PROPOSED SUNFIELD DEVELOPMENT
ARDMORE AIRPORT SAFEGUARDING

Sunfield Developments Limited

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L+R
AIRPORT CONSULTING

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Revision	Date	Description	Author	Verifier	Approver
0	09.06.23	Draft	BMW	BJH	BJH
1	31.01.24	Final	BMW	BJH	BJH
2	19.02.24	Final	BMW	BJH	BJH
3	04.03.24	Final – Updated Sunfield Site Boundary – Drawings	BMW	BJH	BJH

GLOSSARY

Aerodrome	'Aerodrome' is the international term for the area defined for landing, departure and surface movement of aircraft, and is used when referring to regulatory matters.
Aerodrome Elevation	The elevation of the highest point of the landing area
AC	Advisory Circular
AMSL	Above Mean Sea Level
AUP	Auckland Unitary Plan
CAA	Civil Aviation Authority of New Zealand
CAR	Civil Aviation Rules (New Zealand)
CASA	Civil Aviation Safety Authority (Australia)
FAA	Federal Aviation Administration (US)
IFR	Instrument Flight Rules
NASF	National Airports Safeguarding Framework
NZAA	New Zealand Airports Association
PSA	Public Safety Area
PSZ	Public Safety Zone
REPA	Runway End Protection Area
VFR	Visual Flight Rules

1. Introduction

Lambert & Rehbein (SEQ) Pty Ltd was engaged by Sunfield Developments Limited to undertake an aviation safeguarding and airport compatibility assessment of the proposed Sunfield development as it relates to Ardmore Airport in Auckland, New Zealand.

This aviation safeguarding report is a desktop assessment based only on publicly available planning information as it relates to Ardmore Airport. In relation to airport safeguarding aspects where there is an absence of specific Auckland Unitary Plan provisions, reference has been made to the Australian National Airports Safeguarding Framework (NASF), in line with the guidance in the New Zealand Airports Association (NZAA) Airport Master Planning Best Practice Guide. Aircraft noise assessment is not included as part of this report.

2. Sunfield Masterplanned Community

The proposed Sunfield Masterplanned Community (Sunfield) sits between Takanini and Papakura. Ardmore Airport is located immediately to the east of the development site.

Sunfield is proposed to be a 15-minute sustainable neighbourhood across 221 hectares of land which when completed will comprise of the following[1]:

- A community designed to enable "car-less" living.
- 4,000 health homes consisting of 3,400 individual homes and 3 retirement villages (approximately 600 independent living units and care beds).
- 400,000 sqm of employment, retail, healthcare and education buildings.
- A 7.6 hectare town centre.
- 1 school.
- A further 5 retail hubs located throughout the community.
- Permanent jobs for over 11,000 people.
- 27.7 hectares of open spaces, green links, recreation parks and reserves and ecological offsets.
- An extensive restoration and native planting of the core stream and wetland network.
- The establishment of the Sunfield renewable solar energy network for the community.
- The Sunbus autonomous electric shuttle fleet.

The proposed Sunfield Business Park[2] is approximately 55 hectares in area, and forms part of the Sunfield Masterplanned Community. The Business Park precinct is proposed to be zoned industrial with a building height limit of 20 metres throughout. The Business Park proposal is the focus of this assessment.

[1] Studio Pacific Architecture *Sunfield Masterplanned Community* October 2021

[2] Winton Best by Design *Sunfield Business Park Indicative Masterplan* 12 April 2023

3. Ardmore Airport

Ardmore Airport is situated is approximately 30 km southeast from Auckland's CBD and approximately 10 km from Manukau City. The aerodrome elevation is 111 feet (approx. 34 metres) Above Mean Sea Level (AMSL).

The Airport was established in 1943, at the request of the US Airforce as an operational base during WWII. Upon the opening of Auckland International Airport, Ardmore Airport grew as a general aviation hub providing alternate facilities for general aviation (GA). Since June 1995, it has been operated by Ardmore Airport Limited[3].

Today, Ardmore Airport is one of New Zealand's busiest airports with over 10,000 aircraft movements per month [4]. The Airport is open 24 hours per day and hosts over 90 tenants on the airfield from a range of industries and users including[5]:

- Five (5) fixed wing flight schools, two (2) helicopter schools and six (6) charter operators; and
- Maintenance bases for rotary and fixed wing, agricultural aviation suppliers, private hangars, and the NZ Warbirds head office and homebase to about 40 warbird aircraft.

3.1 Aeronautical Information Publication New Zealand

The Aeronautical Information Publication (AIP) New Zealand is a set of documents that provide all the operational information required for safe national and international air navigation within New Zealand airspace. Pilots from anywhere around the world can use the AIP to find information on airspace and aerodromes. The information, as listed below, is publicly available and has been used in this assessment to understand the operations at Admore Airport.

- NZAR AD 2 – 31.1 Ardmore Arrival/Departure (1) Effective 5 Oct 23
- NZAR AD 2 – 31.2 Ardmore Arrival/Departure (2) Effective 5 Oct 23
- NZAR AD 2 – 31.3 Ardmore Arrival/Departure (3) Effective 30 Nov 23
- NZAR AD 2 – 31.4 Ardmore Arrival/Departure (4) Effective 5 Oct 23
- NZAR AD 2 – 31.5 Ardmore Arrival/Departure (5) Effective 5 Oct 23
- NZAR AD 2 – 31.6 Ardmore Arrival/Departure (6) Effective 5 Oct 23
- NZAR AD 2 – 33.1 Ardmore RNP Star RWY 03 Effective 16 Jun 22
- NZAR AD 2 – 33.3 Ardmore RNP Star RWY 21 (1) Effective 16 Jun 22
- NZAR AD 2 – 33.4 Ardmore RNP Star RWY 21 (2) Effective 16 Jun 22
- NZAR AD 2 – 35.1 Ardmore RWY 03 Preferred VFR Arrival/Departure Routes (1) Effective 15 Jun 23
- NZAR AD 2 – 35.2 Ardmore RWY 03 Preferred VFR Arrival/Departure Routes (2) Effective 15 Jun 23
- NZAR AD 2 – 35.3 Ardmore RWY 21 Preferred VFR Arrival/Departure Routes (1) Effective 15 Jun 23

[3] https://www.ardmoreairport.co.nz/13/history-of-ardmore-airport

[4] Civil Aviation Authority of New Zealand Good Practice Guide *In, Out and around Auckland* Revised March 2023

[5] https://www.ardmoreairport.co.nz

- NZAR AD 2 – 35.4 Ardmore RWY 21 Preferred VFR Arrival/Departure Routes (2) Effective 15 Jun 23
- NZAR AD 2 – 35.5 Ardmore Helicopters Arrival/Departure Sectors Effective 15 Jun 23
- NZAR AD 2 – 35.6 Ardmore RWY 03 Helicopters Preferred VFR Arr/Dep – South Effective 25 Feb 21
- NZAR AD 2 – 35.7 Ardmore RWY 21 Helicopter Preferred VFR Arr/Dep – South Effective 25 Feb 21
- NZAR AD 2 – 35.8 Ardmore Helicopter Arrival/Departure (1) Effective 5 Oct 23
- NZAR AD 2 – 35.9 Ardmore Helicopter Arrival/Departure (2) Effective 5 Oct 23
- NZAR AD 2 – 35.10 Ardmore Helicopters – Tower TLOF Training Circuit Effective 22 Sep 11
- NZAR AD 2 – 45.1 Ardmore RNP RWY 03 Effective 16 Jun 22
- NZAR AD 2 – 45.2 Ardmore RNP R RWY 21 Effective 16 Jun 22
- NZAR AD 2 – 45.3 Ardmore RNP Q RWY 21 Effective 16 Jun 22
- NZAR AD 2 – 51.1 Ardmore Aerodrome (1) Effective 5 Oct 23
- NZAR AD 2 – 51.2 Ardmore Aerodrome (2) Effective 15 Jun 23
- NZAR AD 2 – 52.1 Ardmore Operational Data (1) Effective 30 Nov 23
- NZAR AD 2 – 52.2 Ardmore Operational Data (2) Effective 5 Oct 23
- NZAR AD 2 – 53.1 Ardmore Ground Movements (1) Effective 15 Jun 23
- NZAR AD 2 – 53.2 Ardmore Ground Movements (2) Effective 6 Oct 22
- NZAR AD 2 – 62.1 Ardmore SID RWY 21 Effective 6 Oct 22
- NZAR AD 2 – 62.2 Ardmore RNP SID Effective 1 Dec 22
- NZAR AD 2 – 62.3 Ardmore RNP SID RWY 03 (1) Effective 6 Oct 22
- NZAR AD 2 – 62.4 Ardmore RNP SID RWY 03 (2) Effective 6 Oct 22
- NZAR AD 2 – 62.5 Ardmore RNP SID RWY 21 (1) Effective 6 Oct 22
- NZAR AD 2 – 62.6 Ardmore RNP SID RWY 21 (2) Effective 6 Oct 22
- NZAR AD 2 – 62.7 Ardmore RNP SID RWY 21 (3) Effective 6 Oct 22

3.2 Airport Operations

Ardmore Airport is an uncontrolled aerodrome, meaning there is no air traffic control tower services managing the flow of air traffic. Rather Ardmore Airport operates as an 'uncontrolled' aerodrome meaning pilots communicate with each other over a common frequency and follow airspace protocol in arriving, departing and training at Ardmore Airport.

The AIP New Zealand notes that traffic includes student pilots and helicopters in contrary circuits and emphasises that afternoons and weekends are particularly busy for aircraft operations.

Ardmore Airport includes three (3) active runways, helicopter landing areas and taxiways. The main runway, Runway 03/21 is sealed and lit for night use. There is a parallel (unlit) grass runway, also 03/21, to the north. There is a second grass Runway 07/25. Both grass strips are frequently moved sideways to reduce grass wear.

Simultaneous operations occur on the sealed main Runway 03/21 and the parallel grass runway. The previously active sealed Runway 07/25 no longer operates as a runway and is now designated as Taxiway Juliet.

Ardmore Airport facilities along with fixed-wing and helicopter operational information extracted from the AIP New Zealand are illustrated indicatively on **B22156/01** at **Appendix A** and discussed below**.**

3.2.1 Arrivals and Departures

Fixed wing arrival and departure patterns when operating under Visual Flight Rules (VFR) will pass over the Sunfield site when departing Runway 21 and arriving Runway 03 as illustrated on **Figure B22156/01**.

Helicopter arrival and departures operate from the Southern Aiming Point on the south side of Runway 03/21 with preferred arrival and departure patterns occurring between Hamlin Road and Mullins Road, east of the Sunfield site. Helicopter arrivals and departures operate directly underneath the fixed wing circuit as illustrated on **Figure B22156/01** as such there are no low-level fixed wing circuits permitted at Ardmore Airport.

3.2.2 Training Circuits

Fixed wing aircraft circuit training occurs to the south runways and not below 1,100 feet (approx. 335 metres) by day and 1,300 feet (approx. 400 metres) AMSL by night. No low-level fixed wing circuits are permitted due to concurrent helicopter operations. All circuits operate to the south of Runway 03/21 and would pass over the Sunfield site as illustrated on **Figure B22156/01**.

Helicopter circuit training operates to the north from the Touchdown and Lift Off (TLOF) area on the south side of Taxiway Juliet. Training takes place at a maximum circuit altitude of 800 feet (approx. 245 metres) AMSL by day and not above 1000 feet (approx. 305 metres) AMSL by night. The helicopter circuit pattern extends west from the TLOF on the south side of Airfield Road, north prior to Mill Rd, east towards Alfriston-Ardmore Road and south back towards the Airport. This circuit pattern would pass over the north-western portion of the Sunfield site. Depending on the wind direction the helicopter would either be in its initial climb phase or descent for a touchdown as illustrated on **Figure B22156/01**.

Under the noise abatement rules[6] there are no night training circuits, applicable to all aircraft, from Monday to Saturday between 2200 to 0700 (extended to 2230 during NZ Daylight savings), and Sunday night to Monday morning from 2000 to 0700. In addition ex-military jets are not to conduct night training circuits between 2000 and 0700.

[6] NZAR AD 2 – 31.5 Ardmore Arrival/Departure (5) Effective 5 Oct 23

4. Regulatory Environment & Guidelines

There are a number of regulatory and policy documents that govern the operations of aerodromes and airspace in New Zealand, as well as the land use in the vicinity of airports. Those most relevant to this safeguarding assessment are set out in **Figure 1** below.

Figure 1: Regulations & Guidelines

4.1 Civil Aviation Authority of New Zealand

The Civil Aviation Authority of New Zealand (CAA) establishes and maintains the rules that all pilots, engineers, aircraft operators, airlines and aerodromes must follow to keep flying operations safe. The CAA publishes the Civil Aviation Rules of which Part 139 prescribes the rules governing the certification and operation of aerodromes.

Ardmore Aerodrome is a certified aerodrome under the Civil Aviation Authority of New Zealand (CAA) Civil Aviation Rules (CAR) Part 139 *Aerodromes – Certification, Operation and Use*.

The CAA publishes a series of Advisory Circulars (ACs) provide guidance on acceptable means of compliance with various aspects of the CARs (Civil Aviation Rules).

4.2 Auckland Unitary Plan

The Auckland Unitary Plan (AUP) is established under the Resource Management Act 1991 (the Act). The purpose of the Act is to promote the sustainable management of New Zealand's natural and physical resources.

The AUP guides the use of Auckland's natural and physical resources, including land development by determining:

- What can be built and where;
- How to create a higher quality and more compact Auckland;

- How to provide for rural activities; and
- How to maintain the marine environment.

Chapter K *Designations* (at the time of writing) provides for provision in the AUP that give effect to a notice of requirement for a public work or project by a requiring authority. A designation can restrict land, water, subsoil or airspace where this is necessary for the safe or efficient functioning or operation of a public work of infrastructure. It can also require written approval of the requiring authority responsible for the designation before a third party can undertake an activity within the designation.

The Designation Schedule – Ardmore Airport Ltd is provided in the AUP for the efficient operation and growth of Ardmore Airport by enabling airport activities and flights while defining airport approach and land use controls.

The Designation Schedule includes conditions and restrictions relating to:

- Height Restriction;
- Land Use Restriction: Rural Aerodrome Protection Areas (Fixed Wing Aircraft Operation), which serve functions relating to land uses which may be adversely affected by aircraft noise or the risk of aircraft accidents, or which may detrimentally affect the safe operation of aircraft; and
- Various requirements relating to aircraft noise and other airport operational matters.

The height restrictions and protection areas are described in **Section 5.1**.

4.3 NZAA Airport Master Planning Good Practice Guide

The New Zealand Airports Association (NZAA) is the national industry voice for airports in New Zealand of which Ardmore Airport is a member.

The NZAA prepared a guide for airport master planning in conjunction with the Australian Airports Association which provides guidance on the preparation of an airport master plan inclusive of off airport planning objectives and airport safeguarding.

The airport safeguarding section of the NZAA *Airport Master Planning Good Practice Guide* February 2017 refers to the Australian National Airports Safeguarding Framework in the absence of a New Zealand equivalent at the time of publication.

4.4 Australian National Airports Safeguarding Framework

The National Airports Safeguarding Framework (NASF) is an Australian national land use planning framework that aims to:

- Improve community amenity by minimising aircraft noise-sensitive developments near airports including through the use of additional noise metrics and improved noise-disclosure mechanisms; and
- Improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions through guidelines being adopted by jurisdictions on various safety related issues.

The full NASF principles and guidelines can be found on the Australian Department of Infrastructure, Transport, Regional Development, Communications and the Arts at:

https://www.infrastructure.gov.au/infrastructure-transport-vehicles/aviation/aviation-safety/aviation-environmental-issues/national-airports-safeguarding-framework

NASF provides guidance on planning requirements for developments that affect aviation operations and currently incorporates nine (9) Guidelines as follows:

- Guideline A: Measures for Managing Impacts of Aircraft Noise;
- Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports;
- Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports;
- Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers;
- Guideline E: Managing the Risk of Distraction to Pilots from Lighting in the Vicinity of Airports;
- Guideline F: Managing the Risk of Intrusions into the Protected Airspace of Airports;
- Guideline G: Protecting Aviation Facilities - Communication, Navigation and Surveillance (CNS);
- Guideline H: Protecting Strategically Important Helicopter Landing Sites; and
- Guideline I: Managing the Risk in Public Safety Areas at the Ends of Runways.

This assessment utilises the NASF guidelines as a framework to assess the safeguarding of Ardmore Airport with respect to the Sunfield Development proposals, by supplementing with the Australian guidance where there is an absence of New Zealand regulations, Auckland Unitary Plan provisions and other relevant New Zealand aviation guidelines.

5. Ardmore Airport Safeguarding Assessment

This safeguarding assessment considers the relevant aspects of protected operational airspace, building generated windshear and turbulence, wildlife hazards, public safety, lighting and glare, and Communication Navigation and Surveillance facilities.

Aircraft Noise is subject to separate assessment by others. Wind farms and wind monitoring towers are not relevant to the proposed Sunfield development,

Table 1 sets out the hierarchy of regulations and guidance adopted for the safeguarding assessment.

Table 1: Safeguarding Assessment Regulations and Guidance

Safeguarding Aspect	Regulations and Guidance Hierarchy
Protected Operational Airspace	AUP Designation Schedule Section 1. Height Restriction AUP Designation Schedule Rural Aerodrome Protection Areas (Fixed Wing Aircraft Operations) Civil Aviation Rules Part 139 Aerodromes – Certification, Operation and Use CAA Advisory Circular AC139-6 Aerodrome Design Requirements: - All Aeroplanes Conducting Air Transport Operations - All Aeroplanes above 5700 kg MCTOW CAA Advisory Circular AC139-10 Control of Obstacles CAA Advisory Circular AC173-1 Instrument Flight Procedure Design
Building Generated Windshear and Turbulence	NASF Guideline B
Wildlife Hazards	CAA Advisory Circular AC139-16 Wildlife Hazard Management at Aerodromes (7 October 2011) AUP Designation Schedule Section 2. Land use Restriction: Rural Aerodrome Protection Areas (Fixed Wing Aircraft Operation) NASF Guideline C
Public Safety Areas	AUP Designation Schedule Section 2. Land use Restriction: Rural Aerodrome Protection Areas (Fixed Wing Aircraft Operation) NASF Guideline I
Lighting and Glare	NASF Guideline E CAA Civil Aviation Rules Part 77 (1 December 2020) Objects and Activities Affecting Navigable Airspace
Communication, Navigation and Surveillance Facilities	NASF Guideline G

5.1 Protected Operational Airspace

CAA Advisory Circular AC 139-10 *Control of Obstacles Rev 1 (27April 2007)* provides methods for control of obstacles which is provided for in several ways including the enactment of height zoning protection by the local government authority. The objective of the height zoning is to protect the airports Obstacle Limitation Surfaces (OLS) from intrusions by structures and natural tree growth. It is given effect through a "zoning map", the responsibility of which is a matter between the aerodrome operator and the local authority, and is:

> *" … a composite, relating all zoning criteria to the ground level around the aerodrome. It should cover the aerodrome design obstacle limitation surfaces and, where applicable, the take-off flight path for the aerodrome obstacle chart Type "A" and any PANS-OPS surfaces."*

The AUP Designation Schedule 200 Ardmore Airport – Conditions and Restrictions provide requirements for the Airport Authority consent where the relevant height control is exceeded.

The Sunfield Business Park buildings are assessed at a **maximum elevation of 52 metres AMSL** inclusive of all rooftop plant, equipment and other protuberances such as access ladders, antennae etc, based on a building 20 metres high and ground elevation estimated at 32 metres AMSL. This has been evaluated against the height controls in the AUP as discussed below.

5.1.1 Protection Areas

In accordance with the Designation Schedule 200 the Rural Aerodrome Protection Areas extend 900 m from the runway bases. Attachment 4 of the Designation Schedule identifies the areas as being within the lateral extents of the height restriction approach surface.

The Designation Schedule notes that the Rural Aerodrome Protection Areas are considered to be the area where land use restrictions are essential as aircraft pass over these areas on landing and take-off at low altitudes. Within these Protection Areas, any new proposal for buildings or solid structures exceeding 4 metres in height above ground level shall be referred for consent to the Airport Authority.

The Sunfield Business Park areas identified as Yard 1 and 2 are within the protection areas (identified in purple shading) on **Figure B22156/02** and **Figure B22156/03** at **Appendix A**. Any plant, equipment or material stored in these areas higher than 4 metres above the ground level would need to be provided to the Airport Authority for consent to exceed the 4 metre above ground level height control within this area.

Under the AUP, in assessing buildings and structures that exceed 4 metres in the Rural Aerodrome Protection Areas, the Designation Schedule indicates:

> *In assessing buildings and structures that exceed 4m in the Rural Aerodrome Protection Areas, the Airport Authority will consider the need for the proposal, siting, height and construction materials.*
>
> *In considering other land uses, the Airport Authority will take into account possible height intrusion, the likelihood of dust, glare, electrical interference and the possibility of the proposal attracting birds to the area or promoting the gathering of people in the area.*

In relation to protected operational airspace, the height restrictions are discussed further in the following sub-sections. Other safeguarding aspects are assessed throughout the rest **of Section 5**.

5.1.2 Height Restrictions

The Designation Schedule 200 (at the time of writing) states that no building, structure, mast, pole, tree or other object shall penetrate any of the approach, transitional, horizontal or conical surfaces as defined in:

- Attachment 1: Description of Designation;
- Attachment 3: Ardmore Airport Ltd Protection Areas WP49; and
- Attachment 4: Airport Height Surfaces.

The height surfaces are defined differently for the sealed runways and the grass runways. The Designation Schedule continues to include height surfaces for sealed Runway 07/21, even though the AIP New Zealand indicates that this has been converted to Taxiway Juliet and is no longer used as a runway.

In accordance with the AC139-10 *Control of Obstacles* the AUP is a mechanism for local authority to protect the airport operations through zoning maps and the establishment of Height Restrictions.

5.1.2.1 Sealed Runway Height Surfaces

The proposed Sunfield Business Park all Lots (1 to 15) and Yards (1 and 2) are within the lateral extents of the approach, transitional and/or horizontal surfaces as defined in the Designation Schedule 200 and illustrated on **Figure B22156/02** at **Appendix A**.

A summary of the height restriction by Lot/Yard number is shown below on **Table 2**.

All buildings proposed at 52 metres AMSL would remain below the height restriction surfaces. The height restrictions for Yard 1 and 2 would be approximately 42 metres AMSL and 47 metres AMSL respectively.

Therefore, in accordance with the AUP Designation Schedule 200 the proposal would not require consent from the Airport Authority.

Table 2: Height Restriction Sealed Runways

Building #	Height Restriction Surface	Lowest Elevation (m AMSL)	+Above / Below
1	Transitional / Horizontal	66.9	Below
2	Transitional / Horizontal	73.8	Below
3	Horizontal	80.0	Below
4	Horizontal	80.0	Below
5	Horizontal	80.0	Below
6	Horizontal	80.0	Below
7	Transitional / Horizontal	75.3	Below
8	Horizontal	80.0	Below
9	Horizontal	80.0	Below
10	Horizontal	80.0	Below
11	Transitional / Horizontal	60.7	Below
12	Transitional	54.5	Below
13	Transitional / Horizontal	53.0	Below
14	Horizontal	80.0	Below
15	Transitional / Horizontal	56.3	Below
Yard 1	Transitional / Approach	42.1	Within Protection Area. Any planned activities i.e. Plant, equipment, materials etc. that exceed 4 metres above ground level will require consent from Airport Authority
Yard 2	Transitional / Approach	47.6	

5.1.2.2 Grass Runways Height Surfaces

The proposed Sunfield Business Park is within the lateral extents of the height surfaces for the two grass runways nominated approach, transitional and/or horizontal surfaces as defined in the Designation Schedule 200 and illustrated on **Figure B22156/03** at **Appendix A**. Proposed buildings at 52 metres AMSL on all Lots 1 to 15 would remain below the height surfaces applicable to the two grass runways. Both Yard 1 and 2 are within the height restriction surfaces with a lower limit of 52.4 metres AMSL and 58.5 metres AMLS respectively.

5.1.3 Obstacle Limitation Surfaces (OLS)

Under the CAR Part 139, Obstacle Limitation Surfaces (OLS) must be established for runways. The OLS are defined surfaces in the airspace above and adjacent to the aerodromes. These surfaces are in place to enable aircraft to maintain a satisfactory level of safety while manoeuvring at low altitude in the vicinity of an aerodrome. The OLS should be kept free of obstacles.

The OLS for Ardmore Airport include a conical, inner horizontal, approach, transitional and take-off climb surfaces. The CAA Advisory Circular AC139-6 provides the dimensions and slopes of obstacle limitation surfaces for approach and take off runways related to the classification (code) of the runway.

Attachment 1 to the AUP Designation Schedule 200 states "*The Approach surfaces defined in this specification include take-off/climb requirements.*" The approach surface gradient provided in the AUP is 1:40 or 2.5 per cent. The AIP New Zealand operational data for Ardmore also publishes take-off distances with an associated gradient also of 1:40 or 2.5 per cent.

Based on the published information, therefore, there is no reason to assume the operational airspace OLS protection requirements would be more restrictive than the Height Restrictions provided in the AUP and described in **Section 5.1.2** above.

5.1.4 Instrument Flight Procedures / PANS-OPS

Ardmore Airport has instrument flight procedures for Runway 03/21 as follows:

- RNP STAR RWY 03
- RNP STAR RWY 21
- RNP RWY 03
- RNP R RWY 21
- RNP Q RWY 21
- RNP SID RWY 03
- RNP SID RWY 21
- SID RWY 21
- RNP SID

The ICAO Doc 8168 *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) surfaces are used in the construction of instrument flight procedures. The PANS-OPS is designed to safeguard an aircraft from collision with obstacles when flying on instruments. Based on our estimation of the Ardmore Airport PANS-OPS, in accordance with ICAO Doc 8168 (PANS-OPS) Vol 2 Amendment 9 Part III – Section 3, we estimate the lowest surfaces over the proposed Sunfield site to be the RNP Runway 03 Visual Surface Segment (VSS) and the Standard Instrument Departure (SID) Runway 21.

5.1.4.1 RNP Runway 03 VSS

Proposed buildings 13 and 15 are partially within the lateral extents of the RNP Runway 03 VSS as illustrated on **Figure B22156/04** at **Appendix A**. Based on our estimation of the PANS-OPS surface elevations in accordance with CAA advisory Circular AC173-1 Instrument Flight Procedure Design 31 August 2012, Buildings 13 and 15 at 20 m high (52.0 m AMSL) would remain below the RNP Runway 03 VSS. Yards 1 and 2 are also partially within the lateral extents of the RNP Runway 03 VSS with lower limits estimated at approximately 45.5 metres AMLS and 52.8 metres AMLS. However, the Height Restrictions as defined in the AUP Designation Schedule would be more restrictive than the RNP Runway 03 VSS as indicated on **Figure B22156/04**.

5.1.4.2 SID Runway 21

Based on our estimation of the PANS-OPS SID Runway 21 protection areas in accordance with ICAO Doc 8168 (PANS-OPS), the AUP Height Restrictions may not adequately protect the SID against obstacles.

The AUP Designation Schedule / AC 139-10 notes that obstacles that are allowed to penetrate the established PANS-OPS surfaces could raise the minimum safe altitude of the aerodrome instrument flight procedures. The impact of the buildings at 20 m above ground (52.0 m AMSL) would need to be confirmed by the instrument flight procedure designer. However, the AIP New Zealand published procedure (NZAR

AD 2 – 62.1 Ardmore SID RWY 21) cautions that close in obstacles are not considered in the climb gradient due to trees at a maximum of 190 ft AMSL (57.9 m AMSL) left and right of the extended runway centreline between 140 metres and 580 metres from the end of the runway. Trees at 57.9 metres AMSL are more restrictive than the proposed buildings at 52 metres AMSL and so it is reasonable to conclude that the buildings are unlikely to have an unacceptable impact.

5.1.5 Plume Rise

The CAR Part 77 and NASF Guideline F also address activities that could cause air turbulence that could affect the normal flight of aircraft operating in the prescribed airspace and/or emissions of steam, other gas, smoke, dust or other particulate matter that could affect the prescribed airspace in accordance with Visual Flight Rules (VFR).

The proposed Sunfield Business Park site is proposed to be rezoned for industrial use. As the plans are developed in detail, any roof top plant and equipment with exhaust vertical velocities of 4.3 m/s or greater will need to be considered with respect to the AUP Height Restrictions, OLS and PANS-OPS airspace.

5.2 Building Generated Windshear and Turbulence

In the absence of New Zealand guidance on the risk of building generated windshear and turbulence at airports, the NASF Guideline B has been applied.

The purpose of NASF Guideline B is to assist land use planners and airport operators in their planning and development processes to reduce the risk of building generated windshear and turbulence at airports near runways.

Applicability of this Guideline is initially determined by the location of a building within the assessment trigger area around the runway, that is:

- 1,200 m or closer perpendicular to the runway centreline;
- 900 m or closer in front of the runway threshold; and
- 500 m closer from the runway threshold along the runway.

For buildings within the assessment trigger area, Guideline B refers to the mitigation of risk by use of a 'height multiplier' (that is, the 1:35 rule) determining that buildings meeting this rule are not expected to create unsafe wind effects. The 1:35 surface extends perpendicular from the runway centreline (or extended runway centreline) within the assessment trigger area. As the 1:35 surface extends from the runway centreline, when considering buildings against the surface the building height should be measured above runway level. In other words, the distance from the runway centreline to the closest point of the building should be more than 35 times the height (above runway level) of the building.

When a proposed development penetrates the 1 in 35 surface, within the assessment trigger area, a qualified wind engineer or other suitably qualified wind professional may be required to assess the proposed structure using wind tunnel testing or computational fluid dynamics (CFD) in order to satisfy the approval authority/decision maker (and the Civil Aviation Authority if advice is sought) that the structure is acceptable. This additional assessment also applies for buildings with complex shapes or multiple buildings. Guideline B outlines how the assessment report should be structured and the modelling criteria.

All buildings on the Sunfield site are within the assessment trigger areas as defined above for the main Runway 03/21 and both grass runways as shown on **Figure B22156/05** in **Appendix A**. All proposed buildings (identified in the light blue shaded area) with the exception of Building 2 and 6 would require further assessment by a qualified wind engineer or other suitably qualified wind professional in

accordance with NASF Guideline B. Buildings 20 metres above the ground, would not require further assessment if located at 700 metres or more perpendicular from the runway centreline or extended runway centreline as is the case for Building 2 and 6.

If the further assessment identifies that the proposed buildings present a risk of building generated windshear and/or turbulence (by reference to the trigger criteria within the Guideline), mitigation measures may be required to be incorporated into the design in order to reduce this risk to an acceptable level.

5.3 Wildlife Hazards

The CAA provides guidance on the management of wildlife hazards at aerodromes and the AUP also alerts the Airport Authority to consider the possibility of the proposal attracting birds to the area.

The Sunfield proposal includes 27.7 hectares of open spaces, green links, recreation parks and reserves and ecological offsets as well as an extensive restoration and native planting of the core stream and wetland network, and one (1) school.

5.3.1 CAA Advisory Circular AC139-16 Wildlife Hazard Management at Aerodromes

The Civil Aviation Authority of New Zealand (CAA) Advisory Circular AC139-16 Revision 0 (7 October 2011) *Wildlife Hazard Management at Aerodromes* describes an acceptable means of compliance with Civil Aviation Rule Part 139.71, Wildlife Hazard Management, for certificated aerodrome operators in relation to the control of bird hazards at aerodromes. The AC139-16 also contains information related to the control of birds in the vicinity of aerodromes for the guidance of aerodrome operators and local territorial authorities.

AC139-16 Section *Implications of land use activities near aerodromes* discusses hazardous land use practices which should not be located close to aerodromes. These include specifically 'Landfills', 'Wastewater treatment plants', 'Agriculture' (crops and animals) and 'Recreational activities' (grounds – including golf courses, sports fields, school grounds, parks and picnic areas – and water).

'Recreational activities' described as 'Grounds' is included as a potentially hazardous land use due to the high risk of food waste being left at sites. These have the potential to generate feeding grounds and cause birds to fly across the aerodrome or flight path from their roosting site, using the aerodrome as a resting place. The AC suggests proponents work with local authorities to minimise the food sources for birds in these areas, by encouraging the careful management of food waste and grounds.

5.3.2 AUP Designation Schedule – Ardmore Airport Ltd

Conditions and restrictions within the Designation Schedule include Rural Aerodrome Protection Areas which are located under each of the flight paths and extends from the runway bases for 900 metres. Within the Protection Areas for Runway 03/21 is Yards 1 and 2 and a 'Greenspace' as shown on **Figure B22156/06** at **Appendix A**. For proposals within the Protection Areas the Airport Authority will also consider the possibility of the proposal attracting birds to the area and the safety of aircraft operations.

5.3.3 NASF Guideline C

NASF Guideline C pertains to the way in which existing land use is managed in the vicinity of airports with respect to the attraction of wildlife, particularly birds. Guideline C establishes buffer areas of three (3) kilometres, eight (8) kilometres and 13 kilometres of an airport generally measured from the aerodrome reference point.

The *Attachment 1* to Guideline C aligns with the international benchmarks set by ICAO and other international aviation regulators. It provides guidance on the land uses that present a risk of attracting wildlife and triggers (based on the distance from an airport) for adopting active measures to mitigate that risk. Attachment 1 is a tool to assess plans for new or revised land uses within 13 kilometres of an airport.

The proposed Sunfield site is within the three (3) kilometre buffer area of Ardmore Airport. Residential dwellings are not identified as a land use type and as such not associated with wildlife attraction risk. Attachment 1 to Guideline C identifies the wildlife attraction risk for the proposed land uses as follows:

- Conservation (Wildlife sanctuary / conservation area – wetland) as a 'High' wildlife attraction risk and an 'incompatible' use;
- Recreation (parks/playgrounds and sports facilities) as a 'moderate' wildlife attraction risk and the action is to 'mitigate';
- Commercial (warehouse (food storage), fast food/drive-in/outdoor restaurant, shopping centre) as a 'low' wildlife attraction risk and the action is to 'monitor'; and
- Commercial (office building, hotel/motel, car park, cinemas, warehouse (non-food storage), and petrol station) as a 'very low' wildlife attraction risk and the action is also to 'monitor'.

NASF Guideline C recommends the proposal should be submitted to the airport operator and agreed steps for monitoring and/or mitigation should be put in place. Action plans for monitoring could include:

- Regular monitoring surveys;
- Wildlife hazard assessments by qualified ornithologists or biologists;
- Wildlife awareness and management training for relevant staff;
- Establishment of bird population triggers;
- Implementation of activities to reduce hazardous bird populations; and
- Adoption of wildlife deterrent technologies to reduce hazardous bird populations.

Risk mitigation measures that should be considered include:

- A requirement for a Wildlife Management Program;
- The establishment of wildlife management performance standards;
- Allowance for change to design and/or operating procedures at places/plants where land use has been identified as increasing the risk of wildlife strike to aircraft;
- Establishment of appropriate habitat management at incompatible land uses;
- Creation of performance bonds to ensure clean-up and compensation should obligations not be met;
- Authority for airport operators to inspect and monitor properties close to airports where wildlife hazards have been identified; and
- Consistent and effective reporting of wildlife events in line with the relevant transport safety guidelines.

5.4 Public Safety Zones

5.4.1 Protection Areas

The AUP Designation Schedule – Ardmore Airport Ltd provides for Rural Aerodrome Protection Areas which are located under each of the flight paths. The Protection Area extends from the runway bases for a distance of 900 m as illustrated on **Figure B22156/02** and **Figure B22156/03** at **Appendix A**.

The AUP Designation Schedule identifies this land use restriction as being essential as aircraft pass over the Rural Aerodrome Protection Areas on landing and take-off at low altitudes. These areas are subject to high level of aircraft noise as well as a relatively greater risk of aircraft accident in these areas than elsewhere.

In addition to the Height Restrictions, in considering other land uses within the Protection Areas, the Airport Authority will take into account the promoting of gathering of people in these areas.

Yard 1 and Yard 2 lie partially within the Protection Areas. In considering the proposals the Airport Authority might have regard to:

- The AUP Designation Schedule 1102 – Auckland International Airport Ltd Part 2: Restrictions Relating to Runway End Protection Areas;
- The Australian National Airports Safeguarding Framework (NASF) Guideline I: Managing the Risk in Public Safety Areas at the Ends of Runways; and
- The UK and/or other jurisdictions approaches to public safety around airport runways.

5.4.2 Auckland International Airport REPA

The AUP Designation Schedule for Auckland International Airport Ltd provides for Runway End Protection Areas (REPA) in which, statistically there is a risk of aircraft landing or take-off incidents. The shape of the REPA is specified and differs between the REPA for the existing runway and that for the future Northern Runway. No basis for the determination of the shape of the REPA is provided. However, the Designation Schedule refers to the UK Department for Transport's (DfT) Circular 01/2010 *Control of Development in Airport Public Safety Zones* in defining the restrictions as follows:

> *… within the REPA, there shall be no new or replacement dwelling-houses, mobile homes, caravan sites or other residential buildings. Nor shall new or replacement non-residential development be permitted except:*
>
> *(a) Long stay and employee car parking (where the minimum stay is expected to be in excess of six hours);*
>
> *(b) warehousing and storage use, in which a very small number of people are likely to be present within a sizeable site:*
>
> *(c) development of a kind likely to introduce very few or no people on to a site on a regular basis including unmanned structures, engineering operations, buildings housing plant or machinery, agricultural buildings and operations, buildings and structures in domestic curtilage incidental to residential use, and buildings for storage purposes ancillary to existing industrial development;*
>
> *(d) public open space but excluding children's playgrounds and attractions, playing fields or sports grounds; built development for the purpose of housing plant or machinery, and which would entail no people on site on a regular basis including boiler houses, electricity switching stations or installations associated with the supply or treatment of water; and*
>
> *(e) golf courses, but not clubhouses.*

In addition to the above, all activities within the REPA which generate or have the potential to generate mass assembly of people are not permitted.

5.4.3 NASF Guideline I

NASF Guideline I is intended to provide guidance to Australian Government, state, territory and local government decision makers on the assessment and treatment of potential increases in risk to public safety which could result from an aircraft incident or development proposal in areas near the end of an airport runway. The intention is to ensure there is no increase in risk from new development and assist land-use planners to better consider public safety when assessing development proposal, rezoning requests and when developing strategic land use plans.

A PSA is a designated area of land at the end of an airport runway within which development may be restricted in order to control the number of people on the ground around runway ends. The size and shape of a PSA typically depend on the statistical chance of an accident occurring at a particular location. The risk is related to the number and type of aircraft movements and the distance from the critical take-off and landing points. PSAs are based on the landing threshold for each end of the runway and in most cases become narrower with increasing distance before the threshold.

The broad approach to the implementation of PSA policy at an airport runway, described in Guideline I, is based on modelling carried out using appropriate aircraft data to determine the level of risk to people on the ground around airports. This determines the extent of individual risk contours, upon which a person remaining in the same location for a period of a year would be subjected to a particular level of risk of being killed as a result of an aircraft accident.

The Guideline notes that different risk assessment models can be used to identify areas of differing dimensions. Each approach has its own strengths and weaknesses and it is a matter for individual jurisdictions or approval bodies to confirm the acceptable level of risk in the context of broader planning policies.

The Guideline presents two examples of most relevance to Australia to developing PSA contours are the UK and Queensland approaches. The UK model is the most formalised approach to defining a PSA and has been applied at a number of international and Australian airports. The Queensland model is a modified version of the policy and research conducted in the UK.

5.4.3.1 UK Public Safety Zone (PSZ) Aviation Model

Attachment 1 to NASF Guideline I describes the basis of the UK approach to the establishment of PSZs that formed the equivalent policy in the UK until 2021. Under this approach, the individual runway-specific risk profile was calculated for more than 35 airports, determined by reference to:

- The statistical expectation that an aircraft crash occurs in the vicinity of the airport;
- The probability, given a crash has occurred, that it affects a particular location;
- The size of the area likely to be affected as a result of a crash; and
- The probability of fatality for people on the ground within that area.

The UK PSZ areas correspond under this approach essentially, to the 1 in 100,000 per year individual risk level, as calculated for each airport, with additional restrictions imposed on an inner area corresponding to the 1 in 10,000 per year or greater level of individual risk.

5.4.3.2 Queensland State Planning Policy Public Safety Areas

In addition to referencing the UK PSZ Aviation Model described above, NASF Guideline I also references the Queensland SPP PSA model.

The current Queensland SPP PSA model, which has been in place since 2002, applies a 'one-size-fits-all' template in the form of an isosceles trapezoid 1,000 m in length, with a width of 350 m at the runway end, reducing to a width of 250 m at the end furthest from the runway.

The dimensions of the template were determined with reference to the UK methodology for determining third-party risk described above. As the risk profiles at different airports vary with the characteristics of the particular aircraft operations it is not clear what assumed operational regime(s) were used to estimate the risk levels on which the Queensland PSA template is based. However, separate work by L+R Airport Consulting suggests that the template dimensions relate approximately to the width of the 1 in 100,000 level of individual risk and the length of the 1 in 10,000 level of individual risk, when calculated for the ultimate capacity of Brisbane International Airport. This is consistent with the notation in the Queensland State Planning Policy (SPP) guidance material that the current PSA dimensions indicate an area where the individual risk is 1 in 10,000 per year and also partially enclose an area of individual risk of 1 in 100,000.

The Queensland SPP requires a PSA at the end of each airport runway where:

- The airport is designated as a state significant airport;
- The runway handles regular public transport (i.e. commercial airline) operations by jet aircraft; or
- The runway handles more than 10,000 movements per year, excluding light aircraft movements.

5.4.4 UK PSZ Policy Update

Since publication of Guideline I, the UK has modified its approach to the provision of Public Safety Zones and replaced the risk-based model with a standardised shape approach[7]. This reduces the need for individual risk contours to be continually updated for all airports based on a 15-year traffic forecast. It also recognises that the latest accident rates in relation to commercial air transport movements worldwide are lower than those used in the original analysis conducted in 1996 and 2000.

Under the most recent UK policy, Public Safety Zones (PSZs) are established at all the airports that traffic more than 18,000 commercial air transport movements (ATMs) per year. They comprise an outer boundary which is the Public Safety Controlled Zone (PSCZ) and an inner, higher risk zone, which is the Public Safety Restricted Zone (PSRZ).

The length of the PSCZ for an aerodrome with fewer than 45,000 commercial ATMs per year has been set at 1,000 metres from the landing threshold. For an aerodrome with greater than 45,000 commercial ATMs, the PSCZ follows the same lateral plan but extends to 1,500 metres. In both cases, the Public Safety Restricted Zone (PSRZ) has been set at 500 metres from the landing threshold.

The width of the:

- PSRZ at the landing threshold is 75 metres either side of the runway centreline.
- PSCZ at the landing threshold is 140 metres either side of the runway centreline, for instrument runways which would have a 280 metre wide runway strip, or 75 metres either side of the runway centreline for non-instrument runways which would have a 140 metre wide runway strip.

Under the current UK PSZ policy, airports with less than 18,000 commercial air transport movements are not required to have a PSZ.

[7] https://www.gov.uk/government/publications/control-of-development-in-airport-public-safety-zones/control-of-development-in-airport-public-safety-zones

5.4.5 Ardmore Airport Public Safety Risk

The exact nature of aircraft movements at Ardmore, in terms of aircraft type, operation and runway use is not known, which makes any calculation of individual risk levels difficult. However, in both the Queensland PSA model and the current UK PSZ policy, PSAs/PSZs are not considered necessary for runways with less than 10,000 movements (excluding light aircraft), for Queensland, or 18,000 commercial air transport movements, for the UK.

Ardmore Airport traffic is predominantly by aircraft operating under Visual Flight Rules (VFR). These are typically smaller aircraft under 5,700 kg, which are considered as 'light' aircraft whose operations are considered separately to larger aircraft under the aviation rules in New Zealand, Australia and the UK.

In terms of quantifying the number of non-light aircraft operations at Ardmore, reference can be made to Airway New Zealand's movement records. These indicate that, between 2012 and 2021, there were approximately 3,200 IFR movements per year at Ardmore[8].

The other potential source of larger aircraft movements at Ardmore is Warbirds. Under the AUP Designation Schedule, other than for one permitted three-day long (plus two days' practice) airshow each year, movements by ex-military jet aircraft are limited under Condition 6 to an average of 170 movements per year.

Even allowing for some non-jet VFR Warbird aircraft movements at Ardmore, the movement levels are well below the thresholds that would trigger the implementation of public safety land use restrictions under the Queensland or the UK airport public safety policies.

5.5 Lighting and Glare

5.5.1 Protection Areas

The AUP Designation Schedule identifies the Protection Areas as extending 900 metres from the runway bases. In considering land uses in this area, the Airport Authority will also take into account the likelihood of glare.

Glare caused by reflective surfaces may be a source of distraction to pilots. It should be noted that solar panel installation is a particular consideration in relation to glare/reflectivity affecting aircraft in various stages of flight. According to recent (May 2021) US Federal Aviation Administration (FAA) guidance is that:

> *"In most cases, the glint and glare from solar energy systems to pilots on final approach is similar to flint and glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features."*

The FAA has therefore determined to focus on the impact of such systems specifically on airports' air traffic control tower cabs, which Ardmore does not have.

Nevertheless, where solar panels are proposed the Airport Authority may require a solar glare hazard analysis to confirm that the safety of aircraft operations will not be affected, prior to consenting to the installation.

[8] https://www.airways.co.nz/assets/Documents/Aircraft-movements/Movements2112-Stats.pdf

5.5.2 CAR Part 77 Objects and Activities Affecting Navigable Airspace

The CAA Civil Aviation Rules Part 77 (1 December 2020) *Objects and Activities Affecting Navigable Airspace* prescribes rules regarding the use of lights that could pose a hazard in navigable airspace. Lights can pose a hazard to aircraft operations by:

- Causing glare which could potentially blind or distract pilots in critical phase of flight; or
- Being mistaken for aeronautical ground lights which provide critical information to pilots operating in poor light conditions, or otherwise confusing pilots.

NASF Guideline E provides guidance on how these potential risks can be managed.

5.5.3 NASF Guideline E

NASF Guideline E provides guidance on the risk of distractions to pilots of aircraft from lighting and light fixtures near airports. Advice for the guidance of designers and installation contractors is provided for situations where lights are to be installed within a 6 km radius (applied from the centre point of each runway) of a known aerodrome.

Attachment 1 to Guideline E illustrates the primary area divided into four light control zones: A, B, C and D. These zones reflect the degree of interference ground lights can cause pilots as they approach. The proposed Sunfield development is partially within all the light control zones as illustrated on **Figure B22156/07** in **Appendix A**.

Under Guideline E lighting associated with developments should meet the allowable intensity of light sources measured at 3 degrees above the horizontal restrictions associated with the respective zone as follows:

- Zone A does not allow for any (0 cd);
- Zone B allows for 50 cd;
- Zone C allows for 150 cd; and
- Zone D allows for 450 cd.

The lighting designer will need to ensure that all lighting within the development (public and private) meets the above requirements. Proposal for coloured lights should be referred to the airport operator for guidance as they may cause conflict with lights used to identify different aerodrome facilities and infrastructure.

5.6 Communication, Navigation and Surveillance (CNS) Facilities

NASF Guideline G is to formalise the protection of CNS facilities in land use planning decisions. This Guideline provides land use planning guidance to better protect CNS facilities which support the system and processes in place by various agencies to safely manage the flow of aircraft.

There are no CNS facilities located on or adjacent to Ardmore Airport. Some CNS facilities associated with Auckland International Airport are identified in the AIP New Zealand Aerodrome Charts associated with Ardmore instrument flight procedures. However, these facilities are located more than 10 kilometres from the proposed Sunfield site.

6. Summary

This aviation safeguarding assessment report (excluding aircraft noise assessment) is a desktop assessment based only on publicly available planning information and the Aeronautical Information Publication of New Zealand as it relates to Ardmore Airport. The AUP Designation Schedule 200 – Ardmore Airport Ltd, the Civil Aviation Authority of New Zealand (CAA) Civil Aviation Rules (CAR) in conjunction with the Australian National Airports Safeguarding Framework have provided the base for the aviation safeguarding assessment.

The safeguarding assessment results of the proposed Sunfield development including buildings within the proposed Business Park at a maximum elevation of 52 metres AMSL (inclusive of all rooftop plant, equipment, and other protuberances such as access ladders, antennae etc,) is summarised as follows:

Protection of Operational Airspace

- Protection Areas

All buildings (1 to 15) within the Sunfield Business Park site are outside the AUP Rural Aerodrome Protection Areas. Yards 1 and 2 are partially within the Protection Areas. Under the AUP, structures on these sites that exceed 4 metres above the ground will need to be provided to the Airport Authority for consent. In assessing buildings and structures that exceed 4m in the Rural Aerodrome Protection Areas, the Airport Authority will consider the need for the proposal, siting, height and construction materials. However, based on the published information there is no reason to assume the operational airspace Obstacle Limitation Surfaces as defined under the CAR Part 139, or the PANS-OPS surfaces in accordance with AC 173-1, would be more restrictive that the Height Restrictions provided in the AUP.

- Height Restrictions

All proposed buildings within the Sunfield Business Park are within the lateral extents of the AUP Height Restrictions as described for the sealed runway and the grass runways and would not penetrate the Height Restrictions for the sealed runway and the grass runways.

- Plume Rise

As the plans are developed in detail, any roof top plant and equipment with exhaust vertical velocities of 4.3 m/s or greater will need to be considered with respect to the AUP Height Restrictions, OLS and PANS-OPS airspace.

Building Generated Windshear and Turbulence

All proposed buildings within the Sunfield Business Park site are within the assessment trigger areas as defined above for the main Runway 03/21 and both grass runways as per NASF Guideline B. All proposed buildings, with the exception of Building 2 and 6 (as a standalone development), would require further assessment by a qualified wind engineer or other suitably qualified wind professional in accordance with NASF Guideline B. Buildings 20 metres above the ground, would not require further assessment if located at 700 metres or more perpendicular from the runway centreline or extended runway centreline as is the case for Building 2 and 6.

Wildlife Hazards

For proposals within the Rural Aerodrome Protection Areas the Airport Authority will also consider the possibility of the proposal attracting birds to the area and the safety of aircraft operations.

NASF Guideline C pertains to the way in which existing land use is managed in the vicinity of airports with respect to the attraction of wildlife, particularly birds. The proposed Sunfield site is within the three (3)

kilometre buffer area of Ardmore Airport. Guideline C recommends action plans for monitoring and mitigating that should be considered and agreed with the Airport Authority.

Public Safety

There are no buildings within the Rural Aerodrome Protection Areas. Yards 1 and 2 are within the Rural Aerodrome Protection Areas as such in considering the land uses the Airport Authority will take into account the promoting of gathering of people in these areas. Although exact numbers and types of aircraft movements at Ardmore Airport with which to calculate third-party risk levels are not available, from the records that are available, the movement levels appear to be well below the thresholds that would trigger the implementation of public safety land use restrictions under the Queensland or the UK airport public safety policies.

Lighting and Glare

Within the Rural Aerodrome Protection Areas the Airport Authority will take into account the likelihood of glare. Glare caused by reflective surfaces may be a source of distraction to pilots.

Solar panel installation is a particular consideration in relation to glare/reflectivity affecting aircraft in various stages of flight. Whilst the FAA has determined the focus should be on the impact of such systems specifically on airports' air traffic control tower cabs, which Ardmore does not have, the Airport Authority may require a solar glare hazard analysis to confirm that the safety of aircraft operations will not be affected, prior to consenting to the installation.

Lights can pose a hazard to aircraft operations by causing glare or confusion.

NASF Guideline E provides guidance on how these potential risks can be managed.

The lighting designer will need to ensure that all lighting within the development (public and private) meets the above requirements. Proposal for coloured lights should be referred to the airport operator for guidance as they may cause conflict with lights used to identify different aerodrome facilities and infrastructure.

Communication, Navigation and Surveillance Facilities

There are no CNS facilities located on or adjacent to Ardmore Airport. Some CNS facilities associated with Auckland International Airport are identified in the AIP New Zealand Aerodrome Charts associated with Ardmore instrument flight procedures. However, these facilities are located more than 10 kilometres from the proposed Sunfield site and as such it is not expected to adversely affect the facilities as per NASF Guideline G.

Appendix A: Figures

LEGEND:

- FIXED WING VFR OPERATIONS
- HELICOPTER PREFERRED ARRIVAL / DEPARTURE
- HELICOPTER CIRCUIT

HELICOPTER ARRIVAL/DEPARTURE NORTH SECTOR 600-800ft AMSL

HELICOPTER DESCENT NOT BELOW 300ft UNTIL AT THE AIRPORT BOUNDARY.

ALL FIXED WING CIRCUIT SOUTH OF RUNWAYS NOT BELOW 1100ft DAY 1300ft NIGHT

HELICOPTER - TOWER TLOF TRAINING CIRCUIT MAX CIRCUIT ALTITUDE 800ft DAY 1000ft NIGHT

TAXIWAY JULIET

H

GRASS RWY 07/25

GRASS RWY 03/21

SEALED RWY 03/21

SUNFIELD

PREFERRED DEPARTURE

PREFERRED ARRIVAL

HELICOPTER ARRIVAL/DEPARTURE SOUTH EAST SECTOR 600-800ft AMSL

HELICOPTER ARRIVAL/DEPARTURE SOUTH EAST WEST SECTOR 600-800ft AMSL

IMPORTANT:
THIS FIGURE MUST BE READ IN CONJUCTION WITH ASSOCIATED L + R AIRPORT CONSULTING REPORT B22156AR001.

L+R AIRPORT CONSULTING

SUNFIELD DEVELOPMENTS LIMITED

PROPOSED SUNFIELD DEVELOPMENT | ARDMORE AIRPORT SAFEGUARDING ASSESSMENT

ARDMORE AIRPORT OPERATIONS

NORTH

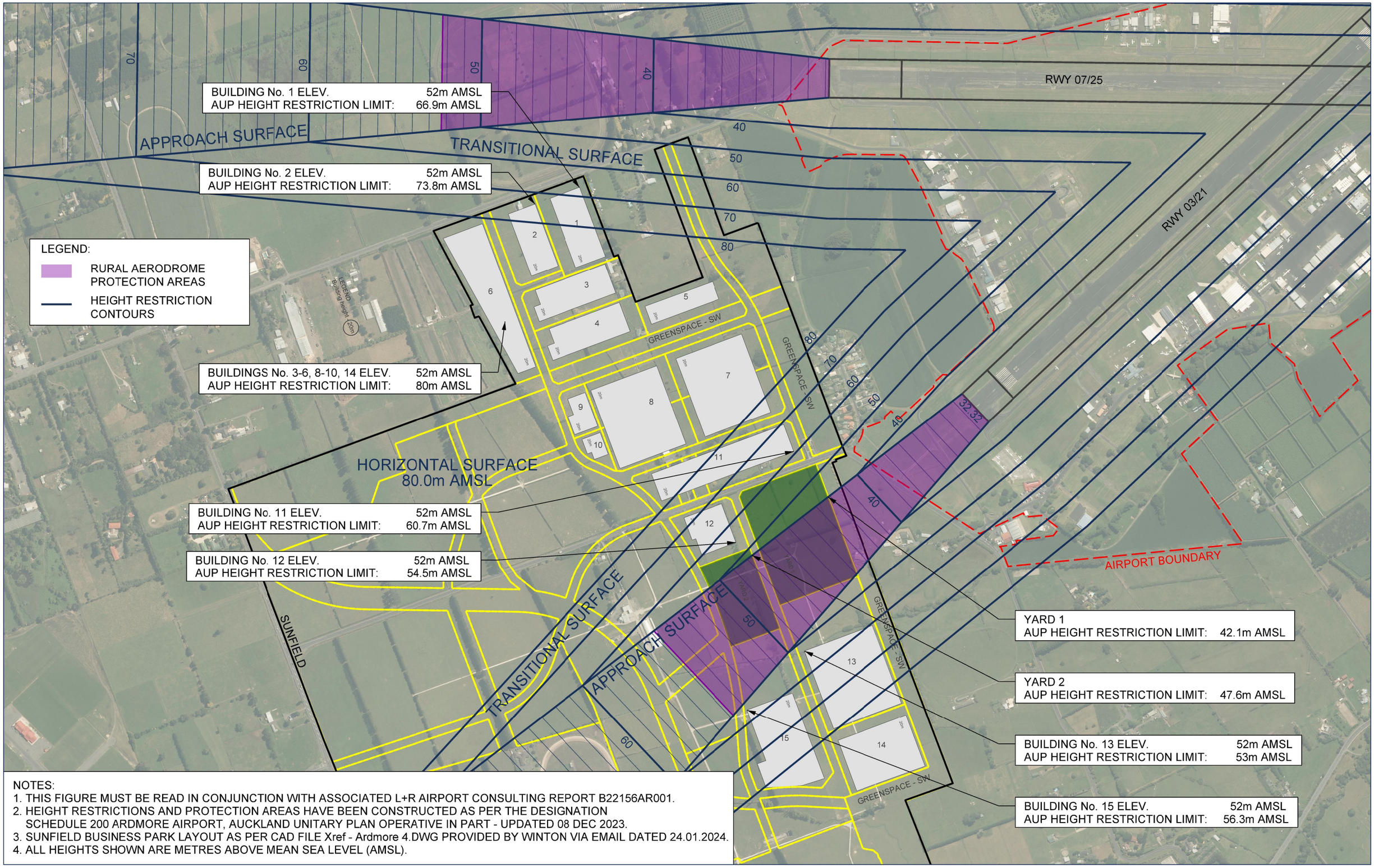
0 200 600 1000m

1:20,000 @ A3

FIGURE

B22156/01

Drawn: MK Checked: BMW Approved: BJH 04.03.24 Rev 2



NOTES:
1. THIS FIGURE MUST BE READ IN CONJUNCTION WITH ASSOCIATED L+R AIRPORT CONSULTING REPORT B22156AR001.
2. HEIGHT RESTRICTIONS AND PROTECTION AREAS HAVE BEEN CONSTRUCTED AS PER THE DESIGNATION SCHEDULE 200 ARDMORE AIRPORT, AUCKLAND UNITARY PLAN OPERATIVE IN PART - UPDATED 08 DEC 2023.
3. SUNFIELD BUSINESS PARK LAYOUT AS PER CAD FILE Xref - Ardmore 4.DWG PROVIDED BY WINTON VIA EMAIL DATED 24.01.2024.
4. ALL HEIGHTS SHOWN ARE METRES ABOVE MEAN SEA LEVEL (AMSL).

L+R AIRPORT CONSULTING

SUNFIELD DEVELOPMENTS LIMITED

PROPOSED SUNFIELD DEVELOPMENT | ARDMORE AIRPORT SAFEGUARDING ASSESSMENT

HEIGHT RESTRICTION AND PROTECTION AREAS (SEALED RUNWAYS)

NORTH

0 80 240 400m

1:8,000 @ A3

FIGURE B22156/02

Drawn: MK Checked: BMW Approved: BJH 04.03.24 Rev 2

BUILDING No. 1 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 63.8m AMSL

BUILDING No. 2 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 72.4m AMSL

LEGEND:

RURAL AERODROME PROTECTION AREAS

HEIGHT RESTRICTION CONTOURS

BUILDINGS No. 3-6, 8-10, 14 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 80m AMSL

HORIZONTAL SURFACE
80.0m AMSL

BUILDING No. 11 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 57.4m AMSL

BUILDING No. 12 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 58.3m AMSL

GRASS RWY 07/25

GRASS RWY 03/21

TRANSITIONAL SURFACE

GREENSPACE - SW

SUNFIELD

TRANSITIONAL SURFACE

APPROACH SURFACE

AIRPORT BOUNDARY

YARD 1
AUP HEIGHT RESTRICTION LIMIT: 52.4m AMSL

YARD 2
AUP HEIGHT RESTRICTION LIMIT: 58.5m AMSL

BUILDING No. 13 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 74.3m AMSL

BUILDING No. 15 ELEV. 52m AMSL
AUP HEIGHT RESTRICTION LIMIT: 77m AMSL

NOTES:
1. THIS FIGURE MUST BE READ IN CONJUNCTION WITH ASSOCIATED L+R AIRPORT CONSULTING REPORT B22156AR001.
2. HEIGHT RESTRICTIONS AND PROTECTION AREAS HAVE BEEN CONSTRUCTED AS PER THE DESIGNATION SCHEDULE 200 ARDMORE AIRPORT, AUCKLAND UNITARY PLAN OPERATIVE IN PART - UPDATED 08 DEC 2023.
3. SUNFIELD BUSINESS PARK LAYOUT AS PER CAD FILE Xref - Ardmore 4.DWG PROVIDED BY WINTON VIA EMAIL DATED 24.01.2024.
4. ALL HEIGHTS SHOWN ARE METRES ABOVE MEAN SEA LEVEL (AMSL).

L+R AIRPORT CONSULTING

SUNFIELD DEVELOPMENTS LIMITED

PROPOSED SUNFIELD DEVELOPMENT | ARDMORE AIRPORT SAFEGUARDING ASSESSMENT

HEIGHT RESTRICTION AND PROTECTION AREAS (GRASS RUNWAYS)

NORTH

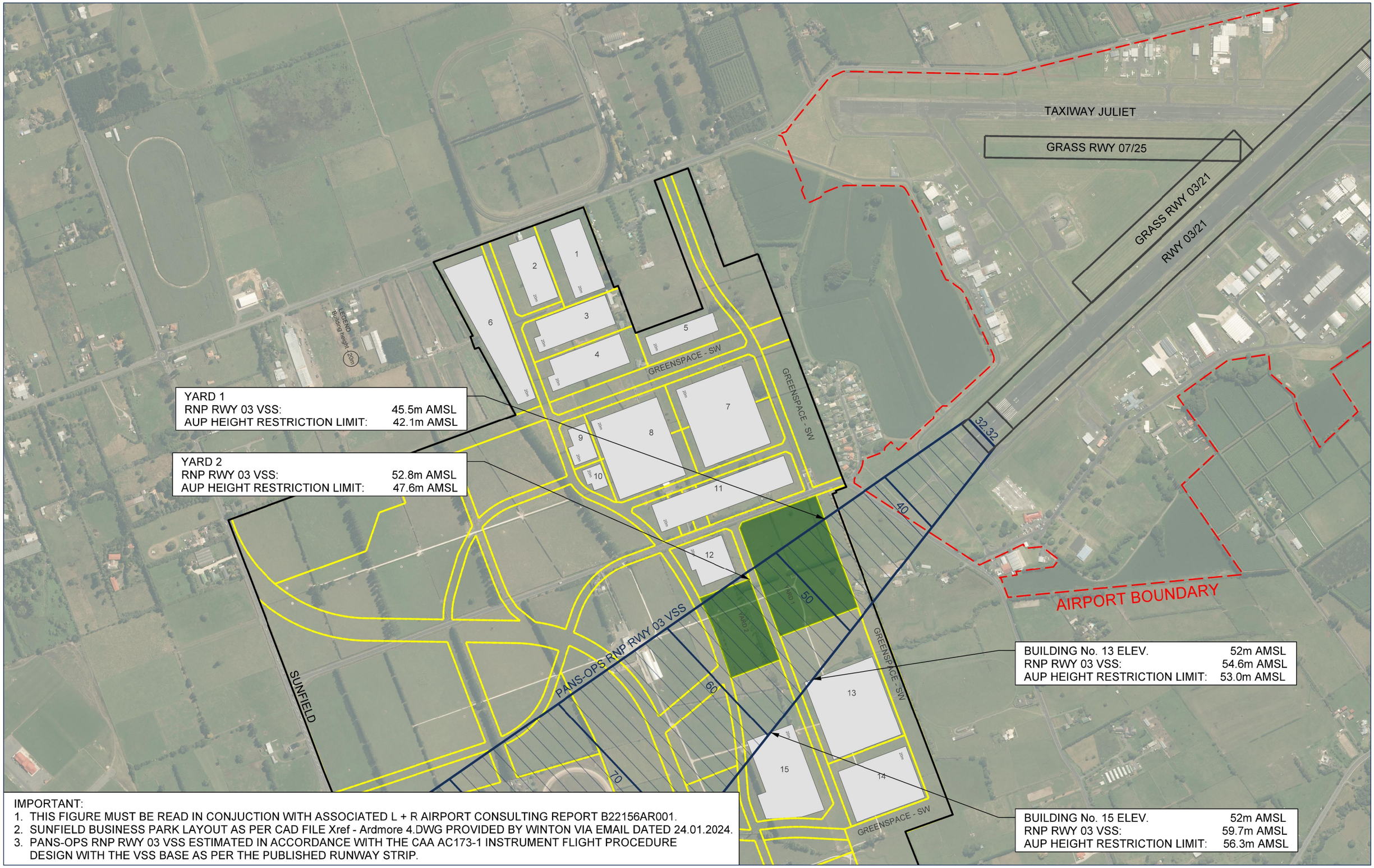
0 80 240 400m

1:8,000 @ A3

FIGURE

B22156/03

Drawn: MK Checked: BMW Approved: BJH 04.03.24 Rev 2



IMPORTANT:
1. THIS FIGURE MUST BE READ IN CONJUCTION WITH ASSOCIATED L + R AIRPORT CONSULTING REPORT B22156AR001.
2. SUNFIELD BUSINESS PARK LAYOUT AS PER CAD FILE Xref - Ardmore 4.DWG PROVIDED BY WINTON VIA EMAIL DATED 24.01.2024.
3. PANS-OPS RNP RWY 03 VSS ESTIMATED IN ACCORDANCE WITH THE CAA AC173-1 INSTRUMENT FLIGHT PROCEDURE DESIGN WITH THE VSS BASE AS PER THE PUBLISHED RUNWAY STRIP.

L+R AIRPORT CONSULTING

SUNFIELD DEVELOPMENTS LIMITED

PROPOSED SUNFIELD DEVELOPMENT | ARDMORE AIRPORT SAFEGUARDING ASSESSMENT

PANS-OPS RNP RWY 03 VSS

NORTH

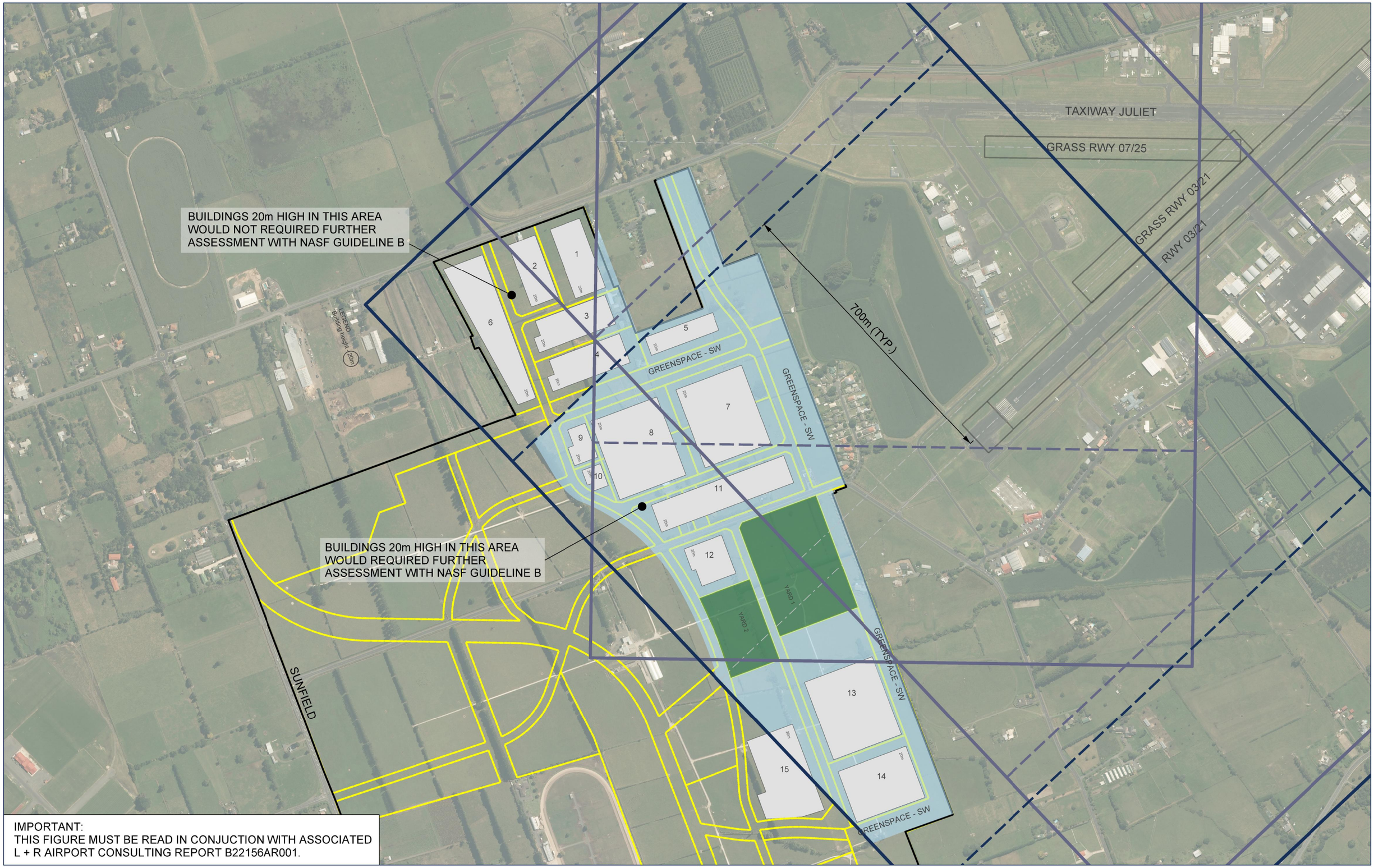
0 80 240 400m

1:8,000 @ A3

FIGURE

B22156/04

Drawn: MK Checked: BMW Approved: BJH 04.03.24 Rev 2



IMPORTANT:
THIS FIGURE MUST BE READ IN CONJUCTION WITH ASSOCIATED L + R AIRPORT CONSULTING REPORT B22156AR001.

L+R AIRPORT CONSULTING

SUNFIELD DEVELOPMENTS LIMITED

PROPOSED SUNFIELD DEVELOPMENT | ARDMORE AIRPORT SAFEGUARDING ASSESSMENT

NASF GUIDELINE B: BUILDING GENERATED WINDSHEAR AND TURBULENCE

NORTH

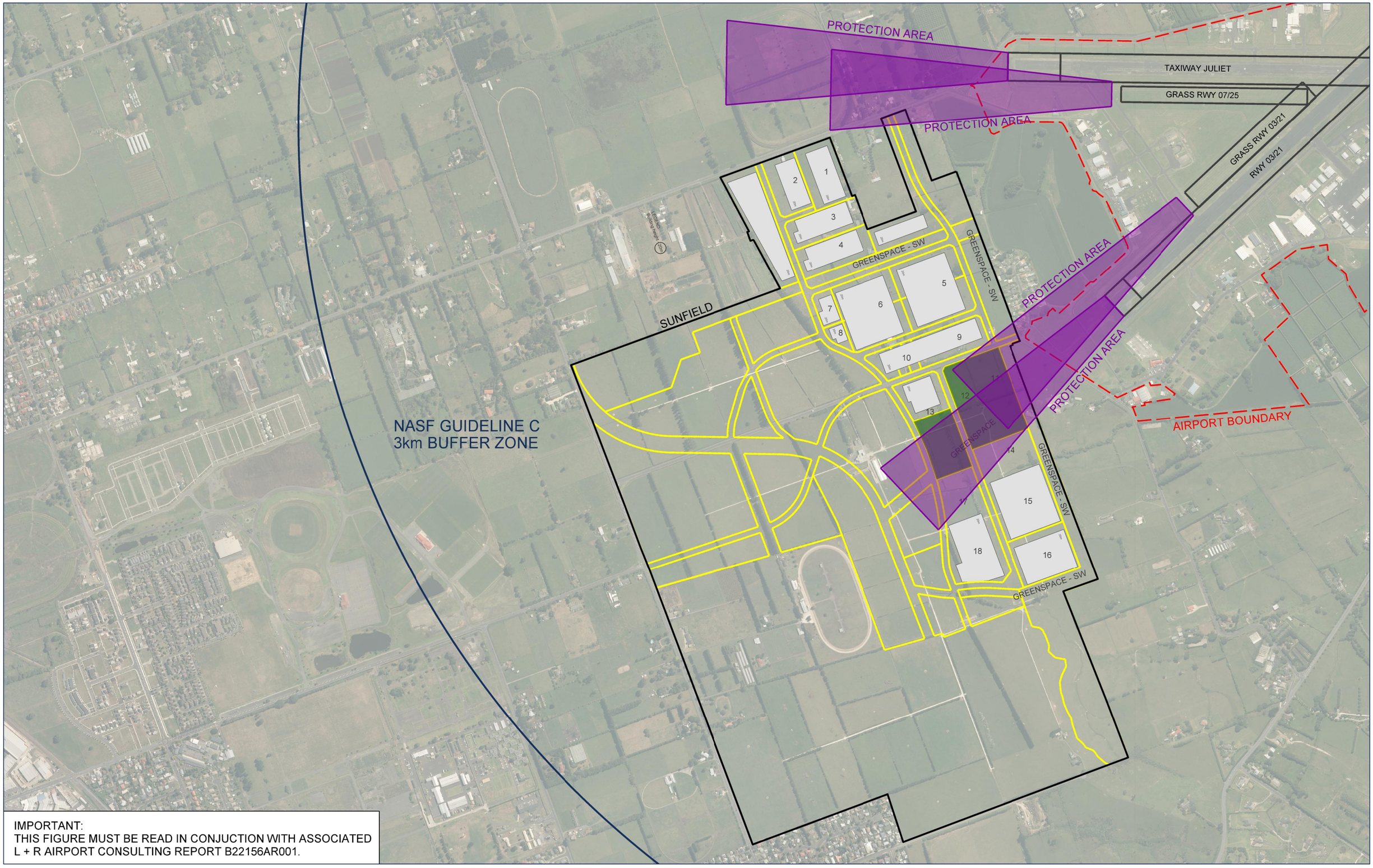
0 80 240 400m

1:8,000 @ A3

FIGURE

B22156/05

Drawn: MK Checked: BMW Approved: BJH 04.03.24 Rev 2



IMPORTANT:
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L+R AIRPORT CONSULTING

SUNFIELD DEVELOPMENTS LIMITED

PROPOSED SUNFIELD DEVELOPMENT | ARDMORE AIRPORT SAFEGUARDING ASSESSMENT

WILDLIFE HAZARDS

NORTH

0 110 330 550

1:11,000 @ A3

FIGURE

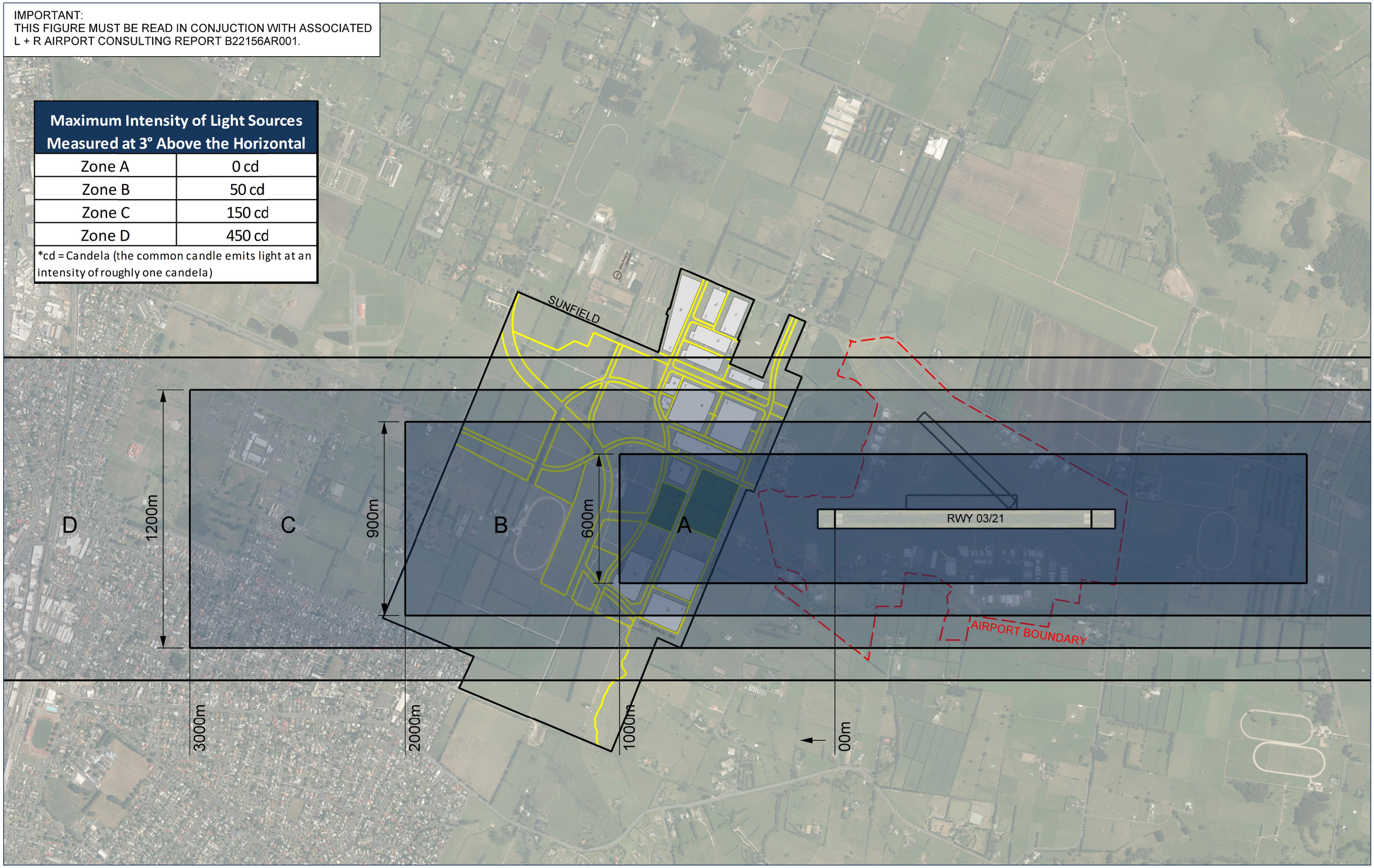
B22156/06

Drawn: MK Checked: BMW Approved: BJH 04.03.24 Rev 2

IMPORTANT:
THIS FIGURE MUST BE READ IN CONJUCTION WITH ASSOCIATED L + R AIRPORT CONSULTING REPORT B22156AR001.

Maximum Intensity of Light Sources Measured at 3° Above the Horizontal	
Zone A	0 cd
Zone B	50 cd
Zone C	150 cd
Zone D	450 cd

*cd = Candela (the common candle emits light at an intensity of roughly one candela)



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NASF GUIDELINE E: MAXIMUM LIGHTING INTENSITY ZONES

NORTH

0 160 480 800m

1:16,000 @ A3

FIGURE

B22156/07

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