

COLLGAR WIND FARM

MERREDIN AIRSPACE STUDY

Report prepared

for

INVESTEC

28 July 2008



PO Box 63
GUILDFORD W.A. 6935

Phone: 08 9201 0034

Facsimile: 08 9201 0074

Email: assist@fortearport.com.au

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

CONTENTS

EXECUTIVE SUMMARY	2
OBJECTIVES and LIMITATIONS	3
OVERVIEW.....	3
RESPONSES TO SPECIFIC ITEMS NOMINATED BY INVESTEC	5
SUMMARY AND CONCLUSION	9

LEGEND

AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
CASA	Civil Aviation Safety Authority
CSWAFC	China Southern Western Australia Flying College
IAP	Instrument Approach Procedures
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LSALT	Lowest Safe Altitude
MTOW	Maximum Takeoff Weight
NOTAM	Notices to Airmen
OLS	Obstacle Limitation Surface
RWY	Runway
RAAF	Royal Australian Air Force
VFR	Visual Flight Rules

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

EXECUTIVE SUMMARY

It is assessed that construction of the Collgar wind farm will have negligible effect on civil aircraft operations.

In particular, the project will have no significant effect on the intensive flying training currently being conducted at Merredin Aerodrome, although some adjustments may be required to areas in which some flying training exercises are conducted. China Southern West Australian Flying College requested that a copy of this report be made available to them so that they could finalise their position on the effect of the Collgar project.

It is assessed that flights by other operators conducted at locations within a radius of 30nm from the aerodrome will not be significantly affected by the project. Further, it is assessed that the wind turbines will not introduce limitations on existing IFR operations or to overflying aircraft.

The risk of airborne collision presented by the wind turbines is minimal since, during daylight operations in Visual Meteorological Conditions, pilots will be able to see and avoid the large conspicuous structures. For flights at night or under Instrument Meteorological Conditions, providing that pilots are made aware of the existence and location of the 165m high wind generators, they are able to make suitable adjustments to flight paths. Subject to appropriate notification to pilots by way of NOTAM and inclusion of the structures on aeronautical charts, there should be no increase in collision risk beyond that presented by natural terrain.

In discussions with all identified stake holders no party has objected to the proposal.

The colour of the wind turbines will have to be chosen so that it contrasts with the background terrain and vegetation in accordance with AC 139-18(0), Obstacle Marking and Lighting of Wind Farms.

If the project proceeds, it is essential that the project manager provide notice to CASA to enable the regulator to assess obstacle lighting needs and make necessary advice to Airservices Australia on charting amendments, as required. The project manager must also provide notice to the RAAF, in accordance with the procedures given in AC 139-08(0), Reporting of Tall Structures to enable their national data base of tall structures to be updated.

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

OBJECTIVES & LIMITATIONS

The objective of this study, commissioned by Investec Capital Bank Australia Ltd (Investec) is to investigate the effect of the proposed Collgar wind farm on aviation activities with particular reference to operations conducted at Merredin Aerodrome. The scope of the study is limited to an assessment of the effects on aviation activities within a range of thirty nautical miles from Merredin Aerodrome.

The study considers the effect of the project in terms of the existing arrangements at Merredin Aerodrome. If, at some future time, the aerodrome owners were to consider upgrade of the aerodrome or to introduce different types of operations or to introduce larger aircraft, then there may be limitations imposed by the wind turbines associated with the wind farm.

This study does not address environmental issues such as noise, visual impact, land use, or the project's impact on flora and fauna. The EMI report by Avail Services Pty Ltd addresses the effect of wind generators in regard to electrical or electromagnetic interference to satellite navigation aids or to navigation aids which may be installed at a future date.

OVERVIEW

Merredin aerodrome is privately owned by China Southern West Australian Flying College (CSWAFC). It is used for intensive flying training given to Chinese national pilots. This training is conducted principally in visual meteorological conditions (VMC) and, generally, does not involve instrument flight procedures. In VMC, pilots are expected to 'see and avoid' obstacles. However, some training is conducted at night and consideration must be given to the risk presented by the wind generators in this circumstance.

Because of the 'visual' nature of the flying training, CSWAFC had not installed a navigation aid nor arranged for the publication of an 'instrument approach procedure' (IAP) using satellite navigation. Had this been the case then the wind farm may have introduced a requirement for changes to those instrument procedures and perhaps reduced the usability of the aerodrome under Instrument Meteorological Conditions (IMC). However, this is not the case at the time of this study.

Similarly, the Collgar wind farm project has the potential to affect IAPs established at aerodromes nearby the project. However, a review of the applicable charts and of the Aeronautical Information Publication (AIP) shows that no procedures exist within the considered area of 30nm radius of Merredin aerodrome. Thus it can be assumed, with a high degree of confidence, that the project will have no significant effect on other airspace users operating under the Instrument Flight Rules (IFR).

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

However, construction of the wind turbines associated with the wind farm will have a minor effect on the calculation of Lowest Safe Altitude (LSALT) by pilots conducting operations under the IFR or at night. The effect is assessed as being operationally insignificant.

Another issue is the extent to which new structures presented by the wind farm turbines might affect the performance of aircraft arriving or departing Merredin. Aircraft with a Maximum Takeoff Weight (MTOW) above 5700kg are required to account for obstacle avoidance under Civil Aviation Order (CAO) 20.7.1B. Sometimes this requirement can impose a limitation on payload. Due to the limitations imposed by the limited runway distance, it is unlikely that aircraft with MTOW above 5700 Kg would operate at Merredin. However, if such aircraft used RWY 10 (taking off towards the wind farm) they would be faced with a gradient of 1.87% maximum. This is below the maximum gradient considered in airport design (2%) but above the minimum single engine climb performance limitation of 1.6% for twin engine aircraft (CAO 20.7.1B). The conclusion is that at some future time, if operations by heavier aircraft were planned at Merredin, there may be some minor payload restrictions imposed on aircraft taking off on RWY 10.

Since the aerodrome is privately owned, CSWAFC has control over other aircraft intending to use the aerodrome. The aerodrome information published by Airservices Australia in the Aeronautical Information Publication (AIP) states that “approvals (to use the aerodrome) can be obtained from CSWAFC ..” This provides the owner with the opportunity to brief visitors on any unusual hazards that might be presented by wind generators or to refuse entry.

Some minor changes will be required to the LSALT of air routes currently published by Airservices Australia. These changes to charts are the responsibility of Airservices Australia and should be effected after the new structures have been formally reported by CASA.

If the project proceeds, it is essential that the project manager provide notice to CASA and the RAAF in accordance with the procedures given in AC139-18(0), Obstacle Marking and Lighting of Wind Farms and AC 139-08(0), Reporting of Tall Structures respectively.

The colour of the wind turbines will have to be chosen so that they contrast with the background terrain and vegetation, which is outlined in AC139-18(0) to ensure they are sufficiently conspicuous.

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

RESPONSES TO SPECIFIC ITEMS NOMINATED BY INVESTEC

In Airport Assist's brief, Investec specified the 'Overall Work Approach' and nominated nine matters for review and assessment. Each of these matters is addressed in the following section.

- 1. "Aeronautical charts and aviation operational documentation to identify airports (licensed or otherwise) airstrips and aircraft movement areas in the vicinity of the wind farm (including helicopter movement areas). There should also be consideration of activities such as crop dusting). At least one neighbouring farm has a private airstrip."***

The following aeronautical charts and other documents have been reviewed:

- World Aeronautical Chart (WAC) 3351 –Perth
- Australia ERC LOW L8, Published by Airservices Australia
- Australia Terminal Area Chart TAC-3, Published by Airservices Australia
- AIP Australia FAC M – 1 (Merredin)
- AIP DAH TOC (Air Route Specifications)
- RFDS Airstrips (Merredin)

The only proximate airport identified from the charts and aeronautical documents was Westonia. Contact with Westonia Mines in Perth showed that the company does not operate charter flights to the airport. The Shire advises that the only regular user of the airport is the RFDS who conduct a regular clinic.

Other aircraft operators in the Shire of Merredin were identified through contact with CSWAFS and the Merredin Shire officers. The operators were:

- Kevin Anderson – a commercial helicopter operator with two aircraft located approximately 4nm to the North of Merredin Aerodrome, and
- Tony Mirfit – a private fixed wing operator located 10 nm to the east of Merredin Aerodrome who operates from his own private airfield.

Discussions were held with these operators and both stated that the wind generators would not affect their operations. Both were invited to a meeting together with the Shire Engineer on Wednesday 16th July but did not attend.

It was determined that aerial agriculture takes place at some times of the year (principally in Spring) from a number of farms in the area. These aircraft operate by day and normally from the

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

farmer's paddock. Since the wind generators would be highly visible it is assessed that they would not produce a hazard to aerial agriculture operations.

It does not appear that sport aviation takes place in the vicinity of the proposed wind farm.

2. *“Published instrument flight routes, lowest safe altitudes, minimum safe altitudes, military low flying routes and approach and departure procedures in the vicinity of the wind farms (if any).”*

There are four published air routes within 30nm of Merredin. These are: W198, J64, Z98 and B469.

Given that the highest point of the highest generator is 603m or 1978 ft AMSL, the project could have a minor effect on lowest safe altitudes for the published routes. Depending on the tolerance areas used to determine the published LSALT they may have to be raised to 3000ft on some routes. The only route likely to be affected is J141 where the LSALT is likely to have to be raised from 2900 to 3000. The practical effect on flight operations is negligible.

There are no navigation aids at Merredin thus there are no instrument approach or departure procedures. The nearest navigation aid to the project is Naremben NDB (approx 30nm from Merredin). There are no instrument approach procedures (IAP) published for this aid. It can be concluded that the wind generators are unlikely to affect any current IAP's.

It was not possible to establish with any degree of certainty whether military low flying is conducted in the area. However, it is normally the policy of the RAAF to avoid declared Flying Training Areas. Merredin has a published Danger Area, D158A, from surface to 5000 ft AMSL, with a radius of 30nm from Merredin Aerodrome. This area covers the Collgar project, thus if the RAAF avoids D158 the project will have no effect on their military low flying routes.

3. *Obstacle Limitation Surfaces emanating from airports (if any) that might be impacted by the wind farm. Other aviation operations (e.g. sport or recreational aviation, agricultural aviation) that might be impacted by the presence of the wind farm, and assessment of the nature of any such impacts.*

Obstacle Limitation Surface (OLS) drawings for Merredin Aerodrome have been produced for Codes 2 and 3- non precision approach. These are shown at Attachments 1 and 2. Currently, the operations conducted at Merredin Airport are relative to a Code 2 airport. Since the airport is registered with CASA there is an inspection requirement.

The wind generators do not intrude on the associated OLS for Code 2. If at some future date the aerodrome was upgraded to Code 3 then the approach OLS surface would be infringed by some wind generators. This is not an insurmountable problem and IAP operations can be tailored to meet the situation.

It is assessed that other aviation operations conducted within 30nm of Merredin will not be significantly impacted by the wind farm. This conclusion is based on fact that there are no facilities

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

in the area enabling the conduct of operations under the IFR thus pilots are required by aviation law to ‘see and avoid’ obstacles. In Advisory Circular AC 139-18(0), it states that “CASA has determined that by day, large wind turbines are sufficiently conspicuous due to their shape and size, provided that the colour of the turbine is of a contrasting colour to the background”.

4. Consultations with key aviation operators at airports or airstrips in the region and other relevant stakeholders.

Consultation was conducted with the following persons:

CSWAFC:	Frank Duan – CEO
	Mark Bucksey – Operations/Safety Manager
	Bob Travis – Manager Merredin
Shire of Merredin:	Jim Garrett – Manager Engineering Services
Shire of Watsonia:	Sara Bright – Office Manager
Local Operators:	Brad and Kevin Atkinson – Helicopter Operators adjacent to Merredin AD
	Tony Murfit - Owner of private aerodrome with fixed wing aircraft
WA Government:	Phil DeCosta – Manager Aviation Policy, Department of Transport and Infrastructure
CASA:	Bill Deuchar – Manager Airports WA
RFDS:	Capt Michael Blues – Chief Pilot
RAAF:	Sqn. Ldr. Murray Sullivan – Operations RAAF Base Pearce

Meetings were held at Merredin with Bob Travers (CSWAFC Manager Merredin) and Jim Garrett (Shire Engineer) and in Perth with Bill Deuchar of CASA.

With the exception of CASA, where the subject of wind farms is still under consideration, none of the persons contacted expressed any objection to the Collgar project.

5. Published aeronautical information of the siting of radio navigation aids in the vicinity of the wind farms, and assessment of the susceptibility or otherwise of their emissions to rotor movement.

There are no ground based navigation aids within 30nm of Merredin Aerodrome. The nearest facility is an NDB at Narembeen which is 35nm from Merredin. This NDB does not have an

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

associated IAP and is used only to supplement the GPS based navigation systems in common use. Thus it is highly unlikely that the wind generators would affect any ground based navigation aids.

The study team is not qualified to comment on possible effects of the wind generators on signals received by GPS navigation systems. The EMI report by Avail Services Pty Ltd addresses this issue.

There are some reports that wind generators can emit microwave radiation that may interfere with aircraft radars or secondary surveillance ground radar. No reference could be found to reports of any such events in Australia. There are no ground radars near Merredin.

6. Assessment of other potential radio frequency interference emanating from the sites that might have an impact upon aeronautical communications or air navigation.

The EMI report by Avail Services Pty Ltd addresses the impact of the wind turbine generators on aeronautical communications.

7. Assessment of any other safety factors such as visibility in low light and poor weather conditions.

As stated in the response to Item 3, CASA in Advisory Circular AC 139-18(0), require wind turbines be sufficiently conspicuous by day and their colour provide contrast with the background.

The proposed height of the towers of 165m (approx. 500ft) AGL is higher than wind farms previously considered by CASA. Consequently, CASA may wish to review its policy in regard to structures with heights of 500ft AGL and above. Although CASA can advise against construction of the project it has no power to prevent it. CASA may decide to increase the conspicuousness of the towers by the requiring the addition of strobe lighting or red lights either flashing or steady. Strobe lighting often produces complaints from nearby residents. All lighting has the disadvantage of cost of maintenance. It also raises the question of limitations on aviation activity if the obstacle lighting is either temporarily or permanently unserviceable.

It is our opinion that the line of towers will be sufficiently conspicuous in visual meteorological conditions so as to make lighting unnecessary. Operations in low light or poor weather should be conducted under the IFR. The associated flying operations procedures guarantee obstacle clearance once the obstacles have been published on aeronautical charts.

8. Consideration of State Government planning and development legislation relating to aerodromes and aviation operations.

Discussion was held with Phil DeCosta, Manager Aviation with the WA State Government, Department of Planning and Infrastructure. Mr DeCosta advised that his department has no policy in regard to the siting of wind farms and their effect on aviation activities.

COLLGAR WIND FARM

MERREDIN – AIRSPACE STUDY

9. Government/stakeholder/other consultations as required.

The persons and organisations consulted are listed in the response at Item 4.

SUMMARY AND CONCLUSION

Following our review of the location of the proposed wind farm and its likely effect on proximate aviation activities, it is our opinion that the project will present little additional risk to aviation and that such risk is within the level generally acceptable in the industry and society.

CSWAFS may be faced with some minor adjustments to the areas in which certain training activities (practice forces landings) take place. However it is noted that they have been provided with a very generous sized training area and any adjustments required should not incur significant penalty.

The absence of ground based navigation aids and published instrument approach procedures in the area means that the towers have little or no effect on instrument flight procedures. The CASA, as the regulator, will have to arrange for the LSALT on one published air route to be raised by 100 ft, which is operationally insignificant.

None of the identified stakeholders, who were contacted by telephone or at meetings, presented any objection to the proposal. It is likely to take some time before CASA presents a view on the project and their determination on the need for lighting of the wind generators.

It is important that the wind generators be in a contrasting colour to the surrounding environment so that their conspicuousness is maximised. This is necessary to ensure that pilots can see and avoid the towers during daylight operations.

It is essential that the project manager notify CASA and the RAAF of the location and height of the towers if a decision is taken to proceed with the project. The process is given in Advisory Circular AC 139-08(0) 'Reporting of Tall Structures'.

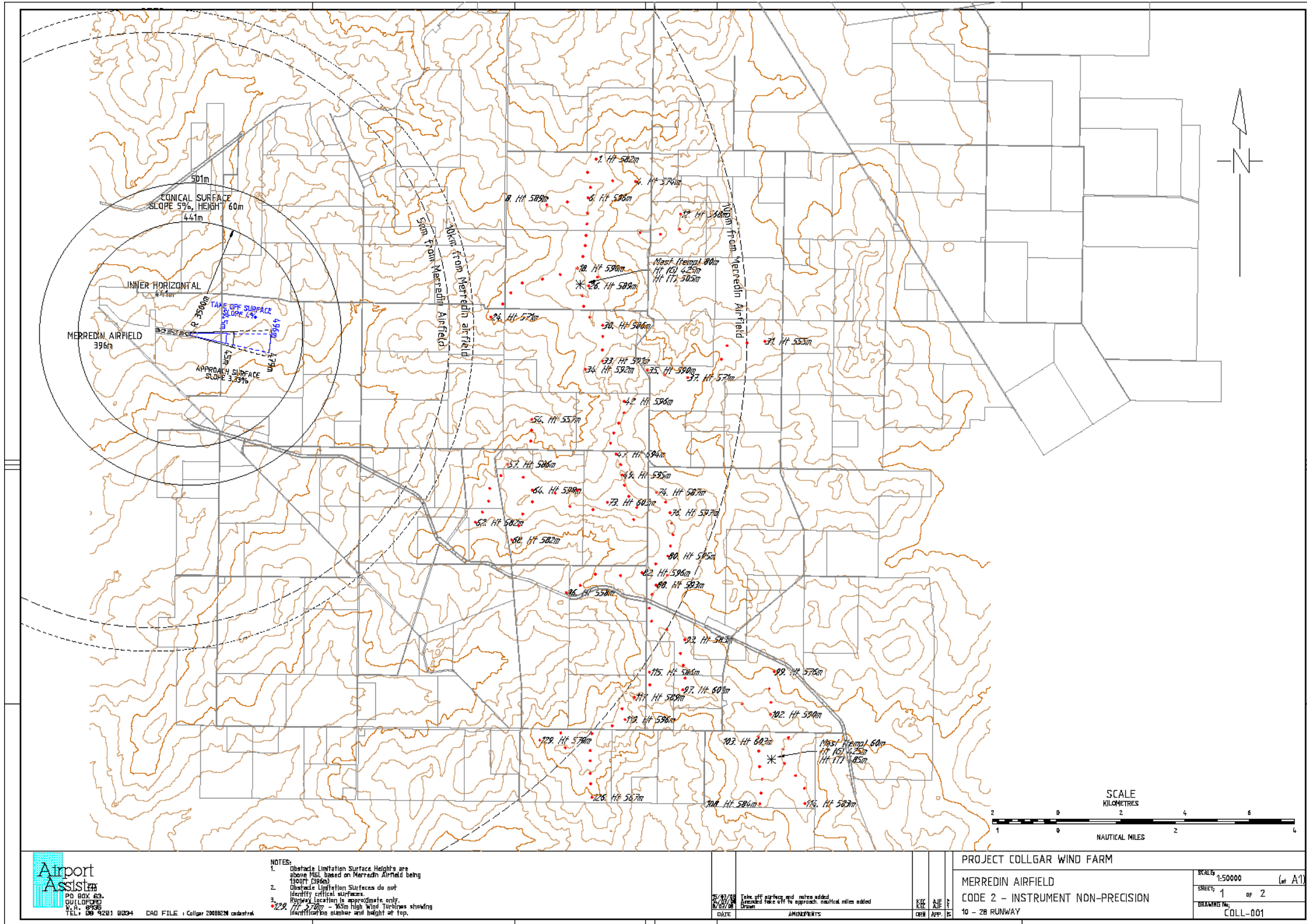
Attachments:

Drawing COLL-001 Sheet 1 of 2 "Merredin Airfield - Code 2 Instrument Non-Precision Runway 10-28"

Drawing COLL-001 Sheet 2 of 2 "Merredin Airfield - Code 3 Instrument Non-Precision Runway 10-28"

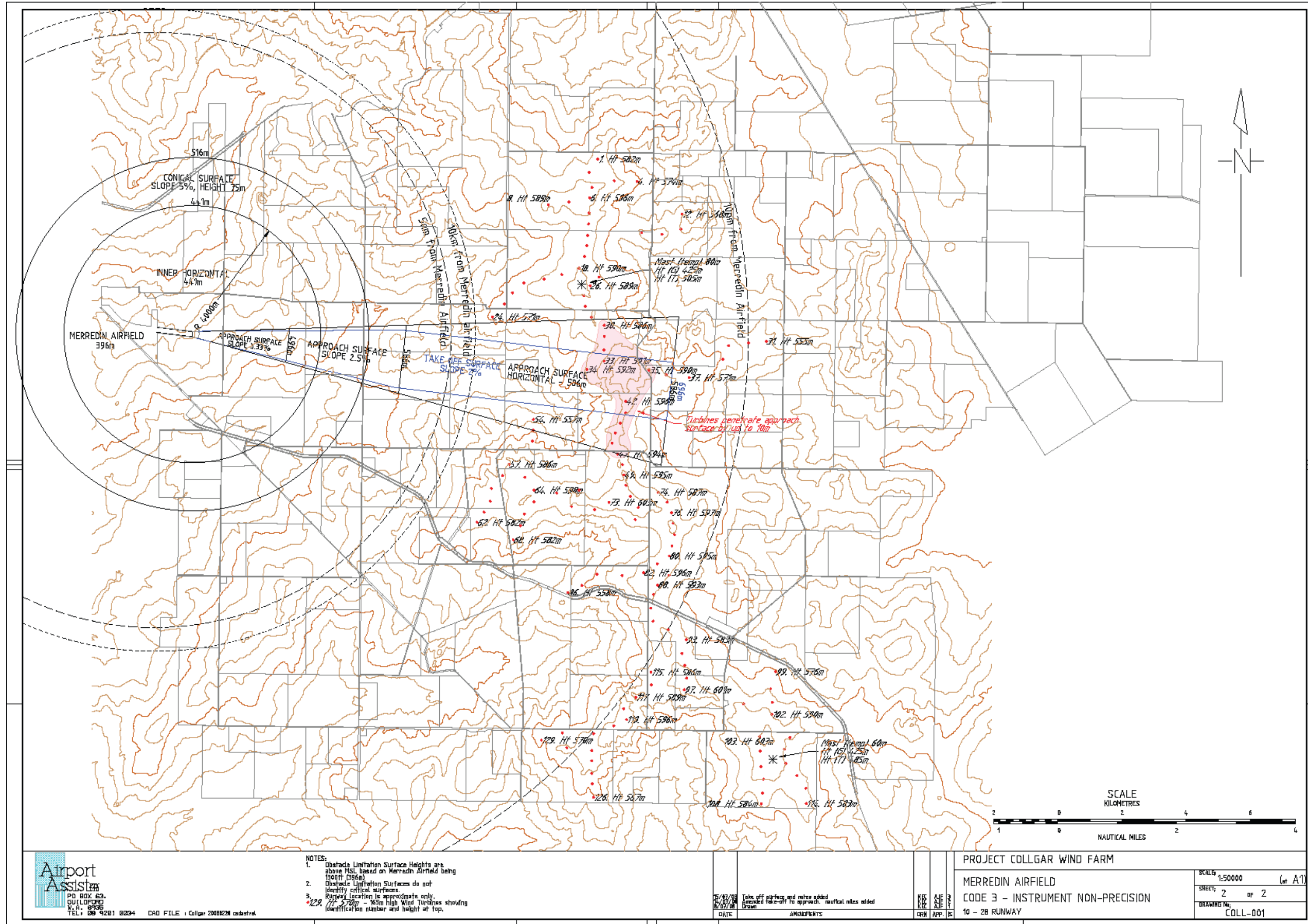
COLLGAR WIND FARM

MERREDIN - AIRSPACE STUDY



COLLGAR WIND FARM

MERREDIN - AIRSPACE STUDY



Airport Assist
 PO BOX 63,
 GULLOFPOND
 W.A. 6945
 TEL: 08 9281 8034 CAD FILE: Collgar 200828 cadastre

- NOTES:
 1. Obstacle Limitation Surface Heights are above MSL based on Merredin Airfield being 100ft (30m).
 2. Obstacle Limitation Surfaces do not identify critical surfaces.
 3. Proposed locations for approximate only.
 * 229. Ht 57.0m - 85m High Wind Turbines showing identification number and height of top.

DATE: 07/01/10
 DRAWN: [Signature]
 CHECKED: [Signature]

PROJECT COLLGAR WIND FARM
 MERREDIN AIRFIELD
 CODE 3 - INSTRUMENT NON-PRECISION
 10 - 28 RUNWAY

SCALE: 1:50000 (at A1)
 SHEETS: 2 OF 2
 DRAWING NO.: COLL-001