

Aviation Peer Review:

Sunfield Masterplanned Community

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Aviation Peer Review: Sunfield Masterplanned Community

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Contents

1. Introduction	4
2. Peer Review Findings	6
3. Observations	16
4. Conclusions	18

1

Introduction

Introduction

Avlaw Aviation Consulting Pty Ltd (Avlaw) has been engaged by Sunfield Developments Limited (Sunfield) to complete a peer review of an aviation safeguarding and airport compatibility assessment prepared by Lambert & Rehbein (L&R), referred to herein as "the report". The report set about identifying any aviation restrictions which have the potential to impact proposed development across a large parcel of land which collectively forms the Sunfield Masterplanned Community, referred to herein as "the site".

These aviation constraints are in place to protect the safety, efficiency and regularity of aircraft operations by ensuring necessary clearances (mandated in legislation) that must be provided between an aircraft and an obstacle (e.g., as buildings and cranes) are maintained as well as mitigating the effects of a range of other hazards to aviation operations, including wildlife, lighting, emissions and plumes, windshear and turbulence, navigation equipment and Public Safety Areas, all of which are considered on this project.

Within the site, the Business Park is of particular importance to Sunfield as it appears to be the part of the site which is most restricted from an aviation perspective and is the focus of the assessment in the report. Avlaw has undertaken its peer review whilst being cognisant of the following:

- All relevant aviation guidelines, regulations and legislation which would ultimately facilitate the required approvals based on anticipated conditions that would apply to a development in close proximity to an airport;
- Identifying revisions or additions which may be required to the documents in preparation for rezoning;
- Critique the assumptions, evidence and analysis of the documents by having regards to its justifications for any conclusions made; and
- Any aspects which the proposed development needs to be assessed against from an aviation perspective which are absent from the documents.

Avlaw notes that noise was excluded from the scope of the report, however we believe it is prudent to point out high-level observations with regards to the potential impacts and considerations that may affect the proposed development at the site proceeds along with rotorwash generated by helicopters overflying the site at relatively low altitude.

This document sets out the results of an investigation into the airport operational restrictions which have the potential to affect the height of built structures, temporary crane activity and land uses across the site and the Business Park. It is important note that buildings have all been assumed to be constructed to a height of 52m AMSL (20m AGL), with most values approximate due to final conclusions being based on 'as constructed' levels and positions.

2

**Peer Review
Findings**

The table below summarises the findings of Avlaw's peer review of the report. To ensure greatest degree of accuracy with respect to the modelling produced by Avlaw to inform its findings, Airways NZ was contacted to provide Aeronautical Information Publication (AIP) entries. This included aerodrome coordinates and other information relating to the protected airspace which has been utilised where relevant to inform the summary of responses tabulated below as well as the associated Figures inserted in this document.

Ardmore Airport			
Criteria	Figure(s)	Effect on the site	Effect on the Business Park
Windshear and Turbulence	2, 3	The majority of the site and Business Park is covered by the windshear and turbulence trigger area which requires a detailed wind study to be completed if a permanent structure is proposed to penetrate the 1:35 surface which extends laterally from the runway centreline within a region 900m from each runway threshold. With respect to the site and the Business Park, this results in the trigger surface rising laterally from the runway from 32.6m AMSL to 66.88m AMSL before the assessment area terminates. Given the extent to which this would limit the height of built structures, Sunfield may consider it of sufficient benefit to seek preliminary advice from a specialist qualified to conduct Computational Fluid Dynamics (CFD) or equivalent modelling to determine if pursuing approvals above the 1:35 surface are likely to yield positive results.	
Wildlife	4	The site and the Business Park fall completely within the 3km wildlife buffer zone which prohibits particular land uses, however, these are not anticipated to be proposed. Based on other permitted land uses, consents will be given based on meeting specific relevant mitigation or monitoring requirements that will be determined through consultation with Ardmore Airport.	
Lighting	Refer to Figure B22156/07 in L&R report	The maximum intensity of light sources permitted by aviation stakeholders is measured at 3 degrees above the horizontal and falls into different zones based on the proximity of the light source to an airport. The majority of the site is limited to a maximum lighting intensity of 0-450 candela. The southern and northern extremities of the site are the only areas not impacted by this restriction.	A large portion of the Business Park is limited to a maximum upwardly directed lighting intensity of 0 candela which includes Yards 1 and 2. Given the land use proposed here is yards for storage and parking, this is not expected to be an impediment to Sunfield. The rest of the Business Park is limited to a maximum lighting intensity ranging from 50-450 candela, increasing as you get further away from RWY 03/21.
Prescribed Airspace: Obstacle Limitation Surfaces (OLS)	5, 6, 7	Most of the site is unaffected by the most critical (i.e. lowest) OLS surface for the main runway at Ardmore Airport i.e. approach surface. The land which sits beneath this surface on the extended centreline to the main runway cannot be penetrated permanently and temporary penetration will only be approved when the main runway is not operational. There is a small area at the very northern tip of the site which sits beneath the approach surface for the northern grass runway, however this is N/A as Avlaw has discovered that it is no longer utilised as a runway.	Yards 1 and 2 will be most restricted with respect to the height of built and temporary structures. Sunfield is aware of this already and as such has proposed yards for storage and parking in this area. None of the other building in the Business Park to a height of 52m AMSL will penetrate the most critical OLS surface.
Prescribed Airspace: Instrument Flight Procedures	8, 9	The site is covered by a range of protection surfaces related to Instrument Flight Procedures, with those related to the Standard Instrument Departure (SID) and Visual Surface Segment (VSS) for Runway 03/21 those which are most limiting. The SID is the most critical of the two until this surface reaches an elevation of approximately 60m AMSL, at which point the VSS becomes more critical across the site towards the SW. Permanent penetration of PANS-OPS surfaces are strictly prohibited, however in this instance, the SID surface covering the site can be ignored as obstacles below 60 AGL are not considered relevant when determining climb gradients for aircraft departure under Instrument Flight Procedures. It is however prudent to point this out and be considered, hence being referenced here.	Yards 1 and 2 will be most restricted with respect to the height of built and temporary structures. Sunfield is aware of this already and as such has proposed the yards be restricted for storage and parking only. One of the buildings closest to runway 03/21 to a height of 52m AMSL penetrate the critical Standard Instrument Departure (SID) surface, but all others remain below this surface. Permanent penetration of PANS-OPS surfaces are strictly prohibited, however in this instance, the SID surface covering the Business Park can be ignored as obstacles below 60 AGL are not considered relevant when determining climb gradients for aircraft departure under Instrument Flight Procedures. It is however prudent to point this out and be considered, hence being referenced here.
Communications, Navigation and Surveillance (CNS)	-	There are no such aids or equipment installed at Ardmore Airport or anywhere else in close enough proximity to the site or the Business Park to warrant any consideration.	
Helicopter Operations	-	Ardmore Airport is the busiest general aviation airport in New Zealand with numerous helicopter flying training schools as well as being the operational base for the Auckland Westpac Helicopter Rescue Service (AWRHS) which operates 24/7. Whilst the helicopter training circuits are largely within the airport boundary, the AWRHS would frequently overfly the site with associated rotorwash winds and noise exposure effects. Helicopters will operate within the airspace that applies to fixed wing aircraft, and therefore limits on development heights will be no more restrictive than those described above (i.e. OLS and Instrument Flight Procedures).	Overflight of the Business Park by the AWRHS is anticipated as the flightpath tracks associated the Runway 03/21 overlie the Business Park site with associated potential for exposure to rotorwash winds and aircraft noise effects. Helicopters will operate within the airspace that applies to fixed wing aircraft, and therefore limits on development heights will be no more restrictive than those described above (i.e. OLS and Instrument Flight Procedures)
Public Safety Areas (PSAs)	-	No PSA has been established for Ardmore Airport and therefore at the time of writing based on information available, this restriction is N/A to the site.	No PSA has been established for Ardmore Airport and therefore at the time of writing based on information available, this restriction is N/A to the Business Park. In the event a PSA is established by Ardmore or industry best practice promotes its adoption and application, it is more likely to impact the areas immediately at the end of runways, thus potentially limiting the land uses in the Business Park including Yards 1 and 2.

Figure 1: Summary of peer review findings (the site and the Business Park)

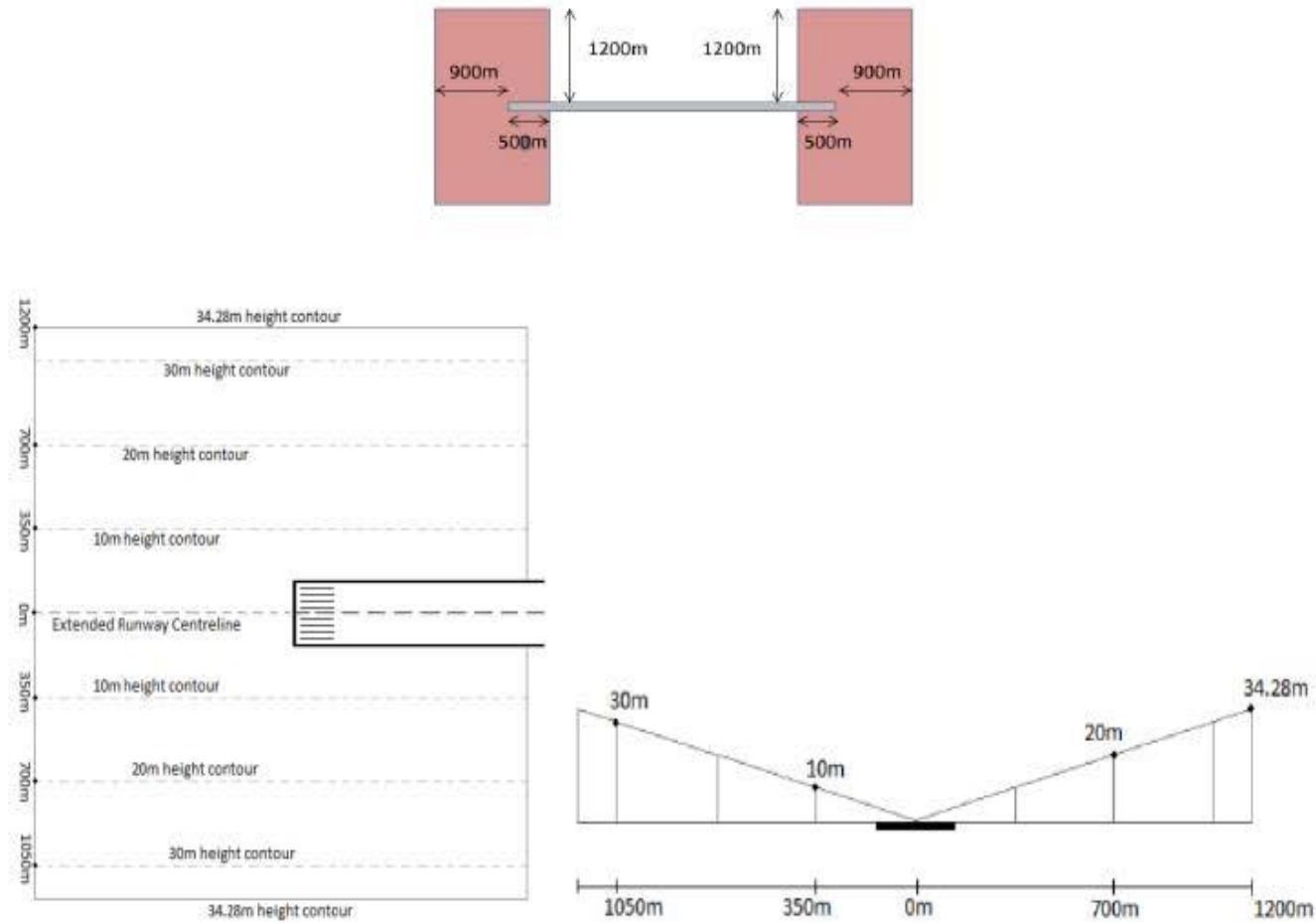


Figure 2: Various illustrations of the windshear and turbulence trigger areas (taken from [NASF](#) Guideline B)

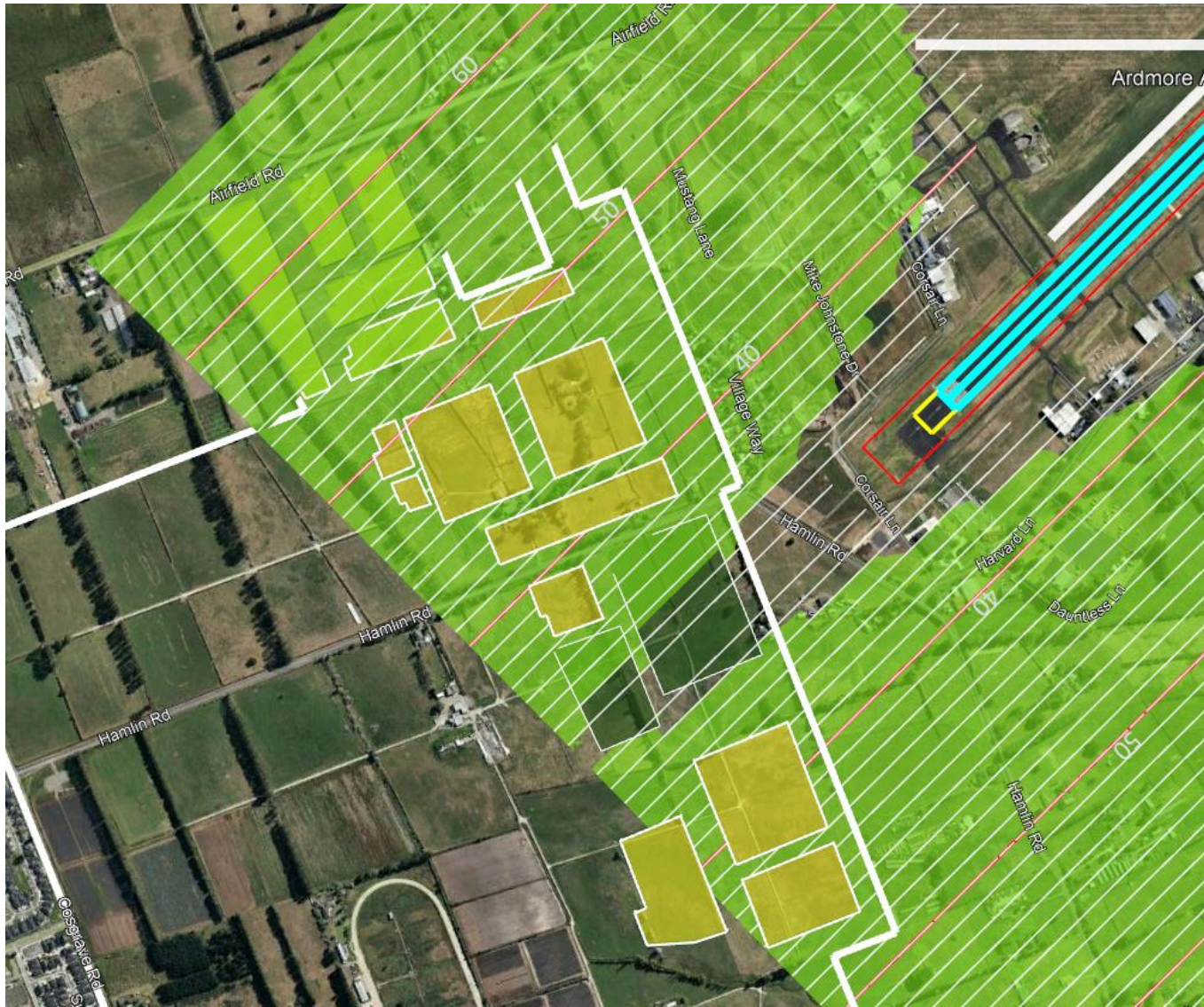


Figure 3: Windshear and Turbulence assessment trigger (Figure 2 overlaid across the site and Business Park – multiple 52m AMSL (20m AGL) buildings intruding (yellow))

Wildlife Hazard Management Action Table

Attachment 1

Land use types	Likely attractants			Wildlife attraction risk	Actions for existing development and land uses in wildlife management areas			Actions for new and changed development and land uses in wildlife management areas		
	▲ natural elements	■ structural elements	● waste and food		0-3 km (Area A)	3-8 km (Area B)	8-13 km (Area C)	0-3 km (Area A)	3-8 km (Area B)	8-13 km (Area C)
Agriculture										
Turf farm, piggery, abattoir, aquaculture	▲	■	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Fruit tree farm/orchard	▲	■	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Fish processing/packing plant	▲	■	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Farm (cattle, dairy, poultry, crops)	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Horticulture, viticulture, market farms/gardens	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Forestry	▲	■	●	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Plant nursery	▲	■	●	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Conservation										
Wildlife/conservation area - wetland, waterways	▲	■	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Wildlife/conservation area - dryland	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Recreation										
Significant open water (ancillary to development)	▲	■	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Showground	▲	■	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Significant landscaped space (ancillary to development)	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Golf course	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Park, playground	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Picnic areas, camping ground	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Racetrack, horse riding school	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Sports facility (tennis, bowls, football fields)	▲	■	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Commercial										
Food processing or storage facility	■	●	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Fast food, drive-in, outdoor restaurant	■	●	●	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Shopping centre	■	●	●	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Warehouse (food storage)	■	●	●	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Car park	■	●	●	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Cinemas	■	●	●	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Hotel/motel	■	●	●	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Office building	■	●	●	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Petrol station	■	●	●	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Warehouse (non-food storage)	■	●	●	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Utilities										
Food / organic waste facility	■	●	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Putrescible waste facility - landfill	■	●	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Putrescible waste facility - transfer station	■	●	●	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Water infrastructure (drains, channels, basins)	▲	■	●	High	Mitigate	Mitigate	Monitor	Mitigate	Mitigate	Monitor
Non-putrescible waste facility - landfill	■	●	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Non-putrescible waste facility - transfer station	■	●	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Sewage / wastewater treatment facility	■	●	●	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Potable water treatment facility	▲	■	●	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action

Figure 4: Actions related to specific land uses within the 3km wildlife buffer (green rectangle applicable to the site and the Business Park)

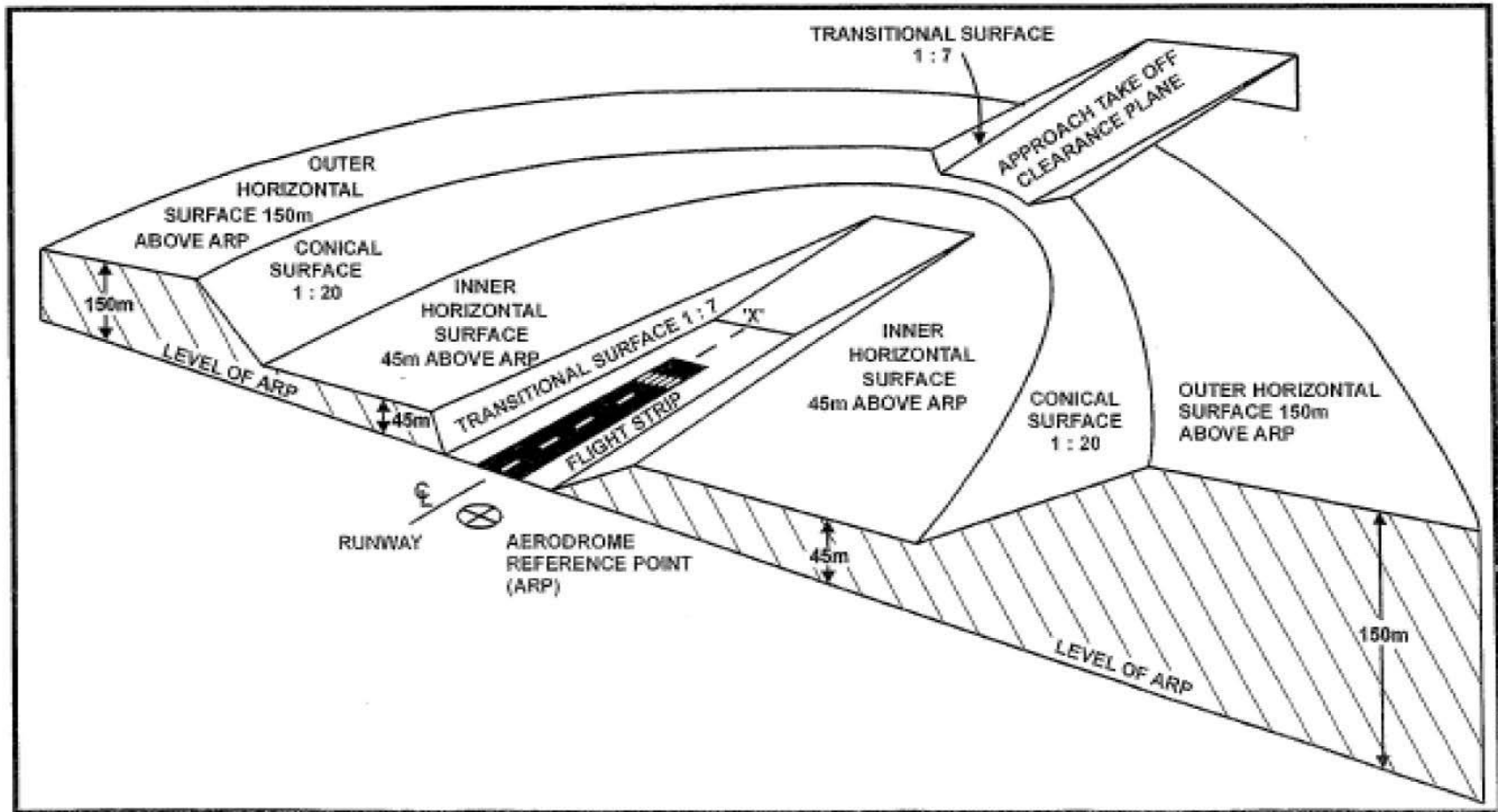


Figure 5: Theoretical section of the OLS

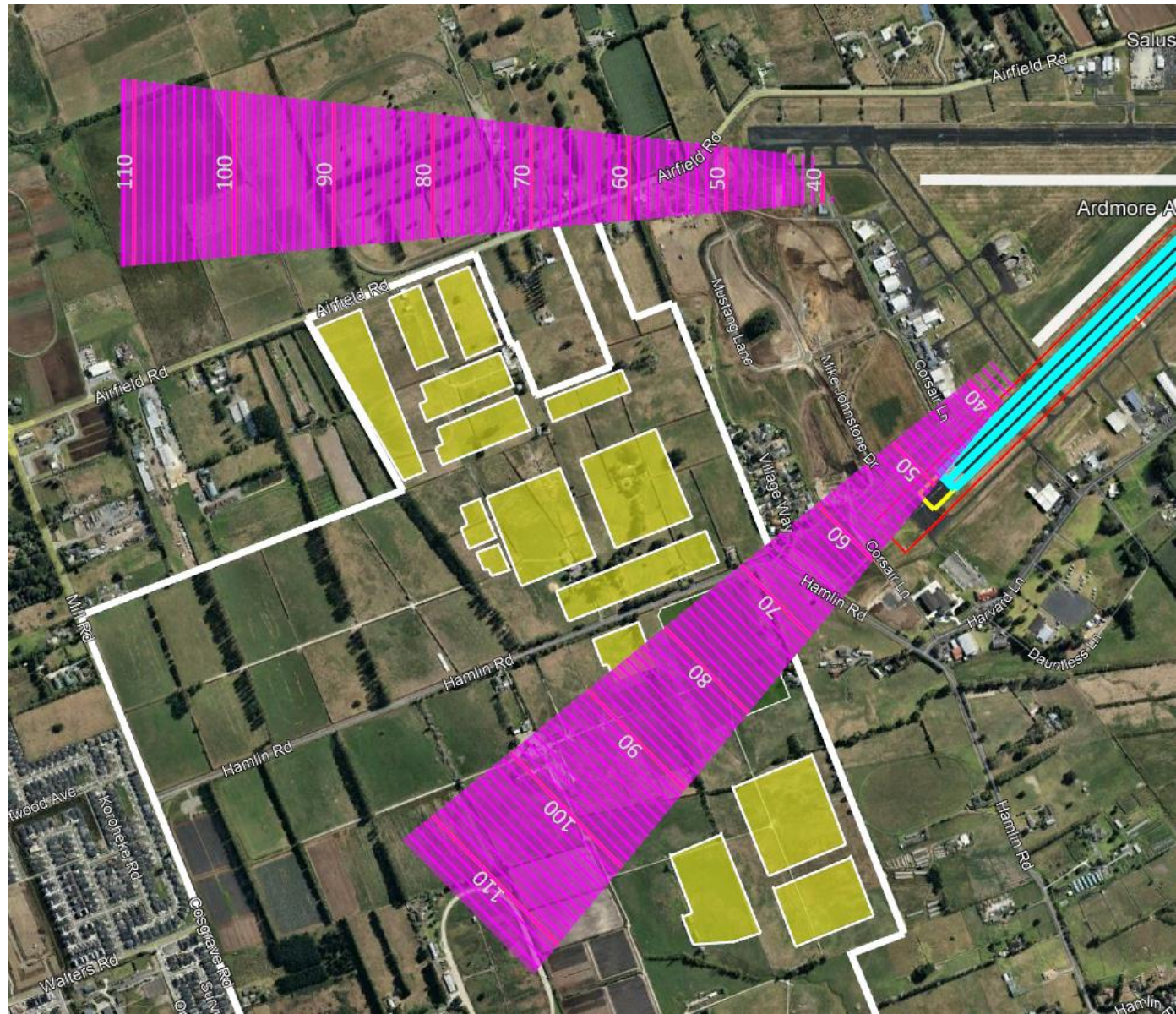


Figure 6: Critical (i.e. lowest) OLS surfaces (magenta) for each of the two grass runways over the site and Business Park (no intrusions)

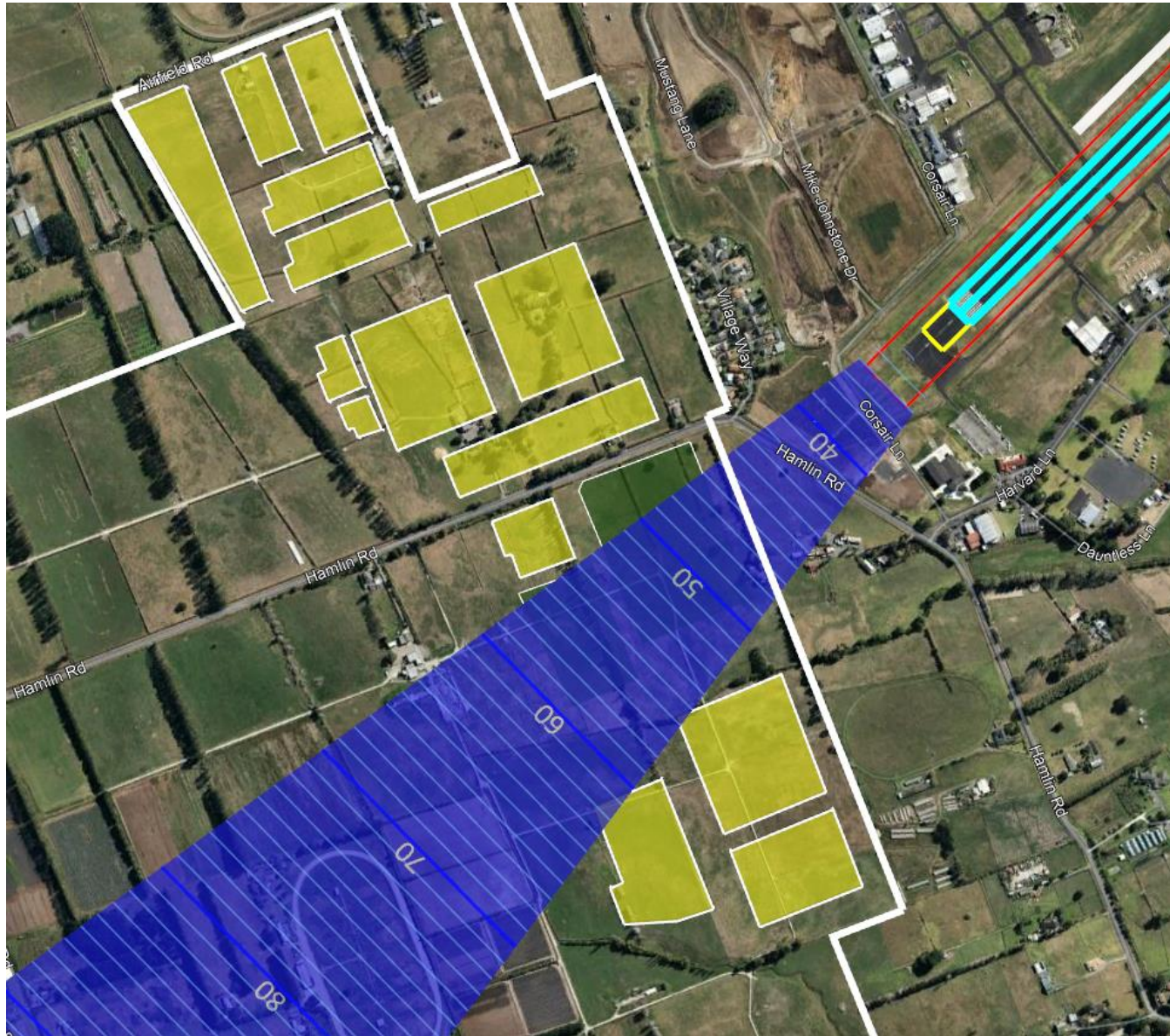


Figure 7: Critical (i.e. lowest) OLS surface for the RWY03/21 over the site and Business Park – approach surface showing no 52m AMSL (20m AGL) buildings intruding

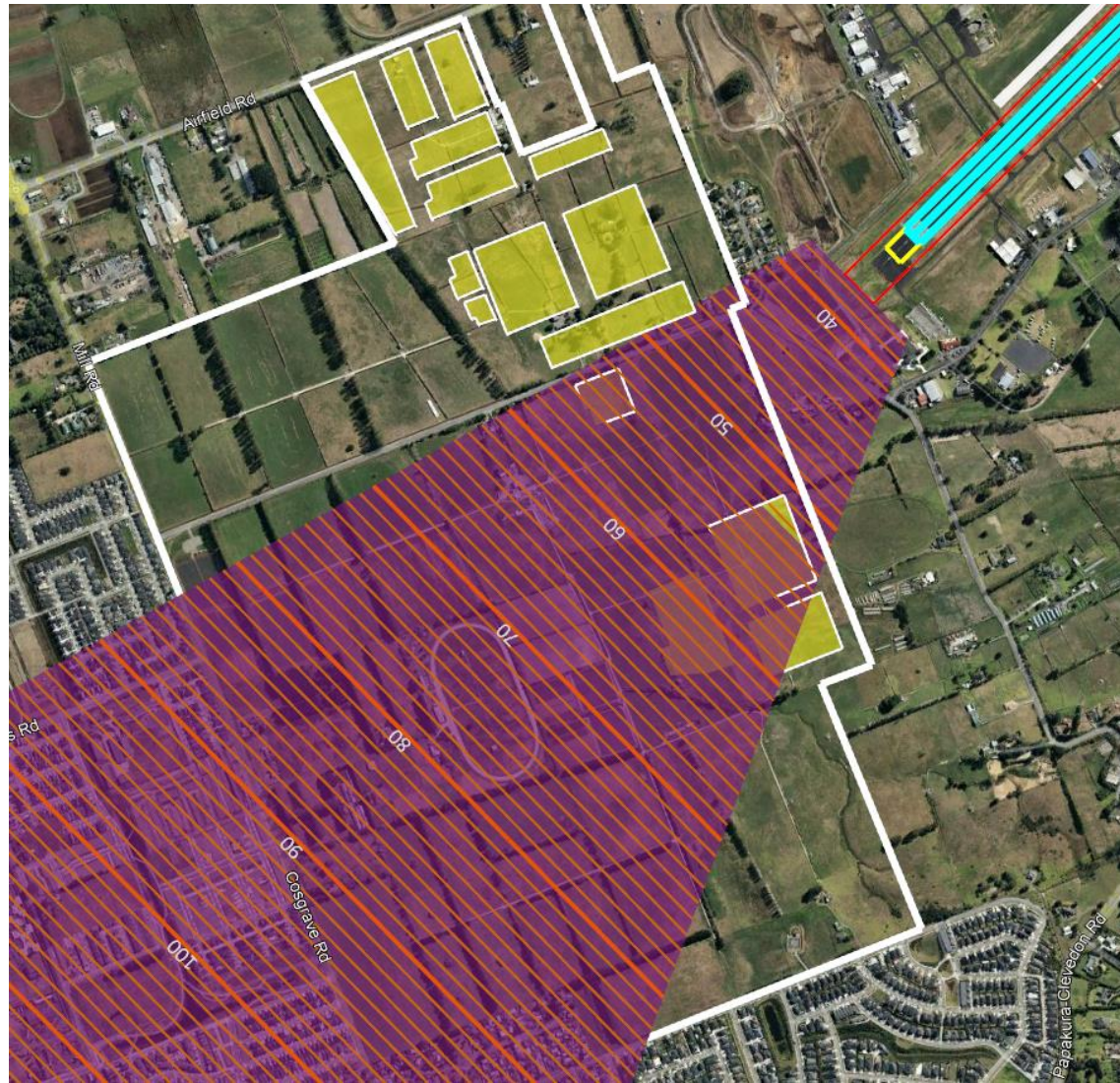


Figure 8: Critical (i.e. lowest) PANS-OPS surface over the site and Business Park – SID RWY 21 showing intrusion of 52m AMSL (20m AGL) building to the East in yellow



Figure 9: VSS surface for runway 03 – 52m AMSL (20m AGL) buildings not intruding

3

Observations

Observations

The site is located adjacent to the western boundary of Ardmore Airport and is overflown by aircraft using the primary runway, Runway 03/21. Ardmore Airport is the busiest general aviation airport in New Zealand and currently operates more than 100,000 aircraft movement per year. The current level of activity is significantly less than past years with theoretical capacity being around 350,000 movements. By agreement with stakeholders through the New Zealand environment court in 2005, aircraft noise parameters have been established based on an annual level of activity of 275,000 movements.

Ardmore Airport provides flying training and aircraft maintenance services as well as being the home of around 800 aircraft and the base for the New Zealand Warbirds Association. Ardmore Airport is also the operational base for the Auckland Westpac Helicopter Rescue Service which operates three helicopters – two Leonardo AW169 and one Kawasaki BK117 types. The service operates 24/7 and conducts over 1100 missions annually. The specialised commercial nature of the service activities results in the helicopters utilising the main runway for approach and departure flights, particularly at night where the airport operating procedures requires helicopters to follow fixed wing aircraft traffic patterns.

As such, the site will be overflown by helicopters operated by the rescue service with the associated potential for the site to be subjected to rotorwash effects. Rotorwash refers to the pulsating wind gusts generated by the vertical downwash of air through a helicopter rotor that transitions to a horizontal wall jet when the airflow impinges on the surface below the helicopter flightpath track.

Aircraft overflying the site will be at an altitude between 40 and 60 metres based on a standard three degree approach path. An estimate of the rotorwash wind velocities generated by an AW169 helicopter sourced from a computer model is a peak velocity of 50 knots (905 kph) and a mean velocity of 30 knots (56 kph). The values relate to a hovering helicopter and the airflow is diverted and rotorwash velocities reduced by the combined effect of the down wash and the forward motion of the helicopter as it overflies the site.

Further study is required to better define the potential range of rotorwash velocities that the site may be exposed to but is mentioned here as an observation that the potential exists for rotorwash winds to affect the site.

Similarly, aircraft noise will be generated by airport operations and has the potential to affect the site, noting that the potential exists for increased levels of aircraft activity to occur in the future.

4

Conclusions

Conclusions

The completion of this peer review has not identified any major differences to the conclusions drawn in the report. It has however provided an opportunity to further refine and increase the degree of accuracy to which the height of development at the site and the Business Park will be restricted to as well as make observations with respect to other factors that were out of scope of the report but which are prudent to consider within the context of property development adjacent to an airport.

The figure on the following page provides a snapshot of the aviation restrictions which most limits the height of development across the Business Park. This essentially amalgamates the most relevant figures inserted in section two and only shows the most restrictive aviation requirements across this piece of land. Specifically, it shows a combination of the following:

- Windshear and turbulence trigger shown at Figure 3 (green);
 - The light blue area represents the extended runway which is inserted as a point of reference for point at which the windshear and turbulence trigger surface commences
- the OLS approach surface shown at Figure 7 (blue); and
- the SID surfaces shown at Figure 8 (purple).

In the interests of being thorough and identifying all the airspace protection surfaces that cover the site and the Business Park, the SID surfaces are included. However, as noted at Figure 1, the purple SID areas can be ignored from a practical perspective when trying to determine the maximum height of development. Although it is prudent to mention, the gradients need not consider obstacles below 60m AGL and as a result, another iteration of Figure 10 which removes these SID surfaces is inserted as Figure 11.

Although out of scope of the report, associated issues relating to rotorwash and the impact of aircraft noise on those occupying development which is proposed at the site and the Business Park are considered worthy of further investigation.

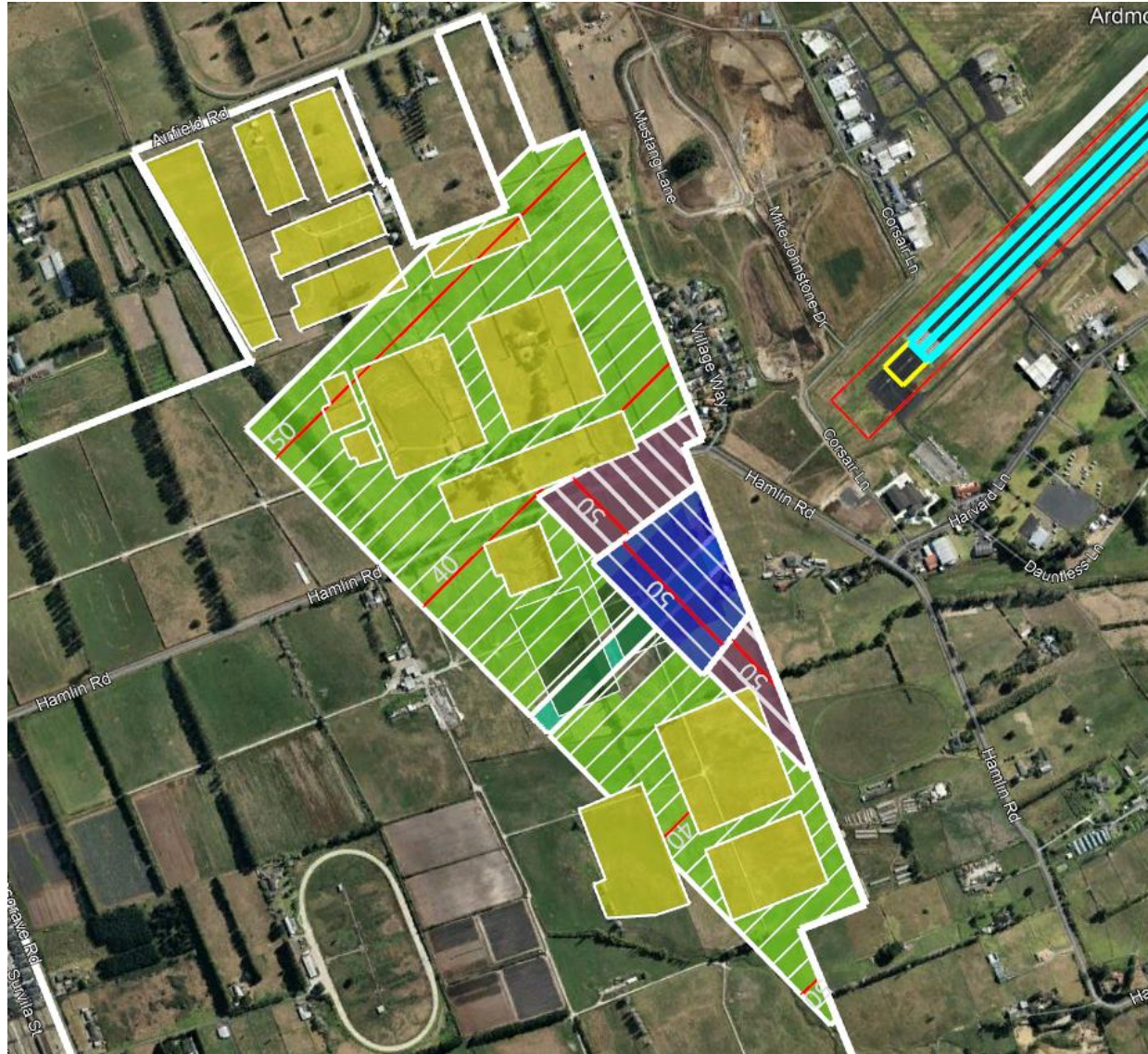


Figure 10: Critical surfaces combination – turbulence trigger (green), SID surfaces (purple) and approach OLS (blue)

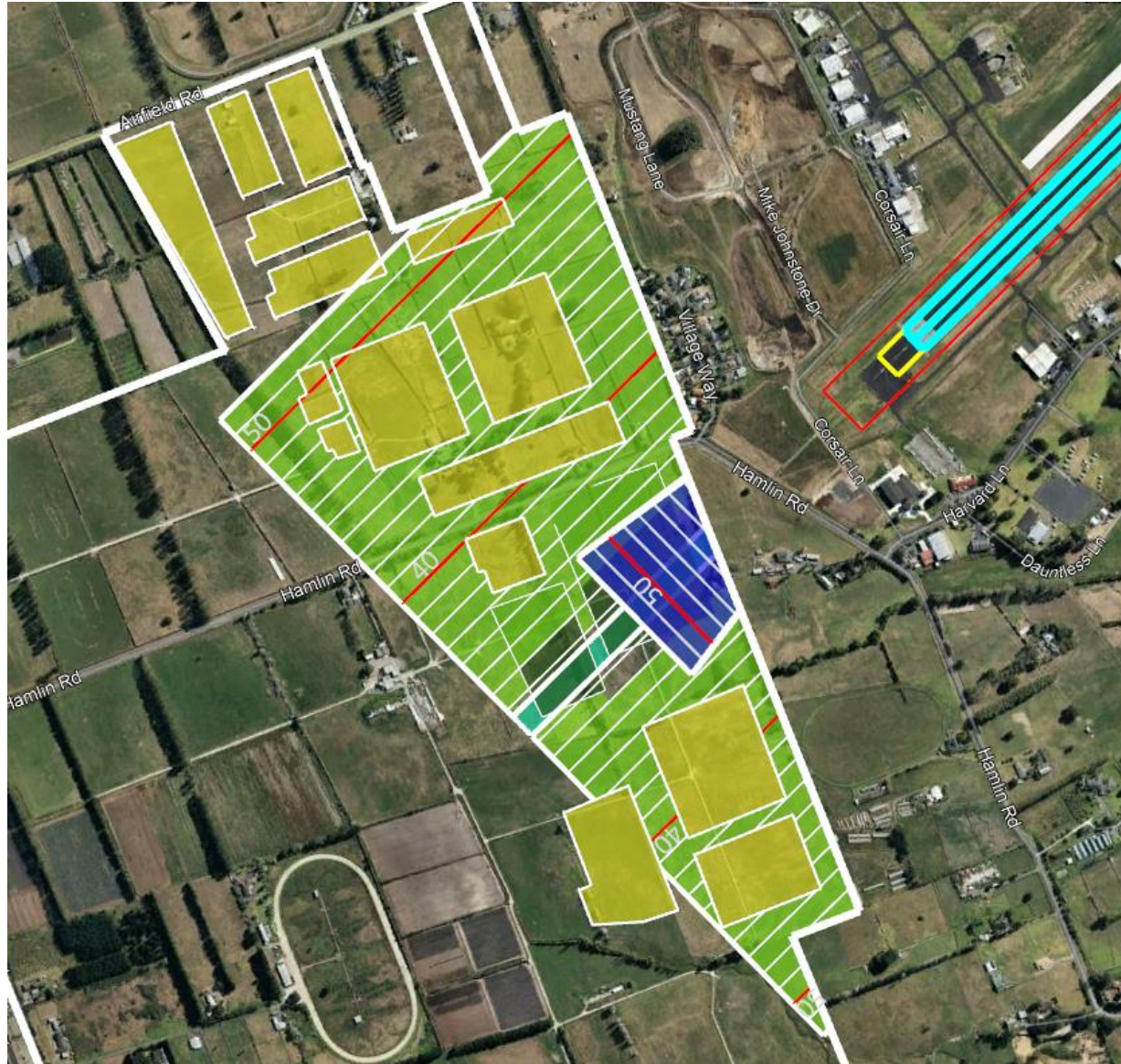


Figure 11: Critical surfaces combination – turbulence trigger (green) and approach OLS (blue)



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