Case Nos.: 13-037/16-038/16-040

ENVIRONMENTAL REVIEW TRIBUNAL

B E T W E E N:

GAIL AND KEVIN ELWOOD and PRESERVE CLEARVIEW INC.

Joint Appellants

- and –

DIRECTOR, MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE

Respondent

WITNESS STATEMENT

OF

CHARLES CORMIER

AERONAUTICAL INFORMATION CONSULTANT

45 Chemin Des Fleurs-Sauvages

Mont-Tremblant, QC J8E 2B3

819-717-9555

1.0 INTRODUCTION

1. I have no personal interest in the outcome of this appeal. I intend to appear before the Environmental Review Tribunal and be subject to direct examination and cross-examination. My evidence will be factual and opinion evidence. I have read the ERT's Practice Direction for Technical and Opinion Evidence, and I provide this statement in accordance with that Practice Direction. Attached as **Exhibit "1"** to this witness statement is a Form 5 that I have signed in accordance with the ERT's Rules of Practice.

2.0 AREA OF EXPERTISE

2. My area of expertise is in aeronautical information consulting.

3. My expertise as an aeronautical consultant includes, (1) analyzing aerodrome potential and feasibility of instrument approaches for airports; (2) designing, maintaining, and flight check of instrument flight procedures; and (3) assessing the effects on aerodromes and air navigation of new obstacles such as wind turbines or high-rise buildings.

3.0 POSITION AND QUALIFICATIONS

4. I presently hold the position of Professional Aeronautical Information Consultant. A copy of my current *curriculum vitae* is attached as **Exhibit "2"** to this my witness statement.

5. I graduated from Collège Militaire Royal de Saint-Jean with a B.Admin in 1975.

6. I have some 40 years' experience in aviation as a pilot in the Royal Canadian Air Force, with Transport Canada, NAV CANADA, and in private industry. I retired from the military in 1991 after active duty as a Sea King pilot in the Gulf War, attaining Lieutenant-Colonel rank. While I no longer actively fly as a pilot, I have held Airline Transport Pilot Licences for both airplanes and helicopters, and accumulated some 7,000 pilot flight time hours.

7. Since 2002, I have been an instrument flight procedure designer and consultant in aeronautical information services, which includes advising on aviation safety related to take-off and landing. A significant part of my work involves the design of instrument flight procedures to permit effective and safe arrivals and departures to small aerodromes and airports across Canada, and internationally.

8. As Chief Technical Director with IDS North America, based in Montreal 2008-2011, I supervised 18 staff to redesign some 1000 instrument procedures per year with advanced computer design tools, under contract with NAV CANADA. I personally have designed or conducted full quality review of over 1500 instrument flight procedures published in Canada, Myanmar, Ecuador and elsewhere. I have performed numerous flight checks, and can advise on aerodrome standards and automated weather observation systems (AWOS) requirements. I am a recognized expert in the application of the Transport Canada manual TP308 "Criteria for the Development of Instrument Procedures."

9. In recent years I have provided advice to numerous airports and to wind turbine developers, with concerns for wind turbines proposed in the vicinity of aviation facilities. The purpose of these retainers was to preserve safe and full access to the airport, including assessment of future expansion, while permitting wind turbines to be erected as close as prudent.

4.0 CHRONOLOGY OF INVOLVEMENT AND DOCUMENTS REVIEWED

10. I designed the instrument approach and departure procedures for Stayner (Clearview Field) Aerodrome in November 2011.

11. I was also retained to assess the impacts of the proposed Fairview Wind Project on the aerodrome at Clearview Field. I have conducted three prior assessments as follows:

    1. Report titled “Review of Fairview Wind Project - Stayner (Clearview) Aerodrome” dated October 10, 2011 (attached **Exhibit 4**).

    2. Report titled “Negative Effects to Stayner (Clearview Field) Aerodrome – Fairview Wind Project” dated January 23, 2014 (attached **Exhibit 5**).

    3. Letter dated November 4, 2015, with comments on Transport Canada letter RDIMS #10115796 dated November 17, 2014 (attached **Exhibit 6**).

12. I have reviewed the documents listed in Schedule “A” attached as **Exhibit "3"** to this witness statement during the preparation of this statement.

5.0 DISCUSSION

5.1 Description of *Clearview Field (CLV2)*

13. Clearview Field (CLV2) is located 2.5 nautical miles (NM) south of the Collingwood Airport (CNY3). It is registered in the Canada Flight Supplement as Stayner Aerodrome CLV2 and is open for use by any light aircraft able to land there with the prior notice to its owners. A copy of an excerpt from the Canada Flight Supplement registration is attached as Figure 1 below:

CANADA FLIGHT SUPPLEMENT / GPH 205

Effective 0901Z 31 March 2016 to 0901Z 26 May 2016

B972 AERODROME/FACILITY DIRECTORY

STAYNER (CLEARVIEW FIELD) ON CLV2

REF	N44 24 16 W80 08 53 2.4WSW 10°W (2012) UTC-5(4) Elev 877' A5000 LO6 RCAP
OPR	Clearview Nursery Ltd. Kevin Elwood 705-428-0063/744-9461 Reg PN
PF	B-1 C-2,3,4,5,6
FLT PLN FIC	NOTAM FILE CYVV London 866-WXBRIEF (Toll free within Canada) or 866-541-4104 (Toll free within Canada & USA)
SERVICES FUEL	MOGAS (emerg use only)
RWY DATA RCR	Rwy 16(164°)/34(344°) 1920x60 turf Thld 16 displ 400' Rwy 16 up 1.15% Opr No win maint. Rwy soft in spring. Ski ops win only
COMM ATF	tfc 122.85 3NM 3900 ASL
CAUTION	Trees either side of rwy. P-lines marked with balls 55' AGL apch Rwy 16. Unlgtd twr 970 ASL midfield 170' E of rwy within bldg cluster.

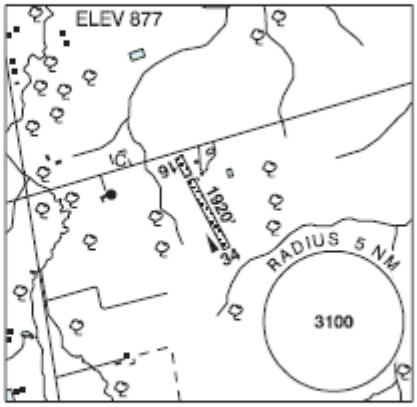


Figure 1: Stayner (Clearview Field) Entry in the Canada Flight Supplement, published by NAV CANADA, March 31, 2016.

14. Clearview Field has a 1,920 x 60 foot turf runway, 16/34 orientated north-west by south-east with a 5,800 square foot aircraft hangar, which can house multiple light aircraft. The runway threshold 16 is displaced 400 feet to avoid the Country Road 91 powerlines. The Aerodrome Elevation is 877 feet above sea level (ASL).

15. It has instrument approaches and departure procedures that were designed by me and fully reviewed by NAV CANADA. The procedures are published by NAV CANADA in the Restricted Canada Air Pilot (RCAP), and are accessible to pilots worldwide for their use. See Figure 2 on the following page for the RNAV(GNSS) RWY 16 approach. Figure 3 on the next page is the VOR/DME A approach, and Figure 4 on the page after is the associated published Aerodrome Chart.

16. It should be noted that some trees, a hangar, the family home, and an antenna do penetrate the transitional surface close to the runway. These are indicated in the "Caution" section of the CFS entry. Since there are some penetrations caused by close-in obstacles, instrument approach procedures may still be designed and published, but in the Restricted Canada Air Pilot, with the caveat that pilots must be familiar with the aerodrome environment prior to use.

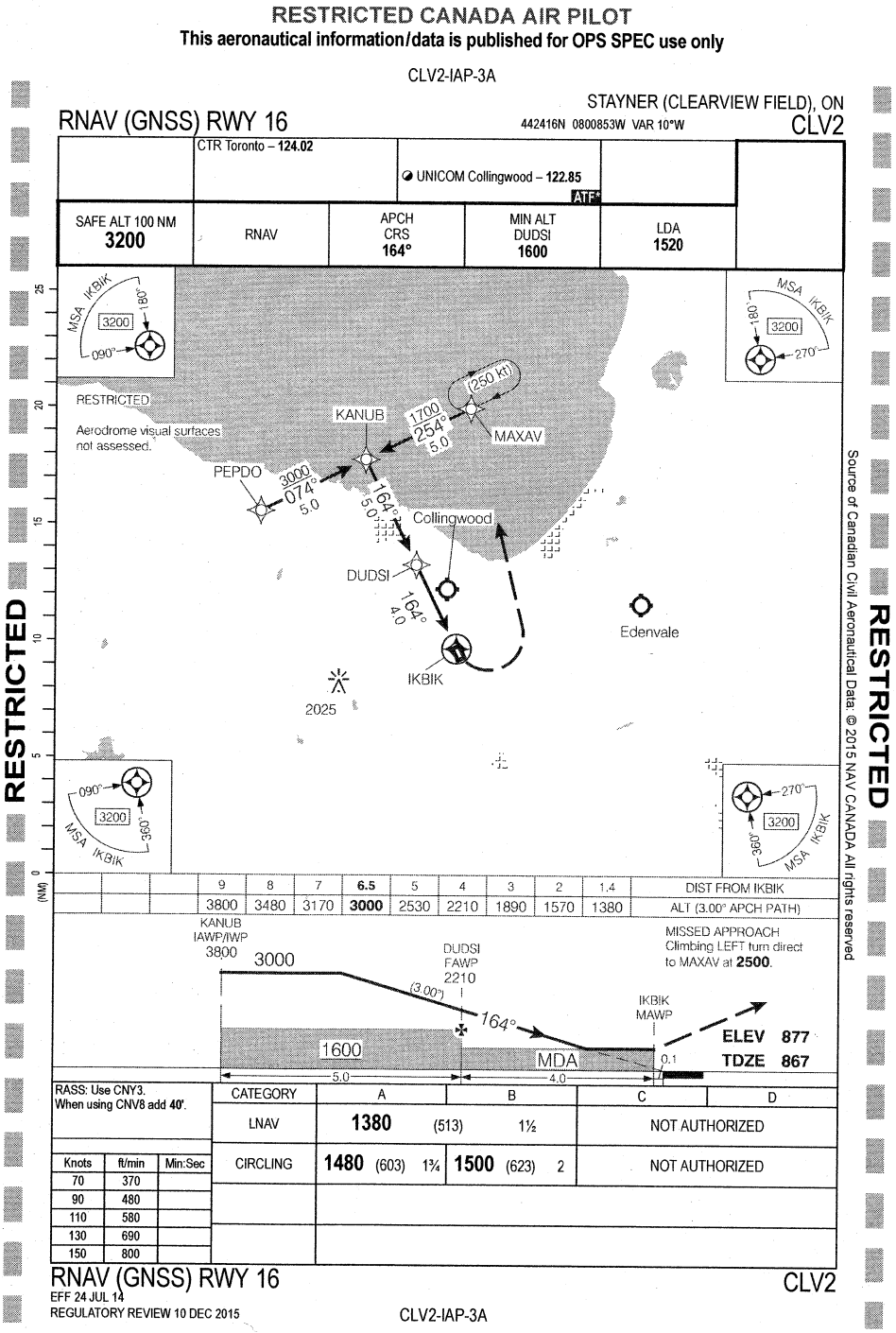


Figure 2: RNAV(GNSS) RWY 16 Approach Chart for Stayner (Clearview Field) as depicted in the Restricted Canada Air Pilot, published by NAV CANADA, October 15, 2015

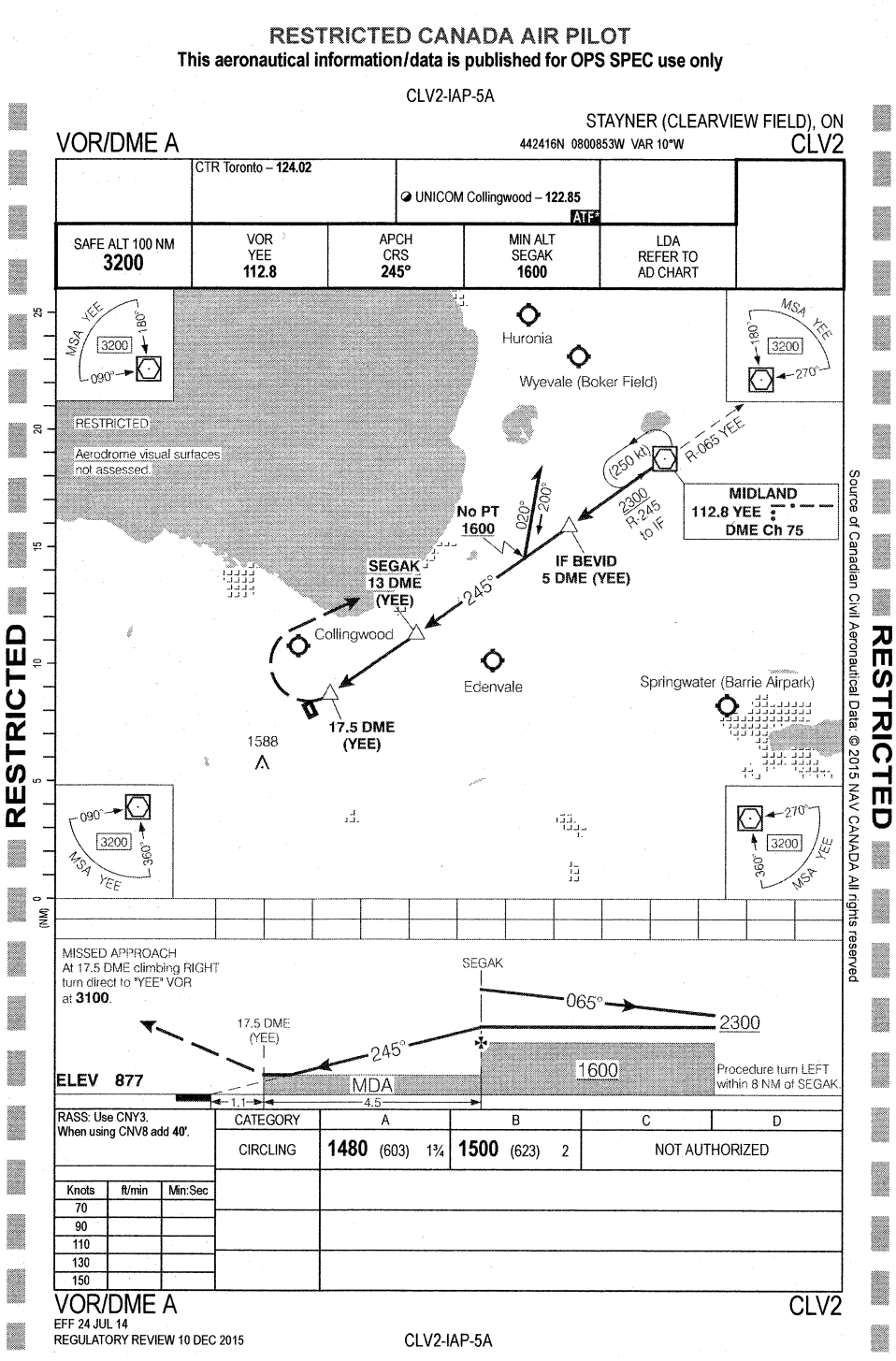


Figure 3: VOR/DME A Approach Chart for Stayner (Clearview Field) as depicted in the Restricted Canada Air Pilot, published by NAV CANADA, October 15, 2015

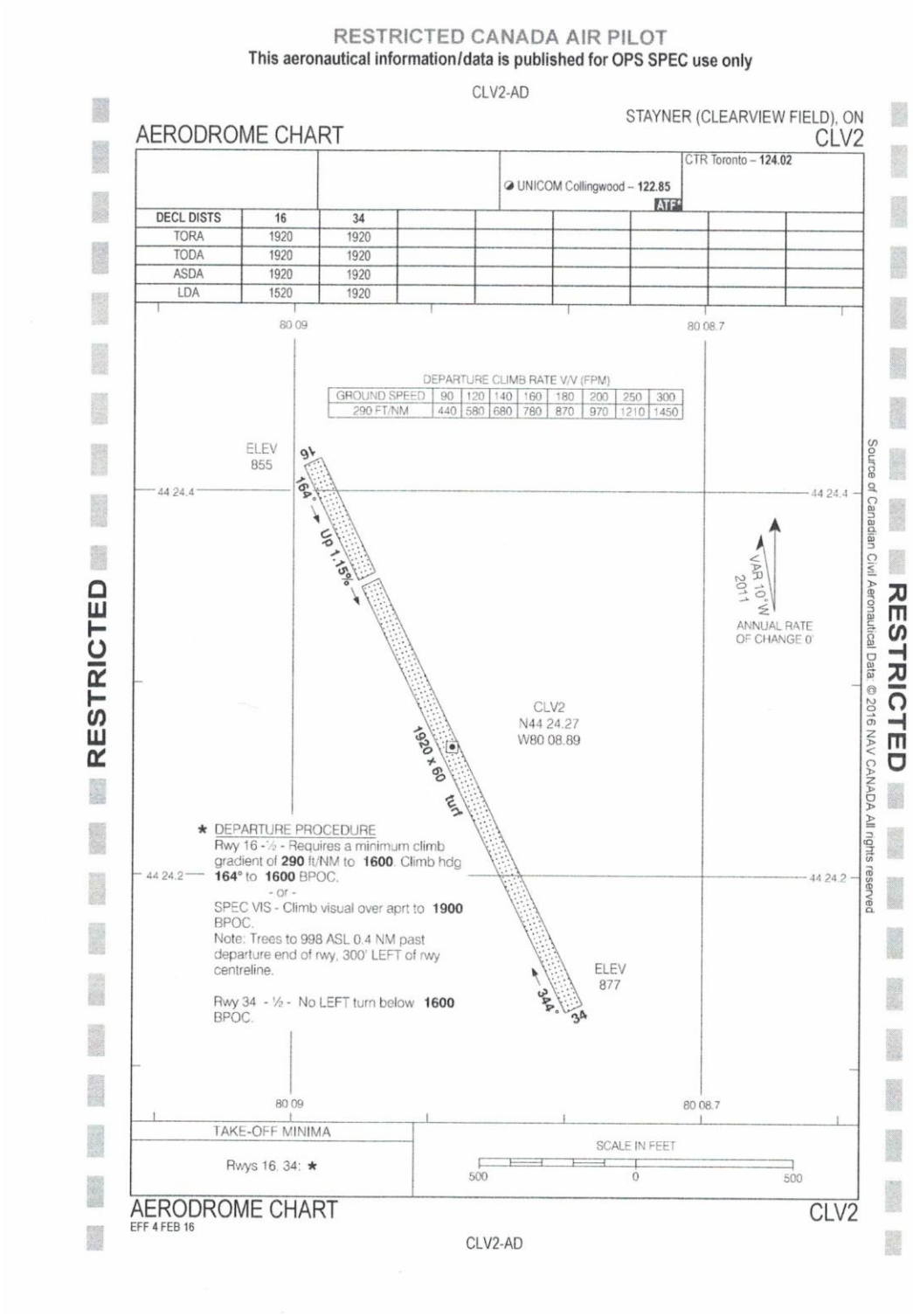


Figure 4: Aerodrome Chart of Stayner (Clearview Field) as depicted in the Restricted Canada Air Pilot, published by NAV CANADA, March 31, 2016

5.2 General Aviation Backgrounder: Key Concepts

5.2.1 Aerodromes and Airports

17. In Canada, all airports are aerodromes, but not all aerodromes are airports. An **aerodrome** is any area of land, water (including frozen surface thereof) or other supporting surface used or designed, prepared, equipped or set apart for use either in whole or in part for the arrival and departure, movement or servicing of aircraft and includes any building, installations and equipment in connection therewith.

18. An **airport** is an aerodrome for which, under Part III of the Air Regulations, an airport certificate has been issued by the Minister of Transport. An airport must meet the standards published in TP312 manual of aerodrome standards in order to be certified. Certification is required when: the aerodrome is located in the built-up area of a city of town, when regular scheduled passenger service is offered, or when the Minister of Transport deems it to be in the best interest of the public for safety reasons. Certification is onerous in that considerable documentation, administrative, technical and inspection requirements must be met.

19. Transport Canada regulates aeronautics and monitors the aviation industry in Canada. It is responsible for aerodrome and airport safety, including controlling obstacles around airports.

20. NAV CANADA is an independent not-for-profit organization responsible for operating the air navigation system and exercising air traffic control in Canada.

5.2.2 Obstacle Limitation Surfaces (OLS)

21. All eight of the Project's turbines will be located within Clearview Field's Obstacle Limitation Surfaces (OLS). OLS are established by Transport Canada to define the airspace around runways to be maintained free of obstacles, in order to minimize dangers to a manoeuvring aircraft, either during an entirely visual approach or during the visual segment of an instrument approach.

22. The methods for calculation and defining the OLS are set out in Transport Canada publication *TP312: Aerodrome Standards and Recommended Practices*.

23. In Canada, the OLS consist of three surfaces (as defined in TP312):

    a. Outer surface: A surface located in a horizontal plane above an aerodrome and its environs.
    b. Take-off/Approach surface: An inclined plane beyond the end of a runway and preceding the threshold of a runway.

c. Transitional surface: A complex surface along the side of the strip and part of the side of the approach surface, that slopes upwards and outwards to the outer surface, when provided.

24. A three dimensional representation of the take/off approach and transitional surfaces from TP312 follows:

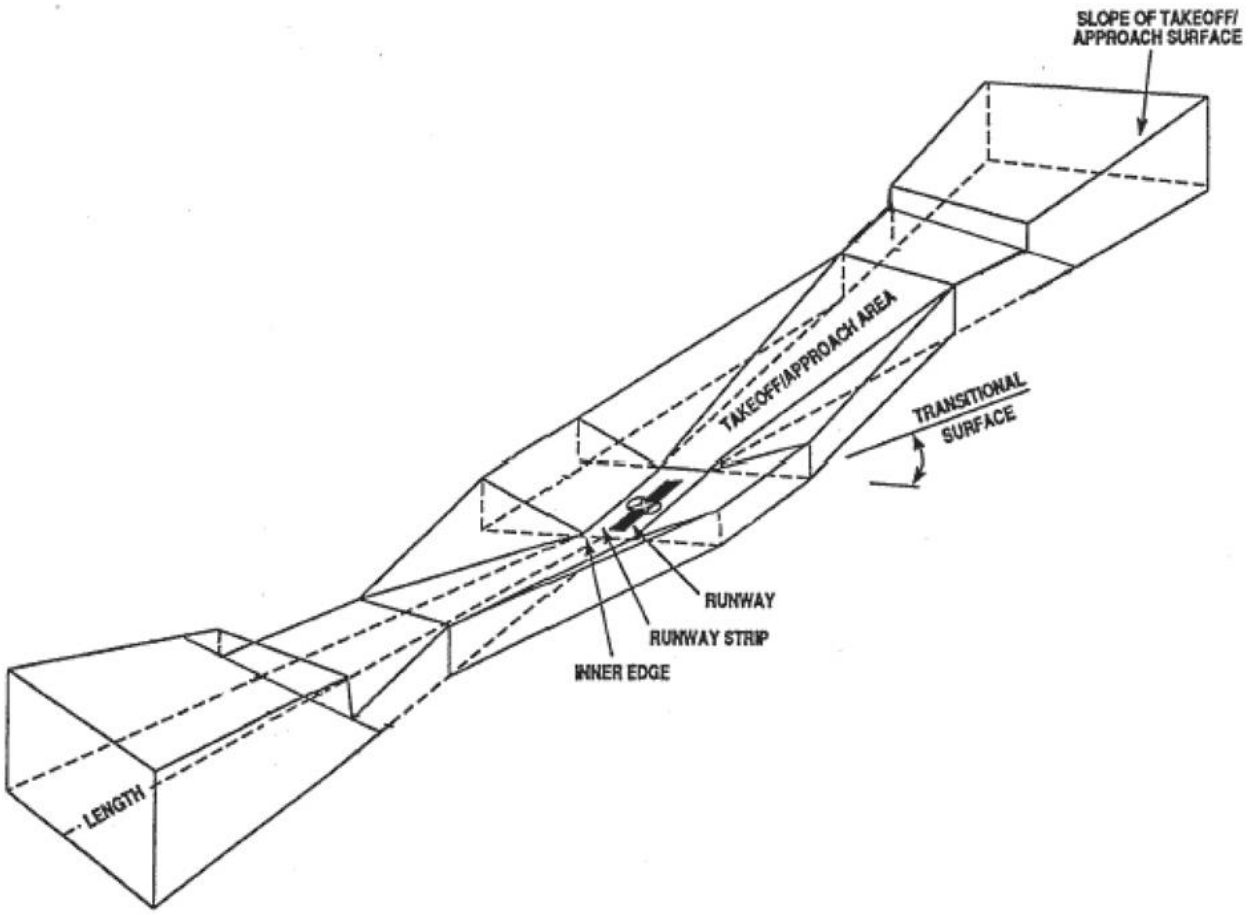


Figure 5: "Obstacle Limitation Surfaces", Transport Canada Aviation Circular No. 301-001, published October 1, 2008

25. For certified airports, the OLS are enforceable standards. For non-certified, registered aerodromes the OLS are recommended safety measures, but they are not enforceable (as Canada does not enforce safety standards for non-certified aerodromes). In its letter dated November 17, 2014 (attached as **Exhibit "7"**) Transport Canada informed the Ministry of the Environment and Climate Change (MOECC) of this:

> Where the aerodrome is not an airport, penetration of these surfaces may affect the operations at the aerodrome. The standards in TP312 - Aerodrome Standards and Recommended Practices can be used but are not enforceable; however, the operational integrity of the aerodrome is enhanced if the

designation of the use of land adjacent to the facility is done in line with technical portions of the standards.

26. TP312's OLS are derived from standards and recommended practices set by the United Nations International Civil Aviation Organization (ICAO) in Annex 14 to the 1944 Convention on International Civil Aviation. The standards were based on safety recommendations by the Aerodromes, Air Routes and Ground Aids Division. Canada is a signatory to the Convention.

27. The OLS's at CNV2 were assessed in accordance with the criteria in TP312, Table 4-1, for a Non-Precision Instrument Runway Code 1, which is the least stringent and is the minimum applied to private aerodromes that have instrument approach procedures published, as follows.

- The **Outer Surface** is a flat surface at 45m above the aerodrome elevation and extends to a 4000m or 2.16 NM radius from the centre point of the runway. It protects for "Circling" manoeuvring but does not normally apply to a Non-Instrument Runway.
- The **Take-off/Approach Surface** commences from a line of 90m width at 60m from the runway end, extends a minimum of 2500m, has a rising slope of 3.33%, and splays at 10%.
- The **Transitional Surfaces** rise at a 1:7 slope laterally from 45m abeam the runway centreline, and from the sides of the Take-off/Approach Surfaces, until it reaches the Outer Surface 45m above aerodrome elevation.

28. The Figure 6 below depicts all three of these surfaces for Clearview Field. The figure was drawn with precise geographic reference by Jacques Beaudry of SIGNAV, under my directions.

29. As previous noted, there are some penetrations of the Transitional Surface caused by existing trees and structures just adjacent to the runway. These are mitigated by a Caution note in the CFS. They are not depicted in Figure 6.

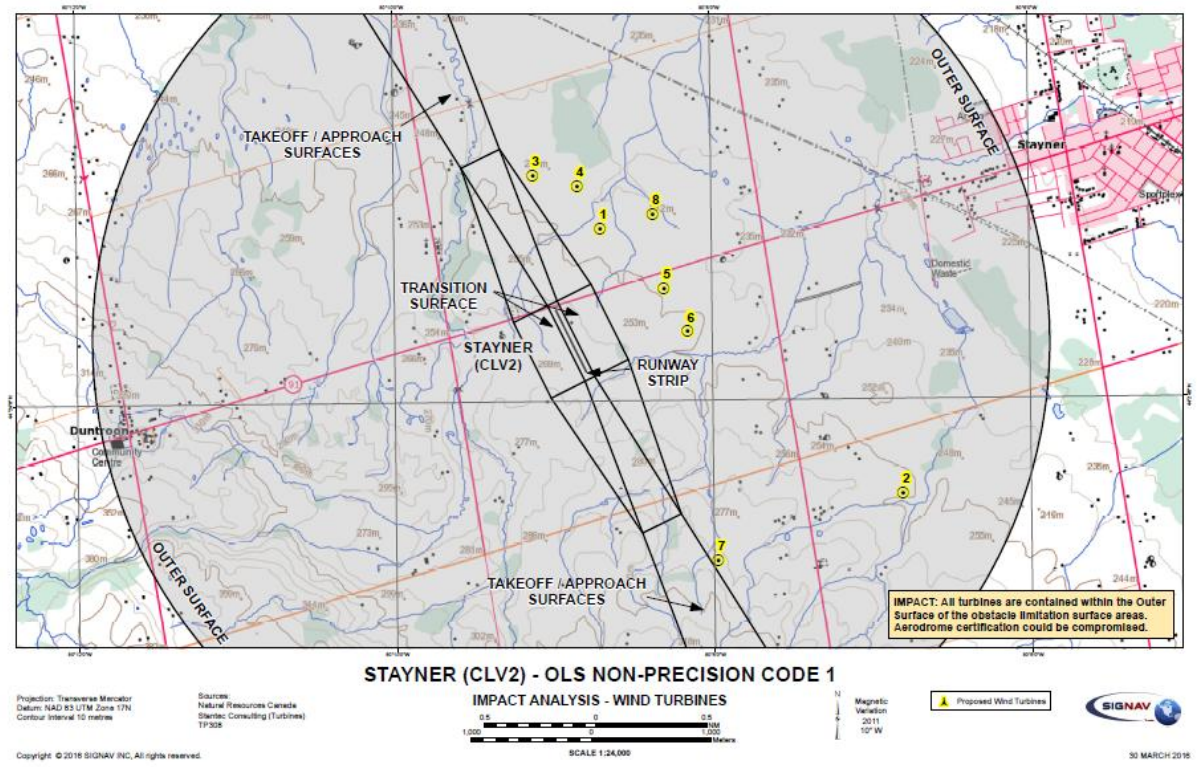


Figure 6: "Stayner (CLV2) - OLS NON-PRECISION CODE 1, produced by Jacques Beaudry, SIGNAV, March 30, 2016.

5.2.3 VFR (Visual Flight Rules) and IFR (Instrument Flight Rules)

30. Pilots may operate their aircraft under Visual Flight Rules (VFR) or Instrument Flight Rules. Most recreational pilots fly VFR only, which requires reasonable weather conditions, visual reference to the ground, and adherence to the principle of see-and-be-seen. VFR pilots must avoid clouds and maintain a safe height above ground unless taking off or landing. IFR pilots require more training, must pass an annual test, and have more instruments and navigational aids in their aircraft. They can fly on their instruments in almost any weather, do not need reference to ground, and require a clearance from the air traffic control agency.

31. Take-off (departure) and landing (approach) can occur under VFR or IFR by using a published instrument procedure as follows:

> **Visual departure/approach**: the pilot departs/approaches by visual reference alone in conditions where the pilots field of vision is not obstructed by clouds or other inclement weather.

Pilots who take-off and land visually are not required to have an instrument rating.

Instrument departure/approach procedure: this is an airport or aerodrome procedure, approved by NAV CANADA used in inclement weather to support visual take-off or landing. Instrument approaches allow a pilot to use aircraft instrumentation to guide the aircraft through non-visual means to a position from which the aircraft can either be visually landed safely or a missed approach performed if the pilot cannot see the runway adequately to execute a normal landing.

An instrument approach or departure procedure cannot be used by a pilot who does not have an instrument rating. In addition, many aerodromes do not have approved instrument procedures, meaning take-off and landing may only be accomplished visually.

5.2.4 Instrument Approaches

32. Instrument procedures are used by pilots to take-off or land with reference to their instruments and navigational systems, with minimal visual reference outside the cockpit. This is particularly useful in times of inclement weather or when operating to or from a busy airport.

33. In Canada, the design of instrument flight procedures is regulated by Transport Canada primarily through a published manual, entitled TP308 “Criteria for the Development of Instrument Procedures.” This comprehensive document details all aspects of the design of various procedures to be used by aircraft operating under IFR.

34. One of the primary purposes of criteria in TP308 is to ensure that aircraft are provided safe clearance from obstacles during take-off and landing. There is considerable emphasis on the Instrument Approach Procedure (IAP), which guides an IFR aircraft from enroute flight to safe descent and alignment with a runway or airport. Protection of aircraft during departure from a runway is also prescribed. There are over 3000 IAP's published by NAV CANADA in a document called the Canada Air Pilot.

35. A critical characteristic of an IAP is the **Minimum Descent Altitude** (MDA) or Decision Altitude (DA), often called **"Minimums"** or **"limits.”** This is the lowest altitude that an aircraft can descend to during final approach, from which a pilot must sight the runway in order to execute a normal landing. The lower the MDA, the greater chance the pilot has to detect the runway environment.

36. The MDA is normally calculated by applying the specified Required Obstacle Clearance (ROC) above the highest obstacle beneath the final segment. In the

case of the RNAV(GNSS) and VOR/DME approaches designed at Clearview Field, the ROC is specified by TP308 as 250 feet above the highest obstacle.

37. Nearly all IAPs also have published limits for "**Circling**" which is an option for the pilot to manoeuvre his aircraft with visual reference to the runway, to land at the opposite end or another runway, other than the runway which he is approaching. Usually, he may manoeuvre left or right of the runway at his discretion, unless a restriction is published preventing "Circling" on either side. Often, this restriction is applied to avoid an obstacle, while keeping the limits reasonably low. The areas assessed for circling are measured as a radius from the runway ends.

38. A commonly-used measurement of the effectiveness and accessibility of an airport is the number of approaches it has published, and the quality of these approaches is judged by the "minimums" specified. The lower the minimum, the better. When new obstacles are introduced in the vicinity of an aerodrome, that cause the “minimums” to be published higher than before, that is referred to in the industry as a "**penalty**". This is because when an aircraft is forced to fly higher in the final segment, the pilot may have greater difficulty seeing the runway in inclement weather, and may not be able to execute his landing. If he cannot see to land, he must divert to his planned alternate aerodrome, which is viewed as penalizing the effectiveness of the approach.

39. Finally, to fly on instruments and conduct instrument approaches and departures, a pilot must carry an instrument rating on his licence. This rating is renewed annually by Transport Canada after a pilot passes a written examination and flight test. There are many licensed pilots in Canada, but the majority can only fly in visual weather conditions, and a relative few have instrument ratings and can fly in inclement weather. Mr. Elwood achieved this qualification in May 2001 and has maintained it since.

5.3 *General Aviation Backgrounder: Departures and Approaches*

5.3.1 Take-Off

40. Take-off is a very demanding and critical phase of flight. This short period of 10 to 20 seconds is very busy, with a multiple factors demanding pilot attention; it is stressful and could be dangerous should a mechanical emergency occur or a challenging environmental condition.

41. After pre-take-off checks are conducted, including verification of engine performance, and after the aircraft is positioned at one runway end, full power is applied to the engine and the aircraft accelerates.

42. On a turf strip like Clearview Field, the aircraft will likely bounce around as it gains speed. The pilot will have to apply foot pressure to the rudder pedals to

compensate for wind conditions which may be blowing from left or right, and to keep aligned on the runway surface.

43. It is also critical to cross check engine instruments to confirm the performance is acceptable for flight, since a problem with power or aircraft control would require the pilot to abort the take-off and stop on runway remaining.

44. When take-off speed is attained, the aircraft will lift off and the pilot must immediately stabilize and adjust his heading. Shortly thereafter he will raise his landing gear if retractable, raise the flaps, and adjust the power to climb or cruise settings. All the while the pilot should also be cross-checking visually for ground obstacles and other aircraft.

45. **IFR Take-off:** When the weather is inclement requiring IFR operations, in the unrestricted condition that currently exists at Clearview Field, all that is required is 1/2 mile visibility.

46. The take-off run is the same except that immediately after take-off, the pilot will primarily refer to his instruments with little visual reference outside the cockpit. He cannot turn until 400 feet above runway elevation.

47. **Take-off/Approach Surface:** In both cases, the area in close proximity to the runway end that the aircraft will be initially operating is the area that is protected by the Obstacle Limitation Surface called the Take-off/Approach Surface, which is reflective of international standards and is clearly defined by Transport Canada in TP312.

48. The **Transitional Surface** is the buffer area beside the runway and the Take-off/Approach Surface that is used to protect for aircraft control problems close to the runway on either take-off or landing.

5.3.2 Landing

49. Landing in visual weather conditions or during inclement weather instrument conditions are similar in a number of respects.

50. **VFR Landing:** In visual conditions, the pilot must overfly the runway to confirm it is clear of obstacles, and then he will visually join a racetrack pattern called "the circuit," normally at 1000 feet above the aerodrome elevation.

51. After passing abeam (at a right angle to) the intended landing end, he slows the aircraft, extends the landing gear if it is retractable, frequently lowers some flaps, and will initiate a descending left turn so to intercept the runway centreline extended.

52. The interception of the centreline is usually about a mile from the runway end at 400-500 feet above touchdown and will be within the Take-off/Approach Surface area previously described.

53. The pilot must manoeuvre to be in-line with the runway, control his airspeed which has been slowed, and judge his aiming point for landing.

54. **IFR Landing:** Landing from an instrument approach, the pilot transitions from referring to his flight instruments, to visually searching for the runway at the MDA, the lowest safe altitude as published and approved by NAV CANADA.

55. If flown properly to minimum altitudes, the approach will guide the aircraft to the lowest published altitude. If the pilot makes visual reference to the landing surface and elects to land, it is done visually as previously described, except that the pilot must adjust his aircraft configuration quickly, initiate a descent, and ensure he is clear of all obstacles, all the while in marginal weather conditions in close proximity to the proposed wind turbines and below the height of the wind turbines blades.

56. The approach transition phase from instrument reference to visual landing occurs in less than 60 seconds. The pilot would be required to avoid several large wind turbines coloured white, the same as the possible clouds and obscuring weather that may be present close to the Take-off/Approach Surface at this low altitude. During this moment of intense pilot workload, any unexpected emergency distraction could result in a collision event.

5.4 Impact of the Project on the Safety of Approaches and Departures at Clearview Field

57. In my prior reports I assessed the impacts of the Project turbine locations and elevations on take-off and landing at Clearview Field both for visual approaches and instrument approaches. This witness statement provides a consolidation, elaboration and update to these comments.

58. The overall conclusion of my prior reports was that the proposed turbines would be dangerous obstacles to the operational aspects of the Clearview Field aerodrome, due to close proximity and significant height, and were negligent of common aviation safety principles.

5.4.1 Impacts to Visual Approaches

59. All eight of the Project turbines penetrate the OLS as published in TP312. TP312 is highly relevant to assessing aerodrome safety, as they are in effect Transport Canada's expert opinion as to the obstacle clearance around a runway required to safeguard take-off and landing.

60. Based on ICAO's Annex 14, the OLS established by TP312 also represents the international consensus of aviation safety experts on the minimum obstacle clearances around aerodromes necessary to protect the safety of aircraft on take-off and landing.

61. The installation of obstacles that are nearly 500 hundred feet high, in close proximity to an aerodrome, that may be challenging for pilots to see and avoid, and penetrate obstacle limitation surfaces, is in my professional opinion negligent and contrary to common sense safety principles.

62. While all eight of the turbines will penetrate the Outer Surface and present safety hazards, two turbine locations in particular are cause for the greatest level of concern:

- Turbine #7 at 1398.2 feet elevation just penetrates the **Take-off/Approach Surface** to the south from Runway 16 where it is 1082.6 feet high, **causing a significant and dangerous penetration of 316 feet; and**

- Turbine #3 at 1283.7 feet elevation is just 60m outside the **Transitional Surface** just east of the Take-off/Approach Surface to the north from Runway 34 where it is 1024.6 feet high, **causing a significant and dangerous penetration of about 259 feet**.

63. It is expected that the aircraft on final approach and departure will be within or in close to the take/off and approach surface and/or the transitional surface.

64. A significant obstacle such as a wind turbine within or near these surfaces is dangerous in that the pilot has little room or time to avoid the obstacle during take-off or landing, an activity that is very intense and demands pilot attention to a variety of factors.

65. During these times a pilot is multitasking to an extraordinary degree within a very compressed timeframe that requires rapid decision making.

66. At a common airspeed of 100 knots soon after liftoff, when taking off to the south, the aircraft will arrive adjacent Turbine #7 in 41 seconds. When taking off north, the aircraft would arrive at Turbines #3 and #4 in 22 seconds.

67. While the pilot would be aware of the turbines since information would be published on charts, and he may see them due to lighting, any distraction, any airborne emergency (such as mechanical issues), any unexpected wind change, any unexpected turbulence could result in collision with the obstacle or a collision with the ground in an attempt to avoid the obstacle.

68. Local meteorological conditions amplify the danger. Close proximity to Georgian Bay and its rapidly changing weather, strong lake effect snowfalls, low ceilings

and poor visibility, combined with the high elevations of the Niagara Escarpment make avoiding a collision even more challenging.

69. The turbines penetrating these two surfaces will be very close on take-off and landing. Experience and skill will be required to avoid them while navigating a successful approach or departure. Pilot inexperience, ordinary pilot errors (such as even the most experienced pilots can make), mechanical issues, poor weather, poor visibility, unexpected wind changes or unexpected turbulence could all lead to risk of a serious collision.

70. Offsetting the alignment from the runway heading will simply make the final approach difficult and the potential to land abnormally is significant. Instead of lining up with the runway normally at perhaps 1000-2000m short of runway, a pilot will likely offset the angle of approach away from the turbine, which will require a more abrupt manoeuvre closer to the runway to reacquire the centreline. Non-standard aircraft handling logically increases risk.

5.4.2 Impact on Instrument Approaches

71. I have designed two instrument approaches as well as departure procedures for Clearview Field. The approaches and departure procedures were fully reviewed by NAV CANADA and were published by it in the Restricted Canada Air Pilot.

72. The Instrument Approaches and Departures for Clearview Field are:

- The **VOR/DME A** approach from the Midland YEE tracked from the northeast on the 245 degree radial aligned to the centre of the runway. A 4.5-mile final segment commenced at 13 DME and ending at 17.5 DME one-mile short of the runway. The missed approach was a climbing right-turn back to the VOR. Because the alignment was perpendicular the runway and did not meet rules for straight-in, only circling minima were published. The **circling minima are a respectable 1480 feet ASL and 1500 feet ASL, or 603 and 623 feet above aerodrome elevation**, for CAT A & B, the same as the RNAV(GNSS) approach.

- The **RNAV(GNSS) RWY 16** approach from the northwest is a standard “T” straight-in to a missed approach waypoint at the runway threshold. The missed approach is left-turning, to return north to the Initial Approach Waypoint Left, to hold over Georgian Bay. Only Category A & B approach speeds of 90 and 120 knots respectively are considered, appropriate to this type of runway. The straight-in **minimums are 1380 feet ASL or 513 feet above touchdown, which are the lowest allowed by TP308 for this aerodrome type**. The associated circling minima are respectable 1480 feet ASL and 1500 feet ASL, or 603 and 623 feet above aerodrome elevation, for CAT A & B, due to rising terrain west.

- **Departure Instructions** from Clearview Field are specified on the Aerodrome Chart, and can be conducted with low cloud ceiling and only 1/2 mile visibility. Departure to the south from runway 16 requires a modest climb gradient of 280 feet/NM until an altitude of 1600 feet is achieved. Or, the pilot can climb visually over the aerodrome at a normal 200 feet/NM until 1900 feet, then proceed on course. Departures north from runway 34 are unrestricted except no left turn is permitted until 1600 feet, to avoid a communications tower to the west.

73. In my **Report of January 23, 2014,** I confirmed my earlier assessment that the turbines when installed would render the Instrument Approach and Departure procedures unsafe and no longer compliant with TP308. As the maintenance agent for these procedures, I would be compelled to immediately rescind them from further use, or amend them as follows:

- The **RNAV(GNSS) RWY 16** approach has excellent minimums at 513 feet above touchdown. **However, 4 turbines will be contained in the final segment, and would cause the limits to be raised to 693 feet above touchdown, a significant penalty of 180 feet.** These are depicted in the map at Figure 7 on the next page.

- The **VOR/DME A** approach has 7 of 8 turbines captured in the final segment, and the last would be immediately in the missed approach, causing the approach limits to rise to 843 feet above aerodrome elevation. **This will be** significant increase of 240 and 220 feet to CAT A & B minima, quite a **negative penalty.** These are depicted in the map at Figure 8, two pages from this.

- The **Circling** option to any approach would be affected by the turbines, **raising the CAT A & B minima by 240 and 220 feet.** These are depicted in the map at Figure 9 three pages following.

- **Departures** from both runway ends would still be penetrated by 2 turbines in the critical zone 1, and would require **a visual climb to 1700 feet ASL before proceeding as the only option.** This would necessitate moderately good weather conditions, and departures in marginal weather would not be permitted, thus removing the option to depart with low cloud cover and as little as 1/2 mile visibility.

74. The introduction of the proposed turbines inside the designated approach surfaces will require that the published minima be immediately raised. Increasing the minimum descent altitude thereby reduces the pilot's chances of seeing the visual runway references required in order to continue to a normal safe landing.

75. The two approaches and the circling areas, with the proposed turbines depicted, are shown as follows:

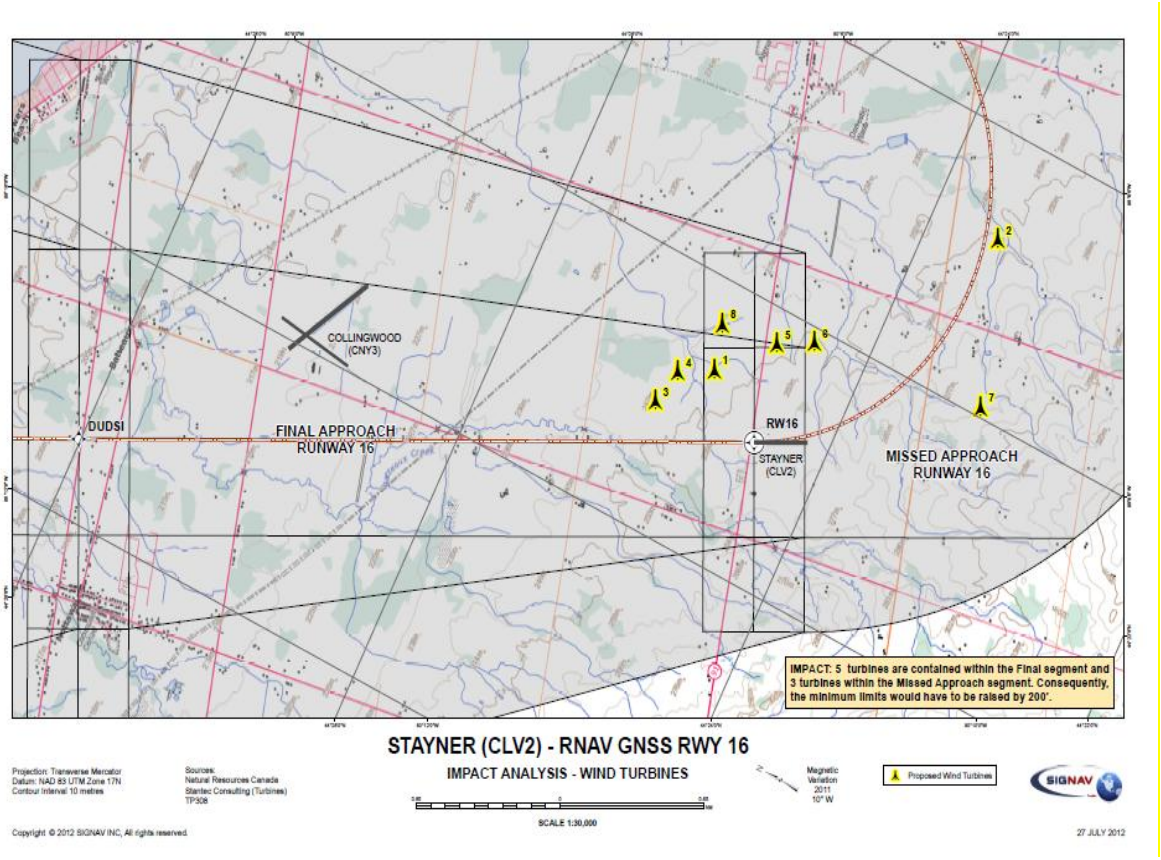


Figure 7: "Stayner (CLV2) - RNAV GNSS RWY 16", produced by Jacques Beaudry, SIGNAV, July 27, 2012.

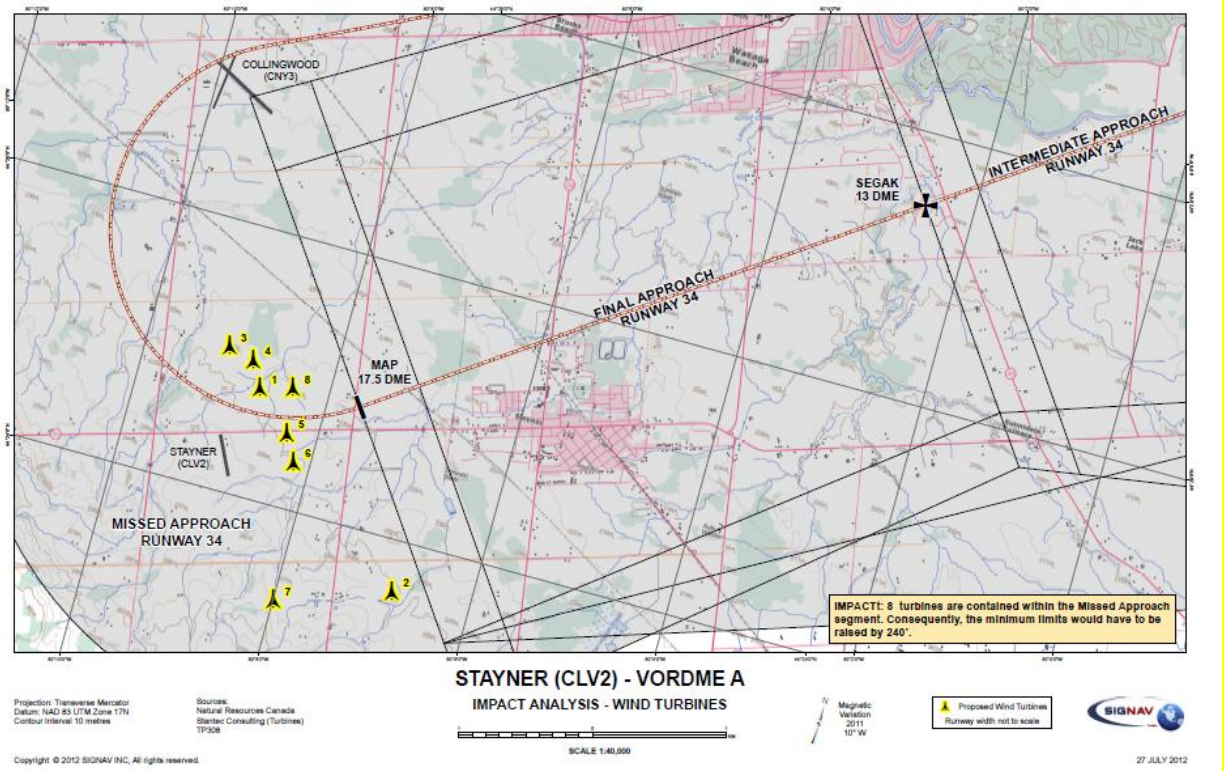


Figure 8: "Stayner (CLV2) - VORDME A", produced by Jacques Beaudry, SIGNAV, July 27, 2012.

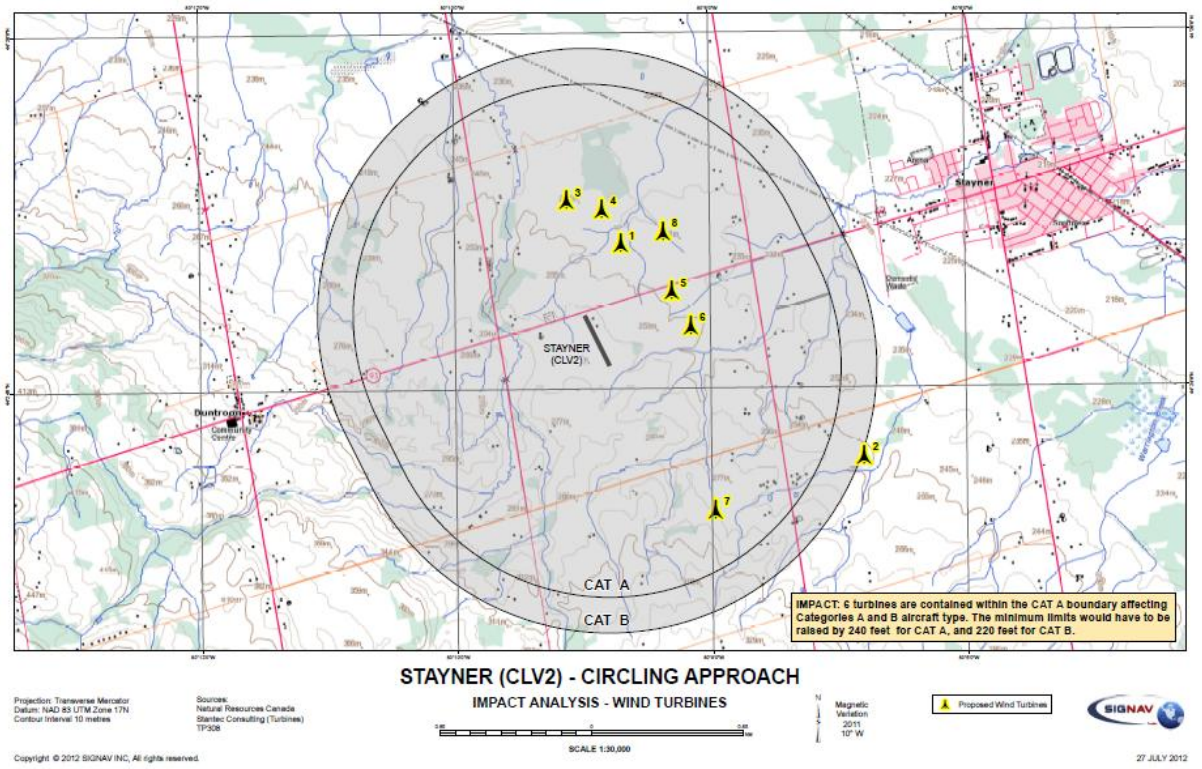


Figure 9: "STAYNER (CLV2) - CIRCLING APPROACH", produced by Jacques Beaudry, SIGNAV, July 27, 2012

5.5 Transport Canada's Advice to the MOEC

76. Transport Canada wrote to the MOECC on November 17, 2014 advising it of some of the implications of the Project. Transport Canada substantially endorsed my earlier analyses of the adverse effects that the Fairview Wind Project will pose to Collingwood Regional Airport and Clearview Field.

77. Transport Canada was particularly concerned with the penetrations of the Obstacle Limitation Surfaces (OLS). Transport Canada confirmed that although an aerodrome is not legally required to comply with OLS, the operational integrity of the aerodrome is enhanced if the use of land adjacent to the facility is done in line with technical portions of the standards.

78. I concur with Transport's assessment with respect to Clearview Field, that:

a. Regarding Turbine #3, "the turbine is a significant obstacle and could potentially pose a hazard to aircraft on final approach to this runway."

b. The last paragraph of Transport Canada's comprehensive letter is very clear: "In conclusion, based on the information reviewed, it appears there would likely be an operational impact on both the Collingwood and Stayner aerodromes. There are aerodromes in Canada where obstacles are located in proximity to runways, and depending on their location, have continued operation with the establishment of specific procedures, and the marking, lighting and publication of these obstacles. However, it should be noted that such mitigation can result in a **decrease in the usability of the Collingwood and Stayner aerodromes."** Transport Canada's statements are consistent with the adverse effects that I have identified in my previous analyses.

c. Transport Canada recommends that the siting of the turbines "be conducted in conjunction with an aerodrome operator at the earliest possible opportunity." wpd has to this date never consulted with me as to the planning or coordination of siting of any turbines.

6.0 CONCLUSIONS

79. The foregoing statements address the aviation hazards that would be created by the eight 500 ft tall wind turbines that wpd proposes to erect in airspace in close vicinity to a registered aerodrome that has instrument flight procedures published by NAV CANADA.

80. Take-off and landing activities are the most hazardous phases of an entire flight because the pilot is changing the aircraft configuration, flying slowly, operating close to the ground, adjusting for changing weather conditions, communicating intentions with ATC and other aircraft, all within a very short time period, a few seconds, while maintaining minimum altitudes and situational awareness.

Decisions are required within a few seconds on many factors simultaneously to ensure a safe flight.

81. The pilot must operate within the Take-Off/Approach Surface when flying close to the runway end. If, in addition, large and dynamic obstacles like a wind turbines are present in or near that surface, such that non-standard responses are required by the pilot, the risk of an accident resulting in serious injury or death escalates substantially and unacceptably.

82. The proposed eight wind turbines would constitute a high risk to the operations of aircraft at the Clearview Field in their non-compliance with international standards as defined by Transport Canada in TP312.

83. In reviewing the safety impact of the proposed Fairview Wind Project on the Clearview Field, I must conclude that should the turbines be erected as proposed they would negatively impact the safety of both visual take-offs and landings, and of instrument flight procedures, such that **it is my professional opinion that the runway cannot be operated safely.**

April 7, 2016

DATE

Charles Cormier
Aeronautical Information Consultant

NAME OF WITNESS

TITLE OF WITNESS

Environment and Land Tribunals Ontario

☒ Environmental Review Tribunal

☐ Niagara Escarpment Hearing Office

☐ Office of Consolidated Hearings

Acknowledgement of Expert's Duty

Case Name and No.:	

1. My name is _Charles Cormier_____*(name)*. I live at _Mont-Tremblant_ (*city)* in the _Province_ *(province/state)* of _Quebec_ *(name of province/state)*.

2. I have been engaged by or on behalf of _Kevin Elwood_ (*name of party/parties)* to provide evidence in relation to the above-noted proceeding.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:

   (a) to provide opinion evidence that is fair, objective and non-partisan;

   (b) to provide opinion evidence that is related only to matters that are within my area of expertise;

   (c) to provide opinion evidence in accordance with the Environmental Review Tribunal's Practice Direction for Technical and Opinion Evidence; and

   (d) to provide such additional assistance as the tribunal may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date …March 15, 2016……. ……..

Signature

Appendix F: Form 5

CHARLES J. CORMIER

45 Chemin des Fleurs-Sauvages, Mont-Tremblant, QC, Canada J8E 2B3
chascorm@rogers.com Tel: 819-717-9555 Cell: 514-979-0961

SUMMARY OF EXPERIENCE

- Aviation Consultant to private industry since 2004. President, CMRSJ Foundation.
- Director at IDSNA for 3 years, supervising major production of flight procedures.
- NAV CANADA for 6 years, as instrument procedure designer and flight inspection pilot.
- Transport Canada for 4 years, as Aviation Inspector and Coast Guard anti-pollution pilot.
- Canadian Forces pilot for 22 years, with broad operational flying, supervisory, and staff experience, attaining Lieutenant-Colonel rank.
- City Councilor, Dieppe, NB, for two terms 2001-2008.
- 7,000+ hours flight time, designed or verified 1500+ instrument flight procedures

EMPLOYMENT HISTORY

2011-present Independent aeronautical information consultant, analyzing aerodrome potential and feasibility of instrument approaches for airports. Design, flight check, and maintain instrument flight procedures for clients across Canada. Assess the effects to airports and air navigation of new obstacles such as wind turbines or high-rise buildings. Président of la Fondation des anciens de Collège Militaire Royal de Saint-Jean, and member of the Board of Governors of the College.

2008-2011 Chief Technical Director, IDS North America, Montreal. Supervised 18 designers in producing 900+ instrument procedures annually with advanced software tools, under contract with NAV CANADA.

2004-2008 Partner with MDA Aviation. Designed instrument approach procedures and analyzed aerodrome standards, navaids and AWOS. Completed significant design projects across Canada, and internationally in Ecuador, Myanmar, Oman and others.

2002-2004 Vice-President of Approach Navigation Systems Inc, Dieppe, NB. Marketed navaids, airport lighting, instrument flight procedures, and weather information systems for aviation and roadways, doubling sales. Director, NB Aerospace and Defence Association.

1996-2002 Aeronautical Information Service specialist, NAV CANADA Moncton office. Designed numerous GPS and conventional instrument approaches, and regional airways. Served as company Flight Safety Officer, and chaired Occupational Health and Safety Committee. Flew Kingair 200 and Citation II jet as inspection pilot. As representative of Canadian Federal Pilots Association, negotiated first contract in 1998.

1991-96 Civil Aviation Inspector with Transport Canada Aviation, Moncton NB. Investigated regulatory violations , supervised amendments to flight publications, and conducted flight inspections with the Twin Otter and Jet Ranger helicopter. Acted as Superintendent of Coast Guard Aviation, flying oil pollution surveillance for two years. Elected regional pilot representative, and chaired the Family Support charity committee. Served part-time with Air Force Reserves at CFB Gagetown, flying the Bell 412 Griffon helicopter.

1987-91 Canadian Forces pilot, flying Sea King helicopters from warships in the Orient, North Atlantic, and Europe. Supervised operations ashore, coordinated naval exercises, served as Unit Instrument Check Pilot and Director of Shearwater Aviation Museum. Volunteered for the Gulf War in 1991 to command the air department of 51 personnel aboard HMCS Protecteur, flying 65 missions and awarded Commander's Commendation.

1985-87 Staff Officer at National Defence Headquarters, Ottawa, planning maritime air requirements. Project Manager for air-droppable rescue kits, Tracker update, and anti-ship rockets, and Emergency Air Officer at National Defence Operations Centre.

1984-85 Attended Canadian Forces Command and Staff College, Toronto.

1979-84 Tracker pilot, flying extensive fisheries surveillance patrols and tactical support to the Navy from Shearwater, NS and Summerside, PEI. Served as Flight Safety Officer, Deputy Operations Officer, Chief Flight Instructor, and President of the Officers' Mess. Supervised operations of multiple-type aircraft during naval exercises off Bermuda.

1975-78 Completed military pilot training on Tutor jets, Moose Jaw, Sask. Flew the DeHavilland Buffalo with Search and Rescue, Summerside, PEI. Six months U.N. Peace-Keeping duty, flying air transport missions from Ismailia, Egypt, throughout Middle-East.

1970-75 Officer-Cadet at Collège Militaire Royal de Saint-Jean, QC. Captain of varsity rugby and badminton teams, awarded Trophy Jean for cultural contributions to college life.

CIVIC SERVICE

Elected two terms 2001-2008, as Councilor-at-Large, City of Dieppe, NB, a rapidly growing bilingual municipality. Director on Boards of the Dieppe Economic Development Corporation, Capitol Theatre, and Codiac Bus Transit. Liaison to Engineering and Fire Departments, and International Kite Festival. President of the Aquatic Centre Construction Committee, and the Dieppe Golf Tournament. Chairman of the Community Consultation and Noise Committees, Moncton International Airport.

EDUCATION AND QUALIFICATIONS

- B.Adm with Honours, Collège Militaire Royal de Saint-Jean, 1975
- Canadian Forces Officer Professional Development Program, completed 1979
- Instrument Check Pilot course, Winnipeg, 1982
- Graduate, Canadian Forces Command and Staff College, Toronto, 1985
- Air Transport Pilot Licenses, both airplane and helicopter, over 7000 hours flight time
- Completed TP308 Course, Criteria for Development of Instrument Procedures, 1997
- Completed training on Advanced TP308 criteria, 2005-2006
- Completed PBN Flight Procedure Design Course, US FAA, May 2014

PERSONAL

Languages: English and French, fluent.
Interests: Golf, ski, fine woodworking, wine collecting, gardening, bicycling, jazz music.
References: Available on request.

SCHEDULE "A"

LIST OF DOCUMENTS REFERRED TO IN WITNESS STATEMENT

1. *Canadian Aviation Regulations, Part III – Aerodrome, Airports and Heliports* (SOR/96-433)
2. International Civil Aviation Organization, *Chicago Convention on International Civil Aviation (1994)* 15 U.N.T.S. 295*, Annex 14, Volume I – Aerodrome Design and Operations*¸July 2013.
3. NAV CANADA, *Canada Air Pilot,* March 31, 2016 edition
4. NAV CANADA, *Canada Flight Supplement*, March 31, 2016 edition
5. NAV CANADA (David Legault), letter to wpd Fairview Wind Inc. (Jonathon Clifford) re evaluation of wind farm: 8 Wind Turbines – Stayner, ON
6. NAV CANADA, *The Restricted Canada Air Pilot,* October 15, 2015 edition
7. Transport Canada, *Aviation Circular No. 301-001*, October 1, 2008
8. Transport Canada, *TP 308, Criteria for the Development of Instrument Procedures, Change 6.*
9. Transport Canada, *TP 312 Aerodrome Standards and Recommended Practices, Edition 5.*

Charles (Chas) Cormier
Aeronautical Information Consultant
45 Chemin des Fleurs-Sauvages
Mont-Tremblant, QC J8E 2B3

October 10, 2011

Kevin Elwood
Clearview Nursery Ltd
8257 County Road 91, R.R. #4
Stayner, ON L0M 1S0

REVIEW OF FAIRVIEW WIND PROJECT - STAYNER (CLEARVIEW) AERODROME

I am pleased to offer you my services as a consultant in aeronautical information services, particularly in regard to wind turbines proposed by WPD Canada Corporation (WPD) in proximity to your aerodrome adjacent to your home in Stayner. In recent years I was able to assist several other airports with concerns for wind turbines proposed in their vicinity, most notably Collingwood, Chatham-Kent, Kincardine, Owen Sound, and Billy Bishop Toronto City airports in Ontario, and Summerside PEI.

I have analyzed the information provided in WPD's draft "Project Description Report" dated June 2011, titled "Fairview Wind Project", regarding the proposed positions of eight turbines. Comments will be provided on any aspects that could affect the Obstacle Limitation Surfaces around your runway at Clearview, and the effect on possible instrument approach procedures (IAP) and departures..

BACKGROUND

Stayner (Clearview Field) Aerodrome (CLV2) is located 2.5 nautical miles (NM) south of the Collingwood Airport (CNY3). It is a Transport Canada registered 1,950 x 50 foot turf runway 16/34 orientated north-west by south-east. The threshold 16 is displaced 400 feet to avoid the Country Road 91 power-lines. The Aerodrome Elevation is 870 feet above sea level (ASL). For navigational aids, the MANS enroute VORTAC is 15 NM south and the Midland enroute VOR/DME is some 18 NM north-east, each which could support instrument approaches to CLV2. Design and flight check of a RNAV(GNSS) LNAV approach to Runway 16 and a VOR/DME A approach off Midland VOR are planned by the end of 2011.

The following aspects were assessed:

- **Obstacle Limitation Surfaces (OLS)** that protect the runway, which are specified in Transport Canada manual TP312, "Aerodrome Standards & Recommended Practices"; and

- **Instrument Approach Procedures and Departures** that will serve the aerodrome in future, that meet the criteria published in Transport Canada manual TP308 "Criteria for the Development of Instrument Procedures".

ANALYSIS

Turbines

A draft "Project Description Report" dated June 2011 and titled "Fairview Wind Project Draft Report", prepared for WPD Canada Corporation by Stantec Consulting Ltd, was provided to the Collingwood Regional Airport Authority and distributed to residents of the local region. The report included a "project location map" and NAD83 coordinates of the proposed eight turbine positions. The locations of the turbines are different than those specified in WPD's previous project proposal of June 2010, and are more northerly and closer to the Collingwood Airport.

The report did not provide information on the heights of the proposed turbines. However the previous proposal and discussions with the Airport Authority indicated that the wind turbine height could be as high as 150 metres to the top of the blade diameter, or 492 feet above ground level (AGL) height. Subsequent correspondence and documents distributed during the public hearing in July indicates a turbine height of 479 feet AGL. Also, the chart of setbacks does not include airport setbacks or impacts on CNY3 or CLV2. The "Study Area" boundary in the report coincides with the "120m zone of investigation" boundary, but Collingwood Airport was not included in the study area.

The ground elevations on topographical maps appear to be at the 245m or 804 foot ASL contour for the 5 northerly turbines: #1, 3, 4, 5, & 8, which would equate to a total turbine height of 1283 feet ASL. Turbines #2 & 6 are within the 255m or 837-foot contour, so would be at 1316 feet ASL. Turbine #7 is on a 285m or 935 foot contour, resulting in a total height of 1414 feet ASL.

Obstacle Limitation Surfaces

Definition: The Obstacle Limitation Surfaces (OLS) are established by Transport Canada to define the airspace around runways to be maintained free of obstacles, in order to minimize dangers to a manoeuvring aircraft, either during an entirely visual approach or during the visual segment of an instrument approach.

Assessment: The OLS's at CNV2 were assessed in accordance with the criteria in TP312, Table 4-1, for a Non-Instrument Runway Code 1, which is the least stringent and is the minimum applied to private aerodromes.

- The **Take-off/Approach Surface** commences from a line of 60m width at 30m from the runway end, extends a minimum of 2500m, has a rising slope of 5%, and splays at 10%.
- The **Transitional Surfaces** rise at a 1:5 slope laterally from 30m abeam the runway centreline, and from the sides of the Take-off/Approach Surfaces.
- The **Outer Surface** is a flat surface at 45m above the aerodrome elevation and extends to a 4000 metre or 2.16 NM radius from the centre point of the runway. It protects for "Circling" manoeuvring but does not normally apply to a Non-Instrument Runway.

Penetration/Impact of proposed WPD wind turbines on CNV2 OLS:

- The **Take-off/Approach Surface** to the south from Runway 16 contains Turbine #7 at about 7000 feet from the runway end, resulting in a significant penetration of 214 feet.

- The **Take-off/Approach Surface** to the north from Runway 34 does not contain turbines, however the **Transitional Surface** to the east would be penetrated by Turbine #4, proposed to be located 800 feet abeam the edge at a point 3700 feet from the runway end, causing a penetration of some 68 feet.

- While this does not normally apply to a Non-Instrument runway, please note that all eight proposed turbines would penetrate the **Outer Surface** of 4000m radius.

Instrument Procedures

When the final design of approaches has been completed, the appropriate altitudes will be confirmed to determine the effects of the wind turbines on the approaches. Only Category A & B approach speeds will be considered, which are lower approach speeds of 90 and 120 knots respectively, appropriate to this type of runway. Transport Canada requires an assessment of departures as mandatory when approaches are published, so departures from both runway ends will be analyzed relative to the turbines.

Effects on RNAV(GNSS) Approaches: The RNAV(GNSS) RWY 16 approach from the northwest will be the preferred approach since the terrain to the north is flatter than to the south, where there is rising ground at Ten Hill up to 1390 feet ASL. The configuration will be a standard "T" straight-in to a missed approach waypoint at 1 NM from the runway, with a left turning missed approach to the north. Without the presence of turbines, the estimated approach limits will be 1380 feet ASL or 510 feet above touchdown, which is the lowest permitted for a runway with OLS assessed as Non-Instrument. These limits could even be lowered if the runway OLS could be assessed as Non-Precision Instrument. If turbines are erected as planned, Turbines #1, #3, #4 and #8 will all penetrate the final segment and cause the approach limits to rise to 1540 feet ASL, a significant penalty of 160 feet.

Effects on VOR/DME A approach from Midland VOR: A circling approach from the Midland YEE VOR/DME would track from the northeast on the 245 degree radial aligned to the centre of the runway. A six-mile final segment would be appropriate, commencing at 12.5 DME and ending at 18.5 DME at the runway. The normal approach limits are estimated at 1400 feet ASL or 530 feet above the aerodrome, nearly the lowest allowed for a circling. The controlling obstacles would be either a power-line crossing the final at 1.5 NM, wooded terrain at 2.8 NM along the right turning missed approach, and terrain at the circling perimeter at 1.5 NM west. However, all but one turbine would penetrate the final segment, and the last #7 would be immediately within the missed approach at 600 feet from the start, causing the minimums to be 1720 feet ASL or 850 feet above aerodrome elevation. This would be a significant penalty increase of 320 feet to the limits. Furthermore, the turbines would be located across the final track where an approaching aircraft would normally manoeuvre and descend for visual landing.

Effects on Circling: The circling assessment is common to all Instrument Approach Procedures (IAP), and allows an aircraft to visually manoeuvre to the opposite runway of approach for landing. With a single RNAV(GNSS) RWY 16 contemplated, circling would be essential for landing on runway 34 should the winds require it. Category A & B aircraft manoeuvring is contained within a 1.3 and 1.5 NM radius of the runway ends. Without turbines, the limits will be the close to straight-in at 1400 feet ASL or 530 feet above touchdown. However with turbines as planned, seven would penetrate the circling area and the minima would increase to1720 feet ASL. Even if circling was restricted to west of the runway only, Turbine #7 still penetrates and raises the minima by 340 feet to 1720 feet ASL.

Departure Assessment: Normal instrument departure permits a climb of 200 feet/NM with an obstacle clearance surface rising at 152 feet/NM beneath the climb. Three zones are assessed but the most critical is the zone 1, which extends to 2 NM beyond the departure end and splays at 15 degrees from 500 feet lateral each side of the end of the runway. For IFR departure, if the obstacle surfaces are not penetrated, visibility of at least ½ mile is normally the minimum requirement.

Departure to the north from runway 34 without turbines is currently unrestricted, except a turn to the west may be delayed until a moderate altitude is attained, to avoid a 1980-foot antenna some 5 NM west of the aerodrome. However, proposed Turbine #4 would penetrate zone 1, and cannot be mitigated by an increased climb gradient or other method. Departure would be limited to a visual climb to 1700 feet ASL before proceeding on course, which would necessitate good weather conditions for safety.

Departure to the south from runway 16 without turbines is currently unrestricted, except a modest climb gradient of perhaps 250 feet/NM would be required to about 1700 feet, in order to overfly the rising terrain to the south. However, proposed Turbine #7 would penetrate zone 1, and could not be mitigated by an increased climb gradient or other method. Departure would again be limited to a visual climb to 1700 feet ASL before proceeding on course, which would necessitate good weather conditions for safety. Departure in marginal weather would be not allowable.

SUMMARY

In summary, the potential effects on the Clearview Aerodrome at Stayner that could be caused by the proposed Fairview Wind Project are as follows:

Obstacle Limitation Surfaces protecting the runway:

- The **Take-off/Approach Surface** to the south from Runway 16 contains Turbine #7, causing a significant and dangerous penetration of 214 feet.
- The **Transitional Surface** to the east of the **Take-off/Approach Surface** to the north from Runway 34 is penetrated by Turbine #4 by about 68 feet.

Instrument Procedures:

- The **RNAV(GNSS) RWY 16** approach that is being designed could have limits at 1380 feet ASL or 510 feet above touchdown or lower. However, 4 turbines will be contained in the final segment, and would cause the limits to be raised to 1540 feet ASL. This is a significant penalty of 160 feet.

- The **VOR/DME A** approach being designed could have limits at 1400 feet ASL or 530 feet above touchdown. However, all but one turbine would be captured in the final segment, and #7 the last would be immediately in the missed approach, causing the approach limits to rise to 1720 feet ASL. This 320-foot increase to 850 feet above touchdown is a significant penalty.
- The **Circling** option to any approach would be affected by the turbines, raising the minimum descent altitude from 1380 feet ASL to1720 feet ASL, a significant penalty of 340 feet.
- Normal **Departures** from both runway ends would be unrestricted except for a reasonable turn restriction to the north and a modest climb gradient briefly to the south. However, 2 turbines would penetrate the critical zone 1 and would require a visual climb to 1700 feet ASL before proceeding on course as the only option, which would necessitate moderately good weather conditions. Departures in marginal weather, otherwise allowed, would not be permitted.

The impact of the proposed Fairview Wind Project on aviation safety and operational effectiveness at the Stayner (Clearview Field) aerodrome is a great concern. The overall conclusion is that the proposed turbines would be dangerous obstacles to the operational aspects of the Stayner (Clearview Field) aerodrome, due to their close proximity and significant height. The operator is investing in instrument approach procedures and departures, to responsibly increase the safe accessibility to the runway in poor weather conditions. The erection of the WPD wind turbines as planned will penalize the approaches and departure procedures with significantly increased minimum limits, and require more complicated manoeuvring. This is disrespectful of an aeronautical facility that has been in place for many years, and negligent regarding common aviation safety principles.

Further clarification of these findings can be provided by contacting me anytime.

Yours truly,

Charles (Chas) Cormier
chascorm@rogers.com
Cell: 514-979-0961

Charles Cormier, has over 35 years aviation experience as a pilot in the Canadian Air Force, with Transport Canada, NAV CANADA, and private industry. He retired from the military in 1991 after active service as a Sea King pilot in the Gulf War, attaining Lieutenant-Colonel rank. As an aeronautical information specialist formerly with NAV CANADA, MDA Aviation, and IDSNA, he has designed or conducted full quality review of over 1000 instrument flight procedures published in Canada, Myanmar, Ecuador and elsewhere. He has performed numerous flight checks, and can advise on aerodrome standards and automated weather observation systems (AWOS) requirements. Until recently, he was Chief Technical Director with IDS North America based in Montreal, which won a contract with NAV CANADA to redesign 900+ instrument procedures per year, with advanced computer design tools. He is currently a Senior Consultant with Explorer Solutions with offices in Montreal and Atlanta.

Charles (Chas) Cormier
Aeronautical Information Consultant
45 Chemin des Fleurs-Sauvages
Mont-Tremblant, QC J8E 2B3

January 23, 2014

Kevin Elwood
Clearview Nursery Ltd
8257 County Road 91, R.R. #4
Stayner, ON L0M 1S0

NEGATIVE EFFECTS TO STAYNER (CLEARVIEW FIELD) AERODROME – FAIRVIEW WIND PROJECT

This is a summary of negative effects to your private aerodrome at Stayner (Clearview) that I perceive will be caused by the Fairview Wind Project proposed by wpd Canada.

As a consultant in aeronautical information services, in recent years I have provided services to numerous airports and to wind turbine developers, with concerns for wind turbines proposed in the vicinity of aviation facilities. Most notably in Ontario, I have assisted the airports at Collingwood, Chatham-Kent, Kincardine, and Billy Bishop Toronto City. The results were that some or most turbines were determined to have no detrimental effects to the airports, but in some instances where there could be effects, turbine locations were moved or cancelled, or instrument approach procedures were modified to preserve or enhance accessibility to the airport. The purpose of my work was always to preserve safe and full access to the airport, including assessment of future expansion, while permitting wind turbines to be erected as close as prudent.

As you know, I am quite familiar with your facility and with the Collingwood Airport, providing it consultancy services since 2008. I have visited your aerodrome several times and designed and conducted the flight check of your RNAV(GNSS) and VOR/DME approaches which are currently published. During 2012-13, I coordinated the sale, installation, and approval process for the Automated Weather Observation System (AWOS) located on the Collingwood airfield, which provides current weather information and most importantly a precise altimeter setting measurement for pilots to use for conducting approaches to your airfield.

I have analyzed the information provided in WPD's draft "Project Description Report" dated June 2011, titled "Fairview Wind Project", regarding the proposed positions of eight turbines. Comments will be provided on any aspects that could affect the Obstacle Limitation Surfaces around your runway at Clearview, and the negative effects the turbines will cause to your published instrument approach procedures (IAP) and departures.

This report will consist of:

- background information on Stayner (Clearview Field) aerodrome,
- information on turbine locations and heights,
- a brief review of relevant Transport Canada criteria,
- a description of the effects that the wpd turbines will have on Obstacle Limitation Surfaces and instrument procedures,
- a final summary and recommendations.

BACKGROUND

Stayner (Clearview Field) Aerodrome

Stayner (Clearview Field) Aerodrome (CLV2) is located 2.5 nautical miles (NM) south of the Collingwood Airport (CNY3). It is a Transport Canada registered 1,950 x 50 foot turf runway 16/34 orientated north-west by south-east. The threshold 16 is displaced 400 feet to avoid the Country Road 91 power-lines. The Aerodrome Elevation is 870 feet above sea level (ASL). For navigational aids, the Midland enroute VOR/DME is some 18 NM north-east, which supports a conventional instrument approach to CLV2 published on June 27, 2013. Additionally, a RNAV(GNSS) LNAV approach to Runway 16 was also published. The Edenvale AWOS altimeter setting was used initially, which was subsequently amended by NAV CANADA on December 12, 2013 to reflect the Collingwood AWOS altimeter reference, thereby lowering limits and improving accessibility.

The Clearview farm was purchased in 1996, as it was suitable for development as an aerodrome and could grow nursery trees. The first section of the runway was built in spring 1997, and a Cessna 185 and Piper PA11 were based on field. The runway was extended to present length in the spring of 2010, when the construction of large aircraft hangar was commenced, completed in spring 2012. A Cessna 206 was purchased in the fall of 2013, to operate from the Clearview Field during float season, as a business. Throughout the 18-year life of your aerodrome, you have personally developed advanced pilot qualifications on jets and multi-engine commercial aircraft, and both your sons have learned to fly, using your facilities. Your aviation venture has experienced steady and measured growth based on a solid business plan. Regrettably, the Fairview Wind Project will likely significantly interfere with your current flight operations, which obviously will harm your business and will cause real concerns for safety.

Fairview Turbines

A draft “Project Description Report” dated June 2011 and titled “Fairview Wind Project Draft Report”, prepared for WPD Canada Corporation by Stantec Consulting Ltd, was provided to adjacent landowners within 550 metres. The report included a “project location map” and NAD83 coordinates of the proposed eight turbine positions. The locations of the turbines are different than those specified in WPD’s previous project proposal of June 2010, and are more northerly closer to Collingwood Regional Airport and very close to your Stayner (Clearview Field) aerodrome.

The report did not provide information on the heights of the proposed turbines. However the previous proposal and discussions with the Airport Authority indicated that the wind turbine height could be as high as 150 metres to the top of the blade diameter, or 492 feet above ground level (AGL) height. Subsequent correspondence and documents distributed during the public meeting in July indicates a turbine height of 479 feet AGL. The ground elevations on topographical maps appear to be at the 245m or 804 foot ASL contour for the 5 northerly turbines: #1, 3, 4, 5, & 8, which would equate to a total turbine height of 1283 feet ASL. Turbines #2 & 6 are within the 255m or 837-foot contour, so would be at 1316 feet ASL. Turbine #7 is on a 285m or 935 foot contour, resulting in a total height of 1414 feet ASL.

The chart of setbacks did not include airport setbacks or impacts on CNY3 or CLV2. The “Project location” boundary in the report coincides with the “120m zone of investigation” boundary, within which Clearview property lines and airspace lie. I have not received nor am I aware of any information from wpd Canada nor its aviation consultants, that assesses or identifies any potential negative environmental effects to the Stayner (Clearview Field) Aerodrome that may result from the turbine project.

CRITERIA

A measure of the effectiveness of the access to an airport can be made by assessing its conformity to two important sets of criteria published by Transport Canada:

- **Obstacle Limitation Surfaces (OLS)** that protect the runway, which are specified in Transport Canada manual TP312, 'Aerodrome Standards & Recommended Practices".
- **Instrument Approach Procedures and Departures** that serve the aerodrome, that meet the criteria published in Transport Canada manual TP308 "Criteria for the Development of lnstrument Procedures".

Obstacle Limitation Surfaces

Definition: The Obstacle Limitation Surfaces (OLS) are established by Transport Canada to define the airspace around runways to be maintained free of obstacles, in order to minimize dangers to a manoeuvring aircraft, either during an entirely visual approach or during the visual segment of an instrument approach.

Assessment: The OLS’s at Clearview were assessed in accordance with the criteria in TP312, Table 4-1, for a Non-Instrument Runway Code 1, which is the least stringent and is the minimum applied to private aerodromes.

- The **Take-off/Approach Surface** commences from a line of 60m width at 30m from the runway end, extends a minimum of 2500m, has a rising slope of 5%, and splays at 10%.
- The **Transitional Surfaces** rise at a 1:5 slope laterally from 30m abeam the runway centreline, and from the sides of the Take-off/Approach Surfaces.
- The **Outer Surface** is a flat surface at 45m above the aerodrome elevation and extends to a 4000 metre or 2.16 NM radius from the centre point of the runway. It protects for “Circling” manoeuvring but does not normally apply to a Non-Instrument Runway.

Instrument Procedures

ln Canada, the design of instrument flight procedures is regulated by Transport Canada primarily through a published manual, TP308, entitled "Criteria for the Development of lnstrument Procedures". This comprehensive document details all aspects of the design of various procedures to be used by aircraft operating under instrument flight rules (lFR), which is particularly useful during inclement weather conditions. While the purpose of instrument flight is to efficiently navigate between take-off and landing, one of the

primary purposes of criteria in TP308 is to ensure that aircraft are provided safe clearance from obstacles. There is considerable emphasis on the lnstrument Approach Procedure (lAP), which guides an IFR aircraft from enroute flight to safe descent and alignment with a runway or airport. Protection of aircraft during departure from a runway is also prescribed.

There are several options of IAP's, dependant on the type of navigational aids serving a runway and available in the cockpit. ln Canada, there are over 3000 IAP's published by NAV CANADA in a document called the Canada Air Pilot. These were designed by specialists qualified in TP308, and are the responsibility of NAV CANADA to be maintained to current standards, including adjustments to the effects of new obstacles.

The use of Global Navigation Satellite System (**GNSS**) technology, commonly called GPS, is growing throughout the aviation world and most other industries. lt is accurate, reliable, commonly available, and very cost effective because the satellite signals are free. Aircraft avionics systems are becoming very sophisticated and capable, for a modest price, and the airport operator does not have to invest in and maintain expensive ground based hardware. IAP's that use GPS as the navigational aid are called RNAV(GNSS) approaches, standing for Area Navigation with Global Navigation Satellite System. There are hundreds of these types published in Canada, thousands in the USA, and soon many all over the world. The most common type of GNSS approach is called LNAV, which is a non-precision option providing lateral navigation guidance to aircraft equipped with the common GPS avionics. The LPV precision option provides a precise vertically-guided descent to landing similar to the glideslope of the traditional ILS system, and requires advanced avionics in the aircraft.

Conventional land-based radio navigational aids such as **VOR** (VHF Omnidirectional Range) and **NDB** (Non-Directional Beacons) in operation in Canada, providing airway guidance and approach alternatives at many airports. While NAV CANADA has been slowly decommissioning those deemed redundant, it is anticipated many will remain in service for another 10-15 years. VOR gives precise bearing information to its location, and is usually incorporates a **DME** (Distance Measuring Equipment), which sends radio signals to indicate accurate mileage information. NDB transmits relative bearing information in the cockpit, in other words a compass needle will point at the airport when in range. An NDB can be enhanced by a DME. This combination is favoured by private operators because the lower costs of equipment, maintenance, and operations are relatively cheaper than more sophisticated navigational aids, such as ILS.

IAP's are divided into segments in a standard method, and each segment must respect a particular **Required Obstacle Clearance (ROC).** That means that there in an altitude specified for each leg or segment, that ensures that a safe height is maintained above the highest obstacle beneath the area of that segment. The **Final segment** is most critical, and supports final descent to the runway with the aircraft in full landing configuration. Typically, the ROC on Final is 250 feet above the highest obstacle for GNSS and VOR/DME approaches, which is regarded as minimal clearance. The last segment is called the **Missed Approach**, which permits an aircraft to navigate and climb safely should the runway not be seen by or available to the pilot. The typical missed approach has a sloping obstacle assessment which rises at 40:1, or 152 feet per NM.

All IAP's have a height specified, called the **Minimum Descent Altitude** (MDA) or Decision Altitude (DA), often called "Minimums". This is the lowest altitude that an aircraft can descend to during final approach, from which a pilot must sight the runway in order to execute a normal landing. The lower the MDA, the greater chance the pilot has to detect the runway environment. The MDA is normally calculated by applying the ROC above the highest obstacle beneath the final segment, or the last portion of the final segment if it is further subdivided by navigational fixes called Step-downs.

Nearly all IAP's also have published limits for "**Circling**" which is an option for pilots to manoeuvre the aircraft with visual reference to the runway, to land at the end opposite or another runway, other than to the runway which he is approaching. He may manoeuvre left or right of the runway at his discretion, unless a restriction is published preventing "Circling" on either side. Often, this restriction is applied to avoid a significant obstacle, to keep the limits reasonably low. The areas assessed for circling are measured as a radius from the runway ends, which increase in distance as the minimum manoeuvring speed of the aircraft increases, because more space is needed to turn. Aircraft approach speed ranges are specified as Categories, with the slowest at Category A being up to 90 knots, and the highest at Category D being 141-165 knots. The radii specified for each of categories "A" to "D" are 1.3, 1.5, 1.7, and 2.3 NM respectively.

Transport Canada requires an assessment of departures when approaches are published. The normal departure has a sloping obstacle assessment which rises at 40:1, or 152 feet per NM, assuming that the aircraft will climb at least at 200 feet/NM gradient. Instructions provide navigation guidance to avoid obstacles, or to climb at steeper gradients, or to climb visually over the airport before proceeding on course at the normal climb rate. This permits departure under IFR during inclement weather.

A commonly-used measurement of the effectiveness and accessibility of an airport is the number of approaches is has published, and the quality of these approaches is judged by the "minimums" specified, the lower the better.

Instrument Approaches and Departures Published for Clearview Field

The two IAP's and departure instructions for Clearview Field are described as follows:

- The **RNAV(GNSS) RWY 16** approach from the northwest is a standard “T” straight-in to a missed approach waypoint at the runway threshold. The missed approach is left-turning, to return north to the Initial Approach Waypoint Left, to hold over Georgian Bay. Only Category A & B approach speeds of 90 and 120 knots respectively are considered, appropriate to this type of runway. The straight-in minimums are 1380 feet ASL or 513 feet above touchdown, which are the lowest allowed by TP308. The associated circling minima are respectable 1480 feet ASL and 1500 feet ASL, or 603 and 623 feet above aerodrome elevation, for CAT A & B, due to rising terrain to the west.

- The **VOR/DME A** approach from the Midland YEE tracks from the northeast on the 245 degree radial aligned to the centre of the runway. A 4.5-mile final segment commences at 13 DME and ending at 17.5 DME one-mile short of the runway. The missed approach is a climbing right-turn back to the VOR. Because the alignment is abeam the runway and does not meet rules for

straight-in, only circling minima are published. The circling minima are a respectable 1480 feet ASL and 1500 feet ASL, or 603 and 623 feet above aerodrome elevation, for CAT A & B, the same as the RNAV(GNSS) approach.

- **Departure Instructions** from Clearview are specified on the Aerodrome Chart. Departure to the south from runway 16 requires a modest climb gradient of 280 feet/NM until an altitude of 1600 feet is achieved. Or, the pilot can climb visually over the aerodrome at the normal 200 feet/NM until 1900 feet, then proceed on course. Departures north from runway 34 are unrestricted except no left turn is permitted until 1600 feet is achieved, to avoid an antenna to the west.

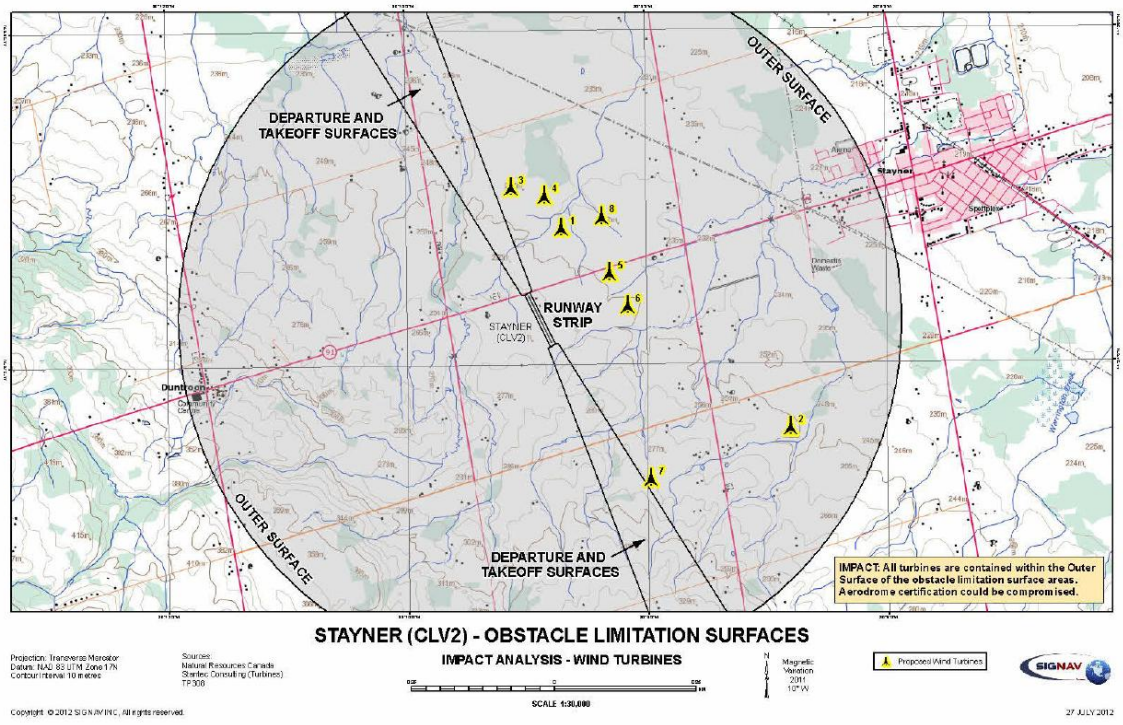
ANALYSIS

Impact to OLS of Fairview Turbines (illustrated below):

- The **Take-off/Approach Surface** to the south from Runway 16 contains Turbine #7 at about 7000 feet from the runway end, resulting in a significant penetration of 214 feet.

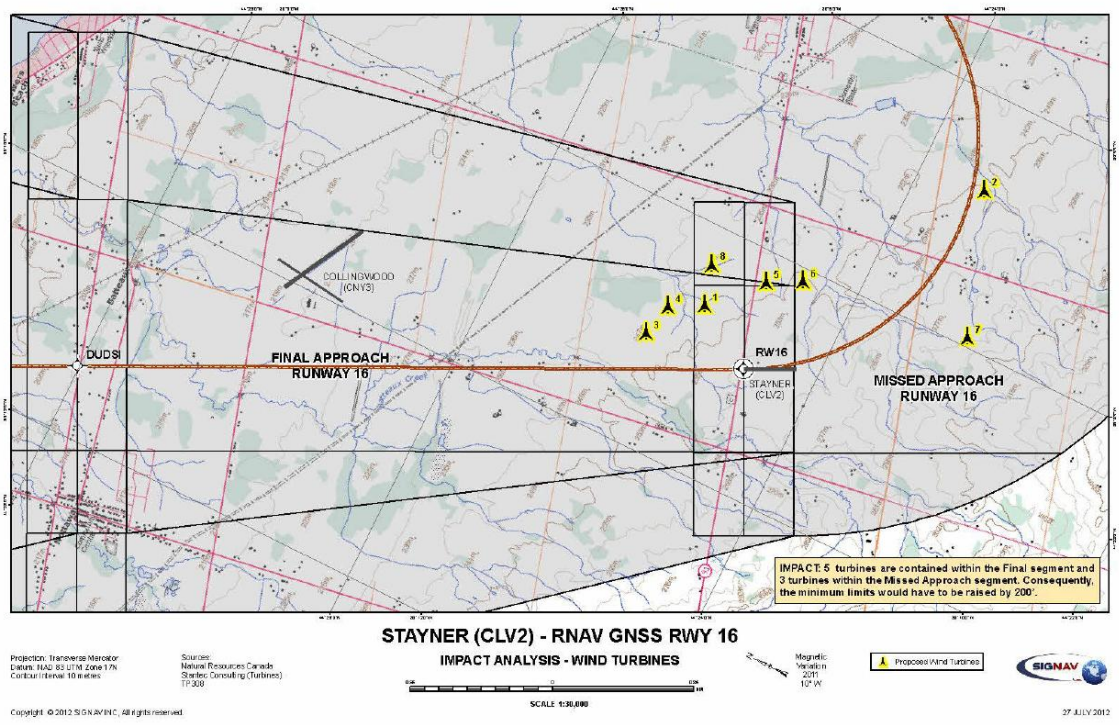
- The **Take-off/Approach Surface** to the north from Runway 34 does not contain turbines, however the **Transitional Surface** just east would be penetrated by Turbine #3, proposed to be located 550 feet abeam the edge at a point 3600 feet from the runway end, causing a penetration of some 138 feet.

- While this does not normally apply to a Non-Instrument runway, please note that all eight proposed turbines would penetrate the **Outer Surface** of 4000m radius.

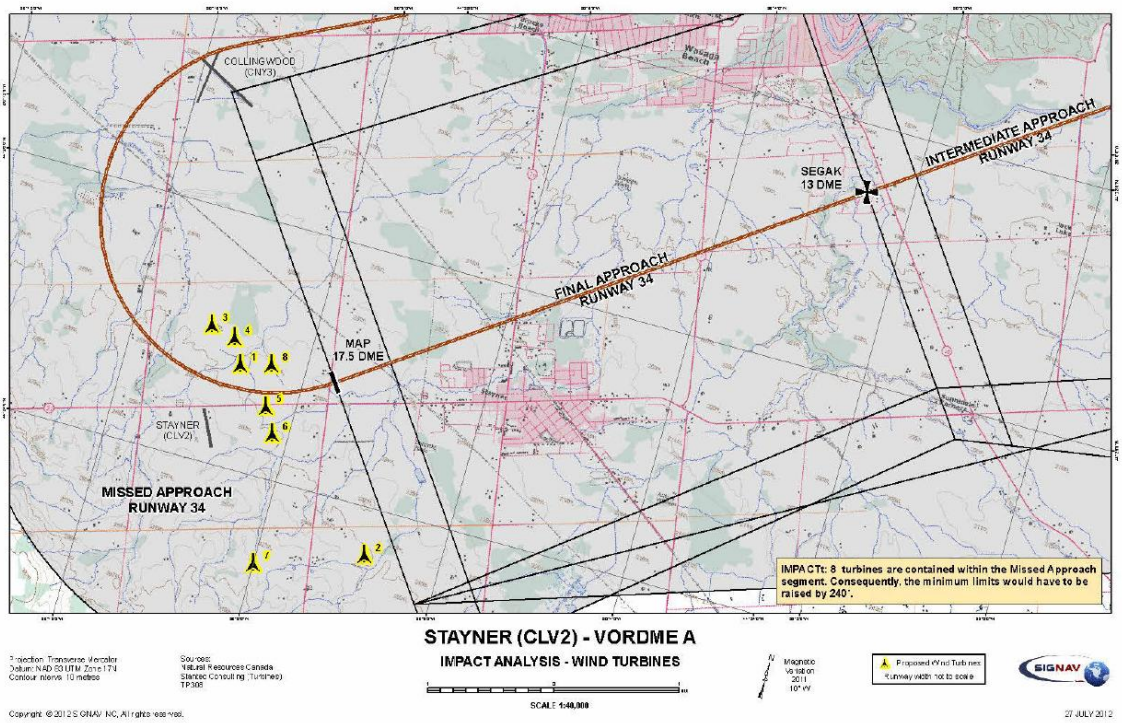


Impacts to Instrument Procedures of Fairview Turbines:

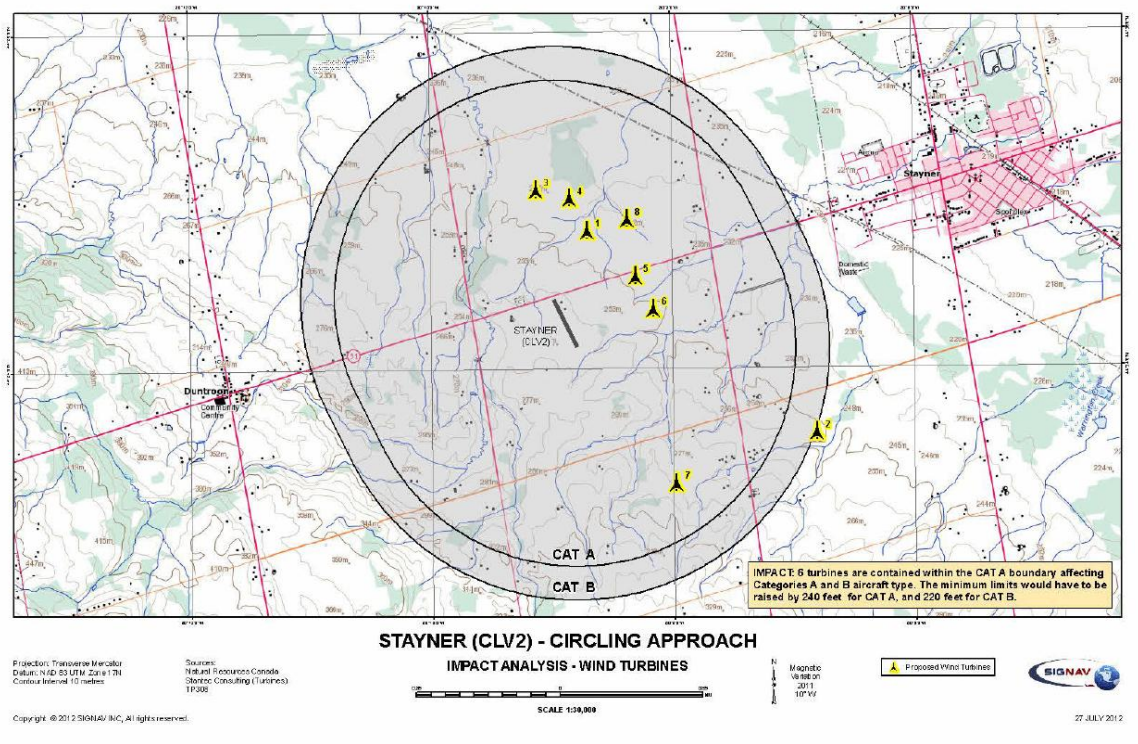
- The **RNAV(GNSS) RWY 16** approach from the northwest will be penetrated in the critical final segment by Turbines #1, #3, #4, #5, and #8. The missed approach segment contains the remaining Turbines #2, #6 and #7. There is insufficient distance to mitigate to penetrations with Step-down Waypoints, so the minimums for straight-in approach must be increased from 1380 feet ASL or 513 feet above touchdown, 1560 feet ASL to 693 feet above touchdown, a significant penalty of 180 feet.



- The **VOR/DME A** features a Missed Approach Point (MAP) which is short of the runway by one mile, in order to facilitate an earlier turn in the missed approach, to avoid rising ground to the west. However, the criteria requires that the final segment must be assessed right up to the runway. Therefore, the final segment would suffer penetrations by all but one turbine, and the last #7 would be immediately within the missed approach at 600 feet from the start. This would require that the minimums be raised from the current 1480 feet ASL and 1500 feet ASL, 603 and 623 feet above aerodrome elevation for CAT A & B, to 1720 feet ASL, 843 feet above aerodrome elevation. This would be a significant penalty increase to the limits of 240 and 220 feet. Furthermore, the turbines would be located across the final track where an approaching aircraft would normally manoeuvre and descend for visual landing to either runway end.



- The **circling** assessment is common to all IAP. Since only a single RNAV(GNSS) approach to runway 16 is published, circling would be essential for landing on runway 34 should the winds require it. Category A & B aircraft manoeuvring is contained within a 1.3 and 1.5 NM radius of the runway ends. With turbines as planned, seven would penetrate the circling area and the minima would increase to 1720 feet ASL or 843 feet above aerodrome elevation, vice the current 1480 and 1500 feet ASL or 603 and 623 feet above aerodrome. This is a negative result of 240 feet increase to limits. Even if circling was restricted to west of the runway only, Turbine #7 still penetrates.



- **Departure Assessment:** Departure to the north from runway 34 without turbines is currently unrestricted, except a turn to the west is delayed until a moderate altitude is attained. However, proposed Turbine #4 would penetrate, and cannot be mitigated by an increased climb gradient or other method. Departure would be limited to a visual climb to 1700 feet ASL before proceeding on course, which would necessitate good weather conditions. Departure to the south from runway 16 without turbines is currently unrestricted, except a modest climb gradient of perhaps 280 feet/NM is required to 1600 feet. However, proposed Turbine #7 would penetrate significantly, and could not be mitigated by an increased climb gradient or other method. Departure would again be limited to a visual climb to 1700 feet ASL before proceeding on course, which would necessitate good weather conditions. Departure in marginal weather would be not allowable, thereby negating the advantageous purposes of an instrument aerodrome.

SUMMARY

In summary, the potential negative effects on the Stayner (Clearview Field) aerodrome that will be caused by the proposed Fairview Wind Project are summarized as follows:

Obstacle Limitation Surfaces protecting the runway:

- The **Take-off/Approach Surface** to the south from Runway 16 contains Turbine #7, causing a significant and dangerous penetration of 214 feet.
- The **Transitional Surface** to the east of the **Take-off/Approach Surface** to the north from Runway 34 is penetrated by Turbine #3 by about 138 feet.

Instrument Procedures:

- The **RNAV(GNSS) RWY 16** approach has excellent minimums at 513 feet above touchdown. However, 4 turbines will be contained in the final segment, and would cause the limits to be raised to 693 feet above touchdown, a significant penalty of 180 feet.
- The **VOR/DME A** approach has 7 of 8 turbines captured in the final segment, and the last would be immediately in the missed approach, causing the approach limits to rise to 843 feet above aerodrome elevation. This will be significant increase of 240 and 220 feet to CAT A & B minima, quite a negative penalty.
- The **Circling** option to any approach would be affected by the turbines, raising the CAT A & B minima by 240 and 220 feet.
- **Departures** from both runway ends are currently very reasonable. However, 2 turbines would penetrate the critical zone 1 and would require a visual climb to 1700 feet ASL before proceeding on course as the only option. This would necessitate moderately good weather conditions, and departures in marginal weather otherwise allowed, would not be permitted.

The impact of the proposed Fairview Wind Project on aviation safety and operational effectiveness at the Stayner (Clearview Field) aerodrome is a great concern. The overall conclusion is that the proposed turbines would be dangerous obstacles to the operational aspects of the Stayner (Clearview Field) aerodrome, due to their close proximity and significant height. It is well known that due to close proximity to Georgian Lake, your region is subject to rapidly changing weather, strong lake effect snowfalls, low ceilings and poor visibility.

There has been an investment in instrument approach procedures and departures, to responsibly increase the safe accessibility to the runway in poor weather conditions. The erection of the WPD wind turbines as planned will penalize the approaches and departure procedures with significantly increased minimum limits, and require more complicated aircraft manoeuvring. This will harm the business capability of an aeronautical facility that has been in place for many years.

Erecting such high obstacles in close proximity to an active aerodrome is negligent regarding common aviation safety principles. This negligence is amplified by the sad report that wpd nor their aviation consultant has never directly contacted you the owner/operator of this facility, as recommended by NAV CANADA on September 23, 2011 and again on March 19, 2013, to review these detrimental effects to avoid adversely affecting air operations.

Further clarification of these findings can be provided by contacting me anytime.

Yours truly,

Charles (Chas) Cormier
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Cell: 514-979-0961

Charles Cormier, has over 37 years aviation experience as a pilot in the Canadian Air Force, with Transport Canada, NAV CANADA, and private industry, with over 7000 hours flight time. He retired from the military in 1991 after active duty as a Sea King pilot in the Gulf War, attaining Lieutenant-Colonel rank. As an aeronautical information specialist formerly with NAV CANADA, MDA Aviation, and IDSNA, he has designed or conducted full quality review of over 1000 instrument flight procedures published in Canada, Myanmar, Ecuador and elsewhere. He has performed numerous flight checks, and can advise on aerodrome standards and automated weather observation systems (AWOS) requirements. Until recently, he was Chief Technical Director with IDS North America based in Montreal, supervising the redesign 900+ instrument procedures per year with advanced computer design tools, under contract with NAV CANADA. As a volunteer, he serves as President of the Foundation of the Royal Military College of Saint-Jean.

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November 4, 2015

Kevin Elwood
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Stayner, ON L0M 1S0

COMMENTS ON TRANSPORT CANADA LETTER
FAIRVIEW WIND PROJECT – STAYNER (CLEARVIEW FIELD) AERODROME

Reference: Transport Canada letter RDIMS #10115796 dated Nov 17, 2014

These are my comments to further amplify the Transport Canada letter at reference, regarding the adverse effects to your private aerodrome at Stayner (Clearview) that will be caused by the Fairview Wind Project proposed by wpd Canada.

As a consultant in aeronautical information services, in recent years I have provided advice to numerous airports and to wind turbine developers, with concerns for wind turbines proposed in the vicinity of aviation facilities. Most notably in Ontario, I have assisted the airports at Collingwood, Chatham-Kent, and Kincardine. The results were that some or most turbines were determined to have no detrimental effects to the airports, but in some instances turbine locations were moved or cancelled, or instrument approach procedures were modified to preserve or enhance accessibility to the airport. The purpose of my work was always to preserve safe and full access to the airport, including assessment of future expansion, while permitting wind turbines to be erected as close as prudent.

Certification versus Registered - Airport versus Aerodrome

The letter goes to some length at the beginning to define the differences between an "aerodrome" and an "airport", with the primary difference being that an airport is a certified aerodrome, and an aerodrome is not certified. Airports must respect the standards of TP 312 Aerodrome Standards, particularly the requirements of Obstacle Limitation Surfaces (OLS) which are often enforced by Airport Zoning Regulations. An aerodrome does not need to respect these OLS requirements, however wherever possible, Transport Canada encourages all aerodrome operators to do so for reasons of safety. There is a requirement in Canada to certify aerodromes as airports when:

- The aerodrome is located within the built-up area of a city of town
- Regularly scheduled passenger service is offered by an air carrier, or
- When the Minister deems it necessary for reasons of safety

Aerodromes should be registered in the Canada Flight Supplement (CFS), which contains essential data pertaining to the facility. The Minister may refuse to register an aerodrome if certain requirements are not met, or when the aerodrome is likely to be hazardous to aviation safety. Your aerodrome at Stayner (Clearview Field) is registered,

and pertinent information is published in the CFS. Also, since you have Instrument Approach Procedures published, it is mandatory to be registered in the CFS.

Transport Canada makes reference to TP1247 "Aviation - Land Use in the Vicinity of Aerodromes", which is a guidance document designed to assist planners and legislators. There is emphasis on a recent update with the following Note: "It is of the utmost importance to be aware that the proximity of obstacles, for example, wind turbines, telecommunications towers, antennae, smoke stacks, etc., may potentially have an impact on the current and future usability of an aerodrome. Therefore, it is critical that planning and coordination of the siting of obstacles should be conducted in conjunction with an aerodrome operator at the earliest possible opportunity." I am aware that wpd has never consulted with you on the characteristics of your aerodrome, not have they ever responded to my analyses of the impacts that their turbines may have on the usability of your aerodrome. While they have been requested by NAV CANADA and Transport Canada to consult with me regarding your published instrument flight procedures, I can attest that not once have I been contacted by wpd.

We can agree that your private aerodrome will likely never be certified, however Collingwood Aerodrome was certified in the past and could easily be in the future. Passenger service to support local industry and tourism, especially to the Blue Mountain site, could be established. Certification is also a marketing tool to attract more business, and higher-powered operators, because it ensures that safety regulations are respected.

TP308 - Instrument Flight Procedures

The letter does provide good comments on the instrument flight procedures that are published in the Canada Air Pilot (CAP) for Collingwood, and those published in the Restricted Canada Air Pilot (RCAP) that serve Clearview Field. These approach procedure and departure instructions are regulated by the Minister through the detailed TP308 criteria.

There is an excellent point made in that: "For aircraft operating under Instrument Flight Rules (IFR), aviation safety is maintained by raising the limits of the instrument approach procedures to avoid the obstacles. While aviation safety has been addressed, it may result in a decrease in the usability of the aerodrome, the effectiveness of the instrument approach and the operational impact of the aerodrome in poor weather conditions." In brief, should the proximity of a new obstacle such as a wind turbine require an increase in limits to avoid it, there is a penalty to the usability of the aerodrome, not to mention to obvious safety implication of new obstacles in close proximity.

Transport did review the effect to the approaches at Collingwood, confirming that there would be impact and a significant penalty to effective use of two approaches. However, Transport makes strong points regarding your approaches at Clearview Field:

- The impacts on the approaches have never been considered by wpd
- The limits to the RNAV RWY 16 must be raised a very significant 180', and circling by 240'.
- The limits of the VOR/DME approach must increase by 240'.

- Circling limits must increase by 240'. Transport suggests restricting circling to west of the runway could mitigate this, but this is false, since one turbine will still penetrate the minimum circling area.

Transport fails to provide comment on IFR departures from Clearview, which is currently very reasonable from both runway ends. However, 2 turbines would penetrate the critical zone 1 and would require a visual climb to 1700 feet ASL before proceeding on course as the only option. This would necessitate moderately good weather conditions, so departures in marginal weather which are otherwise allowed, would not be permitted.

An approach designer has many options to mitigate new obstacles that may affect a published procedure, with the most common being to introduce a "step-down" in the final segment. The pilot would stay at a higher specified altitude until past the "step-down", from where he can descend safely to the runway. The wpd turbines will be too close to the Clearview runway to allow use of this tool, so there is no choice but to raise limits.

The suggestion to mitigate the penalties to the VOR/DME approach by restricting circling to the west would also not work, because the missed approach point of this approach is 1.1 miles east of the runway. An approaching aircraft would not reach the protected circling area, and a wall of turbines would be between it and that area.

Obstacle Limitation Surfaces

Obstacle Limitation Surfaces are specified in TP312, Aerodrome Standards. They must be respected by certified airports, and are strongly recommended to be respected by all other aerodromes, for established safety reasons.

Transport Canada does acknowledge that four turbines would penetrate the "Outer Surface" of the Collingwood Aerodrome. This surface does not apply to an uncertified runway, however there are concerns that the turbines could pose a hazard to aircraft operating in the "circuit pattern". There is a suggestion that this could be mitigated by the aerodrome operator requesting that a non-standard right-hand circuit pattern be published for runways 19 and 31 to avoid the obstacles. Such procedures would have to be approved by Transport Canada, since regulations specify that all turns in the vicinity of an aerodrome should be left-hand. I must caution that introducing non-standard practices introduces risk in that visiting itinerant pilots may not be familiar with the aerodrome and inadvertently may join the standard circuit. As well, all circuits would now overfly the populated urban centre of Collingwood, increasing possible noise hazards to the residents.

Regarding the OLS at Stayner (Clearview Field), Transport Canada acknowledges that the Take-off/Approach Surface of Runway 34 would be penetrated by a turbine by 214'. While the operator of an aerodrome need not comply with OLS, this surface is the most critical and I fully concur with Transport's assessment that "the turbine is a significant obstacle and could potentially pose a hazard to aircraft on final approach to this runway." Displacing the runway 34 threshold just would not work as well.

The transitional Surface adjacent to the Take-off/Approach Surface to Runway 16 would be penetrated 138' by another turbine. While Transport is not able to determine the exact impact on the runway displacement, it states that the obstacle could potentially close the runway, similar to runway 34. Again, it is stated that "the turbine is a significant obstacle and could potentially pose a hazard to aircraft on final approach to this runway."

Conclusions

The final paragraph of Transport Canada's comprehensive letter is very clear: "In conclusion, based on the information reviewed, it appears there would likely be an operational impact on both the Collingwood and Stayner aerodromes. There are aerodromes in Canada where obstacles are located in proximity to runways, and depending on their location, have continued operation with the establishment of specific procedures, and the marking, lighting and publication of these obstacles. However, it should be noted that such mitigation can result in a decrease in the usability of the Collingwood and Stayner aerodromes." This summarizes the concurrence with the adverse effects that I have identified in my previous analyses.

The final sentence states that: "The Department also wishes to emphasize that it is critical that planning and coordination of the siting of obstacles be conducted in conjunction with an aerodrome operator at the earliest possible opportunity." I must affirm that wpd has never communicated with me as your aviation consultant regarding any planning or coordination of siting of any turbines, ever.

To conclude, I am heartened that Transport Canada has endorsed my earlier analyses of the adverse effects that the Fairview Wind Project will pose to Collingwood Regional Airport and your Stayner (Clearview Field) aerodrome. I stand by my previous assessments.

Yours truly,

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Charles Cormier, has over 40 years aviation experience as a pilot in the Canadian Air Force, with Transport Canada, NAV CANADA, and private industry, with over 7000 hours flight time. He retired from the military in 1991 after active duty as a Sea King pilot in the Gulf War, attaining Lieutenant-Colonel rank. As an aeronautical information specialist formerly with NAV CANADA, MDA Aviation, and IDSNA, he has designed or conducted full quality review of 1500+ instrument flight procedures published in Canada, Myanmar, Ecuador and elsewhere. He has performed numerous flight checks, and can advise on aerodrome standards and automated weather observation systems (AWOS) requirements. As Chief Technical Director with IDS North America based in Montreal 2008-2011, he supervised 18 staff to redesign some 1000 instrument procedures per year with advanced computer design tools, under contract with NAV CANADA. He was elected two terms as a City Councillor in Dieppe, NB, 2001-2008, and currently is a Director of the Foundation of the Royal Military College of Saint-Jean, and sits on the Board of Governors of the College.

Transport Canada / Transports Canada

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UNCLASSIFIED

Your file Votre référence

Our file Notre référence
RDIMS #10115796

November 17, 2014

Hayley Berlin
Manager - Service Integration
Environmental Approvals Access and Service Integration Branch
Ministry of the Environment and Climate Change
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Toronto ON M4V 1L5

Subject: Fairview Wind Farm - Aerodromes

Dear Ms. Berlin:

The following comments are provided in response to your request dated October 10, 2014.

The terms "aerodrome" and "airport" are often used interchangeably in general parlance, and in some Transport Canada publications. However, the *Aeronautics Act* definitions are crucial to understanding the application of regulations and standards.

Aerodrome
An "aerodrome" means any area of land, water (including the frozen surface thereof) or other supporting surface used, designed, prepared, equipped or set apart for use either in whole or in part for the arrival, departure, movement or servicing of aircraft and includes any buildings, installations and equipment situated thereon or associated therewith.

Aerodromes must comply with the *Canadian Aviation Regulations* (CARS) Part III, Subpart 1.

Airport
An "airport" means an aerodrome in respect of which a Canadian aviation document is in force, and is referred to as "certified". Airport operators must comply with the *Canadian Aviation Regulations* and the associated standards which include obstacle limitation surfaces (OLS) that must not be penetrated. Wind turbines that penetrate the OLS will affect the airport certification, requiring the airport operator to take action to maintain the standards e.g. displace the runway threshold so there is a shorter runway to land on.

Airports must comply with the *Canadian Aviation Regulations* (CARS) Part III, Subpart 2 and the TP312 - *Aerodrome Standards and Recommended Practices* standards document.

Collingwood and Stayner are "aerodromes" not "airports".

Canada Flight Supplement

The *Canada Flight Supplement* is an aeronautical information publication published by NAV CANADA which contains an Aerodrome Directory including data and sketches of Canadian aerodromes and airports.

Aerodrome operators may request their aerodrome information be registered in the *Canada Flight Supplement* in accordance with the *Canadian Aviation Regulations* (CARS) Part III – Subpart 1.

CAR 301.03(2) states: *"The Minister may refuse to register an aerodrome where the operator of the aerodrome does not meet the requirements of sections 301.05 to 301.09 or where using the aerodrome is likely to be hazardous to aviation safety and, in such a case, shall not publish information with respect to that aerodrome."*

TP1247

TP1247E - "Aviation - Land Use in the Vicinity of Aerodromes" is a guidance document published by Transport Canada. It is designed to assist planners and legislators at all levels of government in becoming familiar with issues related to land use in the vicinity of aerodromes and how land used around an aerodrome will have an impact on its operations.

TP1247 was recently updated to include the following Note:
" Note: It is of the utmost importance to be aware that the proximity of obstacles, for example, wind turbines, telecommunications towers, antennae, smoke stacks, etc., may potentially have an impact on the current and future usability of an aerodrome. Therefore, it is critical that planning and coordination of the siting of obstacles should be conducted in conjunction with an aerodrome operator at the earliest possible opportunity."

Obstacle limitation surfaces are established to ensure the required level of safety. TP1247 identifies three types of surfaces at an aerodrome that should be protected to avoid penetration by objects or structures.

The three types of surfaces are:

1) Outer Surface
2) Take-off/Approach slope surface
3) Transitional Surface

Where the aerodrome is not an airport, penetration of these surfaces may affect the operations at the aerodrome. The standards in TP312 - *Aerodrome Standards and Recommended Practices* can be used but are not enforceable; however, the operational integrity of the aerodrome is enhanced if the designation of the use of land adjacent to the facility is done in line with technical portions of the standards.

At an airport, objects penetrating any of these surfaces would violate the certification standards in TP312 - *Aerodrome Standards and Recommended Practices* and would require some action to bring the airport back into compliance. Depending on the location of the penetrating obstacle, action could be things like a runway threshold displacement, changes to aeronautical information publications, restrictions to operations, and others.

Airports that have an Airport Zoning Regulation have these surfaces protected by law and these zoning regulations apply to land that is located outside the property boundary of the airport. Since aerodromes are not eligible for Airport Zoning Regulations, Transport Canada publishes TP1247 to make provincial/municipal land use authorities aware of development that may be incompatible with an aerodrome or airport.

TP1247 also refers to the requirement for marking and lighting of obstacles in accordance with Transport Canada's Standard 621 – Obstruction Marking and Lighting. The purpose of Standard 621 is to provide an effective means of indicating the presence of objects likely to present a hazard to aviation safety.

TP1247 can be found at the following link:
http://www.tc.gc.ca/eng/civilaviation/publications/tp1247-menu-1418.htm.

Transport Canada Land Use Role

As stated in TP1247E - Aviation - Land Use in the Vicinity of Aerodromes: "From a regulatory perspective, the authority for the designation of and control of the use of lands located outside of aerodrome property rests with provincial/municipal levels of government. The only exception to this fact, in the aviation case, occurs where an airport zoning regulation, made pursuant to the Aeronautics Act, is in force."

The Minister of Transport may exercise authority only over lands that are included in an Airport Zoning Regulation made pursuant to the Act. An Airport Zoning Regulation contains restrictive clauses that describe the activities and uses that are restricted or prohibited and contains a legal description of the lands to which it applies.

Restrictions and or prohibitions contained in an Airport Zoning Regulation may range from limiting the height of structures to prohibiting specified land uses or to prohibiting facilities that may interfere with signals or communications to/from aircraft.

Airport Zoning Regulations can only be enacted for airports.

Therefore, since Collingwood and Stayner are not airports, there are no Airport Zoning Regulations.

TP312

Transport Canada Publication - TP312 E - *Aerodrome Standards and Recommended Practices* contains the standards applicable to land airports which are certified pursuant to the *Canadian Aviation Regulations* - Part III, Subpart 2.

TP312 serves as the authoritative document for airport specifications, including physical characteristics, obstacle limitations surfaces, lighting, markers, marking and signs.

Obstacle limitation surfaces in this document define the airspace to be maintained free from obstacles in order to minimize the dangers presented by obstacles to an aircraft, either during an entirely visual approach or during the visual segment of an instrument approach; and prevent the airport from becoming unusable by the growth of obstacles around the airport.

Since Collingwood and Stayner are not airports, they are not required by regulation to comply with the standards in TP312.

TP308

Section 803.02 of the *Canadian Aviation Regulations* (CARs) regulates the development of civil instrument procedures in Canada through the standards manual entitled *Criteria for the Development of Instrument Procedures*, known as TP 308. Paragraph 120(a) of this document requires that specific aerodrome standards be met before an Instrument Approach Procedure (IAP) is authorized.

The rationale for linking the standards in TP312 and TP 308 is to ensure that a specific obstacle-free environment is provided in the vicinity of the aerodrome to support the visual segment of an IAP.

In accordance with Transport Canada Advisory Circular (AC) No. 301-001, an aerodrome attestation form is required to support a public IAP at an aerodrome. The criteria used are based on TP312, except there are no outer surface criteria. A copy of the aerodrome attestation form can be found at:
http://www.tc.gc.ca/media/documents/ca-opssvs/301-001.pdf

NAV CANADA is the responsible agency for reviewing, publishing and amending Instrument Approach Procedures.

Canada Air Pilot

The *Canada Air Pilot* (CAP) is an aeronautical information publication published by NAV CANADA containing instrument approach procedures for aerodromes and airports across Canada.

The following is in response to your specific questions:

1. Question: Overall, does the Project meet the Transport Canada guidelines for aviation safety (i.e. TP 1247, TP 312, TP 308), including obstacle restrictions and obstacle limitation surfaces with respect to the two proximal aerodromes?

   Answer: Transport Canada has not conducted an assessment of the obstacle restrictions or the obstacle limitation surfaces for compliance with TP1247, TP312 or TP308. However, we offer the following general comments:

   a) TP1247 –The Fairview Wind Project proposal was submitted to Transport Canada and was assessed for marking and lighting requirements. With respect to the obstacle limitation surfaces, refer to c) below. With respect to airport radar, navigation aids, communication systems and weather radar, NAV CANADA would have to make this assessment.

   b) TP308 - An evaluation of the impact of obstacles on TP308 and the instrument approaches at Collingwood and Stayner is the responsibility of NAV CANADA or the sponsor of the instrument approach. NAV CANADA is also responsible to amend all aeronautical information publications to advise pilots of the obstacles and make changes to the instrument approach procedures.

      For aircraft operating under Instrument Flight Rules (IFR), aviation safety is maintained by raising the limits of the instrument approach procedures to avoid the obstacles. While aviation safety has been addressed, it may result in a decrease in the usability of the aerodrome, the effectiveness of the instrument approach and the operational impact of the aerodrome in poor weather conditions.

      The assessment conducted by Charles Cormier on January 20, 2014 for the Collingwood aerodrome and on January 23, 2014 for the Stayner aerodrome indicates that the proposed wind turbines would have an impact on both aerodromes as follows:

      Collingwood:
      There are presently three instrument approaches published in the *Canada Air Pilot*.

      i) RNAV(GNSS) RWY 13 LNAV: Mr. Cormier's assessment indicates the minimum limits would have to be raised by 20'. This would likely have an impact on the aerodrome operation.
      ii) RNAV(GNSS RWY 31 LNAV: Mr. Cormier's assessment indicates the minimum limits would have to be raised by 120'. This is a fairly significant penalty, which would reduce the effectiveness of the instrument approach.

iii) Circling limits for RWY 13 and 31: Mr. Cormier's assessment indicates the circling limits for category C and D aircraft would increase significantly by 360' and 260' respectively. This is a significant penalty on the existing circling limits. However, the impact may be reduced if it is possible to limit circling to one side of the aerodrome (as is done at other aerodromes and airports).
iv) VOR/DME A: Mr. Cormier's assessment indicates the minimum limits would have to be raised 60' for category A & B aircraft, which would likely have an impact on the aerodrome operation, and the minimum limits for category C would have to be raised by 240'. This is a significant penalty, which would reduce the effectiveness of the existing instrument approach. However, the impact may be reduced if it is possible to limit circling to one side of the aerodrome.

Stayner:
There are currently two instrument approaches which are approved for "restricted" use and a special Transport Canada approval is required to use these approaches. It appears wpd Canada may not have considered the impact on these two instrument approaches.

i) RNAV(GNSS) RWY 16: Mr. Cormier's assessment indicates the straight-in minimum limits would have to be raised by 180' and that the circling limits would have to be raised by as much as 240'. These are significant penalties, which would reduce the effectiveness of the existing instrument approach. However, the impact may be reduced if it is possible to limit circling to one side of the aerodrome.
ii) VOR/DME A: Mr. Cormier's assessment indicates the minimum limits would have to be raised by 240' and 220' for category A & B aircraft respectively. This is a significant penalty, which would reduce the effectiveness of the existing instrument approach. However, the impact may be reduced if it is possible to limit circling to one side of the aerodrome.

c) TP312 – The obstacle limitation surfaces identified in TP312 (and TP1247) are established to protect an aircraft either during an entirely visual approach or during the visual segment of an instrument approach. Although an aerodrome does not have to comply with these surfaces, the operational integrity is enhanced if the designation of the use of land adjacent to the facility is done in line with technical portions of the standards.

The assessment conducted by Charles Cormier on January 20, 2014 for the Collingwood aerodrome and on January 23, 2014 for the Stayner aerodrome indicates that the proposed wind turbines would have an impact on both aerodromes as follows:

Collingwood:

i) Mr. Cormier's assessment indicates that the "Outer Surface" (which is normally a 4000m radius around the aerodrome) would be penetrated by 4 turbines by as much as 416'.

ii) The outer surface for airports is established to protect aircraft manoeuvring near the runway and in the "circuit pattern". There is no requirement for an outer surface at an aerodrome. However, the proximity and height of the wind turbines could potentially pose a hazard to aircraft operating in the "circuit pattern".

iii) There are ways to mitigate obstacles that lie within the "circuit pattern". The aerodrome operator could request a right hand circuit pattern be published for runways 19 and 31 to avoid the obstacles. Such procedures would have to be approved by Transport Canada.

Stayner:

i) RWY 34 - Mr. Cormier's assessment indicates Turbine #7 is approximately 7000' south of the runway and would violate the take-off/approach surface by 214'. If Stayner were an airport, appropriate mitigations would be required in order for the airport to remain certified, such as displacing the runway or establishing an offset approach. The impact at an airport would be a displacement of approximately 4280'. Since the runway is only 1920' long, this obstacle would effectively close the runway.

   As an aerodrome, Stayner does not have to comply with the take-off/approach surface. However, in its proposed location and without special procedures in place to avoid the obstacle, the turbine is a significant obstacle and could potentially pose a hazard to aircraft on final approach to this runway.

ii) RWY 16 - Mr. Cormier's assessment indicates Turbine #3 would penetrate the transitional surface by 138'. If Stayner were an airport, appropriate mitigations would be required in order for the airport to remain certified, such as displacing the runway or establishing an offset approach for aircraft landing on runway 16, and implementing special departure procedures for aircraft taking off on runway 34. Transport Canada is not able to determine the exact impact on the runway displacement; however the obstacle could potentially close the runway, similar to runway 34.

   As an aerodrome, Stayner does not have to comply with the transitional surface. However, in its proposed location and without special procedures in place to avoid the obstacle, the turbine is a significant obstacle and could potentially pose a hazard to aircraft on final approach to runway 16 or when overshooting runway 34.

iii) Mr. Cormier also noted that all turbines would penetrate the outer surface. The same general comments apply as outlined in ii) and iii) under Collingwood above.

2. If the turbines are erected where they are proposed:

    a. Question: Do they have the potential to infringe/cause an obstruction in the outer surface and transitional surface around the Stayner (Clearview Field) Aerodrome or Collingwood Regional Airport?

        Answer: Refer to response under Question 1. above.

    b. Question: Could they cause turbulence (e.g. potential cross-wind and roll-hazards) for any type of aircraft that will impair their safe operation when approaching the aerodromes?

        Answer: As you may be aware, there are numerous articles and studies available regarding the effects of turbulence caused by wind turbines. In February 2011, Transport Canada participated in the "Aviation Safety-risk Assessment of The Effect of Wind Turbines on General Aviation Aircraft", which was included within one of your attachments. The Summary 3.4 concluded: "The safety-risks associated with GA aircraft operating in very close proximity to wind turbines – in particular, light and ultra-light aircraft – during take-off and landings from aerodromes, are assessed to be from low to moderate significance. The remainder of the safety-risks to GA aircraft are assessed to be very low." Several strategies to mitigate the hazards and risks were discussed in this document.

    c. Question: Will they impact a pilot's descent to low altitudes with reduced forward visibility in white sky line conditions?

        Answer: Pilots must fly under Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) according to the *Canadian Aviation Regulations*. When operating under VFR, significant obstacles would be seen and avoided as they are marked and lighted, and published in the aeronautical information publications. Pilots operating under IFR would be protected from obstacles by following published instrument procedures.

    d. Question: Could they have an impact on the safe operation of low level Griffith helicopters flying into the aerodromes?

        Answer: The impact on the safe operation of the low level Griffith helicopters would have to be answered by DND.

    e. Question: Do they have the potential to create a safety hazard for aircraft using the surrounding airspace during nighttime?

        Answer: Any obstacle has the potential to create a safety hazard for aircraft if the pilot does not see the obstacle and the aircraft is flying in close proximity

to that obstacle. Significant obstacles are lighted for night time, and are published in the aeronautical information publications.

3. Question: If yes to any of the above, would Transport Canada or NAV CANADA support the implementation of mitigation measures by the proponent to ensure aviation safety? Are the mitigation measures proposed by the proponent adequate to address potential impacts?

   Answer: Transport Canada is not aware of any specific mitigation measures proposed by the proponent. Transport Canada has assessed the obstacles for marking and lighting. The aerodrome operator has an ongoing responsibility to advise NAV CANADA of any change or modification to the information submitted in the Aerodrome Attestation Form. NAV CANADA is responsible for reviewing, publishing and amending instrument approaches and for updating the aeronautical information publications to address the new obstacles. Proposed procedural changes such as a revised circuit pattern would have to be submitted by the aerodrome operator and then reviewed and approved by Transport Canada.

4. Question: Is the meteorological test tower, with a height of 60 meters AGL, stationed approximately 2.5 metres southeast of the Stayner (Clearview Field) Aerodrome creating an aviation safety concern?

   Answer: Transport Canada is not aware of a 60m meteorological test tower located 2.5m SE of the aerodrome. This obstacle is not published in the *Canada Flight Supplement*. If such an obstacle existed, it would constitute a hazard to aircraft taking off and landing from the aerodrome.

5. Question: The Operator of Stayner (Clearview Field) Aerodrome provided information and procedures for pilots operating from the aerodrome, as published by the Federal Government, in its Canada Flight Supplement, Restricted Canada Air Pilot (see original comment from Operator) – would these procedures need to be revised as a result of the proposed turbines?

   Answer: The aeronautical information publications would have to be amended by NAV CANADA to reflect the new obstacles. The impact on the aerodrome and the procedures was discussed in 1. above. In addition, the request for a right hand circuit pattern would have to be approved by Transport Canada.

6. Question: Is Transport Canada able to identify any limitations to the future expansion of the Stayner (Clearview Field) aerodrome, as a result of the proposed turbine locations? If the Stayner (Clearview Field) Aerodrome further developed its existing operation (i.e. extended its runway and added aircraft hangars) would the turbines infringe/cause an obstruction in the outer surface and transitional surface around the airfield, such that it would pose a threat to the aerodrome's operational safety?

Answer: Transport Canada is not aware of the proposed expansion plans by Stayner aerodrome and therefore cannot identify any limitations to future expansion. However, if there is an operational impact on the aerodrome today, there will likely be an operational impact on the aerodrome in the future if the aerodrome is further developed. A qualified aviation consultant would have to make that assessment once they have been made aware of the aerodrome operator's intentions. Safety is addressed through a number of resulting actions, such as marking, lighting, publications, and operating procedures.

7. Question: If the Project was established as proposed, would it trigger the need for displacement of the runway at the Stayner aerodrome?

   Answer: Since Stayner is not an airport, there is no legal requirement for a runway displacement. However, according to the analysis conducted by Charles Cormier on January 23, 2014, theoretically, a penetration of the takeoff and approach surface and transition surface at an airport would require a runway displacement or other mitigative measures. In its proposed location and without special procedures in place to avoid the obstacle, the turbine could potentially pose a hazard to aircraft on final approach to runway 16 or when overshooting runway 34.

8. Question: If the Project was established as proposed, would it complicate visual flights rules and/ or instrument flight rules for either aerodrome?

   Answer: There will be an operational impact at both aerodromes as outlined in 1. above. Aeronautical information publications would be amended by NAV CANADA to account for the new obstacles.

9. Question: Is Transport Canada able to identify any limitations to the future expansion of the Collingwood Regional Airport (CRA), as a result of the proposed turbine locations? If CRA extended its runway to 7,500 feet, would the proposed turbines infringe/cause an obstruction in the outer surface and transitional surface around the aerodrome, such that it would pose a threat to the airport's operational safety?

   Answer: Transport Canada is not aware of the proposed expansion plans by Collingwood aerodrome and therefore cannot identify any limitations to future expansion. However, if there is an operational impact on the aerodrome today, there will likely be an operational impact on the aerodrome in the future if the aerodrome is further developed. Safety is addressed through a number of resulting actions, such as marking, lighting, publications, and operating procedures.

10. Question: If the Project was established, would it trigger the need for displacement of the runways at CRA?

    Answer: Since Collingwood is not an airport, there is no legal requirement to displace a runway. According to the analysis conducted by Charles Cormier on Jan 20, 2014, there was no indication that a displacement would be required.

11. Question: The MOECC received from the CRA a document with "Effects to Collingwood Regional Airport" from the Fairview Wind Project, prepared by Charles (Chas) Cormier, Aeronautical Information Consultant and dated January 20, 2014 (see attachment). Based on the review of this report and using Transport Canada's expertise, is there a potential threat to CRA's operational safety?

    Answer: According to Mr. Cormier's assessment dated January 20, 2014, there will be an operational impact on the aerodrome. See response under Question 1. above. Safety is addressed through a number of resulting actions, such as marking, lighting, publications, and operating procedures.

In conclusion, based on the information reviewed, it appears there would likely be an operational impact on both the Collingwood and Stayner aerodromes. There are aerodromes in Canada where obstacles are located in proximity to runways, and depending on their location, have continued operation with the establishment of specific procedures, and the marking, lighting and publication of these obstacles. However, it should be noted that such mitigation can result in a decrease in the usability of the Collingwood and Stayner aerodromes. The Department also wishes to emphasize that it is critical that planning and coordination of the siting of obstacles be conducted in conjunction with an aerodrome operator at the earliest possible opportunity.

Yours truly,

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Canada