17 May 2022

s47F
Governance Grants Officer
Campaspe Shire Council
P.O Box 35
Echuca, 3564

Dear s47F

Letter of support

Air Ambulance Victoria (AAV) a department of Ambulance Victoria ensures communities outside the metropolitan area have rapid access to the highest level of care and transport to specialist care in the Melbourne metropolitan region, particularly for severe trauma patients. Our fleet of five helicopters and four aeroplanes provide a vital link between rural communities and metropolitan health services.

Echuca Airport is one of our busiest rural locations for patient transfers. Since 5/1/2017 through to 30/4/22, AAV has had 1217 flights into/out of the Echuca airport. Approximately 67% of patient transfers responded to are for urgent or semi-urgent medical needs.

Any proposed improvements to the airport runway/s would be welcomed as would the provision of a patient transfer station which would provide patients with privacy and a transfer area that is out of the weather. The facility will also provide pilots and ambulance staff with more appropriate facilities to carry out their work, as well as improved and more accessible amenities.

AAV is pleased to commend the Campaspe Shire Council's application to the Regional Airports Program for financial support to improve their airport and provide a form of patient transfer facility at Echuca Airport.

s47F

Manager Air Operations

JJ RYAN CONSULTING PTY LTD

Detailed Design Report for the Echuca Aerodrome Airfield Ground Lighting Design

June 2021

Prepared by JJ Ryan Consulting Pty Ltd for Campaspe Shire Council
www.jjryan.com.au
ABN: 69 145 797 726
JJR-4210120A

Version History

Version Number	Prepared By	Revision Date	Approved By	Approval Date	Description
1.0	J.Crone/T Baxter	25/06/2021	J Ryan	25/06/2021	Detailed Design Report
2.0	J.Crone/T Baxter	17/08/2021	J Ryan	18/08/2021	Detailed Design Report

Important Notice

This report is confidential and is provided solely for the purposes of Campaspe Shire Council ("CSC"). This report is provided pursuant to a Consultancy Agreement between JJ Ryan Consulting Pty Ltd ("JJR") and CSC under which JJR undertook to perform a specific and limited task for CSC. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. JJR makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. The executive summary is not a substitute for this. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. JJR is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which JJR becomes aware, after the date of this report.

Unless expressly agreed otherwise in writing, JJR does not accept a duty of care or any other legal responsibility whatsoever in relation to this report, or any related enquiries, advice or other work, nor does JJR make any representation in connection with this report, to any person other than CSC. Any other person who receives a draft or a copy of this report (or any part of it) or discusses it (or any part of it) or any related matter with JJR, does so on the basis that he or she acknowledges and accepts that he or she may not rely on this report nor on any related information or advice given by JJR for any purpose whatsoever.

Acronyms and Definitions

Acronym	Description
ACN	Aircraft Classification Number
AFRU	Aerodrome Frequency Response Unit
AGL	Airfield Ground Lighting
CAD	Computer Aided Design
CASA	Civil Aviation Safety Authority
CSC	Campaspe Shire Council
DOD	Depth of Discharge
ERSA	En-Route Supplement Australia
GST	Goods and Services Tax
HV	High Voltage
ICAO	International Civil Aviation Organisation
IFC	Issued for Construction
IFD	Intensity Frequency Duration
IWDI	Illuminated Wind Direction Indicator
JJR	JJ Ryan Consulting (Design Consultant)
LED	Light Emitting Diode
LV	Low Voltage
MIT	Mains Isolating Transformer
MOS	Manual of Standards
OLS	Obstacle Limitation Surface
PAL	Pilot Activated Lighting
PSD	Particle Size Distribution
SIT	Series Inline Transformer
UPS	Uninterruptable Power Supply

Contents

Tables

1 Introduction

1.1 Project Background

Campaspe Shire Council ("CSC") have engaged JJ Ryan Consulting ("JJR") to design a new Airfield Ground Lighting (AGL) system for Echuca Aerodrome ('Aerodrome'). The project involves redesigning the existing Aerodrome lighting system to current practice and technology in accordance with Civil Aviation Safety Regulations (CASR) and operational requirements for Low Intensity lighting systems.

The existing Aerodrome lighting system is a Pilot Activated (PAL) system and is owned and operated by the Campaspe Shire Council. The system includes the following:

- Low Intensity runway edge lights;
- Runway threshold lighting;
- Runway end lighting;
- Holding point lights;
- Taxiway edge lighting;
- Apron flood lighting;
- Primary illuminated wind direction indicator (IWI); and
- Pilot activated lighting equipment.

The existing lighting system in its entirety by the nature of its current condition has passed its design life, therefore requires replacement to current practices and current technologies with an expectation of the new system designed (and installed) to meet CASR 139: Chapter 9 – Visual Aids Provided By Aerodrome Lighting in particular, to meet operational requirements for a Low Intensity lighting system.

The new system is to be installed in parallel with the existing functioning system without any disruption to the existing system, with a singular switch-over time from the old to the new system.

2 Project Scope

2.1 Purpose

The purpose of this section is to define the scope of the Echuca Aerodrome Airfield Lighting upgrade project.

2.2 Scope Summary

The Detailed Design Package will confirm all elements of the proposed AGL system and provide specific detail on electrical components, materials and methodologies to achieve the project objectives. This will include:

- Design of airside lighting infrastructure;
- Detailed design drawings in both .pdf and .dwg formats;
- Provision of anticipated market pricing range to procure, construct and commission the project; and
- Preparation of a draft Technical Specification for the AGL system works.

3 Detailed Design Summary

3.1 Purpose

The purpose of this section is as follows:

- Outline the Detailed Design Standards and Legislation; and
- Provide an overview of the methodology which forms the basis for this report.

3.2 Design Standards and Legislation

The detailed design has been developed in accordance with the following standards and regulations:

- CASA Manual of Standards Part 139 – 2019;
- AS/NZS 3000:2018 – Electrical installations;
- AS/NZS 3008.1.1:2017 - Electrical Installations-Selection of Cables; and
- Annex 14 to the Convention on International Civil Aviation, Aerodromes, Volume 1 – Aerodrome Design and Operation.
- Annex 14 to the Convention on International Civil Aviation, Aerodromes, Volume 2 – Heliports.

Any current departures from the above and other relevant standards have been noted throughout the report, to be investigated further pending input from CSC.

3.3 Updates to MOS Part 139

CASA has released new safety requirements for aerodromes of all sizes across Australia. The updates reflect changes in technology and best practice and ensures Australia enhances its level of compliance with International Civil Aviation Organization (ICAO) standards. The new measures came into to effect on the 13th August 2020 and are detailed in CASA's updated Manual of Standards (MOS) Part 139 – 2019. The Echuca Aerodrome Airfield Lighting Design has been developed in accordance with MOS 139 – 2019.

The MOS Part 139 comprises specifications prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation. In those parts of the MOS Part 139 where it is necessary to establish the context of standards to assist in their comprehension, the sense of parent regulations has been reiterated.

In addition to the MOS Part 139, specifications and procedures which do not reach the regulatory level and information of an educational or advisory nature, may be issued in the form of Advisory Circulars (AC's).

3.4 Detailed Design Methodology

3.4.1 Overview

The workflow for design development is shown below and is adopted to achieve optimal project outcomes.

JJR will apply resources to the project to achieve the project milestone delivery dates for the engineering scope of works.

The project has been broken into the following detailed scope of work items:

- Airside lighting upgrades in accordance with current standards utilising LED technology;
- Primary power supply;
- Controllers;
- Feed circuits to airside; and
- Light components.

4 Aerodrome Ground Lighting

4.1 Scope of Section

The scope of the Aerodrome lighting works for the project includes replacement of existing lighting components to meet relevant standards for the following:

- Low Intensity runway edge lights;
- Runway threshold lighting;
- Runway end lighting;
- Holding point lights;
- Taxiway edge lighting;
- Apron flood lighting;
- Mains Isolating Transformer (MIT); and
- Switchboard housing the MIT, controls and pilot activated lighting equipment.

Airside lighting is to utilise Pit and Duct system using LED technology.

The design criteria for lighting has been developed in alignment with the following standards including:

- Civil Aviation Act;
- Civil Aviation Regulations;
- CASA MOS Part 139-2019; and
- Australian/New Zealand Standards including:
  - AS/NZS 3000:2018 – Electrical installations; and
  - AS/NZS 3008.1.1:2017 - Electrical Installations-Selection of Cables.

4.2 Existing Lighting

4.2.1 Runway 17/35

Runway 17/35 is currently a non-precision instrument approach runway that is serviced by one lit taxiway located south of the centre on the eastern side of the runway.

The specifications for Runway 17/35 have been summarised below in Table 4.14.1.

Table 4.1 Runway 17/35 specifications

Physical Characteristics	Runway 17/35
Aerodrome Reference Code	2B
Runway Length (following pavement works)	1252m
Runway Width (following pavement works)	23m
Surface	Asphalt
Runway Shoulder Width	Nil
Runway Strip Width - Graded	80m
Runway Strip Width - Total	140m
RESA	60m

The existing Aerodrome lighting system is a Pilot Activated (PAL) system and is owned and operated by the Campaspe Shire Council. The system includes the following:

- Low Intensity runway edge lights;
- Runway threshold lighting;
- Runway end lighting;
- Holding point lights;
- Taxiway edge lighting;
- Apron flood lighting;
- Primary illuminated wind direction indicator (IWI); and
- Pilot activated lighting equipment.

4.3 Proposed Lighting System

The proposed runway edge lighting is to be spaced at 60m longitudinally with both sides equidistant from the runway centreline.

A high-level summary of the electrical components of the AGL design are provided in Table 4.22.

Table 4.2 Electrical design for AGL

Component	Detail	Description
MIT	Baseline requirements: • Voltage rating = 230V • Output power rating = 2.5kW CB for MIT to be greater than 15.5A and less than 40A	MIT in Appendix A (example component)
IWDI	Baseline requirements: • Must connect to 220-240V supply through a 6A CB	Existing to be reused
LED Elevated Lights	LED - Runway lighting, taxiway lighting, threshold lighting – omni-directions elevated	Datasheet in Appendix B (example component)
Apron Lights	Central Apron designed specifically on the;	Datasheet in Appendix C

Component	Detail	Description
	• LED EWO PM67944 R2 Gen3 EP09-LR FCO 144LED 5700K 600mA North Apron designed specifically on the above luminaire and on the; • LED EWO PM67944 R2 Gen3 EP09-LR FCO 144LED 5700K 1850mA Pole heights and luminaire orientation and tilt as shown in the drawings and technical report Any other luminaire type proposed by the contractor needs to be designed for lux and uniformity requirements etc. in accordance with MOS Part 139.	
Primary circuits	Runway, Taxiway and IWDI Circuits	1 x 1C 4 mm2 CU Flex XLPE Stranded
Secondary circuits	Runway, Taxiway and IWDI Circuits	1 x 2C 1.5 mm2 CU Flex XLPE Stranded
Pits	Electrical Pits and Change of Direction Pit	As demonstrated in the drawings
PAL/AFRU	PAL+AFRU (Pilot Activated Lighting + AFRU)	Datasheet in Appendix D Existing to be reused
Aeromedical Shelter	Sylvania Schreder INDU Wall Pack 2 Layout details in technical report	Datasheet in Appendix E

A summary of the power demand for electrical items is provided in Table 4.3 to Table 4.8.

Table 4.3 Electrical design conditions

Parameter	Requirement
Primary Series Current (A)	6.6
Resistivity of copper @20C (ohm-m2/m)	1.724×10^{-6}

Table 4.4 Runway, taxiway and helipad light loads

Name	Wattage	Quantity	Load (W)
Elevated Runway Light (White)	8	38	304
Elevated Runway/Taxiway Light (Blue)	8	41	328
Elevated Runway Light (Omni directional Green)	8	4	32
Elevated Runway Light (Uni-directional Green/Red)	8	12	96
Elevated Taxiway Hold Light (Yellow)	8	2	16
Elevated Helipad Light (Green)	8	23	184
Flush Helipad Light (Green)	8	1	8
Total Runway load			**968**

The exact load of the IWDI is unknown as the existing IWDI does not have documentation detailing the model. As the IWDI is halogen, we can use known halogen IWDI values and the existing 6A fuse to assume the following loads.

Table 4.5 IWDI light loads

Name	Wattage	Quantity	Load (W)
IWDI	600	1	600
Total IWDI Loads			**600**

Table 4.6 Power loss calculation in Primary and Secondary

Equipment	Primary Cable (mm2)	Rp Primary (Ohm)	Pp Primary Power (W)	Secondary Cable (mm2)	Rs Secondary (ohm)	Ps Secondary Power (W)	Total Power Demand (W)
Runway, Taxiway and Helipad Lights	4	14.08	613.17	1.5	20.86	979.73	1885.55

Table 4.7 Power demand summary

Item	Equipment	Power Demand (W)
1	MIT	2500
2	IWDI	600
3	PAL/AFRU	100
4	Centre Apron Floodlights	264
5	North Apron Floodlights	539
6	INDU Wall Packs	280
	Total Power Demand	**2969**

Table 4.8 Cable Schedule

Cable Detail	From	To	Cable Detail	Installation	Demand Current	CB size
A1	ALER DB	MIT	1 x 2C 4 mm2 CU Flex XLPE Stranded + E	Wiring Enclosure in air	11.36	16
Primary	MIT	SITs	1 x 1C 4 mm2 CU Flex XLPE Stranded	Underground	9.52	16
Secondary	SITs	LEDs	1 x 2C 1.5 mm2 CU Flex XLPE Stranded	Underground	0.75	2
B1	ALER DB	Centre Apron Lighting	1 x 2C 10 mm2 CU Flex XLPE Stranded	Underground	4.02	6.00
B1	Centre Apron Lighting	North Apron Lighting	1 x 2C 6 mm2 CU Flex XLPE Stranded	Underground	2.7	-

B2	ALER DB	Aeromedical Shelter	1 x 2C 1.5 mm2 CU Flex XLPE Stranded	Underground	1.00	2

4.4 Future Proofing

The AGL design has been undertaken adopting LED technology for all lighting infrastructure.

4.5 Constructability

4.5.1 Cabling Requirement

All cabling must be installed as per AS/NZS 3000:2018 and joints carried out as per the drawings and best practices for Aerodrome lighting. Cables are sized as per AS/NZS 3008.1.1 and the depth of cables for secondary circuits and low voltage (LV) circuits (IWDI) must be a minimum of 600mm below the surface level. High Voltage (HV) circuits (each Primary Circuit) must be a minimum of 750mm below surface level.

4.5.2 Pits and Ducts

As per the above requirements for safe practices of electrical cable depths, all cables shall have conduits as per the lighting design. 100mm conduits for the Primary circuits shall run between SIT at a minimum depth of 750mm and 50mm conduits for the secondary circuits and LV circuits shall be installed at a depth no less than 500mm. The original client requirements specified the cables to be installed at 600mm below surface level, however typical practice in Australia is to adopt a 750mm depth and has been adopted for the design. It is further noted that this could potentially be reduced pending additional calculations to ensure that the cable size does not need to increase. A 50mm spare conduit runs between each pit as primary feed cable. All conduit shall have draw-ropes in situ. Electrical marking tape shall be installed as per AS/NZS 3000:2018.

Pits shall be installed flush with the final grade surface and the ground compacted to ensure a level surface is maintained. Pits shall have an appropriate gravel bases beneath the pit to allow for acceptable drainage and be backfilled with cement stabilised sand as per the manufacturers recommended installation procedures. The Contractor is to ensure that the installation methodology will ensure an appropriate life cycle flushness of the pit in the installed surfaces.

Ducts shall be backfilled appropriately and compacted to ensure integrity of final surface.

4.6 Design Assumptions

The following assumptions have been made regarding the development of the AGL design:

- Primary Series current to be 6.6A
- Resistivity of copper @ 20ºC is 1.724 x 10^{-6} (ohm-m2/m).
- PAL LEDs are 8 Watt for Runway lighting, Taxiway lighting, threshold lighting – either omni-directional elevated or bidirectional elevated.

The current (2019) version of MOS Part 139 has been adopted.

5 Cost Analysis

A high level cost estimate has been prepared to accompany this design submission and is summarised in Table 5.1.

Table 5.1 Detailed design cost estimate summary

s47(1)(b)

WBS	Description
1	AGL Fixtures and Fittings
2	AGL Cabling/Trenching
	Subtotal =
	Contingency (10%) =
	Project Budget =

The following assumptions and exclusions apply to the cost estimate above:

- Blanket budget contingency of 10% has been applied;
- Accuracy of the above cost estimate is not guaranteed;
- All costs are excluding GST;
- All costs are in 2021 Australian dollars; and
- Standard unit rates have been utilised.

Appendices

Appendix A – ALS 2.5kVA manual

ALS

2.5KVAMIT LED

Product Specification

ALS Part No:	**Y9/2.5KVAMITLED** 89015 (Quote in all correspondence)
Description:	Mains Isolation Transformer – Open type
Electrical Ratings:	Input Voltage – Single phase 0.10, 220, 240, 400, 420, 440V, 50Hz Input Current – 5.7A – 11.4A Output Voltage – 0, 10, 20, 40, 80, 100, 150, 200, 250, 300, 379V Output Current – 6.6A (2.50kVA)
Standard:	Relevant sections of AS61558
Insulation Class:	F (150C). Ta = 60C.
Dimensions:	285mmH x 270mmW x 230mmD.
Weight:	30.0kg approx.

Appendix B – Elevated LED Datasheet

PAL LED Permanent Airport Light

ALS
PAL LED

Airport Lighting Specialists Pty Ltd

Features

PAL LED lights are NATA certified and MOS139 compliant.

Made tough for for harsh Australian conditions.

LED light source – extremely long life.

Power consumption only 10% of incandescent lamps.

Power savings of 50-75% over entire system.

Tough UV stabilized polycarbonate lens.

ASA body that won't rot, rust or crumble.

Lenses are guaranteed for 5 years
(You can't break a single-colored lens).

We make them, so spares are always available.

Superior design means lenses don't jam or break.

Colours

PAL lights are available in all aviation colors.

Green –	Outer Threshold
Green / Red –	Threshold / End
Red -	Runway End
White –	Runway Edge
Blue –	Taxiway, Apron Edge, Turning Node
Yellow –	Holding Point

Other special combinations of colors can be supplied on request – just call us.

Easy Mounting

PAL lights can be screwed to the top of a pit with the series isolation transformer located directly below.

Other mount options are available.

Contact us if you need additional information – we stock all the parts you need.

LED PAL lights for 6.6 Amp circuits

Upgrading to LED can be simple.

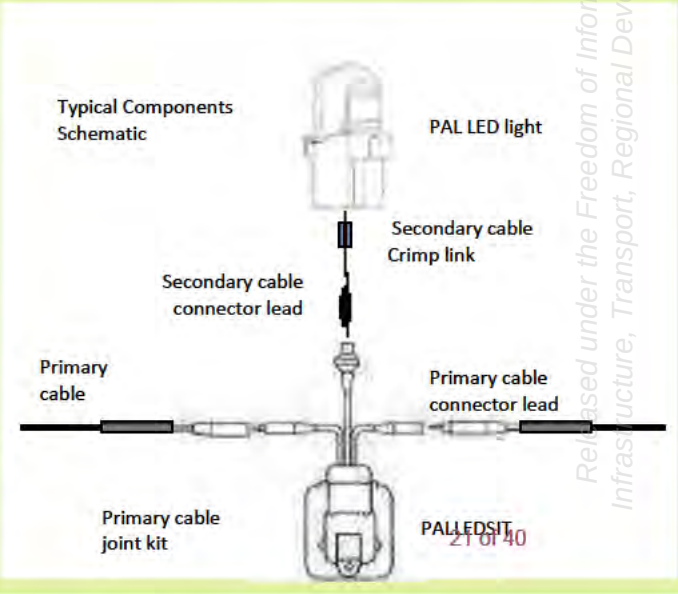
LED light engine is compatible with existing PALs.

Current specific LED SIT ensures precise light output.

Cable losses and connection stress are reduced due to the lower secondary current.

Low power requirement means a smaller MIT is needed.

Lower primary voltages may reduce trenching depth and therefore installation cost.

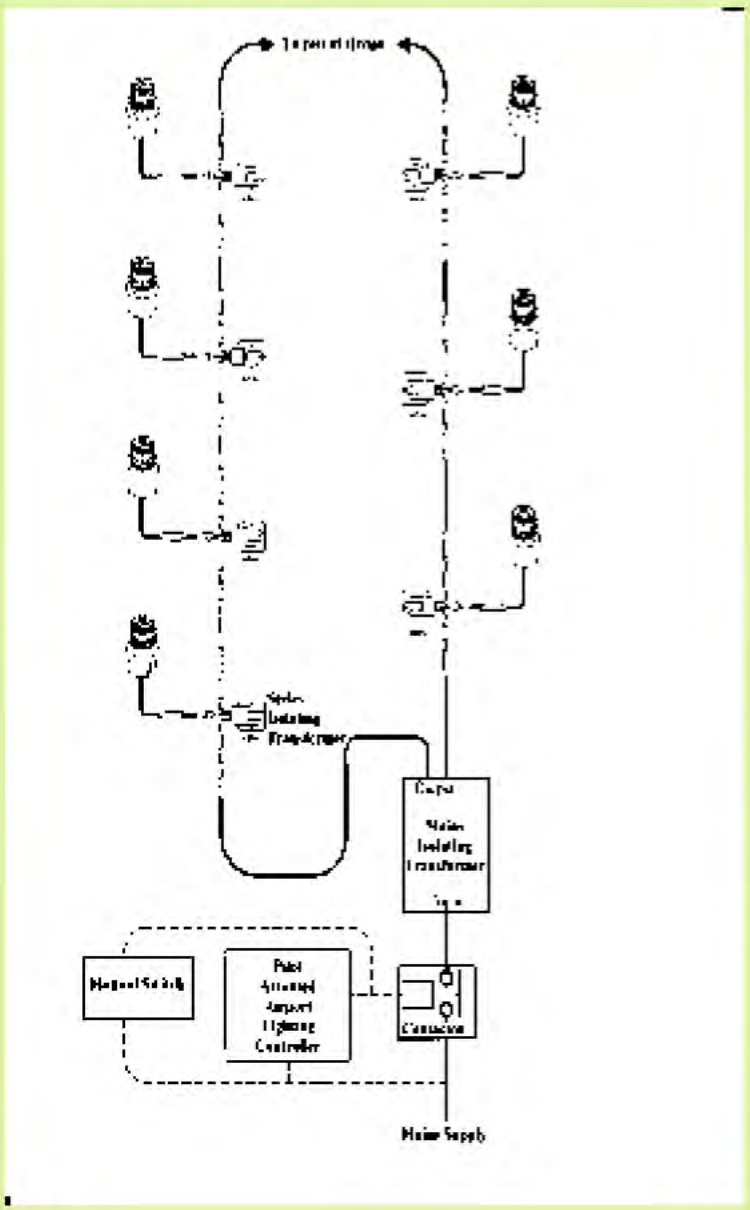


Compliances

Civil Aviation Safety Authority Australia
CASA Manual of Standards Part 139,V1.12 Ch. 9,
Low Intensity Clauses of Sections 9.10 to 9.15

Independantly tested in NATA accredited laboratory

International Civil Aviation Organization
ICAO Annex 14, Volume I, Chapter 5,
Sections 5.3.9.9, 5.3.10.9, 5.3.11.4, 5.3.16.6



They are tough!

Just to show how tough they really are: that's a
3 tonne truck parked on a PAL lens!
(Don't try this with a glass lens).

Other items

PAL lights operate as
part of a series circuit,
so naturally we supply
all the other parts as well!

ALS also supplies:

SITs	Leads,
Connectors	Cables
Lamps	MIT
CCR	RTIL
PAALC	AFRU
IWDI	Socks,
Cones	Gables…

The list goes on!

Why LED?

LED lighting saves energy and produces less greenhouse emissions than equivalent lamps.

LED fittings save on maintenance and spares.
The color remains the same if the LEDs are dimmed.
(Crisp, bright colours). No heat or electrical stress on fittings.

Stock Codes

PAL LED lights

Colour of light	Stock Code
White	PALLEDMOSCLEAR
Red/Green	PALLEDMOSREDGREEN
Green	PALLEDMOSGREEN
Red	PALLEDMOSRED
Blue	PALLEDMOSBLUE
Yellow	PALLEDMOSYELLOW

Series Isolation Transformers

Current	Stock Code
6.6A/350mA	PALLEDSIT6.6A/350
6.6A/700mA	PALLEDSIT6.6A/700

Cables, connectors and joint kits

Item	Stock Code
Primary cable (5kV)	V5/61CALP
Primary Plug/Socket Lead	V10/FAA
Primary Joint Kit	V10/386F
Primary Plug & Socket kit	54SUPERZ6Z6
Secondary cable	V5/3045
Secondary Plug	95MPH
Secondary Joint Crimp	V10/WPS2

Dimensions

Installed height	195 mm
Lights per carton	1 piece
Carton size	150x150x210 mm
Packed weight	0.6 kg

Airport Lighting Specialists Pty Ltd

Phone + 61 (0)3 9432 0511 Fax + 61 (0)3 9432 1952
sales@airportlighting.com.au www.airportlighting.com.au
Factory 5 / 20 Peel Street, Eltham, Victoria, 3095

AUSTRALIAN MADE.

ZA290LED INSET LED LOW INTENSITY LIGHT

ALS
ZA290LED

Airport Lighting Specialists Pty Ltd

NATA

TESTED

Features

ZA290 LED lights are NATA certified and ICAO / MOS139 compliant.

Designed for harsh conditions.

LED light source – extremely long life.

Power consumption 10% of incandescent lamps.

Power savings of 50-75% over entire system.

NVG compatible optional, Infra-red output at 850nm.

Glass Lenses, anodised aluminium body.

Power options: 6.6A Series circuit, low voltage 24 or 48 V DC or 230VAC mains power (dimmable with suitable driver)

Colours

ZA290LED lights are available in all CASA and ICAO aviation colors.

Green –	Threshold
White –	Runway edge.
Blue –	Taxiway, Parking position.
Yellow –	Holding Point.
Red -	Runway end

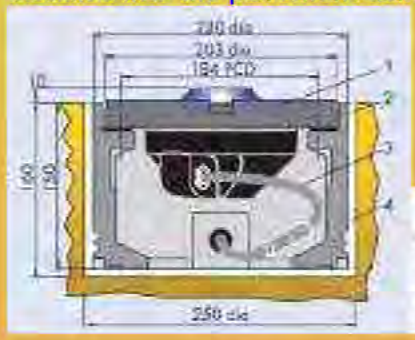
The lowest power consumption- Typically below 12 watts per fitting.

Low secondary current allows long secondary cable runs with negligible losses.

Especially efficient where SITs are located outside the flight strip.

Mounting (typical)

ZA290LED lights are fitted into a seating pot which is installed into the pavement using epoxy grout adhesive.



Airport Lighting Specialists Pty Ltd

Phone + 61 (0)3 9432 0511 Fax + 61 (0)3 9432 1952
sales@airportlighting.com.au www.airportlighting.com.au
Factory 5 / 20 Peel Street, Eltham, Victoria, 3095

25 of 30

NATA

TESTED

Appendix C – Apron Lights Datasheet

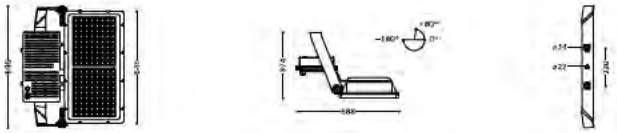
R–System gen3

A–Series / E–Series

R2

26 kg
+ 2 kg Driver

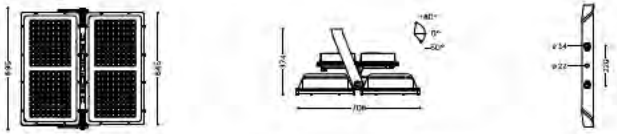
① = 0,33
② = 0,11* / 0,15**



R4

43 kg
+ 4,5 kg Driver

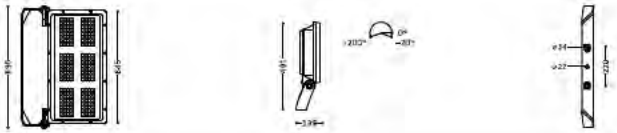
① = 0,45
② = 0,12* / 0,31**



R2–SPORT

20 kg
+ 4,5 kg Driver

① = 0,27* / 0,27** / 0,09***
② = 0,06* / 0,15** / 0,24***



R4–SPORT

37 kg
+ 6,5 kg Driver

① = 0,45* / 0,45** / 0,10***
② = 0,10* / 0,28** / 0,47***

① Projective windage area [m²] ② Lateral windage area [m²] *Tilt 0° **Tilt 30° ***Tilt 90°

FLOODLIGHTS

Models / Equipment Variations

R2 R4

Product Variations

R2 (E–Series) R4 (E–Series)

R2–SPORT (A–Series) R4–SPORT (A–Series)

Accessory

Swivel-mounted bracket Switchboard

Model	Luminous Flux [lm]	Max. Power [W]	Current Feed [mA]	LEDs
R2	90,000	762	1,850	144
R2–SPORT	125,000	1,015	1,800	192
R4	180,000	1,525	1,850	288
R4–SPORT	250,000	2,030	1,800	384

CONSTANTLY UPDATED DATA:
configurator.ewo.com

- Current feed: up to 1,850 mA, depending on ambient temperature
- Allowed ambient temperature range: –40 to +55 °C
- Lifetime: L 90B10 > 60,000 h, SPORT > 30,000 h
- Electronic operating device with DALI 2 or Push-Dimm
- Smart Lighting: control modules for different communication standards available upon request
- Various light distributions for large-area, high bay or street lighting
- Lens made with UV-stabilised polycarbonate, cover in single-pane safety glass (ESG)
- Luminaire housing in die-cast aluminium
- Bracket made of hot-dip galvanised steel, on request with swivelling bracket for floor, wall and ceiling mounting
- Finish: polyester powder coating, white aluminium (RAL 9006 / DB 701)

IP66 RoHS IK08

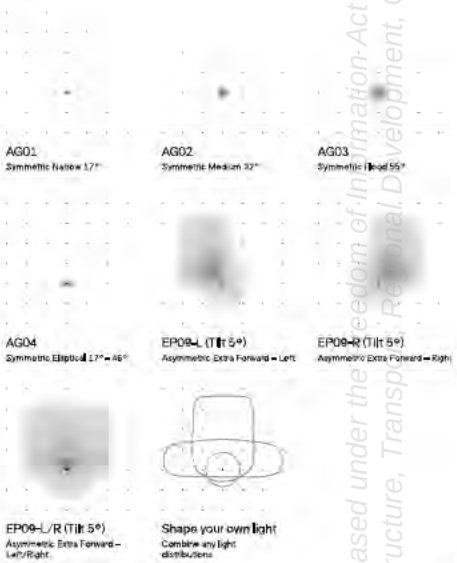
CE

Colour Temperatures

4,000 K 5,700 K

Standard CRI ≥ 70, CRI ≥ 80 upon request

Light Distributions



AG01
Symmetric Narrow 17°

AG02
Symmetric Medium 32°

AG03
Symmetric Broad 55°

AG04
Symmetric Elliptical 17° – 46°

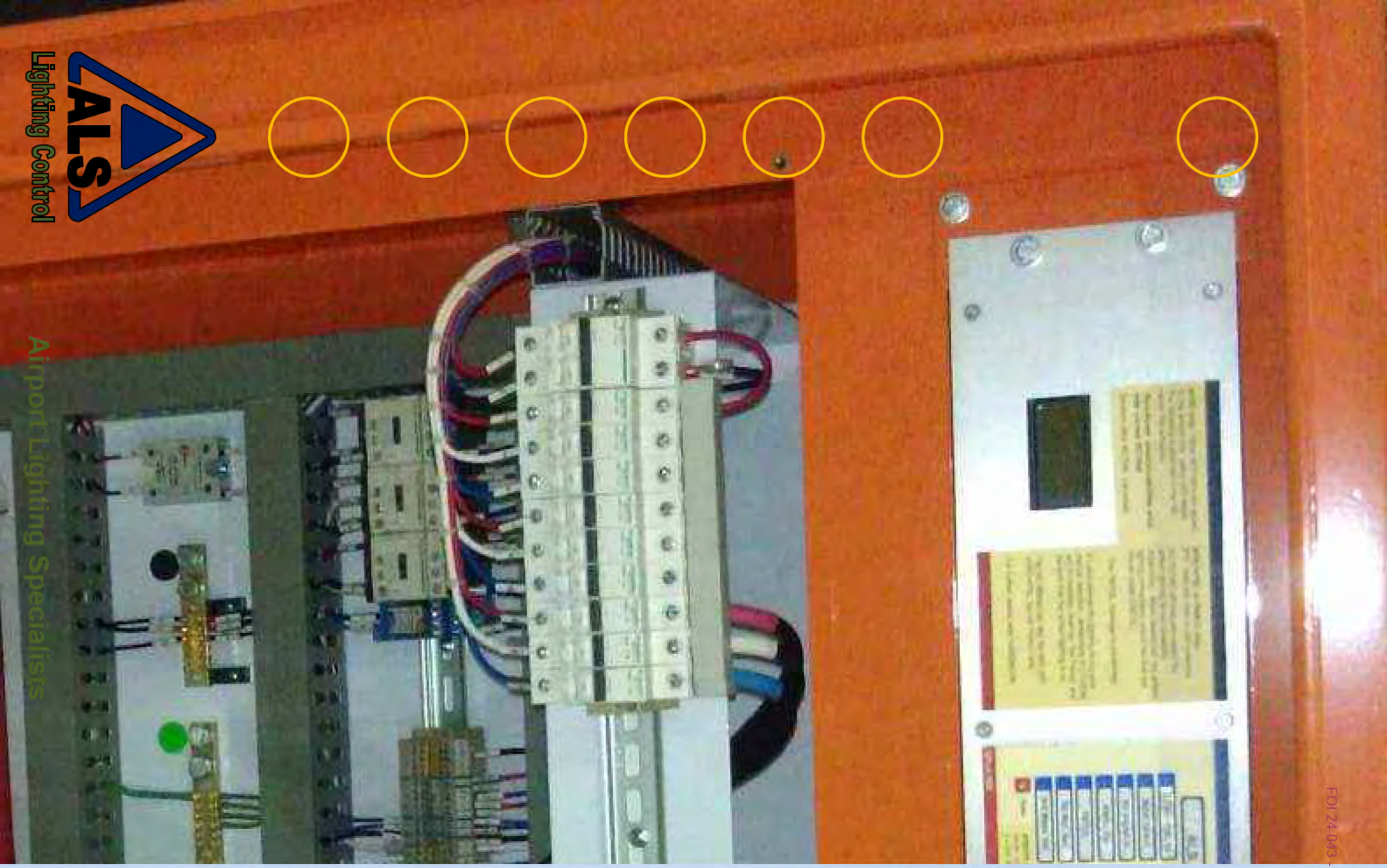
EP09–L (Tilt 5°)
Asymmetric Extra Forward – Left

EP09–R (Tilt 5°)
Asymmetric Extra Forward – Right

EP09–L/R (Tilt 5°)
Asymmetric Extra Forward – Left/Right

Shape your own light
Combine any light distributions

Appendix D – AFRU/PAL Specification



Lighting Control

Airfield lighting power supply and control

In addition to our full range of Airfield lighting equipment, ALS design and manufacture custom electrical switchboards for the activation, control and monitoring of airside lighting.

Each switchboard is designed for the specific site and we can configure the control and power supply to suit whatever operational and physical aspects may be peculiar to your application.

Construction:
Designed for long life, the enclosures are provided with a hot dip galvanized plinth.
Cabinet material will be selected for suitability to the installed location and climate.

We manufacture cabinets in powder coated mild steel, stainless steel and powder coated marine grade aluminum.

Outdoor cabinets are provided with shade panels to reduce internal temperatures.

Cubicles can be powder coated in various colors. Grey is typical, white reduces outdoor temperatures.

Control:
Airfield lighting can be activated remotely, using airband radio by incoming pilots.
Local control is also provided by a mode selector switch enabling manual or PAALC activation and deactivation for safety when servicing the circuits.
Optional PE mode allows dusk to dawn lighting when selected.
An auxiliary input for key switch is provided for local operation.

Monitoring:
The PAALC unit monitors current in the primary AGL and PAPI circuit and will transmit confirmation to the pilot of lighting activation or failure.
A panel ammeter is provided to allow the ARO to easily confirm the circuit current is correct.
Panel meters are provided for the AGL and PAPI circuits. Other circuits can also be monitored if required.

Protection:
All circuits are protected by fast acting circuit breakers.
RCD protection is not provided on isolated circuits but can be provided for internal GPOs and area lighting circuits.

Airport Lighting Specialists Pty Ltd
Phone + 61 (0)3 9432 0511 Fax + 61 (0)3 9432 1952
sales@airportlighting.com.au www.airportlighting.com.au
Factory 5/20 Peel Street, Eltham, Victoria, 3095, Australia

Solar back up:
For remote sites, subject to power outages, we provide solar backup and long runtime batteries for the PAALC system which ensures the PAALC can warn pilots of the lighting outage for extended periods. Where generator power is available, this can also save fuel by only starting a generator if the lighting is actually requested.
Light sensors prevent generator starts during daylight when lighting is not required

Mains Isolation Transformers:
1.0-2.5 KVA for LED circuits
2.5-10.5KVA for lamp circuits
Single (240V) or three phase (415V)
Convection cooled, rated for continuous operation in high temperatures.

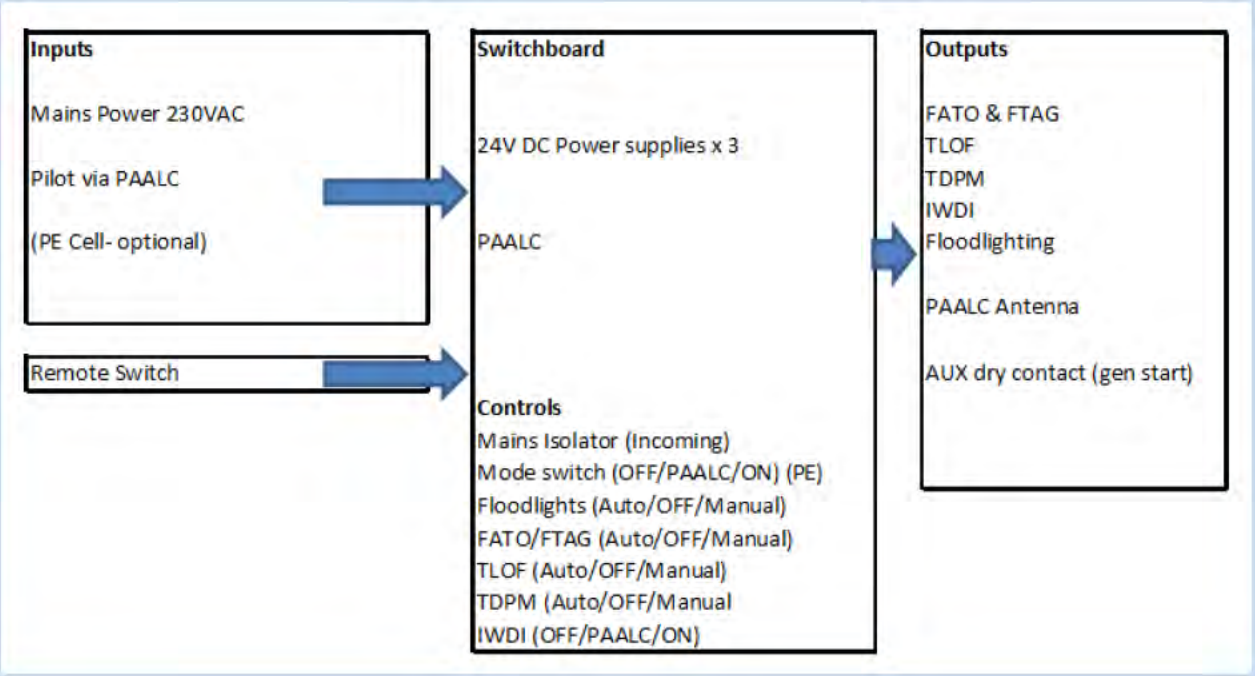
Constant Current Regulators:
Integrated into the control system or stand alone.
Australian manufactured for continuous high temperature operation.
Automatic control or local override.
3 or 6 adjustable intensity steps.
Short and open circuit protection.
Constant output with fluctuating input voltage.
Brownout protection.

Compliances and certification

Transformers to FAA AC 150/5345-47

Airport Lighting Specialists Pty Ltd
Phone + 61 (0)3 9432 0511 Fax + 61 (0)3 9432 1952
sales@airportlighting.com.au www.airportlighting.com.au
Factory 5/20 Peel Street, Eltham, Victoria, 3095, Australia

Typical Switchboard Input / Outputs. These can be customized to meet the site requirements:



Airport Lighting Specialists Pty Ltd
Phone + 61 (0)3 9432 0511 Fax + 61 (0)3 9432 1952
sales@airportlighting.com.au www.airportlighting.com.au
Factory 5/20 Peel Street, Eltham, Victoria, 3095, Australia

PAALC/AFRU Pilot Activated Airport Lighting Controller

Operation

User selectable functions:

As a PAALC, 3 microphone clicks on the designated frequency will activate the airfield lighting for a timed period and confirm operation with a recorded message.

As an AFRU, a single, 2 second microphone click will activate an airfield identification message.

As a PAALC/AFRU, both functions are available.

ALS PAALC/AFRU

Airport Lighting Specialists

Features

- PAALC only for airfield lighting control with voice confirmation
- AFRU only voice response and beep back
- AFRU + PAL for both functions
- AMCA compliant transceiver for ground to air communication
- 19” rack or shelf mounting
- Backup battery for power outages
- Tuned for 15NM range with supplied antenna and 10m cable
- Made in Australia for harsh conditions.
- Local support and backup
- Comprehensive installation and operation manual
- Control tower override input
- Fail safe operation, lights turn ON if PAALC fails.
- Aerodrome unserviceability message option
- 30 or 60 minute lighting periods are selectable by operator
- Lighting inspection / test mode

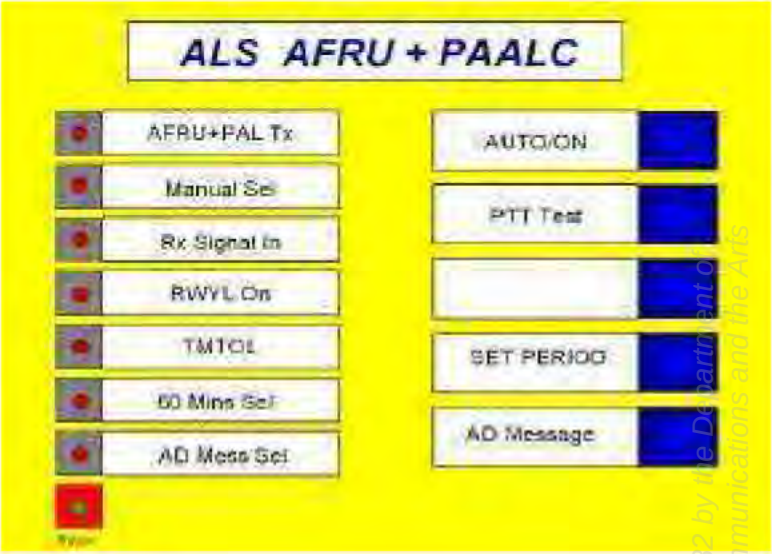
Operation modes

The correct series of microphone clicks will remotely activate the unit for lighting control or aerodrome identification.

Manual activation of lighting from the front panel.

Manual activation of lighting by a key switch.

Override by ATS tower control.



Compliance

Civil Aviation Safety Authority Australia (CASA)

CASA Manual of Standards Part 139,

Ch 9 Section 9.3 Pilot Activated Lighting Systems

Ch 14 Section 14.3 Frequency Confirmation System

ACMA compliant transceiver ICOM A120E

Dimensions

Width 432mm (fits standard 19” rack)
Height 133mm
Depth 380mm
Weight 5kg

Note

Frequency allocation and transmitter licensing can be arranged. Additional charges apply.

A cavity filter is required and is sold separately. If you need one, contact ALS for pricing.

AUSTRALIAN MADE

Airport Lighting Specialists Pty Ltd

Phone + 61 (0)3 9432 0511 Fax + 61 (0)3 9432 1952
sales@airportlighting.com.au www.airportlighting.com.au
Factory 5/20 Peel Street, Eltham, Victoria, 3095, Australia

Additional PAALC and AFRU information.

Frequency allocation and licencing.

Airservices Australia will allocate a frequency to new PAALC/AFRU units. The frequency is allocated to minimise the possibility of interference between units at nearby airports.

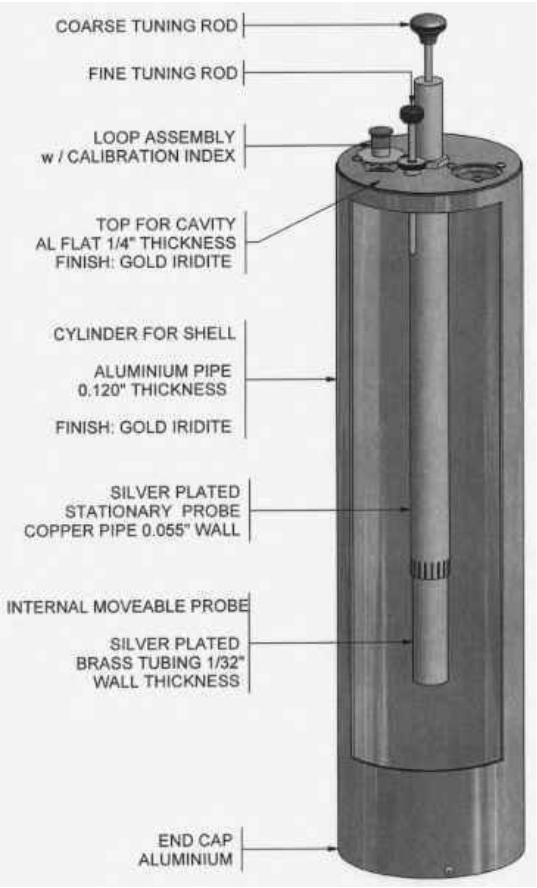
Once the frequency is allocated, ACMA will licence the installation and it is recorded in https://web.acma.gov.au/rrl/register_search.main_page

The mandatory licence is issued at time of application and mut be renewed by the equipment operator thereafter.

Airport Lighting Specialists can assist you with the frequency allocation and licencing process for your equipment. Additional fees and charges apply.

Cavity Filter.

It is a licence condition that a cavity filter be installed. These are tuned for the specific operation frequency allocated in the licencing process. Cavity filters can be supplied but are not included in the PAALC cost.



Appendix E – INDU wall pack 2 datasheet

INDU WALL PACK

IP 65

IK 09

Comfort and efficiency for exterior lighting

Available in two sizes, INDU WALL PACK outperforms all conventional downlight fixtures by providing a bright and long-lasting light for outdoor wall mounted applications. Its slim design ensures a discreet integration without compromising on performance.

INDU WALL PACK delivers a bright white light to ensure perfect visibility and comfort at all times. Thanks to its high optical performance and strong mechanical design, it can achieve substantial energy and maintenance savings. As an option, INDU WALL PACK can integrate a detection sensor and a battery for anti-panic lighting.

RAILWAY STATIONS & METROS

CAR PARKS

INDUSTRIAL HALLS & WAREHOUSES

SPORT FACILITIES

INDU WALL PACK | SUMMARY

Schréder

Concept

The INDU WALL PACK range provides a cost-effective and environment-friendly

LED alternative to fixtures fitted with HID or incandescent lamps. It creates safe and comfortable environments with significant energy and maintenance savings.

These wall-mounted downlight fixtures are composed of a two-piece housing with a powder-coat paint finish; a backplate in die-cast aluminium and a front part in polycarbonate with a polycarbonate protector.

The design of INDU WALL PACK facilitates its installation. Once the mounting plate is fixed to the wall, the optical unit can be easily wired and screwed onto the plate.

Suited to various applications such as building exteriors, outdoor corridors, garages, paths, stairs and other outdoor or indoor environments, INDU WALL PACK not only provides energy efficient lighting, it enhances safety and comfort for people working or visiting facilities.

With its photometric performance, INDU WALL PACK optimises the spacing between two units and reduces the investment and installation time.

As an option, it enables smart lighting: a motion and daylight sensor can create autonomous light-on-demand scenarios for comfort and safety with maximised energy savings while an integrated battery preventspanic in case of a power outage.

INDU WALL PACK is available in two sizes to deliver the most suitable solution.

INDU WALL PACK is secured to the surface with 4 screws.

Thanks to its photometric performance, INDU WALL PACK optimises the spacing between two units.

As an option, a sensor (motion and daylight) and a battery are proposed for maximised savings and enhanced safety.

TYPES OF APPLICATION

- RAILWAY STATIONS & METROS
- CAR PARKS
- INDUSTRIAL HALLS & WAREHOUSES
- SPORT FACILITIES

KEY ADVANTAGES

- High energy savings compared to systems with traditional discharge lamps
- Two sizes to provide the best solution
- Robust yet discreet design to blend into any environment
- High visual comfort
- White light with a high colour rendering index
- Easy installation with removable back plate
- Integrated motion detection sensor (option)
- Emergency lighting with optional battery

INDU WALL PACK | CHARACTERISTICS

Schréder

GENERAL INFORMATION

Recommended installation height	3m to 6m | 10' to 20'
Driver included	Yes
CE Mark	Yes
ENEC certified	Yes
ROHS compliant	Yes
IFS (food & beverage) rev 6.1. compliant	Yes
French law of December 27th 2018 - Compliant with application type(s)	a, b, c, d, e, f, g
Testing standard	LM 79-08 (all measurements in ISO17025 accredited laboratory)

HOUSING AND FINISH

Housing	Aluminium Composite materials
Protector	Polycarbonate
Housing finish	Polyester powder coating
Standard colour(s)	RAL 7040 window grey
Tightness level	IP 65
Impact resistance	IK 09

OPERATING CONDITIONS

Operating temperature range (Ta)	-20 °C up to +50 °C / -4 °F up to 122 °F

· Depending on the luminaire configuration. For more details, please contact us.

ELECTRICAL INFORMATION

Electrical class	Class I EU
Nominal voltage	220-240V – 50-60Hz
Power factor (at full load)	0.9
Surge protection options (kV)	1 2
Electromagnetic compatibility (EMC)	EN 55015:2013/A1:2015, EN 61000-3-2:2014, EN 61000-3-3:2013, EN 61547:2009, EN 62493:2015
Control protocol(s)	1-10V, DALI 2.0
Sensor	Motion sensor (optional)
Emergency	Optional integrated battery

OPTICAL INFORMATION

LED colour temperature	3000K (Warm White 830) 4000K (Neutral White 840)
Colour rendering index (CRI)	>80 (Warm White 830) >80 (Neutral White 840)

LIFETIME OF THE LEDS @ TQ 25°C

All configurations	50,000h - L95

JJ RYAN CONSULTING PTY LTD

Echuca Aerodrome Concept Plan

June 2020

Prepared by JJ Ryan Consulting Pty Ltd for Campaspe Shire Council

www.jjryan.com.au

ABN: 69 145 797 726

JJR-4191027A

Version History

Version Number	Prepared By	Revision Date	Approved By	Approval Date	Description
0.1	T Baxter	5 June 2020	J Ryan	XXX	Draft Concept Plan for Council review
1.0	T Baxter	30 June 2020	J Ryan	30 June 2020	Final Concept Plan

Important Notice

This report is confidential and is provided solely for the purposes of Campaspe Shire Council (CSC). This Concept Plan is provided pursuant to a Consultancy Agreement between JJ Ryan Consulting Pty Ltd (JJR) and CSC under which JJR undertook to perform a specific and limited task for CSC. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. JJR makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. The executive summary is not a substitute for this. Any subsequent report must be read in conjunction with this report.

This report is a qualitative assessment only, based on the scope of services defined by the Client, budgetary and time constraints imposed by the Client, the information supplied by the Client and the method consistent with the preceding. JJR has not attempted to verify the accuracy or completeness of the information supplied.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. JJR is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which JJR becomes aware, after the date of this report.

Unless expressly agreed otherwise in writing, JJR does not accept a duty of care or any other legal responsibility whatsoever in relation to this report, or any related enquiries, advice or other work, nor does JJR make any representation in connection with this report, to any person other than CSC. Any other person who receives a draft or a copy of this report (or any part of it) or discusses it (or any part of it) or any related matter with JJR, does so on the basis that he or she acknowledges and accepts that he or she may not rely on this report nor on any related information or advice given by JJR for any purpose whatsoever.

Executive Summary

Background Information

JJ Ryan Consulting Pty Ltd ("(JJR") have) has been engaged by Campaspe Shire Council (CSC) to develop the Echuca Aerodrome Concept Plan. The Concept Plan is to consider the long-term framework for the development of the following:

- Sizing and maintenance of existing and future facilities. The planning horizon consists of pavement strengthening and extensions to Runway 17/35 and the Terminal Apron, whilst also having regard to the need for an upgrade of associated paved surfaces;
- This Concept Plan covers a 20-year period from 2020 to 2040, with focus on developing Echuca Aerodromes relevant airside facilities and land side infrastructure;
- Local, tourism and business development needs within the Echuca region; and
- Environmental impacts on airport infrastructure and operations, and the development of adaptation options and pathways.

The Concept Plan establishes the strategic direction for the efficient and economic development of the aerodrome over the planning period by:

- Providing for the development of additional uses of the Echuca Aerodrome site;
- Reducing potential conflicts between uses of the aerodrome site; and
- Ensuring that uses of the airport site are compatible with the areas surrounding the aerodrome.

Campaspe Shire

Campaspe Shire (Shire) is in the North Central region of Victoria, approximately 180 kilometres directly north of Melbourne, with an area of 4,519 km^2. The northern boundary of the Shire is shaped by the Murray and Goulburn Rivers, with the Campaspe River influencing the landscape across the Shire. The Shire includes the townships of Echuca, Rochester, Kyabram and Rushworth with an approximate population of 37,208 was recorded in the 2016 Census data.

The Shire's prosperity is built around the thriving agriculture, fishing, forestry, manufacturing, health care and social assistance industries.

Echuca Aerodrome facilitates Aerial Ambulance medical evacuations, Royal Flying Doctor Service (“RFDS”), emergency response, access for dignitaries, courier and charter operations, general aviation (“GA”), aerial surveying and minor tourism.

The Echuca Aerodrome is registered by the Civil Aviation Safety Authority (CASA) and is owned and operated by CSC on behalf of the citizens of Echuca.

Aerodrome Infrastructure

Echuca Aerodrome caters for aeromedical, light aircraft charter operations and general aviation.

The aerodrome is serviced by Runway 05/23 and Runway 17/35.

Runway 05/23 is 510m long and 30m wide gravel runway. The runway strip associated with Runway 05/23 is 570m long and 60m wide.

Runway 17/35 is 1102m long and 30m wide with a central 18m sealed surface. Runway 17/35 currently has a reduced published runway width of 18m. The runway strip associated with Runway 17/35 is 1,222m long and 90m wide.

Environmental Factors

CSC has identified a need to ensure that any future growth and development of Echuca Aerodrome has considered the likely impact on the extent and quality of native vegetation across the site. It is important that long-term planning for the sustainable use and development of the Echuca Aerodrome accommodates any significant environmental factors, in order to achieve an integrated and balanced management strategy for this key infrastructure asset. Significant environmental factors include the threatened ecological communities or species listed at National, State or regional level under environmental legislation.

Forecasting

Growth forecast scenarios for annual aerodrome aircraft movements have not been developed to estimate future aerodrome infrastructure requirements due to the lack of movement data.

The following airport user groups represent the most frequent operations at Echuca Aerodrome:

- Aeromedical;
- General Aviation (GA); and
- Charter flights.

Airport infrastructure needs to be designed to ensure capacity to support future anticipated growth. It is recommended that CSC consider tracking aircraft movements at Echuca Aerodrome. Aircraft movement data can be analysed and forecast to provide an indication of future facility requirements.

Proposed Infrastructure Development

The current runway pavement comprises of a of a bitumen seal with 5mm aggregate on a gravel base and was last resealed around 2000. Pavement works are proposed to be undertaken at which time it is proposed to upgrade other airside infrastructure to accommodate the Beechcraft King Air 350.

Runway 17/35 is proposed to be extended north by 150m to provide a total runway length of 1252m to accommodate the Beechcraft King Air 350. This will not require land acquisition due to the location of the existing aerodrome boundary.

Geotechnical investigations were undertaken, including the drilling of boreholes and coring of the existing pavement material. The outcomes of the pavement testing was utilised as an input to the selection of an appropriate pavement upgrade recommendations.

Undertaking intrusive testing (pavement coring), gathering samples for laboratory testing and reverse engineering of the pavement allowed a technical evaluation of the PCN of the current pavement.

A PCN numerical value was technically assessed for each of the different pavement sections along the Runway, with a resulting PCN of 1 for Runway and a PCN of 1 to 3 for the Taxiways and Aprons.

The PCN is therefore below the ACN of the aircraft currently used by the Air Ambulance and RFDS.

Based on the results of this assessment, it is recommended that to accommodate the existing and proposed use of Air Ambulance and RFDS aircraft at the Airport, the pavement should be strengthened. The strengthening should be in the form of a full pavement reconstruction which can utilise the existing pavement as subbase (potentially stabilised) where possible and if desired.

If no treatment is applied, it should be anticipated that the pavement will deteriorate at an accelerated rate in coming years under the current and forecast traffic loading.

The Terminal Apron is proposed to be extended to provide sufficient pavement for parking of the Beechcraft King Air 200 and 350.

A covered area for aeromedical operations is proposed to allow all weather access for ambulance staff, Air Ambulance and RFDS.

Upgrading the existing runway, taxiway and apron lighting to LED technology has been included for longer term planning considerations to improve the environmental impact of the aerodrome and reduce energy use costs.

Locations for a helipad have been included in the development plans to facilitate helicopter operations including aeromedical evacuations.

Potential hangar locations have been identified to provide future space for an increase in general aviation at the Aerodrome. The hangars have been located so as not to inhibit future growth and expansion of the existing aprons.

The existing terminal building is proposed to be refurbished as part of the longer-term development plans. To protect against the impact of climate change, environmental and clean energy solutions are to be incorporated into the new terminal design.

CASA has released new safety requirements for aerodromes of all sizes across Australia. The updates reflect changes in technology and best practice and ensures Australia enhances its level of compliance with International Civil Aviation Organization (ICAO) standards. The new measures come into to place on the 13th August 2020 and are detailed in CASA's updated Manual of Standards (MOS) Part 139 - 2019. All recommendations for the Echuca Aerodrome Concept Plan have been developed in accordance with MOS 139 - 2019.

Contents

Tables

Figures

1 Introduction

1.1 Background

JJ Ryan Consulting Pty Ltd ("JJR") have been engaged by Campaspe ("CSC") to develop the Echuca Aerodrome Concept Plan ("Concept Plan") to guide the long-term framework for the development and maintenance of existing and future facilities. The planning horizon of this Concept Plan covers a 20-year period from 2020 to 2040, with focus on developing Echuca Aerodromes airside facilities over the next 5 years.

The Concept Plan will be utilised by CSC to guide the future development decisions of the Echuca Aerodrome and aid in the development of CSC aviation operations and facilities to achieve sustainable growth. This will allow Council to capitalise on future business, operations and commercial development opportunities for the continued future success of Echuca Aerodrome.

Australia's network of airports forms an integral part of the national economic infrastructure and are critical to connecting communities and enhancing broader economic performance. Airports need to be properly planned and protected to realise the benefits of their role in the national economy and a Concept Plan is a key component to the orderly and proper planning of any airport.

The Concept Plan establishes the strategic direction for the efficient and economic development of the aerodrome over the planning period by:

- Providing for the development of additional uses of the Echuca Aerodrome site;
- Reducing potential conflicts between uses of the aerodrome site; and
- Ensuring that uses of the airport site are compatible with the areas surrounding the aerodrome.

1.2 Overview of Campaspe Shire

1.2.1 Location and Access

Campaspe Shire (Shire) is in the North Central region of Victoria, approximately 180 kilometres directly north of Melbourne, with an area of 4,519 km^2. The northern boundary of the Shire is shaped by the Murray and Goulburn Rivers, with the Campaspe River influencing the landscape across the Shire (Figure 1.1). The Shire includes the townships of Echuca, Rochester, Kyabram and Rushworth with an approximate population of 37,208 was recorded in the 2016 Census data, (accessed 05/05/2020 from the Australian Bureau of Statistics (ABS) website, https://www.abs.gov.au).

A diverse transport network of rail and highways through the Shire supports excellent connectivity to domestic markets within Victoria and adjoining states of South Australia and New South Wales. The Shire is highly accessible to international markets with its transport network links to Victoria's ports and airports. The proximity to Victoria's capital city, Melbourne, with daily passenger rail and road transport services supports tourist accessibility to the Shire.

The Shire's prosperity is built around the thriving agriculture, fishing, forestry, manufacturing, health care and social assistance industries. These Shire industries are supported by a growing tourism industry, which is driven by a diverse range of historic and natural attractions and activities, including the Australian iconic Murray River, world's largest ironbark forest, historic gold rush townships and a developing gourmet food and wine attraction.

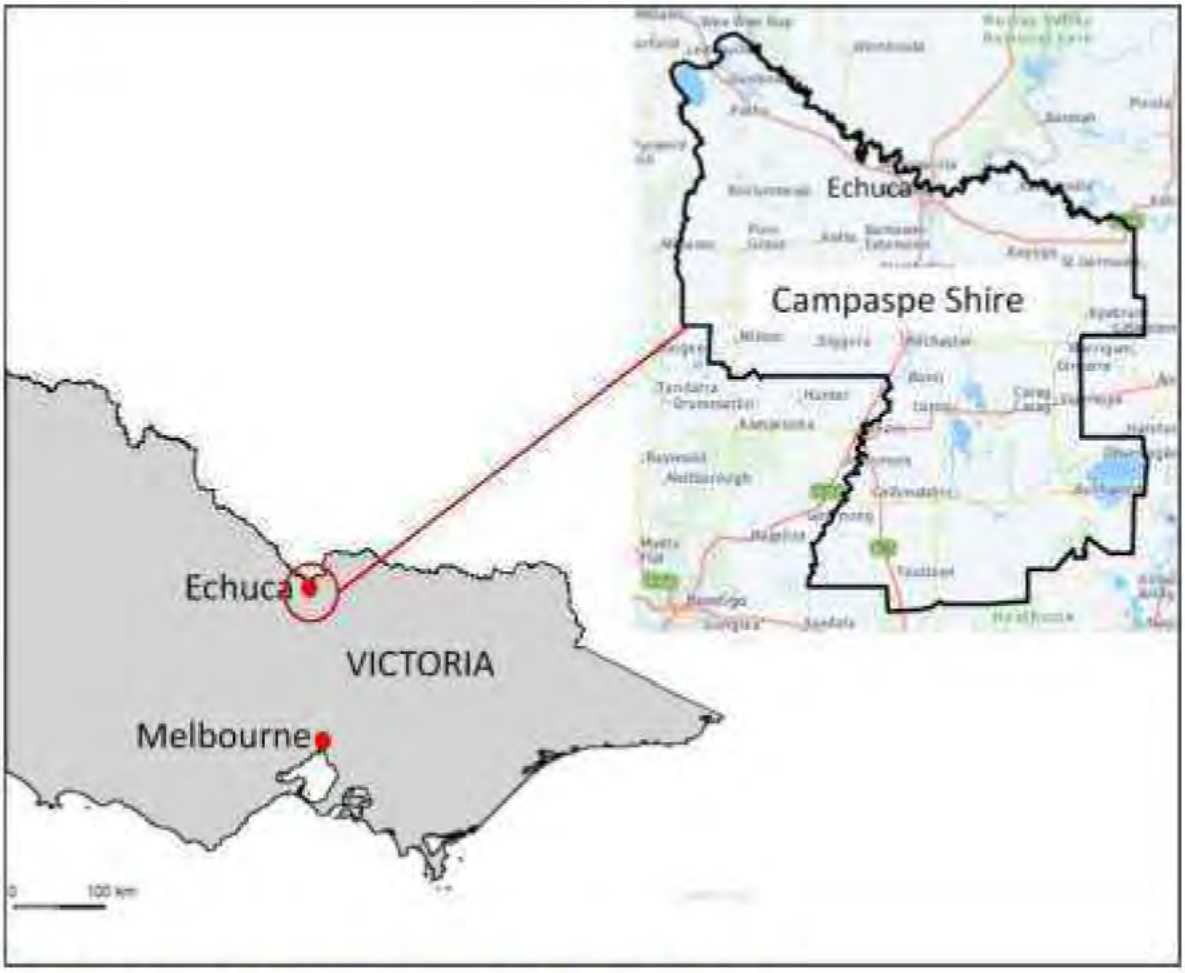


Figure 1.1 Location of Campaspe Shire within Victoria, Australia.

1.2.2 Climate in Campaspe Shire

Campaspe Shire has a Mediterranean climate, experiencing warm summers and cool to mild winters, with average daily temperatures between 15 and 18°C (). Current average temperatures for the Shire were based on a 12 month period between 1 May 2019 and 30 April 2020, and indicated average maximum daily temperatures between 21 and 24°C () and minimum daily temperatures between 6 and 9°C ().

In the last decade the Shire has experienced a warmer and drier climate, and endured extreme climate conditions, including drought, fire and floods. Under predicted climate change conditions, the Shire is likely to become warmer and drier, developing a more semi-arid climate with average daily temperatures increased by 1-2°C between 2030 and 2050 (Campaspe Environment Strategy 2018-2022).

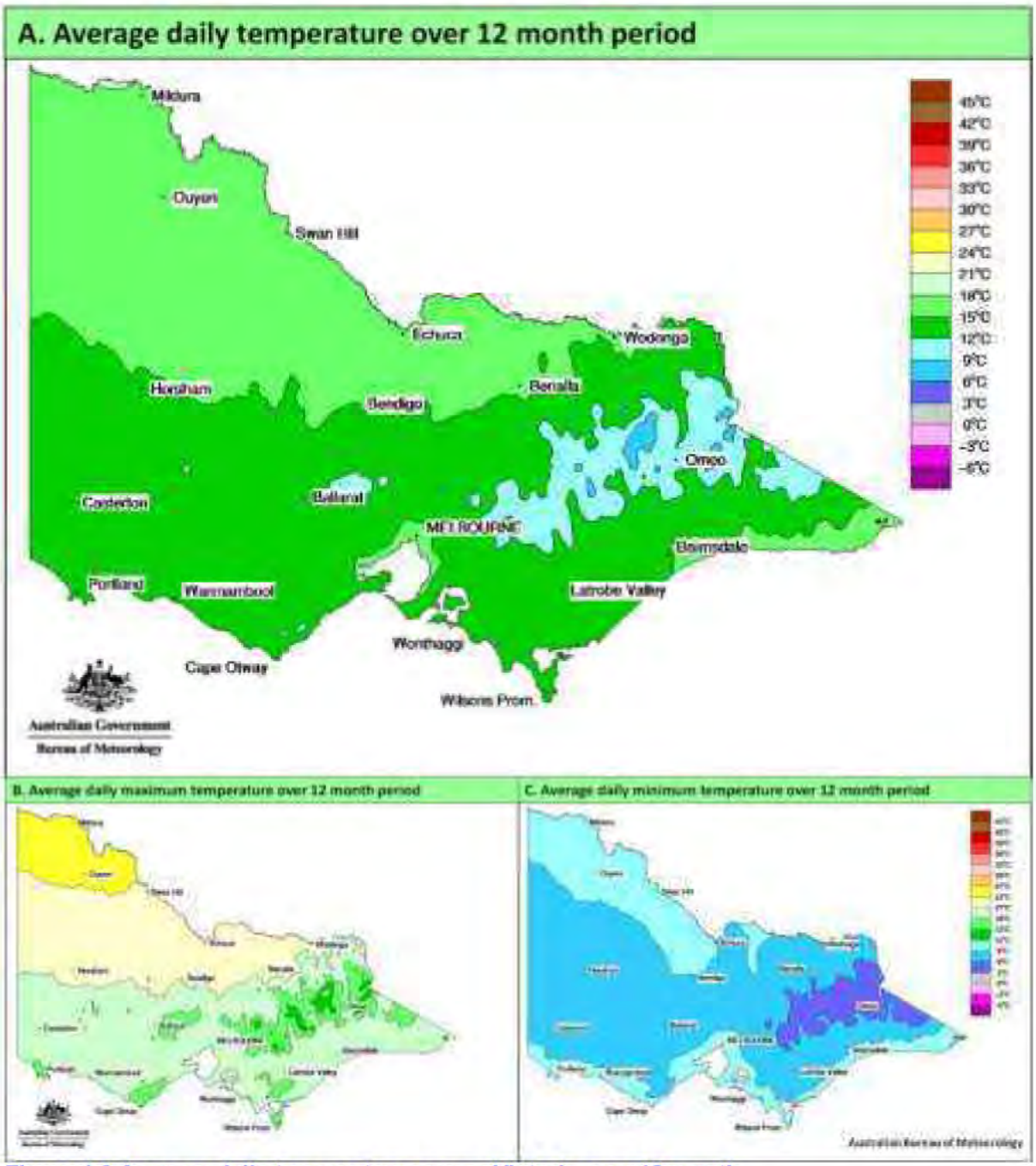


Figure 1.2 Average daily temperature across Victoria over 12 month.

Average annual rainfall across Victoria was estimated over a 30 year period between 1961 and 1990 (www.bom.gov.au), and indicated that rainfall within the Campaspe Shire tends to be uniformly distributed throughout the year (Figure 1.3). On average the Shire may receive annual rainfall between 400 and 600mm (Figure 1.3), with summer months slightly drier compared to winter months (Figure 1.3).

In the future, climate-change induced conditions predict that the Shire will experience drier conditions, with average rainfall approximately 100mm less than current average annual rainfalls (Campaspe Shire Environment Strategy 2018-2022).

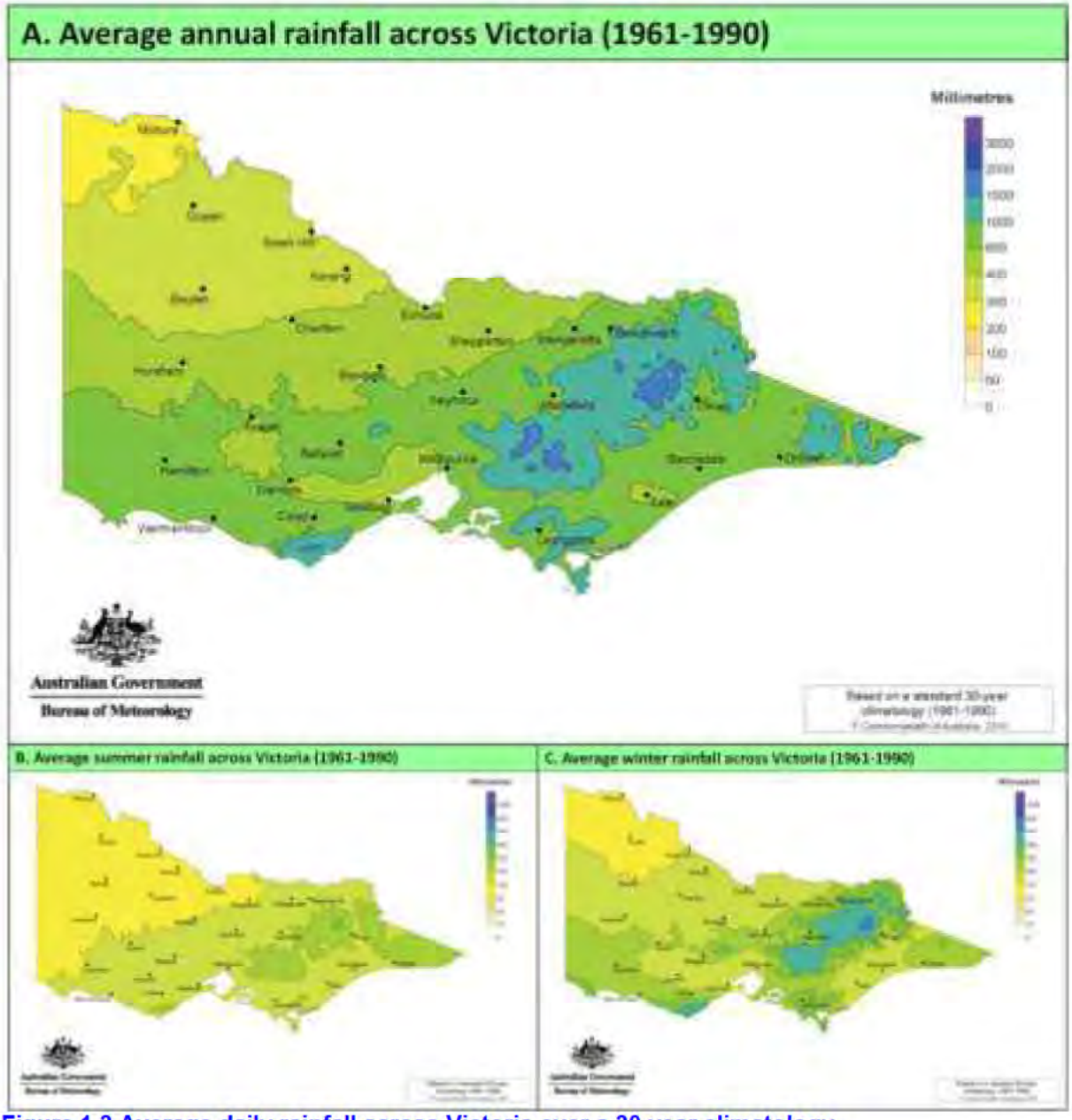


Figure 1.3 Average daily rainfall across Victoria over a 30 year climatology.

1.2.3 Climate at Echuca Aerodrome

Weather conditions at Echuca Aerodrome have been recorded since 1881, including temperatures and rainfall (www.bom.gov.au). While Echuca experiences on average maximum and minimum annual daily temperatures of 22.3°C and 9.3°C, respectively (Figure 1.4). Warmer temperatures tend to occur in summer months, being on average 29 to 31°C, although daily temperatures have been recorded above 40°C in the years 2009, 2012, 2016 and 2019. Winter months tend to experience cooler temperatures with averaged monthly minimum temperatures between 3.8 and 4.7°C (Figure 1.4). The coolest winter temperatures were recorded at -5.5°C in July 1982 and -5°C in August 1997, and more recently a low of -1.5°C in September 2018.

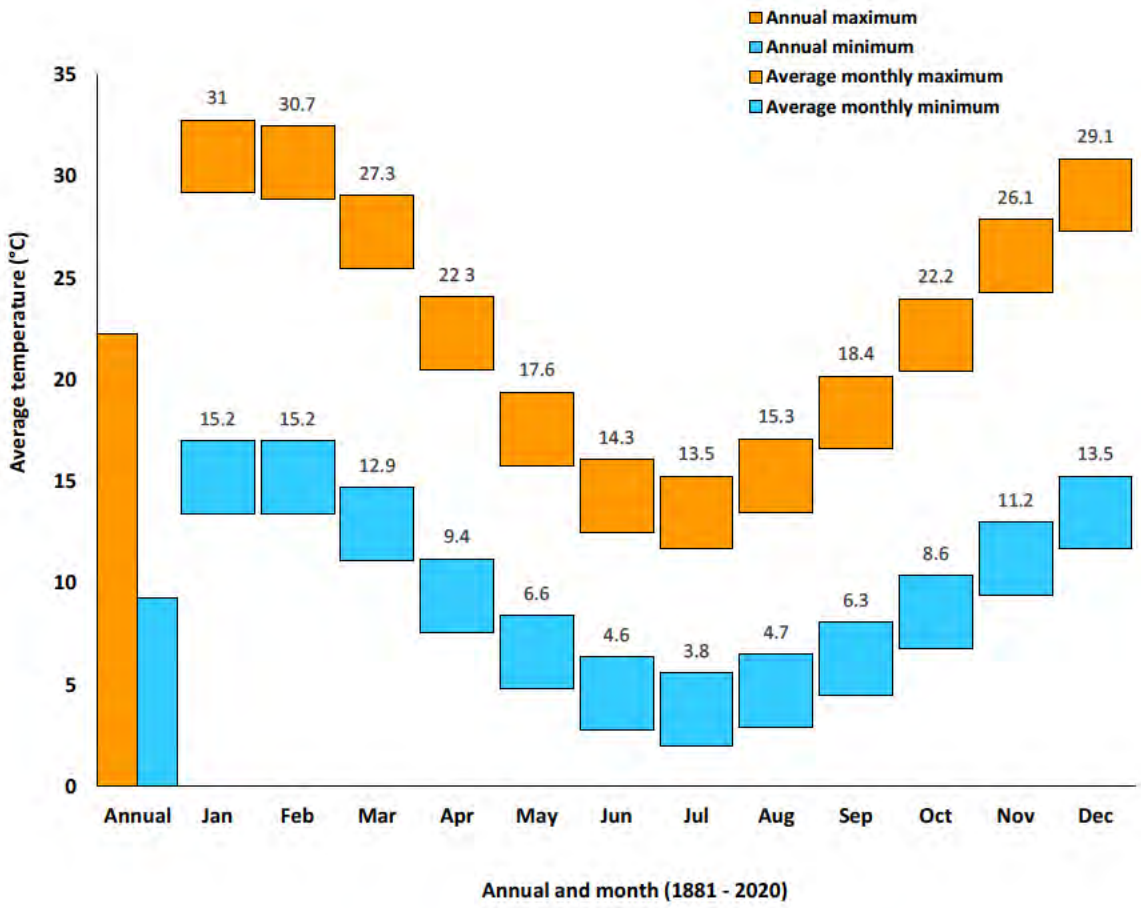


Figure 1.4 Average annual and monthly temperature(°C) at Echuca Aerodrome

On average, rainfall tends to be uniformly distributed throughout the year, with a median annual rainfall for Echuca of 426mm, based on records between 1859 and 2020 (Figure 1.5). The average annual rainfall indicates Echuca has experienced a consistent average above 400mm annually since rainfall has been recorded (Figure 1.5A), except for the most recent 30 year period between 1991 and 2020, which observed a lower average (398mm) compared to other 30 year periods between 1881 a and 1990 (Figure 1.5A).

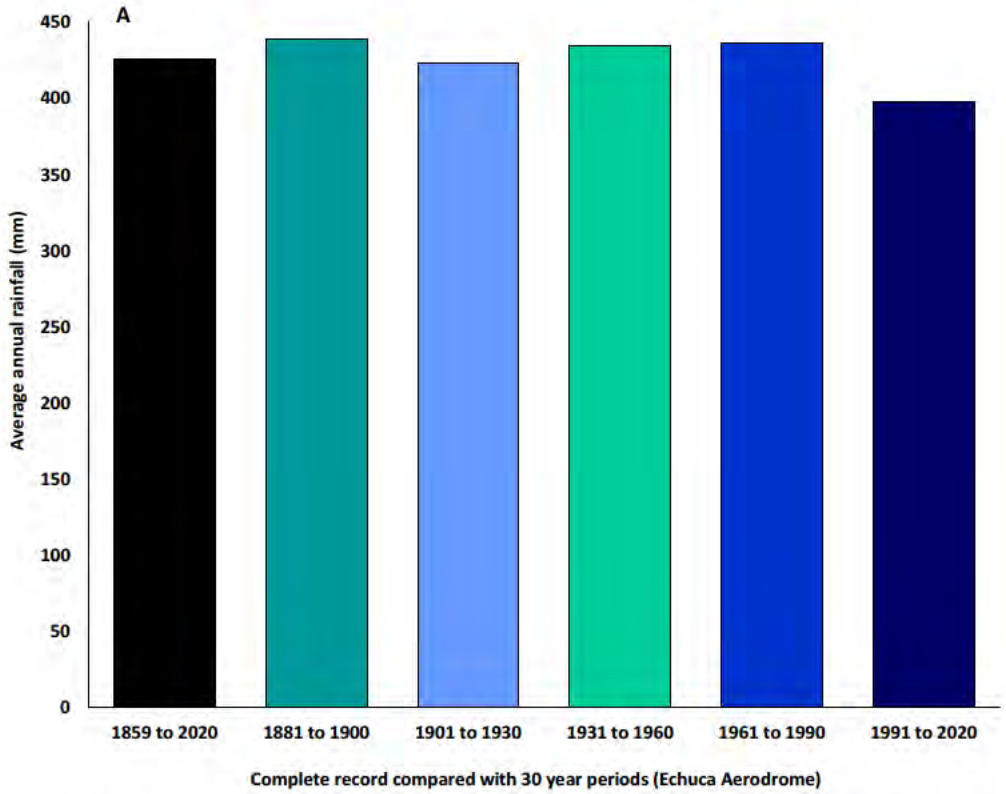
The rainfall is relatively consistent between months, with average monthly rainfalls between approximately 20 and 50mm (

Figure 1.5). Average monthly rainfall in the summer months appears less compared to average monthly rainfalls in the winter, although higher than average rainfall has occurred in November and December for the most recent 30 year period between 1991 and 2020 (

Figure 1.5).

It is predicted that under climate change conditions, average annual rainfall will decline by approximately 100mm. There is a potential that the effect of climate change-induced conditions are beginning with hotter and drier summers over the most recent 30 year period, being 1991 to 2020.

The humidity in Echuca is low, where during summer the average relative humidity is approximately 30% in the afternoon and approximately 52% at 9am. In winter it is approximately 62% at 3pm, whilst it is approximately 85% at 9am.



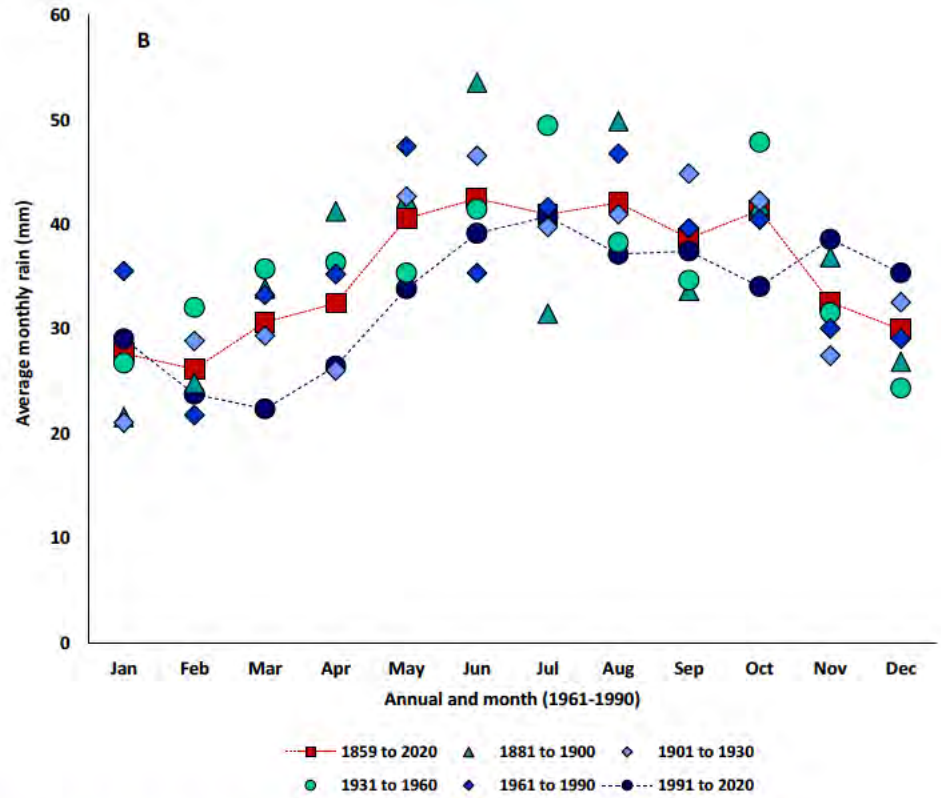


Figure 1.5 Average (A) annual and (B) monthly rainfall (mm) at Echuca.

1.2.4 Economic Drivers

The Campaspe Shire, in 2016, generated an estimated $5.17 billion in economic output, with manufacturing representing 31% of output and generated approximately $1.613 billion (https://app.remplan.com.au/campaspe/economy/industries/output). Two thirds of manufacturing comprise food manufacturing with several national and international food producers, including Murray Goulburn, SPC Ardmona, Nestle, Coca Cola, Fonterra and Kraft Heinz. In the Shire, food manufacturing is supported by a diverse range of agricultural production, with key industries such as dairy farming, cereal and grain production and continued growth in agricultural production of fruit and vegetables along with viticulture. More than 50% of economic output in 2016, at an estimated $2.888 billon, was generated by manufacturing; agriculture, forestry and fishing; and construction industry sectors (Figure 1.6).

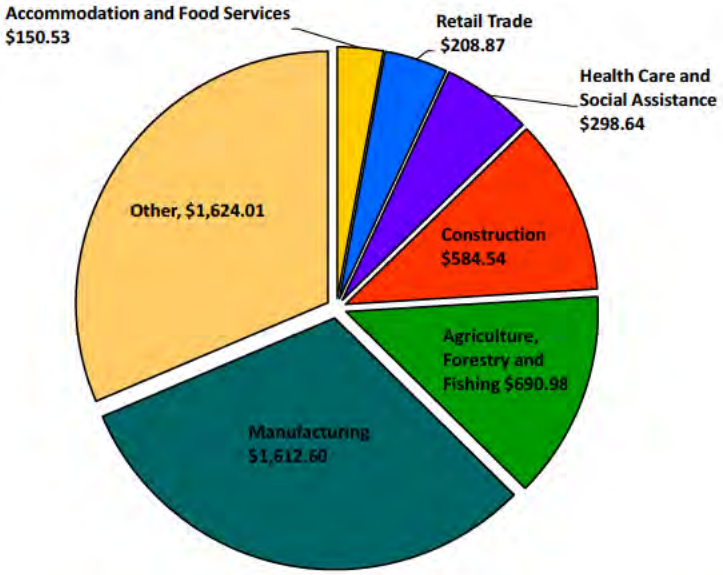


Figure 1.6 Economic output ($million) by major industry generators within Campaspe Shire, 2016.

The economy of Campaspe Shire, when based on businesses by industry, indicates the Shire is primarily affected by agriculture, forestry and fishing (Figure 1.7) with 35% of businesses related to this industry (Australian Bureau of Statistics website, www.abs.gov.au). Although manufacturing was a major generator of economic output in Campaspe Shire (Figure 1.3), this industry only represents a low number of businesses in the Shire (Figure 1.7). An overview of Campaspe Shire businesses by industry in 2016

An overview of Campaspe Shire economy in 2016 showed that output was primarily generated by manufacturing, followed by agriculture, forestry and fishing, and construction industries (Figure 1.3). In comparison, economy within the Shire showed based on businesses by industry, mainly created by Agriculture, forestry and fishing, followed by construction and rental, hiring and real estate services industries (Figure 1.7).

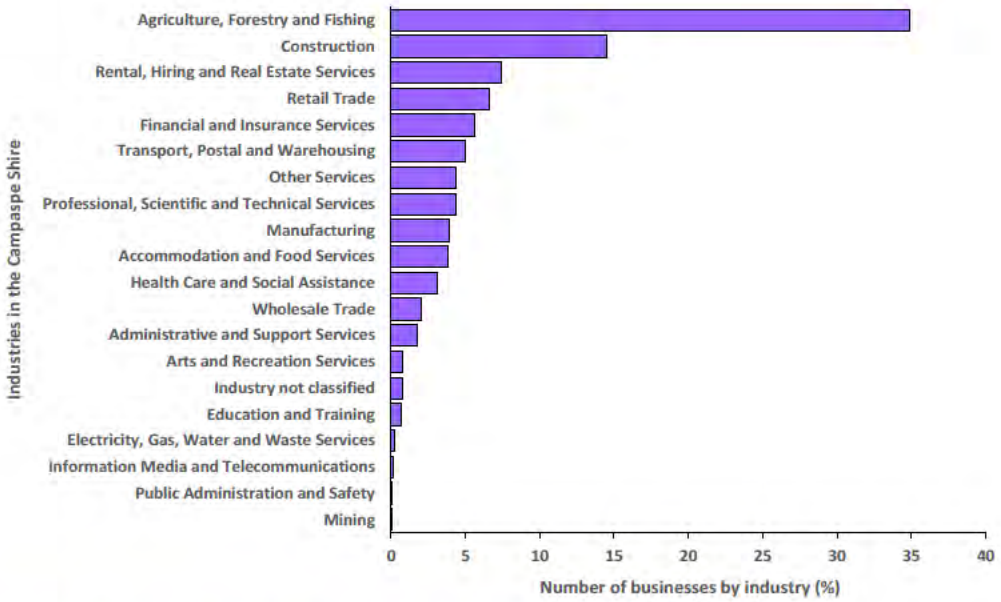


Figure 1.7 Overview of Campaspe Shire businesses by industry (%).

The Campaspe Shire wealth is diverse and supported by a range of industries with Agriculture, forestry and fishing an important part of the Shire's economy. It is noted that tourism was not included as an industry in the Campaspe Shire economic analysis conducted by the Australian Bureau of Statistics. However, tourism is a growing industry in the Shire and generated $248 million to the Campaspe Shire economy in 2018 (Table 1.1).

	Visitors	Nights	Average stay (nights)	Economic input ($m)
Domestic Day	577,000			67
Domestic Overnight	478,000	1,224,000	3	174
International	9,000	110,000	12	7
Total	**1,064,000**	**1,334,000**	**3**	**248**

Table 1.1 Tourism-associated economic output in the Campaspe Shire in 2018.

Agriculture, Forestry and Fishing

Gross Regional Product (GRP) for Campaspe Shire was $1.85 billion in 2016, in which agriculture, forestry and fisheries the largest value-added contributor to the Shire, being 13.4% to the GRP and employment within the Shire. A diverse range of agriculture activities are undertaken across the Shire, including:

- Dry land grazing and crops including cereal, grain and sheep
- Dairy farming; and
- Irrigated viticulture, fruit and vegetables, particularly tomatoes.

Agritourism is a growing industry, which supports the sustainability of farming businesses in the Shire.

Tourism

Tourism is a growing industry for the Murray region, generating about $364 million, and as an industry is becoming an important part of the economy for the region. The region's unique landscapes and culture have attracted visitors interested in nature-based, social and heritage-built tourism features. More recently there has been a growing interest in a range of agritourism, such as Farm 2 Plate, AirBnB, and Farm Stays, as well as winery and cellar door tourism. Many rural property owners have incorporated tourism as part of their agribusiness, such as farm gate tours, masterclasses, weddings, functions and retreats.

Tourism is a growth industry in the Campaspe Shire in which more than $200 million is generated by tourism industries and provides approximately 7% of employment in the Shire (A guide to tourism, Campaspe Shire Council).

Campaspe Shire's accessible location to regional towns and Melbourne, good weather, rich and diverse range of agricultural and food processing land uses along with natural, cultural and historic landmarks has resulted in the increasing popularity to visitors, particularly day and overnight trips by domestic visitors (Table 1.1). A portion of the Heathcote Wine District is in the southern portion of Campaspe Shire, and winery and cellar door tourism are increasing in popularity within the Shire.

Campaspe Shire Council annual report for 2018-2019 identified tourism as an important part of their resilient economy strategy with a focus on facilitating and supporting growth of sustainable tourism and event industries. The Murray River offers water skiing, paddle boarding and fishing activities as well as an historic experience with a cruise onboard an authentic paddle steamer. Visitors can experience the Shire's historic beginnings at the Discovery Centre located at the Port of Echuca, where touch screens and audio visuals engage visitors in the Shire's pioneering heritage, including a working saw mill and walkways along the heritage listed Echuca Wharf and the magnificent red gums along the river bank.

1.2.5 Echuca

The name Echuca is an Aboriginal word meaning "meeting of the waters" and reflects the importance of the rivers in the history and continued growth of the township. The town was established on the banks of the Murray River, and in proximity to the junction of the Murray and Campaspe Rivers being approximately 4 km. The Murray River system has been an important source of food and transport in the historic establishment of Echuca, which was once Australia's largest inland port.

The Campaspe River flows from the Victorian highlands, 220 km through the southern Murray-Darling basin before meeting with the Murray River near Echuca, with its catchment including the townships of Echuca, Rochester and Kyneton. The Campaspe River has a strong association with the historic development of Echuca and the surrounding Campaspe Shire, when its rich riverine plains and alluvial gold deposits attracted farmers and gold miners. The Campaspe River is also of environmental importance, supporting significant ecosystems with a diverse range of flora and fauna, including platypus, the Murray cod and trout. The rich heritage of Echuca associated with the river network, along with the natural and cultural features, makes the township a popular area for tourists to visit, with a variety of tourist attractions, including:

- Port of Echuca Discovery Centre;
- Heritage listed Echuca Wharf walkway;
- Murray River red gum walkway;
- Murray River paddle steamer tours
- Billabong Ranch trail rides and carriages;
- The Strawberry Pick;
- St Anne's Winery;
- Cape Horn Vineyard;

- National Holden Motor Museum;
- Echuca Historical Society Museum; and
- The Great Aussie Beer Shed.

It is noted that most tourists visiting Echuca will travel via the road and public transport networks.

1.3 Overview of Echuca Airport

1.3.1 Background

Echuca Aerodrome is located approximately 3km south of the Echuca township at latitude 36° 09' 24" south, longitude E 144° 45' 42" east and an elevation of 323 feet. One access point is provided via Cessna Ct to the east, which connects to McKenzie Rd, which is an important road link that runs from Echuca township to Kyabram township in the eastern part of the Shire. The area of the airport consists of 210 hectares that is subdivided into 15 lots, with the majority privately owned.

The Airport is a "Registered" aerodrome and provides important access to healthcare and emergency services to the local community through the VIC and NSW Air Ambulance, RFDS and other emergency services. An overview of the Echuca Aerodrome in relation to surrounding districts is shown in

.

Figure 1.8 Echuca Aerodrome site

1.3.2 Land Uses

The Campaspe Planning Scheme classifies Echuca Aerodrome as Special Use Zone 3. The purpose of the zone is to provide for the use of the land for the purpose of an aerodrome and ensure that use and development of the land and facilities does not interfere with the Aerodrome operations, or cause loss in amenity to the surrounding area.

Schedules 5 – 7 in the Campaspe Planning Scheme are design and development overlays to ensure the safe and efficient use of the Aerodrome and development is compatible and appropriately sited to maintain the safe and efficient operation of the Aerodrome. The Overlays specify obstacle height areas to ensure all buildings and works are sited to minimise off site effects on the Aerodrome as well as compliance with any approved Obstacle Limitation Surface Plan.

The surrounding land is primarily zoned for industrial use to the north, farming to the east and south with a mix of uses adjoining the western boundary of the Aerodrome, including low density residential, public park and recreation, and urban floodway zone. Several significant overlays are associated with industrial zoned land and with the Campaspe River that passes in close vicinity to the western boundary of the Aerodrome. A land subject to inundation overlay (LSIO) affects most of the adjoining properties as well as the central area of land for the Aerodrome. No heritage areas or structures have been identified pertaining to airport land or infrastructure.

A stock proof fence surrounds the airport to prevent wildlife from damaging airside infrastructure and to deter unauthorised access.

1.3.3 Ownership and Management

Campaspe Shire Council ("Council") is the owner and operator of the Echuca Aerodrome. The Aerodrome is located on the southern fringe of the Echuca township. Ownership and operations of the aerodrome were granted to CSC by the Department of Civil Aviation in 1972.

1.3.4 Airport Regulations

The Echuca Aerodrome is registered by the Civil Aviation Safety Authority (CASA) permitting aeromedical services and GA operations at the aerodrome.

It is understood that Echuca Aerodrome became a Registered aerodrome in accordance with the requirements of Civil Aviation Act 1988 (Cth) and Civil Aviation Safety Regulations (CASR) 1998 (Cth) on 6 August 2004.

The *Airports Act 1996 (Cth)* does not maintain a statutory application to Echuca Aerodrome, however it has been utilised as an industry benchmark for airport concept planning.

CASA has modified the CASR requirements to remove the current two-tier aerodrome certification system of 'certified' and 'registered' aerodromes and replace it with a new scalable certification framework. This new framework single authorisation using risk-based standards. The changes enforce regulatory requirements on aerodromes based on the complexity of their operations and resultant risk.

Requirements for a safety management system, wildlife hazard management system and an aerodrome emergency plan would be based on proposed risk-related criteria that reflect aircraft and passenger movement activity. A summary of the CASA requirements that come into effect in August 2020 for aerodrome management is provided in Table 2.2.

1.4 Echuca Aerodrome Concept Plan Development Methodology

The objectives of the Echuca Aerodrome Concept Plan are as follows:

- Consult with key stakeholders to determine future needs for the aerodrome and incorporate these into the Aerodrome Concept Plan;
- Identify aerodrome infrastructure and layout requirements to cater for the Beechcraft King Air 350; and
- Provide information to enable CSC to apply for funding from Government programs for the required airport upgrades of Runway 17/35 and associated infrastructure.

The Echuca Aerodrome Concept Plan outlines the plans for investment in the physical capacity of the Aerodrome, including strengthening, extending and widening Runway 17/35 and associated paved surfaces, expansion of the terminal apron, new hangars, aeromedical shelter and upgrading the airfield and apron lighting.

The Echuca Aerodrome Concept Plan will ensure Echuca Aerodrome is well placed for future growth and drive the region's economic success.

1.5 Consultation with CSC and key stakeholders.

Wide consultation has been undertaken to ensure future growth requirements are captured enabling CSC to develop the aerodrome in a manner to meet the needs and expectations of the local community, CSC, State and Commonwealth Government agencies.

The purpose of the Concept Plan is to facilitate the appropriate development of Echuca Aerodrome and the local surrounds over the next 20 years, which will in turn, increase levels of employment, output and investment at the Echuca Aerodrome.

1.6 Echuca Aerodrome Concept Plan Methodology

The methodology to deliver all components of the Concept Plan is illustrated as a flowchart in which includes:

- Reviewing existing information on the aerodrome including site visit of the airport, and previous Airport Master Plans, annual Aerodrome Safety Inspection report and survey data (note: no aerodrome manual has been developed for Echuca Aerodrome);
- Consult with key stakeholders to determine future needs for the airport, and incorporate these into the Concept Plan;
- Develop a range of feasible and practicable options for CSC to consider regarding the future development of the Aerodrome;
- Undertake a native vegetation a investigation of the current and proposed facilities and operations, in collaboration with Council staff and key stakeholders;
- Develop risk treatments and adaptation pathways based on proposed development, in collaboration with CSC staff and key stakeholders;
- Produce a final deliverable that outlines all of the above, and includes a succinct breakdown of proposed development options, assessment of these options, and recommended future actions for the development of the Aerodrome.

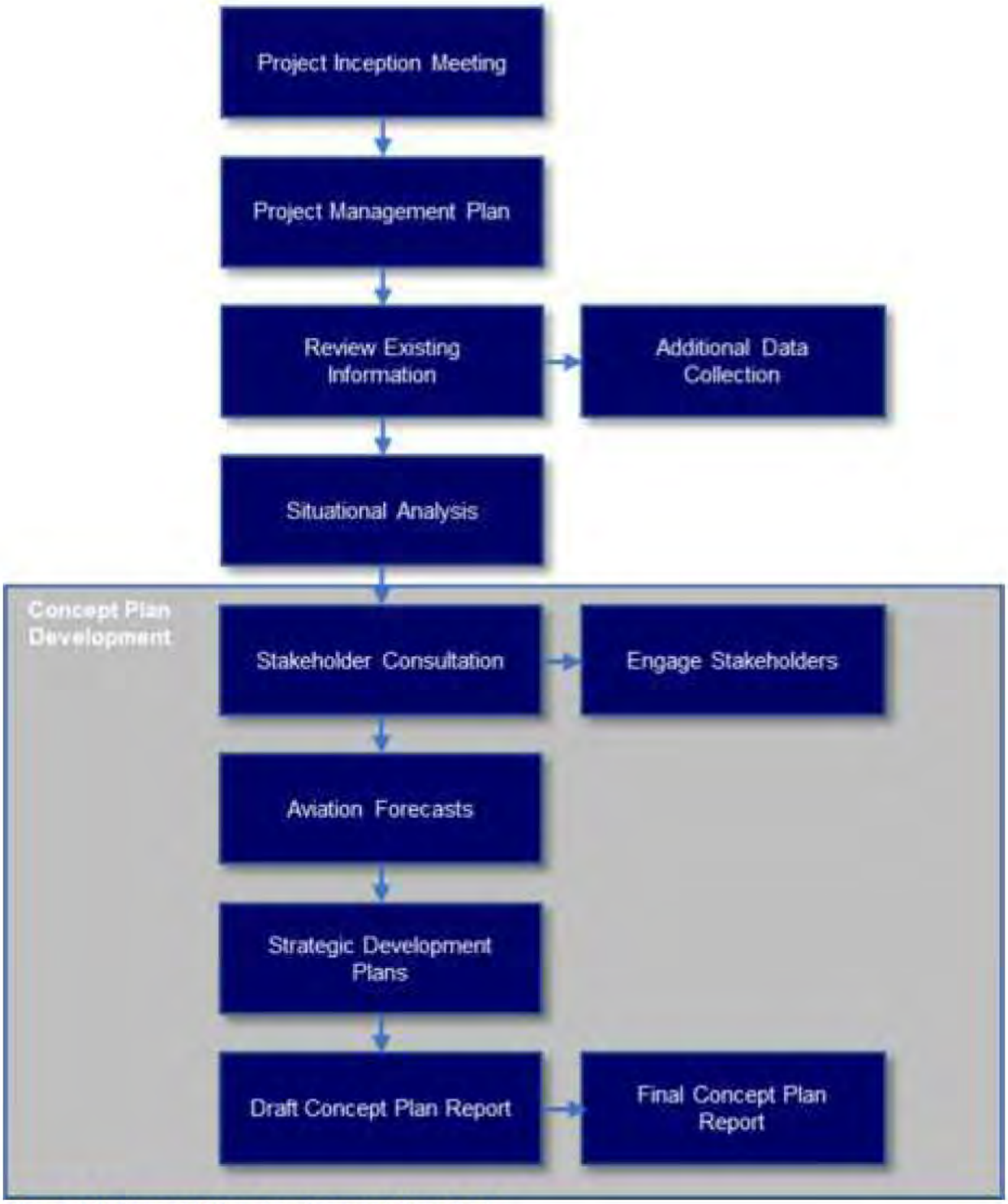


Figure 1.9 Concept Plan development flowchart

1.7 Report Structure

The Concept Plan is structured over the following five (5) sections.

- **Section 1** has provided an overview of the Aerodrome Concept Plan purpose, as well as an overview of the Campaspe region, the Aerodrome and the methodology to develop the Concept Plan.
- **Section 2** provides as overview of the concept planning context, including policy and legislative requirements and an overview of key stakeholder consultation.
- **Section 3** provides an overview of the results of the native vegetation assessment;
- **Section 4** provides an overview of the aerodrome objectives, the existing Airport facilities (including airside, terminal and landside infrastructure) as well as an overview of historical aviation activity.
- **Section 5** provides an overview of future airport development plans. This has been based on know aviation movements, the proposed design aircraft and other demand for facilities. Aircraft noise and airport lighting within the vicinity of aerodromes is also considered.
- **Section 6** provides an implementation plan which considers the planning, development, implementation, handover/completion and asset management phases. A financial plan is also included which provides high level cost estimates for infrastructure upgrades.

2 Concept Planning Context

2.1 Policy Context

A summary of the relevant plans and strategies that support the region, and specifically the Echuca Aerodrome are provided in Figure 2.1.

Figure 2.1 Context of the Echuca Aerodrome Concept Plan

This Concept Plan provides direction for the future development of Echuca Aerodrome. By necessity, the Concept Plan is flexible to cater for a range of development activities that may occur over the next 20 years.

The Concept Plan sets out the development objectives for the aerodrome, together with concepts for individual precincts. The timing and form of development will be influenced by a multitude of factors and CSC may review the Concept Plan in accordance with the requirements of all stakeholders to reflect changes in community expectations, aerodrome user requirements, political landscape and so forth.

The Concept Plan has been prepared by reviewing existing conditions and operations at Echuca Aerodrome and considers projected aerodrome activity for the planning period. The proposed layout of the aerodrome recognises current and projected aerodrome activities and operations, the likely need for new buildings, the expansion and upgrade of the runway and associated infrastructure and the most suitable location for aviation and non-aviation activities to achieve the development objectives.

While the Concept Plan provides a framework for the future of the aerodrome, the ability to achieve this will be influenced by external factors such as the aviation industry, the community and commercial markets. Therefore, the timing of development at the aerodrome will remain flexible and should be continually monitored and reassessed by CSC.

2 Concept Planning Context

2.1 Policy Context

A summary of the relevant plans and strategies that support the region, and specifically the Echuca Aerodrome are provided in Figure 2.1.

Figure 2.1 Context of the Echuca Aerodrome Concept Plan

This Concept Plan provides direction for the future development of Echuca Aerodrome. By necessity, the Concept Plan is flexible to cater for a range of development activities that may occur over the next 20 years.

The Concept Plan sets out the development objectives for the aerodrome, together with concepts for individual precincts. The timing and form of development will be influenced by a multitude of factors and CSC may review the Concept Plan in accordance with the requirements of all stakeholders to reflect changes in community expectations, aerodrome user requirements, political landscape and so forth.

The Concept Plan has been prepared by reviewing existing conditions and operations at Echuca Aerodrome and considers projected aerodrome activity for the planning period. The proposed layout of the aerodrome recognises current and projected aerodrome activities and operations, the likely need for new buildings, the expansion and upgrade of the runway and associated infrastructure and the most suitable location for aviation and non-aviation activities to achieve the development objectives.

While the Concept Plan provides a framework for the future of the aerodrome, the ability to achieve this will be influenced by external factors such as the aviation industry, the community and commercial markets. Therefore, the timing of development at the aerodrome will remain flexible and should be continually monitored and reassessed by CSC.

2.1.1 National and State Strategies

National Aviation Policy

The National Aviation Policy White Paper (2009) includes policy goals regarding the access to and maintenance of regional airports through local government councils. The government wants to implement a 'hub and spoke' geographical strategy by avoiding the provision of subsidies to airports within driving distance of each other. Echuca is considered a 'hub' of local activity and can work on the assumption that grants for maintenance of the airport will be provided where they could significantly benefit the regional economy, which will also be assumed for the Concept Plan development.

2.1.2 Regional Strategies

A series of regional plans and strategies were developed in relation to the Loddon Mallee area with a united focus on supporting existing infrastructure and services, promote connectivity of townships and identify initiatives and strategies for future economic and social growth in the area. The series was initiated by the release of the Loddon Mallee North and South Regional Growth Plans, with all documents in alignment with each other and to strategic planning objectives for the 10 Local Government Areas (LGAs) that represent the Loddon Mallee area.

Loddon Mallee North Regional Growth Plan

The Loddon Mallee North Regional Growth Plan uses a land use planning framework that identifies strategic growth of regional urban growth. A good existing transport infrastructure with adaptability for future economic and social growth is a key component to support growth of regional townships.

Mildura, Echuca and Swan Hill were identified as regional centres for future urban growth. Echuca's role as a regional centre in the Loddon Mallee North Region was identified as an important urban hub for northern Victoria and southern New South Wales, including industrial, community, health, recreational, transport and tourism activities. The Loddon Mallee North Regional Growth Plan proposes to reinforce Echuca as an important regional centre and tourism destination.

Loddon Mallee Regional Strategic Plan 2015

The Loddon Mallee Regional Strategic Plan focused on the improvement and growth for Loddon Mallee and identified four strategic directions, which were:

- Foster comparative advantages in agriculture, food processing and other regionally important industries;
- Build connecting infrastructure to support a diverse economy;
- Enhance wellbeing and economic participation of the regional population; and
- Protect and enhance the liveability and appeal of Loddon Mallee area.

Priorities were developed to achieve each of the four strategic directions, which included funding opportunities for new infrastructure and to generate an increase in economic activity as well as build on the strengths and unique attributes of regional centres and townships. Echuca was identified as an important regional centre that offers employment in agriculture, manufacturing, tourism and health services and has strong road and rail transport networks for freight and passenger movements.

Regional airports and aerodromes were identified as an important component of the strategy for connecting infrastructure and supporting a diverse economy. Mildura Airport was described as the second largest airport in Victoria, based on repeat traffic movement and the only regional Victorian airport to operate commercial passenger air services. Funding to maintain and expand the Mildura Airport was identified as an important priority in connecting Loddon Mallee area to surrounding regions

in Victoria and South Australia as well as Sydney and Broken Hill in New South Wales. Regional airfields, such as Echuca were important for specialised health, freight and emergency services maintain connectivity within the region.

Loddon Campaspe Integrated Transport Strategy

The purpose of the Loddon Campaspe Integrated Transport Strategy (ITS) is to ensure the transport network can meet current needs as well as be adaptable for future regional transport needs. The ITS identifies that the regional transport network is instrumental to sustain and grow regional economic and social activities. To achieve this, the ITS aligns with existing State, regional and local strategies and polices, including Loddon Mallee Regional Growth Plans.

The ITS focus is primarily on road, rail and public transport, being major transport modes that support regional urban growth.

Loddon Campaspe Regional Economic Growth Strategy

The Loddon Campaspe region is comprised of six Local Government Areas (LGA) and is the most populated region of the Loddon Mallee area, sustaining 1.25% growth annually. It is predicted that by 2031 the population growth in the Loddon Campaspe region will support 75% of the population in the Loddon Mallee area.

The purpose of the Loddon Campaspe Regional Economic Growth Strategy (the Strategy) was to identify initiatives and strategic directions for economic growth in the region, with focus on improved employment and Gross Regional Product (GRP) to increase regional prosperity. The Strategy identified five existing areas with potential to focus regional economic growth, which are:

- Bendigo regional city;
- Regional employment and innovation corridor (between Clarkefield and Echuca-Moama);
- Strong regional food industry;
- Tourism and international economy; and
- Industries of the future.

Echuca was identified as an important component for several of the economic focal areas, including business and tertiary education within the innovation corridor, a range of cultural and active tourism activities, and manufacturing associated with agriculture, which represented approximately 57% of regional generated output.

Northern Victoria Regional Transport Strategy 2009

Northern Victoria Region (NVR) encompassed 11% of area in Victoria and comprised of six Local Government Areas (LGA), being Campaspe, Loddon, Moira, Gannawarra, Strathbogie and City of Greater Shepparton. Economy in the NVR is supported by a diverse range of agricultural activity and contributed 25% of the value for Victoria's agriculture produce at the time. Agriculture, manufacturing and food processing, health services and tourism are important drivers of transport demands and needs in the region. Transport needs in the region also need to consider connectivity between townships, with accessibility challenged by the natural landscape and extensive land requirements associated with the NVR agricultural activities.

The NVR Transport Strategy considered the important drivers in the region in relation to road, rail, aviation, and public transport networks, which identified 10 objectives and developed nine strategies to achieve these objectives. The objectives and strategies for the NVR Transport Strategy in general identified enhancing infrastructure for existing transport networks as well as developing a clear road network for heavy vehicles, freight and tourism.

There are airfields for light aircraft in each LGA within the NVR, and are able to support the air ambulance service, however, none of the airfields currently provide passenger services due to insufficient demands. Echuca and Yarrawunga Aerodromes are situated near to the Murray River and thereby offers potential to support aviation-based tourism activities. The NVR Transport Strategy identified actions to further develop regional airports, which are as follows:

- Potential use of Echuca Aerodrome for freight, including connecting heavy vehicle transport network with possible distribution centre at the airfield;
- Enhancement of airports for tourism;
- Ensure airports are suitable for emergency services;
- Develop and implement a master plan for Echuca Aerodrome;
- Develop Echuca South-east Industrial Commercial Growth Corridor Land Strategy, including Echuca Aerodrome; and
- Promote Echuca airfield.

Loddon Campaspe Integrated Transport Strategy, Loddon Campaspe Regional Economic Growth Strategy as well as relevant local plans and strategies for the Shire of Campaspe have been aligned to the relevant objectives and strategies identified by the NVR Transport Strategy.

2.1.3 Local Strategies

Campaspe Council Plan 2017 – 2021

In accordance with Victoria's Planning and Environment Act (PEA) 1987, the Campaspe Shire Council (CSC) has prepared the planning scheme as a framework for managing development in a way that advances the purpose of the PEA 1987 through the following:

- Identifying outcomes sought to be achieved in the local government area as the context for assessing development;
- Identifying standard or VicSmart development applications; and
- Identifying specific measures to guide and regulate development within the local government area.

The Campaspe Planning Scheme ('Planning Scheme') covers the whole local government area including roads and watercourses. The Planning Scheme identifies Echuca Aerodrome as an important regional asset with potential for future growth and development through aviation and non-aviation compatible landuses and activities (Planning Scheme clause 21.08.2). Development restrictions in the vicinity of the Airport as well as requirements for activities conducted at the Airport are specified in the Planning Scheme, including obstacle heights in Schedules 5 and 6 to the Design and Development Overlay (Planning Scheme clause 43.02). These restrictions have been considered during the development of future airport infrastructure.

Campaspe Shire Council (CSC) 2019-2020 Budget and Strategic Resource Plan

Campaspe Shire Council's Budget and Strategic Resource (BSR) Plan is a key component in implementing the Council Plan. The Strategic Resource Plan is a rolling four (4) year plan that identifies financial and non-financial resources CSC requires to achieve the strategic objectives in the Council Plan. The BSR Plan outlines CSC's services and infrastructure activities, which contribute to achieving community needs identified in Campaspe: Our Future and are incorporated into the Annual Budget.

Infrastructure renewal work at Echuca Aerodrome was listed in the 2019 – 2020 BSR Plan as a carry-over project from the previous annual budget. The proposed 2020 – 2021 BSR Plan was recently released and is open for public comment until 27 May 2020. On-going maintenance and services associated with the Echuca Aerodrome are not detailed in the proposed BSR Plan.

Campaspe Shire Council (CSC) Asset Management Strategy

Campaspe Shire Council's Asset Management Strategy identifies the essential activities required to achieve the implementation of CSC's Asset Management Policy, Sustainable Asset Management. The Policy provides the guidelines for development of consistent asset management practices to ensure assets owned or managed by the Campaspe Shire are for the purpose of providing community services to achieve the following:

- Meet the service levels agreed with the community;
- Support CSC to deliver effective outcomes;
- Are fit and safe for the purpose for which they have been provided; and
- Minimise detrimental impact on the natural environment.

The CSC Asset Management Strategy identified that assets required individual Asset Management plans to sustain long-term, cost effective technical and financial management of each asset. The AMS identifies that the Asset Management plans were outdated and are currently under review, with details of an asset management improvement plan for 2017 – 2020 listed in Appendix A. The Echuca Aerodrome was not identified in the listed assets for the current improvement period.

Shire of Campaspe Economic Development Strategy 2014 – 2019

The Shire of Campaspe reported that the Gross Regional Product and value increase within industries for agriculture, forestry and fishing, manufacturing and health services has supported a growing regional economy. Growth in tourism activities, increased labour force and low unemployment rate also attribute to the growing economy for Campaspe Shire.

The aim of the Shire of Campaspe Economic Development Strategy was to sustain economic growth into the future through focus on the following:

- Improve business and investor confidence;
- Diversified economy;
- Improve productivity;
- Attract and develop a skilled workforce;
- Improve connectivity for transport networks and trade linkages with regional, metro and export markets
- Improve awareness and promotion of the Shire

Transport and logistics are important to support existing and future economic output for the Shire of Campaspe. Improvements to heavy vehicle and freight transport network within the Shire needs to align with regional and state freight network initiatives to enable sustained economic growth.

Echuca is an important service, tourism and employment hub for the Shire of Campaspe. The township is located on the Murray River with Moama directly across the river in New South Wales. The Echuca-Moama bridge is an important link in the regional transport network, providing an opportunity for improved transport connectivity to regional markets in New South Wales.

The Loddon Campaspe Regional Economic Growth Strategy identified Echuca Aerodrome for potential growth in tourism-based aviation and as a potential freight distribution centre, which could improve trade linkages within regional Victoria and New South Wales.

Echuca South East Industrial & Commercial Growth Corridor Land Strategy

Echuca is the largest urban centre in the Shire of Campaspe and located approximately 190 km north of Melbourne. Situated on the riverbank of the Murray River, Echuca has developed from a river port town to an important industrial, community, health, recreation and transport hub for northern Victoria and southern New South Wales. The township has good transport networks with major interstate and

state highways providing good transport connectivity to regional and metro Victoria as well as regional New South Wales. Echuca is central to one of Australia's most diverse and intensively developed agricultural regions, with the local and regional economy driven by irrigated agriculture and processing of agricultural products in the region.

The Echuca South-East Industrial and Commercial Growth Corridor Land Strategy (South-East GCS) was developed based on the objectives and strategies for settlement (Clause 11) and economic development (Clause 17) as outlined in the State Planning Policy Framework. In particularly, Clause 17.02 states strategies for the design of industrial development, which includes:

Encourage manufacturing and storage industries that generate significant volumes of freight to locate close to air, rail and road freight terminals.

The study area for the Echuca South-East GCS comprises urban, industrial and rural zoned areas as well as the Echuca Aerodrome and the Shire of Campaspe saleyards, pound and waste transfer station. The vision for the Echuca South-East CGS is for an area that:

- Is the focus of industrial and large-scale commercial development for the Campaspe Shire;
- Provides attractive south and east gateways to Echuca;
- Exhibits high-quality built form that embraces best practice sustainability principles;
- Contains a diversity of industries that services the local economy, interstate and export markets;
- Accommodates industries with larger buffer requirements to ensure the establishment, operation and expansion occurs without impacting on amenity of sensitive uses;
- Supports significant food processing industries that generate significant employment and export income for the community;
- Accommodates public uses that serve important community needs; and
- Draws inspiration from the landscape character of the surrounding area, including Campaspe and Murray Rivers as well as regional native vegetation.

The Echuca Aerodrome is located in the central area of the Echuca South-East GCS and bounded by industrial zoned land to the north, rural living and rural zoned lands to the east, Campaspe River and the Melbourne-Murray River rail link on the western boundary and the Campaspe saleyards in the south. Areas of surplus land was identified within the area zoned for the Echuca Aerodrome, which have Relevant objectives for Echuca Aerodrome state that the primary function for aviation and aviation-associated uses should be protected, while identified surplus land be investigated for potential redevelopment with potential uses being compatible with the operations of the Aerodrome.

Plains Grassland is a regional and nationally endangered ecological community, with areas of native vegetation characteristic of the Plains Grassland identified within the Echuca South-East GCS. Sites of Plains Grassland vegetation have been found within the area of the Echuca Aerodrome as well as along the reserve of the Old Aerodrome Road, which adjoins the western boundary of the Aerodrome. Relevant objectives in the Echuca South-East GCS specifies protection of Plains Grassland vegetation in alignment with state and national environmental legislation. The presence of Plains Grassland at the Echuca Aerodrome is described in detail under section 3 Native Vegetation Assessment.

Shire of Campaspe Environment Strategy 2018-2022

The Campaspe Shire Environment Strategy ('Environment Strategy') identifies environmental programs that CSC conduct. The Environment Strategy describes the environmental, community, cultural and economic importance to the Shire and its alignment with State government legislation and directions. CSC's commitment to the environment, engagement with stakeholders and environmental benefits are described in the Environment Strategy. An environmental program of significance to the region is the Northern Plains Grassland and the Grassland wanderer project, with the Grassland wanderer identified as a threatened bird species at global, national and State levels. The Northern Plains Grassland is identified as a threatened ecological community at national and State levels. The CSC is one of several

stakeholders working together on the project and includes Federal governments, North Central Catchment Management Authority, local landowners and the community. The project focus is to protect, restore and enhance the condition and extent of the grasslands, as well as purchase grassland habitat to be conserved on Crown Land. To date over 3,000 hectares has been reserved in the Campaspe Shire as part of the Terrick Terrick National Park.

Areas of Northern Plains Grassland have been identified at the Echuca Aerodrome and the CSC is committed to conserving and protecting the grassland habitat. The condition and extent of Northern Plains Grassland is discussed further in Section 3 of this Concept Plan (3. Native Vegetation Assessment).

2.1.4 Previous and Current Master Plans

Echuca Aerodrome Master Plan 2010

This Airport Master Plan was the first to be developed for the Echuca Aerodrome and defined the location, tenants and activity at the Aerodrome. The Echuca Aerodrome Master Plan 2010 established a baseline to ensure the Aerodrome's future viability to allow the Aerodrome to reach its maximum potential regarding on-aerodrome and off-aerodrome development occurring in response to current and future demand. This included not only development within the Aerodrome airside and landside precinct but also beyond the Aerodrome boundaries with the ability to protect the runway approaches and building and structure heights that lie within the Aerodrome's Obstacle Limitation Surfaces (OLS) area.

The potential development of the Echuca Aerodrome identified safeguarding the OLS area to minimise the potential encroachment of incompatible activities and allow aircraft to operate safely with minimal or no restrictions. The OLS area and dimensions provided in the Master Plan were incorporated into the Echuca South East Industrial and Commercial Growth Corridor Strategy 2018-2022 to ensure that the OLS area is safeguarded for current and future uses of the Aerodrome and surrounding property.

This Master Plan considered that the Echuca Aerodrome has adequate capacity for the next 10 – 15 years and identified six areas of surplus land within the area of the Aerodrome. The Master Plan recommended further investigations into the potential for redevelopment of these parcels of land for non-aviation uses, provided the development did not restrict or prevent the ongoing operation of the Aerodrome. The six parcels of land identified by this Master Plan were investigated as part of the Echuca South East Industrial and Commercial Growth Corridor Strategy 2018-2022.

2.2 Legislative Context

2.2.1 General

This section describes regulations that may directly impact Echuca Aerodrome operations, management and development.

The legislative context has been divided into the following categories for discussion:

- Aerodrome operations;
- Airspace, safety and noise management; and
- Aerodrome safeguarding.

2.2.2 Aerodrome Operations

CASA is a Commonwealth regulator that has primary (although not exclusive) responsibility for aviation safety, including the operation of aerodromes.

CASA ensures the continued safe operation of aerodromes by administering various legislation, including but not limited to the following:

- *Civil Aviation Act* 1988;
- *Civil Aviation Safety Regulations* (CASR) 1998 which is accompanied by Advisory Circulars (AC), Acceptable Means of Compliance (AMC) / Guidance Material (GM) and the Manuals of Standards (MOS); and
- *Civil Aviation Regulations* (CAR) 1988 which is accompanied by Civil Aviation Orders (CAOs) and Civil Aviation Advisory Publications (CAAPs).

CASA's primary function is to conduct the safety regulation of civil air operations and airports in Australia and the operation of Australian aircraft overseas. It is also required to provide comprehensive safety education and training programs, cooperate with the Australian Transport Safety Bureau, and administer certain features of Part IVA of the Civil Aviation (Carriers' Liability) Act 1959.

CASA is authorised to determine and audit against the MOS Part 139 which provides a detailed set of standards for aerodrome compliance. CASA classifies aerodromes by reference to the passenger carrying capacity of aircraft that use them. Aerodromes are subject to different regulatory requirements depending upon which category it falls into, as summarised in Table 2.1.

Table 2.1 Categories of aerodromes under CASR Part 139 (Adapted: CASA 2015)

Regulatory Requirement	Certified Aerodromes	Registered Aerodromes	Other Aerodromes - more than 9 but not more than 30 passengers	Other Aerodromes - operations under proposed CASR 135
Maximum LOS provided	RPT or frequent charter with more than 30 passengers	Same physical standards as certified aerodrome	Not certified or registered but served by RPT or by charter operations at least once per week	
Responsibility for certification/registration	CASA	Approved Person	AOC[1] Holder Responsibility	AOC[1] Holder Responsibility
Aerodrome standards	MOS Part 139	MOS Part 139	MOS Part 139	MOS Part 139, Chap 13
Aerodrome manual required	Yes	No	No	No
Safety Management System required	Yes	No	No	No
Aerodrome Technical Inspection required	Yes	No	No	No
Aerodrome Safety Inspection required	No	Yes (if RPT or charter operations with more than 9 passenger seats)	Yes	No
Trained Reporting Officer required	Yes	Yes	Yes	AOC[1] Holder Responsibility
Aerodrome details published in ERSA/NOTAM [2]	Yes	Yes	No	No
Aerodrome operator	Yes	Yes	AOC[1] Holder Responsibility	AOC[1] Holder Responsibility

required to monitor obstacles				
Non-precision instrument approach procedures made available	Yes	Yes	No	No

[1]*Details of certified airports must be published in the Airservices Australia En Route Supplement Australia (ERSA) and Notice to Airmen (NOTAM) publication, limited information may be published for other aerodromes.*

CASA has modified the CASR requirements to remove the current two-tier aerodrome certification system of 'certified' and 'registered' aerodromes and replace it with a new scalable certification framework. This new framework single authorisation using risk-based standards. The changes enforce regulatory requirements on aerodromes based on the complexity of their operations and resultant risk.

Requirements for a safety management system, wildlife hazard management system and an aerodrome emergency plan would be based on proposed risk-related criteria that reflect aircraft and passenger movement activity. A summary of the CASA requirements that come into effect in August 2020 for aerodrome management is provided in Table 2.2.

Table 2.2 Passenger movement thresholds for proposed aerodrome management requirements (Source: CASA 2020)

Regulatory Requirement	International RPT Operations	More than 350,000 pax	50,000 + pax or 100,000 + movements	Less than 50,000 pax or less than 100,000 movements	10,000-50,000 pax or 20,000-100,000 aircraft movements	25,000 + pax or, 20,000 + aircraft movements	Less than 10,000 pax or less than 20,000 aircraft movements
Full Emergency Planning & Response	Yes	Yes	Yes	No, see 24.03,4.04 & 24.06	N/A	N/A	N/A
Full Safety Management System	Yes + 25.04	N/A	Yes	N/A	N/A	No, see 26.01 (risk management plan)	N/A
Full Aerodrome Technical Inspection	N/A	N/A	Yes	N/A	No, see 12.07 & 12.09	N/A	No, see 12.11
Full Wildlife Hazard Management Plan	Yes	N/A	Yes	No – 17.03(4)	No – 17.03(4)	No – 17.03(4)	No – 17.03(4)

Certified aerodromes require an Aerodrome Manual covering elements such as aerodrome emergency plans, aerodrome lighting, aerodrome reporting, unauthorised entry to the airport, aerodrome serviceability and technical inspections, aerodrome works safety, aircraft parking control, airside vehicle control, bird and animal hazard control, obstacle control, disabled aircraft removal, handling of hazardous materials, protection of radar and navigational aids as well as low visibility operations (AAA 2012).

Manual of Standards (MOS) Part 139

The MOS Part 139 comprises specifications prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation. In those parts of the MOS Part 139 where it is necessary to establish the context of standards to assist in their comprehension, the sense of parent regulations has been reiterated.

In addition to the MOS Part 139, specifications and procedures which do not reach the regulatory level and information of an educational or advisory nature, may be issued in the form of Advisory Circulars (AC's).

Aerodrome standards will change from time to time to meet identified safety needs, technological changes and changes in international standards and practices. It is recognised that there are difficulties and limitations in applying new standards to existing aerodrome facilities and installations. Appendices and tables form part of the main document and have the same status as the primary text. The MOS Part 139 may also require standards from other documents to be followed. In this case, the referred standards become part of the MOS Part 139.

CASA has released new safety requirements for aerodromes of all sizes across Australia. The updates reflect changes in technology and best practice, and ensures Australia enhances its level of compliance with International Civil Aviation Organization (ICAO) standards. The new measures come into to place on the 13th August 2020 and are detailed in CASA's updated Manual of Standards (MOS) Part 139 - 2019.

2.2.3 Airspace, Safety and Noise Management

CASA and Airservices Australia (AsA) share responsibility for the provision of airspace management. CASA's Office of Airspace Regulation (OAR) is a distinct operational unit within CASA and is responsible for regulating Australian airspace whereas AsA administers the use of airspace classified by OAR.

The OAR conducts aeronautical studies to determine the appropriateness of the surrounding airspace classification and whether there is a need for reassessment of the risk at a particular airport. AsA has responsibility for airspace management, aeronautical information, aviation communications, radio navigation aids and aviation rescue and firefighting services.

Relevant legislative instruments include, but are not limited to the following:

- *Airspace Act* 2007;
- *Airspace Regulations* 2007;
- *Air Navigation Act* 1920;
- *Air Navigation Regulations* 1947;
- *Air Navigation (Aircraft Noise) Regulations* 1984;
- *Air Services Act* 1995; and
- *Air Services Regulations* 1995.

Depending on the level of service required to manage traffic safely and efficiently, Australian airspace is classified as either controlled (Class A, Class C, Class D or Class E) or non-controlled (Class G). This is in line with the International Civil Aviation Organisation (ICAO) Annex 11 and is further described in the Australian Airspace Policy Statement (AAPS).

The classification determines the category of flights permitted and the level of Air Traffic Services (ATS) that must be provided. Echuca Aerodrome is considered a non-controlled aerodrome and therefore subject to Common Traffic Advisory Frequency (CTAF) procedures.

Another agency is the Australian Transport Safety Bureau (ATSB). The ATSB is Australia's national transport safety investigator which was established by the *Transport Safety Investigation Act* 2003 (TSI Act). The ATSB conducts its safety investigations in accordance with the provisions of the TSI Act and with a focus on improving safety. Under the TSI Act, it is not a function of the ATSB to apportion blame or provide a means for determining liability in safety matters and the ATSB does not investigate for the purpose of taking administrative, regulatory, or criminal action.

2.2.4 Aerodrome Safeguarding

The National Airports Safeguarding Advisory Group (NASAG), comprising of Commonwealth, State and Territory government planning and transport officials, the Department of Defence, CASA, AsA and the Australian Local Government Association (ALGA), has developed the National Airports Safeguarding Framework (NASF). The NASF is a national land use planning framework that aims to:

- Improve community amenity by minimising aircraft noise-sensitive developments near airports; 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 NASF has the following parts that are relevant to Echuca Aerodrome:

- Principles for National Airports Safeguarding Framework;
- Guideline A: Managing Aircraft Noise;
- Guideline B: Managing Building-Generated Windshear;
- Guideline C: Managing Wildlife Strike Risk;
- Guideline E: Managing Pilot Lighting Distraction;
- Guideline F: Managing Protected Airspace Intrusion; and
- Guideline G: Communications, Navigation and Surveillance.

2.3 Critical Planning Parameters

2.3.1 Aerodrome Reference Code System

The aerodrome reference code system specifies the standards for aerodrome facilities based on the performance and size of typically used aircraft. The code is comprised of three elements:

- Element 1 is a number related to the aeroplane reference field length;
- Element 2 is a letter related to the aeroplane wingspan and outer main gear wheel span; and
- Element 3 is the greatest OMGWS of the aeroplanes that the aerodrome or facility is nominated by the operator to serve.

The code letter or number within an element selected for design purposes is related to the characteristics of the critical aircraft for which the facility is provided.

The Aerodrome Reference Code is based on the characteristics of an aircraft and not the airport. The aerodrome facilities are then determined to meet the characteristics of the critical aircraft. A summary of the aerodrome reference codes in MOS Part 139 are provided in

Table 2.3.

The choice of OMGWS lies with the aerodrome operator. A failure to choose that which is the most demanding of applicable options may result in operational limitations for a particular aircraft type.

Table 2.3 Aerodrome reference code (MOS Part 139 - 2019)

Code Element 1		Code Element 2		Code Element 3
Code number	**Aeroplane reference field length**	**Code letter**	**Wing span**	**Outer main gear wheel span (OMGWS)**
1	Less than 800m	A	Up to but not including 15m	Up to but not including 4.5m
2	Not less than 800m	B	15m up to but not including 24m	4.5m up to but not including 6m
3	Not less than 1200m	C	24m up to but not including 36m	6m up to but not including 9m
4	Not less than 1800m	D	36m up to but not including 52m	9m up to but not including 15m
		E	52m up to but not including 65m	
		F	65m up to but not including 80m	

Unless otherwise agreed by CASA, aerodrome operators are required to maintain the aerodrome's runways and taxiways in accordance with the standards set out in the MOS Part 139 applicable to the Aerodrome Reference Code for the runway or taxiway.

2.3.2 Design Aircraft

The runway length, width and strength for an aerodrome will need to be based on the critical aircraft likely to utilise the aerodrome currently or in the future. The critical aircraft at the aerodrome is currently the Beechcraft King Air 200 operated by the Air Ambulance and RFDS.

The indicative characteristics of the aircraft considered critical to current and future operations at the aerodrome are provided in Table 2.4.The design aircraft to be adopted for future aerodrome development is the Beechcraft King Air 350 in the event that the operator that services this route utilises this aircraft which is significantly larger than the Beechcraft King Air 200.

Table 2.4 Aircraft design characteristics

Aircraft	ARFL (m)	MTOW (kg)	ACN*	Code
King Air B350	1,260	6,804	4	2B
King Air B200	592	5,670	3	1B

**The ACN is based on the aircraft's MTOW on a flexible pavement with a subgrade strength category rated as medium or "B"*

It is also necessary to consider the length of the aircraft to establish a design envelope for planning of movement areas including aprons. The wheelbase and other physical characteristics also impact this design process relating to the movement characteristics of the aircraft.

2.3.3 Aircraft Movement Areas

The movement areas comprise of the runways, taxiways and aprons. These need to be designed to provide adequate capacity for all relevant aircraft, particularly on the apron to ensure parking positions, hangars and taxi lanes are accessible at all times.

The required sizes of the movement areas for future development of the aerodrome has been described in Section 4 of the Concept Plan, based on individual aircraft requirements as well as swept path analysis.

2.3.4 Pavement Strength

The pavement rating for airports is determined using the Aircraft Classification Number (ACN) – Pavement Classification Number (PCN) rating system method outlined in Section 5.04(1)(c) of the new MOS Part 139. CASA does not specify a standard for pavement bearing strength, however the pavement must be of adequate bearing strength to ensure aircraft do not experience safety or operational problems.

The current PCN of Runway 17/35 is reported in ERSA as PCN 9/F/A/800(116PSI)/T Grass. Central 18(60) sealed. This indicates the PCN is based on an aircraft user method. Pavement investigations have been completed as part of this Concept Plan and recommendations are outlined in Section 4 of the Concept Plan which provide a more accurate PCN for Runway 17/35.

2.4 Stakeholder Engagement

It is important to identify relevant stakeholders, their interactions with the various aerodrome assets and their relevant serviceability and performance expectations to gain an understanding of stakeholder's perceptions and requirements of the different assets and the overall network.

A Stakeholder Engagement Plan was developed for the Echuca Aerodrome Concept Plan to provide a strategic direction for the public consultation process during the planning and preparation phase of the Concept Plan. The purpose of this plan was to assist Council and ensure the preparation of the Concept Plan considered and involved all relevant stakeholders and parties of interest.

The objectives of the Plan were as follows:

- Share information and create alignment between Council and stakeholders;
- Identify and develop a plan to inform key stakeholders;
- Assign responsibilities for project tasks and information, particularly those related to the dissemination of information to stakeholders;
- Manage sponsor and stakeholder information and expectations; and
- Maintain the focus of the Echuca Aerodrome Concept Plan and all related development.

The main component of the consultation period involved Key stakeholder consultation.

Typical stakeholder groups relevant to the Echuca Aerodrome Concept Plan and their typical expectations regarding Level of Service (LOS) requirements are summarised in Table 2.5.

Table 2.5 Echuca Aerodrome stakeholders and their qualitative LOS expectations

Group	Stakeholder Description	Qualitative LOS Expectations
Local Industry	Business, commerce, tourism organisations	Access to major centres, condition of facilities
Emergency Services	Air Ambulance Royal Flying Doctors Service (RFDS), Department of Fire & Emergency Services Country Fire Authority Victoria Police Ambulance Victoria State Emergency Service (SES)	Accessibility, capacity, availability and safety of facilities
Other Airport Users	Charter aircraft operators and General Aviation (GA) users	Condition of facilities, accessibility and safety
Service Providers	Aviation fuel suppliers	Condition of facilities, operational efficiency
Aerodrome Operator	Campaspe Shire Council	Safety, airport growth and economic benefits to community, customer satisfaction
Employees	Council employees of the airport organisation and airport tenants	Provide secure jobs, wages, and benefits
Commonwealth Regulators	AsA, CASA, BOM etc	Regulatory compliance / airport standards, safety, performance, capacity, noise, economic benefits
Non-Government Organisations	Aircraft Owners & Pilots Association, Australian Airports Association, Recreational Aviation Australia	Facilities, safety, sustainability of the airport to continue operating

2.4.1 Key Stakeholder Consultation Feedback

The stakeholder consultation included Council identifying and seeking to consult with all appropriate individual stakeholders across a variety of businesses and user groups including:

- Airport Operator (Campaspe Shire Council);
- Airport Users;
- Local Government;
- Victorian Government;
- Commonwealth Government; and
- Concessionaires / Refuelling.

A summary of aerodrome stakeholders that were identified are provided in Table 2.6. It should be noted that not everyone was approached for feedback as this was beyond the scope of this Concept Plan. Council may seek to engage further with relevant stakeholders in the future including those outlined below.

Table 2.6 Echuca Aerodrome relevant stakeholders

Category	Stakeholder Description
Airport Operator	Campaspe Shire Council
Airport Users	Pelair

Category	Stakeholder Description
	Royal Flying Doctor Service (RFDS)
	Aircraft & Charter Operators
	Recreational Aviation Australia
	Sport Aircraft Association of Australia
	Australian Sports Rotorcraft Association Inc. (ASRA)
	Emergency Rescue Helicopter Service
	Babcock
	Kagome
	Parmalat
	Simplot
	Heinz
	Aero Club
	Airport Tenants
Local Government	Gannawarra Shire Council
	Loddon Shire Council
	Greater Bendigo Council
	Strathbogie Council
	Greater Shepparton Council
	Moira Council
	Murray River Council
Victorian Government	Department of Fire & Emergency Services
	Country Fire Authority
	Victoria Police
	Ambulance Victoria
	State Emergency Service (SES)
Commonwealth Government	Department of Infrastructure & Regional Development (DIRD)
	Civil Aviation Safety Authority (CASA)
	Bureau of Meteorology
Concessionaires / Refuelling	Refuelling Operator

3 Native Vegetation Assessment

3.1 Victoria's Native Vegetation Legislation

Campaspe Shire Council is in the Victorian Riverina bioregion and located along the eastern boundary of the North Central Catchment Management Authority (CMA).

National and State significant environmental and heritage sites, ecological communities and species occurrence within the Echuca Aerodrome site was investigated using the following environmental legislation:

- The Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999 provides legislative protection for Matters of National Environmental Significance (MNES), including all nationally threatened fauna and flora species, and ecological communities.
- Victoria's Planning and Environment Act 1987 sets up procedures to manage the use and development of land as well as the framework for regional and local legislative policies and procedures for interactions between land use and State significant environmental communities and threatened native species. The Department of Environment, Land, Water and Planning (DELWP) provide online environmental management tools to investigate pre-1750, extant and health of native vegetation across the State.
- Victoria's Flora and Fauna Guarantee (FFG) Act 1988 is supported by the Flora and Fauna Guarantee Regulations 2011 and provides conservation and management of the State's threatened communities and species. This legislation is key to management of remnant native vegetation, including reducing removal of native species, conserving fragments of significant native vegetation communities and support enhancing and improving connectivity in native vegetation.

Australia's Commonwealth and National heritage lists were accessed from the Australian Government Department of Agriculture, Water and Environment (http://www.environment.gov.au/heritage/heritage-places) on 24 April 2020 and no historically significant places or locations were identified on the Airport site.

3.2 Native Vegetation Assessment at Echuca Aerodrome

A native vegetation assessment at Echuca Aerodrome was conducted as part of the Echuca Aerodrome Master Plan 2010. The assessment found seven sites of Plains Grassland in the vicinity of the existing terminal building, with six of the sites identified as areas of very high conservation significance grassland. The remnant grassland is listed under the Environment Protection and Biodiversity Conservation Act 1999 as a critically endangered ecological community (Cheers, 2009).

Environmental constraints relevant to the Aerodrome site and associated with threatened native fauna and vegetation have been identified using statutory online search tools, including EPBC Protected Matters Search Tool, Victorian Biodiversity Atlas and Victorian Department of Environment, Land, Water and Planning (DELWP) NatureKit interactive map and Native Vegetation Information Management (NVIM) tool.

A search of EPBC protected matters identified one (1) threatened ecological community relevant to the Airport site, being the Natural Grasslands of the Murray Valley Plains and classified as critically endangered. The EPBC protected matters identified eight (8) threatened species, which are associated with the Natural Grasslands of the Murray Valley Plains and relevant to the Airport site (Table 3.1).

Table 3.1 List of threatened fauna and flora species associated with the Plains.

Fauna	Common name	Species
Bird	Plains-wanderer	*Pedionomus torquatus*
Frog	Sloane's Froglet	*Crinia sloanei*
Insect	Golden Sun Moth	*Synemon plana*
Reptile	Striped legless lizard	*Delma impar*
Flora	**Common name**	**Species**
Perennial shrub	Spiny Rice-flower	*Pimelea spinescens* subsp. *Spinescens*
Perennial Saltbush	Turnip Copperburr	*Sclerolaena napiformis*
Perennial herb	Slender Darling-pea	*Swainsona murrayana*
Perennial herb	Red Swainson-pea	*Swainsona plagiotropis*

The above described nationally threatened species that may occur on the Aerodrome site were listed as threatened species of State significance under Victoria's FFG Act 1988, except for Sloane's froglet. The International Union for Conservation of Nature (IUCN) Red List for globally significant species documents four of the above described threatened species, being the Plains-wanderer as critically endangered, the striped legless lizard as endangered, Murray Swainson-pea as vulnerable, and Sloane's froglet is noted as insufficient data.

3.2.1 Historic Native Vegetation occurrence at Echuca Aerodrome

Survey data for species indicative of the Plains Grasslands historically recorded on the Echuca Aerodrome site was accessed from the DELWP Biodiversity Atlas. Twenty-three (23) surveys have been recorded on and adjacent to the Airport site between 1983 to 2017 (Figure ZZ), with plant species indicative of the ecological community, Plains Grassland recorded in nineteen (19) surveys. The highest number of indicative plant species typical of high-quality Plains Grassland habitat was recorded at Survey 1 in 1999. To protect Plains Grassland communities under national environmental law, a habitat patch needs to be in good condition, high quality and at least 0.04 hectares (400 sq. m) in area. Historic survey data indicated several patches of Plains Grassland communities occur across the Aerodrome site, however, assessment of the condition and quality of the patches is limited without information on the size of patches.

During the period of historic survey data, the Plains Grassland-associated plant species most frequently reported (58%) were *Rytidosperma* spp. (wallaby grasses) and *Sclerolaena napiformis* (Turnip copperburr). Majority of plant species were observed at less than 1% cover within surveys, except the critically endangered Turnip copperburr, where 64% of observations recorded 15 or more individual plants, with a maximum of 454 individual plants in one survey period.

The northern area of the Airport site, which indicates the most substantive patch of Plains Grasslands (Figure XXB) was surveyed once in 1983 (survey 7) as well as two surveys on adjacent land to the Airport in 1992 and 1997 at site 8 (Figure ZZ). Survey 7 was in the north-eastern corner of the Airport and recorded 33 individual plants typical of the Plains Grassland habitat, with 17 plant species identified within the Table 3.1 list of indicative species for Plains Grassland habitat.

In 1997, survey 8a recorded observations between the Aerodrome main office and runway. The survey recorded 3 plant species associated with the Plains Grasslands habitat, with 454 plants documented for the threatened species, Turnip copperburr.

Figure 3.1 Survey sites on and adjoining the Echuca Airport site.

An ecological survey of the Aerodrome site was conducted in November 2009 as part of the Echuca Aerodrome Master Plan (EAMP) 2010. The survey included 6 sites located between the buildings and runway and at the southern edge of the main runway (Figure 3.1). The EAMP survey sites, E1 and E6 appear to be in a similar survey location to historic survey 1 (1999) and 8a (1997). Wallaby grasses were recorded in both the historic surveys and the EAMP survey, although in historic surveys genus *Rytidosperma* were frequently observed, compared to the genus *Austrodanthonia* recorded at all sites for the EAMP. Spear grasses (*Austrostipa* spp.) were recorded at all sites for the EAMP and historic survey 1 (1999). Turnip copperburr plants were recorded at similar historic and EAMP survey sites, (being E1 and E6 and historic surveys 1 an 8a), with total number of Plains Grassland-associated plants recorded at historic survey 1 was 67% higher than recorded at EAMP survey sites 1 and 6. Historic survey 8a recorded least number of species but the highest total number of plants, which were 454 Turnip copperburr plants. This may be due to variation in seasonal weather prior to the survey, or seasonal period, being in May compared to September and November for the other surveys.

Fig AA. Example of suitable Plains Grassland habitat for the Plains-wanderer. Sourced from Werribee Open Zoo Plains-wanderer captivity breeding program.

The Campaspe River is a geographic boundary that naturally separates the Plains Grassland habitat on the Aerodrome site with critical Plains Grassland habitat for the Plains-wanderer nationally identified in the north central region of Victoria (National Recovery Plan 2016), being Plains Grassland that surrounds Terrick Terrick National Park, Bael Bael Nature Conservation Reserve, and Trust for Nature's Wanderers Plain.

The home range for a Plains-wanderer pair is approximately 18ha in suitable habitat. There are no historic records of the Plains-wanderer on or adjoining the Aerodrome site, which may suggest that the survey area habitat structure was not suitable, area was less than required for home range, or was not conducted at optimum observation times, being at night (National Recovery Plan 2016).

3.3 Echuca Aerodrome Current Native Vegetation Assessment

The document, *Landowner agreement between the Secretary to the DELWP and Campaspe Shire Council* (Landowner Agreement) was recently prepared to identify, protect, and manage remnant patches of Northern Plains Grassland vegetation on the Aerodrome site. The document identified eight native vegetation zones of relatively good quality (Figure 3.2) based on assessments of the Aerodrome site conducted by Steve Hamilton, Hamilton Environmental Services in September to November 2014, February and August 2018, and September and October 2019. Reports for the native vegetation surveys conducted in 2018 and 2019 were not available.

3.3.1 Map of the Extent and Condition of Native Vegetation

Approximately 50% of the Aerodrome site was estimated as possible remnant Northern Plains Grassland on the site (Figure 3.2) based on current EVC 132 estimates using DELWP NatureKit interactive map. A large proportion of this area has been extensively disturbed in association with the use and management of the Aerodrome.

The state has determined that the extent of native vegetation characteristic of Northern Plains Grassland and of relatively good quality on the Aerodrome site equates to 3.9545 ha, being the total of the eight identified native vegetation zones (Figure 3.2). Sites 1A, 2A, 3A and 5A (Figure 3.2) are generally congruous to sites recommended suitable for native vegetation protection in the report by Cheers & Cheers (2009) and undertaken as part of the Echuca Aerodrome Master Plan 2010. The fenced potential site in Figure 3.2 was identified as site 4 in Cheers & Cheers (2009) report as good quality but was excluded in the Landowner Agreement. Sites 6A, 7A, and 8A (Figure 3.2) were not identified in the report prepared by Cheers & Cheers (2009). The eight zones identified by the Landowner Agreement were visually surveyed on Friday, 26 June 2020.

3.3.2 Vegetation Quality Assessment

Northern Plains Grassland native vegetation comprise native grasses, perennial herbs and chenopods, with the optimum period to assess distribution and biodiversity of native vegetation being in the flowering period that occurs in the spring months of September to November. The expected low distribution and biodiversity of native vegetation that occurs during winter months was observed during the survey conducted 26 June 2020.

Figure 3.2 Aerial survey of native vegetation at Echuca Aerodrome, including estimated area for the 8 native vegetation patches identified under the Landowner Agreement.

In general, all sites except site 4A and 5A appeared to be dominated by weed species, particularly onion grass (*Romulea rosea*) at sites 1A to 5A and wild oat grass (*Avena fatua*) at sites 6A to 8A. Characteristic red clay dirt between scattered native species was not observed at any of the eight sites. Salt bushes (*Atriplex* spp.) and windmill grass (*Chloris truncata*) were present at all sites.

3.4 Extent and Quality of Native Vegetation at Echuca Aerodrome

The extent and diversity of native vegetation at Echuca Aerodrome was lower compared to previous reports. This may be attributed to the seasonal differences, being outside native plants flowering period and numerous plant species being perennials and dormant at this time of year. All sites, except the unfenced portion of site 4A appeared overgrown with weed species, which may be a seasonal influence as well as recent rainfall creating suitable growth conditions.

On-site assessment of native vegetation at Echuca Aerodrome was limited to survey observation of proposed native vegetation sites defined by the Landowner agreement due to weather and covid-19 restrictions. It is recommended that a survey of each site (as defined by the Landowner agreement) be conducted during the perennial flowering season (September to December) to enable a more representative and detailed assessment of the biodiversity and distribution of native vegetation at Echuca Aerodrome, particularly for national and/or state listed threatened species, including Red Swainson-pea (*Swainsona plagiotropis*), Turnip copperburr (*Sclerolaena napiformis*), billy-buttons (*Craspedia* spp.) and cut-leaf burr-daisy (Calotis anthemoides).

3.5 Likely Impacts from any Proposed Works in the Concept Plan

1. The boundaries for sites 1A, 2A, 3A and 5A as defined under the Landowner agreement must be identified to determine whether the site boundaries adjoining the drainage channel will be impacted with proposed maintenance, weed removal and upgrade of the drainage channel.
2. The upgrade of the taxiway is unlikely to impact the adjoining native vegetation sites 1A and 5A, however the site boundaries defined under the Landowner agreement must be identified to confirm the measured gravel buffer between native vegetation sites and the taxiway is adequate for widening the bitumen without impacting native vegetation.
3. Widening runway 17/35 by 5m has potential to impact native vegetation within site 2, located east of runway 17/35, being in the grassed area between the existing runway and drainage channel (Figure 3.2). The site contains threatened Turnip copperburr plants, and along with any other Northern Plains Grassland plant species would be recommended to be relocated to site 4A or the unnamed fenced site prior to any works associated with widening the runway to the east.

4 Existing Facilities

4.1 Airport Objectives

The Echuca Aerodrome Manual is currently being prepared to ensure the aerodrome is operated and maintained in accordance with the operating procedures specified in CASR Part 139 as a critical transportation asset to facilitate CSC's commitment to ensuring the accessibility of the region.

4.2 Aerodrome Inspections

Aerodrome Safety Inspections (ASI) are carried out annually in accordance with Civil Aviation Safety Regulations (CASR). Inspections of specific issues are completed before the annual inspection when a problem is identified from a serviceability inspection. The Airport Manager is required to ensure that technical inspections are carried out by qualified persons and that appropriate corrective actions are undertaken in good time.

4.3 Facilities and Levels of Service

The high-level components and facilities available at the Aerodrome are summarised in Figure 4.1.

Figure 4.1 Basic categorisation of aerodrome infrastructure types.

Airside	Landside
•One sealed runway •One gravel runway •One sealed taxiway •Three gravel taxiways •Three sealed aprons •Nine hangars •Airfield lighting •Refuelling facilities •Aeroclub building •Illuminated wind indicator	•Terminal facilities •Fencing •Entry road •General car parking area •Utility services

An overview of the existing airport boundary and facilities is shown in Figure 4.2.

Figure 4.2 Existing site and facilities plan

Figure 4.3 Existing aerodrome site boundary and facilities plan

4.4 Airside Facilities

An overview of all airside facilities is provided in the sections below. There are currently no CASA exemptions at the aerodrome.

The aerodrome is serviced by Runway 05/23 and Runway 17/35 as shown in Figure 4.4.

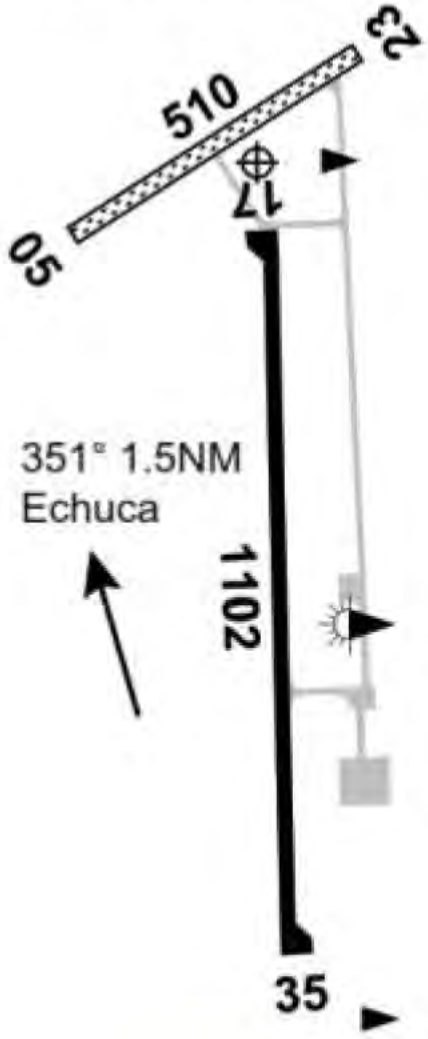


Figure 4.4 ERSA extract showing aerodrome layout

Runway 05/23 is 510m long and 30m wide. The runway strip associated with Runway 05/23 is 570m long and 60m wide. Runway 05/23 is an unsealed (grassed) runway which is understood to be used for ultralight aircraft and for training purposes. This runway is suitable for Code 1 non-instrument approach operations

Runway 17/35 is 1102m long and 30m wide with a central 18m sealed surface. The runway strip associated with Runway 17/35 is 1,222m long and 90m wide. The runway pavement sealed surface has a published Pavement Classification Number (PCN) of 9/F/A/800(116PSI)/T.

Runway 17/35 currently has a published width of 18m sealed and therefore does not comply with the requirement for a Code 2 in accordance with MOS 139. This runway is suitable for non-precision instrument approach operations by aircraft up to Code 1B.

Runway 17/35 is installed with a low intensity runway lights (LIRL) along the runway edge, providing a single stage of brightness.

The Airport's current Masterplan (Beca Pty Ltd, 2010) states that the existing pavement consists of a bitumen seal with 5mm aggregate on a gravel base and was last resealed around 2000. As flexible pavements are typically designed for a 20-year functional life, this would imply that the pavement is reaching the end of its function life, noting that a pavements structural life can be significantly longer. Spray seals are noted to have a typical life expectancy of 7-15 years, making the existing seal older than usual.

4.4.1 Taxiways

Echuca Aerodrome is serviced by 5 taxiways. The Airport's taxiways are unnamed. The following naming conventions are adopted in this report:

1. Central (main) taxiway (10.5m wide).
2. Northern sealed taxiway (10.5m wide).
3. Southern sealed taxiway (10.5m wide).
4. Northern unsealed taxiway (5-9m wide).
5. Southern unsealed taxiway.

There are also two (2) sealed taxilanes which provide access to hangars.

All of the sealed taxiways and taxilanes are surfaced with the same 5mm bituminous spray seal surfacing as the runway, leading to the presumption that they were resurfaced at the same time as the runway (2000). The central taxiway has a short section of concrete pavement / blast pad used for engine run-up. The blast pad also bridges the Airport's main open stormwater drain / grassed swale. The sealed taxiways are 10.5m wide.

The two (2) unsealed taxiways provide access from the aprons to each end of Runway 17/35 and the eastern end of Runway 05/23. They are both constructed of gravel / road base; however, the southern unsealed taxiway has since been overlaid with a different type of granular material. Both unsealed taxiways are 9m wide. The unsealed taxiways are generally in good condition and the hangar taxilanes are noted to be in poor condition with a number of structural defects.

4.4.2 Aprons

The aerodrome has three sealed aprons consisting of the following:

- Southern (Parking) Apron.
- Terminal Apron.
- Northern (Re-Fuelling) Apron.

All aprons are similarly sealed with 5mm size spray seals likely placed at the same time as the runway and taxiways. The Southern Apron is used for aircraft parking and is approximately 5600m^2. The Northern Re-Fuelling Apron is approximately 1600m^2. The Terminal Apron is 1400m^2 and is primarily used for parking RFDS aircraft.

Floodlighting is provided on the Terminal Apron which is recommended to be upgraded to LED in the long-term planning considerations.

The Northern and Southern apron are in relatively good condition. Both are exhibiting some of the typical defects, including flushing, minor depressions, and edge defects.

The Southern Apron is sealed with tie-down cables available for aircraft with an MTOW below 5,700kg.

The terminal apron was judged to be in good condition apart from a defective patched area closest to the terminal where Air Ambulance and Royal Flying Doctors Service (RFDS) park their aircraft.

4.4.3 Visual and Navigation Aids

The aerodrome maintains the following navigational aids to assist pilots and aerodrome users:

- Illuminated Wind Indicator (IWI) located north of the Terminal apron; and
- Two Secondary Wind indicator (not illuminated) located on the eastern side of the thresholds of Runway 17/35.

Echuca Aerodrome is an approved non-precision GPS assisted aerodrome with RNAV-Z (GNSS) procedures for Runway 17 and Runway 35.

CASA published CAO 20.18 mandated the use of Global Navigation Satellite System (GNSS) for all Instrument Flight Rule (IFR) aircraft operating in Australian airspace by 4 February 2016. As part of the transition to satellite-based navigation, the Airservices Navigation Rationalisation Project (NRP) decommissioned approximately half of Australia's network of conventional navigation facilities. The remaining network of navigation aids subsequently formed the Backup Navigation Network (BNN) which will be maintained and monitored by Airservices to support GNSS contingency.

It should be noted that as part of the NRP, the NDB at Echuca has been decommissioned.

Runway 17/35 has runway edge lights (LIRL), PAL and CTAF frequency 122.8MHz (for operations in the vicinity of non-controlled aerodromes). Runway and taxiway lights can be switched on remotely by pilots either on the ground or in the circuit area by selecting the frequency above. AROs can also switch on the runway and taxiway lights remotely as required.

Low visibility observations or Runway Visual Range (RVR) assessments and observations are not provided at the aerodrome. There is no local Air Traffic Control (ATC) and nor has CASA approved or requested Low Visibility Operation (LVO) procedures. Any operations in low visibility are at the discretion of the commanding pilot.

4.4.4 Air Traffic Management

Echuca Aerodrome is an uncontrolled aerodrome which operates without an ATC tower.

4.4.5 Refuelling Facilities

Jet A1 and AVGAS fuel bowsers are located on a concrete slab adjacent to the western side of the refuelling apron. These facilities are owned and operated by the Echuca Aeroclub.

Figure 4.5 Refuelling facilities

4.4.6 General Aviation Precinct

There are currently 9 hangars located at the Echuca aerodrome.

Other buildings include:

- Airport Terminal building; and
- Aero Club Building

The terminal provides amenities for passengers and pilots as well as two offices.

4.5 Landside Infrastructure

4.5.1 Landside Access

Airport access is from Echuca-Kyabram Road which connects the airport to the Echuca township.

4.5.2 Car Parking

Car parking is available adjacent to the terminal building. The car park comprises of a gravel surface and is not currently line marked. The car park provides ample parking based on the current operations at the airport.

There are no public bus services from the airport into town, and the taxi journey takes approximately 7 minutes.

4.6 Historical Aviation Activity

4.6.1 Aircraft Movements

Echuca Aerodrome does not currently monitor aircraft movements.

Royal Flying Doctor Service

The RFDS provides 24-hour aeromedical emergency services to regional and remote areas of Australia. The RFDS utilise four different aircraft, although only the Beechcraft King Air 200 is used for operations at Echuca Aerodrome.

Aeromedical movements are generally governed by the population and population growth rates in the surrounding area.

VIC Air Ambulance

Air Ambulance operate four Beechcraft King Air 200 fixed-wing aircraft and Augusta Westland AW-139 twin engine helicopter, which are used in emergencies and for the routine transport of non-emergency patients to ensure difficult to reach patients in regional and remote areas across the state receive the medical care they require and transport to a hospital if necessary.

Air Ambulance VIC indicated that they undertake operations in and out of Echuca on average once per week, although frequency varies.

General Aviation

Echuca Aerodrome is home to a number of general aviation businesses and transient operators. These provide services such as flight training, charter services, patient, aircraft maintenance, access for dignitaries, freight, aerial surveying and minor tourism.

5 Airport Development

Echuca Aerodrome does not currently monitor aircraft movements therefore aircraft movement forecasts have not been developed for this Concept Plan. It is recommended that CSC consider tracking aircraft movements at Echuca Aerodrome. Airport infrastructure needs to be designed to ensure capacity to support future anticipated growth. Aircraft movement data can be analysed and forecast to provide an indication of future facility requirements. In addition to monitoring aircraft movements, CSC should consider implementing a series of charges for aircraft movements to assist with the cost of aerodrome maintenance.

5.1.1 Population Trends

Prior to undertaking Airport development planning, the Echuca and surrounding regions population data was assessed. Campaspe Shire experienced a population increase over the past 20 years. In a report commissioned by CSC the total population of the Shire is expected to increase by 12% between 2020-2035.

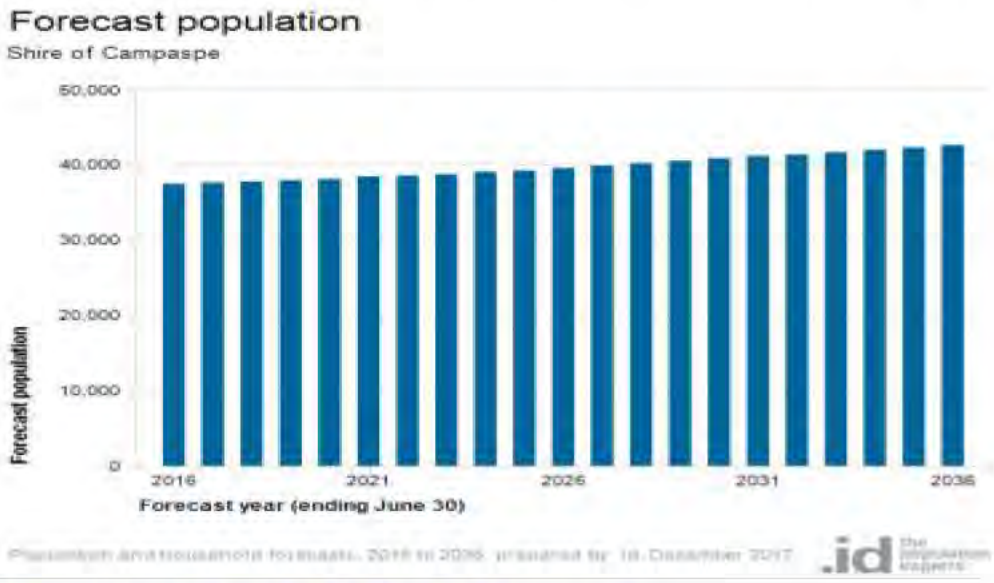


Figure 5.1 Population Forecast for the Shire of Campaspe

The State of Victoria as a whole has experienced a population growth of 2.51% between 2011 and 2016. A comparison of the population growth rates for Campaspe Shire and Victoria is provided in Figure 5.2.

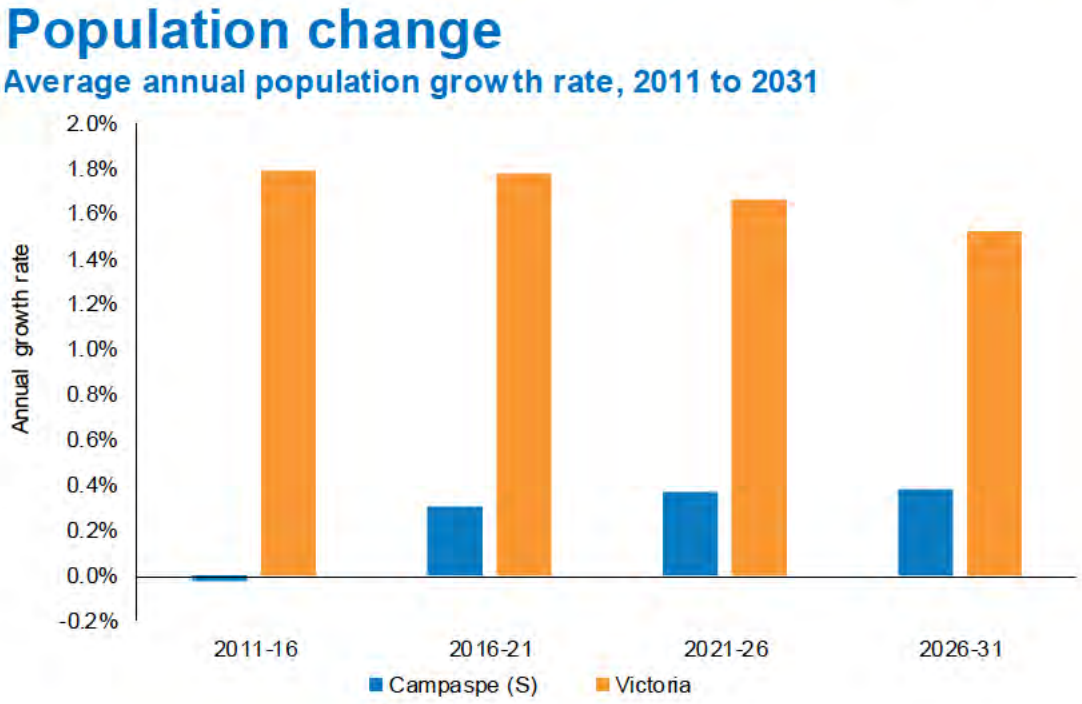


Figure 5.2 Population comparison analysis for Campaspe

5.2 Design Aircraft

The dimensions, shape and layout of basic airport facilities such as runways, taxiways and aprons are essentially determined by the performance capability and size of the aircraft that are intended to use them. Different facilities on the airport, such as those intended for aeromedical services and those intended solely for light GA aircraft, are normally planned for their specific critical aircraft.

The design aircraft traffic mix and annual departures adopted for the Aerodrome is provided in Table 5.1. The critical aircraft in the mix is the Beechcraft King Air 350. It was assumed that the Beechcraft King Air 200 will be phased out in favour of the Beechcraft King Air 300 and 350 in coming years and the Beechcraft King Air 200 was not considered. As it is unknown whether the Air Ambulance will predominantly use the Beechcraft King Air 300 or 350, a 50% split was assumed between the two (2) aircraft types. The Beechcraft King Air 350 was assumed for all RFDS movements.

It is understood that an L-39 fighter jet visits the Aerodrome a few times per year. This was included in the traffic mix and assigned 5 annual departures per annum.

Table 5.1 Adopted Design Traffic

Design Aircrafts	Operating Weight – MTOW (Tonnes)	Tire Pressure (kPa) (COMFAA only)[1]	Annual Departures (2021)
King Air B350	6.849	634	151
King Air B300	6.396	634	125
L-39 Fighter Jet	4.700	690	5

[1] **Tire Pressure is automatically calculated in FAARFIELD and has little impact on overall pavement depth**

Like the PCN calculation, the training and charter aircraft were not considered in the traffic mix as no information regarding frequency was supplied. Although the information supplied was limited, it is noted that for aerodromes (such as Echuca) where there is clear critical aircraft (King Air B350 and B300), the other aircraft have negligible effect on the required pavement thickness.

For example, to test the sensitivity of COMFAA's required design thickness to the addition of lighter aircraft in in the traffic mix, 3000 movements each of the Airport's ultralight and light training airplanes (the Jabiru J160c and Piper Archer II respectively) and a Beechcraft Baron E55 were included in the traffic mix. The increase in pavement thickness required due to the addition of these aircraft was 2.0mm.

Table 5.2 Aircraft groupings and characteristics for facility planning

Description	Characteristic Aerodrome Reference Code	Characteristic ACN
Light aircraft (private)	1A	NR *
Light aircraft (commercial)	2B	NR *
Turbo-prop and regional jet	3C	20
Medium-jet	4C	44

* NR = Not Rated due to aircraft being < 5.7 tonne MTOW

Table 5.3 Typical examples of critical aircraft for airport user groups

	Typical Maximum Aircraft Sizes >>>	GA / RFDS	RFDS	Charter or RPT 9 – 30 Passengers	Charter or RPT ≥ 30 Passengers	Charter or RPT ≥ 30 Passengers	RPT ≥ 50 Passengers
	Aerodrome parameter	**Beech King Air 200 Series**	**Beech King Air B350CHW Series**	**Beechcraft 1900D**	**Saab 340B**	**Bombardier Dash 8 Q100**	**Bombardier Dash 8 300**
Design Aircraft Parameters	**Typical Airline Operators** #*						
	Aircraft Code	1B	1B	2B	3C	2C	2C
	Engine Type	Twin Engine Turbo-Prop	Twin Engine Turbo-Prop	Twin Engine Turbo-Prop	Twin Engine Turbo-Prop	Twin Engine Turbo-Prop	Twin Engine Turbo-Prop
	Aircraft Classification Number, F/ A/ B/ C/ D/	2/ 3/ 3/ 4/	3/ 3/ 4/ 4/	3/ 4/ 4/ 5/	6/ 7/ 8/ 9/	7/ 8/ 9/ 11	8/ 9/ 11/ 13/
	Tyre Pressure (kPa)	730	730	670	820	805	670
	Aeroplane Reference Field Length (ARFL) (m)	592	1,236 **	1,098	1,220	948	1,122
	ARFL based on Bureau of Meteorology (m)~	707	1,571	1,396	1,551	1,205	1,426
	Wing-span (m)	16.6	17.7	16.6	21.4	25.9	27.4
	Outer Main Gear Wheel Span (m)	5.6	5.0	5.8	7.5	8.5	8.5
	Length (m)	13.3	14.2	17.6	19.7	22.3	25.7
	Maximum Take-off Weight (kg)	5,670	7,484	7,530	12,371	15,650	18,642
	Typical Seating Capacity	2 patients + crew or 8 seats	2 patients + crew or 11 seats	19	36	37	50
	Security screening required *	No	No	No	No	No	No
Movement Area Requirements	**Runway physical requirements**						
	Maximum field length for code of runway (m) **	800 *1,000 (RFDS)*	800 *1,260 (RFDS)*	1,200	1,800	1,200	1,200
	Minimum runway width for code (m) **	18	18 *23 (RFDS)*	23	30	30	30
	Minimum PCN F/ A/ B/ C/ D/	2/ 3/ 3/ 4/	3/ 3/ 4/ 4	3/ 4/ 4/ 5/	6/ 7/ 8/ 9/	7/ 8/ 9/ 11	8/ 9/ 11/ 13/
	Runway strip length (m)	30	1380	60	60	60	60
	Runway strip width (m)	90	90	150	150	150	150
	Runway strip graded area width (m)	60	60	80	90	80	80
	RESA area	Not applicable	Not applicable	Not applicable	90	90	90
	Taxiway physical requirements				*Wheel base < 18.0m*	*Wheel base < 18.0m*	*Wheel base < 18.0m*
	Minimum taxiway width (m)	10.5	10.5	10.5	15.0	15.0	15.0
	Minimum taxiway strip width (m)	21.5	21.5	21.5	26.0	26.0	26.0
	Minimum taxiway strip graded area width (m)	12.5	12.5	12.5	12.5	12.5	12.5
	Apron requirements						
	Separation from centre parking to object	16.5	16.5	16.5	24.5	24.5	24.5
	Separation from wing tip to object	3.0	3.0	3.0	4.5	4.5	4.5
Terminal Requirements	**Terminal area requirements**						
	Wait / circulate area (1.9m2 / pax)	0.0	0.0	36.1	68.4	70.3	95.0
	Bag claim area (1.6m2 / pax)	0.0	0.0	30.4	57.6	59.2	80.0
	Check-in queue area (1.4m2 / pax)	0.0	0.0	26.6	50.4	51.8	70.0
	Hold-room inspection area (1.0m2 / pax)	0.0	0.0	19.0	36.0	37.0	50.0
	Terminal requirements (other)						
	Wet areas (0.5m2 / pax)	0.0	0.0	9.5	18.0	18.5	25.0
	Back of house area (0.6m2 / pax)	0.0	0.0	11.4	21.6	22.2	30.0
	Airport manager office area (0.6m2 / pax)	0.0	0.0	11.4	21.6	22.2	30.0
	Services (ICT / elec / Mech) area (0.3m2 / pax)	0.0	0.0	5.7	10.8	11.1	15.0
	Other / miscellaneous	0.0	0.0	9.5	18.0	18.5	25.0
	Calculated gross terminal area required	**0.0**	**0.0**	**159.6**	**302.4**	**310.8**	**390.0**

These are example aircraft only because there are various other regional charter / RPT operators in Victoria utilising turboprops

* Jets have been excluded from analysis, only turboprops have been investigated.

~ Based on data obtained from the Bureau of Meteorology and the procedure for basic runway length calculation outlined in ICAO Aerodrome Design Manual Part I Runways

** Relevant reference field length and runway widths have been obtained from RFDS, all other ARFL's have been obtained from MOS Part 139, however the reference field length may change depending on a range of factors (for example temperature, altitude and operating weight)

5.3 Airport Precincts

Several future precincts have been identified, specifically:

- Airside:
  - Aircraft Movement Areas.
  - Helipad.
  - Apron.
  - GA Hangars.
- Terminal; and
- Aeromedical Facilities.

Detailed future development precincts plans are provided in Figure 5.3 to Figure 5.4, with higher quality resolution provided in Appendix C.

The major works proposed comprise of significant upgrades to the airside infrastructure. This will involve pavement works for the runway, taxiway and apron to accommodate the Beechcraft King Air 350 design aircraft.

Upgrade works for the existing pavement have been recommended based on knowledge of the current condition of pavement from the most recent Pavement Investigations. The existing pavement works required have been confirmed with onsite investigations to determine the current structural strength and PCN and the required works to accommodate the Beechcraft King Air 350.

A more detailed breakdown of the proposed works is presented in the following sections.

Figure 5.3 Future aerodrome precinct layout plan.

Figure 5.4 Future aerodrome site boundary and facilities plan.

5.3.1 Airside

Runway 17/35

CSC engaged JJR to investigate and evaluate the Airport's existing pavement assets and provide Concept Design options for pavement upgrades. The scope of pavement investigation, evaluation and design works is as follows:

- Detailed visual inspection of the Airport's airside pavements;
- Review of historical documentation to gather available information about the pavement's history;
- Undertaking of geotechnical investigations, in-situ strength testing, laboratory testing of sampled materials and geotechnical reporting;
- Evaluation of the existing pavement strength and Pavement Classification Number (PCN) rating in accordance with the Civil Aviation Safety Authority (CASA) Advisory Circular (AC) 139-25(0);
- Provision of Concept Pavement Designs (including options) for pavement upgrades, including:
    - Pavement details of the runways, aprons and taxiways;
    - Futureproofing and longevity of the pavements;
    - Capacity to withstand the design aircraft specifications; and
    - Air ambulance helicopter helipad.
- Evaluation of pavement options through a whole-of-life costing assessment using Net Present Value (NVP) analysis.

Runway 17/35 is 1102m long and 30m wide with a central 18m bitumen sealed surface. Turning nodes of 40m wide are provided at both ends to allow 180° manoeuvres prior to take-off. The runway strip is 1,222m long and 90m wide including approximately 5m of gravel surface at the runway edges. Runway 17/35 has a published PCN rating numerical value of 9.

The Airport's current Masterplan (Beca Pty Ltd, 2010) states that the existing pavement consists of a bitumen seal with 5mm aggregate on a gravel base and was last resealed around 2000. As flexible pavements are typically designed for a 20-year functional life, this would imply that the pavement is reaching the end of its function life, noting that a pavements structural life can be significantly longer. Spray seals are noted to have a typical life expectancy of 7-15 years, making the existing seal older than usual.

Further details of the concept pavement designs are included in the Echuca Aerodrome Pavement Report. In general, options for upgrading/strengthening of existing pavements involve either of the following.

- Full depth reconstruction; or
- Overlay, either:
    - Directly on top of the existing pavement; or
    - Following in-situ stabilisation of the existing pavement.

CSC has been approached by the operators of aeromedical services into Echuca to consider upgrades to the current pavement to facilitate future operations of the Beechcraft King Air 350. The Echuca Aerodrome requires upgrade works to cater for the introduction of the Beechcraft King Air 350 as part of the aeromedical industry shift towards aircraft of this size and capability. The Beechcraft King Air 350 has increased runway requirements to the Beechcraft King Air 200. The proposed upgrades were a focal point of discussions with various stakeholder as part of the Stakeholder Consultation process.

An overview of the required works proposed at the time of the plan is as follows:

- Increase the Runway 17/35 width from 18m to 23m;
- Expand the Terminal apron from 1400m^2 to 2785m^2;
- Extend the runway length by 150m from 1,102m to 1,252m; and

- Upgrade airfield lighting.

If runway works proceed the runway strip width (including flyover area) of 90m indicated in ERSA will be required to be updated to be 140m in accordance with the MOS 139 (2019) requirements for a Code 1 or 2 runway strip based on a non-precision approach runway.

The proposed infrastructure upgrades including apron extensions have been designed considering Obstacle Limitation Survey (OLS) impacts. The proposed King Air B350 movements and parking positions are designed to ensure the tail of the aircraft will be below the transitional surface. The proposed hangars and other associated infrastructure upgrades have been located to ensure no penetration of the OLS. The future OLS based on the runway extension is provided in Appendix E.

Runway 17/35 is installed with a low intensity runway lights (LIRL) along the runway edge, providing a single stage of brightness. It is proposed to replace all lighting systems with LED technology in the longer term to increase perception and reduce energy costs at the Airport. These works should be undertaken to coincide with upgrades to the paved surface.

Runway 05/23

Runway 05/23 is an unsealed (grassed) runway which is understood to be used for ultralight aircraft and for training purposes. It has a length of 510m and width of 18m. It is noted that the grass runway is not a further focus of this report.

Taxiway

The Airport's taxiways are unnamed. The following naming conventions are adopted in this report:

- Central (main) taxiway (10.5m wide).
- Northern sealed taxiway (10.5m wide).
- Southern sealed taxiway (10.5m wide).
- Northern unsealed taxiway (5-9m wide).
- Southern unsealed taxiway.

There are also two (2) sealed taxilanes which provide access to hangars.

All of the sealed taxiways and taxilanes are surfaced with the same 5mm bituminous spray seal surfacing as the runway, leading to the presumption that they were resurfaced at the same time as the runway (2000). The central taxiway has a short section of concrete pavement / blast pad used for engine run-up. The blast pad also bridges the Airport's main open stormwater drain / grassed swale. The sealed taxiways are 10.5m wide.

The two (2) unsealed taxiways provide access from the aprons to each end of Runway 17/35 and the eastern end of Runway 05/23. They are both constructed of gravel / road base; however, the southern unsealed taxiway has since been overlaid with a different type of granular material. Both unsealed taxiways are 9m wide.

The current sealed taxiways are 10.5m wide and are suitable for aircraft with a OMGWS of 4.5m up to but not including 6m. The sealed taxiways are in similar a condition to the runway and it is recommended that they are resurfaced at the same time as the runway.

The taxiway is proposed to be reconstructed to correct existing defects and provide sufficient pavement strength and width for the King Air B350.

The taxiway edge lighting should be upgraded to LED technology undertake to coincide with upgrades to the lighting on Runway 17/35.

Navigation Aids

A Global Navigation Satellite System (GNSS) is available at Echuca Aerodrome which improves the aerodromes usability. The existing runway lighting consists of low intensity edge lighting. Medium-intensity lighting installation would not be currently feasible for Echuca given the impracticality of having the airport manned. New runway edge and threshold lighting would be required as part of the runway extension works.

Upgrading the existing lighting to LED technology has been included in the longer-term plan to improve the environmental impact of the aerodrome and reduce energy use costs.

A Precision Approach Path Indicator (PAPI) is not currently provided at Echuca Aerodrome and is not required for the planned upgrades to design aircraft. PAPIs are required by CASA for airports that facilitate turbojet aircraft movements. The installation of PAPIs at Echuca Aerodrome has been reviewed and determined to be unrealistic based on forecast aircraft movements.

Aprons

The aprons at Echuca Aerodrome consist of the following:

- Southern (Parking) Apron.
- Terminal Apron.
- Northern (Re-Fuelling) Apron.

All aprons are similarly sealed with 5mm size spray seals likely placed at the same time as the runway and taxiways. It is recommended that they are resurfaced at the same time as the runway and taxiways.

The Southern Apron is used for aircraft parking and is approximately 5600m² The Northern Re-Fuelling Apron is approximately 1600m². The Terminal Apron is 1400m² and is primarily used for parking RFDS aircraft.

The Northern and Southern Apron are in relatively good condition. Both are exhibiting some of the typical defects, including flushing, minor depressions, and edge defects. The Terminal Apron was judged to be in good condition apart from a defective patched area closest to the terminal where Air Ambulance and Royal Flying Doctors Service (RFDS) park their aircraft.

The existing aprons are proposed to be reconstructed to the required depth and provide adequate subgrade strength to accommodate the King Air B200 and B350 and increased GA activity, along with new linemarking.

The Terminal Apron development is based on maintaining the existing configuration and extending as necessary to accommodate the King Air B200 and B350.

Aircraft Hangars

Potential hangar locations have been identified to provide improved airside facilities and to allow for the safe storage and maintenance of GA, rotary and aeromedical aircraft.

The development plans identify the proposed location of the hangars based on access and optimising the layout of the aerodrome to mitigate the risk of limiting future infrastructure development. All proposed hangar locations have been designed to ensure no penetration of structures into the OLS.

Helicopter Facilities

There are currently no dedicated helicopter facilities available at the aerodrome. Locations for a helipad have been included in the development plans to facilitate the Air Ambulance AW139 rotary operations and to attract and cater for future helicopter use including associated maintenance activities.

The AW139 is understood to a have an MTOW of 6.8 tonne currently; and a new model will be introduced with an MTOW of 7.0 tonne. Generally, heliports are constructed with a concrete surface. The pavement is designed considering a dynamic load equal to 150 percent of the gross helicopter weight, equally distributed between the main landing gears. For most helicopters under approximately 13 tonne MTOW including the AW139, a minimum thickness PCP base (150mm) is sufficient. This is supported by 150mm of unbound of stabilised crushed rock.

LED Airside Lighting

LED lighting is proposed for all airside lighting, including apron floodlighting. The existing runway and taxiway lights should be replaced with LED fittings as part of the lighting upgrade to coincide with any runway or taxiway widening plans.

Airside drainage

Drainage works are set to commence following the release of the Echuca Aerodrome Concept Plan so will not be evaluated further in this plan.

5.3.2 Terminal

The Echuca Aerodrome terminal is 85m^2 with amenities for passengers and pilots as well as two offices. The terminal provides adequate capacity for the current operations and therefore no upgrade is proposed for this Concept Plan.

The Echuca Aerodrome terminal should be able to accommodate up to 11 passengers and staff at any one time, assuming the critical Beechcraft King Air 350 aircraft at full capacity.

The Federal Aviation Administration (FAA) sets out the parameters surrounding adequate terminal area planning design, with the area per peak hour pilot/passenger provided in Table 5.4. The peak number of passengers has been based on a full capacity Beechcraft King Air 350 aircraft with 11 passengers and 2 crew, with a x1.5 peak loading applied.

Table 5.4 General aviation terminal building area requirements

Terminal functional areas	Area per peak hour pilot / passenger
Waiting lounge	1.4 m^2
Management/operations	0.3 m^2
Public conveniences	0.2 m^2
Concession area	0.5 m^2
Circulation, storage, HVAC	2.3 m^2
Total	**4.7 m^2**

The total terminal area required to provide an adequate and functional passenger terminal is therefore 92m^2, which is not a statutory requirement, however for best planning and future provision a terminal area of 100m^2 has been adopted.

To protect against the impact of climate change, environmental and clean energy solutions are recommended to be incorporated into a terminal refurbishment.

The building could incorporate an Energy Star rating by incorporating solar panels for used for power delivery with storage battery back-up. Main grid power should only be used for emergencies or if solar panels are not producing adequate supply.

- Solar power is proposed as the primary power source with a battery storage back-up; within the terminal building, including perimeter, and external lighting for pedestrian walkways and car parks. LED lighting should be used for all airside, landside and building lighting with an approximate 85% saving in energy use.
- Installation of LED lighting for the terminal building, including interior and exterior for pedestrians;

The terminal building should be fully insulated (roof, walls and floor), double glazed windows and doors and window tinting. Extended eaves, roof overhang or verandas to be provided for additional shade and cooling. External building materials, including the roof, should not be highly reflective. This will minimise sun reflection glare to pilots, passengers and staff.

The refurbished terminal building should incorporate new services connections including electrical and water supply, as well as a new septic system. The following initiatives could be considered to save water and/or minimise use:

- Rainwater catchment tanks, minimum flush toilets and wash basins, dry chemical urinals, recycled grey water for flora and wash downs;
- Terminal design additions potentially including further insulation, double glazed and tinted windows and extended eaves, roof overhang or verandas for additional cooling; and
- Recycling of grey water for plants and grass.

Aeromedical Passenger Transfer Shelter

The key stakeholder consultation highlighted the requirement for a covered area or garage for aeromedical response vehicles. It has been identified that this should be placed south of the existing passenger terminal to provide a place where the paramedics and the doctors can be with the patient, in a sheltered well-lit area, ready for the transfer between the road ambulance and the aircraft.

5.4 Aircraft Noise

The impact of aircraft noise is an important consideration in any proposed development related to individual airport concept plans. An understanding of noise generation and its impacts on adjoining land provides information to local government authorities for planning of adjacent land.

Australian Noise Exposure Forecasting (ANEF) has not been undertaken as part of the scope of this Airport Concept Plan. It is recommended to develop a new ANEF to ensure that any future developments around the airport are appropriately planned to take into consideration the impacts of aircraft noise.

5.5 Airport Lighting

As per the NASF, it is important to consider sources of significant lighting in the vicinity of airports to minimise and/or avoid confusion to pilots. A lighting zone plan for Echuca Aerodrome has been provided for on and around the Airport consistent with the requirements of NASF Guideline E - Managing Pilot Lighting Distraction. The Echuca Aerodrome lighting zone plan is provided in Appendix F.

6 Implementation Plan

This section of the Concept Plan outlines the typical processes involved in undertaking the proposed development identified in the concept plan, from the planning phase to construction completion.

The implementation plan has been set out in Figure 6.1 covers the typical development process for airport infrastructure.

Figure 6.1 Airport infrastructure development flowchart

6.1 Concept Planning

This Aerodrome Concept Plan has outlined proposed infrastructure development required over the next 5 to 20 years based on current information and anticipated forecast data.

The commercial and context of aerodrome operations is continuously evolving and thus this Concept Plan is recommended to be reviewed at regular intervals to ensure its appropriate for the growth of the aerodrome.

This Concept Plan should be reviewed ideally at the 5-year interval but at a maximum of 10-year interval. The Concept Plan should also be reviewed where any major changes in key aerodrome growth drivers occur to ensure forecasting and development is appropriate and feasible.

6.2 Planning

The feasibility and practicality of all aerodrome development items outlined in this Concept Plan has been considered to set realistic development targets. The infrastructure developments considered to be the most critical to the success of the aerodrome and should be developed further are highlighted in Table 6.1, including the potential development trigger.

Table 6.1 Echuca Aerodrome priority developments

Infrastructure Development	Development Trigger	Planning Elements
Strengthening existing pavement	Funding arrangement	Pavement investigations to review existing pavement condition have been completed. A detailed investigation into cost and funding requirements should be undertaken to understand the budget of proposed works.
Runway extension and widening	Introduction of the Beechcraft King Air 350 aircraft.	Pavement investigations to review existing pavement condition have been completed. A detailed investigation into cost and funding requirements should be undertaken to understand the budget of proposed works.
Apron extension	Introduction of the Beechcraft King Air 350 aircraft.	A detailed investigation into cost and funding requirements should be undertaken to understand the budget of proposed works. Detailed aircraft swept path analysis to confirm required pavement extension.
Upgrade airfield lighting	Introduction of the Beechcraft King Air 350 aircraft.	A detailed investigation into cost and funding requirements should be undertaken to understand the budget of proposed works.
Aeromedical Passenger Transfer Shelter	Funding arrangement	Small budget impact and potential to generate additional aeromedical flights.
Hangar construction	As required when funded by private developers	Construction of new hangars has been proposed in the long-term planning horizon. Construction should occur in stages to distribute funding requirements. Detailed analysis into hangar demand should be undertaken, and the legalities of private hangar ownership should be investigated.

The initial planning phase for proposed infrastructure development has been undertaken in this Concept Plan, which should be supplemented by additional CSC requirements. The next step in the planning phase is to undertake feasibility studies and concept designs based on Table 6.1. The planning phase concludes upon development of a project proposal for the proposed infrastructure development item.

6.3 Development

At the completion of the planning phase, the most critical or most desirable infrastructure developments sought by CSC can be highlighted and progress to the design and development phase. This will involve potentially assessing concurrent developments to determine how to allocate available funding where budget implications will restrict development of all items detailed above. Any statutory approvals required, and other legal implications need to be considered at this stage to eliminate the potential for the project to be subsequently abandoned in this nature.

The design development can commence upon confirmation of available budget, with preliminary designs based on the concepts developed in the Planning phase. This is followed by a detailed design of the project and the development of tender documentation at the completion of this phase. The tender documentation will include cost and schedules, contract, specifications, a final Project Management Plan and a Business Case dependent on project scope.

6.4 Implementation

The implementation phase involves tender procurement, and subsequent manufacturing, delivery, construction, installation and testing of infrastructure. The implementation phase will vary dependent on the scale of the project.

6.5 Handover & Completion

The handover and completion phase of any development covers final project close out items required prior to the contractor releasing the infrastructure to CSC to allow its use. The final testing and defects liability period will typically last between 6 to 12 months from completion of construction.

6.6 Asset Management

CSC currently has an Asset Management Strategy that applies to a high-level asset management plan for all CSC owned and operated assets.

The Asset Management Strategy has not been reviewed for quality, completeness, and accessibility of asset data and knowledge, organisational function with respect to the establishment of a steering committee and roles, responsibilities, processes and procedures for asset management that span the asset creation phase, as well as operations, maintenance, performance reporting, and strategic planning.

A number of short (5 year) term and long (10-20 year) term asset management objectives should be defined to achieve general industry practice for aerodrome asset management in the short and long terms respectively. This would require development of a reliable asset inventory and definition of performance and serviceability requirements as well as asset indicators. A cross-asset approach should be adopted to enable optimal allocation of resources to the different asset components to address the short and longer-term requirements of the different stakeholders and deliver value for money.

The development of asset management plans will allow for the auditing of the plans to ensure that the asset management processes and procedures are being followed to ensure that the intended outcomes are achieved.

6.7 Financial Plan

A financial assessment and cost estimates of the capital works outlined in this Concept Plan have been provided in this section.

6.7.1 Estimated Development Costs

The costs outlined for all capital works have been developed based on JJR's experience from similar projects and specifically regional airports across Australia. The cost estimates have not been adjusted for inflation, however a regional and remote location multiplier applied.

The indicative costs for all proposed capital works in this Concept Plan are outlined in Table 6.2.

s47(1)(b)

[redacted]

6.7.2 Assumptions & Exclusions

The following assumptions and exclusions apply to this cost estimate:

- Cost estimates include a blanket contingency of 30%;
- No detailed survey information is available;
- Land acquisition has not been considered;
- The accuracy of the above cost estimates is not guaranteed and should not form part of CSC's Council budget; and
- No allowance for design and management costs or construction contingency has been included.

The following key assumptions are related to the aerodrome upgrade costs:

- All costs are excluding GST;
- All costs are in 2020 Australian dollars;
- No escalation has been applied to cost estimates;
- Standard unit rates have been utilised; and
- No preliminary design has been undertaken for the costs.

6.7.3 Reliability and Confidence in Forecasts

JJR has used its reasonable endeavours to ensure that the data contained in the Concept Plan reflects the most accurate and timely information available to it and is based on information that was current as of the date of the cost estimate development.

The cost estimates are based on various assumptions and other information developed by JJR from its independent research effort, general knowledge of the industry and consultations with CSC. No warranty or representation is made by JJR that any of the projected values or results contained in the cost estimates will actually be achieved. In addition, the cost estimate is based upon information that was obtained on or before the date in which the cost estimate was prepared. Circumstances and events may occur following the date on which such information was obtained that are beyond our control and which may affect the findings or projections contained in the cost estimate. JJR may not be held responsible for such circumstances or events and therefore specifically disclaim any responsibility.

JJR has relied on information provided by CSC and by third parties (Information Providers) to produce the cost estimate and arrive at its conclusions. JJR has not verified information provided by Information Providers (unless specifically noted otherwise) and JJR assumes no responsibility and makes no representations with respect to the adequacy, accuracy or completeness of such information. No responsibility is assumed for inaccuracies in reporting by Information Providers including, without limitation, by CSC representatives or for inaccuracies in any other data source whether provided in writing or orally used in preparing or presenting the cost estimate.

In no event, regardless of whether JJR's consent has been provided, shall JJR assume any liability or responsibility to any third party to whom the Report is disclosed or otherwise made available.

The conclusions in the cost estimate must be viewed in the context of the entire Concept Plan including, without limitation, any assumptions made, and disclaimers provided. The conclusions in this cost estimate must not be excised from the body of the cost estimate under any circumstances. The cost estimates applied are indicative only and CSC should independently review any estimate prior to finalising CSC budgets.

Appendices

Appendix A – Existing Facilities Plan

				DESIGN LOT CODE		PLOT DATE 07 June 2020	TIME 09:27:29	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
EXTERNAL REFERENCE FILES (UP TO 35 XREFS)	REV	DATE	AMENDMENT / REVISION DESCRIPTION	DVF No	APPROVAL	TITLE	NAME	PRINCIPAL
	A	01.06.2020	ISSUED FOR REVIEW	NA	JR	DRAFTER	D.BRUGMAN	Campaspe Shire Council
						DRAFTING CHECK	T.BAXTER	DESIGNER: JJ RYAN CONSULTING PTY LTD
						DESIGNER	D.BRUGMAN	
						DESIGN CHECK	T.BAXTER	
						DESIGN MANAGER	M.PATMORE	
						PROJECT MANAGER	J.RYAN	

SCALES AT A1 SIZE DRAWING
SCALE 1:1000 10 0 10 20 30 40 50

CO-ORDINATE SYSTEM: MGA ZONE 55 | HEIGHT DATUM: A.H.D.

CAMPASPE SHIRE COUNCIL
ECHUCA AIRPORT
EXISTING FACILITIES PLAN
1 TO 1,000 SCALE

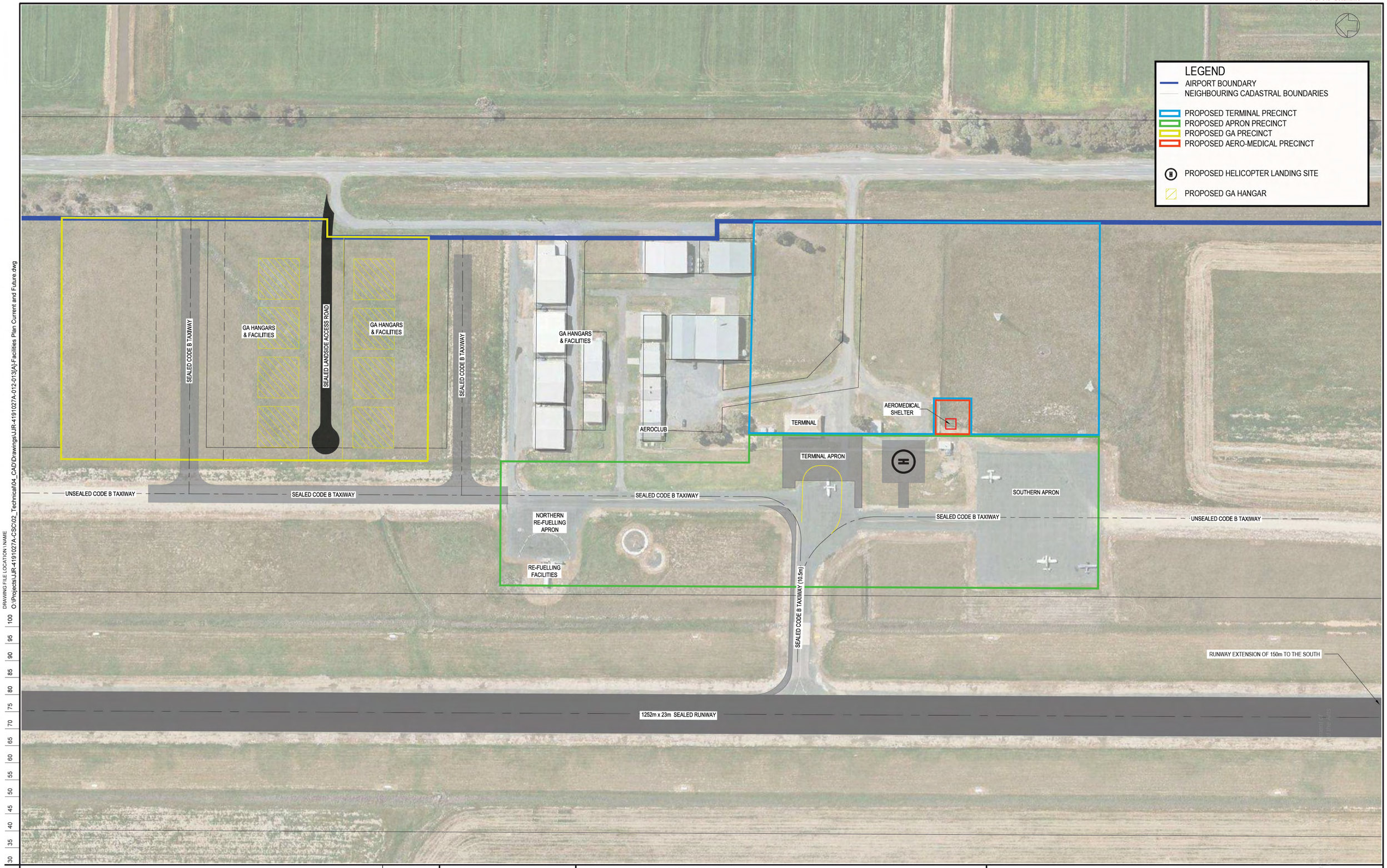
CLIENT PROJECT / DRAWING No	ISSUE STATUS	JJR PROJECT / DRAWING No	ISSUE
.	.	JJR-4191027A-013	A

THIS SHEET MAY BE PREPARED USING COLOUR AND MAY BE INCOMPLETE IF COPIED
DRAWING FILE LOCATION \ NAME
O:\Projects\JJR-4191027A-CSC\02_Technical\04_CAD\Drawings\JJR-4191027A-012-013[A]-Facilities Plan Current and Future.dwg

A1 ORIGINAL 200 mm ON ORIGINAL

				DESIGN LOT CODE	PLOT DATE 07 June 2020	TIME 09:21:58	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING		CAMPASPE SHIRE COUNCIL
EXTERNAL REFERENCE FILES (UP TO 35 XREFS)	REV	DATE	AMENDMENT / REVISION DESCRIPTION	DVF No	APPROVAL	TITLE	NAME	PRINCIPAL	DESIGNER	SCALES AT A1 SIZE DRAWING	ECHUCA AIRPORT EXISTING FACILITIES PLAN 1 TO 4,000 SCALE
	A	01.06.2020	ISSUED FOR REVIEW	NA	JR	DRAFTER	D.BRUGMAN	Campaspe Shire Council	JJ RYAN CONSULTING PTY LTD	SCALE 1:4000 40 0 40 80 120 160 200	
						DRAFTING CHECK	T.BAXTER				
						DESIGNER	D.BRUGMAN				
						DESIGN CHECK	T.BAXTER				
						DESIGN MANAGER	M.PATMORE				
						PROJECT MANAGER	J.RYAN			CO-ORDINATE SYSTEM: MGA ZONE 55 / HEIGHT DATUM: A.H.D.	CLIENT PROJECT / DRAWING No: . / ISSUE STATUS: . / JJR PROJECT / DRAWING No: JJR-4191027A-012 / ISSUE: A

Appendix B – Future Facilities Plan



THIS SHEET MAY BE PREPARED USING COLOUR AND MAY BE INCOMPLETE IF COPIED
200 mm ON ORIGINAL
A1 ORIGINAL
DRAWING FILE LOCATION \ NAME
O:\Projects\JJR-4191027A-CSC\02_Technical\04_CAD\Drawings\JJR-4191027A-012-013[A]-Facilities Plan Current and Future.dwg

DESIGN LOT CODE	PLOT DATE	TIME	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
	07 June 2020	09:37:22	

EXTERNAL REFERENCE FILES (UP TO 35 XREFS)	REV	DATE	AMENDMENT / REVISION DESCRIPTION	DVF No	APPROVAL
	A	01.06.2020	ISSUED FOR REVIEW	NA	JR

TITLE	NAME
DRAFTER	D.BRUGMAN
DRAFTING CHECK	T.BAXTER
DESIGNER	D.BRUGMAN
DESIGN CHECK	T.BAXTER
DESIGN MANAGER	M.PATMORE
PROJECT MANAGER	J.RYAN

PRINCIPAL: Campaspe Shire Council

DESIGNER: JJ RYAN CONSULTING PTY LTD

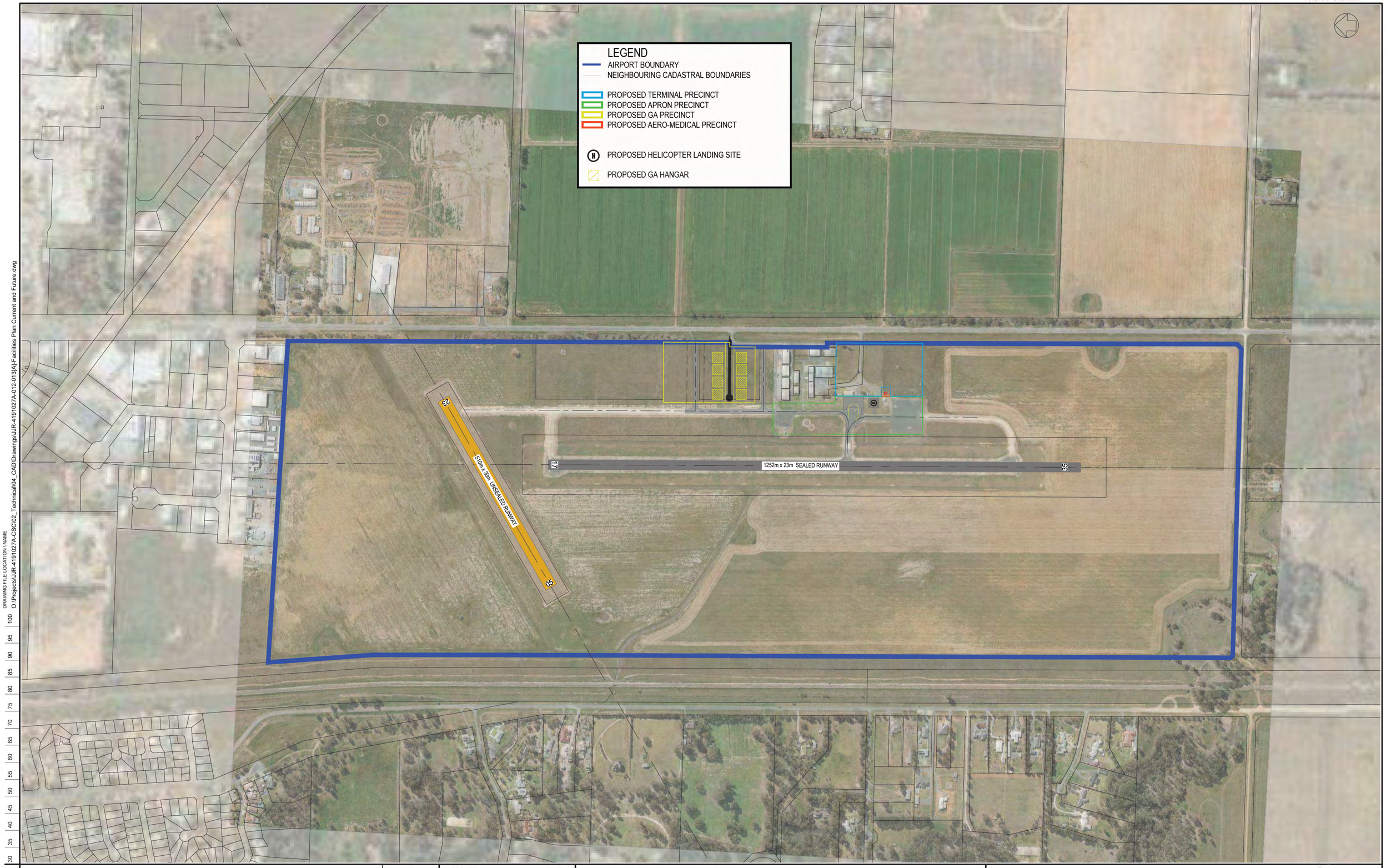
SCALES AT A1 SIZE DRAWING
SCALE 1:1000 (10 0 10 20 30 40 50)

CO-ORDINATE SYSTEM: MGA ZONE 55 | HEIGHT DATUM: A.H.D.

CAMPASPE SHIRE COUNCIL

ECHUCA AIRPORT
FUTURE FACILITIES PLAN
CONCEPT 1
1 TO 1,000 SCALE

CLIENT PROJECT / DRAWING No	ISSUE STATUS	JJR PROJECT / DRAWING No	ISSUE
.	.	JJR-4191027A-015	A



THIS SHEET MAY BE PREPARED USING COLOUR AND MAY BE INCOMPLETE IF COPIED

A1 ORIGINAL 200 mm ON ORIGINAL

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

DRAWING FILE LOCATION \ NAME
O:\Projects\JJR-4191027A-CSC\02_Technical\04_CAD\Drawings\JJR-4191027A-012-013[A]-Facilities Plan Current and Future.dwg

DESIGN LOT CODE

PLOT DATE 07 June 2020 TIME 09:41:06

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

CAMPASPE SHIRE COUNCIL

ECHUCA AIRPORT
FUTURE FACILITIES PLAN
CONCEPT 1
1 TO 4,000 SCALE

EXTERNAL REFERENCE FILES (UP TO 35 XREFS)

REV	DATE	AMENDMENT / REVISION DESCRIPTION	DVF No	APPROVAL
A	01.06.2020	ISSUED FOR REVIEW	NA	JR

DRAFTER	D.BRUGMAN
DRAFTING CHECK	T.BAXTER
DESIGNER	D.BRUGMAN
DESIGN CHECK	T.BAXTER
DESIGN MANAGER	M.PATMORE
PROJECT MANAGER	J.RYAN

PRINCIPAL: Campaspe Shire Council

DESIGNER: JJ RYAN CONSULTING PTY LTD

SCALES AT A1 SIZE DRAWING
SCALE 1:4000 40 0 40 80 120 160 200

CO-ORDINATE SYSTEM: MGA ZONE 55

HEIGHT DATUM: A.H.D.

CLIENT PROJECT / DRAWING No: .

ISSUE STATUS: .

JJR PROJECT / DRAWING No: JJR-4191027A-014

ISSUE: A

Appendix C – Development Precinct Plan

New aeromedical shelter

Terminal Apron increased

Helipad

Southern End of Runway extended by 150 mtrs

New lighting (shown by 'blue squares)

RUNWAY STRIP

23

05

EXTENT OF WORKS (AREA TO BE DISTURBED)

existing runway to be widened by a total of 5mtrs

runway lighting to be upgraded with LED lighting in accordance with CASR requirements (shown by 'red squares')

Runway to be strengthened overall to provide a PCN of '4' in order to take the Beechcraft King Air 350 aircraft

NOT FOR CONSTRUCTION

AT A3 SIZE DRAW NG

DRAWING FILE LOCATION / NAME
D:\JJRyan Dropbox\Dropbox (JJ Ryan Consulting P)\Operations Folder\Projects\JJR-4210120A-CSC\02_Technical\04_CAD\Info Docs\JJR-4210120A-ID002.dwg

ECHUCA AIRPORT
OVERVIEW OF WORKS - OPTION 1 DESIGN
1 to 5000 SCALE

INFORMATION DOCUMENT

JJR-4210120A-ID002

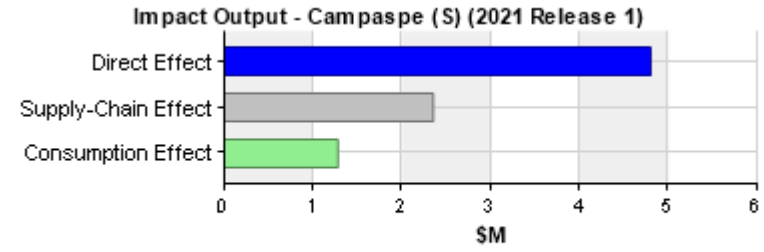
JJ RYAN CONSULTING PTY LTD

Impact Report for Campaspe (S)

Impact Scenario

Industry Sector	Direct Change Jobs	Direct Change Output ($M)
Specialised Other Machinery Equipment Manu.		$0.960
Heavy Civil Engineering Construction		$3.360
Professional, Scientific Technical Services		$0.480

Impact on Output

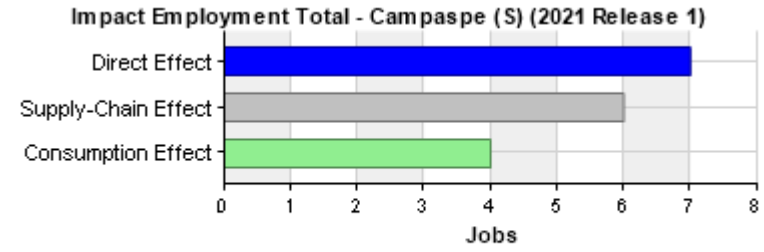


From a direct increase in output of $4.800 million it is estimated that the demand for intermediate goods and services would rise by $2.354 million. This represents a Type 1 Output multiplier of 1.490. These supply-chain effects include multiple rounds of flow-on effects, as servicing sectors increase their own output and demand for local goods and services in response to the direct change to the economy.

The increases in direct and indirect output would typically correspond to the creation of jobs in the economy. Corresponding to this change in employment would be an increase in the total of wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption effects under this scenario are estimated at $1.277 million.

Total output, including all direct, supply-chain and consumption effects is estimated to increase by up to $8.432 million. This represents a Type 2 Output multiplier of 1.757.

Impact on Employment

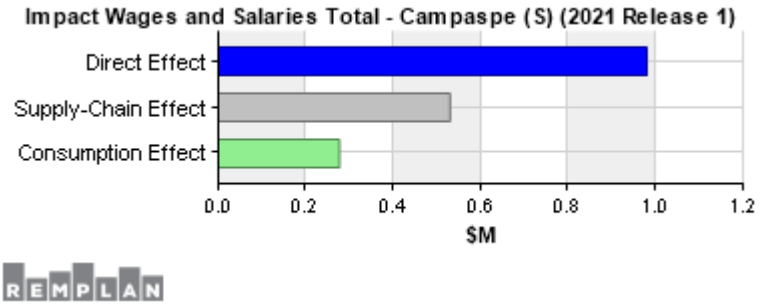


From a direct increase in output of $4.800 million the corresponding creation of direct jobs is estimated at 7 jobs. From this direct expansion in the economy, flow-on supply-chain effects in terms of local purchases of goods and services are anticipated, and it is estimated that these indirect impacts would result in the gain of a further 6 jobs. This represents a Type 1 Employment multiplier of 1.857.

The increase in direct and indirect output and the corresponding creation of jobs in the economy are expected to result in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption effects under this scenario are estimated to further boost employment by 4 jobs.

Total employment, including all direct, supply-chain and consumption effects is estimated to increase by up to 17 jobs. This represents a Type 2 Employment multiplier of 2.429.

Impact on Wages and Salaries

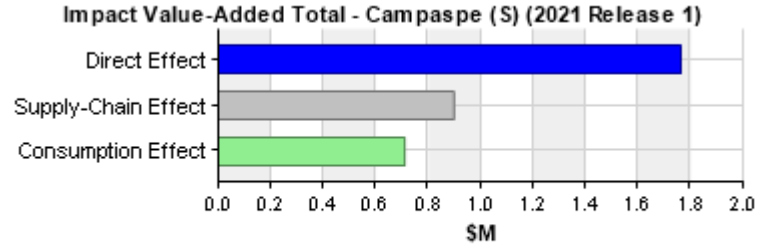


From a direct increase in output of $4.800 million it is estimated that direct wages and salaries would increase by $0.980 million. From this direct expansion in the economy, flow-on supply-chain effects in terms of local purchases of goods and services are anticipated, and it is estimated that these indirect impacts would result in the gain of a further 6 jobs and a further increase in wages and salaries of $0.530 million. This represents a Type 1 Wages and Salaries multiplier of 1.541.

The increase in direct and indirect output and the corresponding creation of jobs in the economy are expected to result in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption effects under this scenario are expected to further boost employment in sectors such as retail therefore further increasing wages and salaries by $0.277 million.

Total wages and salaries, including all direct, supply-chain and consumption effects is estimated to increase by up to $1.786 million. This represents a Type 2 Wages and Salaries multiplier of 1.823.

Impact on Value-Added



From a direct increase in output of $4.800 million the corresponding increase in direct value-added is estimated at $1.763 million. From this direct expansion in the economy, flow-on supply-chain effects in terms of local purchases of goods and services are anticipated, and it is estimated that these indirect impacts would result in a further increase to value-added of $0.899 million. This represents a Type 1 Value-added multiplier of 1.510.

The increase in direct and indirect output and the corresponding boost to jobs in the economy are expected to result in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption effects under this scenario are expected to further boost value-added by $0.711 million.

Total value-added, including all direct, supply-chain and consumption effects is estimated to increase by up to $3.372 million. This represents a Type 2 Value-added multiplier of 1.913.

Impact Summary

Impact Summary	Direct Effect	Supply-Chain Effect	Consumption Effect	Total Effect	Type 1 Multiplier	Type 2 Multiplier
Output ($M)	$4.800	$2.354	$1.277	$8.432	1.490	1.757
Employment (Jobs)	7	6	4	17	1.857	2.429
Wages and Salaries ($M)	$0.980	$0.530	$0.277	$1.786	1.541	1.823
Value-added ($M)	$1.763	$0.899	$0.711	$3.372	1.510	1.913

Disclaimer

All figures, data and commentary presented in this report are based on data sourced from the Australian Bureau of Statistics (ABS), most of which relates to the 2016, 2011, 2006 and 2001 Censuses.

Using ABS datasets and an input / output methodology industrial economic data estimates for defined geographic regions are generated.

This report is provided in good faith with every effort made to provide accurate data and apply comprehensive knowledge. However, REMPLAN does not guarantee the accuracy of data nor the conclusions drawn from this information. A decision to pursue any action in any way related to the figures, data and commentary presented in this report is wholly the responsibility of the party concerned. REMPLAN advises any party to conduct detailed feasibility studies and seek professional advice before proceeding with any such action and accept no responsibility for the consequences of pursuing any such action.