



Australian Government

Civil Aviation Safety Authority

**Part 101 (Unmanned aircraft and rockets) Manual
of Standards 2018**

I, SHANE PATRICK CARMODY, Director of Aviation Safety, on behalf of CASA, make this instrument under regulation 101.028 of the *Civil Aviation Safety Regulations 1998*.

Shane Carmody
Director of Aviation Safety

Date 2018

CONSULTATION DRAFT

CHAPTER 1	PRELIMINARY	9
1.01	Name of instrument.....	9
1.02	Commencement.....	9
1.03	Definitions	9
1.04	References to documents.....	14
1.05	Abbreviations	14
1.06	Tables, Figures and Notes	14
1.07	Table of Contents	15
CHAPTER 2	RePL TRAINING COURSE.....	16
<i>Division 2.1</i>	<i>General</i>	<i>16</i>
2.01	Purpose.....	16
2.02	Application.....	16
<i>Division 2.2</i>	<i>Aeronautical knowledge and practical competency standards</i>	<i>17</i>
2.03	General English language proficiency standards under Part 61.....	17
2.04	Aeronautical radio operator — knowledge and competency standards.....	17
2.05	Aeronautical knowledge standards.....	18
2.06	Practical competency standards	19
<i>Division 2.3</i>	<i>Examinations — RePL training course theory component</i>	<i>21</i>
2.07	Aeronautical knowledge examinations for a RePL training course.....	21
2.08	Aeronautical knowledge examinations for a RePL training course.....	21
2.09	Examination pass mark, examiner and resits	21
2.10	Examination questions	21
2.11	Examination duration	21
2.12	Examination question sets.....	22
2.13	Examination results	22
2.14	Examination records.....	22
2.15	Examination security.....	23
2.16	Post- examination knowledge deficiency reports (KDRs).....	23
2.17	Documented practice and procedures for examinations, KDRs etc.....	24
<i>Division 2.4</i>	<i>Practical competencies — completion of RePL training course for manual or automated operation component.....</i>	<i>25</i>
2.18	Assessment of practical competencies for a RePL training course.....	25
<i>Division 2.5</i>	<i>RePL training course to upgrade a RePL</i>	<i>27</i>
2.19	Meaning of relevant RPA.....	27
2.20	RePL training course — upgrade a RePL for a small RPA whose weight is less than 7 kg to include another small RPA of the same category whose weight is 7 kg or more	27
2.21	RePL training course — upgrade a RePL for a small RPA to include a different category of small RPA	27
2.22	RePL training course — upgrade a RePL for a small RPA to include a medium or large RPA of the same category.	28
2.23	RePL training course — upgrade a RePL for a small RPA to include a medium or large RPA of a different category	29
2.24	RePL training course — upgrade a RePL for a medium or large RPA to include another medium or large RPA of the same category.....	30
2.25	RePL training course — upgrade a RePL for a medium or large RPA to include another medium or large RPA of a different category	31

<i>Division 2.6</i>	<i>RePL training course — administration</i>	33
2.26	Student class time.....	33
2.27	Student ratios.....	33
2.28	Means of achieving or simulating the flight conditions.....	33
<i>Division 2.7</i>	<i>RePL training course instructors</i>	35
2.29	Requirements for RePL training instructors.....	35
<i>Division 2.8</i>	<i>RePL flight tests — standards and repeats</i>	36
2.30	Flight tests — competency standards.....	36
CHAPTER 3	UNITS OF COMPETENCY AND COURSE STANDARDS —	
	NON-RePL QUALIFICATIONS	38
<i>Division 3.1</i>	<i>Training course units of competency — non-RePL</i>	38
3.01	Prescribed units of competency for a training course	38
<i>Division 3.2</i>	<i>Training course standards —non-RePL</i>	39
3.02	Prescribed standards for a training course.....	39
CHAPTER 4	OPERATIONS IN CONTROLLED AIRSPACE	40
<i>Division 4.1</i>	<i>Operation of unmanned aircraft at controlled aerodromes</i>	40
4.01	Purpose	40
4.02	Definition	40
4.03	Application of prescribed requirements relating to the operation of RPA below 400 ft in controlled airspace	40
4.04	Approval to operate an RPA in a no-fly zone of a controlled aerodrome.....	41
4.05	Approach and departure paths — controlled aerodromes.....	41
CHAPTER 5	RPA OPERATIONS BEYOND VISUAL LINE OF SIGHT	44
5.01	Application	44
5.02	Requirements for RPA operations do not apply in an approved area	44
5.03	Requirements for an approval to operate an RPA beyond visual line of sight	44
5.04	Definitions for this Chapter.....	44
5.05	Documented practices and procedures for EVLOS operations.....	46
5.06	Remote pilots for EVLOS operations	47
5.08	Handover procedures between an observer and a remote pilot for EVLOS operations	47
5.09	Pre-flight briefing for an EVLOS operation	48
5.10	Radio and telephone communications in an EVLOS operation class 2.....	48
5.11	Orientation, height and lateral distance of an RPA in an EVLOS operation	48
5.12	Weather and visibility conditions for an EVLOS operation	49
5.13	Controlled airspace and EVLOS operations	49
5.14	Night EVLOS operations	49
5.15	If manned aircraft are active in the airspace	49
5.16	Procedures for loss of control of an RPA in an EVLOS operation.....	50
5.17	Procedures for loss of radio and telephone communications in an EVLOS operation class 2.....	50
5.18	Conflict between the requirements of this Chapter and the documented practices and procedures	50

CHAPTER 6	OPERATIONS AT NIGHT.....	52
<i>Division 6.1</i>	<i>RPA.....</i>	<i>52</i>
6.01	Requirements for an approval to operate an RPA at night.....	52
CHAPTER 7	RESERVED	53
CHAPTER 8	OPERATIONS OF RPA GENERALLY — NEAR PEOPLE	54
<i>Division 8.1</i>	<i>Operations near people</i>	<i>54</i>
8.01	Requirements for an approval to operate an RPA with 15 m of a person.....	54
CHAPTER 9	OPERATIONS OF RPA IN PRESCRIBED AREAS.....	55
<i>Division 9.1</i>	<i>RPAS operations at or near non-controlled aerodromes.....</i>	<i>55</i>
9.01	Prescribed areas and requirements	55
9.02	Approval to operate an RPA in a prescribed area	55
9.03	No-fly zone — non-controlled aerodromes	55
<i>Division 9.2</i>	<i>No-fly zones in certain non-controlled airspace</i>	<i>57</i>
9.04	Prescribed areas and requirements	57
9.05	Approval to operate an RPA in a prescribed area	57
CHAPTER 10	RECORD KEEPING FOR CERTAIN RPA	58
<i>Division 10.1</i>	<i>Preliminary.....</i>	<i>58</i>
10.01	Definitions for the Chapter.....	58
<i>Division 10.2</i>	<i>Record keeping requirements — RPA other than excluded RPA</i>	<i>59</i>
10.02	Purpose	59
10.03	Chief remote pilot records.....	59
10.04	RPAS operational release.....	60
10.05	RPAS operational log.....	61
10.06	Remote pilot log — for flight time.....	61
10.07	RPAS technical log	62
10.08	Records of qualification and competency	63
<i>Division 10.3</i>	<i>Record keeping requirements — excluded RPA</i>	<i>64</i>
10.09	Purpose	64
10.10	RPAS operational log	64
10.11	Remote pilot log — for flight time.....	64
10.12	RPAS technical log	64
<i>Division 10.4</i>	<i>Requirements for giving information to CASA.....</i>	<i>66</i>
10.13	Purpose	66
10.14	Particular small and medium excluded RPA — information about operation.....	66
10.15	Particular small and medium excluded RPA — information required every 3 years	67
10.16	Very small RPA for hire or reward — information required every 3 years.....	67
10.17	Certified RPA operator — changes to information already given to CASA	68
CHAPTER 11	NOTIFICATION OF CHANGE TO OPERATE VERY SMALL RPA FOR HIRE OR REWARD	70
11.01	Change relating to operating very small RPA for hire or reward	70
11.02	Notice to CASA of operation of very small RPA including for hire or reward	70

Schedule 1	Acronyms and abbreviations.....	71
Schedule 2	Directory for aeronautical knowledge standards for a RePL training course	73
Appendix 1	Aeronautical knowledge standards — Common Units.....	73
Appendix 2	Aeronautical knowledge standards — Aeroplane category	73
Appendix 3	Aeronautical knowledge standards — Helicopter (multirotor class) category	73
Appendix 4	Aeronautical knowledge standards — Helicopter (single rotor class) category	73
Appendix 5	Aeronautical knowledge standards — powered-lift category	74
Appendix 6	Aeronautical knowledge requirement — RPA with a liquid-fuel system.....	74
Schedule 3	Directory for practical competency standards for a RePL training course	75
Appendix 1	Practical competency standards — Common units.....	75
Appendix 2	Practical competency standards — Aeroplane category	75
Appendix 3	Practical competency standards — Helicopter (multirotor class) category	75
Appendix 4	Practical competency standards — Helicopter (single rotor class) category	76
Appendix 5	Practical competency standards — powered-lift category	76
Appendix 6	Practical competency standards — RPA with a liquid-fuel system....	76
Schedule 4	Aeronautical knowledge units.....	77
Appendix 1	Any RPA — Common Units.....	77
Unit 1	RBAK— Basic aviation knowledge for RPAS.....	77
Appendix 1	Any RPA — Common Units (contd.).....	80
Unit 2	RACP — Airspace, charts and aeronautical publications for RPAS	80
Appendix 1	Any RPA — Common Units (contd.).....	82
Unit 3	RBMO — Basic meteorology for RPA operations	82
Appendix 1	Any RPA — Common Units (contd.).....	83
Unit 4	REES — Electrical and electronic systems for RPAS	83
Appendix 1	Any RPA — Common Units (contd.).....	86
Unit 5	RHPF — Human performance for RPAS	86
Appendix 1	Any RPA — Common Units (contd.).....	89
Unit 6	RKOP RPAS knowledge — operations and procedures.....	89
Appendix 1	Any RPA — Common Units (contd.).....	92
Unit 7	RORA — Operation rules and air law for RPAS.....	92
Appendix 1	Any RPA operated under an automated flight management system... 93	
Unit 8	RAFM — Automated flight management systems knowledge.....	93
Appendix 2	Category specific units — Aeroplane category.....	94
Unit 9	RBKA — Aircraft knowledge and operation principles: Aeroplanes.94	
Appendix 3	Category specific units — Helicopter (multirotor class) category.....	97

Unit 10	RBKM — Aeronautical knowledge and operation principles: Multirotor	97
Appendix 4	Category specific units — Helicopter (single rotor) category	100
Unit 11	RBKH — Aeronautical knowledge and operation principles: Single rotor	100
Appendix 5	Category specific units — powered-lift category	103
Unit 12	RBKP — Aircraft knowledge and operation principles: Powered-lift.....	103
Appendix 6	Any RPA with a liquid-fuel system	107
Unit 13	REFE — Medium or large RPA with a liquid-fuel system knowledge	107
Schedule 5	Practical competency units.....	108
Appendix 1	Any RPA — Common units.....	108
Unit 14	RC1 — Pre- and post-operation actions and procedures for RPAS.....	108
Appendix 1	Any RPA — Common units (contd.).....	111
Unit 15	RC2 — Energy reserves management for RPAS.....	111
Appendix 1	Any RPA — Common units (contd.).....	115
Unit 16	RC3 — Manage crew, payload and bystanders for RPAS operations	115
Appendix 1	Any RPA — Common units (contd.).....	117
Unit 17	RC4 — Navigation and operation of RPAS.....	117
Appendix 1	Any RPA — Common units (contd.).....	121
Unit 18	RNT — Non-technical skills for operation of RPAS.....	121
Appendix 1	Any RPA operated under an automated flight management system.....	125
Unit 19	RAF — Automated flight management systems for RPAS.....	125
Appendix 2	Category specific units — Aeroplane category.....	127
Unit 20	RA1 — Ground operations and launch	127
Appendix 2	Category specific units — Aeroplane category (contd.).....	129
Unit 21	RA2 — Normal operations.....	129
Appendix 2	Category specific units — Aeroplane category (contd.).....	131
Unit 22	RA3 — Land and recover	131
Tolerances	131	
Appendix 2	Category specific units — Aeroplane category (contd.).....	133
Unit 23	RA4 — Advanced manoeuvres.....	133
Appendix 2	Category specific units — Aeroplane category (contd.).....	136
Unit 24	RA5 — Abnormal and emergency operations	136
Appendix 3	Category specific units — Helicopter (multirotor class) category....	138
Unit 25	RM1 — Control on ground, launch, hover and landing.....	138
Appendix 3	Category specific units — Helicopter (multirotor class) category (contd.)	140
Unit 26	RM2 — Normal operations.....	140
Appendix 3	Category specific units — Helicopter (multirotor class) category (contd.)	141
Unit 27	RM3 — Advanced manoeuvres	141
Appendix 3	Category specific units — Helicopter (multirotor class) category (contd.)	142

Unit 28	RM4 — Operation in abnormal situations and emergencies	142
Appendix 4	Category specific units — Helicopter (single rotor class) category..	144
Unit 29	RH1 — Control on ground.....	144
Appendix 4	Category specific units — Helicopter (single rotor class) category (contd.)	147
Unit 30	RH2 — Launch, hover and landing.....	147
Appendix 4	Category specific units — Helicopter (single rotor class) category (contd.)	148
Unit 31	RH3 — Normal operation	148
Appendix 4	Category specific units — Helicopter (single rotor class) category (contd.)	150
Unit 32	RH4 — Advanced manoeuvres.....	150
Appendix 4	Category specific units — Helicopter (single rotor class) category (contd.)	151
Unit 33	RH5 — Operation in abnormal situations and emergencies	151
Appendix 5	Category specific units — powered-lift category	153
Unit 34	RP1 — Control on ground, launch, hover and landing.....	153
Appendix 5	Category specific units — powered-lift category (contd.).....	156
Unit 35	RP2 — Transitional flight	156
Appendix 5	Category specific units — powered-lift category (contd.).....	158
Unit 36	RP3 — Climb, cruise and descent.....	158
Appendix 5	Category specific units — powered-lift category (contd.).....	160
Unit 37	RP4 — Advanced manoeuvres.....	160
Appendix 5	Category specific units — powered-lift category (contd.).....	163
Unit 38	RP5 — Operation in abnormal situations and emergencies.....	163
Appendix 7	Any RPA with a liquid-fuel system	166
Unit 39	REF — Medium or large RPA with liquid-fuel system.....	166
Schedule 6	Flight Test Standards.....	168
Appendix 1	Aeroplane category flight test	168
Appendix 2	Helicopter category (Multirotor class) flight test.....	173
Appendix 3	Helicopter category (Single-rotor class) flight test	179
Appendix 4	Powered-lift category flight test.....	185
Appendix 5	RePL upgrades	192

CHAPTER 1 PRELIMINARY

1.01 Name of instrument

- (1) This instrument is the *Part 101 (Unmanned aircraft and rockets) Manual of Standards 2018*.
- (2) This instrument may also be cited as the Part 101 MOS.
- (3) In this instrument, unless the contrary intention appears, references to “the MOS” or “this MOS” are references to the Part 101 MOS.

1.02 Commencement

This MOS commences on the day that is 6 months after registration.

1.03 Definitions

- (1) In this MOS, words and phrases have the same meaning as in CASR, unless the contrary intention appears.

Note Some CASR definitions are included in subsection (2) for ease of reference.

- (2) Without affecting subsection (1), in this MOS:

AA is short for Airservices Australia.

AC is short for Advisory Circular.

AC 101-10 means the *AC 101-10, Remotely piloted aircraft systems — operation of excluded RPA*.

Note 1 AC 101-10 was first published by CASA in September 2016 and is relevant as it exists from time to time.

Note 2 All references to documents are to the particular document as it exists, or is in force, from time to time. See section 1.04.

ADF is short for the Australian Defence Force.

aeronautical knowledge component: see paragraph 2.02 (1) (a).

aeronautical knowledge standards means the standards and requirements for the aeronautical knowledge component of a RePL training course.

Note See also section 2.02.

AGL is short for above ground level.

AIP ERSA is short for the *Aeronautical Information Package, En Route Supplement Australia*, as published by AA.

applicant means a person who applies for, or undergoes training for, a RePL.

approach or departure path, for a controlled aerodrome, has the meaning given in Chapter 4 of this MOS.

approved means approved in writing by CASA, unless a contrary intention is expressly stated.

ARN is short for aviation reference number.

as safely possible, in relation to the landing of an RPA as soon as safely possible, refers to the safety of people, manned aircraft and property other than the RPA itself.

AROC is short for aeronautical radio operator certificate.

ATC is short for air traffic control.

automated operation, for an RPA, means that after take-off and until it lands, the RPA:

- (a) either:

- (i) flies a pre-determined flight path programmed into the RPAS before take-off; or
 - (ii) changes its flight path or configuration in flight solely because of pre-programmed turning or way point data, or configuration settings; and
- (b) is not subject to any manual manipulation or manual reconfiguration.

AWIS is short for the aerodrome weather information service of the BOM.

BOM is short for the Bureau of Meteorology.

CAO is short for Civil Aviation Order.

CAR means the *Civil Aviation Regulations 1988*.

CASR means the *Civil Aviation Safety Regulations 1998*.

CASR Dictionary means the dictionary mentioned in regulation 1.4 of CASR.

CASA RePL Upgrade Supplement for the Part 101 MOS is the CASA document of that name, as in existence from time to time.

Note CASA RePL Upgrade Supplement for the Part 101 MOS is available on the CASA website.

category, for an RPA, means one of the following:

- (a) the aeroplane category;
- (b) the helicopter (multirotor class) category;
- (c) the helicopter (single rotor class) category;
- (d) the powered-lift category.

chief remote pilot has the same meaning as in subregulation 101.340 (1) of CASR.

civil aviation legislation has the meaning given in section 3 of the *Civil Aviation Act 1988*.

controlled aerodrome has the same meaning as in Part 139 of CASR.

documented practices and procedures, for an RPA operator, means the written practices and procedures of the operator, including any amendments, that have been approved in writing by CASA.

Note See also subsection 1.03 (3).

emergency and collision avoidance procedures means an RPA operator's documented practices and procedures designed to ensure that an RPA in an RPA operation does not become a hazard to any aircraft, person or property during the operation.

employed means employed under a contract of service or a contract for services.

essential duties means tasks whose performance is essential to the safe operation of an RPA.

EVLOS is short for extended visual line of sight.

Note See also the definitions in section 5.04 for Chapter 5.

examiner means 1 of the following:

- (a) the chief remote pilot of an RPA operator; or
- (b) a RePL training instructor who is authorised by the chief remote pilot in accordance with the RPA's documented practices and procedures;

provided that, unless subsection (5) applies, he or she has not been the RePL training instructor for the applicant.

flight time, for an RPA operation, means:

- (a) for the flight of an RPA that is an aeroplane — the time from the moment the aeroplane begins to move under the control of the remote pilot in preparation for flight, until the moment the aeroplane comes to rest at the end of the flight;
- (b) for the flight of an RPA that is an aircraft in one of the following categories, namely, helicopter (multirotor class) category, helicopter (single rotor class) category, or RPA powered-lift category — the time from the moment the aircraft's rotor blades start turning under the control of the remote pilot in preparation for flight, until the moment the rotor blades stop turning after the aircraft comes to rest at the end of the flight;
- (c) for the flight of an airship — the time from the moment the airship is released from its mooring under the control of the remote pilot in preparation for flight, until the moment the airship is tethered at the end of the flight.

gross weight, for an RPA, means the total weight of the RPA at take-off, including fuel, equipment, payloads (if any) and anything attached to the RPA.

helicopter, when used to describe a kind of RPA, means an RPA with 1 or more main rotors.

Note See also subsection 1.03 (4).

HLS or helicopter landing site means an area of land or water, or a defined area on a structure, intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

job safety assessment, for an operation of an RPA, other than excluded RPA, by an RPA operator, means a procedure undertaken in accordance with the RPA operator's documented practices and procedures to:

- (a) assess the safety of the operation; and
- (b) identify safety risks arising from the operation; and
- (c) formulate risk mitigation measures for the operation, including risk management plans.

maintenance controller has the same meaning as in subparagraph 101.340 (1) (d) of CASR.

MOS means Manual of Standards.

movement area has the same meaning as in regulation 2 of CAR.

Note For ease of reference, movement area means that part of an aerodrome to be used for the surface movement of (manned) aircraft, including manoeuvring areas and aprons.

NAIPS is short for the National Aeronautical Information Processing System administered by AA.

non-controlled aerodrome means a place that is:

- (a) a helicopter landing site not located at a controlled aerodrome; or
- (b) an aerodrome that is not a controlled aerodrome.

person, includes an RPA operator.

practical competency standards means the standards and requirements for the practical competency component of a RePL training course.

Note See also section 2.02.

practical competency component: see paragraph 2.02 (1) (b).

RAIM is short for receiver autonomous integrity monitoring, which is a technology developed to assess the integrity of GPS signals.

remote pilot means the holder of a remote pilot licence. However, in Schedule 5 a reference (however expressed) to a remote pilot demonstrating a behaviour is taken to be a reference to an applicant for a RePL.

Note See also RePL holder.

remote pilot log: see section 10.05.

remote pilot licence has the same meaning as in Division 101.F.3 of CASR.

remote pilot station means the place from which an RPA is operated by a RePL holder.

RePL is short for remote pilot licence.

RePL holder means the holder of a remote pilot licence.

RePL training course is the expression used in this MOS to denote an RPL training course as defined in the CASR Dictionary.

Note **RPL training course** means “training in the operation of RPA for the grant of a remote pilot licence that is conducted: (a) by a person who is certified under regulation 101.335 and whose operations include conducting training; and (b) in accordance with any standards or requirements prescribed by the Part 101 Manual of Standards”.

RePL training course instructor: see section 2.29.

RePL training organisation means a person certified as an RPA operator under regulation 101.335 of CASR whose operations include the conduct of a RePL training course.

RePL training organisation’s procedures means an RePL training organisation’s documented practices and procedures for paragraph 101.335 (1) (d) of CASR.

RePL training unit means a unit of aeronautical knowledge or a unit of practical competency for a RePL training course:

- (a) prescribed in Schedules 2 and 3 of this MOS, for the purposes of the definition of RPL training course in Part 1 of the CASR Dictionary; and
- (b) contained in Schedules 4 and 5 respectively.

RePL training unit content, for a RePL training unit, means the content for the RePL training unit:

- (a) mentioned in column 2 of an item in an Appendix of Schedules 2 and 3; and
- (b) described for the corresponding unit in Schedules 4 and 5 respectively.

RPA means a remotely piloted aircraft, other than a balloon or a kite, which may be identified by the following:

- (a) category (for example, the aeroplane category);
- (b) size (for example, medium, large);
- (c) complexity (for example, automated, manual, liquid-fuel system).

RPA operator means a person who is certified as an RPA operator in accordance with regulation 101.335 of CASR.

Note Most provisions of this MOS are expressed to apply to RPA operators. However, some provisions are expressed to apply more broadly to a person. Reference to a person includes an RPA operator, unless the contrary intention appears.

RPAS is short for remote pilot aircraft system and has the same meaning as in the CASR Dictionary.

Note **RPAS** means a set of configurable elements consisting of a remotely piloted aircraft, its associated remote pilot station (or stations), the required command and control links and any other system elements that may be required at any point during the operation of the aircraft.

RPAS operational log see: paragraph 10.04.

RPAS operational release see: section 10.03.

RPAS technical log: see section 10.06.

RPL training course: see RePL training course.

runway has the same meaning as in the Part 139 Manual of Standards.

runway strip has the same meaning as in the Part 139 Manual of Standards.

runway threshold has the same meaning as in the Part 139 Manual of Standards.

student has the same meaning as applicant.

theory component of a RePL training course means the aeronautical knowledge component of the course.

Note See also subsection 2.02 (1).

type, for an RPA, means an RPA of a particular category, size and complexity, where:

- (a) category refers to whether the RPA is in the aeroplane category, the helicopter (multirotor class) category, the helicopter (single rotor class) category or the powered-lift category; and
- (b) size refers to whether the RPA is of a particular size (for example, medium, large); and
- (c) complexity refers to whether the RPA:
 - (i) is generally operated in automated mode, or manual mode, or has a liquid-fuel system; and
 - (ii) is of a particular design and make, including of a design and make that:
 - (A) stems from a common basic design; and
 - (B) is essentially similar in different models.

unit code, for a RePL training unit, means the unit code mentioned:

- (a) in an item of Schedule 2 or Schedule 3 for the RePL training unit; and
- (b) in the corresponding Appendix in Schedule 4 or 5.

VLOS is short for visual line of sight.

Note See also the definitions in section 5.04 for Chapter 5.

- (3) The following requirements apply for an RPA operator's **documented practices and procedures**:
 - (a) the RPA operator must provide documented practices and procedures, as required by a provision of this MOS, for the use and guidance of the operator's remote pilots and other operations personnel (including trainees) (**the operations personnel**);
 - (b) the documented practices and procedures must contain such information, procedures and instructions with respect to the flight operations of all types of RPA operated by the RPA operator as are required or necessary under this MOS to ensure the safe conduct of the RPA operations;
 - (c) the documented practices and procedures must be amended from time to time, where necessary, as the result of changes in the operator's operations, aircraft or equipment, or in the light of experience;

Note Documented practices and procedures do not comply with this MOS unless they have been approved in writing by CASA. See the definition of **documented practices and procedures**. Amendments to documented practices and procedures do not become part of the documented practices and procedures until they have been approved in writing by CASA.

- (d) a copy of the documented practices and procedures must:

- (i) be given to the operator's remote pilots; and
 - (ii) be given to each member of the operations personnel, as the RPA operator considers necessary; and
 - (iii) be given to CASA; and
 - (iv) be accessible for use by all operations personnel of the RPA operator who have not been given a copy;
 - (e) a copy of any approved amendments to the documented practices and procedures must be forwarded, or made accessible, (as the case requires) to the persons mentioned in paragraph (d);
 - (f) the documented practices and procedures must contain a statement that the RPA operator requires each remote pilot and each member of the operations personnel to comply with the documented practices and procedures in so far as they relate to his or her duties or activities for the RPA operator.
- (4) Under this MOS, a helicopter must be in one of the following categories:
- (a) helicopter (single rotor class) category;
 - (b) helicopter (multirotor class) category.
- (5) The *proviso* in the definition of *examiner* in subsection (2) does not apply to an RPA operator's chief remote pilot if:
- (a) the chief remote pilot is also the only RePL training instructor employed by the RPA operator; and
 - (b) the RPA operator's documented practices and procedures describe how the flight testing will be conducted; and
 - (c) the applicant seeks only a RePL for a very small or small RPA.

1.04 References to documents

- (1) In this MOS, unless the contrary intention appears, a reference to a document that is applied, adopted or incorporated, (however described) is a reference to the document as it exists from time to time.
- (2) In this MOS, a reference to any legislative instrument is a reference to the instrument as in force from time to time.

1.05 Abbreviations

- (1) In this MOS, unless the contrary intention appears, an acronym or abbreviation mentioned in Schedule 1 has the meaning given to it by Schedule 1.
- (2) Unless the contrary intention appears, if an acronym or abbreviation used in this MOS is not given a meaning under Schedule 1, the acronym or abbreviation has the meaning that is given to it by:
 - (a) the Act or the regulations; or
 - (b) if paragraph (a) does not apply — the prevalent usage, custom and practice of the aviation industry.
- (3) To avoid doubt, in this MOS neither a unit code nor an examination code is an acronym or abbreviation within the meaning of this section.

1.06 Tables, Figures and Notes

In this instrument:

- (a) if a numbered Figure in the form of a drawing, diagram or similar representation is expressed as *illustrating matters*, it is guidance that is to be taken into account in interpreting the provision which refers to the Figure; and

- (b) if a numbered Figure in the form of a drawing, diagram or similar representation is expressed as *showing matters*, it is to be read with, and may supplement, the information in the provision which refers to the Figure; and
- (c) a Note provides information and does not contain standards unless the contrary intention is expressed in a provision for the Note.

Note Figures and Tables (other than those in Schedules) are not numbered sequentially. For ease of reference, they are numbered by reference to the section or subsection which first refers to the Figure or Table.

1.07 Table of Contents

The Table of Contents for this MOS:

- (a) is not part of this MOS; and
- (b) is for guidance only; and
- (c) may be modified or edited in any published version of this MOS.

CONSULTATION DRAFT

CHAPTER 2 RePL TRAINING COURSE

Division 2.1 General

2.01 Purpose

For paragraph (b) of the definition of *RePL training course* in the CASR Dictionary, this Chapter prescribes the standards and requirements for the conduct of training in the operation of RPA for the grant of a RePL.

Note 1 An RPL training course may only be conducted by a person who is certified under regulation 101.335 and whose operations include conducting training.

Note 2 The requirement to hold a RePL authorising a person to operate an RPA does not apply in relation to the operation of an excluded RPA: see subregulation 101.252 (1) of CASR.

2.02 Application

- (1) The standards and requirements prescribed by this Chapter apply, in accordance with this Chapter, to:
 - (a) the theory component of a RePL training course, as mentioned in subparagraph 101.295 (2) (a) (iii) of CASR (the *aeronautical knowledge component*); and
 - (b) the component of a RePL training course for the manual or automated operation of a category of RPA that an applicant for a RePL proposes to operate, as mentioned in subparagraph 101.295 (2) (b) (i) of CASR (the *practical competency component*).

Note The more commonly used expressions *aeronautical knowledge component* and *practical competency component* are used in this MOS as provided for in subsection 2.02 (1).

- (2) Training which does not comply with the standards and requirements prescribed by this Chapter is not training that is a *RePL training course*.

Note Generally speaking, eligibility for the grant of a RePL is dependent (1) on passing the theory component of a RePL training course (that is, meeting the aeronautical knowledge standards): see subparagraph 101.295 (2) (a) (iii) of CASR; and (2) on completing a RePL training course in the manual or automated operation of a category of RPA that the applicant proposes to operate (that is satisfying the practical competency standards): see subparagraph 101.295 (b) (i).

CHAPTER 2 RePL TRAINING COURSE

Division 2.2 Aeronautical knowledge and practical competency standards

2.03 General English language proficiency standards under Part 61

- (1) Without affecting any other provision of this Chapter, subject to subsection (5) a RePL training course may include, as part of the practical competency component, training and assessment in general English language proficiency in accordance with this section.

Note An applicant for a RePL must have general English language proficiency. A RePL training course may specifically include general English language proficiency training in accordance with subsections (2) and (3) of this section. Otherwise, RePL applicants must obtain their general English language proficiency by virtue of holding, or having held, a flight crew licence issued by CASA.

- (2) The general English language proficiency standards and evidence for the training are as set out in Section 1: English Language Proficiency, GEL — General English language proficiency, in Schedule 2 of the Part 61 MOS, which is hereby incorporated into this MOS.

Note All of the requirements under GEL — General English language proficiency must be met. See the Table of Contents at the front of Schedule 2 of the Part 61 MOS to find unit code GEL.

- (3) Despite subclause 5.1.1 of Section 1 of Schedule 2 of the Part 61 MOS, the assessment mentioned in subclause 5.1.1 must be made by an examiner.
- (4) For this Chapter, an applicant is deemed to have been trained, and assessed as competent, in the practical competency component requirement for general English language proficiency mentioned in *Appendix 1, Practical competency standards — Common Units*, in Schedule 3 of this MOS if the applicant:
 - (a) satisfies the standards and assessment of a RePL training course in accordance with subsections (2) and (3); or
 - (b) holds, or has held, a flight crew licence issued by CASA; or
 - (c) holds, or has held, a flight crew qualification granted by the ADF that CASA is satisfied is equivalent to a flight crew licence; or
 - (d) holds an overseas flight crew licence that:
 - (i) CASA is satisfied is equivalent to a flight crew licence; and
 - (ii) states that the applicant meets ICAO level 4, 5 or 6 aviation English language proficiency standards; or
 - (e) both:
 - (i) holds an overseas flight crew licence that CASA is satisfied is equivalent to a flight crew licence; and
 - (ii) has a current aviation English language proficiency assessment.

2.04 Aeronautical radio operator — knowledge and competency standards

- (1) A RePL training course may include training and assessment in the operation of an aeronautical radio.
- (2) The aeronautical radio operator knowledge standards are as set out in Unit 1.2.1 — RARO, in Section 1.2 of Appendix 1 in Schedule 3 of the Part 61 MOS, which is hereby incorporated into this MOS.
- (3) The aeronautical radio operator competency standards are as set out in Part C3 in Section 2: Common Standards, in Schedule 2 of the Part 61 MOS, which is hereby incorporated into this MOS.

- (4) A person is eligible for the grant of an AROC only if each of the requirements in Subpart 64.B of CASR are complied with as if they applied to an applicant for a RePL.

2.05 Aeronautical knowledge standards

- (1) A RePL training course for a category of RPA must include training and assessment in the units of aeronautical knowledge (including Common Units) that are for the category in accordance with the standards and requirements in Schedule 2.
- (2) For a table with the heading “Aeronautical knowledge standards” in an Appendix of Schedule 2, each unit of knowledge mentioned in a cell in column 2 of the table (the *unit of knowledge*) has the unit code mentioned in the corresponding cell in column 1 (the *unit code*).
- (3) The unit coded document containing the requirements of a unit of knowledge is the document in an Appendix of Schedule 4 which has the same unit code.
- (4) A RePL training course for a category of RPA must require the applicant to complete all of the matters, in all of the items, of the following units of knowledge:
 - (a) for any RPA category — the units in Appendix 1 of Schedule 4, Common Units;
 - (b) for an RPA that is in the aeroplane category — the units in Appendix 2 of Schedule 4;
 - (c) for an RPA that is in the helicopter (multirotor class) category — the units in Appendix 3 of Schedule 4;
 - (d) for an RPA that is in the helicopter (single rotor class) category — the units in Appendix 4 of Schedule 4;
 - (e) for an RPA that is in the powered-lift category — the units in Appendix 5 of Schedule 4;
 - (f) for any RPA in any RPA category, whether operated under a manual or an automated flight management system — the units in Appendix 6 of Schedule 4;
 - (g) for any medium or large RPA in any RPA category, with a liquid-fuel system — the units in Appendix 7 of Schedule 4.
- (5) To avoid any doubt, the requirements under the following:
 - (a) paragraph (4) (a);
 - (b) paragraphs (4) (f) and (g);are in addition to any requirements expressed in paragraphs (4) (b) to (4) (e), as the case requires.
- (6) If:
 - (a) on a particular date — a person was granted a RePL in a category of RPA; and
 - (b) not more than 5 years after the particular date — the person is an applicant for a RePL in a different category or for a medium or large RPA;then, the person is deemed to have completed the common units of the aeronautical knowledge component for the RePL training course.
- (7) If:
 - (a) on a particular date — a person was granted a RePL in a category of RPA; and
 - (b) more than 5 years after the particular date — the person is an applicant for a RePL in a different category or for a medium or large RPA; and
 - (c) the person is an involved RPA participant;

then, the person is deemed to have completed the common units of the aeronautical knowledge component for the RePL training course.

- (8) For subsection (7), ***involved RPA participant*** means a person whose log books and RPA operator records show that the person, as a chief remote pilot or RePL holder, has performed chief remote pilot duties or flown RPA, during not less than 50% of the total number of completed weeks between:
- (a) first qualifying for the RePL; and
 - (b) the date of application for a RePL in a different category or for a medium or large RPA.

2.06 Practical competency standards

- (1) The practical competency component of a RePL training course for a category of RPA (including with a liquid-fuel system or otherwise) must be for one of the following:
- (a) the automated operation mode — for an applicant for a RePL for automated operation mode only;
 - (b) both the automated operation mode and the manual mode — for an applicant for a RePL for the manual operation mode.

Note A condition to the effect of the relevant operational mode limitation will be imposed on the RePL under regulation 11.056 and paragraph 101.300 (2) (a) of CASR. If a RePL for a category of RPA is granted with a condition limiting RPA operations to automated operation only, the condition may be removed and the limitation lifted only if the applicant successfully completes the practical competency component of a RePL training course for the same RPA category.

- (2) Without affecting anything else in this section, the practical competency component of a RePL training course for a particular medium or large RPA for which the applicant seeks the RePL, must be conducted and assessed with respect to the particular medium or large RPA only.
- (3) A RePL training course for a category of RPA must include training and assessment in the units of practical competency that are for the category in accordance with the standards and requirements in Schedule 3.
- (4) For a table with the heading “Practical competency standards” in an Appendix of Schedule 3, each unit of competency mentioned in a cell in column 2 of the table (the ***unit of practical competency***) has the unit code mentioned in the corresponding cell in column 1 (the ***unit code***).
- (5) The unit coded document containing the requirements of a unit of practical competency is the document in an Appendix of Schedule 5 which has the same unit code.
- (6) A RePL training course for a category of RPA must require the applicant to complete the following units of practical competency:
- (a) for any RPA category — the units in Appendix 1 of Schedule 5, Common Units;
 - (b) for an RPA that is in the aeroplane category — the units in Appendix 2 of Schedule 5;
 - (c) for an RPA that is in the helicopter (multirotor class) category — the units in Appendix 3 of Schedule 5;
 - (d) for an RPA that is in the helicopter (single rotor class) category — the units in Appendix 4 of Schedule 5;
 - (e) for an RPA that is in the powered-lift category — the units in Appendix 5 of Schedule 5;

- (f) for any RPA in any RPA category, whether operated under a manual or an automated flight management system — all of the items in the unit in Appendix 6 of Schedule 5;
 - (g) for any medium or large RPA in any RPA category, with a liquid-fuel system — all of the units in Appendix 7 of Schedule 5.
- (7) For an item mentioned in a table of an Appendix of Schedule 5 (the *practical competency units*), the training and assessment of the subject matter mentioned in column 2 of the item must be within the Tolerances mentioned in column 3 of the item, and across the Range of Variables mentioned in column 4 of the item.
- (8) To avoid any doubt, the requirements under the following:
- (a) paragraph (6) (a);
 - (b) paragraphs (6) (f) and (g);
- are in addition to any requirement expressed in paragraphs (6) (b) to (e), as the case requires.

CONSULTATION DRAFT

CHAPTER 2 RePL TRAINING COURSE

Division 2.3 Examinations — RePL training course theory component

2.07 Aeronautical knowledge examinations for a RePL training course

This Division is for subparagraph 101.295 (2) (a) (iii) of CASR and the definition of RPL training course in the CASR Dictionary.

2.08 Aeronautical knowledge examinations for a RePL training course

- (1) To pass the theory component of a RePL training course (the *aeronautical knowledge component*), an applicant must pass an examination (the *aeronautical knowledge examination*, or the *examination*).
- (2) The examination must not be an open-book examination.

Note The examination is one in which the candidate must not use any document or material, separate from the examination text, to assist in answering examination questions.

2.09 Examination pass mark, examiner and resits

- (1) The pass mark for the examination is 75%.
- (2) The examination must be assessed by:
 - (a) a RePL training instructor; or
 - (b) the chief remote pilot for the RePL training organisation.
- (3) An applicant who does not pass the examination at the first attempt may attempt the examination again (a *resit*) only once without having to repeat the aeronautical knowledge component of the RPL training course.

2.10 Examination questions

- (1) The examination must be a set of at least 80 multiple choice questions covering all of the aeronautical knowledge units in Schedule 4 that are for the relevant category of RPA, including for automated flight management systems and liquid-fuel systems if required, (the *relevant units*), for which the applicant is applying for a RePL (the *relevant RePL*).

Note To achieve a pass mark of 75%, the applicant must have at least 60 correct answers for an examination of 80 questions; at least 64 correct answers for an examination of 85 questions; at least 68 correct answers for an examination of 90 questions, etc.

- (2) The examination questions must be compiled as follows, based on the items in the relevant units for the relevant RePL:
 - (a) for each Priority A item in the relevant units for the relevant RePL — there must be at least 2 questions;
 - (b) for each Priority B item in the relevant units for the relevant RePL — there must be at least 1 question;
 - (c) for every 2 Priority C items in the relevant units — there must be at least 1 question.
- (3) The number of examination questions must be such as to ensure that the requirements of subsections (1) and (2) are met.

Note Depending on the relevant RePL sought, more than 80 questions may have to be formulated to ensure that the requirements of subsections (1) and (2) are met.

2.11 Examination duration

The examination must be a continuous examination that is to be completed within 1 hour and 30 minutes.

2.12 Examination question sets

- (1) The examination must be 1 of at least 6 unique sets of questions used by the RePL training organisation, and, subject to subsection (5), approved in writing by CASA.
- (2) For subsection (1), each unique set of questions must:
 - (a) be comprised of at least 80 multiple choice questions; and
 - (b) be such that no question appears in a set in the same form or presentation as in any other set.
- (3) Each set of the 6 unique sets of questions must have a unique identification code number.
- (4) Examinations, each comprising one of the unique sets of questions, must be randomly rotated:
 - (a) for each RePL training course; and
 - (b) for each examination which an applicant is resitting.
- (5) Despite subsection (1), an RePL training organisation:
 - (a) may, without CASA approval, modify not more than 10% of the total number of multiple choice questions in any unique set in any 12 month period, to make the questions more effective for the examination; and
 - (b) must keep for 5 years written records recording:
 - (i) how any question has been modified under paragraph (a);
 - (ii) the date of the modification; and
 - (iii) the reason for the modification.
- (6) CASA may, in writing, direct an RePL training organisation to modify any question, including a question modified by the organisation under subsection (5).

2.13 Examination results

Not later than 4 weeks after an examination, the RePL training organisation must inform each applicant in writing:

- (a) of his or her examination mark and whether or not he or she has passed the examination; and
- (b) if the applicant has not passed the examination — that the examination may be resat only once without having to repeat the aeronautical knowledge component of the RePL training course.

2.14 Examination records

- (1) The RePL training organisation must retain for not less than 12 months, the examination as completed by each applicant and assessed by the RePL instructor or chief remote pilot.
- (2) The RePL training organisation must make, and keep for at least 7 years, a record of the following for each examination that is attempted by an applicant:
 - (a) the applicant's name;
 - (b) the date of the examination;
 - (c) whether the examination was a resit;
 - (d) the unique identification code number of the examination;
 - (e) the applicant's mark in the examination and whether the applicant passed the examination;
 - (f) the name and position of the person who assessed the examination.

2.15 Examination security

- (1) To deliver a RePL training course, a RePL training organisation must comply with this section.
- (2) The RePL training organisation must ensure that the 6 unique sets of questions for examinations, and each examination question within a set:
 - (a) is subject to secure handling and custody procedures set out in the organisation's documented practices and procedures (*examination security procedures*); and
 - (b) before and after an examination commences — is not disclosed to:
 - (i) any applicant sitting the examination; or
 - (ii) any person who has not undertaken in writing to comply with the examination security procedures; and
 - (c) immediately after the examination — cannot be physically retained or electronically recorded by the applicant; and
 - (d) subject to subsection (3), at all times after the examination — cannot be obtained by any person who has not undertaken in writing to comply with the examination security procedures.
- (3) Paragraph (2) (d) does not apply in respect of a request for a copy of the examination or any question, made in writing by CASA.
- (4) The RePL training organisation must ensure that each examination is conducted in accordance with subsection (5).
- (5) For subsection (4), the conduct of the examination must:
 - (a) comply with the procedures set out in the organisation's documented practices and procedures for the conduct of examinations (*conduct of examination procedures*); and
 - (b) prevent a student who is taking the examination from:
 - (i) using any means to answer a question that is not approved in the conduct of examination procedures; or
Note See subsection 2.08 (2): the examination is not an open-book examination.
 - (ii) being coached or prompted by any person during the examination.

2.16 Post- examination knowledge deficiency reports (KDRs)

- (1) This section applies if a candidate for an aeronautical knowledge examination passes the examination, but with a score of less than 100%.
Note The pass mark is 75%: see subsection 2.09 (1).
- (2) The RePL training organisation must, as soon as practicable but before the candidate attempts the flight test mentioned in paragraph 2.18 (3) (c):
 - (a) prepare a report identifying the items of the aeronautical knowledge units with respect to which the candidate answered examination questions incorrectly (the *knowledge deficiency*); and
 - (b) give a copy of the report to the candidate with a view to the candidate remedying the knowledge deficiency.
Note The actual questions must not be provided to the candidate – see paragraph 2.15 (2) (b).
- (3) Subject to subsection (4), before the candidate attempts the flight test mentioned in paragraph 2.18 (3) (c), the RePL training organisation's RePL training course instructor or chief remote pilot (the *examiner*) must be satisfied, through an oral examination, that the candidate has remedied the knowledge deficiency.

- (4) If, following an oral examination mentioned in subsection (3), the examiner is not satisfied, then the candidate must not attempt the flight test unless he or she has:
 - (a) provided the examiner with a satisfactory written response to the knowledge deficiency; or
 - (b) repeated and passed the relevant aeronautical knowledge component of the RePL training course.

2.17 Documented practice and procedures for examinations, KDRs etc.

The RePL training organisation must set out in its documented practices and procedures, the procedures, including timeframes where relevant, to be followed to ensure compliance with this Division.

CONSULTATION DRAFT

CHAPTER 2 RePL TRAINING COURSE

Division 2.4 Practical competencies — completion of RePL training course for manual or automated operation component

2.18 Assessment of practical competencies for a RePL training course

- (1) This Division is for subparagraph 101.295 (2) (b) (i) of CASR and the definition of RPL training course in the CASR Dictionary.
- (2) To complete the RePL training course component for the operation of a category of RPA (the *practical competencies*), the applicant must be assessed as competent in each of the units in Schedule 5 (the *relevant practical competency units*) that is:
 - (a) for the relevant RPA category (including with or without a liquid-fuel system, as the case requires); and
 - (b) conducted:
 - (i) for the automated operation mode; or
 - (ii) for both the automated operation mode and the manual mode; as the case requires for the RePL that the applicant is applying for (the *relevant RePL*).
- (3) To be assessed as competent, the applicant must:
 - (a) demonstrate to a RePL training instructor all of the behaviours mentioned in each item of the relevant practical competency unit; and
 - (b) satisfy the RePL training instructor that each of the behaviours referred to in paragraph (a) has been demonstrated within the relevant tolerances, and across the range of variables, (if any), mentioned for the item; and
 - (c) having satisfied the requirements of paragraphs (a) and (b), pass a RePL training course flight test in the relevant RPA, conducted in accordance with the RePL training organisation's documented practices and procedures by an examiner.

Note A flight test cannot not be attempted until the applicant has satisfied the RePL training instructor with respect to all relevant behaviours under paragraph (3) (a), and remedied any knowledge deficiency (see section 2.16).

- (4) Subject to subsection (5), for subsection (3), a behaviour must be demonstrated:
 - (a) for the relevant RPA category and the relevant RePL; and
 - (b) across as many of the range of variables as the operating conditions reasonably permit.
- (5) The RePL training instructor must:
 - (a) require the applicant to provide a satisfactory simulation or oral explanation of each of the variables not selected for demonstration because operating conditions did not permit demonstration of the variable; and
 - (b) certify to the RePL training organisation, in accordance with the organisation's documented practices and procedures, that paragraph (a) was complied with.
- (6) For paragraph (3) (b), a behaviour demonstrated outside a relevant tolerance may be considered to have been demonstrated within the tolerance if the RePL training instructor:
 - (a) is satisfied that:
 - (i) the only reason for failure to demonstrate the behaviour is the unavoidable impact of the relevant operating conditions; and

- (ii) in the circumstances, the behaviour that was demonstrated was not so far outside the tolerance as to indicate a lack of competence in the relevant operating conditions; and
 - (b) certifies to the RePL training organisation, in accordance with the organisation's documented practices and procedures, that paragraph (a) was the case.
- (7) The training course flight test for the relevant RPA mentioned in paragraph (3) (c) must be in accordance with the flight test standards in Schedule 6.

CONSULTATION DRAFT

CHAPTER 2 RePL TRAINING COURSE

Division 2.5 RePL training course to upgrade a RePL

2.19 Meaning of relevant RPA

- (1) In a section of this Chapter, reference to a *relevant RPA* means the particular type of RPA for which the applicant seeks an upgraded RePL.
- (2) Without affecting anything else in this Division, for a particular type of medium or large RPA for which the applicant seeks the upgraded RePL the following:
 - (a) the practical competency component of a RePL training course;
 - (b) the training course flight test;must be for the particular type of medium or large RPA only.

2.20 RePL training course — upgrade a RePL for a small RPA whose weight is less than 7 kg to include another small RPA of the same category whose weight is 7 kg or more

- (1) This section prescribes the standards and requirements for an RePL training course for the holder of a RePL:
 - (a) in a category of small RPA whose weight is less than 7 kg; and
 - (b) who applies to be a RePL holder for another small RPA in the same category whose weight is 7 kg or more (a *relevant RPA*).

Note There are no additional aeronautical knowledge requirements.
- (2) The practical competency component of the RePL training course must require the applicant to do the following:
 - (a) complete flying training operating a relevant RPA; and
 - (b) be assessed as competent in all of the units of practical competency (other than the Common Units) that are required for the relevant RPA under Schedule 5 (including in the manual mode of operation if the case so requires);
- (3) The person who supervises the flying mentioned in paragraph (2) (a) must be the same person who performs the assessment of competence for paragraph (2) (b).
- (4) Despite paragraph 2.29 (2) (a), the person who supervises flying and assesses competency for subsections (2) and (3) must be:
 - (a) for an RPL training organisation — one of the following who has a RePL which permits operations in the RPA category with a weight of 7 kg or more:
 - (i) the chief remote pilot;
 - (ii) a RePL training instructor; or
 - (b) if not for an RPL training organisation — the chief remote pilot of a certified RPA operator who has documented practices and procedures for the purposes of this section.

2.21 RePL training course — upgrade a RePL for a small RPA to include a different category of small RPA

- (1) This section prescribes the standards and requirements for a RePL training course for the holder of a RePL in a category of small RPA who applies to be a RePL holder for a different category of small RPA (the *relevant RPA*).

Note CASA will issue an RePL with a condition that limits operations in a new category to RPA with a gross weight of less than 7 kg unless the practical component of the RePL training course is completed on an RPA in the relevant category weighing more than 7 kg.

- (2) Subject to subsections (3) and (7), the aeronautical knowledge component of the RePL training course must require the applicant to complete training in, and pass an examination for, all of the units of knowledge that are required for the relevant RPA under Schedule 4, except those units for which the holder passed the aeronautical knowledge examination:
- (a) not more than 5 years before applying for a RePL for the relevant RPA; or
 - (b) more than 5 years before applying for a RePL for the relevant RPA provided the applicant is an involved RPA participant.

Note **Involved RPA participant** is defined in subsection (7).

- (3) An applicant who holds 1 of the following:
- (a) a flight crew licence;
 - (b) an overseas flight crew licence, or a flight crew qualification granted by the ADF, that CASA is satisfied is equivalent to a flight crew licence;
- that is for a category of manned aircraft that is similar to the category of the relevant RPA, is taken to satisfy the aeronautical knowledge component of the training mentioned in subsection (2).
- (4) For subsection (2), the examination must be:
- (a) carried out by the person who conducts the applicant's training course flight test for the relevant RPA; and
 - (b) comply with the requirements set out in the operator's documented practices and procedures dealing with the following for the examination:
 - (i) the content, including the variation and security of relevant questions;
 - (ii) the pass mark, including procedures for knowledge deficiency reporting and re-examination;
 - (iii) notifications and certifications for applicants, and record keeping.

Note Examinations may be oral or written, but must be supported by appropriate records in accordance with the operator's documented practices and procedures.

- (5) The practical competency component of the RePL training course must require the applicant to complete training, and be assessed as competent, in all of the units of practical competency that are required under Schedule 5 for the relevant RPA (including in the manual mode of operation if the case so requires).
- (6) For subsection (5), the practical competency component of the RePL training course must also require the applicant to pass the training course flight test for the relevant RPA, conducted by an examiner in accordance with the relevant flight test standards in Schedule 6.
- (7) For subsection (2), **involved RPA participant** means a person whose log books and RPA operator records show that the person, as a chief remote pilot or RePL holder, has performed chief remote pilot duties or flown RPA, during not less than 50% of the total number of completed weeks between:
- (a) first qualifying for the RePL in a category of small RPA; and
 - (b) the date of application to be a RePL holder in a different category of small RPA.

2.22 RePL training course — upgrade a RePL for a small RPA to include a medium or large RPA of the same category.

- (1) This section prescribes the standards and requirements for an RePL training course for the holder of a RePL in a category of small RPA who applies to be a RePL holder for a medium or large RPA in the same category (the **relevant RPA**).

- (2) Without affecting subsection (3), if the holder is applying for the first time to be a RePL holder for an RPA with a liquid-fuel system, the relevant aeronautical knowledge and practical components of the RePL training course must require the applicant to:
 - (a) complete training in, and pass the examination for, the units of knowledge required for the relevant RPA with a liquid-fuel system under Schedule 4; and
 - (b) complete training in and demonstrate the practical competencies required for the relevant RPA with a liquid-fuel system under Schedule 5.
- (3) The aeronautical knowledge and practical competency components of the RePL training course (including examination and assessment) must comply with the requirements in *CASA RePL Upgrade Supplement for the Part 101 MOS* for the relevant RPA.
- (4) The practical competency component of the RePL training course must require the applicant to pass the training course flight test for the relevant RPA, conducted by an examiner in accordance with the relevant flight test standards in Schedule 6.

Note *CASA RePL Upgrade Supplement for the Part 101 MOS* may be freely accessed through the CASA website: casa.gov.au

2.23 RePL training course — upgrade a RePL for a small RPA to include a medium or large RPA of a different category

- (1) This section prescribes the standards and requirements for an RePL training course for the holder of a RePL in a category of small RPA who applies to be a RePL holder for a medium or large RPA in a different category, with or without a liquid-fuel system, as the case requires (the *relevant RPA*).
- (2) Subject to subsections (3) and (8), the aeronautical knowledge component of the RePL training course must require the applicant to complete training in, and pass an examination for, all of the units of knowledge that are required under Schedule 4 for the relevant RPA, except those units for which the holder passed the aeronautical knowledge examination:
 - (a) not more than 5 years before applying for a RePL for the relevant RPA; or
 - (b) more than 5 years before applying for a RePL for the relevant RPA provided the applicant is an involved RPA participant.

Note *Involved RPA participant* is defined in subsection (8).

- (3) An applicant who holds 1 of the following:
 - (a) a flight crew licence;
 - (b) an overseas flight crew licence, or a flight crew qualification granted by the ADF, that CASA is satisfied is equivalent to a flight crew licence;
 that is for a category of manned aircraft that is similar to the category of the relevant RPA, is taken to satisfy the aeronautical knowledge component of the training mentioned in subsection (2).
- (4) For subsection (2), the examination must comply with the requirements set out in the operator's documented practices and procedures dealing with the following for the examination:
 - (a) the content, including the variation and security of relevant questions;
 - (b) the pass mark, including procedures for knowledge deficiency reporting and re-examination;
 - (c) notifications and certifications for applicants, and record keeping.

Note Examinations may be oral or written but must be supported by appropriate records in accordance with the operator's documented practices and procedures.

- (5) The practical competency component of the RePL training course must require the applicant to complete training, and be assessed as competent, in all of the units of practical competency that are required in Schedule 5 for the relevant RPA (including in the manual mode of operation if the case so requires).
- (6) Without affecting subsection (5), if the holder is applying for the first time to be a RePL holder for RPA with liquid-fuel system, the relevant aeronautical knowledge and practical components of the RePL training course must require the applicant to:
 - (a) complete training in, and pass the examination for, the units of knowledge required for RPA with a liquid-fuel system under Schedule 4; and
 - (b) complete training in and demonstrate the practical competencies required for RPA with a liquid-fuel system under Schedule 5.
- (7) The relevant practical competency component of the RePL training course must require the applicant to pass the training course flight test for the relevant RPA, conducted by an examiner in accordance with the relevant flight test standards in Schedule 6.
- (8) For subsection (2), *involved RPA participant* means a person whose log books and RPA operator records show that the person, as a chief remote pilot or RePL holder, has performed chief remote pilot duties or flown RPA, during not less than 50% of the total number of completed weeks between:
 - (a) first qualifying for the RePL in a category of small RPA; and
 - (b) the date of application to be a RePL holder for a medium or large RPA in a different category, with or without a liquid-fuel system, as the case requires.

2.24 RePL training course — upgrade a RePL for a medium or large RPA to include another medium or large RPA of the same category

- (1) This section prescribes the standards and requirements for a RePL training course for the holder of a RePL in a category of medium or large RPA who applies to be a RePL holder for another medium or large RPA of the same category (the *relevant RPA*).
- (2) Without affecting subsection (3), if the holder is applying for the first time to be a RePL holder for RPA with liquid-fuel system, the relevant aeronautical knowledge and practical components of the RePL training course must require the applicant to:
 - (a) complete training in, and pass the examination for, the units of knowledge required for RPA with a liquid-fuel system under Schedule 4; and
 - (b) complete training in and demonstrate the practical competencies required for RPA with a liquid-fuel system under Schedule 5.
- (3) The aeronautical knowledge and practical competency components of the RePL training course (including examination and assessment) must comply with the requirements in *CASA RePL Upgrade Supplement for the Part 101 MOS* for the relevant RPA.
- (4) The relevant practical competency component of the RePL training course must require the applicant to pass the training course flight test for the relevant RPA, conducted by an examiner in accordance with the relevant flight test standards in Schedule 6.

Note *CASA RePL Upgrade Supplement for the Part 101 MOS* may be freely accessed through the CASA website: www.casa.gov.au.

2.25 RePL training course — upgrade a RePL for a medium or large RPA to include another medium or large RPA of a different category

- (1) This section prescribes the standards and requirements for an RePL training course for the holder of a RePL in a category of medium or large RPA who applies to be a RePL holder for medium or large RPA in a different category, with or without a liquid-fuel system (the *relevant RPA*).
- (2) Subject to subsection (3), the aeronautical knowledge component of the RePL training course must require the applicant to complete training in, and pass an examination for, all of the units of knowledge that are required under Schedule 4 for the relevant RPA, except those units for which the holder passed the aeronautical knowledge examination:
 - (a) not more than 5 years before applying for a RePL for the relevant RPA; or
 - (b) more than 5 years before applying for a RePL for the relevant RPA, provided the applicant is an involved RPA participant.

Note 1 **Involved RPA participant** is defined in subsection (7).

Note 2 Under subsection 2.25 (2), the aeronautical knowledge component would include training and examination in a liquid-fuel system if the holder is applying for the first time to be a RePL holder for RPA with a liquid-fuel system.

- (3) An applicant who holds 1 of the following:
 - (a) a flight crew licence;
 - (b) an overseas flight crew licence, or a flight crew qualification granted by the ADF, that CASA is satisfied is equivalent to a flight crew licence;that is for a category of manned aircraft that is similar to the category of the relevant RPA, is taken to satisfy the aeronautical knowledge component of the training mentioned in subsection (2).
- (4) For subsection (2), the examination must comply with the requirements set out in the operator's documented practices and procedures dealing with the following for the examination:
 - (a) the content, including the variation and security of relevant questions;
 - (b) the pass mark, including procedures for knowledge deficiency reporting and re-examination;
 - (c) notifications and certifications for applicants, and record keeping.

Note Examinations may be oral or written but must be supported by appropriate records in accordance with the operator's documented practices and procedures.

- (5) The practical competency component of the RePL training course must require the applicant to complete training, and be assessed as competent, in all of the units of practical competency that are required under Schedule 5 for the relevant RPA (including in the manual mode of operation if the case so requires).

Note Under subsection 2.25 (5), the practical competencies component would include training and demonstration of competence in a liquid-fuel system if the holder is applying for the first time to be a RePL holder for RPA with a liquid-fuel system.

- (6) The relevant practical competency component of the RePL training course must require the applicant to pass the training course flight test for the relevant RPA, conducted by an examiner in accordance with the relevant flight test standards in Schedule 6.
- (7) For subsection (2), *involved RPA participant* means a person whose log books and RPA operator records show that the person, as a chief remote pilot or RePL holder,

has performed chief remote pilot duties or flown RPA, during not less than 50% of the total number of completed weeks between:

- (a) first qualifying for the RePL in a category of medium or large RPA; and
- (b) the date of application to be a RePL holder for a medium or large RPA in a different category, with or without a liquid-fuel system, as the case requires.

CONSULTATION DRAFT

CHAPTER 2 RePL TRAINING COURSE

Division 2.6 RePL training course — administration

2.26 Student class time

- (1) To deliver the *aeronautical knowledge component* of a RePL training course, a RePL training organisation must ensure that each student has not less than 15 hours of contact time with a RePL training instructor.
- (2) For subsection (1), *contact time* with a student is accumulated through one or both of the following, namely, the instructor being
 - (a) physically present, instructing and responding in a class room;
 - (b) virtually present, instructing and responding on-line in real time.

Note The minimum of 15 hours contact time may be reached through an accumulation of physical presence, virtual presence or a mixture of both. However, CASA will not certify a person to be an RPA operator for the purpose of conducting a RePL training course unless CASA is satisfied that the operator's documented practices and procedures ensure that the minimum of 15 hours focuses on significant matters of substance for persons training for a RePL.

2.27 Student ratios

- (1) To deliver a RePL training course, a RePL training organisation must ensure that the ratio of students to RePL training instructors is not greater than
 - (a) for the theoretical component (aeronautical knowledge component) — 10 students to 1 instructor, unless CASA approves otherwise, in writing, in accordance with subsection (2); and
 - (b) for the practical component (practical competencies component):
 - (i) 5 students to 1 instructor — for a RePL for an RPA that the RPA training organisation specifies in its documented practices and procedures is not complex; and
 - (ii) x students to 1 instructor — for a RePL for an RPA that the RPA training organisation specifies in its documented practices and procedures is complex, where x is a number less than 5.

Note CASA will not certify a person to be an RPA operator for the purpose of conducting a RePL training course for a complex RPA unless CASA is satisfied that the operator's documented practices and procedures ensure that the figure attributed to the value "x" is commensurate with the relevant RPA complexity.

- (2) For paragraph (a), CASA may approve otherwise only if CASA is satisfied, on application, that:
 - (a) the relevant instructor has the qualifications and experience to ensure the effective delivery of the theoretical component to a larger number of students; and
 - (b) the RePL training organisation's structure and management is appropriate to support the instructor's delivery of the component to the larger number of students.

2.28 Means of achieving or simulating the flight conditions

To deliver a RePL training course for any type of RPA, including with a liquid-fuel system as the case requires (the *relevant RPA*), a RePL training organisation must ensure that there is available to each student a means of achieving or simulating the flight conditions and variables:

- (a) mentioned in each item of the practical competency units in Schedule 5 that are for the relevant RPA; and
- (b) that cannot otherwise be reasonably demonstrated.

Note The applicant must accumulate sufficient practical flying experience on the relevant category of RPA, commensurate with the size of the RPA and the complexity of the RPAS, but, in any case, not less than 5 hours flight time under standard RPA operating conditions (in accordance with paragraph 101.295 (2) (c) of CASR). The amount of flying required for a category, size or complexity of RPA is to be as specified in the training organisation's documented practices and procedures.

CONSULTATION DRAFT

CHAPTER 2 RePL TRAINING COURSE

Division 2.7 RePL training course instructors

2.29 Requirements for RePL training instructors

- (1) A RePL training course for a type of RPA may only be conducted by a RePL training instructor who satisfies the requirements of this section.
- (2) The RePL training instructor must comply with the following requirements:
 - (a) be employed by the RPA training organisation which is delivering the RePL training course;
 - (b) hold a RePL for the type of RPA for which he or she instructs;

Note Under regulation 202.455 and subregulation 202.461 (3) of CASR, if before 29 September 2016, a person was certified as a UAV controller, the certification has effect as if it were the grant of a RePL.

- (c) have 1 or more of the following:
 - (i) a pilot instructor rating issued under Part 61 of CASR;
 - (ii) a Certificate III or IV in Training and Assessment issued by an educational institution under a State or Territory government;
 - (iii) a certificate of successful completion of a training program in the principles of instruction issued by a person approved in writing by CASA;

Note In approving a person to deliver a program and issue a certificate under subparagraph 2.29 (2) (c) (iii), CASA will be guided by the extent to which the program satisfies the requirements of clause 3. *Principles and methods of instruction*, in Section 2.4 of Schedule 3 of the Part 61 Manual of Standards.

- (d) have the number of hours of experience in the operation of unmanned aircraft required for the RePL training course under the RPA training organisation's documented practices and procedures;

Note Unmanned aircraft include model aircraft but not rockets, fireworks or balloons. See regulation 101.005 of CASR.

- (e) have satisfied any currency and recency requirements for operation of the relevant RPA in accordance with the RePL training organisation's documented practices and procedures.

Note For the conduct of an RPL training course, a chief remote pilot may be a RePL training instructor if he or she satisfies the requirements of this section. However, a chief remote pilot who has acted as a RePL training instructor for an applicant cannot also be the examiner for that applicant unless the chief remote pilot is the RPA operator's only RePL training instructor and the operator's documented practices and procedures describe how flight testing will be conducted so as to avoid the effects (if any) of a conflict of interest. See the definition of *examiner* in section 1.03.

CHAPTER 2 RePL TRAINING COURSE

Division 2.8 RePL flight tests — standards and repeats

2.30 Flight tests — competency standards

- (1) The competency standards for a flight test for a RePL in an aircraft category are as set out in the Appendix in Schedule 6 that is for the licence in the relevant category (the *relevant Appendix*).
- (2) For subsection (1), the competency standards for a flight test mentioned in an Appendix in Schedule 6 comprise the following:
 - (a) the flight test requirements mentioned in the Appendix for the test;
 - (b) the knowledge requirements mentioned in the Appendix for the test;
 - (c) the practical flight standards mentioned in the Appendix for the test.

Note For paragraph (c), the aircraft category for a licence is identified in the title of the relevant Appendix in Schedule 6.

- (3) For a flight test, the knowledge required of a person is a satisfactory level of knowledge of the items in clause 2 of the relevant Appendix.

Note The knowledge is tested through a series of oral questions and answers before the flight test begins. The examiner may ask as many questions relevant to the items in clause 2 as he or she considers appropriate and necessary to determine whether the candidate has the required level of knowledge of the items.

- (4) For subsection (3), specific questioning for every item of the relevant knowledge requirements is not required, provided the examiner is satisfied, from the answers to the questions that are asked, that the candidate has a satisfactory knowledge of the items about which questions are not asked.

Note The examiner should consider the candidate's aeronautical knowledge examination results to determine which questions would be appropriate to ensure that the candidate has a full range of relevant knowledge.

- (5) For a flight test, the practical competency required of a person is this:

that for each unit of competency mentioned in columns 1 and 2 of a row of the table in clause 3 of the relevant Appendix in Schedule 6, the person has the ability to perform each of the items or manoeuvres mentioned in column 3 of the row, subject to the accuracy and tolerance mentioned in column 4 of the row.
- (6) To determine if a candidate has passed the flight test, the examiner conducting the flight test must be satisfied that the candidate has demonstrated:
 - (a) the knowledge required under subsection (3); and
 - (b) the competency required under subsection (5).
- (7) The examiner conducting the flight test must keep the following records for at least 7 years after the flight test:
 - (a) the list of questions asked of the candidate to demonstrate his or her knowledge of the items mentioned under clause 2 of the relevant Appendix (the *items*);
 - (b) for each question in the list, a record of whether the candidate did, or did not, demonstrate a satisfactory level of knowledge;
 - (c) if the examiner relied on subsection (4) with respect to any particular item, a record that this was the case for the item;
 - (d) the overall assessment of the candidate's level of knowledge;
 - (e) against the list of units of competency, items and manoeuvres, and accuracies and tolerances in the practical flight standards in clause 3 of the relevant

Appendix, an indication of whether the candidate did, or did not, demonstrate competency;

- (f) the overall assessment of the candidate's level of practical competency.
- (8) If an applicant fails a flight test mentioned in this Chapter, he or she may repeat the flight test but only after completing such additional training as is specified in writing by the examiner.
- (9) For subsection (8), the specified additional training must be based on such of the practical competencies mentioned in subsection 2.18 (2) as are relevant to any deficiency which resulted in the applicant failing the flight test.
- (10) If subsection (8) applies to an applicant, copies of the written specification must be kept with the records referred to in subsection (7).

CONSULTATION DRAFT

**CHAPTER 3 UNITS OF COMPETENCY AND COURSE STANDARDS —
NON-RePL QUALIFICATIONS**

Division 3.1 Training course units of competency — non-RePL

3.01 Prescribed units of competency for a training course

For an approval of a training course under a relevant regulation of CASR Part 101, this Division prescribes the units of competency which the training course must cover for subparagraph 101.029 (2) (a) (i) of CASR.

RESERVED

CONSULTATION DRAFT

**CHAPTER 3 UNITS OF COMPETENCY AND COURSE STANDARDS —
NON-RePL**

Division 3.2 Training course standards —non-RePL

3.02 Prescribed standards for a training course

For an approval of a training course under a relevant regulation of CASR Part 101, this Division prescribes the standards which the training course must meet for subparagraph 101.029 (2) (a) (ii) of CASR.

RESERVED

CONSULTATION DRAFT

CHAPTER 4 OPERATIONS IN CONTROLLED AIRSPACE

Division 4.1 Operation of unmanned aircraft at controlled aerodromes

4.01 Purpose

For subsection 101.072 (1) of CASR, this Division prescribes the requirements relating to the operation in controlled airspace, below 400 ft, of an unmanned aircraft to which this Division applies.

Note Any operation above 400 ft within 3 NM of an aerodrome, would be subject to the restrictions and permission requirements under regulations 101.070 and 101.075.

4.02 Definition

In this Division:

no-fly zone of a controlled aerodrome means any areas and airspace that are:

- (a) within 3 NM of the movement area of a controlled aerodrome; and
- (b) the approach and departure paths referred to in section 4.05, whether or not they extend beyond 3 NM of the movement area of the controlled aerodrome.

unmanned aircraft to which this Division applies has the meaning derived from section 4.03.

4.03 Application of prescribed requirements relating to the operation of RPA below 400 ft in controlled airspace

- (1) Subject to subsections (2) and (3), this Division applies to:

- (a) an RPA;
- (b) a model aircraft.;

- (2) This Division does not apply to a micro RPA, a tethered balloon or kite, an unmanned free balloon, a rocket or fireworks.

Note The operation of these aircraft and rockets is governed by particular provisions in Part 101 of CASR.

- (3) This Division does not apply to the operation of an unmanned aircraft in accordance with any of the following:

- (a) an authorisation (however called) or exemption, granted under CASR, that permits operation of the aircraft within 3 NM of the movement area of a controlled aerodrome;
- (b) the approval of an approved area under regulation 101.030 of CASR;
- (c) if the unmanned aircraft is an RPA operated by the holder of a remote pilot licence — the privileges and limitations of:
 - (i) the licence; and
 - (ii) the certification of the RPA operator conducting the operation.
- (d) if the unmanned aircraft is an RPA that is operated by an RPA operator:
 - (i) within 3 NM of the movement area of the controlled aerodrome but outside the aerodrome approach and departure paths; and
 - (ii) in accordance with the permission of ATC.

Note An RPA operator means a person who is certified as an RPA operator in accordance with regulation 101.335 of CASR. See the definitions in subsection 1.03 (2).

4.04 Approval to operate an RPA in a no-fly zone of a controlled aerodrome

- (1) Subject to the requirements in subsection (2), a person is approved to operate an unmanned aircraft to which this Division applies in a no-fly zone of a controlled aerodrome.
- (2) For subsection (1), the requirements are that the unmanned aircraft must:
 - (a) be operated exclusively inside a building whose structure at the time of the operation makes it impossible for the RPA to escape and fly away; or
 - (b) be tethered, on a lead that is no longer than x ft, in such a way that is impossible for it to escape and fly away in normal, abnormal or emergency operations.
- (3) For paragraph (2) (b), x ft is the distance in feet from the point on the ground at which the tether is attached to the ground, to the maximum height permitted by ATC for the unmanned aircraft to operate.

Note 1 Controlled aerodromes are in controlled airspace and have instrument approach procedures.

Note 2 The designation of controlled aerodromes and controlled airspace is made in the *Determination of airspace and controlled aerodromes etc.*, as in force from time to time. This is a legislative instrument revised and reissued by CASA approximately every 6 months. Controlled aerodrome information in the Determination in force at any particular time is also published by Airservices Australia in the *Designated Airspace Handbook*.

4.05 Approach and departure paths — controlled aerodromes

- (1) For paragraph 4.01 (1) (b), Figure 4.03 (1)-1 shows the approach and departure paths of a controlled aerodrome.

Note 1 Figure 4.05 (1)-2 also illustrates a cross-section of part of Figure 4.05 (1).

Note 2 Figure 4.05 (1)-3 illustrates one example of a multi-runway scenario to which the requirements in this Division apply in the same way as for a single runway. Application of the requirements does not affect the black shaded areas but produces overlapping grey shaded areas, and what would otherwise be a grey shaded area becomes a black shaded area because of the intersection of the runways.

- (2) As shown in Figure 4.05 (1), the no-fly zone is up to 400 ft, as follows:
 - (a) anywhere on or from the ground upwards in the area that is the runway or the runway strip;
 - (b) anywhere in the following areas which are the approach and departure paths for the controlled aerodrome;
 - (i) subject to subparagraph (ii) — on or from the ground upwards in the area that is shaded black:
 - (A) to a distance of 7 km from the end of the runway strip; and
 - (B) to a width that is initially 1 km until the splay exceeds 1 km, and then to the width of the splay up to 3.85 km;
 - (ii) anywhere from 300 ft (90 m) above the ground (referenced to the aerodrome elevation) in the area that is between 7 km and 8.5 km from the end of the runway strip, with an initial splay width of 3.85 km and a final splay width of 4.65 km;
 - (c) anywhere from 150 ft (45 m) above the ground (referenced to the aerodrome elevation) in the area that is shaded grey.
- (3) The area that is shaded black, which shows the approach and departure paths and the ground below them, is described as follows:
 - (a) symmetrical trapezoids with the shorter side coincident with the ends of a nominal 100 m wide runway strip and extending out at an angle of 15 degrees

- on either side to a distance of 8.5 km, the width of the splay at that distance being no greater than 3.85 km); and
- (b) a rectangle extending 500 metres on either side of the runway centreline and overlying the runway strip until it intersects the trapezoids at a distance of approximately 1.68 km from the end of the runway strip.
- (4) The area that is shaded grey is described as the racetrack shape comprised of 2 semi-circles each:
- (a) with a radius of 4 km from the point on the centreline at each end of the runway in the direction of the closest threshold (*point 1*); and
 - (b) ending at the point that is perpendicular to *point 1*; and
 - (c) extending in lines parallel to the centreline until the lines extended from 1 semi-circle meet the lines extended from the other semi-circle.

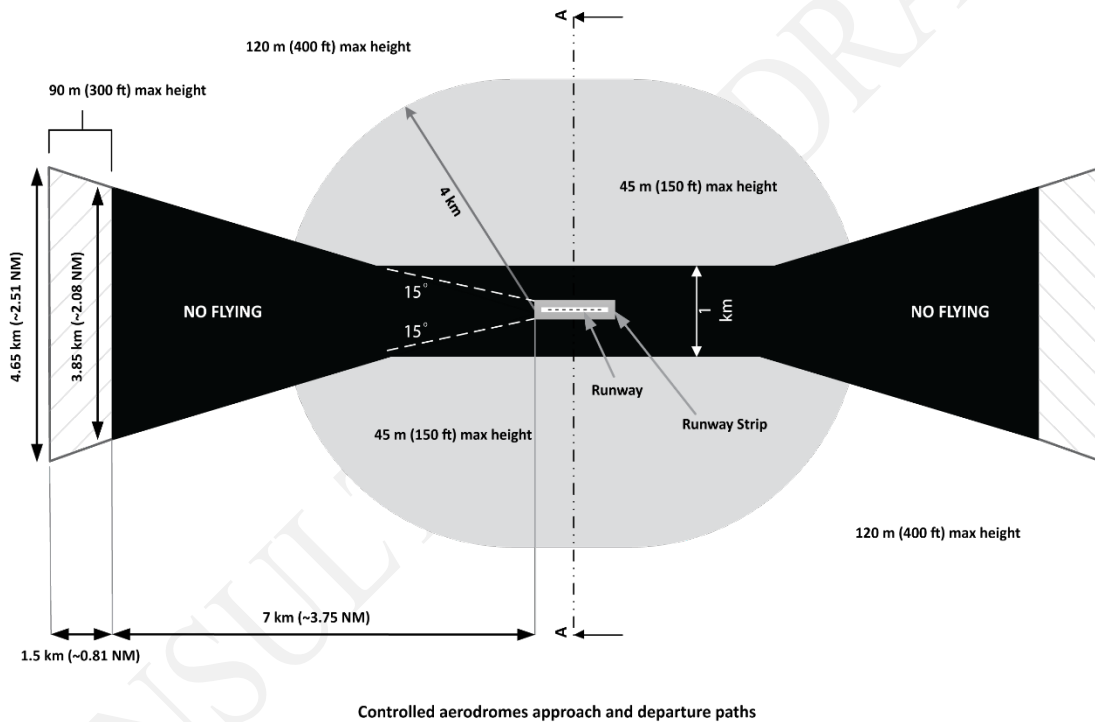
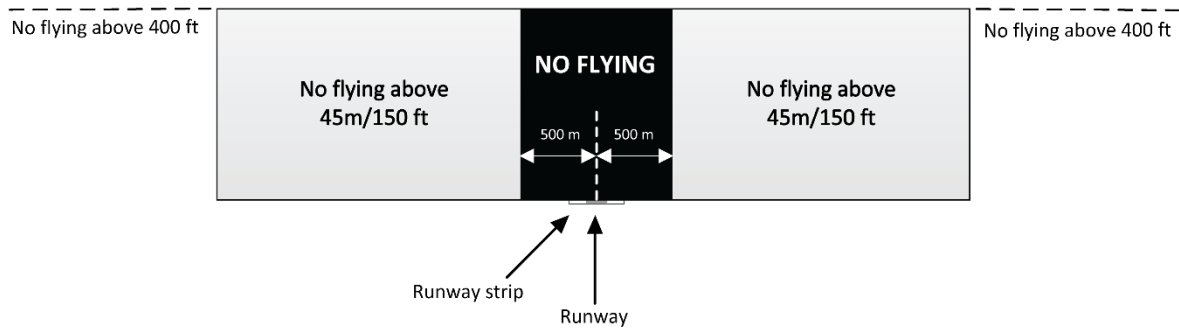


Figure 4.05 (1)-1: Controlled aerodromes approach and departure paths (shows matters)

Note The diagram is not to scale.



Section through A-A

Figure 4.05 (1)-2: Controlled aerodromes approach and departure paths cross section (illustrates matters)

Note The diagram is not to scale.

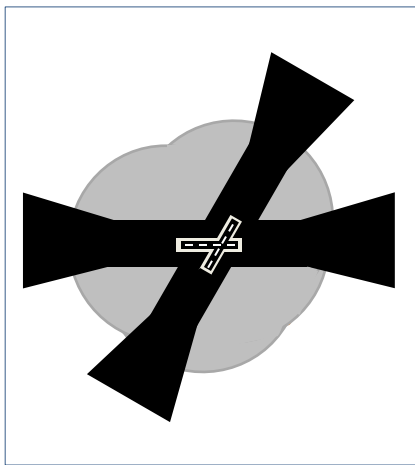


Figure 4.05 (1)-3: Intersecting runways (illustrates matters)

CHAPTER 5 RPA OPERATIONS BEYOND VISUAL LINE OF SIGHT

5.01 Application

This Chapter applies only for RPA operations conducted by an RPA operator.

5.02 Requirements for RPA operations do not apply in an approved area

This Chapter does not apply to any area that is an area approved by CASA for regulation 101.030 of CASR.

5.03 Requirements for an approval to operate an RPA beyond visual line of sight

- (1) For paragraph 101.073 (2) (a) of CASR, this Chapter prescribes the requirement for the grant of an approval by CASA under paragraph 101.029 (2) (b) of CASR (an *approval*), for a person to operate an RPA, other than a large RPA, beyond the person's visual line of sight.

Note See also paragraph 101.300 (4) (b) of CASR.

- (2) In this Chapter, the approval mentioned in subsection (1) is referred to as:
 - (a) an EVLOS operation approval; or
 - (b) an EVLOS operation class 1 approval; or
 - (c) an EVLOS operation class 2 approval.
- (3) For the grant of an approval, the RPA operator's documented practices and procedures must:
 - (a) provide for the matters mentioned in this Chapter; and
 - (b) be in accordance with the requirements of this Chapter; and
 - (c) ensure that RPA operations are conducted in accordance with the approval.

5.04 Definitions for this Chapter

In this Chapter:

EVLOS is short for extended visual line of sight.

EVLOS operation class 1 means an RPA operation that is beyond VLOS, and in which:

- (a) at least 1 trained visual observer class 1 (the *observer*) is used; and
- (b) the location of the RPA, and the ground beneath and the airspace surrounding, the RPA, is:
 - (i) located within VLOS for each relevant observer throughout the operation; or
 - (ii) beyond VLOS but with the relevant observer knowing the exact location of the RPA; and
- (c) the observer is in the same location as the remote pilot; and
- (d) an FPV system may be used, but not as a substitute for any observer; and
- (e) the observer's duty is to:
 - (i) either:
 - (A) keep the RPA constantly within VLOS; or
 - (B) know the exact location of the RPA; and
 - (ii) maintain constant situational awareness of the airspace surrounding, and the ground below, the RPA; and

- (iii) remain in continual, direct, verbal communication with the remote pilot without the use of any device; and
- (iv) do the following:
 - (A) advise the remote pilot if the RPA is likely to become a hazard to any other aircraft, or any person or property; and
 - (B) direct the remote pilot on the action required to ensure that the RPA does not become a hazard to another aircraft, person or property; and
 - (C) immediately direct the safe termination of the operation if:
 - (I) the exact location of the RPA is lost to the relevant observer's direct sight or knowledge; or
 - (II) the RPA becomes a hazard to another aircraft, person or property and termination of the operation is the only safe course of action.

Note 1 A flight may be ended by means of controlled flight into terrain, if this is possible without creating a hazard to other aircraft, people or property, and all other options are exhausted.

Note 2 An EVLOS operation extends the distance of operation of an RPA. However, by virtue of the definition, the remote pilot, while operating the RPA using FPV, cannot be the observer for an EVLOS class 1 operation.

EVLOS operation class 2 means an RPA operation that is beyond VLOS in which:

- (a) at least 1 trained visual observer class 2 (the *observer*) is used; and
- (b) the RPA, and the ground beneath and the airspace surrounding the RPA, is:
 - (i) located within VLOS for each relevant observer throughout the operation; or
 - (ii) beyond VLOS but with the relevant observer knowing the exact location of the RPA; and
- (c) the observer is in a different location from the remote pilot; and
- (d) an FPV system may be used, but not as a substitute for any observer; and
- (e) the observer's duty is to:
 - (i) either:
 - (A) keep the RPA constantly within VLOS; or
 - (B) know the exact location of the RPA; and
 - (ii) maintain constant situational awareness of the air space surrounding, and the ground below, the RPA operation; and
 - (iii) remain in continual direct, verbal communication with the remote pilot using a radio or telephone communication system; and
 - (iv) do the following:
 - (A) advise the remote pilot if the RPA is likely to become a hazard to any other aircraft, or any person or property; and
 - (B) direct the remote pilot on the action required to ensure that the RPA operation does not become a hazard to another aircraft, person or property; and
 - (C) immediately direct the safe termination of the operation if:
 - (I) the exact location of the RPA is lost to the relevant observer's direct sight or knowledge; or
 - (II) the RPA becomes a hazard to another aircraft, person or property and termination of the operation is the only safe course of action.

Note 1 A flight may be ended by means of controlled flight into terrain, if this is possible without creating a hazard to other aircraft, people or property, and all other options are exhausted.

Note 2 An EVLOS operation extends the distance of operation of an RPA. By virtue of the definition, the remote pilot may be the initial EVLOS class 2 observer provided that he or she is not simultaneously using an FPV system.

EVLOS operation means:

- (a) an EVLOS operation class 1; or
- (b) an EVLOS operation class 2.

first person view system is a system that:

- (a) uses a camera on an RPA to produce a video display of the flight as it would be seen if a pilot were notionally on board the RPA, in order to assist the remote pilot to navigate, orient, and avoid obstacles to, the RPA; and
- (b) is sufficiently powerful, sensitive and robust to remain effective for the duration of the EVLOS operation; and
- (c) is approved by CASA for the EVLOS operation.

Note Use of an FPV may assist a remote pilot but its use cannot transform the remote pilot into an observer for an EVLOS operation. A remote pilot cannot simultaneously use an FPV and be an observer.

FPV system is short for first person view system.

observer means:

- (a) a trained visual observer class 1; or
- (b) a trained visual observer class 2.

trained visual observer class 1 means a person who has been:

- (a) trained by an RPA operator, in accordance with the requirements in its documented practices and procedures, to observe and communicate about an RPA in an EVLOS operation class 1; and
- (b) certified by the RPA operator to have successfully completed the training in accordance with the documented practices and procedures.

trained visual observer class 2 means a person who has been:

- (a) trained by an RPA operator, in accordance with the requirements in its documented practices and procedures, to observe, and communicate about, an RPA in an EVLOS operation class 1 or class 2; and
- (b) certified by the RPA operator to have successfully completed the training in accordance with the documented practices and procedures.

VLOS is short for visual line of sight.

5.05 Documented practices and procedures for EVLOS operations

For an EVLOS operation approval, an RPA operator must have documented practices and procedures containing the following:

- (a) for each matter, activity or requirement mentioned in this Chapter — procedures and requirements that comply with this Chapter; and
- (b) the operator's statement to its remote pilots and observers that the procedures and requirements for relevant operations must be complied with.

Note See also the definition of **documented practices and procedures** in subsection 1.03 (2) which requires documented practices and procedures to be approved by CASA.

5.06 Remote pilots for EVLOS operations

- (1) Before conducting an EVLOS operation, the remote pilot:
 - (a) must have completed at least 5 hours of flight time (in addition to the 5 hours experience required under paragraph 101.295 (2) (c) of CASR), operating, in VLOS operations, an RPA of the same type as the RPA that is to be used in the EVLOS operation; and
 - (b) must have been trained and certified by the RPA operator, in accordance with its documented practices and procedures, as competent to carry out the particular EVLOS operation; and
 - (c) must have successfully completed a proficiency check that was:
 - (i) conducted by:
 - (A) the chief remote pilot of the RPA operator; or
 - (B) a person certified as an RPA operator to conduct an RPL training course which includes a proficiency check for the purpose of this section; and
 - (ii) undertaken not more than 12 months before the EVLOS operation; and
 - (iii) carried out in accordance with the relevant RPA operator's documented practices and procedures for proficiency checks under this section.

Note Under subregulation 101.300 (4), a RePL is subject to the condition that an RPA must be operated within VLOS unless the licence holder has met certain requirements set out in that subregulation.

5.07 Observers for EVLOS operations

- (1) An EVLOS operation class 1 may only be conducted using a trained visual observer class 1 or class 2, certified by the RPA operator as competent to carry out the particular EVLOS operation in accordance with the documented practices and procedures.
- (2) An EVLOS operation class 2 may only be conducted using a trained visual observer class 2, certified by the RPA operator as competent to carry out the particular EVLOS operation in accordance with the documented practices and procedures.
- (3) An observer for subsection (1) or (2) must have no duties during the operation of an RPA, other than those mentioned in paragraph (e) of the definition of EVLOS operation class 1 or EVLOS operation class 2, as the case requires.
- (4) An observer for subsection (1) or (2) must not be required to observe more than 1 RPA for more than 1 remote pilot in any EVLOS operation unless the operation is
 - (a) approved in writing by CASA; and
 - (b) operated in accordance with any conditions of the approval.
- (5) An observer for subsection (1) or (2) may use a device, for example, binoculars or a telescope, to assist in carrying out his or her duties, but must not use the device as the primary means of keeping the surrounding airspace and ground in sight.
- (6) For subsection (4), the duties mentioned in paragraph (e) of the definition of EVLOS operation class 1 or EVLOS operation class 2 are to be read as also referring to more than 1 RPA or more than 1 remote pilot, as the case requires.

5.08 Handover procedures between an observer and a remote pilot for EVLOS operations

- (1) Control of an RPA must not be transferred (*handed over*) from the remote pilot (the *handing over remote pilot*) to another person (the *new remote pilot*) unless:

- (a) the other person is also a remote pilot who complies with section 5.06; and
 - (b) the handover is in accordance with the RPA operator's documented practices and procedures.
- (2) After a handover occurs, the new remote pilot is:
- (a) the remote pilot of the RPA; and
 - (b) responsible and accountable for ensuring that the EVLOS operation complies with all requirements of the relevant civil aviation legislation as if the operation were first commencing from the time, date and location at which the new remote pilot assumes control of the RPA.

5.09 Pre-flight briefing for an EVLOS operation

The RPA operator must ensure that each remote pilot and each observer who is to be involved in an EVLOS operation is briefed, before the operation commences, on the emergency and collision avoidance procedures relevant to the operation.

5.10 Radio and telephone communications in an EVLOS operation class 2

For an EVLOS operation class 2, the radio or telephone communication system (the *primary communication system*) used by the remote pilot and each observer must be supported by an alternative or backup radio or telephone communication system (the *secondary communication system*) that is immediately activated if the primary communication system fails.

Note If a mobile telephone is the primary communication system which fails, a second mobile telephone is **not** a secondary communication system.

5.11 Orientation, height and lateral distance of an RPA in an EVLOS operation

- (1) In an EVLOS operation, an RPA must not be flown at a distance from the remote pilot that is more than 80% of:
 - (a) the manufacturer's control link performance figure for flight below 500 ft, in the prevailing atmospheric conditions and applicable terrain of the operation; or
 - (b) another demonstrable control link performance figure that is approved in writing by CASA.
- (2) If subsection (1) does not apply, in an EVLOS operation an RPA with a return-to-home (*RTH*) function must not be flown at a distance from the remote pilot that is more than 80% of the distance between:
 - (a) the remote pilot; and
 - (b) the point recommended by the manufacturer of the RTH function as the maximum distance at which the RTH function will operate in the event of a lost control link;

provided that the RPA operator has first tested the serviceability of the RTH function at the maximum VLOS distance for the RPA in flight towards an observer.
- (3) In an EVLOS operation:
 - (a) the RPA must not be flown at a distance that is more than 1 500 m from the relevant observer whose duty it is to keep the RPA constantly within VLOS or to know the exact location of the RPA (the *relevant observer*); and
 - (b) the location, orientation and height of the RPA must be known to the relevant observer and the remote pilot at all stages of the operation; and

- (c) any part of which is conducted within 3 NM of the movement area of an aerodrome, including an aerodrome that is a HLS — the height of the RPA must be referenced to the aerodrome or HLS elevation as published in the AIP from time to time.

Note The on-line AIP may be freely accessed through the AA website at: <https://www.airservicesaustralia.com/aip/aip.asp>.

5.12 Weather and visibility conditions for an EVLOS operation

- (1) An RPA may only be flown in an EVLOS operation:
 - (a) if the remote pilot, and any observer, each has visual acuity (including when corrected) that complies with the private motor vehicle licensing visual acuity standards (as in force from time to time) of the State or Territory in which the operation takes place; and
 - (b) in conditions with a visibility minimum of 5 000 m.

Note The motor vehicle licensing visual acuity standards of the States and Territories, as in force from time to time, are available for free on the websites of the relevant State or Territory government departments responsible for motor vehicle licensing.

- (2) If, during an operation, visibility falls below 5 000 m, the EVLOS operation must be terminated and the RPA landed, as soon as safely possible.

5.13 Controlled airspace and EVLOS operations

An approval of an EVLOS operation conducted in controlled airspace applies only if the operation is conducted in accordance with:

- (a) the requirements of this MOS for regulations 101.070, 101.072 and 101.075 of CASR; and
- (b) any other conditions in any approval from CASA or the air traffic control service for the aerodrome for operations in the relevant controlled airspace.

Note See also Chapter 4.

5.14 Night EVLOS operations

For an approval of an EVLOS operation to be conducted at night the RPA operator must:

- (a) be approved for night RPA operations under instrument CASA 01/17, or any replacement instrument in force from time to time unless the replacement instrument expressly applies otherwise; and
- (b) satisfy CASA that he or she can and will comply with the conditions of the instrument.

Note Chapter 6 of this MOS is reserved for more general requirements relating to night operations.

5.15 If manned aircraft are active in the airspace

- (1) If, during an RPA operation, a manned aircraft is:
 - (a) flying in the relevant airspace of the operation (the *relevant airspace*); or
 - (b) likely to be flying in the relevant airspace;then, the remote pilot must ensure that the RPA operation does not become a hazard to the manned aircraft, by using the relevant aeronautical VHF channel for:
 - (c) regular broadcasts; or
 - (d) direct radio communication with the pilot of the manned aircraft.

(2) Without affecting subsection (1), a remote pilot must take reasonable steps to make and keep in direct radio communication with the pilot of a manned aircraft while he or she is in relevant airspace.

(3) In this section:

relevant airspace means any point of non-controlled airspace into which the manned aircraft is flying at a particular time that is both less than 3 NM in distance and less than 1 500 ft in height from any point of the airspace in which the RPA is flying at the same time.

5.16 Procedures for loss of control of an RPA in an EVLOS operation

(1) For an RPA in an EVLOS operation, the RPA operator's documented practices and procedures must have procedures for the remote pilot to resolve a loss of control over the RPA.

(2) For subsection (1), the procedures must be such as to ensure that the remote pilot can:

(a) re-establish control over the RPA; or

(b) end the flight without creating an unreasonable hazard to another aircraft, or to people or property.

Note A flight may be ended by means of controlled flight into terrain, if this is possible without creating a hazard to other aircraft, people or property, and all other options for the continuation of safe, observed, flight are exhausted.

5.17 Procedures for loss of radio and telephone communications in an EVLOS operation class 2

(1) For an RPA in an EVLOS operation class 2, the RPA operator's documented practices and procedures must have procedures for the remote pilot to resolve:

(a) any radio or telephone communication system failure relating to the observation of the RPA; or

(b) any breakdown in communication procedures relating to the observation of the RPA; or

(c) any loss of situational awareness by the relevant observer of the RPA for any reason.

(2) For subsection (1), the procedures must be such as to ensure that the remote pilot must:

(a) for a loss of communications with an observer — immediately use the secondary communication system; or

(b) for a loss of situational awareness by the relevant observer — immediately implement the RPA operator's procedures for loss of situational awareness by an observer to return the RPA to VLOS or EVLOS; or

(c) end the flight without creating an unreasonable hazard to another aircraft, or to people or property.

Note A flight may be ended by means of controlled flight into terrain, if this is possible without creating a hazard to other aircraft, people or property, and all other options for the continuation of safe flight are exhausted.

5.18 Conflict between the requirements of this Chapter and the documented practices and procedures

(1) An RPA operator must ensure that there is no conflict or inconsistency between the requirements of this Chapter and the documented practices and procedures.

- (2) If there is any conflict or inconsistency:
- (a) the requirements of this Chapter must prevail; and
 - (b) the documented practices and procedures must be immediately revised and corrected.

Note See also the definition of *documented practices and procedures* in subsection 1.03 (2) which requires documented practices and procedures to be approved by CASA.

CONSULTATION DRAFT

CHAPTER 6 OPERATIONS AT NIGHT

Division 6.1 RPA

6.01 Requirements for an approval to operate an RPA at night

For subregulation 101.095 (1A) of CASR, this Division prescribes the requirements for the grant of an approval under regulation 101.029 (2) (b) of CASR, for a person to operate an RPA at night.

Note 1 Night operations are otherwise limited by paragraph 101.095 (1) (b) of CASR, and other provisions of this MOS — see, for example, section 5.14.

Note 2 Pending development of standards for inclusion in the MOS, night RPA operations may only be conducted if they are approved under instrument CASA 01/17, or any replacement instrument in force from time to time unless the replacement instrument expressly applies otherwise.

RESERVED

CONSULTATION DRAFT

CONSULTATION DRAFT

CHAPTER 8 OPERATIONS OF RPA GENERALLY — NEAR PEOPLE

Division 8.1 Operations near people

8.01 Requirements for an approval to operate an RPA with 15 m of a person

For subregulation 101.245 (5) of CASR, this Division prescribes the requirements for the grant of an approval under regulation 101.029 (2) (b) of CASR, for an RPA operator to safely operate a very small or a small RPA within 15 m of a person who is not directly associated with the operation of the RPA.

RESERVED

CONSULTATION DRAFT

CHAPTER 9 OPERATIONS OF RPA IN PRESCRIBED AREAS

Division 9.1 RPAS operations at or near non-controlled aerodromes

9.01 Prescribed areas and requirements

- (1) Without affecting Division 9.2, for subregulation 101.247 (1) of CASR, this Division prescribes the requirements relating to the operation of an RPA in a prescribed area.
- (2) For subsection (1), the no-fly zone of a non-controlled aerodrome is a prescribed area for this Division.
- (3) For this Division:
no-fly zone of a non-controlled aerodrome means the areas and airspace referred to in section 9.03.

9.02 Approval to operate an RPA in a prescribed area

- (1) Subject to the requirements in subsection (2), a person is approved to operate an RPA in the no-fly zone of a non-controlled aerodrome, including a non-controlled aerodrome that is a HLS.
- (2) For subsection (1), the requirements are that the RPA must:
 - (a) be operated exclusively inside a building whose structure at the time of the operation makes it impossible for the RPA to escape and fly away; or
 - (b) be:
 - (i) tethered to the ground, on a lead that is no longer than 150 ft (45 m), in such a way that is impossible for it to escape and fly away during normal, abnormal or emergency operations; and
 - (ii) at least 500 m from the movement area of the non-controlled aerodrome.

9.03 No-fly zone — non-controlled aerodromes

- (1) For subsection 9.01 (3), the no-fly zone of a non-controlled aerodrome, including a non-controlled aerodrome that is a HLS, is any airspace that is within 3 NM of the movement area of the aerodrome (the *relevant airspace*) at any time when a *relevant event* is occurring.
- (2) For subsection (1):
relevant event occurs when a manned aircraft is within the relevant airspace, including when the aircraft is in the course of approaching, landing at, taking off from, or manoeuvring on the movement area of, the aerodrome.
- (3) Except when an RPA is tethered in accordance with subsection 9.02 (2), if a person who is flying an RPA within relevant airspace becomes aware that a relevant event is occurring, or is about to occur, the person must:
 - (a) if the RPA is airborne:
 - (i) act immediately to ensure that the RPA is safely manoeuvred away from the path of the manned aircraft; and
 - (ii) land the RPA as soon as safely possible; or
 - (c) if the RPA is on the ground, on water, or on any object or structure on the ground or water — not launch the unmanned aircraft.
- (4) For subsection (3), awareness that a relevant event is occurring, or is about to occur, is taken to be present where a reasonable person would have been aware that the relevant event was occurring, or was about to occur.

CONSULTATION DRAFT

CHAPTER 9 OPERATIONS OF RPA IN PRESCRIBED AREAS

Division 9.2 No-fly zones in certain non-controlled airspace

9.04 Prescribed areas and requirements

- (1) For subregulation 101.247 (1) of CASR, this Division prescribes the requirements relating to the operation of an RPA in a prescribed area.
- (2) For subsection (1), the no-fly zone of non-controlled airspace described in subsection (3) is a prescribed area for this Division.
- (3) If:
 - (a) controlled airspace overlies non-controlled airspace (the *overlying controlled airspace*); and
 - (b) the lower limit of the overlying controlled airspace is less than 500 ft AGL; then, the airspace that is within 100 ft of the lower limit of the overlying controlled airspace is the *no-fly zone of non-controlled airspace*.

9.05 Approval to operate an RPA in a prescribed area

A person must not operate an RPA in a no-fly zone of non-controlled airspace unless CASA has authorised the operation in writing for this Division.

CHAPTER 10 RECORD KEEPING FOR CERTAIN RPA

Division 10.1 Preliminary

10.01 Definitions for the Chapter

In this Chapter:

configuration of an RPA mentioned in this Chapter is comprised of the particular RPA's airframe, engines and motors, and all of the flight control system hardware for the RPA.

Note The configuration of an RPA for its **unique identification mark** does not include propellers, rotors or batteries.

unique identification mark, for an RPAS for an RPA mentioned in this Chapter, is the number (and letters, if any) that the RPA operator or other operator, as the case may be, ascribes to each configuration of the RPA that he or she operates.

CONSULTATION DRAFT

Division 10.2 Record keeping requirements — RPA other than excluded RPA

10.02 Purpose

For paragraph 101.272 (1) (a) of CASR, this Division prescribes record keeping requirements for an RPA operator of an RPA other than an excluded RPA.

Note For an RPA operator, see also regulation 101.335.

10.03 Chief remote pilot records

- (1) An RPA operator must ensure that its chief remote pilot keeps the following records:
 - (a) records which reasonably demonstrate that the chief remote pilot is regularly and consistently performing his or her functions and duties mentioned in paragraphs 101.342 (a), (b), (c) and (d) of CASR (*chief remote pilot's duties records*);

Note Regulation 101.342 of CASR refers to the chief remote pilot: (a) ensuring the operator's RPA operations are conducted in accordance with the civil aviation legislation; (b) maintaining a record of the qualifications held by each person operating an RPA for the operator; (c) monitoring the operational standards and proficiency of each person operating RPA for the operator; and (d) maintaining a complete and up-to-date reference library of certain relevant operational documents.

- (b) the following *RPAS operational record* in relation to an RPA operation:
 - (i) if a job safety assessment is carried out in relation to the operation — a copy of the assessment;
 - (ii) if a risk management plan is produced for the operation — a copy of the plan;
 - (iii) if an operational flight plan is issued for the operation — a copy of the plan;
 - (iv) a copy of the any NAIPS, NOTAM, or AIS briefing, document produced for the operation;
 - (v) if the operation involves the carriage of cargo or payloads requiring special or unusual handling — a description of:
 - (A) the cargo or payloads and
 - (B) the requirements for special or unusual handling of the cargo or payload;
- (c) if the RPA operator is a RePL training organisation — a record of the training course delivered (*RePL training course records*), including the following:
 - (i) the full name of each individual who attended the training course;
 - (ii) the dates on which the training course was conducted;
 - (iii) the RePL training units covered in the training course;
 - (iv) the outcome of the course for each individual attending it;
 - (v) the chief remote pilot's certification that the RePL training course, and RePL training units covered, complied with this MOS.
- (d) if the RPA operator is not a RePL training organisation and conducts training that is not a RePL training course — a record of the training delivered and its outcome, including the following:
 - (i) the full name of each individual who attended the training;
 - (ii) the dates on which the training was conducted;
 - (iii) the nature and outcome of the training covered.

- (2) The RPA operator must keep the following records for the period stated for the record:
 - (a) chief remote pilot's duties records — for at least 7 years after the day the record is made;
 - (b) RPA operational record — for at least 7 years after the day the operation ends;
 - (c) RePL training course records — for at least 7 years after the day the course ends.

10.04 RPAS operational release

- (1) Before commencing an RPA operation, the RPA operator must make and keep a record of the following information (an ***RPAS operational release***) for the operation:
 - (a) the nature and purpose of the operation;
 - (b) information identifying the relevant RPA, including the type, model, and unique identification mark ;
 - (c) the remote pilot station for the operation;
 - (d) the dates and times of the operation;
 - (e) the places from which the RPA is to be:
 - (i) launched for the operation; and
 - (ii) landed and recovered at the end of the operation;
 - (f) the full name and ARN of:
 - (i) the pilot in command; and
 - (ii) each other remote pilot involved in the operation (if any);
 - (g) if an individual who is not the remote pilot for the operation is assigned a duty in relation to the operation — the individual's full name and the duties assigned to the individual;
 - (h) whether the RPA is to be operated within VLOS, or within EVLOS, or beyond VLOS during the operation;
 - (i) whether or not CASA has issued any instrument of approval, authorisation, direction, instruction, permission or exemption (however described) for the operation, and the full details of the instrument;

Note The requirement to record full details of the instrument is met by including a copy of the instrument with the record.
 - (j) certification:
 - (i) by the RPA's maintenance controller (if any); or
 - (ii) by a person within the meaning of subparagraph 101.340 (1) (c) (ii) of CASR;

that the RPA for the operation is serviceable for the purpose of the operation.

Note The requirement to record full details of the certification is met by including a copy of the certification with the record or identifying the relevant certification and its location.
- (2) An RPA operation must not commence until a copy of the approved RPA operational release has been provided to the remote pilot of the RPA.
- (3) The RPA operator must keep the RPA operational release for at least 7 years after the day the operation ends.
- (4) For subsection (2), ***approved RPA operational release*** means the RPA operational release approved in writing by the RPA operator or the chief remote pilot.

10.05 RPAS operational log

- (1) The RPA operator must ensure that the remote pilot in command of an RPA flight maintains an operational record (the *RPAS operational log*) in which the following is recorded as soon as practicable after the pilot ceases to operate the RPA:
 - (a) the nature and purpose of the operation;
 - (b) information identifying the RPA, including the type, model and unique identification mark ;
 - (d) the remote pilot station for the operation;
 - (e) the dates and times of the operation;
 - (f) the places, identified by specific location or global Cartesian coordinates, from which the RPA was:
 - (i) launched for the operation; and
 - (ii) landed and recovered at the end of the operation;
 - (g) the name and ARN of the remote pilot in command;
 - (h) the names, roles, and ARNs if applicable, of other crew members responsible for the safe operation of the RPA for the operation.
 - (i) whether the RPA was operated within VLOS, within EVLOS 1, EVLOS 2 or beyond VLOS during the operation;
 - (j) if the RPA was operated beyond VLOS — the route flown, including the turning points, identified by specific location or global Cartesian coordinates;
 - (k) whether the RPA was flown above 400 ft for any part of the operation, and the relevant flight segments;
 - (l) whether the RPA was serviceable after the final flight of the day, and the nature of any unserviceability.
 - (m) where the RPAS operational log is not part of the RPAS operational record and the RPAS operational release — appropriate references to identify the RPAS operational record and the RPAS operational release.

Note The RPAS operational record under paragraph 10.02 (1) (b), the RPAS operational release under subsection 10.03 (1), and the RPAS operational log under subsection 10.04 (1), may all be kept in a single document.

- (2) The RPA operator must ensure that the remote pilot operational log for an RPA operation is kept until the day that is at least 7 years after the last time the RPA is operated by the operator.

10.06 Remote pilot log — for flight time

- (1) The RPA operator must ensure that each of the operator's remote pilots keeps a remote pilot log to record his or her accumulated flight time operating RPA.
- (2) The remote pilot log must also record the following for the remote pilot:
 - (a) information identifying each RPAS operation, including the type, model and unique identification mark of each RPA that is flown by the pilot;
 - (b) the date, location and duration of each RPA flight;
 - (c) separate accumulated flight times for operations that are:
 - (i) at night; or
 - (ii) within VLOS; or
 - (iii) within EVLOS; or
 - (iv) beyond VLOS;

(d) accumulated flight time in simulated operation of RPAS, including details of the type of RPAS operations simulated.

(3) The RPA operator must ensure that the remote pilot log for an RPA operation is kept until the day that is at least 7 years after the last time the RPA is operated by the operator.

10.07 RPAS technical log

(1) The RPA operator must ensure that 1 of the following:

(a) the operator's maintenance controller (if any); or

(b) a person within the meaning of subparagraph 101.340 (1) (c) (ii) of CASR; keeps a record (the *RPAS technical log*) of the following information in relation to the maintenance of the RPAS:

(c) information identifying the RPAS, including:

(i) the type, model and unique identification mark of the RPA; and

(ii) the unique identification mark of the RPA in any previous configuration (if applicable);

(d) the following information relating to the continuing airworthiness of the RPAS:

(i) the total flight time the RPA has been operated;

(ii) where applicable to the airworthiness of the RPA — individual in-service times for engines, motors, rotors and propellers;

(iii) the maximum gross weight of the RPA;

(iv) the minimum gross weight or payload required for the RPA to operate (if applicable);

(v) the maintenance schedule for the RPAS;

(vi) the maintenance carried out on the RPA in accordance with the operator's documented practices and procedures;

(vii) the date or operational time for the next maintenance action;

(viii) the results of any rectification of defective equipment essential to the safety of the RPAS operation;

(ix) if a defect or abnormality of the RPAS affects the operation of the RPA — a description of the defect or abnormality and an explanation of how it affects the operation of the RPA;

(x) if fail safe equipment that is fitted to the RPA is unserviceable:

(A) a description of each piece of such equipment; and

(B) an explanation for its unserviceability; and

(C) the precautions required, or limitations imposed, when operating the RPA with the unserviceable fail-safe equipment;

(xi) certification by the person mentioned in paragraph (1) (a) or (1) (b) (as the case requires) that all maintenance required for the RPAS to be serviceable for operations has been completed;

Note A requirement to record a certification is met by including a copy of the certificate with the record.

(2) The RPA operator must keep the RPA technical log until the day that is at least 7 years after the last time the RPA is operated by the operator.

- (3) Within the period of 7 years after the last time the RPA is operated by the RPA operator, he or she must, as soon as practicable, provide a copy of the RPA technical log to CASA upon written request.
- (4) Within the period of 7 years after the last time the RPA is operated by the RPA operator, he or she must, as soon as practicable, provide a copy of the RPA technical log to a person who:
 - (a) makes a written request for the log; and
 - (b) provides reasonable evidence that he or she is the new operator of the RPA; and
 - (c) provides payment for preparation and provision of the log, based on a reasonable cost recovery for such preparation and provision.

Note The complete technical history of an RPAS is of vital importance to the safety of future RPA operations by the new RPA operator.

10.08 Records of qualification and competency

- (1) This section applies if a person (the *candidate*):
 - (a) is employed by an RPA operator; and
 - (b) performs duties other than those of the remote pilot, in relation to the safety of RPA operations; and
 - (c) obtains a qualification or a competency in relation to the safe operation of an RPA.
- (2) The RPA operator must:
 - (a) make a record (*the record*) of the person obtaining the qualification or competency; and
 - (b) provide a copy of the record to the person before the person exercises any privileges attributable to the qualification or competency; and
 - (d) keep the record for at least 7 years after day the person ceases to be employed by the operator.

Note Observers, ground handlers and loading staff who have a direct role in ensuring the safety of RPA operations are examples of persons for whom this section would apply.

CHAPTER 10 RECORD KEEPING AND GIVING INFORMATION TO CASA

Division 10.3 Record keeping requirements — excluded RPA

10.09 Purpose

For paragraph 101.272 (1) (a) of CASR, this Division prescribes record keeping requirements for an operator of a medium RPA that is an excluded RPA for subregulation 101.237 (7) of CASR (the *applicable RPA*).

Note For an RPA operator, see also regulation 101.335.

10.10 RPAS operational log

- (1) The operator must ensure that the remote pilot in command of the applicable RPA flight maintains an operational record (the *RPAS operational log*) in which the following is recorded as soon as practicable after the pilot ceases to operate the RPA:
 - (a) the nature and purpose of the operation;
 - (b) the specific location of the operation;
 - (c) information identifying the RPA, including the type, model and unique identification mark;
 - (d) the remote pilot station for the operation;
 - (e) the dates and times of the operation;
 - (f) the name and ARN of the remote pilot in command;
 - (g) whether the RPA was serviceable after the final flight of the day, and the nature of any unserviceability.
- (2) The operator must ensure that the remote pilot operational log for the applicable RPA operation is kept until the day that is at least 3 years after the last time the RPA is operated by the operator.

10.11 Remote pilot log — for flight time

- (1) The operator must ensure that each of the operator's remote pilots flying an applicable RPA keeps a remote pilot log to record his or her accumulated flight time operating excluded RPA.
- (2) The remote pilot log must also record the following for the remote pilot:
 - (a) information identifying each RPAS operation, including the type, model and unique identification mark of each RPA that is flown by the pilot;
 - (b) the date, location and duration of each RPA flight;

Note: A remote pilot who flies for the operator of an excluded RPA and also for a certified RPA operator may record the information in the same log/record provided that the different types of operators are identified.
- (3) The operator of the applicable RPA must ensure that the remote pilot log for an RPA operation is kept until the day that is at least 3 years after the last time the RPA is operated by the operator.

10.12 RPAS technical log

- (1) The operator must keep a record (the *RPA technical log*) of the following information in relation to the operation and maintenance of the RPAS for the applicable RPA:
 - (a) information identifying the RPAS, including:

- (i) the type, model and unique identification mark of the RPA; and
 - (ii) the unique identification mark of the RPA in any previous configuration (if applicable);
- (b) the following information relating to the continuing airworthiness of the RPAS:
- (i) the total flight time the RPA has been operated;
 - (ii) where applicable to the airworthiness of the RPA — individual in-service times for engines, motors, rotors and propellers;
 - (iii) the maintenance schedule for the RPAS;
 - (iv) the date or operational time for the next maintenance action;
 - (v) any maintenance carried out on the RPA;
 - (vi) the results of any rectification of defective equipment essential to the safety of the RPAS operation;
 - (vii) certification by the operator that all maintenance required for the RPAS to be serviceable for operations has been completed;
 - (viii) any other unrectified equipment unserviceabilities of the RPAS.

Note A requirement to record a certification is met by including a copy of the certificate with the record.

- (2) The operator of the RPA must keep the RPA technical log until the day that is at least 7 years after the last time the RPA is operated by the operator.
- (3) Within the period of 7 years after the last time the RPA is operated by the RPA operator, he or she must, as soon as practicable, provide a copy of the RPA technical log to CASA upon written request.
- (4) Within the period of 7 years after the last time the RPA is operated by the RPA operator, he or she must, as soon as practicable, provide a copy of the RPA technical log to a person who:
- (a) makes a written request for the log; and
 - (b) provides reasonable evidence that he or she is the new operator of the RPA; and
 - (c) provides payment for preparation and provision of the log, based on a reasonable cost recovery for such preparation and provision.

Note The complete technical history of an RPAS is of vital importance to the safety of future RPA operations by the new RPA operator.

Division 10.4 Requirements for giving information to CASA

10.13 Purpose

For paragraph 101.272 (1) (b) of CASR, this Division prescribes requirements for a person who operates, or proposes to operate, an RPA (the **RPA operator**) to give information to CASA.

10.14 Particular small and medium excluded RPA — information about operation

- (1) This section applies to a person if:
 - (a) the person operates any of the following (a **relevant RPA**):
 - (i) a small RPA that is an excluded RPA for subregulation 101.237 (4) of CASR;
 - (ii) a medium RPA that is an excluded RPA for subregulation 101.237 (7) of CASR.
 - (2) At least 5 days before the first operation of the relevant RPA, the person must give CASA the information mentioned in subsection (3) unless he or she has previously given CASA the same information for the same or a different RPA.

Note A person who has notified CASA under subsection 10.09 (2) is not required to notify CASA again before the first operation of a different RPA. For the different RPA, subsection 10.09 (4) applies.
 - (3) For subsection (2), the person must:
 - (a) give CASA the following information:
 - (i) if the person is an individual — the person's full name;
 - (ii) if the person has an operating or trading name — the operating or trading name;
 - (iii) the person's street, postal and email addresses;
 - (iv) whether the RPA is:
 - (A) a small RPA that is an excluded RPA for subregulation 101.237 (4) of CASR; or
 - (B) a medium RPA that is an excluded RPA for subregulation 101.237 (7) of CASR; and
 - (v) each street address of the land or locality over which the RPA will be operated;

Note A locality is a geographical area name that is in common usage to describe the area, for example, the name of a State or Territory, the name of a local government area, the name of a city or metropolitan suburb or collection of suburbs.
 - (vi) the nature and purpose of operating the RPA;
 - (vii) the full name and ARN of each person who flies the RPA for the operation; and
 - (b) give CASA a written statement, in the form and manner approved by CASA, declaring that the operator has read and is familiar with *AC 101-10, Remotely piloted aircraft systems — operation of excluded RPA*, as existing at the time of making the particular statement.
 - (4) If:
 - (a) the person has given CASA the information mentioned in paragraph (3) (a); and

(b) any of that information changes;

then the person must notify CASA in writing of the change not more than 21 days after the change.

- (5) For subsection (3), unless CASA agrees otherwise, the information must be given to CASA through the approved online notification system.

Note The online notification system may be freely accessed through www.casa.gov.au

- (6) To avoid doubt, subsection (2) does not apply to an RPA operator.

10.15 Particular small and medium excluded RPA — information required every 3 years

- (1) This section applies to a person who:

(a) has given CASA information in accordance with subsection 10.09 (2) (the *initial notification*); and

(b) continues to conduct RPA operations to which section 10.09 applies.

- (2) Subject to subsection (3), every 3 years after the date of initial notification (the *triennial due date*), the person must resubmit to CASA the information mentioned in paragraph 10.09 (3) (a), updated to the date of resubmission (the *updated information*).

- (3) For subsection (2), but subject to subsection (4), the updated information must be submitted to CASA not earlier than 1 month before, and not later than one month after, the biennial due date.

Note The effect of subsections (2) and (3) is that updated information must be correct as of the date of resubmission.

- (4) If, on a date (the *relevant date*) during a 3 year period mentioned in subsection (2):

(a) the person gives CASA some new information; and

(b) no other information already given to CASA has changed;

then, calculation of the next triennial due date is from the relevant date.

- (5) Subsections 10.14 (4) and (5) apply to the updated information in the same way as they apply to the information mentioned in paragraph 10.14 (3) (a)

10.16 Very small RPA for hire or reward — information required every 3 years

- (1) This section applies to a person who:

(a) has notified CASA under regulation 101.372 of CASR; and

(b) continues to operate, or conduct operations using, very small RPA for hire or reward.

- (2) Every 3 years after the date of initial notification (the *triennial due date*), the person must submit to CASA the following information updated to the date of submission (the *updated information*):

(a) if the person is an individual — a change to the person's full name;

(b) if the person has a trading name — a change to the person's trading name;

(c) a change to the person's street, postal or email addresses;

(d) a change to the kind of very small RPA the person operates, from that mentioned in the notice given under regulation 101.372 of CASR;

(e) a change to the place or places where the person intends to operate the very small RPA.

- (3) For subsection (2), but subject to subsection (4), the information must be submitted to CASA not earlier than 1 month before, and not later than one month after, the triennial due date.
- (4) If:
 - (a) the person has given CASA the information mentioned in subsection (2); and
 - (b) any of that information changes within the 3 year period mentioned in subsection (2);
 then, unless the person has previously notified CASA of the change under regulation 101.373 (1), the person must notify CASA in writing of the change not more than 21 days after the change.

Note Changes to certain notified information must be reported to CASA under regulation 101.373 (1): see section 11.01.
- (5) For subsections (2) and (4), unless CASA agrees otherwise, the information must be given to CASA through the approved online notification system.

Note The online notification system may be freely accessed through www.casa.gov.au
- (6) If, on a date (the *relevant date*) during a 3 year period mentioned in subsection (2):
 - (a) the person gives CASA some new information; and
 - (b) no other information already given to CASA has changed;
 then, the relevant date becomes the new triennial due date.
- (7) To avoid doubt, subsection (2) does not apply to an RPA operator.

10.17 Certified RPA operator — changes to information already given to CASA

- (1) This section applies to an RPA operator who is certified under regulation 101.335 of CASR to operate an RPA other than an excluded RPA.
- (2) The operator must inform CASA in writing of any change in the information given to CASA for the purposes of the operator's certification.
- (3) For subsection (2), the information includes changes to any of the following:
 - (a) if the operator is an individual — the person's name;
 - (b) if the operator has an operating or trading name — the operating or trading name;
 - (c) the operator's street, postal and email addresses;
 - (d) the identity of the chief remote pilot;
 - (e) the identity of:
 - (i) the maintenance controller (if any); or
 - (ii) the person within the meaning of subparagraph 101.340 (1) (c) (ii) of CASR;
 - (f) the kinds of RPA operated by the operator;
 - (g) the operator's documented practices and procedures.
- (4) The operator must give CASA the information mentioned in subsections (2) and (3) not later than 21 days after the day the change occurred.
- (5) For subsections (2), (3) and (4):
 - (a) CASA may approve in writing the form and the manner in which the information is to be given to CASA; and
 - (b) if paragraph (a) applies, the information must be given to CASA in accordance with the approval.

Note The effect of subsection (5) is that the relevant information must be given to CASA whether or not CASA has issued an approval; if CASA has issued an approval, the giving of the information must comply with the approval.

CONSULTATION DRAFT

CHAPTER 11 NOTIFICATION OF CHANGE TO OPERATE VERY SMALL RPA FOR HIRE OR REWARD

11.01 Change relating to operating very small RPA for hire or reward

For paragraph 101.373 (1) (b) of CASR, the following kinds of changes are prescribed for a person who has given notice in accordance with regulation 101.372 of CASR:

- (a) if the person is an individual — a change to the person's full name;
- (b) if the person has a trading name — a change to the person's trading name;
- (c) a change to the person's street, postal or email addresses;
- (d) a change to the kind of very small RPA the person operates, from that mentioned in the notice given under regulation 101.372 of CASR;
- (e) a change to the place or places where the person intends to operate the very small RPA.

Note The notice under regulation 101.372 of CASR is that the person intends to do either or both of the following: (a) operate very small RPA for hire or reward; (b) conduct operations using very small RPA for hire or reward.

11.02 Notice to CASA of operation of very small RPA including for hire or reward

For paragraph 101.028 (b) of CASR, the following form and manner of a notification for subregulation 101.372 (1) are approved:

- (a) the notification to CASA must be made through the CASA on-line notification system for very small RPA for hire or reward; and
- (b) the notification must contain the following information:
 - (i) if the person is an individual — the person's full name;
 - (ii) if the person has a trading name — the person's trading name;
 - (iii) the person's street, postal or email addresses;
 - (iv) a description of the kind of very small RPA the person operates;
 - (v) the place or places where the person intends to operate the very small RPA.

Note The notice under regulation 101.372 of CASR is to the effect that the person intends to do either or both of the following: (a) operate very small RPA for hire or reward; (b) conduct operations using very small RPA for hire or reward.

Schedule 1 Acronyms and abbreviations

Abbreviation	Meaning
AC	Advisory Circular
AGL	above ground level
AIP	aeronautical information package
ATC	air traffic control
AWIS	aerodrome weather information service
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
CTA	controlled airspace
EMI	electromagnetic interference
ERSA	En Route Supplement Australia
EVLOS	extended visual-line-of-sight
FPV	first person view
FT or ft	feet
g	gravitational force
GPS	global positioning system
HF	high frequency
K_v	motor velocity constant (RPM per volt)
m	metres
MF	medium frequency
MOS	manual of standards
NM	nautical miles
NOTAM	notice to airmen
PRD	prohibited/restricted/danger areas
RAIM	receiver autonomous integrity monitoring
RPA	remotely piloted aircraft
RPAS	remotely piloted aircraft system
RePL	remote pilot licence
RPM	revolutions per minute

Abbreviation	Meaning
RPS	remote pilot station
UHF	ultra-high frequency
UTC	universal time coordinate
V	volts
VHF	very high frequency
VLOS	visual line-of-sight

CONSULTATION DRAFT

Schedule 2 Directory for aeronautical knowledge standards for a RePL training course

Appendix 1 Aeronautical knowledge standards — Common Units

Unit code	Unit of knowledge
RBAK	Basic aviation knowledge for RPAS
RACP	Airspace, charts and aeronautical publications for RPAS
RBMO	Basic meteorology for RPAS operations
REES	Electrical and electronic systems for RPAS
RHPF	Human performance for RPAS
RKOP	RPAS knowledge — of operations and procedures
RORA	Operation rules and air law for RPAS
RAFM	Automated flight management systems for RPAS — knowledge

Appendix 2 Aeronautical knowledge standards — Aeroplane category

Unit code	Unit of knowledge
RBKA	RPA that is an aeroplane – aircraft knowledge and operation principles

Appendix 3 Aeronautical knowledge standards — Helicopter (multirotor class) category

Unit code	Unit of knowledge
RBKM	RPA that is a multirotor – aeronautical knowledge and operation principles

Appendix 4 Aeronautical knowledge standards — Helicopter (single rotor class) category

Unit code	Unit of knowledge
RBKH	RPA that is a helicopter – aeronautical knowledge and operation principles

Appendix 5 Aeronautical knowledge standards — powered-lift category

Unit code	Unit of knowledge
RBKP	RPA that is a powered-lift aircraft – aircraft knowledge and operation principles

Appendix 6 Aeronautical knowledge requirement — RPA with a liquid-fuel system

Unit code	Unit of knowledge
REFE	RPA with liquid-fuel system – knowledge

CONSULTATION DRAFT

Schedule 3 Directory for practical competency standards for a RePL training course

Appendix 1 Practical competency standards — Common units

Unit code	Unit of practical competency
GEL	General English language proficiency
RC1	Perform pre- and post-operation actions and procedures for RPAS
RC2	Energy management for RPAS
RC3	Manage crew, payload and bystanders for RPAS operation
RC4	Navigation and operations of RPAS
RNT	Non-technical skills for operation of RPAS
RAF	Automated flight management systems for RPAS — operation

Appendix 2 Practical competency standards — Aeroplane category

Unit code	Unit of practical competency
RA1	RPA that is an aeroplane – ground operation and launch
RA2	RPA that is an aeroplane – normal operation
RA3	RPA that is an aeroplane – land and recover
RA4	RPA that is an aeroplane – advanced manoeuvres
RA5	RPA that is an aeroplane – abnormal and emergency operations

Appendix 3 Practical competency standards — Helicopter (multirotor class) category

Unit code	Unit of competency
RM1	RPA that is a multirotor – control on ground, launch, hover and landing
RM2	RPA that is a multirotor – normal operations
RM3	RPA that is a multirotor – advanced manoeuvres
RM4	RPA that is a multirotor – abnormal situations and emergencies

Appendix 4 Practical competency standards — Helicopter (single rotor class) category

Unit code	Unit of competency
RH1	RPA that is a helicopter – control on ground
RH2	RPA that is a helicopter – launch, hover and landing
RH3	RPA that is a helicopter – normal operation
RH4	RPA that is a helicopter – advanced manoeuvres
RH5	RPA that is a helicopter – abnormal situations and emergencies

Appendix 5 Practical competency standards — powered-lift category

Unit code	Unit of competency
RP1	RPA that is a powered-lift category aircraft – control on ground, launch, hover and landing
RP2	RPA that is a powered-lift category aircraft – transition to and from vertical flight
RP3	RPA that is a powered-lift category aircraft – climb, cruise & descent
RP4	RPA that is a powered-lift category aircraft – advanced manoeuvres
RP5	RPA that is a powered-lift category aircraft – manage abnormal situations at altitude and near the ground

Appendix 6 Practical competency standards — RPA with a liquid-fuel system

Unit code	Unit of competency
RLF	Medium or Large RPA with a liquid-fuel system – operation

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units

Unit 1 RBAK— Basic aviation knowledge for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Direction of flight and wind</i></p> <p>(a) expressing direction of flight: (i) as a 3 figure group; (ii) in the clock code;</p> <p>(b) difference between aircraft heading and track;</p> <p>(c) wind velocity;</p> <p>(d) the relationship between true and magnetic heading.</p>	A
2	<p><i>Time</i></p> <p>(a) time as a 4, 6 and 8 figure group;</p> <p>(b) UTC;</p> <p>(c) converting local and standard time to and from UTC.</p>	A
3	<p><i>Units of measurement for aeronautics</i></p> <p>(a) differences between height, altitude and elevation;</p> <p>(b) units of measurement for: (i) horizontal distance; (ii) vertical distance; (iii) speeds; (iv) visibility; (v) temperature; (vi) atmospheric pressure; (vii) weight;</p> <p>(c) converting between different units of measurement.</p>	A
4	<p><i>Energy</i></p> <p>Aircraft energy, including:</p> <p>(a) potential energy;</p> <p>(b) kinetic energy;</p> <p>(c) inertia</p>	A
5	<p><i>Aerodynamics, weight and balance</i></p> <p>(a) terminology: (i) aerofoil, angle of attack and relative airflow; (ii) centre of pressure and centre of gravity; (iii) lift, weight, thrust and drag;</p>	A

Item	Aeronautical knowledge topics	Priority
	(b) ‘Bernoulli’s principal’, ‘Coandra effect’ and ‘Newton’s third law’; (c) basic weight and balance principles; (i) empty weight; (ii) operating weight; (iii) maximum gross weight; (iv) arm, moment, datum, station and index unit; (v) centre of gravity limits; (vi) loading limits.	
6	<i>Lift and drag</i> (a) changes to lift and drag resulting from: (i) airspeed changes; (ii) angle of attack changes. (b) types of drag, including: (i) parasite (zero lift), form, interference and skin friction; (ii) induced (lift dependent).	A
		B
7	<i>Propellers and rotors</i> (a) terminology; (b) blade angle, helix angle or pitch; (c) propeller/rotor thrust and torque; (d) propeller/rotor principles.	B
8	<i>Principles of operation – flight control</i> (a) longitudinal, lateral and vertical axes; (b) pitch, roll and yaw; (c) skid and slip; (d) effect of changes in power on vertical and horizontal speed; (e) relationship between control inputs and aircraft movements; (f) angle of climb and rate of climb; (g) trim controls.	A
9	<i>Principles of operation – remote pilot station</i>	C

Item	Aeronautical knowledge topics	Priority
	Features of a remote pilot station: (a) transmitter; (b) command and control link; (c) flight controls; (d) other controls; (e) aerals; (f) software and geo-fencing; (g) telemetry; (h) non-payload communications; (i) power supply.	

CONSULTATION DRAFT

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units (contd.)

Unit 2 RACP — Airspace, charts and aeronautical publications for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Airspace</i></p> <ul style="list-style-type: none"> (a) classification of airspace; (b) airspace depiction on aeronautical charts, including: <ul style="list-style-type: none"> (i) flight information area; (ii) Class G airspace; (iii) controlled aerodromes; (iv) control area; (v) control zone; (vi) VFR route and lane of entry; (vii) prohibited areas; (viii) restricted areas; (ix) danger areas; (x) common traffic advisory frequencies and associated airspace; (xi) radio frequency boundaries; (c) airspace in relation to the circumstances in which an aeronautical radio qualification is required. 	A
2	<p><i>Obtaining information or approval</i></p> <ul style="list-style-type: none"> (a) permissions for RPA operations in restricted areas; (b) aeronautical information publications, including: <ul style="list-style-type: none"> (i) AIP; (ii) ERSA; (iii) NOTAM. 	A
3	<p><i>NOTAMs 1</i></p> <ul style="list-style-type: none"> (a) obtaining NOTAMs for operational areas; (b) decoding NOTAMs; 	A
	<p><i>NOTAMs 2</i></p> <ul style="list-style-type: none"> (a) submitting a NOTAM for publication. 	C

Item	Aeronautical knowledge topics	Priority
4	<p><i>Form of the earth, aeronautical charts and maps</i></p> <ul style="list-style-type: none"> (a) features on an aeronautical chart (other than airspace); (b) cardinal and ordinal points of the compass; (c) latitude and longitude; (d) depiction of height and elevation on charts; (e) distance on the earth and in charts; (f) magnetic variation; (g) relationship between magnetic heading, relative heading and magnetic bearing. 	A
	<p><i>Form of the earth, aeronautical charts and maps 2</i></p> <ul style="list-style-type: none"> (a) electronic maps and charts. 	C

CONSULTATION DRAFT

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units (contd.)

Unit 3 RBMO — Basic meteorology for RPA operations

Item	Aeronautical knowledge topics	Priority
1	<p><i>Weather phenomena</i></p> <p>(a) causes and effects of the following weather phenomena in relation to RPA operations:</p> <ul style="list-style-type: none">(i) thunderstorms;(ii) low cloud;(iii) poor visibility (fog, mist, dust, haze);(iv) turbulence;(v) extreme heat and cold;(vi) strong winds and windshear;(vii) rain and humidity;(viii) convection;(ix) precipitation static; <p>(b) the meaning of symbols used on weather maps.</p>	B
2	<p><i>Weather observations</i></p> <p>Indications of the presence of:</p> <ul style="list-style-type: none">(a) turbulence, thermals or dust devils; and(b) wind gradient and wind shear.	C
3	<p><i>Aeronautical forecasts</i></p> <ul style="list-style-type: none">(a) obtaining aeronautical forecasts for the area of operations;(b) decoding an aeronautical forecast.	B

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units (contd.)

Unit 4 REES — Electrical and electronic systems for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Electrical Terms</i></p> <p>(a) volts; (b) amps; (c) watts; (d) ohms; (e) hertz.</p>	B
2	<p><i>Function of electrical components</i></p> <p>(a) electrical components of an RPA: (i) electronic speed controller; (ii) battery eliminator circuit; (iii) receiver and remote receivers; (iv) telemetry module (v) flight batteries; (vi) receiver battery; (vii) circuit breakers and fuses; (viii) servomechanisms; (ix) antennas; (x) GPS receiver; (xi) altimeters (radio, radar, laser, acoustic); (xii) collision avoidance sensors; (b) equipment redundancy; (c) malfunctions and system back-ups; (d) consequences of a malfunction; (e) remedial actions in the event of failure.</p>	A
8	<p><i>Electric motors</i></p> <p>(a) current draw through the motor in relation to rotor or propeller diameter or pitch; (b) current draw through the motor in relation to rotor or propeller loads determination of appropriate ‘Kv’.</p>	A
9	<p><i>Batteries</i></p> <p>(a) types of batteries: (i) nickel metal hydride batteries; (ii) lithium polymer batteries;</p>	A

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (iii) alkaline batteries; (iv) nickel cadmium batteries; (v) fuel cells (b) battery specifications and abbreviations (types, voltage; amperage etc); (c) characteristics of batteries used as an energy source for RPA: <ul style="list-style-type: none"> (i) cell count (ii) nominal voltage; (iii) battery configuration; (iv) parallel; (v) series; (vi) charge rate; (vii) battery capacity; (viii) maximum current draw; (ix) discharge rate; (x) main power plug; (xi) balance plug; (d) batteries classified as dangerous goods for air transportation. 	
10	<p><i>Charging/discharging batteries</i></p> <ul style="list-style-type: none"> (a) charging procedures for batteries; (b) discharging procedures for batteries; (c) cell balancing in multi-cell batteries; (d) state of the charge of a battery with reference to capacity and voltage. 	A
11	<p><i>Battery limitations</i></p> <ul style="list-style-type: none"> (a) ‘continuous C-rating’ and ‘maximum burst C-rating’; (b) trade-off between battery size and flight endurance of an electrically-powered RPA; (c) battery serviceability; (d) battery checkers. 	B
12	<p><i>Electromagnetic radiation</i></p> <ul style="list-style-type: none"> (a) radio waves (b) characteristics of radio waves, wave propagation, transmission including: (c) the radio frequency band ranges (MF, HF, VHF, UHF); (d) effective range of transmissions; (e) factors affecting the propagation of radio waves, including: <ul style="list-style-type: none"> (i) terrain; (ii) ionosphere; (iii) sun spot activity; 	A

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (iv) interference from electrical equipment; (v) thunderstorms; (vi) power attenuation; (f) radio antenna types, characteristics, optimisation and shielding: <ul style="list-style-type: none"> (i) digital and analogue signals; (ii) command and control link range testing; (iii) radio frequencies for RPA operations. 	
14	<p><i>Global Positioning System (GPS)</i></p> <ul style="list-style-type: none"> (a) components of a GPS; (b) how GPS works, including accuracy of different systems; (c) factors that affect the performance of GPS, including the following: <ul style="list-style-type: none"> (i) number of satellites available; (ii) path interference; (iii) electromagnetic interference (EMI); (iv) type of software; (v) signal availability; (vi) indications of faulty GPS equipment. 	A

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units (contd.)

Unit 5 RHPF — Human performance for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>General</i></p> <ul style="list-style-type: none"> (a) airmanship; (b) differences between the sensory information available to a person operating an RPA compared to the pilot of manned aircraft; (c) situational awareness during RPA operations; (d) information processing and decision making in relation to the following factors; <ul style="list-style-type: none"> (i) personality traits; (ii) pride, peer pressure or employer pressure; (iii) desire to get the task done; (iv) anxiety, over-confidence, boredom or complacency; (v) long or short-term memory; (vi) memory limitations; (vii) aides memoire and rules of thumb; (viii) workload and overload; (ix) skill, experience and recency; (e) the methods of enhancing decision-making skills; (f) temporal factors relating to system latency. 	C
2	<p><i>Basic health</i></p> <ul style="list-style-type: none"> (a) medical and psychological factors that may affect pilot performance in relation to operating RPA: <ul style="list-style-type: none"> (i) an upper respiratory tract infection including colds, hay fever, congestion of air passages and sinuses; (ii) a headache, including a migraine; (iii) an injury; (iv) ageing (v) dehydration and heat stroke; (vi) fatigue (vii) alcohol use and smoking; (viii) drug use, including prescription and over the counter medications; (ix) emotions, including anger, anxiety, depression and fear spatial disorientation and illusions; (b) the main medical issues or conditions that may affect a person’s ability to operate an RPA safely. 	C

Item	Aeronautical knowledge topics	Priority
3	<p><i>Vision, spatial disorientation, illusions</i></p> <p>(a) anatomy of the eye and its functioning during the day and at night; limitations of the eye: (i) the ability to discern objects/aircraft at a distance and height; (ii) empty field myopia; (iii) glare; (iv) colour discrimination; (v) myopia, hyperopia, astigmatism, presbyopia and parallax;</p> <p>(b) enhancing vision within the definition of VLOS: (i) prescription spectacles; (ii) suitable sunglasses;</p> <p>(e) disorientation during RPA operations;</p> <p>(f) visual illusions: (i) typical illusions, including relative motion; (ii) the conditions under which visual illusions may occur; (iii) how to overcome sensory illusions.</p>	B
4	<p><i>Stress in relation to operating RPA</i></p> <p>(a) the effects of short and long term stress on the performance and health of a person operating an RPA;</p> <p>(b) symptoms of stress in an excessively hot, cold, windy, vibrating or noisy environment</p> <p>(c) causes and effects of domestic or work related stress;</p> <p>(d) principles of stress management including: (i) cognitive or behavioural techniques for managing stress; (ii) relaxation; (iii) time management.</p>	C
5	<p><i>Threat and error management</i></p> <p>(a) principles of threat and error management in relation to operating RPA;</p> <p>(b) processes to identify and manage threats and errors during RPA operations;</p> <p>(c) the use of checklists and standard operating procedures to prevent errors;</p> <p>(d) crew resource management;</p> <p>(e) risk perception when remote from the location of RPA operation;</p> <p>(f) strategic versus tactical risk management.</p>	B
6	<p><i>Co-ordinating crew</i></p>	C

Item	Aeronautical knowledge topics	Priority
	(a) verbal and non-verbal communication, including the following factors: <ul style="list-style-type: none"> (i) barriers to communication; (ii) listening skills; (iii) assertion skills; (b) aspects of individuals that may affect the safe operation of the RPA: <ul style="list-style-type: none"> (i) personality; (ii) judgement; (iii) leadership style. 	

CONSULTATION DRAFT

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units (contd.)

Unit 6 RKOP RPAS knowledge — operations and procedures

Item	Aeronautical knowledge topics	Priority
1	<p><i>General operations</i></p> <p>(a) general considerations relating to:</p> <ul style="list-style-type: none">(i) flight and equipment batteries;(ii) the fitting and refitting of battery packs;(iii) starting and ground running of motors/engines;(iv) bystanders;(v) crew briefing; <p>(b) responsibilities of the remote pilot:</p> <ul style="list-style-type: none">(i) under Part 101 of CASR;(ii) in relation to the operator’s documented practices and procedures;(iii) keeping operational logs in accordance with section 6.6; <p>(c) considerations:</p> <ul style="list-style-type: none">(i) after an operation has ended;(ii) in relation to disarming the RPA;(iii) in relation to aircraft noise and wildlife.	A
2	<p><i>Risk assessment and management</i></p> <p>(a) the strategic risk assessment process relevant to RPAS operations, including:</p> <ul style="list-style-type: none">(i) hazard identification;(ii) risk identification;(iii) risk mitigation measures; <p>(b) elements of a job safety assessment for the operation of an RPA;</p> <p>(c) completing a job safety assessment for the operation of an RPA.</p>	A
3	<p><i>Airworthiness — general</i></p> <p>(a) determine RPAS serviceability for a specific operation;</p> <p>(b) use of the RPA technical log;</p> <p>(c) responsibilities of the holder of a remote pilot licence in relation to the continuing airworthiness of the RPA including:</p> <ul style="list-style-type: none">(i) conducting inspections of the RPA;(ii) reporting defects or unserviceability in relation to the RPAS.	A
5	<p><i>Role equipment or sensors</i></p>	B

Item	Aeronautical knowledge topics	Priority
	(a) safety and performance implications of various payloads (including cameras and other sensors).	
6	<p><i>Accident and incident reporting</i></p> <p>(a) definitions of accident and incidents;</p> <p>(b) requirements for accident and incident reporting (however described) mentioned in the <i>Transport Safety Investigation Regulations 2003</i> and the <i>Transport and Safety Investigation (voluntary and Confidential Reporting Scheme) Regulation 2012</i>.</p>	A
7	<p><i>Abnormal operations</i></p> <p>Considerations in the event of the following:</p> <p>(a) if the engine or motor of an RPA fails in the following circumstances:</p> <ul style="list-style-type: none"> (i) immediately after launch; (ii) on approach to landing; (iii) when operating within controlled airspace under ATC control; (iv) in a built-up area; (v) in the vicinity of bystanders; <p>(b) a datalink failure;</p> <p>(c) a remote pilot station failure;</p> <p>(d) if a fire takes hold on the RPA during flight or on the ground.</p>	A
8	<p><i>Fail-safe procedures and emergency actions</i></p> <p>(a) Failsafe systems and emergency actions, including:</p> <ul style="list-style-type: none"> (i) the ‘return to home’ system; (ii) regain link holding pattern; (iii) RPA flies to a pre-determined holding point; (iv) emergency parachute deployment; (v) immediate landing; (vi) flight termination. 	A
9	<p><i>Operation of RPA near aerodrome</i></p> <p>(a) considerations in relation to operating an RPA near an aerodrome:</p> <ul style="list-style-type: none"> (i) the location of the movement area of the aerodrome; (ii) the structure of the approach and departure paths for aerodromes and helicopter landing sites (HLS); 	A

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (b) the prohibitions in Part 101 of CASR relating to operating RPA at or near particular aerodromes and HLS; (c) the process to obtain a permission, approval or exemption (however described) under CASR in relation to operating an RPA at or in the approach and departure paths of a particular aerodrome; (d) determining the runway or runways in use at an aerodrome; (e) traffic patterns at aerodromes; (f) limitations on the operation of an RPA near an aerodrome if the aerodrome has more than 1 runway; (g) limitations imposed by the Part 101 MOS with respect to operations in controlled and non-controlled airspace. 	
10	<p><i>Operations of RPA above 400 FT AGL</i></p> <p>Considerations relating to operations of an RPA above 400 FT AGL:</p> <ul style="list-style-type: none"> (a) airspace classification; (b) aeronautical radio use and qualifications; (c) identifying the location of non-controlled aerodromes; (d) use of RPA observers. 	A

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common Units (contd.)

Unit 7 RORA — Operation rules and air law for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Aviation legislation and information</i></p> <p>(a) documents that contain aviation legislation, aeronautical information and general operating rules that apply to the operation of RPA;</p> <p>(b) obtaining the documents and ensuring that the information is up-to-date.</p>	A
2	<p><i>Remote pilot licence</i></p> <p>(a) conditions that apply to a remote pilot licence under Part 101 of CASR;</p> <p>(b) other conditions that may apply to a remote pilot licence;</p> <p>(c) conditions that apply to a certified RPA operator under Part 101 of CASR.</p>	A

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA operated under an automated flight management system

Unit 8 RAFM — Automated flight management systems knowledge

Item	Aeronautical knowledge topics	Priority
1	<p><i>General</i></p> <ul style="list-style-type: none">(a) use of automated flight management systems for RPA;(b) limitations of an automated flight management system;(c) identifying faults with automated flight management system;(d) automated flight management system in abnormal and emergency situations (for example, loss of control, loss of thrust);(e) precautions when programming an automated flight management system.	A

CONSULTATION DRAFT

Schedule 4 Aeronautical knowledge units

Appendix 2 Category specific units — Aeroplane category

Unit 9 RBKA — Aircraft knowledge and operation principles: Aeroplanes

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical components found on the fuselage of the RPA:</p> <ul style="list-style-type: none">(i) hatches;(ii) vents;(iii) drains;(iv) aerals;(v) catapult attachment;(vi) airdrop launch attachment;(v) fail-safe equipment; <p>(b) typical features of the wings of the RPA:</p> <ul style="list-style-type: none">(i) leading and trailing edges;(ii) ailerons;(iii) flaps;(iv) elevon/flaperon;(v) servomechanisms; <p>(c) typical components found on the tail of the RPA:</p> <ul style="list-style-type: none">(i) vertical stabiliser;(ii) elevator/stabiliser/stabilator;(iii) rudder; <p>(d) undercarriage and recovery fittings of the RPA:</p> <ul style="list-style-type: none">(i) undercarriage;(ii) floats;(iii) brakes;(iv) steering mechanism;(v) hook/skid.	B
2	<p><i>Aeroplane aerodynamics</i></p> <p>(a) characteristics of an aerofoil:</p> <ul style="list-style-type: none">(i) chord;(ii) span;(iii) aspect ratio;(iv) camber;(v) aerodynamic stall;(vi) wing loading.	B

Item	Aeronautical knowledge topics	Priority
4	<p><i>Launch</i></p> <p>(a) effects of cross-wind on high- and low-wing aeroplanes during launch;</p> <p>(b) effects of cross-wind on tail-wheel equipped aeroplanes;</p> <p>(c) advantages of launching into wind;</p>	A
5	<p><i>Climbing</i></p> <p>Effects on climb rate and angle resulting from changes in the following:</p> <p>(a) weight;</p> <p>(b) power;</p> <p>(c) airspeed (changed from recommended);</p> <p>(d) flap deflection;</p> <p>(e) headwind/tailwind component, windshear;</p> <p>(f) bank angle;</p> <p>(g) altitude and density altitude.</p>	A
6	<p><i>Straight and level</i></p> <p>Relationship between attitude, angle of attack and airspeed in level flight.</p>	A
7	<p><i>Turning</i></p> <p>(a) concept of balanced turns;</p> <p>(b) explain the relationship between the stall speed of an RPA and the angle of bank;</p> <p>(c) effect of increasing or decreasing bank angle on:</p> <p>(i) stall airspeed, including the rate of increase of stall speed with increasing bank;</p> <p>(ii) the aircraft's structure (load factor);</p> <p>(d) precautions during steep turns:</p> <p>(i) shortly after launch; and</p> <p>(ii) during a glide, particularly on approach to land;</p> <p>(e) visual illusions during level turns at low level when turning downwind or into wind.</p>	A
8	<p><i>Stalling, spinning and spiral dives</i></p> <p>(a) the characteristics of a stall;</p> <p>(b) visual signs from the ground when the RPA is approaching a stall;</p> <p>(c) stall recovery;</p> <p>(i) the effect of using ailerons when approaching and during the stall; and</p> <p>(ii) why the RPA may stall at different speeds;</p> <p>(d) effects of the following on the stall airspeed:</p> <p>(i) power;</p>	A

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (ii) flap; (iii) manoeuvres; (iv) weight; (v) airframe frost and ice; (vi) air density; (c) manoeuvres during which the RPA may stall at an angle which appears to be different to the true stalling angle; (d) differences between a spin and a spiral dive; (e) spiral dive recovery. 	
9	<p><i>Descent</i></p> <ul style="list-style-type: none"> (a) angle of descent and attitude relating to: <ul style="list-style-type: none"> (i) power – constant airspeed; (ii) flap – constant airspeed; (b) effect of headwind/tailwind on the glide path and glide distance; (c) effect of changes in indicated airspeed on the distance that can be achieved in still air. 	A
10	<p><i>Landing and recovery</i></p> <ul style="list-style-type: none"> (a) characteristics of a smooth landing; (b) effects of a cross-wind on high- and low-wing during landing and recovery; (c) advantages of landing into the wind; (d) differences between a flapless approach and an approach with flap in terms of: <ul style="list-style-type: none"> (i) attitude during descent; (ii) approach path angle; (iii) threshold and touchdown speeds; and (iv) landing roll; (e) deep stall landings; (f) use of a recovery net. 	A

Schedule 4 Aeronautical knowledge units

Appendix 3 Category specific units — Helicopter (multirotor class) category

**Unit 10 RBKM — Aeronautical knowledge and operation principles:
Multirotor**

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical components of the RPA:</p> <ul style="list-style-type: none">(i) the centre body;(ii) the arm attachments;(iii) the battery strap and mounting;(iv) the motors and motor attachments;(v) landing gear;(vi) other protective components of the RPA; <p>(b) location and function of electrical components of the RPA:</p> <ul style="list-style-type: none">(i) its electronic speed controllers;(ii) its receiver and antenna;(iii) its gyros/Inertial Management Unit;(iv) its flight controller;(v) its battery;(vi) its battery eliminator circuit;(vii) its GPS sensor and antenna.	B
2	<p><i>Weight and balance- launch and landing and recovery</i></p> <p>Effects of changes to the following the performance of the RPA:</p> <ul style="list-style-type: none">(a) weight;(b) power;(c) ground effect;(d) wind.	A
3	<p><i>Aerodynamics – multirotor lift and drag</i></p> <p>(a) aerodynamic properties of a rotor blade:</p> <ul style="list-style-type: none">(i) aerofoil shape;(ii) blade twist;(iii) blade taper; <p>(b) Definitions of the following terms:</p> <ul style="list-style-type: none">(i) rotor thrust;(ii) rotor drag;(iii) relative airflow;(iv) rotational airflow;(v) induced airflow;	B

Item	Aeronautical knowledge topics	Priority
	(vi) torque reaction.	
4	<i>Aerodynamics – hovering and forward flight</i>	A
5	(a) Definitions of the terms: <ul style="list-style-type: none"> (i) ground effect; (ii) re-circulation; (b) translational lift; (c) drag in forward flight.	
6	<i>Principles of operation – flight controls</i> <ul style="list-style-type: none"> (a) primary flight controls and how they affect the movement of a multirotor about its longitudinal, lateral and normal vertical axes, including: <ul style="list-style-type: none"> (i) hover; (ii) yaw control; (iii) forward operation; (iv) ascent and descent; (v) lateral horizontal operation; (b) secondary flight controls – trim controls; (c) stabilisation; (d) GPS hold. 	A
7	<i>Aerodynamics – abnormal operations</i> <ul style="list-style-type: none"> (a) direction of rotation of a rotor and the implication of incorrect installation; (b) effects on the operation of the RPA if a motor of the RPA fails to produce thrust. 	A
8	<i>Launch</i> <ul style="list-style-type: none"> (a) advantages of launching the RPA into the wind; (b) aerodynamic effects of wind shear and ground effect on the operation of the RPA. 	B
9	<i>Climbing</i> <ul style="list-style-type: none"> (a) Effect on climb rate and angle from changes in the following: <ul style="list-style-type: none"> (i) weight; (ii) power; (iii) airspeed; (iv) a headwind or tailwind or windshear; (v) bank angle; (vi) altitude and density altitude. 	A
10	<i>Turning</i>	B

Item	Aeronautical knowledge topics	Priority
	(a) banked turns; (b) rotations or flat turns; (c) limitations on steep turns.	
11	<i>Descending, landing and recovery</i> (a) avoiding vortex ring state when operating the RPA; (b) recovery actions to escape vortex ring state. (c) advantages of landing and recovery into the wind; (d) considerations when landing and recovering.	A

CONSULTATION DRAFT

Schedule 4 Aeronautical knowledge units

Appendix 4 Category specific units — Helicopter (single rotor) category

Unit 11 RBKH — Aeronautical knowledge and operation principles: Single rotor

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical components of the fuselage of the RPA, including:</p> <ul style="list-style-type: none">(i) the inspection hatches;(ii) the vents;(iii) the drains;(iv) the aerials;(v) the boom;(vi) the tail rotor; <p>(b) typical components of the recovery system:</p> <ul style="list-style-type: none">(i) the skids;(ii) the floats.	B
2	<p><i>Helicopter key lift components</i></p> <p>(a) typical components of the rotor system:</p> <ul style="list-style-type: none">(i) the flybar (if any);(ii) the swash plate;(iii) the clutch (if any).	A
3	<p><i>Aircraft Performance</i></p> <p>(a) Effects of the following on aircraft performance:</p> <ul style="list-style-type: none">(i) the gross weight of the RPA;(ii) engine power;(iii) ground effect.	A
4	<p><i>Aerodynamics –lift and drag</i></p> <p>(a) aerodynamic properties of a rotor blade:</p> <ul style="list-style-type: none">(i) aerofoil shape;(ii) blade twist;(iii) blade taper; <p>(b) definitions of the following terms:</p> <ul style="list-style-type: none">(i) rotor thrust;(ii) rotor drag;(iii) total reaction;(iv) relative airflow;(v) rotational airflow;	B

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (vi) induced airflow; (vii) centrifugal reaction; (viii) rotor disc; (ix) coning angle; (c) terminology in relation to an operating rotor blade: <ul style="list-style-type: none"> (i) feathering; (ii) flapping; (iii) flapping to equality; (iv) dragging; (v) advance angle. 	
5	<p><i>Aerodynamics of hovering</i></p> <ul style="list-style-type: none"> (a) aerodynamic vectors of a rotor blade during hover; (b) terminology relating to hovering: <ul style="list-style-type: none"> (i) ground effect; (ii) tail rotor drift; (iii) rotor shaft tilt effect; (iv) re-circulation; (c) abnormal operations: <ul style="list-style-type: none"> (i) vortex ring state (settling with power); (ii) loss of tail-rotor effectiveness; (iii) the appropriate recovery actions to (i) to (ii). (d) effects of the following on hovering: <ul style="list-style-type: none"> (i) the gross weight of the RPA; (ii) pressure altitude; (iii) temperature; (iv) ground effect. 	A
6	<p><i>Aerodynamics –forward operation</i></p> <p>Terminology in relation to forward flight:</p> <ul style="list-style-type: none"> (a) dissymmetry of lift; (b) flapback; (c) cyclic limits; (d) airflow reversal; (e) retreating blade stall; (f) compressibility; (g) inflow roll; (h) translational lift; (i) aerodynamic vectors of a rotor blade during forward flight. 	B
7	<p><i>Aerodynamics—power requirements</i></p>	A

Item	Aeronautical knowledge topics	Priority
	(a) power available and power required in relation to the following: <ul style="list-style-type: none"> (i) best speed for range; (ii) best speed for endurance; (iii) best rate of climb; (iv) best angle of climb; (b) 'overpitching' – causes and recovery actions.	
8	<i>Principles of flight – helicopter controls</i> <ul style="list-style-type: none"> (a) flight controls: <ul style="list-style-type: none"> (i) cyclic and collective; (ii) trim systems; (iii) tail gyroscope; (b) aerodynamic enhancements: <ul style="list-style-type: none"> (i) a canted tail rotor; (ii) sweep back on tips; (iii) a shrouded tail rotor; (iv) tail surfaces, fins, end plates and stabilators. 	A
9	<i>Autorotative flight</i> <ul style="list-style-type: none"> (a) the meaning of the following terms in relation to an RPA that is capable of autorotative flight: <ul style="list-style-type: none"> (i) autorotative force; (ii) autorotative section; (b) the effect on autorotation of the RPA if the following are varied: <ul style="list-style-type: none"> (i) all-up-weight; (ii) density altitude; (iii) airspeed; (iv) rotor RPM. 	A
10	<i>Effects of particular conditions</i> <ul style="list-style-type: none"> (a) undesirable aircraft states: <ul style="list-style-type: none"> (i) ground resonance; (ii) mast bumping; (iii) dynamic roll-over; (b) avoiding undesirable aircraft states. 	A

Schedule 4 Aeronautical knowledge units

Appendix 5 Category specific units — powered-lift category

**Unit 12 RBKP — Aircraft knowledge and operation principles:
 Powered-lift**

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical physical components of the RPA:</p> <ul style="list-style-type: none">(i) the fuselage;(ii) the motor attachments, including booms;(iii) hatches;(iv) vents;(v) drains;(vi) aerials;(vii) fail-safe equipment;(viii) the battery compartment/mounting;(ix) the motors/engines(s);(x) landing gear;(xi) protective components of the RPA;(xii) rotors and propellers; <p>(b) typical features of the wings of the RPA:</p> <ul style="list-style-type: none">(i) leading and trailing edges;(ii) ailerons;(iii) flaps;(iv) elevon/flaperon;(v) servomechanisms; <p>(c) typical components found on the tail of the RPA:</p> <ul style="list-style-type: none">(i) vertical stabiliser;(ii) elevator/stabiliser/stabilator;(iii) rudder; <p>(d) location and function of electrical components of the RPA:</p> <ul style="list-style-type: none">(i) its electronic speed controller(s);(ii) its receiver and antenna;(iii) its gyros/Inertial Management Unit;(iv) its flight controller;(v) its battery or batteries;(vi) its battery eliminator circuit;(vii) its GPS sensor and antenna.	B

Item	Aeronautical knowledge topics	Priority
2	<p><i>Aeroplane aerodynamics</i> Characteristics of an aerofoil:</p> <ul style="list-style-type: none"> (a) chord; (b) span; (c) aspect ratio; (d) camber; (e) aerodynamic stall; (f) wing loading. 	B
3	<p><i>Aerodynamics – Vertical flight</i></p> <ul style="list-style-type: none"> (a) aerodynamic properties of a rotor blade: <ul style="list-style-type: none"> (i) aerofoil shape; (ii) blade twist; (iii) blade taper; (b) definitions of the following terms: <ul style="list-style-type: none"> (i) rotor thrust; (ii) rotor drag; (iii) relative airflow; (iv) rotational airflow; (v) induced airflow; (vi) torque reaction. 	B
4	<p><i>Principles of operation – flight controls</i> Primary flight controls and how they affect the movement of the aircraft about its longitudinal, lateral and vertical axes, including:</p> <ul style="list-style-type: none"> (a) yaw control; (b) roll control; (c) pitch control; (d) horizontal operation using vertical motors; (e) vertical ascent and descent; (f) secondary flight controls – trim controls; (g) stabilisation; (h) GPS hold. 	A
5	<p><i>Launch, landing and recovery</i></p> <ul style="list-style-type: none"> (a) effects of changes to the following on the performance of the RPA: <ul style="list-style-type: none"> (i) weight; (ii) power; (iii) ground effect; (iv) wind and windshear; (v) translational lift; (vi) other considerations when landing and recovering; 	A

Item	Aeronautical knowledge topics	Priority
	(b) avoiding vortex ring state when operating the RPA; (c) recovery actions to escape vortex ring state.	
6	<i>Aerodynamics – hovering and vertical climbing</i> (a) aerodynamics of vertical climbing; (b) definitions of the terms: (i) ground effect; (ii) re-circulation.	A
	<i>Aerodynamics – transitional flight and forward flight</i> (a) aerodynamics of transition from vertical flight to horizontal/climbing flight; (b) aerodynamics of transition from horizontal flight/descent to vertical flight; (c) aircraft configuration changes during transitional flight; (d) relationship between attitude, angle of attack and airspeed in level flight; (e) drag in forward flight; (f) airspeed and groundspeed.	
7	<i>Climbing – aeroplane mode</i> Effect on climb rate and angle from changes in the following: (a) weight; (b) power; (c) airspeed; (d) a headwind or tailwind; (e) bank angle; (f) pressure altitude and density altitude.	A
8	<i>Turning</i> (a) concept of balanced turns; (b) explain the relationship between the stall speed of an RPA and the angle of bank; (c) effect of increasing or decreasing bank angle on: (i) stall airspeed, including the rate of increase of stall speed with increasing bank; (ii) the aircraft's structure (load factor); (d) precautions during steep turns: (i) shortly after launch; (ii) during a glide, particularly on approach to land; (e) visual illusions during balanced level turns at low level when turning downwind or into wind; (f) rotations or flat turns in vertical mode.	A

Item	Aeronautical knowledge topics	Priority
9	<p><i>Descent</i></p> <p>(a) angle of descent and attitude relating to:</p> <p style="padding-left: 20px;">(i) power – constant airspeed;</p> <p style="padding-left: 20px;">(ii) flap – constant airspeed;</p> <p>(b) effect of headwind/tailwind on the glide path and glide distance;</p> <p>(c) effect of changes in indicated airspeed on the distance that can be achieved in still air.</p>	A
10	<p><i>Aerodynamics – abnormal operations vertical flight</i></p> <p>(a) direction of rotation of a rotor and the implication of incorrect installation;</p> <p>(b) effects on the operation of the RPA if a motor of the RPA fails to produce thrust.</p>	A
11	<p><i>Stalling, spinning and spiral dives – aeroplane mode</i></p> <p>(a) the characteristics of a stall;</p> <p>(b) visual signs from the ground when the RPA is approaching a stall;</p> <p>(c) stall recovery;</p> <p style="padding-left: 20px;">(i) the effect of roll control when approaching and during the stall; and</p> <p style="padding-left: 20px;">(ii) why the RPA may stall at different speeds;</p> <p>(d) effects of the following on the stall airspeed:</p> <p style="padding-left: 20px;">(i) power;</p> <p style="padding-left: 20px;">(ii) flap;</p> <p style="padding-left: 20px;">(iii) manoeuvres;</p> <p style="padding-left: 20px;">(iv) weight;</p> <p style="padding-left: 20px;">(v) airframe frost and ice;</p> <p style="padding-left: 20px;">(vi) air density;</p> <p>(e) manoeuvres during which the RPA may stall at an angle which appears to be different to the true stalling angle;</p> <p>(f) differences between a spin and a spiral dive;</p> <p>(g) spin and spiral dive recovery.</p>	A

Schedule 4 Aeronautical knowledge units

Appendix 6 Any RPA with a liquid-fuel system

**Unit 13 REFE — Medium or large RPA with a liquid-fuel system
knowledge**

Item	Aeronautical knowledge topics	Priority
1	<p><i>Knowledge requirements</i></p> <p>Characteristics and operation of liquid-fuel systems:</p> <ul style="list-style-type: none">(a) the way a liquid-fuel system works;(b) systems associated with a liquid-fuel system;(c) the differences between two and four-stroke engines;(d) the effect of increasing altitude and temperature on engine performance;(e) mixture leaning procedures and effects;(f) the kinds of abnormal and emergency situations that may arise if operating the RPA;(g) the effects and limitations of turbo- and super-charging in relation to the RPA;(h) the effect of fuel burn on weight and balance in relation to the RPA.	A

Schedule 5 Practical competency units

Appendix 1 Any RPA — Common units

Unit 14 RC1 — Pre- and post-operation actions and procedures for RPAS

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of Variables
1	<p>Pre-operation actions and procedures:</p> <ul style="list-style-type: none"> (a) assemble and prepare the RPA for operation; conduct a post-assembly inspection of the RPA; (b) locate the controls of the remote pilot station and check the RPA responds appropriately to control inputs; (c) obtain, interpret and apply information contained in the RPA operator's documented practices and procedures mentioned in paragraph 101.370 (b) of CASR, including information relating to the following: <ul style="list-style-type: none"> (i) weather forecasts; (ii) local observations; (iii) NOTAM; (iv) area approvals; (v) other aeronautical information such as information from ERSA or CASA; (d) decide whether the current and forecast weather conditions are suitable for the proposed operation; (e) work out the energy requirements of the 	<ul style="list-style-type: none"> (a) within a reasonable period of time; (b) demonstrating dexterity in handling the RPA. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator's documented practices and procedures; (b) type of RPA; (c) weather forecast sources; (d) single or multiple RPA operations in a day; (e) location of RPA operations; (f) with and without a checklist; (g) day and night operations; (h) electric and liquid-fuel system powered.

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of Variables
	<p>RPA for the proposed operation;</p> <p>(f) decide whether the RPA's equipment is serviceable for the proposed operation;</p> <p>(g) decide whether the aircraft batteries or fuel are the correct kind for the RPA and are serviceable;</p> <p>(h) work out whether the RPA is within its centre of gravity for the operation.</p>		
2	<p><i>Perform pre-operation inspection:</i></p> <p>(a) ensure locking and securing devices, covers and bungs for the RPA are removed;</p> <p>(b) complete a pre-operation inspection before each flight as set out in the RPA operator's documented practices and procedures;</p> <p>(c) start the RPA's engine or motor in accordance with the RPA operator's documented practices and procedures mentioned in paragraph 101.370 (b) of CASR for the operation of the RPA.</p>	<p>(a) within a reasonable period of time;</p> <p>(b) demonstrating dexterity in handling the RPA;</p> <p>(c) no locking or securing devices, bungs or covers in place.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) type of RPA.</p>
3	<p><i>Post-operation actions and procedures:</i></p>	<p>(a) within a reasonable period of time;</p> <p>(b) demonstrating familiarity with the RPA and the RPA operator's documented</p>	<p>(a) activities are performed in accordance with operator's documented</p>

Item	Topic and requirement	Tolerances	Range of Variables
	<p>If operating an RPA, the applicant must be able to...</p> <p>(a) shut-down aircraft in agreement with the operation manual;</p> <p>(b) conduct post-operation inspection and secure the aircraft (if applicable);</p> <p>(c) complete all required post-operation administration documentation;</p> <p>(d) disassemble aircraft for transport.</p>	<p>practices and procedures;</p> <p>(c) demonstrating dexterity in handling the RPA;</p> <p>(d) all locking or securing devices, bungs or covers are in place.</p>	<p>practices and procedures;</p> <p>(b) kind of RPA</p> <p>(c) dry and wet weather.</p>

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 1 Any RPA — Common units (contd.)

Unit 15 RC2 — Energy reserves management for RPAS

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of Variables
1	<p><i>Plan energy requirements:</i></p> <p>(a) work out the duration of the operation taking into account operational environment and relevant abnormal or emergency conditions, contingencies and any reserves.</p>	<p>(a) demonstrating familiarity with the RPA and the RPA operator's documented practices and procedures;</p> <p>(b) the calculated RPA operation endurance is within +/- 10%.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) length and type of operation;</p> <p>(c) type of energy source for RPA;</p> <p>(d) various wind and temperature conditions;</p> <p>(e) variation in operating weight and aircraft configuration.</p>
2	<p><i>Manage battery system or systems:</i></p> <p>(a) if the energy source for the RPA is a battery or battery systems:</p> <p>(i) verify the quantity of energy on board the RPA before and after the operation;</p> <p>(ii) ensure the batteries are secured to the RPA for the operation;</p> <p>(iii) ensure the battery connectors are connected properly and secure for the operation;</p> <p>(iv) monitor energy usage during the operation;</p>	<p>(a) within a reasonable period of time;</p> <p>(b) demonstrating familiarity with the RPA;</p> <p>(c) demonstrating dexterity in handling the RPA and the batteries;</p> <p>(d) operating RPA above minimum voltage, as stated in the operator's documented practices and procedures;</p> <p>(e) not operating above maximum current draw for the RPA systems, as stated in the operator's documented practices and procedures.</p>	<p>(a) old and new batteries;</p> <p>(b) battery connector types;</p> <p>(c) types of battery;</p> <p>(d) with and without telemetry.</p>

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of Variables
	<ul style="list-style-type: none"> (v) maintain a battery log for the operation; (vi) perform battery changes correctly; (vii) maintain energy loads within system limits during the operation; (b) if the energy source of the remote pilot station for the RPA is a battery or battery systems — manage the remote pilot station power supply to ensure sufficient energy to complete an operation with a suitable reserve; (c) ensure the batteries for the RPA contain at least the percentage of charge required in the operator’s documented practices when the RPA is landed and recovered for each operation. 		
3	<p>Recharge battery or batteries:</p> <ul style="list-style-type: none"> (a) if the RPA has an electric motor: <ul style="list-style-type: none"> (i) inspect the battery to ensure it is safe to be recharged; (ii) ensure the battery charger is setup correctly for the type of battery; (iii) correctly connect and disconnect a battery to the battery charger; 	<ul style="list-style-type: none"> (a) within a reasonable period of time; (b) demonstrating familiarity with the RPA; (c) demonstrating care in handling the batteries; with no less than 75% of accuracy; (d) battery is charged to the desired level; (e) does not exceed the charging limitations for the batteries. 	<ul style="list-style-type: none"> (a) types of battery; (b) types of chargers; (c) battery management is performed in accordance with operator’s documented practices and procedures.

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of Variables
	<ul style="list-style-type: none"> (iv) perform battery quality and quantity checks after charging; (v) calculate the time it would take to use and recharge 30% of a battery or battery system's capacity for a particular operation; (vi) if a battery is unsafe for an operation — recognise that the battery is unsafe for the operation; (vii) check that the battery has sufficient charge for storage. 		
4	<p>Manage fuel system (very small and small RPA):</p> <ul style="list-style-type: none"> (a) if the RPA is a very small or small RPA and the energy source for the RPA is liquid fuel: <ul style="list-style-type: none"> (i) calculate fuel required for the operation before the operation; (ii) calculate and state endurance of the RPA at any point during the operation of the RPA; (iii) identify the quantity of fuel on-board the RPA before the operation; (iv) ensure the fuel cap or caps are closed 	<ul style="list-style-type: none"> (a) within a reasonable period of time; (b) demonstrating familiarity with the RPA; (c) demonstrating dexterity in handling the RPA and the batteries: <ul style="list-style-type: none"> (i) for (ii), in column 2, fuel calculation is within 10% (but not below); (ii) for (iii) in column 2, quantity is within +/- 10% accuracy; (iii) for (vi) in column 2, calculated reserve is within of 10% actual reserve at end of flight. 	<ul style="list-style-type: none"> (a) kind of RPA; (b) kind of liquid fuel; (c) method used to calculate the fuel needed for an operation; (d) method used to calculate the fuel burn rate; (e) method used to check fuel quantity on-board; (f) method used to check fuel quality.

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of Variables
	<p>before and during the operation;</p> <p>(v) operate the RPA's fuel pumps and engine controls correctly during the operation;</p> <p>(vi) monitor fuel use during the operation;</p> <p>(b) ensure the RPA lands at the end of the operation and is recovered with the amount of reserve fuel that is in accordance with the calculated fuel use for the operation.</p>		
5	<p>Refuel RPA (very small and small RPA):</p> <p>(a) if the RPA is a very small or small and liquid fuel is the source of the energy for the RPA — before the operation:</p> <p>(i) identify the correct kind of fuel to be used;</p> <p>(ii) if the fuel of the RPA must be mixed — mix the fuel correctly;</p> <p>(iii) correctly fuel or refuel the RPA;</p> <p>(iv) perform a fuel quality check;</p> <p>(v) ensure the RPA's fuel cap is closed and secured after the RPA has been fuelled.</p>	<p>(a) within a reasonable period of time;</p> <p>(b) demonstrating familiarity with the RPA;</p> <p>(c) demonstrating dexterity in handling the RPA and the fuel;</p> <p>(d) safe handling of fuel and equipment.</p>	<p>(a) refuelling procedures according to operator's documented procedures;</p> <p>(b) types of liquid fuels;</p> <p>(c) factors which affect fuel-oil mix ratios.</p>

Schedule 5 Practical competency units

Appendix 1 Any RPA — Common units (contd.)

Unit 16 RC3 — Manage crew, payload and bystanders for RPAS operations

Item	Topic and requirement If operating an RPA, the applicant must be able to ...	Tolerances	Range of variables
1	<p>Manage bystanders:</p> <ul style="list-style-type: none"> (a) ensure that bystanders remain a safe distance away from the operation; (b) ensure bystanders are aware of and avoid interference with the operation and the systems controls used in the operation such as the remote pilot station; (c) manage bystander safety in the event of abnormal or emergency situation arising as a result of the operation; (d) demonstrate effective oral communication to bystanders in a clear, effective manner; (e) ensure communications are understood by bystanders. 	clear, effective communication.	<ul style="list-style-type: none"> (a) co-operative bystanders; (b) non-cooperative bystanders.
2	<p>Manage people involved in the operation:</p> <ul style="list-style-type: none"> (a) establish and maintain clear communication between persons involved in the operation of the RPA, with a particular view to ensuring the safe operation of the RPA; (b) implement effective and safe hand-overs of 	clear, effective communication.	<ul style="list-style-type: none"> (a) communication face to face; (b) communication over a radio.

Item	Topic and requirement If operating an RPA, the applicant must be able to ...	Tolerances	Range of variables
	the RPA before, during and after an operation.		
3	<p><i>Manage payloads and dangerous goods:</i></p> <p>(a) manage loading, unloading and security of payload during an operation of the RPA;</p> <p>(b) identify dangerous goods and apply operator procedures to ensure safety of the operation.</p>	<p>(a) within a reasonable period of time;</p> <p>(b) demonstrating familiarity with the RPA;</p> <p>(c) demonstrating dexterity in handling the RPA.</p>	<p>(a) different kinds of payload;</p> <p>(b) internal and external payloads;</p> <p>(c) activities are performed in accordance with operator's documented practices and procedures.</p>

Schedule 5 Practical competency units

Appendix 1 Any RPA — Common units (contd.)

Unit 17 RC4 — Navigation and operation of RPAS

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Operational ‘rules’:</i></p> <p>(a) explain the purpose of the following documents in relation to RPA operations:</p> <ul style="list-style-type: none"> (i) CASR; (ii) this Manual of Standards; (iii) Advisory Circulars; (iv) AIP; (v) ERSA; <p>(b) operate the RPA in compliance with the requirements relating to operating RPA mentioned in Part 101 of CASR and this Manual of Standards;</p> <p>(c) state the requirements of the RPA operator’s documented practices and procedures mentioned in paragraph 101.370 (b) of CASR relating to the operation of the RPA.</p>	[No tolerances]	(a) activities are performed in accordance with the operator’s documented practices and procedures.

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
2	<p>Operational basics:</p> <p>(a) describe different traffic patterns of manned aircraft at aerodromes;</p> <p>(b) describe suitable vertical and horizontal separation distances between the RPA and other aircraft;</p> <p>(c) explain when an incident or accident report must be submitted in relation to an operation of the RPA.</p>	[No tolerances]	<p>(a) traffic patterns at aerodromes;</p> <p>(b) controlled and non-controlled aerodromes</p> <p>(c) flight separation considerations;</p> <p>(d) types of incident;</p> <p>(e) day and night operations;</p> <p>(f) manual and automated flight.</p>
3	<p>Orientation:</p> <p>(a) interpret a given map or chart in relation to a proposed operation of the RPA and work out its implications for the operation;</p> <p>(b) in relation to any kind of aerodrome (including HLS) — point out the approach and departure paths and movement areas;</p> <p>(c) explain the significance of track and ground speed in relation to an operation of the RPA;</p> <p>(d) state the relevance of height, altitude and elevation in relation to different circumstances in which the RPA is operated.</p>	[No tolerances]	<p>(a) type of map projection;</p> <p>(b) various map scales;</p> <p>(c) digital or paper map;</p> <p>(d) different aerodromes and HLS;</p> <p>(e) at, near and away from aerodromes and HLS.</p>

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
4	<p><i>Use of aeronautical charts:</i></p> <p>(a) on a visual navigation chart that covers an area in which the RPA is proposed to operate — identify, without reference to the chart legend:</p> <ul style="list-style-type: none"> (i) major features including roads, rivers, lakes; (ii) obstacles spot heights including elevation or height above terrain; (iii) CTA, CTR, PRDs and aerodrome information; (iv) secondary controlled aerodromes; (v) other symbols with reference to the chart legend; (vi) determine position in relation to other aviation activities; (vii) identify airspace boundaries and symbols. 	<ul style="list-style-type: none"> (a) quickly identifies major features, obstacles, heights and prescribed airspace boundaries; (b) determines position with reasonable accuracy; (c) distinguishes between communication and navigation data. 	<ul style="list-style-type: none"> (a) types of aeronautical chart; (b) paper and digital maps and charts; (c) aerodrome maps and aerial/satellite images.
	<p><i>Use of ERSA:</i></p> <p>(a) use an ERSA to extract:</p> <ul style="list-style-type: none"> (i) information for a particular aerodromes or airspace; 	[No tolerances]	[No variables]

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
	(ii) information and data about PRD areas.		
5	<p>Operations preparation:</p> <p>(a) identify the operational documentation required for a planned operation;</p> <p>(b) read and interpret a NOTAM, using NOTAM decode information;</p> <p>(c) obtain and comply with ATC clearances; receive and correctly read back an airways clearance;</p> <p>(d) read and explain the meaning of the typical conditions of an area approval with regard to the mission being planned;</p> <p>(e) apply the 'fly neighbourly' principles;</p> <p>(f) read and interpret a local weather forecast and determine whether it would be suitable to operate the RPA for the operation given the forecast.</p>	<p>(a) all necessary documents identified;</p> <p>(b) understanding of NOTAMs is accurate;</p> <p>(c) makes informed decisions about whether to carry out the operation.</p>	<p>(a) operational documentation;</p> <p>(b) complexity of NOTAM;</p> <p>(c) area approval;</p> <p>(d) type of weather forecast;</p>

Schedule 5 Practical competency units

Appendix 1 Any RPA — Common units (contd.)

Unit 18 RNT — Non-technical skills for operation of RPAS

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Maintain effective lookout:</i> (a) maintain obstacle and traffic separation using a systematic visual scan technique at a rate determined by location, visibility and terrain.</p>	[No tolerances]	(a) various weather conditions; (b) surrounding terrain and obstacles.
2	<p><i>Maintain situational awareness:</i> (a) collect information to enable the safe operation of the RPA; (b) collect information about the environment in which the RPA is operating so that the applicant can demonstrate making operational adjustments to enable the safe operation of the RPA during the operation; (c) non-weather hazards to operations (for example, thermal plumes, powerlines, animals).</p>	(a) makes decisions in a timely manner.	(a) location of RPA operation (for example, urban, suburban, park, beach).
3	<i>Assess situations and make decisions:</i>	(a) makes decisions in a timely manner.	(a) various operational scenarios.

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
	<ul style="list-style-type: none"> (a) identify problems that may affect the safe operation of the RPA; (b) analyse the problems; (c) identify solutions to the problems; (c) assess the solutions and risks of the solutions; (d) decide on a course of action; (e) if appropriate — communicate the proposed course of action; (f) if appropriate — allocate tasks relating to the proposed course of action; (g) take actions to achieve optimum outcomes for the operation; (h) monitor progress of the course of action; (i) adjust the course of action to achieve the optimum outcomes for the operation. 		
4	<p><i>Set priorities and manage tasks:</i></p> <ul style="list-style-type: none"> (a) organise workload and priorities to ensure safe operation of the RPA during the operation; (b) anticipate events and tasks that may occur during the operation; (c) plan events and tasks for the operation so that the events and task occur sequentially; (d) use technology to reduce workload and improve cognitive and 	[No tolerances]	[No variables]

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
	manipulative activities during the operation.		
5	<p><i>Maintain effective communications and interpersonal relationships:</i></p> <p>(a) establish and maintain effective and efficient communications and interpersonal relationships with all stakeholders to ensure the optimum outcome of the operation;</p> <p>(b) define and explain objectives to stakeholders;</p> <p>(c) recognise hazardous attitudes and mindsets;</p> <p>(d) demonstrate a level of assertiveness that ensures the optimum completion of the operation.</p>	[No tolerances]	
7	<p><i>Recognise and manage threats:</i></p> <p>(a) identify environmental or operational threats likely to affect the safety of the operation;</p> <p>(b) identify if competing priorities and demands may represent a threat to the safety of the operation;</p> <p>(c) develop and implement countermeasures to manage threats;</p> <p>(d) during the operation, monitor and assess the progress of the operation to ensure a safe outcome and</p>	<p>(a) quickly identifies threats and makes and implements suitable countermeasures in a timely way.</p>	<p>(a) types of threat;</p> <p>(b) various risk mitigations to minimise threat.</p>

Item	Topic and requirement If operating an RPA, the applicant must be able to...	Tolerances	Range of variables
	modify actions accordingly.		
	<p>Recognise and manage errors:</p> <ul style="list-style-type: none"> (a) apply the RPA operator's documented practices and procedures mentioned in paragraph 101.370; (b) prevent aircraft handling, procedural or communication errors; (c) during the operation, identify errors in the operation of the RPA before the safety of the operation is affected; (d) during the operation, monitor the following to identify potential or actual errors in the operation: <ul style="list-style-type: none"> (i) the RPA systems using a systematic scan technique; (ii) the environment in which the RPA is operating; (iii) the other individuals who have been assigned duty; (iv) in relation to the operation; (e) during the operation, implement measures to prevent errors or take action to correct errors before the safety of the operation is compromised. 	(a) minimises the consequences of an error in a timely manner.	(a) type of errors.

Schedule 5 Practical competency units

Appendix 1 Any RPA operated under an automated flight management system

Unit 19 RAF — Automated flight management systems for RPAS

Item	Topic and requirement If operating an RPA under an automated flight management system, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Pre-operation preparation before the operation:</i></p> <p>(a) check the automated flight management system software is current and up to date;</p> <p>(b) load a flight plan for the automated operation of the RPA;</p> <p>(c) check the automated flight management system software and the RPA is ready for the operation.</p>	[No tolerances]	<p>(a) various meteorological conditions;</p> <p>(b) size of operation area;</p> <p>(c) category of RPA.</p>
2	<p><i>Automated operation control:</i></p> <p>(a) demonstrate a launch of an automated operation of the RPA;</p> <p>(b) modify the automated pre-programmed or automatic operation path for the RPA;</p> <p>(c) demonstrate a landing and recovery of an RPA that has carried out as an automated operation.</p>	<p>(a) initial climb is established quickly;</p> <p>(b) modifications made in a reasonable amount of time;</p> <p>(c) RPA lands within designated/predicted area/limits;</p> <p>(d) stable approach to landing.</p>	<p>(a) various meteorological conditions;</p> <p>(b) size of operation area;</p> <p>(c) category of RPA.</p>
3	<p><i>Emergency procedures:</i></p> <p>(a) interrupt an automated operation of the RPA mid- operation and</p>	<p>(a) error-free and timely re-programming;</p> <p>(b) RPA is handled with dexterity and actions performed or</p>	<p>(a) operations in both dark conditions and</p>

Item	Topic and requirement If operating an RPA under an automated flight management system, the applicant must be able to...	Tolerances	Range of variables
	<p>redirect the RPA to the safe way-point;</p> <p>(b) demonstrate a go-around on the final approach of the RPA before landing and recovery;</p> <p>(c) demonstrate the procedure to terminate the automated operation of the RPA.</p>	<p>simulated in a timely way;</p> <p>(c) for the go-around, the aircraft does not descend below a nominated height;</p> <p>(d) safe termination procedure.</p>	<p>under artificial illumination;</p> <p>(b) various weather conditions;</p> <p>(c) urban, suburban and unpopulated areas;</p> <p>(d) category of RPA.</p>

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 2 Category specific units — Aeroplane category

Unit 20 RA1 — Ground operations and launch

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
1	<p>Ground operations—pre-launch ground/water taxi: if performing the pre-launch of the RPA and the RPA is being taxied on the ground or water:</p> <ul style="list-style-type: none"> (a) perform applicable taxi checks, including instrument checks as required; (b) maintain safe taxi speed and control of the RPA; (c) maintain safe spacing from obstructions, and persons; (d) avoid causing a hazard to another aircraft, objects or persons; (e) apply correct handling techniques to take wind into account; (f) use checklists at appropriate times during ground operations. 	<ul style="list-style-type: none"> (a) demonstrates dexterity with equipment; (b) sets-up the RPA for launch in a timely way; (c) maintains safe control of the RPA at all times. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator’s documented practices and procedures; types of undercarriage (b) distance from obstacles, people and aircraft; (c) with and without checklists; (d) types of undercarriage.
2	<p>Ground operations—launch:</p> <ul style="list-style-type: none"> (a) for the hand pre-launch of the RPA: <ul style="list-style-type: none"> (i) demonstrate the correct way to hold the RPA pre-launch; 	<ul style="list-style-type: none"> (a) demonstrates confidence in positioning and handling the RPA; (b) handles the RPA with skill and precision; (c) throwing action is controlled and safe; (d) RPA is launched safely. 	<ul style="list-style-type: none"> (a) kind of RPA; (b) launch location; (c) remote pilot launch or launch by assistant; (d) different launch methods; (e) populated or unpopulated launch areas.

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
	<ul style="list-style-type: none"> (ii) demonstrate the necessary precautions when hand launching; (iii) demonstrate correct launch technique. 		
3	<p>Launch actions:</p> <ul style="list-style-type: none"> (a) if performing the launch of an RPA: <ul style="list-style-type: none"> (i) demonstrate smooth application of power and control and a controlled initial climb; (ii) work out a plan of action, in advance, to ensure the safest outcome in the event of abnormal operations; (iii) perform the checks mentioned in the RPA checklist set out in operator's operations manual; (iv) ensure the flight path for launching the RPA is clear of other aircraft, people and other hazards before launch. 	<ul style="list-style-type: none"> (a) initial climb is without major deviations in heading or attitude. 	<ul style="list-style-type: none"> (a) kind of RPA; (b) launch location; (c) remote pilot launch and launch by assistant; (d) different launch methods; (e) populated and unpopulated launch areas.

Schedule 5 Practical competency units

Appendix 2 Category specific units — Aeroplane category (contd.)

Unit 21 RA2 — Normal operations

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Straight and level:</i></p> <p>(a) operate the RPA in straight and level flight at the desired altitude;</p> <p>(b) identify and avoid terrain and traffic when operating the RPA.</p>	<p>(a) RPA to maintain a constant height and heading;</p> <p>(b) RPA is operated within its performance limitations.</p>	<p>(a) various meteorological conditions;</p> <p>(b) undulating terrain</p> <p>(c) near aerodromes and away from aerodromes;</p> <p>(d) daytime and night.</p>
2	<p><i>Climb:</i></p> <p>(a) operate the RPA at a constant angle of climb;</p> <p>(b) operate the RPA at a constant rate of climb.</p>	<p>(a) the RPA maintains:</p> <p>(i) an even rate of climb;</p> <p>(ii) a constant airspeed;</p> <p>(iii) a consistent climb angle.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>
3	<p><i>Trim:</i></p> <p>(a) trim the RPA to maintain the desired flight plan for the operation.</p>	<p>(a) trims the RPA to maintain a constant heading and height for approximately 10 seconds.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>
4	<p><i>Turns:</i></p> <p>(a) operate the RPA to perform turns that are properly co-ordinated;</p> <p>(b) operate the RPA to perform turns that are conducted within a nominated area;</p> <p>(c) operate the RPA so that level turns are at a constant altitude.</p>	<p>(a) the RPA remains within the nominated area;</p> <p>(b) turns are conducted at a constant altitude and radius;</p> <p>(c) RPA sink/skid is minimised during the turns;</p> <p>(d) completes turn within 15 degrees of stated final heading.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>
5	<p><i>Descent:</i></p>	<p>(a) the RPA maintains:</p> <p>(i) an even rate of descent;</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>

Item	Topic and requirement	Tolerances	Range of variables
	<p>If operating an RPA that is an aeroplane, the applicant must be able to...</p> <p>(a) descend the RPA at a constant angle of descent;</p> <p>(b) descend the RPA at a constant rate of descent;</p> <p>(c) use lift/drag devices appropriately during the descent of the RPA.</p>	<p>(ii) a constant airspeed;</p> <p>(iii) a consistent descent angle;</p> <p>(iv) consistent aircraft attitude.</p>	

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 2 Category specific units — Aeroplane category (contd.)

Unit 22 RA3 — Land and recover

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
1	<p>Recover RPA:</p> <ul style="list-style-type: none"> (a) allow sufficient space to align RPA for a stabilised approach to the place in which the RPA will land and be recovered; (b) maintain a constant landing position aim point for the RPA; (c) achieve a smooth, positively-controlled transition from final approach to touchdown, including the following: <ul style="list-style-type: none"> (i) minimise ballooning during flare; (ii) touchdown at a controlled rate of descent, in the specified touchdown zone within tolerances; (iii) maintain positive directional control and cross-wind correction after-landing where applicable; (iv) demonstrate smooth roll out control; (v) perform crosswind landings. 	<ul style="list-style-type: none"> (a) stable and controlled approach to land; (b) lands within the nominated area; (c) minimal deviations after landing; (d) keeps RPA within approach area during a crosswind landing; (e) landing speeds within 10% of recommended speed. 	<ul style="list-style-type: none"> (a) meteorological conditions; (b) landing surface type; (c) undercarriage type; (d) aeroplane landing configuration; (e) different recovery methods.

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
3	<p><i>Conduct a missed approach:</i></p> <ul style="list-style-type: none"> (a) recognise the conditions when a missed approach should be executed; (b) make the decision to execute a missed approach in a timely way; (c) carry out a missed approach and reposition for landing by doing the following: <ul style="list-style-type: none"> (i) select power, attitude and configuration to safely control RPA; (ii) manoeuvre RPA clear of the ground and conduct after launch procedures; (iii) make allowance for wind velocity during go-around. 	<ul style="list-style-type: none"> (a) maintains RPA within nominated area; (b) shows dexterity in configuring RPA for go-around; (c) RPA does not descend below nominated height. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator's; documented practices and procedures; (b) various meteorological conditions.

Schedule 5 Practical competency units

Appendix 2 Category specific units — Aeroplane category (contd.)

Unit 23 RA4 — Advanced manoeuvres

Item	Topic and requirement If operating and RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Enter and recover from stall:</i></p> <ul style="list-style-type: none"> (a) perform pre-manoeuvre checks for stalling RPA; (b) recognise stall signs and symptoms when operating the RPA; (c) control the RPA by applying the required pitch, roll and yaw inputs as appropriate in a smooth, coordinated manner to recover from the following manoeuvres: <ul style="list-style-type: none"> (i) incipient stall; (ii) stall with full power applied; (iii) stall without power applied; (iv) stall during straight and level operation, when climbing, when descending, during an approach to land configuration and when turning; (d) perform stall recovery with the RPA as follows: <ul style="list-style-type: none"> (i) positively reduce angle of attack; (ii) use power available and excess height to 	<ul style="list-style-type: none"> (a) minimal height loss RPA performance limits are not exceeded during the stall recovery; (b) perform recovery procedures in a timely manner; (c) control movements are made in a positive and precise manner; (d) desired flight path is quickly re-established. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator's documented practices and procedures; (b) various stall characteristics; (c) RPA at high and low heights.

Item	Topic and requirement If operating and RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
	<p>increase the aircraft energy state of the RPA;</p> <p>(iii) minimise height loss for simulated low altitude condition;</p> <p>(iv) re-establish desired flight path and controlled and balanced operation of the RPA;</p> <p>(e) recover the RPA from stall in simulated partial and complete thrust failure configurations.</p>		
2	<p>Figure of 8:</p> <p>(a) operate the RPA to demonstrate either an inward or outward figure of eight, without loss of height and with the crossover directions directly in front of the operator.</p>	<p>(a) turns are smooth and controlled;</p> <p>(b) turn radius is consistent;</p> <p>(c) height is maintained and sink is minimised during the turns;</p> <p>(d) the cross-over point is within 5 metres either side of the remote pilot;</p> <p>(e) the figure of eight loops are of similar size and radius.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) size of flight area;</p> <p>(c) various meteorological conditions.</p>
3	<p>Sideslip RPA (if permitted for the RPA by its manufacturer):</p> <p>(a) perform a straight sideslip by:</p> <p>(i) inducing slip to achieve increased rate of descent while maintaining</p>	<p>(a) sideslip is done in a controlled manner;</p> <p>(b) smooth control inputs; RPA remains stable during the manoeuvre</p> <p>(c) RPA is transitioned from a sideslip to controlled and balanced flight without</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) various slip characteristics;</p> <p>(c) RPA at high and low heights.</p>

Item	Topic and requirement If operating and RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
	<p>track and airspeed; and</p> <p>(ii) adjusting the rate of descent by coordinating the angle of bank and applied rudder;</p> <p>(b) recover the RPA from a sideslip and return it to controlled and balanced flight.</p>	<p>delay and with confidence;</p> <p>(d) flight profile is maintained within RPA performance limits.</p>	
4	<p><i>Control at a distance:</i></p> <p>(a) demonstrate accurate control and navigation at a distance of at least 200 m;</p> <p>(b) perform a horizontal rectangular pattern at a distance of 200 m;</p> <p>(c) demonstrate recovery of the RPA after it has lost orientation.</p>	<p>(a) the RPA maintains a constant height;</p> <p>(b) RPA turns are smooth;</p> <p>(c) heading corrections are minimised;</p> <p>(d) remote pilot shows coordination when flying the RPA towards him/herself.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) various sizes of RPA;</p> <p>(c) RPA at high and low heights.</p>

Schedule 5 Practical competency units

Appendix 2 Category specific units — Aeroplane category (contd.)

Unit 24 RA5 — Abnormal and emergency operations

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
1	<p>Manage loss of thrust – launch:</p> <p>(a) correctly identify loss of thrust after the RPA has been launched;</p> <p>(b) apply the highest priority to taking action to control the RPA;</p> <p>(c) maintain control of RPA;</p> <p>(d) perform initial actions from memory consistent with the operator’s documented practices;</p> <p>(e) manoeuvre the RPA to achieve the safest possible outcome to confidently state the actions being performed;</p> <p>(f) make a safe landing.</p>	<p>(a) identifies the problem in a timely way;</p> <p>(b) the RPA is configured correctly and in a timely manner for a forced landing;</p> <p>(c) best glide speed maintained;</p> <p>(d) RPA remains within the nominated area;</p> <p>(e) Safe landing achieved or guaranteed.</p>	<p>(a) activities are performed in accordance with operator’s documented practices and procedures;</p> <p>(b) location of operation;</p> <p>(c) loss of thrust at different stages of flight;</p> <p>(d) various metrological conditions.</p>
2	<p>Recover from unusual aircraft attitudes:</p> <p>(a) identify unusual attitude of the RPA during an operation for example, whether it is nose-high or nose-low;</p> <p>(b) recover the RPA from nose-low or nose-high unusual attitudes by adjusting pitch, bank and power to resume</p>	<p>(a) recovers in a timely manner;</p> <p>(b) uses efficient; control inputs</p> <p>(c) minimal loss of height;</p> <p>(d) airspeeds are consistent with published aircraft performance information.</p>	<p>(a) location of operation;</p> <p>(b) various metrological conditions.</p>

Item	Topic and requirement If operating an RPA that is an aeroplane, the applicant must be able to...	Tolerances	Range of variables
	<p>controlled and balanced operation;</p> <p>(c) to apply controlled corrective action while maintaining RPA performance within limits.</p>		
3	<p>Loss of control link:</p> <p>(a) operate the RPA to demonstrate the loss of link procedures.</p>	<p>(a) identifies the problem in a timely way;</p> <p>(b) timely application of procedures.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) various options for loss of command link.</p>
4	<p>Other emergency situations:</p> <p>(a) perform emergency manoeuvres with the RPA to avoid a collision with other aircraft.</p>	<p>(a) the RPA is manoeuvred correctly, confidently and without delay.</p>	<p>(a) by day and night;</p> <p>(b) various collision angles;</p> <p>(c) operations near and away from remote pilot.</p>

Schedule 5 Practical competency units

Appendix 3 Category specific units — Helicopter (multirotor class) category

Unit 25 RM1 — Control on ground, launch, hover and landing

Item	Topic and requirement If operating an RPA that is a multirotor, the applicant must be able to ...	Tolerances	Range of variables
1	<p><i>Control multirotor on the ground:</i></p> <p>(a) demonstrate control of the multirotor that is on the ground and has its rotors spinning.</p>	<p>(a) no tipping, moving or sliding of the RPA.</p>	<p>(a) activities are performed in accordance with operator’s documented practices and procedures;</p> <p>(b) type of multirotor;</p> <p>(c) calm and windy conditions.</p>
2	<p><i>Launch and hover:</i></p> <p>(a) launch the RPA to above eye-level, hover for ten seconds and land;</p> <p>(b) perform a half and quarter pirouette, pausing in each direction for 10 seconds.</p>	<p>(a) hover must be stable with heading and altitude reasonably constant;</p> <p>(b) the RPA must remain over the selected take-off position for at least 10 seconds, with no drift;</p> <p>(c) ‘nose’ of RPA must point towards ‘centre of circle’ during pirouette.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night;</p> <p>(c) RPA automation aids on or off.</p>
3	<p><i>Landing:</i></p> <p>(a) perform an approach and landing from straight down, vertical landing;</p> <p>(b) perform an approach and landing when the RPA is moving towards the holder of the remote pilot licence who is operating the RPA;</p> <p>(c) perform a landing from approach, when the</p>	<p>(a) the RPA must land within the nominated landing area;</p> <p>(b) stable approach to landing;</p> <p>(c) minimal bouncing on touchdown;</p> <p>(d) no damage to the RPA or its payload;</p> <p>(e) the RPA must land within 1 metre of the nominated landing position.</p>	<p>(a) activities are performed in accordance with operator’s documented practices and procedures;</p> <p>(b) various meteorological conditions;</p> <p>(c) open and confined landing area;</p> <p>(d) RPA automation aids on and off.</p>

Item	Topic and requirement	Tolerances	Range of variables
	<p>RPA is in a sideways orientation;</p> <p>(d) identify a landing is not likely to safe and a baulked landing procedure should be applied and the RPA operated to a nominated go-around point;</p> <p>(e) perform a rectangular circuit of the RPA followed by a straight line 45 degree descent to land in forward flight to a nominated point;</p> <p>(f) perform a 45 degree descent profile from a height in sideways operation to a nominated point before landing the RPA.</p>		

Schedule 5 Practical competency units

Appendix 3 Category specific units — Helicopter (multirotor class) category (contd.)

Unit 26 RM2 — Normal operations

Item	Topic and requirement If operating an RPA that is a multirotor, the applicant must be able to ...	Tolerances	Range of variables
1	<p><i>Control multirotor during normal operation:</i></p> <ul style="list-style-type: none"> (a) perform straight and level forwards operation to a marker, hold for ten seconds and return tail first; (b) perform a vertical rectangle, at least 5m high and 20m wide, with clockwise and counter clockwise 360 degree pirouettes; (c) perform a vertical circle, into hover and bottom of circle to perform a figure 8 at a constant altitude, in both an outwards and inwards direction; (d) perform an upside-down triangle with a 45 degree ascent and descent to and from a minimum height of 5 metres; (e) demonstrate operation in every direction in different orientation. 	<ul style="list-style-type: none"> (a) reasonably straight line out and back; (b) consistent height stable hover (heading and height) with minimal drift; (c) vertical circle must have an even radius and be completed at an even speed; (d) constant radius turns; (e) the RPA must come to a complete stop, before changing direction; (f) vertical circle must have an even radius and be completed at a consistent speed; (g) vertical flight manoeuvres with minimal drift. 	<ul style="list-style-type: none"> (a) various meteorological conditions; (b) size of vertical circle; (c) size of vertical rectangle; (d) size of flat eight; (e) inwards or outwards facing flat eight; (f) with and without RPA automation aids.

Schedule 5 Practical competency units

Appendix 3 Category specific units — Helicopter (multirotor class) category (contd.)

Unit 27 RM3 — Advanced manoeuvres

Item	Topic and requirement If operating an RPA that is a multirotor, the applicant must be able to ...	Tolerances	Range of variables
1	<p>Control multirotor in advanced manoeuvres:</p> <ul style="list-style-type: none"> (a) perform a straight and level forwards operation to a marker, hover, turn 180 degrees, and fly back nose-in and establish hover; (b) with the nose of the RPA in — move sideways for a minimum of 10 metres, establish hover and return to take off point; (c) perform a series of coordinated turns in both directions; (d) perform a nose-in hover at a distance of at least 300 m for a minimum of 20 seconds and land; (e) recover from a simulated loss of orientation of the RPA at a distance; (f) perform an eight point pirouette pausing at each point; (g) perform a 360 degree level turn in the hover. 	<ul style="list-style-type: none"> (a) reasonably straight line out and back; (b) consistent height; (c) stable hover (heading and height) with minimal drift; (d) reorientation of the RPA to be achieved in a timely manner; (e) RPA must remain at least 100 metres away from remote pilot, unless otherwise stated; (f) for the nose-in manoeuvre the nose of the RPA must point generally to the centre of the circle. 	<ul style="list-style-type: none"> (a) various meteorological conditions; (b) with and without RPA automation aids; (c) daytime and night.

Schedule 5 Practical competency units

Appendix 3 Category specific units — Helicopter (multirotor class) category (contd.)

Unit 28 RM4 — Operation in abnormal situations and emergencies

Item	Topic and requirement If operating an RPA that is a multirotor, the applicant must be able to ...	Tolerances	Range of variables
1	<p><i>Return to home and parachute deployment:</i></p> <p>(a) demonstrate the ‘return to home’ failsafe function if such a function is fitted to the RPA;</p> <p>(b) demonstrate or simulate a parachute deployment recovery system if such a system is fitted to the RPA.</p>	<p>(a) RPA must return home to the nominated location via the nominated path;</p> <p>(b) parachute deployment timely and safe.</p>	<p>(a) various meteorological conditions;</p> <p>(b) various flight modes;</p> <p>(c) various events leading to the need for the safety actions.</p>
2	<p><i>Manage abnormal situations:</i></p> <p>(a) demonstrate operating the RPA to avoid a vortex ring state;</p> <p>(b) demonstrate recovery from a vortex ring state to a landing.</p>	<p>(a) no damage to the RPA;</p> <p>(b) RPA handled with dexterity;</p> <p>(c) RPA lands in the nominated area.</p>	<p>(a) various meteorological conditions.</p>
3	<p><i>Control link corruption:</i></p> <p>(a) demonstrate the loss of command and control link procedures in accordance with the RPA operator’s documented practices and procedures.</p>	<p>(a) timely application of procedures.</p>	<p>(a) activities are performed in accordance with operator’s documented practices and procedures.</p>
3	<p><i>Safe forced landing and collision avoidance:</i></p>	<p>(a) no damage to RPA;</p> <p>(b) manoeuvres completed with a suitable safety margin.</p>	<p>(a) activities are performed in accordance with operator’s documented practices and procedures.</p>

Item	Topic and requirement If operating an RPA that is a multirotor, the applicant must be able to ...	Tolerances	Range of variables
	<ul style="list-style-type: none"> (a) perform a safe forced landing of the RPA; (b) perform emergency manoeuvres: <ul style="list-style-type: none"> (i) to avoid a collision with another aircraft; (ii) to avoid other risks to the safe operation of the RPA (including bird attack); (iii) to land the RPA safely in a confined landing area. 		

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 4 Category specific units — Helicopter (single rotor class) category

Unit 29 RH1 — Control on ground

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Start and stop engine or motor:</i></p> <ul style="list-style-type: none"> (a) ensure the RPA is in a suitable location for starting the engine and rotors of the RPA; (b) perform pre-start and start actions for the operation of the RPA; (c) perform shutdown and after-shutdown actions for the operation of the RPA; (d) control blade sailing during start and shut down of the operation of the RPA by appropriately positioning the RPA and using cyclic pitch; (e) comply with RPA operator’s documented practices and report deviations from the procedures as required under the procedures; (f) manage emergencies appropriately (including simulated emergencies). 	<ul style="list-style-type: none"> (a) start and stop the engine or motor in a timely manner; (b) show dexterity with engine or motor controls; (c) minimal blade sailing during start-up and shut-down; (d) emergency actions taken in a timely way. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator’s documented practices and procedures; (b) type of helicopter.
2	<p><i>Engage rotor:</i></p> <ul style="list-style-type: none"> (a) if applicable — set the engine or motor RPM within limits before rotor engagement for 	<ul style="list-style-type: none"> (a) engine/motor and rotor systems operated within RPA performance limits; (b) demonstrates dexterity in handling controls. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator’s documented practices and procedures; (b) type of helicopter.

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
	<p>the RPA for the operation;</p> <p>(b) if applicable — engage the rotor correctly for the RPA for the operation;</p> <p>(c) maintain motor or engine RPM within limits during rotor engagement when the RPA is being operated for the operation;</p> <p>(d) maintain disc position within operating limits as RPM for the rotor increases during the operation;</p> <p>(e) if applicable — operate the rotor brake for the RPA correctly during the operation.</p>		
3	<p><i>Control main rotor disc and anti-torque system:</i></p> <p>(a) maintain the correct main rotor disc attitude during all rotor RPM speeds and loads during the operation of the RPA;</p> <p>(b) if applicable — set the correct engine idle RPM for the RPA for the operation;</p> <p>(c) set the correct anti-torque trim position to compensate for main rotor torque for the RPA for the operation;</p> <p>(d) maintain the correct rotor disc attitude and rotor RPM at the same time as performing other tasks or actions in</p>	<p>(a) engine/motor and rotor systems operated within RPA performance limits;</p> <p>(b) demonstrates dexterity in handling controls.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) type of helicopter control systems;</p> <p>(c) calm and windy conditions.</p>

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
	relation to the operation.		

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 4 Category specific units — Helicopter (single rotor class) category (contd.)

Unit 30 RH2 — Launch, hover and landing

Item	Topic and requirement If operating an RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Launch, hover and landing:</i></p> <p>(a) launch the RPA to eye-level height and hover the RPA for ten seconds before landing the RPA;</p> <p>(b) perform a ‘nose in’ hover and a half and quarter pirouette;</p> <p>(c) to perform a rectangular circuit of the RPA followed by a straight line 45 degree descent to land in forward flight to a nominated point;</p> <p>(d) to perform a 45 degree descent profile from a five metre height in sideways operation at 90 degrees to the direction the RPA is facing to a nominated point before landing the RPA.</p>	<p>(a) hover must be stable with heading and altitude reasonably constant;</p> <p>(b) the RPA must remain over the selected take-off position for at least 10 seconds, with no drift;</p> <p>(c) the RPA must land within 1 metre of the nominated landing position;</p> <p>(d) nose points to ‘centre of circle’ during pirouette;</p> <p>(e) height is consistent during rectangle manoeuvre.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>

Schedule 5 Practical competency units

Appendix 4 Category specific units — Helicopter (single rotor class) category (contd.)

Unit 31 RH3 — Normal operation

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Control helicopter in normal operation:</i></p> <p>(a) operate the RPA in a straight line to 20 metres, return the RPA tail first, perform a brief hover and land the RPA;</p> <p>(b) perform a vertical circle, a brief hover and land the RPA;</p> <p>(c) perform a brief hover, a vertical rectangle, followed by returning to the point above the start point, a brief hover and landing the RPA;</p> <p>(d) briefly hover followed by executing a flat eight in any direction at a constant height, a brief hover and landing the RPA;</p> <p>(e) perform an upside down triangle with a 45 degree ascent and descent;</p> <p>(f) able to work out the RPA's orientation when it is at a long distance.</p>	<p>(a) the RPA must come to a complete stop, before changing direction;</p> <p>(b) flight is a reasonably straight line out and back, minimal drift throughout exercise;</p> <p>(c) vertical circle must have an even radius and be completed at a consistent speed;</p> <p>(d) horizontal flight manoeuvres must be completed at a constant altitude;</p> <p>(e) vertical flight manoeuvres must minimize drift;</p> <p>(f) minimal variations in height, constant radius turns and loops of equal size during the 'flat 8';</p> <p>(g) for (f), RPA must be at least 100 metres away from the remote pilot;</p> <p>(h) flying must be smooth with few undulations in the flight path;</p> <p>(i) landing must be within the nominated area.</p>	<p>(a) various meteorological conditions;</p> <p>(b) size of vertical circle;</p> <p>(c) size of vertical rectangle;</p> <p>(d) size of flat eight;</p> <p>(e) inwards or outwards facing flat eight.</p>

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
2	<p>Landing:</p> <ul style="list-style-type: none"> (a) perform an approach and landing from straight down, vertical landing; (b) perform an approach and landing when the RPA is moving towards the holder of the remote pilot licence who is operating the RPA; (c) perform a landing from approach, when the RPA is in a sideways orientation; (d) identify a landing is not likely to safe and a baulked landing procedure should be applied and the RPA operated to a nominated go-around point; (e) perform a rectangular circuit of the RPA followed by a straight line 45 degree descent to land in forward flight to a nominated point; (f) perform a 45 degree descent profile from a height in sideways operation to a nominated point before landing the RPA. 	<ul style="list-style-type: none"> (a) the RPA must land accurately within the nominated landing area; (b) landing to be controlled with even rate of descent consistent with a safe landing; (c) minimal bouncing on touchdown; (d) no damage to the RPA or its payload; (e) the RPA must land within 1 metre of the nominated landing position. 	<ul style="list-style-type: none"> (a) various meteorological conditions; (b) size of operating area; (c) daytime and night for landing manoeuvres.

Schedule 5 Practical competency units

Appendix 4 Category specific units — Helicopter (single rotor class) category (contd.)

Unit 32 RH4 — Advanced manoeuvres

Item	Topic and requirement If operating an RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
1	<p>Advanced manoeuvres:</p> <ul style="list-style-type: none"> (a) perform an eight point pirouette pausing at each point and then landing the RPA; (b) with the nose of the RPA pointed in — move sideways for a minimum of 10 metres, establish hover and return to take off point, hover and land nose in; (c) perform a series of coordinated turns in both directions; (d) perform a remote nose-in hover for a minimum of 20 seconds and land; (e) simulate a loss of orientation of the RPA at a distance and return the RPA to the place at which it was launched; (f) perform an eight point pirouette pausing at each point and then landing the RPA; (g) perform a nose-in 360 degree level turn in the hover. 	<ul style="list-style-type: none"> (a) each point in the pirouette must be held for at least 2 seconds; (b) keeping a constant height during the pirouette and nose-in hover; (c) for nose-in circle, the nose of the RPA must generally point into the centre of the circle; (d) stable hover (heading and height) with minimal drift; (e) procedure turns to have constant radius, be of equal size and constant height; (f) reorientation of the RPA to be achieved in a timely manner; (g) RPA must be at least 100 metres away from remote pilot. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator’s documented practices and procedures; (b) various sizes of RPA; (c) RPA at high and low heights.

Schedule 5 Practical competency units

Appendix 4 Category specific units — Helicopter (single rotor class) category (contd.)

Unit 33 RH5 — Operation in abnormal situations and emergencies

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
1	<p><i>Return to home:</i></p> <p>(a) demonstrate the ‘return to home’ failsafe function if such a function is fitted to the RPA.</p>	<p>(a) RPA must return home to the nominated location via the nominated path.</p>	<p>(a) various meteorological conditions;</p> <p>(b) selected flight mode.</p>
2	<p><i>Manage abnormal situations:</i></p> <p>(a) demonstrate operating the RPA to perform an autorotation to a safe landing;</p> <p>(b) demonstrate operating the RPA to avoid loss of tail effectiveness;</p> <p>(c) demonstrate operating the RPA to avoid a vortex ring state;</p> <p>(d) demonstrate operating the RPA to avoid ground resonance.</p>	<p>(a) no damage to the RPA;</p> <p>(b) RPA handled with dexterity;</p> <p>(c) RPA lands in the nominated area.</p>	<p>(a) various meteorological conditions.</p>
3	<p><i>Control link corruption:</i></p> <p>(a) demonstrate the loss of command and control link procedures in accordance with the RPA operator’s documented practices and procedures mentioned in paragraph 101.370 (b) of CASR.</p>	<p>(a) timely application of procedures.</p>	<p>(a) activities are performed in accordance with operator’s documented practices and procedures.</p>

Item	Topic and requirement If operating and RPA that is a single rotor, the applicant must be able to...	Tolerances	Range of variables
4	<p><i>Safe forced landing and collision avoidance:</i></p> <p>(a) perform a safe forced landing of the RPA;</p> <p>(b) perform emergency manoeuvres:</p> <p style="padding-left: 20px;">(i) to avoid a collision with another aircraft; and to avoid other risks to the safe operation of the RPA (including bird attack);</p> <p style="padding-left: 20px;">(ii) to land the RPA safely in a confined landing area.</p>	<p>(a) no damage to RPA;</p> <p>(b) manoeuvres completed with a suitable safety margin.</p>	<p>activities are performed in accordance with operator's documented practices and procedures.</p>

Schedule 5	Practical competency units
Appendix 5	Category specific units — powered-lift category
Unit 34	RP1 — Control on ground, launch, hover and landing

CONSULTATION DRAFT

Item	Topic and requirement	Tolerances	range of variables
1	<p>Control RPA on the ground:</p> <p>(a) demonstrate control of the RPA that is on the ground and has its rotors spinning.</p>	<p>(a) no tipping, moving or sliding of the RPA.</p> <p>(b) Activities are performed in accordance with operator's documented practices and procedures:</p>	<p>(a) type of powered-lift;</p> <p>(b) calm and windy conditions.</p>
1	<p>Launch and hover:</p> <p>(a) launch the RPA to above eye-level, hover for ten seconds and land.</p>	<p>(a) hover must be stable with heading and altitude reasonably constant;</p> <p>(b) the RPA must remain over the selected take-off position for at least 10 seconds, with no drift.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night RPA automation aids on and off.</p>

Item	Topic and requirement	Tolerances	range of variables
	<p>If operating an RPA that is in the powered-lift category, the applicant must be able to operate the RPA to...</p> <p>Landing:</p> <ul style="list-style-type: none"> (a) perform an approach and landing; (b) perform an approach and landing when the RPA is moving towards the remote pilot; (c) perform a landing from approach, when the RPA is in a sideways orientation; (d) identify a landing is not likely to be safe and a baulked landing procedure should be applied and the RPA operated to a nominated go-around point; (e) perform a rectangular circuit of the RPA followed by a straight line 45 degree descent to a nominated point and landing. 	<ul style="list-style-type: none"> (a) stable approach to landing; (b) minimal bouncing on touchdown; (c) no damage to the RPA or its payload; (d) the RPA must land within 2 metres of the nominated landing position. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator's documented practices and procedures; (b) various meteorological conditions; (c) open and confined landing area; (d) RPA automation aids on and off.

Schedule 5 Practical competency units

Appendix 5 Category specific units — powered-lift category (contd.)

Unit 35 RP2 — Transitional flight

Item	Topic and requirement If operating an RPA that is in the powered-lift category, the applicant must be able to...	Tolerances	For this range of variables
1	<p><i>Manual transitional flight:</i></p> <p>(a) accurately and safely transition the RPA from vertical flight to horizontal flight;</p> <p>(b) accurately and safely transition the RPA from vertical flight to climbing flight;</p> <p>(c) accurately and safely transition the RPA from horizontal flight to vertical flight;</p> <p>(d) accurately and safely transition the RPA from descending flight to vertical flight.</p>	<p>(a) RPA remains at a safe distance from people and obstacles during all manoeuvres;</p> <p>(b) airspeeds maintained within manufacturer's limits for the transitions where applicable.</p>	<p>(a) various meteorological conditions;</p> <p>(b) undulating terrain;</p> <p>(c) near aerodromes and away from aerodromes;</p> <p>(d) daytime and at night.</p>
2	<p><i>Abnormal manual transitional flight:</i></p> <p>(a) articulate suitable and achievable plan to recover the RPA from abnormal transition;</p> <p>(b) recover RPA from abnormal transition to vertical and climbing flight;</p> <p>(c) recover RPA from abnormal transition from horizontal and descending flight.</p>	<p>(a) implements recovery plan in a timely way;</p> <p>(b) demonstrates dexterity in controlling the aircraft.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and at night.</p>

Item	Topic and requirement If operating an RPA that is in the powered-lift category, the applicant must be able to...	Tolerances	For this range of variables
3	<p><i>Automated transitional flight:</i></p> <ul style="list-style-type: none"> (a) articulate suitable and achievable plan to recover the RPA from abnormal transition; (b) monitor transition to ensure safe flight; (c) implement recovery plan to ensure safe outcome. 	<ul style="list-style-type: none"> (a) implements recovery plan in a timely way. 	<ul style="list-style-type: none"> (a) various meteorological conditions; (b) daytime and at night.

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 5 Category specific units — powered-lift category (contd.)

Unit 36 RP3 — Climb, cruise and descent

Item	Topic and requirement If operating an RPA that is in the powered-lift category, the applicant must be able to...	Tolerances	
1	<p><i>Straight and level:</i></p> <p>(a) operate the RPA in straight and level flight at the desired altitude;</p> <p>(b) identify and avoid terrain and traffic when operating the RPA.</p>	<p>(a) RPA to maintain a constant height and heading;</p> <p>(b) RPA is operated within its performance limitations.</p>	<p>(a) various meteorological conditions;</p> <p>(b) undulating terrain;</p> <p>(c) near aerodromes and away from aerodromes;</p> <p>(d) daytime and night.</p>
2	<p><i>Climb:</i></p> <p>(a) operate the RPA at a constant angle of climb;</p> <p>(b) operate the RPA at a constant rate of climb.</p>	<p>the RPA maintains:</p> <p>(a) an even rate of climb;</p> <p>(b) a consistent climb angle.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>
3	<p><i>Trim:</i></p> <p>(a) trim the RPA to maintain the desired flight plan for the operation.</p>	<p>(a) trims the RPA to maintain a constant heading and height for approximately 10 seconds.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>
4	<p><i>Turns:</i></p> <p>(a) operate the RPA to perform turns that are properly co-ordinated;</p> <p>(b) operate the RPA to perform turns that are conducted within a nominated area;</p> <p>(c) operate the RPA so that level turns are at a constant altitude.</p>	<p>(a) the RPA remains within the nominated area;</p> <p>(b) turns are conducted at a constant altitude and radius;</p> <p>(c) RPA sink/skid is minimised during the turns;</p> <p>(d) completes turn within 15 degrees of stated final heading.</p>	<p>(a) various meteorological conditions;</p> <p>(b) daytime and night.</p>

Item	Topic and requirement If operating an RPA that is in the powered-lift category, the applicant must be able to...	Tolerances	
5	<p>Descent:</p> <ul style="list-style-type: none"> (a) descend the RPA at a constant angle of descent; (b) descend the RPA at a constant rate of descent; (c) use lift/drag devices appropriately during the descent of the RPA. 	<p>the RPA maintains:</p> <ul style="list-style-type: none"> (a) an even rate of descent; (b) a consistent descent angle; (c) consistent attitude. 	<ul style="list-style-type: none"> (a) various meteorological conditions; (b) daytime and night.

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 5 Category specific units — powered-lift category (contd.)

Unit 37 RP4 — Advanced manoeuvres

Item	Topic and requirement If operating an RPA that is powered-lift category, the applicant must be able to...	Tolerances	
1	<p><i>Enter and recover from stall in other than vertical flight:</i></p> <ul style="list-style-type: none"> (a) perform pre-manoeuvre checks for stalling RPA; (b) recognise stall signs and symptoms when operating the RPA; (c) control the RPA by applying the required pitch, roll and yaw inputs as appropriate in a smooth, coordinated manner to recover from the following manoeuvres: <ul style="list-style-type: none"> (i) incipient stall; (ii) stall with full power applied; (iii) stall without power applied; (iv) stall during other flight phases; (d) perform stall recovery with the RPA as follows: <ul style="list-style-type: none"> (i) positively reduce angle of attack; (ii) use power available and excess height to increase the aircraft energy state of the RPA; (iii) minimise height loss for simulated low altitude condition; 	<ul style="list-style-type: none"> (a) minimal height loss; (b) RPA performance limits are not exceeded during the stall recovery perform recovery procedures in a timely manner; (c) control movements are made in a positive and precise manner; (d) desired flight path is quickly re-established. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator’s documented practices and procedures; (b) various stall characteristics; (c) RPA at high and low heights.

Item	Topic and requirement If operating an RPA that is powered-lift category, the applicant must be able to...	Tolerances	
	<ul style="list-style-type: none"> (iv) re-establish desired flight path and controlled and balanced operation of the RPA; (e) recover the RPA from stall in simulated partial and complete thrust failure configurations. 		
2	<p>Figure 8:</p> <ul style="list-style-type: none"> (a) operate the RPA to demonstrate either an inward or outward figure 8, without loss of height and with the crossover directions directly in front of the operator. 	<ul style="list-style-type: none"> (a) turns are smooth and controlled; (b) turn radius is consistent; (c) height is maintained and sink is minimised during the turns; (d) the cross-over point is within 5 metres either side of the remote pilot; (e) the figure of eight loops are of similar size and radius. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator's documented practices and procedures; (b) size of flight area; (c) various meteorological conditions.
3	<p>Sideslip RPA (if permitted for the RPA):</p> <ul style="list-style-type: none"> (a) perform a straight sideslip by: <ul style="list-style-type: none"> (i) inducing slip to achieve increased rate of descent while maintaining track and airspeed; (ii) adjusting the rate of descent by coordinating the angle of bank and applied rudder; (b) recover the RPA from a sideslip and return it to controlled and balanced flight. 	<ul style="list-style-type: none"> (a) sideslip is done in a controlled manner; (b) smooth control inputs; (c) RPA remains stable during the manoeuvre; (d) RPA is transitioned from a sideslip to controlled and balanced flight without delay and with confidence; (e) flight profile is maintained within RPA performance limits. 	<ul style="list-style-type: none"> (a) activities are performed in accordance with operator's documented practices and procedures; (b) various slip characteristics; (c) RPA at high and low heights.

Item	Topic and requirement If operating an RPA that is powered-lift category, the applicant must be able to...	Tolerances	
4	<p><i>Control at a distance:</i></p> <p>(a) demonstrate accurate control and navigation at a distance of at least 200 m;</p> <p>(b) perform a horizontal rectangular pattern at a distance of 200 m;</p> <p>(c) demonstrate recovery of the RPA after it loss of orientation.</p>	<p>(a) the RPA maintains a constant height;</p> <p>(b) RPA turns are smooth;</p> <p>(c) heading corrections are minimised;</p> <p>(d) remote pilot shows coordination when flying the RPA towards him/herself.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) various sizes of RPA;</p> <p>(c) RPA at high and low heights.</p>

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 5 Category specific units — powered-lift category (contd.)

Unit 38 RP5 — Operation in abnormal situations and emergencies

Item	Topic and requirement If operating an RPA that is powered-lift category the applicant must be able to...	Tolerances	
1	<p><i>Manage loss of thrust in other than vertical flight:</i></p> <p>(a) correctly identify loss of thrust after the RPA has been launched;</p> <p>(b) apply the highest priority to taking action to control the RPA;</p> <p>(c) maintain control of RPA;</p> <p>(d) perform initial actions from memory consistent with the operator's documented practices and procedures;</p> <p>(e) manoeuvre the RPA to achieve the safest possible outcome;</p> <p>(f) confidently state the actions being performed;</p> <p>(g) make a safe landing.</p>	<p>(a) identifies the problem in a timely way;</p> <p>(b) the RPA is configured correctly and in a timely manner for a forced landing;</p> <p>(c) best glide speed maintained;</p> <p>(d) RPA remains within the nominated area;</p> <p>(e) safe landing achieved or guaranteed.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) location of operation;</p> <p>(c) loss of thrust at different stages of flight;</p> <p>(d) various metrological conditions.</p>
3	<p><i>Recover from unusual Aircraft attitudes in other than vertical flight:</i></p> <p>(a) identify unusual attitude of the RPA during an operation for example, whether it is nose-high or nose-low;</p> <p>(b) recover the RPA from nose-low or nose-high unusual attitudes and</p>	<p>(a) recovers in a timely manner;</p> <p>(b) uses efficient control inputs;</p> <p>(c) minimal loss of height;</p> <p>(d) airspeeds are consistent with published aircraft performance information where applicable.</p>	<p>(a) location of operation;</p> <p>(b) various metrological conditions.</p>

Item	Topic and requirement If operating an RPA that is powered-lift category the applicant must be able to...	Tolerances	
	<p>resume controlled and balanced operation;</p> <p>(c) apply controlled corrective action while maintaining RPA performance within limits.</p>		
4	<p>Loss of control link:</p> <p>(a) operate the RPA to demonstrate the loss of link procedures.</p>	<p>(a) identifies the problem in a timely way</p> <p>timely application of procedures.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures;</p> <p>(b) various options for loss of command link.</p>
5	<p>Other emergency situations:</p> <p>(a) perform emergency manoeuvres with the RPA to avoid a collision with other aircraft.</p>	<p>(a) the RPA is manoeuvred correctly, confidently and without delay;</p> <p>(b) airspeeds are consistent with any published aircraft performance information;</p>	<p>(a) by day and night;</p> <p>(b) various collision angles;</p> <p>(c) operations near and away from remote pilot.</p>
6	<p>Parachute deployment in vertical flight:</p> <p>(a) demonstrate or simulate a parachute deployment recovery system if such a system is fitted to the RPA.</p>	<p>(a) Parachute deployment timely and safe.</p>	<p>(a) various meteorological conditions;</p> <p>(b) various flight modes.</p>
7	<p>Manage abnormal situations:</p> <p>(a) demonstrate operating the RPA to avoid a vortex ring state;</p> <p>(b) demonstrate recovery from a vortex ring state to a safe landing.</p>	<p>(a) no damage to the RPA;</p> <p>(b) RPA handled with dexterity;</p> <p>(c) RPA lands in the nominated area.</p>	<p>(a) various meteorological conditions.</p>

Item	Topic and requirement If operating an RPA that is powered-lift category the applicant must be able to...	Tolerances	
8	<p><i>Safe forced landing:</i></p> <p>(a) perform a safe forced landing of the RPA;</p> <p>(b) land the RPA safely in confined landing area.</p>	<p>(a) no damage to RPA;</p> <p>(b) manoeuvres completed with a suitable safety margin.</p>	<p>(a) activities are performed in accordance with operator's documented practices and procedures.</p>

CONSULTATION DRAFT

Schedule 5 Practical competency units

Appendix 7 Any RPA with a liquid-fuel system

Unit 39 REF — Medium or large RPA with liquid-fuel system

Item	Topic and requirement If operating a large or medium RPA with a liquid-fuel system, the applicant must be able to...	Tolerances	
	<p><i>Practical operation standards:</i></p> <p>(a) before the operation:</p> <p style="padding-left: 20px;">(i) conduct fuel checks of the RPA before the RPA is operated;</p> <p style="padding-left: 20px;">(ii) confirm the required amount of fuel is on board the RPA to complete the operation safely with a reasonable reserve;</p> <p>(b) manage engine handling, temperature and oil pressures when the RPA is on the ground and during an operation of the RPA;</p> <p>(c) monitor fuel use during an operation of the RPA and manages the RPA to ensure that the RPA does not run out of fuel during the operation;</p> <p>(d) adjust the fuel mixture when the RPA is on the ground and during an operation of the RPA to achieve stated fuel burn</p>	<p>(a) operates engine and RPA within performance limits as set out in manuals;</p> <p>(b) lands with sufficient fuel reserves relative to flight duration;</p> <p>(c) manages fuel burn to within expected range;</p> <p>(d) takes timely action to remedy engine problems;</p> <p>(e) makes calculations accurately and within a reasonable time.</p>	<p>(a) type of RPA liquid-fuel system;</p> <p>(b) activities are performed in accordance with operator's documented practices and procedures.</p>

Item	Topic and requirement If operating a large or medium RPA with a liquid-fuel system, the applicant must be able to...	Tolerances	
	<p>rates or optimal engine performance;</p> <p>(e) refuel aircraft safely and complete post-fuelling checks;</p> <p>(f) complete operational and technical log;</p> <p>(g) make required calculations to complete a diversion from the original planned operation/destination;</p> <p>(h) remedy simple engine problems.</p>		

CONSULTATION DRAFT

Schedule 6 Flight Test Standards

Remote pilot licence — (RePL)

Appendix 1 Aeroplane category flight test

1. Flight test requirements

- 1.1 An applicant for a remote pilot licence in the aeroplane category must demonstrate his or her competency as follows: for each unit of competency mentioned in a unit coded item in a row of column 1 of the table in clause 3, he or she must perform all of the manoeuvres for the RPA mentioned in column 2 of the item, within the relevant accuracy/tolerances specified in column 3 of the item for the manoeuvre.
- 1.2 For subclause 1.1, a sustained deviation outside the applicable flight tolerance is not permitted.
- 1.3 For topic/requirement (v) in item 1 of Unit 21 - RA3 – Land and recover, in Appendix 2 of Schedule 5, if sufficient cross-wind conditions do not exist at the time of the flight test then, the element may be excluded from the flight test provided the flight test examiner (the *examiner*) is satisfied that the applicant's training records indicate that relevant competency has been achieved during training.
- 1.4 Manoeuvres may be completed in automated flight mode if:
 - (a) there is no option for manual flight; or
 - (b) the applicant chooses to qualify with an 'automated only' restriction on his or her RePL.

2. Knowledge requirements

The applicant may be required by the examiner to demonstrate his or her knowledge of the following with respect to the operation of an RPA in the aeroplane category:

- (a) the limitations of the licence;
- (b) normal, abnormal and emergency flight procedures;
- (c) operating limitations;
- (d) weight and balance limitations;
- (e) aircraft performance data, including take-off and landing performance data;
- (f) flight planning and risk assessment;
- (g) applicability of drug and alcohol regulations;
- (h) in-flight data requirements (for example, GPS height);
- (i) emergency equipment;
- (j) energy planning for the flight;
- (k) managing payload and bystanders;
- (l) battery management;
- (m) RPAS functions and features, including the meaning of any audible or visual indications.

3. Practical flight standards

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RC1	Pre- and post-flight actions and procedures	(a) Assembly, inspection and preparation of the aircraft and ground station for flight, referring to the operator's procedures manual as required; (b) disassembly and post-flight procedures.	(a) Familiarisation with equipment and manuals to successfully assemble and disassemble the system; (b) all pre- and post-flight procedures completed correctly; (c) dexterity with equipment/tooling; (d) completes a post-flight damage inspection.
RC2	Energy management	<i>Electric-powered RPA:</i> (a) identifies the amount of energy required and available for each flight stage, including reserves; (b) changes batteries within reserve limits (as required); (d) carries out fuel quality and contamination checks; (e) ensures RPS power within limits.	(a) The calculated RPA operation endurance is within +/- 10%; (b) sufficient reserves are available to cover variations and contingencies; (c) RPA operated within manufacturer's or operator's voltage and current limits.
		<i>Very small or small RPA with liquid-fuel system:</i> (a) identifies the amount of energy available for each flight stage, including reserves; (b) confirms correct amount of fuel is on aircraft; (c) fuels and refuels as required; (d) ensures RPS power within limits; (e) carries out fuel quality and contamination checks.	(a) The calculated RPA operation endurance is within +/- 10%; (b) sufficient reserves are available to cover variations and contingencies; (c) safe fuelling and refuelling procedures; (d) identifies correct fuel grade.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RC3	Manage crew, payload and bystanders	(a) Communicates effectively with simulated crew and bystanders; (b) ensures payloads are correctly attached and suitable for the RPA (as applicable).	[No tolerances.]
RNT	Autoflight systems for RPAS	(a) Performs examiner-selected items/ manoeuvres in flight test schedule using automated flight controls; (b) programs RPAS to complete an amendment to the planned flight; (c) safely manages the RPA in an emergency situation.	(a) Demonstrates good understanding of automated flight modes; (b) programs flight and amendment to plan in a timely way; (c) flies the RPA accurately in manoeuvres, including landings and hovers.
RAF	Non-technical skills for RPAS	(a) Maintains effective look-out for other aircraft and hazards; (b) maintains situational awareness; (c) sets priorities and makes good decisions.	(a) Identifies and effectively manages hazards associated with the flight of the RPA; (b) chooses safest option when confronted with hazardous situation.
RA1	Ground operation and launch	(a) Where applicable, taxi aircraft to take-off commencement point; (b) launch the aircraft or take-off and fly a circuit pattern; (c) where applicable, trim aircraft.	(a) Aircraft taxied safely, and taxi/pre-take-off checks completed; (b) safe, stable controlled launch/take-off; (c) even rate of climb; (d) maintains nominated circuit height; (e) where applicable, aircraft trimmed correctly for each stage of flight; (f) lateral distances should be sufficient to allow stabilised final approach segment.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RA2	Normal operations	(a) Complete procedure turns both left and right.	(a) Turns should be straight and level with minimal variation in height; (b) turns should be of an equal radius, independent of wind direction.
		(b) Complete steep turns in different directions.	(a) Turns should be straight and level with minimal variation in height; (b) turns should be of a constant radius; independent of wind direction.
RA3	Land or recover	(a) Overfly the landing area at circuit height and then complete a landing with touch and go (remain 5 metres off the ground if no undercarriage); (b) repeat in opposite direction.	(a) Approach attitude controlled by elevator and constant; (b) stabilised descent controlled by power; (c) aircraft accurately positioned for landing; (d) constant climb away angle.
RA4	Advanced manoeuvres	<i>Inward and outward figure of eight:</i> (a) fly at nominated height away from pilot and turn left or right 90 degrees; fly 30 metres at a constant height turn left or right 180 degrees and fly back past pilot for a further 30 metres; then turn in the opposite direction 180 degrees again and then fly back to centre point opposite pilot and repeat twice more.	(a) Accurate altitude control; (b) equal circle size and crossover point directly in front of pilot.
		(b) demonstrate the use of all available flight modes.	(a) Familiar with all modes and demonstrates competent ability to use them.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
		<p>(c) simulate the most complex task the applicant will be performing when qualified, using all available control method/s, radio procedures where applicable.</p> <p>[The manoeuvre must assume full crew/team available and examiner is an informed participant requiring briefing if applicable.]</p>	<p>(a) Maintains safe distance from obstacles;</p> <p>(b) other relevant tolerances at examiner's discretion;</p> <p>(c) conducts suitable team briefing, including intent of operation, emergency plans, any other specific relevant tasking for team members.</p>
RA5	Abnormal situations and emergencies	<p><i>Glide approach/simulated 'dead stick':</i></p> <p>The manoeuvre must:</p> <p>(a) simulate zero power landing by bringing throttle to idle on command;</p> <p>(b) land/recover the aircraft without using engine/motor power from circuit height at a position over the landing area;</p>	<p>(a) Uses elevators to maintain slight nose down attitude;</p> <p>(b) manoeuvres the aircraft to a suitable position to land in the landing/recovery area;</p> <p>(c) maintains safe control of the aircraft;</p> <p>(d) completes pre-landing/recovery checks.</p>
		<p>(c) demonstrate/simulate the use of all available fail-safe equipment and modes;</p>	<p>(a) Familiar with fail-safe features and how to use them effectively in flight;</p> <p>(b) ensures safe outcome from abnormal/emergency scenarios.</p>
		<p>(d) recover from aerodynamic stall in different configurations.</p>	<p>(a) Correct recovery technique used;</p> <p>(b) returns to safe level flight.</p>

Schedule 6 Flight Test Standards

Remote pilot licence — (RePL)

Appendix 2 Helicopter category (Multirotor class) flight test

1. Flight test requirements

- 1.1 An applicant for a remote pilot licence in the Helicopter category (Multirotor class) must demonstrate his or her competency as follows: for each unit of competency mentioned in a unit coded item in a row of column 1 of the table in clause 3, he or she must perform all of the manoeuvres for the RPA mentioned in column 2 of the item, within the relevant accuracy/tolerances specified in column 3 of the item for the manoeuvre.
- 1.2 For subclause 1.1, a sustained deviation outside the applicable flight tolerance is not permitted.
- 1.3 For Unit codes RM1 and RM2 in the table in clause 3, if sufficient cross-wind conditions do not exist at the time of the flight test then, the element may be excluded from the flight test provided the flight test examiner (the examiner) is satisfied that the applicant's training records indicate that relevant competency has been achieved during training.
- 1.4 Manoeuvres may be completed in automated flight mode if:
 - (a) there is no option for manual flight; or
 - (b) the applicant chooses to qualify with an 'automated only' restriction on his or her RePL.

2. Knowledge requirements

The applicant may be required by the examiner to demonstrate his or her knowledge of the following with respect to the operation of an RPA in the Helicopter category (Multirotor class):

- (a) the limitations of the licence;
- (c) normal, abnormal and emergency flight procedures;
- (d) operating limitations;
- (e) weight and balance limitations;
- (f) aircraft performance data, including take-off and landing performance data;
- (g) flight planning and risk assessment;
- (h) applicability of drug and alcohol regulations;
- (i) in-flight data requirements (for example, GPS height);
- (j) emergency equipment;
- (k) energy planning for the flight;
- (l) managing payload and bystanders;
- (m) battery management;
- (n) RPAS functions and features, including the meaning of any audible or visual indications.

3. Practical flight standards

Unit code	Unit of competency	Item/manoeuvre	Accuracy/Tolerances
RC1	Pre- and post-flight actions and procedures	<p>(a) Assembly and preparation of the aircraft and ground station for flight, referring to the operator's procedures manual as required;</p> <p>(b) disassembly and post-flight procedures.</p>	<p>(a) Familiar with equipment and manuals to successfully assemble and disassemble the system;</p> <p>(b) all pre- and post-flight procedures completed correctly;</p> <p>(c) dexterity with equipment/tooling.</p>
RC2	Energy management	<p><i>Electric-powered RPA:</i></p> <p>(a) identifies the amount of energy required and available for each flight stage, including reserves;</p> <p>(b) changes batteries within reserve limits (as required);</p> <p>(d) carries out fuel quality and contamination checks;</p> <p>(e) ensures RPS power within limits.</p>	<p>(a) The calculated RPA operation endurance is within +/- 10%;</p> <p>(b) sufficient reserves are available to cover variations and contingencies;</p> <p>(c) RPA operated within manufacturer's or operator's voltage and current limits.</p>
		<p><i>Very small or small RPA with liquid-fuel system:</i></p> <p>(a) identifies the amount of energy available for each flight stage, including reserves;</p> <p>(b) confirms correct amount of fuel is on aircraft;</p> <p>(c) fuels and refuels as required;</p> <p>(d) ensures RPS power within limits;</p> <p>(e) carries out fuel quality and contamination checks.</p>	<p>(a) The calculated RPA operation endurance is within +/- 10%;</p> <p>(b) sufficient reserves are available to cover variations and contingencies;</p> <p>(c) safe fuelling and refuelling procedures;</p> <p>(d) identifies correct fuel grade.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/Tolerances
RC3	Manage crew, payload and bystanders	(a) Communicates effectively with simulated crew and bystanders; (b) ensures payloads are correctly attached and suitable for the RPA (as applicable).	[No tolerances.]
RAF	Autoflight systems for RPAS	(a) Performs examiner-selected items/ manoeuvres in flight test schedule using automated flight controls; (b) programs RPAS to complete an amendment to the planned flight; (c) safely manages the RPA in an emergency situation.	(a) Demonstrates good understanding of automated flight modes. (b) programs flight and amendment to plan in a timely way; (c) flies the RPA accurately in manoeuvres, including landings and hovers.
RNT	Non-technical skills for RPAS	(a) Maintains effective look-out for other aircraft and hazards; (b) maintains situational awareness; (c) sets priorities and makes good decisions.	(a) Identifies and effectively manages hazards associated with the flight of the RPA; (b) chooses safest option when confronted with hazardous situation.
RM1	Control on ground, launch, hover and landing	(a) Start engines/ motors and ready aircraft for lift-off; (b) lift-off to height of 2 metres, hover for 10 seconds, land.	(a) Controlled ascent and descent with minimal drift throughout exercise; (b) stable hover.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/Tolerances
RM2	Normal operations	<p>Without GPS hold:</p> <p>(a) Lift-off to height of 2 metres and establish stable hover;</p> <p>(b) fly straight out for 10 metres (over cone);</p> <p>(c) re-establish hover, return tail first;</p> <p>(d) re-establish hover and land on lift-off spot;</p> <p>(e) repeat above with 'GPS hold' on.</p>	<p>(a) Controlled ascent and descent with minimal drift (including height) throughout;</p> <p>(b) stable hover;</p> <p>(c) straight line out and back;(d) land accurately in take-off spot.</p>
		<p>(a) Lift-off to height of 5 metres and turn aircraft 90 degrees left or right, turn opposite direction 180 degrees, turn back 90 degrees;</p> <p>(b) land at lift-off spot.</p>	<p>(a) Controlled ascent and descent with minimal drift (including height) throughout exercise;</p> <p>(b) stable hover;</p> <p>(c) accurate landing at lift-off position.</p>
RM3	Advanced manoeuvres	<p>Figure of eight:</p> <p>(a) Lift-off to height of 5 metres, establish stable hover, turn left or right 90 degrees fly 10 metres at a constant height;</p> <p>(b) without stopping, turn outward 180 degrees and fly back past pilot for a further 10 metres;</p> <p>(c) without stopping turn outward 180 degrees again and then fly back to starting point;</p> <p>(d) turn outwards (tail towards pilot) hover and land.</p>	<p>(a) Turns should be accurate and over nominated points [<i>Cones should be placed at the 180 degree turn points.</i>];</p> <p>(b) smooth flying with even, balanced turns;</p> <p>(c) airspeed should be consistent from when the RPA departs the first hover until entering the final hover;</p> <p>(d) accurate landing at nominated spot.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/Tolerances
		<p><i>Vertical rectangle:</i></p> <p>(a) Lift-off to height of 2 metres and hover and complete a vertical nose out rectangle climbing to 10 metres high and 10 metres wide. [First movement is sideways left or right; remote pilot should be at the middle of the 10-metre side; sides (vertical axis) should be half way between the pilot and marker cone.]</p>	<p>(a) Smooth flying with even and controlled ascent and descent rates;</p> <p>(b) no drift (especially forward or back);</p> <p>(c) accurately positions aircraft.</p>
		<p>(a) Simulate the most complex task the applicant will be performing when qualified, using all available control method/s, radio procedures where applicable.</p> <p>[Assume full crew/team available and assume examiner is an informed participant requiring briefing if applicable.]</p>	<p>(a) Maintains safe distance from object of inspection/photo;</p> <p>(b) other relevant tolerances at examiner's discretion;</p> <p>(c) conducts suitable team briefing, including intent of operation, emergency plans, any other specific relevant tasking for team members.</p>
RM4	Abnormal situations and emergencies	<p>(a) From normal flight at a position approximately 50 metres away from the pilot, fly the RPA back to the take-off position and land keeping 5 metres from all marker cones while in full manual mode (that is, no stabilisation or GPS).</p> <p><i>Note</i> Applicants should not undertake this task unless confident to operate in full manual mode.</p>	<p>(a) Applicant manoeuvres and lands RPA safely without GPS or other stabilisation.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/Tolerances
		(a) Simulated emergency including activation of fail-safe functions/equipment; (b) safe termination of flight in other degraded modes of operation at examiner's discretion.	(a) Applicant demonstrates an understanding of failure modes and terminates flight safely.

CONSULTATION DRAFT

Schedule 6 Flight Test Standards

Remote pilot licence — (RePL)

Appendix 3 Helicopter category (Single-rotor class) flight test

1. Flight test requirements

- 1.1 An applicant for a remote pilot licence in the Helicopter category (Multirotor class) must demonstrate his or her competency as follows: for each unit of competency mentioned in a unit coded item in a row of column 1 of the table in clause 3, he or she must perform all of the manoeuvres for the RPA mentioned in column 2 of the item, within the relevant accuracy/tolerances specified in column 3 of the item for the manoeuvre.
- 1.2 For subclause 1.1, a sustained deviation outside the applicable flight tolerance is not permitted.
- 1.3 For Unit codes RH2 and RH3 in the table in clause 3, if sufficient cross-wind conditions do not exist at the time of the flight test then, the element may be excluded from the flight test provided the flight test examiner (the *examiner*) is satisfied that the applicant's training records indicate that relevant competency has been achieved during training.
- 1.4 Manoeuvres may be completed in automated flight mode if:
 - (a) there is no option for manual flight; or
 - (b) the applicant chooses to qualify with an 'automated only' restriction on his or her RePL;
 - (c) Knowledge requirements.

The applicant may be required by the flight test examiner to demonstrate his or her knowledge of the following with respect to the operation of an RPA in the Helicopter category (Single-rotor class):

- (a) the limitations of the licence;
- (b) normal, abnormal and emergency flight procedures;
- (c) operating limitations;
- (d) weight and balance limitations;
- (e) aircraft performance data, including take-off and landing performance data;
- (f) flight planning and risk assessment;
- (g) applicability of drug and alcohol regulations;
- (h) in-flight data requirements (for example, GPS height);
- (i) emergency equipment;
- (j) energy planning for the flight;
- (k) managing payload and bystanders;
- (l) battery management;
- (m) RPAS functions and features, including the meaning of any audible or visual indications.

2. Practical flight standards

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RC1	Pre- and post-flight actions and procedures	<ul style="list-style-type: none"> (a) Assembly and preparation of the aircraft and ground station for flight, referring to the operator's procedures manual as required; (b) disassembly and post-flight procedures. 	<ul style="list-style-type: none"> (a) Familiar with equipment and manuals to successfully assemble and disassemble the system; (b) all pre- and post-flight procedures completed correctly; (c) dexterity with equipment/tooling.
RC2	Energy management	<p>Electric-powered RPA:</p> <ul style="list-style-type: none"> (a) identifies the amount of energy required and available for each flight stage, including reserves; (b) changes batteries within reserve limits (as required); (c) ensures RPS power within limits. <p>Very small or small RPA with liquid-fuel system:</p> <ul style="list-style-type: none"> (a) identifies the amount of energy available for each flight stage, including reserves; (b) confirms correct amount of fuel is on aircraft; (c) fuels and refuels as required; (d) carries out fuel quality and contamination checks; (e) ensures RPS power within limits. 	<ul style="list-style-type: none"> (a) The calculated RPA operation endurance is within +/- 10%; (b) sufficient reserves are available to cover variations and contingencies; (c) RPA operated within manufacturer's or operator's voltage and current limits. <ul style="list-style-type: none"> (a) The calculated RPA operation endurance is within +/- 10%; (b) sufficient reserves are available to cover variations and contingencies; (c) safe fuelling and refuelling procedures; (d) identifies correct fuel grade.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RC3	Manage crew, payload and bystanders	<ul style="list-style-type: none"> (a) Communicates effectively with simulated crew and bystanders; (b) ensures payloads are correctly attached and suitable for the RPA (as applicable). 	[No tolerances.]
RAF	Autoflight systems for RPAS	<ul style="list-style-type: none"> (a) Performs examiner-selected items/ manoeuvres in flight test schedule using automated flight controls; (b) programs RPAS to complete an amendment to the planned flight; (c) safely manages the RPA in an emergency situation. 	<ul style="list-style-type: none"> (a) Demonstrates good understanding of automated flight modes; (b) programs flight and amendment to plan in a timely way; (c) flies the RPA accurately in manoeuvres, including landings and hovers.
RNT	Non-technical skills for RPAS	<ul style="list-style-type: none"> (a) Maintains effective look-out for other aircraft and hazards; (b) maintains situational awareness; (c) sets priorities and makes good decisions. 	<ul style="list-style-type: none"> (a) Identifies and effectively manages hazards associated with the flight of the RPA; (b) chooses safest option when confronted with hazardous situation.
RH1	Control on ground	<ul style="list-style-type: none"> (a) Start engines/motors and ready aircraft for lift-off; (b) lift-off to height of 2 metres, hover for 10 seconds, land. 	<ul style="list-style-type: none"> (a) Controlled ascent and descent with minimal drift throughout exercise; (b) stable hover.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RH2	Launch, hover and landing	<p><i>Without GPS hold:</i></p> <p>(a) lift-off to height of 2 metres and establish stable hover;</p> <p>(b) fly straight out for 10 metres (over cone);</p> <p>(c) re-establish hover, return tail first;</p> <p>(d) re-establish hover and land on lift-off spot;</p> <p>(e) repeat above with 'GPS hold' on.</p>	<p>(a) Controlled ascent and descent with minimal drift (including height) throughout;</p> <p>(b) stable hover;</p> <p>(c) straight line out and back;</p> <p>(d) land accurately in take-off spot.</p>
RH3	Normal operations	<p>(a) Lift-off to height of 5 metres. and turn aircraft 90 degrees left or right; turn opposite direction 180 degrees; turn back 90 degrees;</p> <p>(b) land at lift-off spot.</p>	<p>(a) Controlled ascent and descent with minimal drift (including height) throughout exercise;</p> <p>(b) stable hover;</p> <p>(c) accurate landing at lift-off position.</p>
		<p>(a) Lift-off to height of 5 metres. and turn aircraft 90 degrees left or right, turn opposite direction 180 degrees, turn back 90 degrees;</p> <p>(b) land at lift-off spot.</p>	<p>(a) Controlled ascent and descent with minimal drift (including height) throughout exercise;</p> <p>(b) stable hover;</p> <p>(c) accurate landing at lift-off position.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RH4	Advanced manoeuvres	<p>Figure of eight:</p> <p>(a) Lift-off to height of 5 metres, establish stable hover, turn left or right 90 degrees fly 10 metres at a constant height and without stopping, turn outward 180 degrees and fly back past pilot for a further 10 metres and without stopping, turn outward 180 degrees again and then fly back to starting point;</p> <p>(b) turn outwards (tail towards pilot) hover and land.</p>	<p>(a) Turns should be accurate and over nominated points [<i>Cones should be placed at the 180 degree turn points.</i>];</p> <p>(b) smooth flying with even, balanced turns;</p> <p>(c) airspeed should be consistent from when the RPA departs the first hover until entering the final hover;</p> <p>(d) accurate landing at nominated spot.</p>
		<p>Vertical rectangle:</p> <p>(a) lift-off to height of 2 metres and hover;</p> <p>(b) complete a vertical nose out 10 metres wide rectangle climbing to 10 metres high.</p> <p><i>Note</i> First movement is sideways left or right. Pilot should be at the middle of the 10-metre side, and sides (vertical axis) should be half way between the pilot and a marker cone.</p>	<p>(a) Smooth flying with even and controlled ascent and descent rates;</p> <p>(b) no drift (especially forward and back);</p> <p>(c) accurately positions aircraft.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
		<p>(a) Simulate the most complex task the applicant will be performing when qualified, using all available control method/s and radio procedures where applicable.</p> <p>Assume full crew/team available, and assume examiner is an informed participant requiring briefing if applicable.</p>	<p>(a) Maintains safe distance from object of inspection/photo;</p> <p>(b) other relevant tolerances at examiner's discretion;</p> <p>(c) conducts suitable team briefing, including intent of operation, emergency plans, any other specific relevant tasking for team members.</p>
RH5	Abnormal situations and emergencies	<p>(a) From normal flight, at a position approximately 50 metres away from the pilot, fly the RPA back to the take-off position and land, keeping 5 metres from all marker cones while in full manual mode (that is, no stabilisation or GPS).</p> <p><i>Note</i> Applicants should not undertake this task unless confident to operate in full manual mode.</p> <p>(a) Simulated emergency including activation of fail-safe functions/equipment;</p> <p>(b) safe termination of flight in other degraded modes of operation at examiner's discretion.</p>	<p>(a) Applicant manoeuvres and lands RPA safely without GPS or other stabilisation.</p> <p>(a) Applicant demonstrates an understanding of failure modes and terminates flight safely.</p>

Schedule 6 Flight Test Standards

Remote pilot licence — (RePL)

Appendix 4 Powered-lift category flight test

1. Flight test requirements

- 1.1 An applicant for a remote pilot licence in the aeroplane category must demonstrate his or her competency as follows: for each unit of competency mentioned in a unit coded item in a row of column 1 of the table in clause 3, he or she must perform all of the manoeuvres for the RPA mentioned in column 2 of the item, within the relevant accuracy/tolerances specified in column 3 of the item for the manoeuvre.
- 1.2 For subclause 1.1, a sustained deviation outside the applicable flight tolerance is not permitted.
- 1.3 For Unit codes RP1, RP2 and RP3 in the table in clause 3, if sufficient cross-wind conditions do not exist at the time of the flight test then, the element may be excluded from the flight test provided the flight test examiner (the examiner) is satisfied that the applicant's training records indicate that relevant competency has been achieved during training.
- 1.4 Manoeuvres may be completed in automated flight mode if:
 - (a) there is no option for manual flight; or
 - (b) the applicant chooses to qualify with an 'automated only' restriction on his or her RePL.

2. Knowledge requirements

The applicant may be required by the flight test examiner to demonstrate his or her knowledge of the following with respect to the operation of an RPA in the Powered-lift category:

- (a) the limitations of the licence;
- (b) normal, abnormal and emergency flight procedures;
- (c) operating limitations;
- (d) weight and balance limitations;
- (e) aircraft performance data, including take-off and landing performance data;
- (f) flight planning and risk assessment;
- (g) applicability of drug and alcohol regulations;
- (h) in-flight data requirements (for example, GPS height);
- (i) emergency equipment;
- (j) energy planning for the flight;
- (k) managing payload and bystanders;
- (l) battery management;
- (m) RPAS functions and features, including the meaning of any audible or visual indications.

3. Practical flight standards

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RC1	Pre- and post-flight actions and procedures	<ul style="list-style-type: none"> (a) Assembly and preparation of the aircraft and ground station for flight, referring to the operator's procedures manual as required; (b) disassembly and post-flight procedures. 	<ul style="list-style-type: none"> (a) Familiar with equipment and manuals to successfully assemble and disassemble the system; (b) all pre- and post-flight procedures completed correctly; (c) dexterity with equipment/tooling.
RC2	Energy management	<p><i>Electric-powered RPA:</i></p> <ul style="list-style-type: none"> (a) identifies the amount of energy required and available for each flight stage, including reserves; (b) changes batteries within reserve limits; (c) ensures RPS power within limits; (d) carries out fuel quality and contamination checks; (e) ensures RPS power within limits. 	<ul style="list-style-type: none"> (a) The calculated RPA operation endurance is within +/- 10%; (b) sufficient reserves are available to cover variations and contingencies; (c) RPA operated within manufacturer's or operator's voltage and current limits.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
		<p>Very small or small RPA with liquid-fuel system:</p> <p>(a) identifies the amount of energy available for each flight stage, including reserves;</p> <p>(b) confirms correct amount of fuel is on aircraft;</p> <p>(c) fuels and refuels as required;</p> <p>(d) ensures RPS power within limits;</p> <p>(e) carries out fuel quality and contamination checks.</p>	<p>(a) The calculated RPA operation endurance is within +/- 10%;</p> <p>(b) sufficient reserves are available to cover variations and contingencies;</p> <p>(c) safe fuelling and refuelling procedures;</p> <p>– (d) identifies correct fuel grade.</p>
RC3	Manage crew, payload and bystanders	<p>(a) Communicates effectively with simulated crew and bystanders;</p> <p>(b) ensures payloads are correctly attached and suitable for the RPA (as applicable).</p>	[No tolerances.]
RAF	Autoflight systems for RPAS	<p>(a) Performs examiner-selected items/ manoeuvres in flight test schedule using automated flight controls;</p> <p>(b) programs RPAS to complete an amendment to the planned flight;</p> <p>(c) safely manages the RPA in an emergency situation.</p>	<p>(a) Demonstrates good understanding of automated flight modes;</p> <p>(b) programs flight and amendment to plan in a timely way;</p> <p>(c) flies the RPA accurately in manoeuvres, including landings and hovers.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RNT	Non-technical skills for RPAS	<ul style="list-style-type: none"> (a) Maintains effective look-out for other aircraft and hazards; (b) maintains situational awareness; (c) sets priorities and makes good decisions. 	<ul style="list-style-type: none"> (a) Identifies and effectively manages hazards associated with the flight of the RPA; (b) chooses safest option when confronted with hazardous situation.
RP1	Control on ground, launch, hover and landing	<ul style="list-style-type: none"> (a) Start engines/ motors and ready aircraft for lift-off; (b) lift-off to height of 2 metres, hover for ten seconds, land. 	<ul style="list-style-type: none"> (a) Controlled ascent and descent with minimal drift throughout exercise; (b) stable hover.
		<p>Without GPS hold:</p> <ul style="list-style-type: none"> (a) lift-off to height of 2 metres and establish stable hover; (b) fly straight out for 10 metres (over cone); (c) re-establish hover, return tail first; (d) re-establish hover and land on lift-off spot; (e) Repeat above with 'GPS hold' on. 	<ul style="list-style-type: none"> (a) Controlled ascent and descent with minimal drift (including height) throughout; (b) stable hover; (c) straight line out and back; (d) land accurately in take-off spot.
RP2	Transition to and from vertical flight	<p>Manual transitional flight:</p> <ul style="list-style-type: none"> (a) accurately and safely transition the RPA from vertical flight to horizontal flight; (b) accurately and safely transition the RPA from horizontal flight to vertical flight. 	<ul style="list-style-type: none"> (a) RPA remains at a safe distance from people and obstacles during all manoeuvres; (b) airspeeds maintained within manufacturer's limits for the transitions where applicable.

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
		<p><i>Automated transitional flight:</i></p> <p>(a) demonstrate automated transitions to and from vertical flight.</p>	<p>(a) RPA remains at a safe distance from people and obstacles during all manoeuvres;</p> <p>(b) airspeeds maintained within manufacturer's limits for the transitions where applicable.</p>
RP3	Climb, cruise & descent	<p>(a) Climb the aircraft at best rate or angle climb speed, level off, fly horizontal to a distance of 300 m, fly back towards starting point and descend to nominated height.</p>	<p>(a) Maintains correct airspeeds and tracks accurately.</p> <p>(b) accurately orientates the aircraft at a distance for return flight.</p>
		<p>(b) Complete procedure turns both left and right.</p>	<p>(a) Turns should be straight and level with minimal variation in height;</p> <p>(b) turns should be of an equal radius, independent of wind direction.</p>
		<p>(c) Complete steep turns in different directions.</p>	<p>(a) Turns should be straight and level with minimal variation in height;</p> <p>(b) turns should be of a constant radius, independent of wind direction.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RP4	Advanced manoeuvres	<p><i>Inward and outward figure of eight:</i></p> <p>(a) Fly at nominated height away from pilot and turn left or right 90 degrees, then fly 30 metres at a constant height and turn left or right 180 degrees, and fly back past pilot for a further 30 metres, then turn in the opposite direction and fly back to centre point opposite pilot and repeat twice more.</p>	<p>(a) Accurate altitude control;</p> <p>(b) equal circle size and crossover point directly in front of pilot.</p>
		<p>(b) Demonstrate the use of all available flight modes.</p>	<p>(a) Familiar with all modes and demonstrates competent ability to use them.</p>
		<p>(c) Simulate the most complex task the applicant will be performing when qualified, using all available control method/s and radio procedures, where applicable.</p> <p>Assume full crew/team available and examiner is an informed participant requiring briefing if applicable.</p>	<p>(a) Maintains safe distance from obstacles;</p> <p>(b) other relevant tolerances at examiner's discretion;</p> <p>(c) conducts suitable team briefing, including intent of operation, emergency plans, any other specific relevant tasking for team members.</p>

Unit code	Unit of competency	Item/manoeuvre	Accuracy/tolerance
RP5	Manage abnormal situations at altitude and near the ground	(a) Demonstrate/ simulate the use of all available fail-safe equipment and modes.	(a) Familiar with fail-safe features and how to use them effectively in flight; (b) ensures safe outcome from abnormal/ emergency scenarios.
		(a) Recover from aerodynamic stall in different configurations.	(a) Correct recovery technique used; (b) returns to safe level flight.
		(a) Recover RPA from abnormal transition to horizontal and vertical flight manually; (b) recover RPA from abnormal transition to horizontal and vertical flight in automated mode.	(a) Implements recovery plan in a timely way; (b) demonstrates dexterity in controlling the aircraft; (c) where available, initiates and completes recovery action through fail-safe procedures.
		(a) Land/recover the aircraft without using engine/motor power from circuit height at a position over the landing area.	(a) Uses elevators to maintain slight nose down attitude; (b) manoeuvres the aircraft to a suitable position to land in the landing/ recovery area; (c) maintains safe control of the aircraft; (d) completes pre-landing/recovery checks.

Schedule 6 Flight Test Standards

Remote pilot licence — (RePL)

Appendix 5 RePL upgrades

Liquid-fuel system flight test

1. Flight test requirements

- 1.1 An applicant for a RePL with liquid-fuel system privileges must demonstrate the following:
- (a) by oral questions and answers, his or her knowledge of any of the items set out in clause 2; and
 - (b) all of the competencies in the units of competency mentioned in clause 3, by operating an RPA in the category he or she wishes to operate.
- 1.2 For subclause 1.1, an examiner must pass the applicant only if the applicant demonstrates accurately, correctly and in a timely way, the knowledge and the competencies to the examiner's satisfaction.
- 1.3 The flight test for liquid-fuel systems may be combined into a flight test for a RePL in any category of RPA.

2. Knowledge requirements

- 2.1 The applicant is required to demonstrate his or her knowledge of the privileges and limitations of the endorsement and of the following topics:
- (a) the components of a liquid-fuel system fitted to the RPA;
 - (b) the way the type of liquid-fuel system fitted to the flight test RPA works;
 - (c) the operation of systems associated with the type of liquid-fuel system fitted to the flight test RPA;
 - (d) the differences between two and four-stroke piston engines (where applicable);
 - (e) the effect of increasing altitude and temperature on engine performance;
 - (f) mixture leaning procedures and effects (where applicable);
 - (g) abnormal and emergency procedures (for example partial or complete loss of power);
 - (h) the effects and limitations of turbo- and super-charging of piston engines (where applicable);
 - (i) the effects of fuel burn on weight and balance;
 - (j) general engine handling applicable to the type of liquid-fuel system fitted to the flight test RPA.

3. Practical flight standards

The applicant is required to demonstrate the following actions or procedures:

- (a) conducts all relevant fuel checks prior to flight;

- (b) confirms required amount of fuel is on board to complete the flight safely with a reasonable reserve;
 - (c) manages engine handling, temperatures and oil pressures while on ground and in flight;
 - (d) manages fuel competently while in flight;
 - (e) adjusts mixture in flight to achieve stated fuel burn rates or optimal engine performance;
 - (f) refuels aircraft safely and does relevant post-fuelling checks;
 - (g) completes flight technical log accurately;
 - (h) takes timely, appropriate action to remedy actual or simulated engine problems;
 - (i) competently, and within a reasonable time, makes required fuel calculations to complete an amendment to the original planned flight.
-

CONSULTATION DRAFT