in Map 5.3, Phase III includes projects between years ten and twenty. As the majority of the projects may be implemented within Phases I and II, Phase III includes the

provision of additional hangar space for commercial / industrial and private users and a new vehicle parking area for general aviation users.

Table 5.1: Project Phasing Plan Schedule

Facility Requirements	
Phase I 2015 – 2020	
Runway 23-05 Runway Surface Remediation and Improvements	
Visual Guidance Indicators (PAPI Relocation) and Threshold Marking	
Runway Holding Bay (Turning D)	
Apron 1 Expansion	
Apron 1 Surface Remediation and Maintenance	
Terminal Building	
Tie-Downs	
Helipad	
Obstruction Lighting	
Fencing and Gates	
Aircraft Movement Monitoring System	
Commercial and Industrial Hangar	
General Aviation Hangar	
Landscaping	
Branding and Signage	
Phase II 2020 – 2025	
Taxiway Surface Remediation	
Taxiway Echo	
Apron 3	
Airport Operations Shop and Vehicle Storage	
Commercial and Industrial Hangar	
General Aviation Hangar	
Vehicle Parking Requirements	
Phase III 2025 – 2035	
Commercial and Industrial Hangar	
General Aviation Hangar	
Vehicle Parking Requirements	



5.3 CAPITAL IMPROVEMENT STRATEGY

Table 5.2: Summary of Capital Improvement Value

	Cost (\$)	20% Contingency (\$)	Total (\$)
Phase I: Short Term (2015 to 2020)	1,465,746	293,153	1,758,900
Phase II: Mid Term (2020 to 2025)	608,500	121,700	730,200
Phase III: Long Term (2025 to 2035)	Via Private Development		
Total Phases I - III (2015 to 2035)	2,074,246	414,853	2,489,100

As presented in Tables 5.2 and 5.3, the cost of implementing the Airport Master Plan is estimated at \$2,056,600 over 20 years. Of this amount, \$462,000 is currently accommodated in the Four Year Capital Plan for rehabilitation of the runway. To fully fund this plan, other sources of revenue would have to be accessed. Below are a number of potential funding sources that could be explored.

- Four Year Capital Plan:** \$462,000 has been allocated in the Four Year Capital Plan for the rehabilitation of the airport runway. Following the completion of the Four Year Capital Plan, Council may choose to fund other identified projects at the airport from a future capital plan.
- Short Term Borrowing:** The City of Vernon has the capability to borrow up to \$1,907,500 in the short term (i.e. without going through the referendum process). This amount would have to be repaid within five years of the initial borrowing (long term borrowing would require public consent through referendum).
- Building Canada Fund – Small Communities Grant:** The Government of Canada and the Government of British Columbia are offering a grant to support infrastructure projects in communities with populations less than 100,000. The total amount available in the program for British Columbia is approximately \$218 million. The City of Vernon could apply for this grant to fund implementation of the Airport Master Plan. If successful, however, the City would be required to contribute 33% of the total project cost.
- British Columbia Air Access Program (BCAAP):** The Government of British Columbia is offering capital funding to assist B.C. airports with improvements to their infrastructure.
- Other Grant Opportunities:** Other grant opportunities may be explored for implementation of the Airport Master Plan.



- **Airport User Fees:** It is recommended that changes to various user fees charged at the airport be explored. These would include tie-down fees, landing fees, and the price of fuel. Depending on the scale of the fee changes, demand at the airport could be reduced. For example, an increase to fuel sales may result in some airport users travelling to other airports to refuel.
- **Airport Development Fees:** It is recommended that the viability of additional fees for development of the airport be explored to assist in funding the plan. However, such fees may discourage development at the airport and result in delays of acquiring the funding necessary to proceed with implementation projects.
- **Reserves:** Some funds may be accessed from various City reserves should other funding sources prove not to be viable.

5.4 SUMMARY

The main goals of the Vernon Regional Airport Master Plan are to ensure that the existing assets at the airport are maintained in a sustainable manner, that investment in new facilities is made with a clear understanding of the outcomes and that the area can continue to develop into a thriving employment hub for Vernon. Most importantly, the Airport Master Plan aims to ensure that the Vernon Regional Airport is able to continue operating safely. The implementation of this document through the Project Phasing Plan and Capital Improvement Strategy aims to achieve these goals. Monitoring the actual demand, movement activity and facility conditions over time is necessary to ensure that the planned phasing is meeting the needs of the airport users.



Table 5.3: Capital Improvement and Project Phasing

	Project	Cost (\$)	20% Contingency (\$)	Total (\$)
Phase I: Short-term (2015 to 2020)				
2017				
	Runway 23-05 Runway Surface Remediation and Improvements	493,333	98,667	592,000
	Visual Guidance Indicators (PAPI Relocation) and Threshold Marking	295,833	59,167	355,000
	Runway Holding Bay (Turning D)	101,250	20,250	121,500
2017 Total		890,416	178,083	1,068,500
2018				
	Apron 1 Expansion	141,665	28,335	170,000
	Apron 1 Surface Remediation and Maintenance	92,000	18,400	110,400
	Terminal Building	50,000	10,000	60,000
	Branding and Signage	30,000	6,000	36,000
	Landscaping	20,000	4,000	24,000
	Commercial and Industrial Hangar	Via Private Development		
	General Aviation Hangar	Via Private Development		
2018 Total		333,665	66,735	400,400
2019				
	Tie-Downs	26,665	5,335	32,000
	Helipad	50,000	10,000	60,000
	Landscaping	30,000	6,000	36,000
	Commercial and Industrial Hangar	Via Private Development		
	General Aviation Hangar	Via Private Development		
2019 Total		106,665	21,335	128,000
2020				
	Aircraft Movement Monitoring System	15,000	3,000	18,000
	Obstruction Lighting	20,000	4,000	24,000
	Fencing and Gates	70,000	14,000	84,000
	Landscaping	30,000	6,000	36,000
	Commercial and Industrial Hangar	Via Private Development		
	General Aviation Hangar	Via Private Development		
2020 Total		135,000	27,000	162,000
Total Phase I: Short-term (2015 to 2020)		1,465,746	293,153	1,758,900
Phase II: Mid-term (2020 to 2025)				
	Taxiway Surface Remediation	110,000	22,000	132,000
	Taxiway Echo	90,000	18,000	108,000
	Apron 3	350,000	70,000	420,000
	Airport Operations Shop and Vehicle Storage	58,500	11,700	70,200
	Commercial and Industrial Hangar	Via Private Development		
	General Aviation Hangar	Via Private Development		
	Vehicle Parking Requirements	Via Private Development		
Total Phase II: Mid-term (2020 to 2025)		608,500	121,700	730,200
Phase III: Long-term (2025 to 2035)				
	Commercial and Industrial Hangar	Via Private Development		
	General Aviation Hangar	Via Private Development		
	Vehicle Parking Requirements	Via Private Development		
Total Phase III: Long-term (2025 to 2035)		Via Private Development		
Total Phases I - III (2015 to 2035)		2,074,246	414,853	2,489,100



Map 5.1: Phase I Short Term 2015 to 2020 Layout



Area of Development

- PHASE I

Changes/Additions

- PARKING
- VIEWING PLATFORM
- HELIPAD
- NEW HANGAR
- TIE-DOWN LEASE
- PAVED ASPHALT
- SHORT TERM PARKING
- REHABILITATION AREA
- LANDSCAPE

Existing Airfield Structures

- ROTATING BEACON
- SIGN
- WINDSOCK
- WEATHER STATION

Changes/Additions

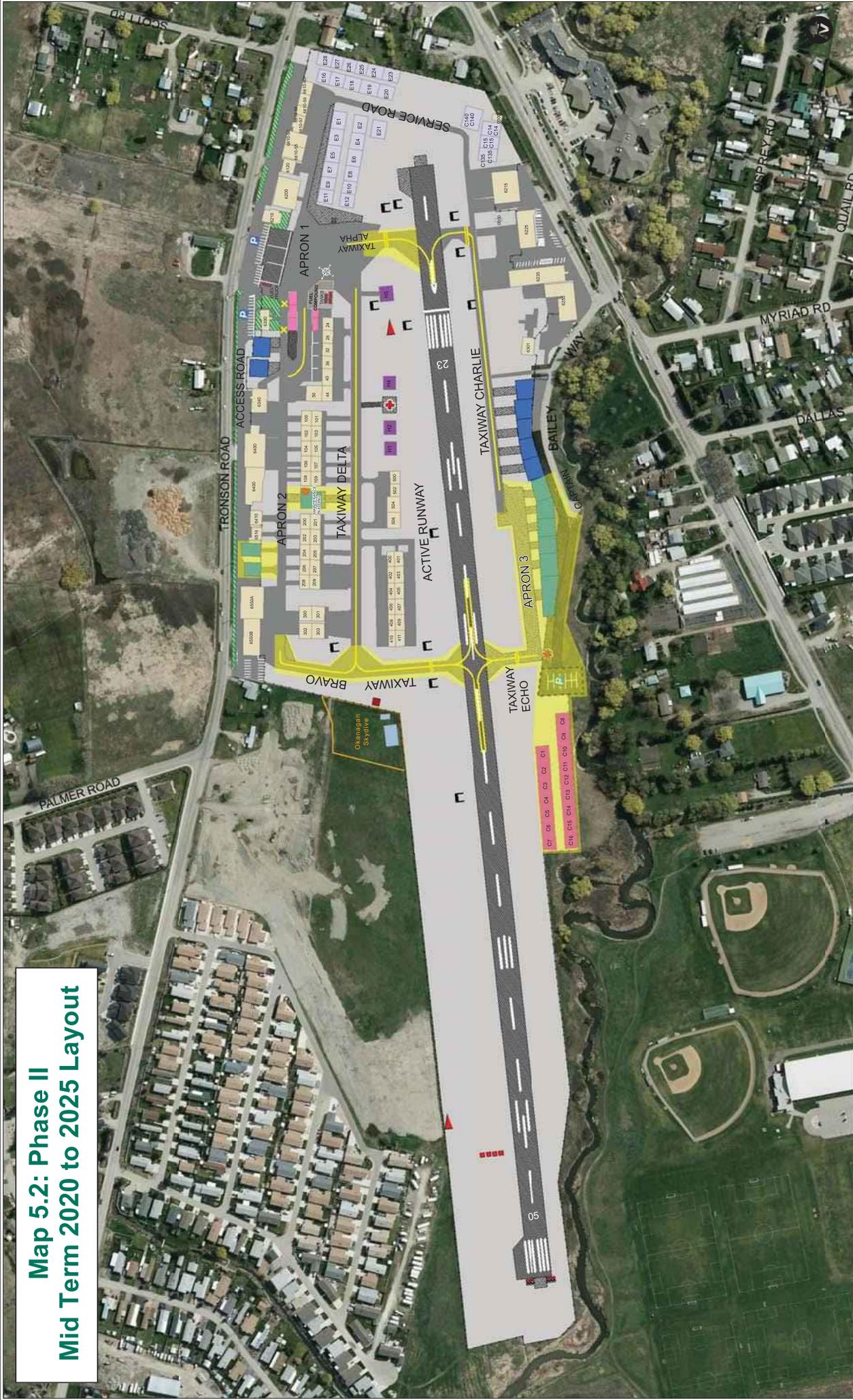
- PAPI LIGHTS
- END LIGHT (RED)
- WINGBAR LIGHTS (GREEN/BLACK)

VERNON Regional Airport MASTER PLAN

Date: 9/29/2016

Notes: This map is for general information and is not intended for use in any other way. The City of Vernon is not responsible for any errors or omissions. No warranty is made by the City of Vernon for any use of this map. The City of Vernon is not responsible for any use of this map.

Map 5.2: Phase II Mid Term 2020 to 2025 Layout



Area of Development
PHASE II

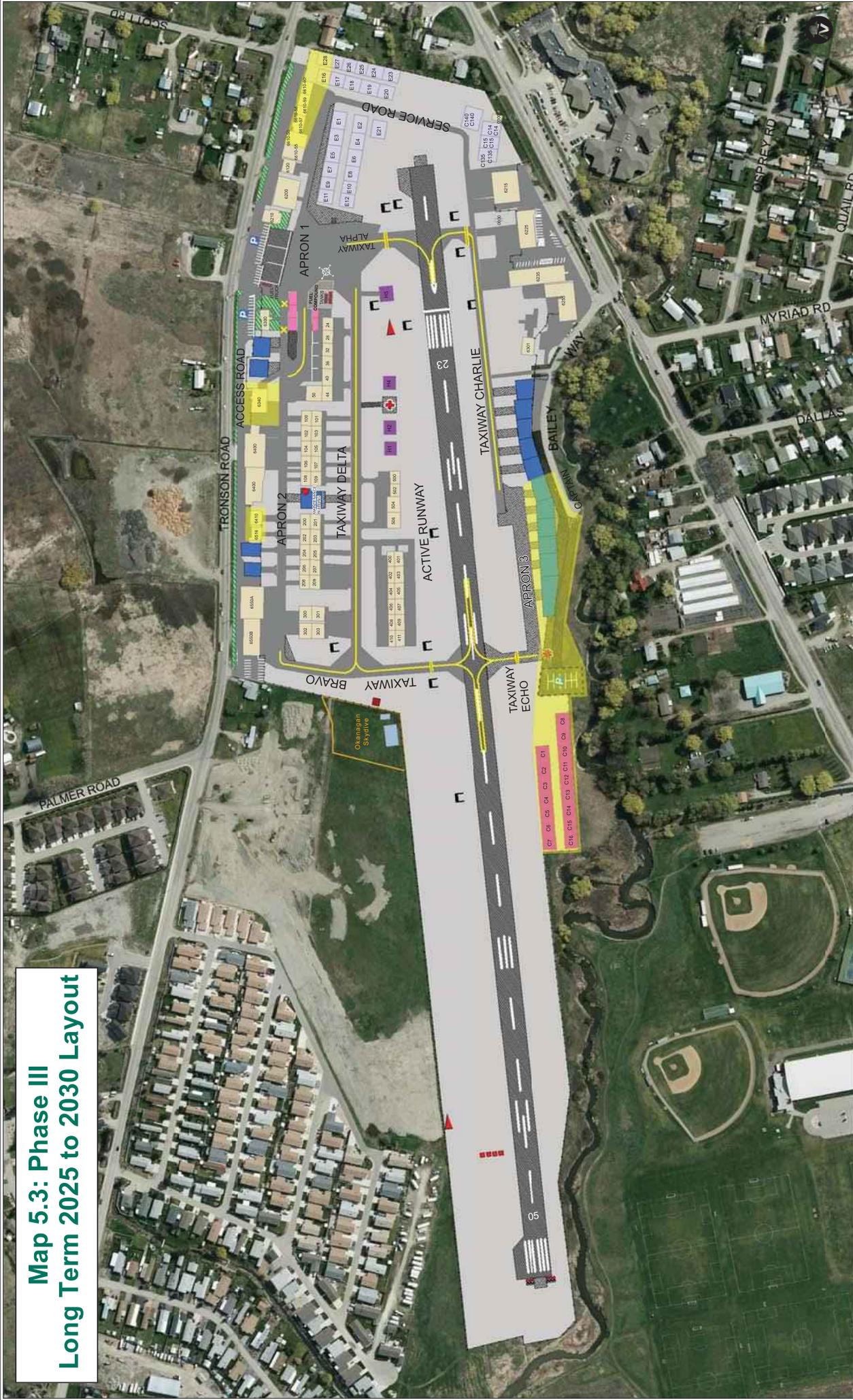
Changes/Additions

PAVING PLATFORM
 HELIPAD
 PAPI LIGHTS
 END LIGHT (RED)
 WINGBAR LIGHTS (GREEN/BLACK)
 NEW HANGAR
 TI-E-DOWN LEASE
 PAVED ASPHALT
 SHORT TERM PARKING
 REHABILITATION AREA
 LANDSCAPE

ROTATING BEACON
 SIGN
 WINDSOCK
 WEATHER STATION

0 40 80 160
 Meters
 Date: 9/29/2018
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Map 5.3: Phase III Long Term 2025 to 2030 Layout



Area of Development

- PHASE III

Changes/Additions

- PARKING
- VIEWING PLATFORM
- HELIPAD
- PAPI LIGHTS
- END LIGHT (RED)
- WINGBAR LIGHTS (GREEN/BLACK)
- NEW HANGAR
- TI-E-DOWN LEASE
- SHORT TERM PARKING
- REHABILITATION AREA
- LANDSCAPE

Existing Airfield Structures

- ROTATING BEACON
- SIGN
- WINDSOCK
- WEATHER STATION

VERNON
Regional Airport
MASTER PLAN

Date: 9/29/2018

Scale: 1:10,000

Scale: 1" = 100'