

Drone Management

EPP-00-01

Applicability

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|-------------------|
| ARTC Network Wide |
| SMS |

Publication Requirement

| |
|---------------------|
| Internal / External |
|---------------------|

Primary Source

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| Civil Aviation Safety Authority (CASA) Remotely Piloted Aircraft Regulations and Advisory Circulars |
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Document Status

| Version # | Date Reviewed | Prepared by | Reviewed by | Endorsed | Approved |
|-----------|---------------|------------------------|----------------------------------|------------------------|---|
| 1.0 | 22 May 2018 | GM Technical Standards | Stakeholders & Manager Standards | GM Technical Standards | OSERC 15/05/2018 (Updates as requested by OSERC approved by GMTS 05/06/2018) |

Amendment Record

| Amendment Version # | Date Reviewed | Clause | Description of Amendment |
|---------------------|---------------|--------|---|
| 1.0 | 22 May 2018 | | First issue of new procedure. Includes updates following conditional approval by OSERC. |

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1 Introduction

1.1 Purpose

ARTC encourages the innovation that drone usage can bring, if operations are conducted safely. The purpose of this procedure is to set out the mandatory requirements to operate a drone for an ARTC or third-party purpose.

1.2 Scope

This procedure covers drone operations by ARTC staff and by drone services companies for any ARTC or third-party purpose. The requirements of this procedure are in addition to those imposed by the Civil Aviation Safety Authority (CASA) on drone operations. Any alteration or addition to CASA requirements which is at variance to this procedure shall have precedence.

1.3 Document Owner

The Manager Standards is the Document Owner and is the initial point of contact for all queries relating to this procedure. Any drone related issue that cannot be resolved at the local level shall be advised to Manager Standards for resolution.

1.4 Responsibilities

The drone operator and responsible managers are responsible for the implementation of this procedure.

Business Unit Asset Managers are responsible for managing the process.

1.5 Reference Documents

The following document supports this procedure:

- CASA Regulation CASR 101.F
- CASA Advisory Circular 101-01 v2.0
- CASA Advisory Circular 101-10 v1.2

1.6 Definitions

The following terms and acronyms are used within this document:

| Term or acronym | Description |
|---------------------|---|
| APRA | Australian Prudential Regulatory Authority |
| ARN | CASA Aviation Reference Number per AC 101-10 |
| ARTC | Australian Rail Track Corporation Ltd. |
| CASA | Civil Aviation Safety Authority |
| Controlled Airspace | Airspace of defined dimensions within which an air traffic control service is provided to flights in accordance with the airspace |

| Term or acronym | Description |
|-----------------|---|
| | classification. (definition per AC 101-10) |
| Drone | This term substitutes for Unmanned Aerial Vehicle (UAV), Remotely Piloted Aircraft System (RPAS), Remotely Piloted Aircraft (RPA), Unmanned Aircraft System (UAS) |
| Excluded RPA | Unmanned aircraft that may, under certain conditions, be operated without an explicit authorisation from CASA (definition per AC 101-10) |
| Micro RPA | An RPA with a weight of 100 g or less. |
| RePL | Remote Pilot Licence |
| ReOC | Remote Piloted Aircraft Operator's Certificate |
| Small RPA | An RPA with a gross weight of at least 2 kg but less than 25 kg |
| Very Small RPA | An RPA with a gross weight of more than 100 g but less than 2 kg. |
| VLOS | Visual Line of Sight |

2 Use of Drones for an ARTC or Third-Party Purpose

2.1 Allowable ARTC Drone Usage

Drones can be utilised above ARTC owned or leased land for the following purposes:

- A. Bridge and tower structural inspections.
- B. Incident site inspections (derailments, flood damage, plant incidents etc).
- C. Survey data collection.
- D. Maintenance data collection.
- E. Project scoping data collection.
- F. Operational status data collection.
- G. Establishing that the configuration of assets is compliant with requirements.
- H. Media and promotional purposes.
- I. Third Party purposes (e.g. Electricity Authority, Lease Owner etc)
- J. Security purposes.
- K. Purposes as agreed by a relevant General Manager.

The use of drones for track inspections that would satisfy a Maintenance Scheduled Task (MST) and replace a Hi-Rail, Front of Train or Walking Inspection are not currently permitted. This could change if video data analytics can be demonstrated to be effective.

2.2 Drone Types

Most drone usage by ARTC staff and specialist drone contractors will be in the Very Small RPA category. Usage of Micro RPA drones will be treated the same as Very Small RPA drones. Usage of Small RPA drones (above 2 kg weight) and heavier invokes the more stringent safety requirements outlined below.

Procurement of a standard drone type is not mandatory. Structures Managers are currently utilising the DJI Phantom 4 Professional for bridge inspections and can be contacted for advice on drone performance and reliability.

2.3 Drone Kits

Where drones are registered on the ARTC Ellipse asset register, they should be registered as a Drone Kit. The Drone Kit is inclusive of the drone, batteries, controller, headsets, data cables, spares, manual, carry case (where available), Flight Logbook and the CASA Smartphone App “Can I Fly There?”

3 ARTC Insurance Requirements

The Public Liability and Professional Indemnity Insurance held by ARTC allows for ARTC owned drone operations for an ARTC purpose. The insurance requires that ARTC comply with all Australian laws and regulations, and that certain operational limitations be observed. These operational limitations align with the operational limitations imposed by CASA, noting an insurance limit of a 1 km horizontal distance limit from the drone operator, compared to the CASA limit of Visual Line of Sight in Day Meteorological Conditions. The stricter insurance limit shall apply to drones flown for an ARTC purpose. Drones permitted by ARTC to be flown for a third-party purpose over ARTC property are not covered by ARTC insurance, hence the CASA VLOS limit shall apply to such flights.

Compliance with this procedure is deemed as complying with ARTC’s insurance requirements.

Contractors or third parties conducting drone flights over the ARTC rail corridor shall provide evidence of public risk insurance with an APRA-approved Australian insurance company for at least \$20 million and where required, provide professional indemnity insurance for at least \$1 million.

4 CASA Requirements

CASA limitations on drone operations are as follows:

- A. Advisory Circular 101-10 Remotely Piloted Aircraft Systems – Operation of Excluded RPA provides a series of exemptions from CASA approval requirements.
- B. Operations outside the CASA requirements must be justified by an approved Safety Case.
- C. CASR 101.070 restricts operations above 400 feet (121.9 metres) from the launch point of the drone.
- D. CASR 101.73 requires that drone operations be conducted within visual line of sight of the operator.
- E. CASR 101.75 sets approval requirements to operate a drone within 3 Nautical Miles (NM) (5.5 km) of an aerodrome with controlled airspace. This can be considered as an aerodrome with air traffic control coverage.
- F. CASR 101.095 requires that drone operations be conducted in Daylight Visual Meteorological Conditions, or otherwise a Safety Case has to be approved by CASA.
- G. CASR 101.097 prohibits autonomous launch or release of a drone without approval. A pilot must be in control of the launch or release of the drone.

- H. CASR 101.238 prohibits drone operations within 30m of a person not directly involved in the operation and not within areas where police, fire, public safety or emergency operations are being conducted without the approval of a person in charge of the operation.
- I. CASR 101.245 allows operations near people who are not involved in the drone operations to be reduced from 30m to 15m with their prior written consent.
- J. CASR 101.280 requires that drone operations not be conducted over populous areas.
- K. CASR 101.F.3 establishes the requirements for remote pilot licences for certain drone operations, known as the CASA Remote Pilot Licence (RemPL).
- L. CASR 101.F.4 establishes requirements for the authorisation of drone operations.

5 ARTC Drone Piloting Requirements

All persons piloting a drone of mass greater than 2.0 kg for an ARTC purpose are to be licensed with a CASA Remote Pilot Licence (RemPL) in accordance with CASR 101.F.3. and be current on the aircraft type.

All drone flights over ARTC owned or leased land for a third-party purpose are to be conducted by a person holding a CASA RemPL and they are to be current on the aircraft type. A CASA Aviation Reference Number (ARN) is to be provided to ARTC.

All drone flights for an ARTC purpose set out at Section 2 that are conducted by a non-ARTC employee require that the pilot hold a current RemPL licence and be current on the aircraft type.

Evidence of a current CASA RemPL licence and the relevant ARN are to be recorded on the Pre-Work Brief for each drone flight for which a RemPL licence is required.

Operation of drones of less than 2.0 kg mass (Very Small RPA) or less than 100 g mass (Micro RPA) by an ARTC employee does not require a CASA RemPL licence, provided that:

- a. The drone flight is for an ARTC purpose as set out in Section 2 of this procedure.
- b. The drone pilot complies with the limitations set out in this procedure.

The responsible manager must:

- a. satisfy themselves that the drone operator can suitably control the drone, and not pose a risk to people or assets. This can be achieved via a training course or on the job training.
- b. maintain a register of those ARTC employees that are authorised to operate ARTC owned drones under their control.

6 Engagement of External Drone Operators

Any proposed drone operator to be engaged for an ARTC purpose must show evidence of current CASA licensing for drone flight operations. The contracted drone pilot must hold a current RePL and be current on the aircraft type. The drone operating company must hold a current ReOC with a minimum of 7kg certification. The contractor's Aviation Reference Number (ARN) must be provided for the contracted flight programme.

Where the drone flight will be over the rail corridor, the drone operator must be briefed on rail safety requirements by a Protection Officer, and if not a holder of a Rail Industry Worker (RIW) track awareness competency, must be accompanied by a Protection Officer. This applies whether the drone is launched from within the rail corridor or not.

Where drone operations are to take place away from the rail corridor (such as at a communications tower site or at a Provisioning Centre), an ARTC staff member with responsibility for safety must concur with the proposed flight plan. CASA requirements must be adhered to at all times.

The terms of engagement of any drone contractor engaged by ARTC must state that *“intellectual property and copyright rights in all images and data collected by the Remote Piloted Aircraft vest in ARTC. The contractor may retain copies for records management purposes only provided they are kept secure.”*

7 Third Party Drone Operations

ARTC may be approached by a third party regarding the proposed flight of a drone over ARTC property for a third-party purpose. The person operating a drone for a third-party purpose must meet the licencing requirements of section 6 and agree in writing to comply with all relevant sections of this procedure.

8 ARTC Owned Drones

8.1 Drone Registration

All ARTC owned drones of greater than 2.0 kg mass and associated equipment are to be registered in Ellipse as a drone kit, and subject to the maintenance regime outlined by the drone manufacturer. Spare drone batteries also need to be controlled and stored safely.

Registration in Ellipse of ARTC owned drones that weigh less than 2.0 kg is not mandatory but is encouraged for management purposes.

For drone kit purchases, refer to Section 9 of FIN-GL-018 Coding and Reporting Guidelines for required actions by the responsible manager.

8.2 Drone Logbooks

Each ARTC drone must have a log maintained by the drone operator, which records flight location, flight purpose, flight date, flight start time, flight duration, flight plan summary and risks assessed. The operator must also sign the log to indicate that pre-flight and post-flight inspections of the drone and associated equipment were conducted successfully. Where multiple flights occur at a single location, one combined entry per day is permitted. The drone log can be in electronic form, if there is provision for the drone operator to acknowledge that the required inspections have been conducted. Appendix B shows an example of ARTC Form EPP0001F-01.

Any damage to the drone that would impact on flight performance is to be listed in the logbook, including propeller replacements. The responsible manager is to inspect each drone logbook at least annually, with a latitude of three months, and countersign the logbook.

9 Pre-Flight Planning

9.1 Use the “Can I Fly There?” CASA App

The “Can I Fly There? App provides a mapped view of where drones can be flown to avoid prohibited areas. Use the App to see if the intended flight location is allowed, and under what conditions. For example, drone flights less than 5.5 km from a controlled airport can only be undertaken if:

- a. The drone is in the Micro RPA category (less than 100 g in weight); or
- b. CASA has given specific authorisation; or
- c. The drone operator holds a remote pilot licence (REPL) and operates in accordance with the procedures in the Remote Operator's Certificate (ReOC) issued by CASA.

The areas displayed on the maps in the "Can I Fly There?" App are permanent restrictions. Temporary airspace restrictions are listed on Air Services Australia NOTAMs.

9.2 Check of NOTAMs

Air Services Australia issues advisory notices of temporary restrictions on flight areas, known as NOTAMs. The NAIPS website (<https://www.airservicesaustralia.com/naips/Account/LogOn>) can be checked as part of the pre-flight planning for any posted NOTAMs for the area where the drone is planned to be flown. A NOTAM check would not be necessary for flights such as inspections under bridges or flights at heights below local features such as towers or buildings.

9.3 Worksite Protection Plan

In the event of an incident involving a drone, investigators will need to establish that the drone flight was adequately planned. All drone flights for an ARTC or third-party purpose over the rail corridor are to be planned and risk assessed, with the details recorded in the Worksite Protection Plan and briefed as part of the Pre-Work Brief. If the flight is intended to be conducted in a shutdown, and no Work Group will be near the intended flight path, the flight details need only be recorded in the drone logbook as set out in Section 7.2.

In all cases, the CASA limit of not flying any drone within 30m horizontal distance of people not involved in controlling the drone must be adhered to, with one exception. If the drone is planned to be flown between 15m and 30m horizontal distance of people who are not controlling the drone, this needs to be added to the Worksite Protection Plan and signed by each person who will be near the drone as part of the Pre-Work Brief. Risks associated with distracting Work Groups need to be assessed and controlled.

Flights of Very Small RPA and Micro RPA can be undertaken at any reasonable distance from people that are protected from being struck by the drone by reason of them being in a train, other enclosed vehicle or building/structure.

9.4 Flight Planning

The detail in flight plans should be tailored to the task at hand, so that the flight achieves its intended aims, and safety is never compromised. The flight plans should aim to document and communicate the minimum necessary information only. The details of the drone flight plan must be documented on the Worksite Protection Plan, where one exists. For flights away from the rail corridor, the flight plan can be annotated in the drone logbook. Any flights over private land should be undertaken after seeking the express permission of the landholder.

Examples of flight plans for different purposes are shown at Appendix A.

9.5 Pre-Flight Checklist

The drone operator must check that there is no damage to the drone that would impact flight performance. The drone battery should be checked for any distortion or cracking. The drone manufacturer's instructions must be followed to ensure that the control software is ready to use and that all control links between the controller and the drone are established. Just prior to flight,

the drone operator shall ensure that no assumptions regarding weather or distance from uninvolved people have changed and react accordingly. An example Drone Flight Checklist is shown at Appendix C using ARTC Form EPP0001F-02.

10 Protection Officer Responsibilities

Within ARTC rail corridors, the Protection Officer has ultimate responsibility for the safety of the worksite, inclusive of the drone operations. If the Protection Officer becomes concerned that worksite safety may be compromised by the drone operations, they have the authority to suspend drone operations until worksite safety can be re-established.

11 Additional ARTC Drone Operation Limitations

The following limitations apply to drone operations for an ARTC or third-party purpose over and above those required by CASA:

- A. The operation of drones weighing more than 2 kg over a level crossing are prohibited unless the drone operator can ascertain that no public use of the level crossing can occur during the approach and overflight of the level crossing by the drone. For Very Small RPA and Micro RPA, no overflight of the level crossing can take place until it is clear of pedestrians, cyclists and motorcyclists.
- B. No drone operation is permitted to continue where wind speed (constant or gusts) causes a loss of drone position control.
- C. No drone operation over ARTC tracks that adjoin tracks with overhead electrical wires in the Sydney, Melbourne and Adelaide areas without approval from the relevant adjoining Rail Infrastructure Manager.
- D. No drone operation near overhead electrical wires or powerlines without the drone operator having successfully completed ARTC Electrical Safety Awareness training.
- E. When operating the drone, the drone operator and the drone must remain outside the approach distance for Ordinary Persons for AC and DC power lines per Table 1 of the NSW Workcover document "Work near Overhead Power Lines Code of Practice 2006" available from www.safework.nsw.gov.au. The distances are 3.0 m up to 132,000 V AC or 1,500 V DC, 6.0 m between 132,000 V AC and 330,000 V AC, and 8.0 m above 330,000 V AC.
- F. No drone overflight of crewed trains where the drone mass exceeds 2.0 kg.
- G. No drone of mass exceeding 2.0 kg overflight of operational tracks without a method of Safeworking that precludes trains from entering the drone flight area for the duration of the flight plan, except where the drone flight area is below the level of the tracks (e.g. bridge inspection).
- H. The details of the drone operator, inclusive of CASA RePL and ARN details where applicable, must be included on the Pre-Work Brief for flights over the rail corridor.
- I. Any drone near misses, incidents or accidents that occur when being used for an ARTC purpose are to be reported using the normal incident reporting procedures and are the responsibility of the relevant worksite supervisor. If the near miss, incident or accident involves another aircraft, the incident is also to be immediately reported to the ATSB by the Business Unit Safety Advisor per CASA AC 101-10 section 3.5.
- J. Any unlawful activities captured as still photographs or video by the drone should be reported to the responsible manager as soon as possible.

12 Post-Flight Activities

On recovering the drone it must be inspected for damage. The drone battery should be checked for excessive heat, distortion or cracking. The batteries should be re-charged and stored strictly in accordance with the drone manufacturer's instructions to mitigate any fire risk.

The drone logbook entry should be completed. Any issues with other parts of the drone kit should also be listed in the drone logbook. Data downloads that didn't occur during the flight should be completed promptly, and the data description updated as necessary to associate the data with the particular flight.

13 Safety Risks to be considered

Risk assessment of drone operations must consider the following risks:

- A. The risk of injury arising from a fall from heights (risk avoided by substitution of drone operations instead of inspection at height).
- B. The risk of injury to persons arising from the drone coming into contact with them.
- C. The risk of distraction of ARTC workers or rail traffic crews when a drone flies in their vicinity, leading to a loss of situational awareness to the task at hand.
- D. The risk of damage to assets arising from the drone coming into contact with them.
- E. The risk of accidental knocking out of power to Rail infrastructure or adjacent properties where Powerlines cross across ARTC corridor and are exposed. (Non-electrified track areas)
- F. The risk to ARTC's insurance coverage if drone operations are not carried out in accordance with this procedure.
- G. The risk to ARTC's reputation if a drone incident results in an injury or fatality to persons, or damage or destruction of assets.
- H. The risk of fire or explosion of the drone battery.
- I. The risk of damage to the drone, or loss of the drone.

14 Appendix A – Flight Planning

An example of a flight plan with sufficient information to achieve a detailed structural inspection of a bridge would be as follows:

- A. Prepare to take-off at 09:00 hours from location xx adjacent to bridge yy. This will be the landing site and emergency landing site.
- B. Climb 1m and establish stable hovering flight.
- C. Conduct the bridge inspection per the agreed inspection schedule of bearings, joints and members, ensuring images are collected to comply with the bridge inspection standards.
- D. Height limit is top of bridge plus 5m
- E. Flight extent is between bridge abutments and 10m either side of bridge
- F. Return to directly above the take-off location.
- G. Descend to land for a battery change-out.

In the case of flights with simpler objectives the flight planning can be less prescriptive, tailored for the task being undertaken. An example for a derailment site could be:

“Drone to be launched from the southern end of the site. The flight will cover the extent of the derailment site in all directions and has the purpose of photographing the derailment for subsequent analysis. Maximum height will be 50m above ground, and the landing site will be the same as the take-off site. There is no emergency landing site available. Flight duration will be approximately 20 minutes, based on battery endurance.”

The minimum requirements are to describe:

- a. Take-off, Landing and Emergency Landing Sites (where available)
- b. Maximum height to be utilised above the take-off position
- c. Outer horizontal limits in each direction (this can be designated physical features or an estimated distance from the take-off position)
- d. Intended flight start date and time, and duration (this can be annotated in the drone logbook).

16 Appendix C – Drone Flight Checklist EPP0001F-02



EPP-00-01 Appendix C – Example Drone Flight Checklist

Corporate Services & Safety [Plant & Equipment] Form

Form Number: EPP0001F-02

EPP-00-01 Drone Management

Drone Flight Checklist

| Item | Description | Details or Tick / No / NA | Notes and Comments |
|------|--|---------------------------|-------------------------------------|
| 1 | Date | 23/5/18 | |
| 2 | Drone Operator | A Davis | Licence no: |
| 3 | Drone Operator training current | ✓ | |
| 4 | "Can I Fly There" App checked | ✓ | No airport airspace restrictions. |
| 5 | NOTAMS checked | NA | |
| 6 | Local Hazards checked | ✓ | Adjacent Overhead Wiring is live. |
| 7 | Local Authorisations obtained | ✓ | Authority of adjacent RIM obtained. |
| 8 | Flight Plan developed | ✓ | |
| 9 | Dump zone location checked | ✓ | Use take-off location. |
| 10 | Protection Officer briefed | ✓ | |
| 11 | Worksite Protection Plan includes flight details | ✓ | |
| 12 | Weather acceptable | ✓ | |
| 13 | Drone Logbook Available | ✓ | |
| 14 | Work Crew briefed | ✓ | |
| 15 | Pre-Flight Damage Inspection | ✓ | |
| 16 | Pre-Flight Battery Inspection | ✓ | |
| 17 | Pre-Flight Checks per Manufacturer's Manual | ✓ | |
| 18 | Post-Flight Damage Inspection | ✓ | |
| 19 | Post-Flight Battery Inspection | ✓ | |
| 20 | Drone Kit re-packaged | ✓ | |
| 21 | Drone Logbook updated | ✓ | |
| 22 | Any Incidents Notified | NA | |