SCOPE OF SERVICES – AERONAUTICAL GROUND LIGHTING

1. **Background**
	1. The proper planning, development and delivery of aircraft pavement and aeronautical ground lighting (**AGL**) systems maintenance and capital works on Defence airfields is paramount to ensure the Commonwealth maintains its Defence airfields in a serviceable condition to enable military aircraft to operate safely and to meet its operational requirements. A representative map showing the location of Defence airfields is presented in Annex A.
2. **Commonwealth Objectives**
	1. The objectives of the Services provided by the Consultant are to:
		1. provide AGL and other aeronautical visual aids designed to meet the operational requirements of Defence aircraft;
		2. provide AGL and other aeronautical visual aids designed to meet the safety requirements of Defence aircraft and personnel; and
		3. advise on maintenance requirements of AGL and other aeronautical visual aids to the required operational and safety standards in a cost effective manner.
3. **Skills and Qualifications**
	1. The Commonwealth requires suitably skilled persons to be offered by the Consultant, matched to the specific needs of the Services. Skills that will be required to deliver the Services include:
		1. Electrical engineering design (including high voltage, constant current regulators and non-earthed electrical protection);
		2. AGL design;
		3. AGL installation practices;
		4. AGL operation;
		5. presentation and communication;
		6. audit;
		7. inspection; and
		8. budgeting and forecasting.
	2. Additional qualification/s and/or minimum experience may be required for specific engagements.
	3. As a guide, the levels of AGL Design Consultants are based on relevant experience as follows:
		1. Junior Engineer <5 years relevant experience
		2. Assistant Engineer 5-10 years relevant experience
		3. Senior Technical 10-15 years relevant experience
		4. Technical Director >15 years relevant experience.
4. **Services**
	1. The Consultant must be able to provide the Services in accordance with the timeframes outlined by the Commonwealth's Representative.
	2. The Commonwealth requires specialist AGL consultants, either individually or as part of a team, to perform the following services:
		1. conduct AGL audits and inspections (refer to Annex B), including inspections (in part, or whole) in accordance with Defence Aviation Safety Authority specified Aerodrome Technical Inspections (**ATI’s**);
		2. undertake AGL design (including master planning, scoping studies, design reports, drawings and specifications, and undertake technical construction monitoring), refer to Annex C;
		3. provide AGL technical advisory services, including the conduct of third-party/independent auditor functions, refer to Annex D;
		4. AGL training services, refer to Annex E;
		5. Commissioning and handover activities for AGL systems and equipment (including supporting communications, control and power systems);
		6. Test and evaluation activities for AGL systems and equipment (including supporting communications, control and power systems);
		7. Verification and validation activities for AGL systems and equipment (including supporting communications, control and power systems);
		8. Conduct investigations into cybersecurity and cyberworthiness status of AGL systems and equipment, or cybersecurity and cyberworthiness incidents and issues in relation to AGL systems and equipment (including supporting communications, control and power systems); and
		9. Development of cybersecurity and cyberworthiness requirements for AGL systems and equipment (including supporting communications, control and power systems).
	3. Or, with respect to 4.2 (h) and 4.2 (i) have the ability to engage the required specialist cybersecurity and cyberworthiness services, or, have the ability to project manage the delivery of specialist cybersecurity and cyberworthiness services where they have been engaged by the Commonwealth.
	4. Where Consultants are engaged to perform design services, the AGL scope of works may require interface works with aircraft pavements that is likely to require specialist pavement design services for the associated works. If the scope of works requires both an AGL designer and a pavement designer, a lead consultant/designer will be identified/responsible for coordinating the design for both AGL and pavements. The lead designer is to only engage a subconsultant from the Aircraft Pavement Service Category under the Panel in respect of the interface works, eg An AGL lead is to engage a sub-consultant from the Aircraft Pavement Service Category under the Panel only.
	5. The Consultant must have and maintain for the term of the Engagement an in-depth understanding of all relevant Statutory Requirements and policy frameworks for the Services, including any relevant applicable Australian and international standards and Commonwealth policy, which may include:
		1. [Defence Aviation Safety Regulation](https://www.defence.gov.au/DASP/Docs/Manuals/DefenceAviationSafetyRegulation/DASRWeb/index.htm#8797.htm) ([DASR 139](https://www.defence.gov.au/DASP/Docs/Manuals/DefenceAviationSafetyRegulation/DASRWeb/index.htm#15303.htm)); URL:
			1. <https://www.defence.gov.au/DASP/Docs/Manuals/DefenceAviationSafetyRegulation/DASRWeb/index.htm#8797.htm>
			2. <https://www.defence.gov.au/DASP/Docs/Manuals/DefenceAviationSafetyRegulation/DASRWeb/index.htm#15303.htm>
		2. Airworthiness Design Requirements Manual (ADRM), [Section 6](https://www.defence.gov.au/DASP/Docs/Manuals/7001054/ADRMWeb/index.htm#25408.htm); URL:
			1. <https://www.defence.gov.au/DASP/Docs/Manuals/7001054/ADRMWeb/index.htm#25408.htm>
		3. Manual of Infrastructure Engineering - Electrical ([MIEE](https://defence.gov.au/estatemanagement/Governance/Policy/EngineeringMaintenance/Electrical.asp)); URL:
			1. <https://defence.gov.au/estatemanagement/Governance/Policy/EngineeringMaintenance/Electrical.asp>
		4. Manual of Infrastructure Engineering - Aeronautical Ground Lighting ([MIE-AGL](https://www.defence.gov.au/estatemanagement/Governance/Policy/EngineeringMaintenance/AircraftPavement.asp)) (DRAFT); URL:
			1. <https://www.defence.gov.au/estatemanagement/Governance/Policy/EngineeringMaintenance/AircraftPavement.asp>
			2. <https://www.defence.gov.au/estatemanagement/Governance/Policy/EngineeringMaintenance/AircraftPavements/AircraftPavement/Manual-of-Infrastructure-Engineering-Aeronautical-Ground-Lighting.pdf>
		5. Civil Aviation Safety Regulation Part 139 [Manual of Standards](https://www.legislation.gov.au/Details/F2020C00797) (latest version); URL:
			1. <https://www.legislation.gov.au/Details/F2020C00797>
		6. ICAO Annex 14 Volumes I and II (latest version available for a price at the [ICAO store](https://store.icao.int/en/shop-by-areas/safety/aerodromes)); URL:
			1. <https://store.icao.int/en/shop-by-areas/safety/aerodromes>
		7. Australian Building Codes Boards’ ([ABCBs](https://www.abcb.gov.au/Connect/Categories/National-Construction-Code)) National Construction Code of Australia; URL:
			1. <https://www.abcb.gov.au/Connect/Categories/National-Construction-Code>
		8. US Department of Defense Unified Facilities Criteria ([UFC](https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-260-01)) 3-260-1 and ([UFC](https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-535-01)) 3-535-1; URL:
			1. <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-260-01>
			2. <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-535-01>
		9. Defence Explosive Ordnance Publication ([DEOP](https://www.defence.gov.au/jcg/jlc/eDEOP_101.asp)) 101: Department of Defence Explosive Regulations. URL:
			1. <https://www.defence.gov.au/jcg/jlc/eDEOP_101.asp>
	6. The Consultant must provide deliverables as specified for a particular Engagement including reports, papers, reviews and advices.
	7. Deliverables from the Consultant should be applied in an appropriate context to enhance the Commonwealth's decision-making, reporting and public consultation.
	8. Specific deliverables that may be required for an Engagement include:
		1. Scoping study reports;
		2. Feasibility study reports;
		3. Electrical, Electronic and Control System investigation reports;
		4. Engineering design reports;
		5. Engineering drawings and specifications;
		6. Preparation of design documents as part of tender documentation;
		7. Technical Assessment and reporting on tendered documents;
		8. On site supervision of construction work including the confirmation of quality as detailed in the specification;
		9. Commissioning witnessing and handover documentation review and clearance;
		10. Providing a consultant design certificate for the completed works against the design;
		11. Commissioning and handover reports and documentation for AGL systems and equipment (including supporting communications, control and power systems);
		12. Test and evaluation plans for AGL systems and equipment (including supporting communications, control and power systems);
		13. Verification and validation strategies for AGL systems and equipment (including supporting communications, control and power systems);
		14. Cybersecurity and cyberworthiness reports (including assessments and analysis) of AGL equipment and supporting communications, control and power equipment; and
		15. Presentations and training materials.
	9. The Consultant may be required to arrange, attend, minute and participate in meetings as specified for a particular Engagement including project team meetings and meetings with stakeholders.
	10. The Consultant may be required to travel to Defence sites or other locations as part of delivering the Services.
5. **Technical Requirements**
	1. The Consultant is required to maintain a detailed knowledge of engineering best practice and relevant design policy and standards. Technical design aspects may be specified by the Commonwealth Representative or in relevant Defence policy and may include design inputs or techniques to be used.
	2. Any spatial data developed by the Consultant during the term of the Engagement is to meet the Estate and Infrastructure Group’s Spatial Data Management Plan ([**SDMP**](http://intranet.defence.gov.au/EstateManagement/Governance/Policy/SDMP/default.asp)) and be uploaded into the Garrison Estate Management System and/or other platform as identified in the SDMP. The SDMP is available externally on the internet at <http://www.defence.gov.au/estatemanagement>.
6. **Works Safety Officer (WSO)**
	1. The designer is to engage a Works Safety Officer (WSO) to safely perform airside activities, such as asphalt coring, sub-grade testing, visual inspections, etc.
	2. The WSO is engaged, and paid by, the consultant but the WSO works on behalf of the Commonwealth (WSO Services Subcontract, Clause 2.2 (e) and 13.7 (g)) to ensure all airside works are performed safely. The WSO is not to do tasks that take away from the WSO’s ability to carry out its briefed services (WSO Consultant Deed Poll, Clause 2.2).
	3. The [WSO Services Subcontract](https://www.defence.gov.au/estatemanagement/Support/DIP/Templates/DIPWSOServicesSubcontract.DOC) and [WSO Consultant Deed Poll](https://www.defence.gov.au/estatemanagement/Support/DIP/Templates/DIPWSOConsultantDeedPoll.DOC) is available publically on DEQMS from the Defence Infrastructure Panel (DIP) webpage at: <https://www.defence.gov.au/estatemanagement/Support/DIP/Templates.asp>
7. **Interpretation**
	1. Unless the context otherwise requires, capitalised terms in the Scope of Services or Brief will have the meaning given to them by the Defence Infrastructure Panel 2022-2027 Terms of Engagement, Panel Conditions, Official Order, or the meaning given to them by the Commonwealth as published on the Defence Estate Quality Management System (**DEQMS**) website (<http://www.defence.gov.au/estatemanagement>), from time to time.

**Annexes:**

* + - * 1. Representative Locations of Defence Airfields including Defence Certification Status
				2. AGL Audits and Inspections
				3. AGL Design Services
				4. AGL Technical Advisory Services
				5. AGL Training and Professional Development Services

**Legend:**

City / Regional Centre

Local Council - Defence Lease

RAAF Base

Army Aviation Base

Navy Base

ADF Training Area

**RAAF Darwin (MOB)**

**Robertson Barracks (H)**

**Annex A** – **Representative Locations of Defence Airfields including Defence Certification Status**

**Mt Bundey (O)**

**Scherger (C)**

**Nackeroo (O)**

**Tindal (MOB)**

Cairns

**Edinburgh (MOB)**

**Defence Certification Status:**

**MOB**—Defence Certified Aerodrome/Main Operating Base – Aerodromes that will be certified for fixed wing aircraft in accordance with Defence Aviation Safety Regulation 139 (DASR.139) and the Airworthiness Design Requirements Manual (ADRM) that are key to the generation and maintenance of Defence capability

**C**—Defence Certified Aerodrome – Aerodromes that will be certified for fixed wing aircraft but are not Main Operating Bases.

**H**—Heliports – Aerodromes that will be certified as heliports in accordance with DASR.139 and the ADRM.

**O**—Other Defence Aerodromes – Aerodromes that will not be certified but are used to maintain Defence capability such as those located on ADF Training Areas.

**East Sale (MOB)**

**Richmond (MOB)**

**Townsville (MOB)**

**Amberley (MOB)**

**HMAS Albatross (C)
Jervis Bay (C)**

**Puckapunyal (O)**

**Bindoon (O)**

**Wyoming Airfield (O)**

**Rockhampton:
Williamson (O)
Samuel Hill (O)**

**HMAS Stirling (H)**

**GinGin (C)**

**Holsworthy (H)**

Luscombe Field

Canberra

Melbourne

Sydney

**Wagga Wagga (O)**

**Williams
(Point Cook) (C)**

Hobart

**Newcastle:
Williamtown (MOB)**

Brisbane

**AAC Oakey (C)**

Adelaide

**Pearce (MOB)**

Perth

**Woomera (C)**

**Curtin (C)**

**Learmonth (C)**

**Annex B – Audit and Routine Inspection Services**

1. **AGL Systems Audits And Inspections**
	1. **Purpose**
		1. Generally, the Consultant may be required to:
			1. conduct AGL inspections to assess the Defence land-based aerodrome, or Defence land-based heliport, AGL system (including sub-systems and components) for condition, obsolescence or supportability issues, operational adequacy and the effectiveness of the maintenance regime;
			2. determine the level of compliance and any necessary changes required to the current spares holdings or maintenance arrangements to ensure that the life of the AGL is optimised; and
			3. develop a maintenance works program incorporating all required maintenance activities for the following five years to ensure the sustainability of the AGL system.
	2. **Core Inspection Requisites**

The Consultant may be required to undertake the following core inspection requirements:

* + 1. **Compliance Audit**
			1. The compliance audit is a detailed assessment of the operational suitability of the lighting system against relevant codes, standards and regulations and dispensations. The purpose of the assessment is to enable all areas of non-compliance to be clearly identified, particularly any critical safety hazards and risks.
			2. Where a deficiency is identified, the Consultant may be required to liaise with the Commonwealth and other agencies in determining the most appropriate treatment strategy and/or suitability for dispensation or application for a Military Aerodrome Certification Review Item (**MACRI**) which is safe and complies with the WHS Legislation and the DASR.139.
			3. Where the corrective works, dispensation or MACRI are particularly high risk, complex or extensive, the Consultant may be required by the Commonwealth to workshop these elements with the key stakeholders.
			4. Upon request by the Commonwealth's Representative, the Consultant may be required to assist in amending and promulgating dispensations as part of updating the AGL Configuration Manual for the respective airfield or airfields.
			5. Resulting reports may be required to address the civil and military requirements separately and the standards used for assessment must include:
				1. DASR 139 – Aerodromes;
				2. Civil Aviation Safety Authority requirements and guidance such as the Manual of Standards Part 139 (MOS139); and
				3. International Civil Aviation Organisation (**ICAO**) publications and guidance.
		2. **Condition Assessment**
			1. The condition assessment is primarily a detailed visual assessment to identify any faults, defects, obsolescence or supportability issues and required corrective actions which must:
				1. determine the suitability of the current maintenance regime;
				2. consider the whole AGL installation including cabling, fittings, aerodrome lighting equipment rooms (**ALER**) and the available equipment manufacturer's support; and
				3. address any equipment (including plant or structures) that represents a potential risk to the availability and safety of the aerodrome (including work health and safety risks) and any other areas where intervention is required to prevent accelerated deterioration and the need for premature replacement.
			2. Circuit insulation resistance tests may need to be observed by the Consultant and a representative sample of pits, series isolation transformers (**SITs**) and lights may also require close inspection (i.e. they may need to be dismantled and opened for inspection). These tasks are to be undertaken with the relevant maintenance contractor, however, the Consultant must arrange for appropriate test equipment to be provided in consultation with the maintenance contractor. The Consultant must identify this to the Commonwealth's Representative in advance of its proposed cable assessment regime.
			3. Where any element is recommended for replacement on economic grounds, the condition assessment is to include suitable financial justification on a through life basis.
		3. **Maintenance Works Program**
			1. The Consultant may be required to develop an agreed maintenance works program for all identified works found during the condition assessment which must include agreed compliance rectifications and other required works needed to sustain the AGL over the next five years. The program will also predict the major maintenance activities such as replacement of the AGL system associated with major pavement overlay, even where this is beyond the next five years.
			2. This maintenance works program is to be separated into:
				1. routine maintenance elements to be undertaken by the regional maintenance contractor; and
				2. where separate projects will be required for more significant works.
			3. AGL cost estimates, within the recommended risk managed works program, are to allow for sufficient spares holdings in order to comply with the required number of spares as defined in the relevant AGL Configuration Manual.
			4. The report must also differentiate between discretionary and non-discretionary items.
			5. The works program is to include maintenance requirements, priorities, timings and costing estimates accurate to P50 probabilistic cost modelling. Works must be arranged in suitable works packages, where appropriate.
			6. All routine maintenance works recommended in the report must have sufficient detail to enable the Commonwealth's regional staff to undertake these works using regional contractors without further technical assistance.
			7. The Consultant, in developing the AGL system maintenance recommendations, should consider all relevant areas, such as:
				1. previous AGL inspection reports and the works completed since the last inspection;
				2. recommended pavement works contained in relevant Pavement Inspection Reports;
				3. Commonwealth planning guidance where appropriate (eg master plans);
				4. planned major projects; and
				5. issues concerning work health and safety (including risk and hazard identification).
		4. **Maintenance Practice Assessment**
			1. The current maintenance program and maintenance activities for given airfield(s) are to be assessed for suitability and effectiveness. The Consultant may be required to review the relevant AGL Maintenance Authority’s maintenance regime and assess compliance against the requirements of the respective AGL Configuration Manual. This must include identification of all opportunities and deficiencies and where necessary updating of the AGL Configuration Manual maintenance requirements to reflect any necessary changes. As a minimum, the following must be considered and reviewed:
				1. suitability of current maintenance practices against the AGL Configuration Manual requirements;
				2. suitability of the AGL Configuration Manual maintenance requirements for the aerodrome operations and usage patterns;
				3. suitability of all required maintenance documentation/records such as the maintenance diary, insulation resistance readings and the inspection; and
				4. suitability of the maintenance contractor's qualifications and experience (including in respect of electrical qualifications and licences for the relevant State or Territory, and work health and safety (WHS) Legislation).
		5. **Spares Holdings Assessment**
			1. The Consultant may be required to assess the adequacy of spares holdings to ensure operational objectives can be sustained. Should such assessment be required, at a minimum, the Consultant should review the adequacy of the spares holdings against the required spares required by the AGL Configuration Manuals and the available manufacturer's support.
	1. **Methodology**
		1. The Consultant may be required to develop a suitable inspection methodology. It is anticipated that each inspection will involve a pre-inspection site visit, for the data collection phase and maintenance practice assessment. For aspects such as spares holdings, maintenance records, fault records and any required information deemed necessary for the full onsite inspection, it is particularly important that cable condition information be gathered to allow for suitable testing prior to site inspection. Where necessary it may also involve coordinating further testing of the AGL system, arranged by the Consultant, prior to or coinciding with the full inspection site visit. For example, if the cable insulation resistance results are poor, the Consultant may be required to arrange for more detailed or invasive cable testing targeted to determine the extent of corrective works.
		2. The AGL inspections, whilst primarily involving visual assessment of the AGL system, may also include close inspection of a suitable representative sample of the light fittings, surge diverters, constant current regulators, AGL Control System components, pits and SITs.The inspection will include primary circuit insulation resistance tests and operational checks of key areas such as the controls and constant current regulators (**CCR**), including load checks.The visual assessment must be undertaken both at night and during the day.
		3. The inspection may incorporate suitable stakeholder meeting(s) on site with the Commanding Officer of the Base, Combat Support Squadron, Senior Air Traffic Controller (**SATCO**), the AGL Maintenance Agent, relevant Commonwealth regional staff and where appropriate the civilian operators or their nominated representatives.
		4. At the conclusion of the site inspection and when the AGL Configuration Manualand the AGL Condition Assessment reports are in a suitable draft format, the Consultant may be required to facilitate a workshop with the stakeholders to discuss the findings and recommendations of the reports.
		5. The AGL elements that the inspection needs to cover will include:
			1. Aerodrome Lighting Equipment Rooms (**ALER**):
				1. ALER controls;
				2. ALER work health safety assessment (work space and electrical equipment);
				3. SCADA controller, Programmable Logistic Controllers (PLC) and any associated ICT equipment, software used in support;
				4. Pilot activated lighting control system;
				5. AGL associated lumatrol levels;
				6. tower interface and tower controls;
				7. regulators including operation, loading and calibration;
				8. surge diverter panels; and
				9. mains and emergency power.
			2. Lighting Systems:
				1. approach lighting systems (eg High Intensity Approach Lights (**HIAL**), Sequential Flashing Approach Lighting (**SFAL**), Simply Approach Lighting (**SAL**));
				2. runway lighting systems (eg Medium Intensity Runway Lighting (**MIRL**), High Intensity Runway Lights (**HIRL**));
				3. taxiway lighting systems;
				4. apron edge lighting systems;
				5. movement area guidance signs (**MAGS**) including distance to run markers (**DTRM**) and hook cable markers (**HCM**);
				6. illuminated wind indicators (**IWI**);
				7. miscellaneous items:

beacons; and

obstacle lighting, primarily on Base but also significant off Base lighting; and

* + - * 1. Apron floodlighting (operation lux measurements and tower heights and positions);
			1. AGL cabling (primary, secondary and connectors), SITs, pits and duct network;
			2. Photometric compliance of AGL fittings;
			3. Compatibility of inset light fitting and base combinations;
			4. A review of all related publications including aeronautical publications such as the En Route Supplement and approach plates to ensure suitability of the AGL for the specified operations;
			5. Any other potential adverse impact to aircraft or the safety of persons including general condition of surrounding pavement, potential for foreign object debris (**FOD**) and conflicts with line marking (and all relevant work health and safety risks); and
			6. Any significant extraneous lighting impacting on the aerodrome.
	1. **Typical report outline**

The report is to be developed by the Consultant in consultation with the Commonwealth. The final approach must be reviewed and not rejected by the Commonwealth's Representative prior to the Consultant submitting the completed report. A table of contents for a typical AGL Audit and Routine Inspection follows:

*Contents*

*Executive Summary 1*

 *Compliance 1*

 *Condition 1*

 *Maintenance Regime 2*

 *Spares 2*

*1 Recommended Maintenance Works 3*

*1.1 Routine Maintenance Priority Criteria 3*

*1.2 Routine Maintenance Works 4*

*1.3 Recommended Risk Managed Works Program and Estimates 5*

*2. Introduction 6*

*2.1 Base [insert] Aeronautical Ground Lighting Layout 6*

*2.2 Inspection Commission, Details and Conditions 7*

*2.3 Audit and Inspection Methodology 8*

*2.4 Previous Audits 8*

*3. Compliance Assessment 9*

*3.1 Installation Standards 9*

*3.2 Standards and Installations 9*

*3.3 Compliance of AGL to Standards 10*

*3.4 Compliance 10*

*3.5 Dispensations 10*

*3.6 Definitions 12*

*4. Condition Assessment 16*

*4.1 General System Performance 17*

*4.2 Element Condition Status 18*

*5. Maintenance Regime Assessment 22*

*5.1 Contracted Responsibilities 22*

*5.2 Procedures 22*

*5.3 Maintenance Records 22*

*5.4 As-constructed Documentation 22*

*5.5 Equipment 23*

*5.6 Resources 23*

*5.7 Issues Identified 23*

*5.8 Recommendations 24*

*6. Spares Assessment 25*

*6.1 Requirement 25*

*6.2 Location 25*

*6.3 Spares Inventory 25*

*6.4 Spares Usage 33*

*6.5 Spares Replenishment 33*

*6.6 Recommendations 33*

*7. Other Recommendations 34*

*8. Work Health and Safety Matters (Including Risks and Hazards) 35*

### ***Appendices***

1. *Detailed Findings*
2. *Maintenance Practices*
3. *Industry Support*
4. *Previous Works and Recommendations*
5. *In-Brief and Out-Brief Minutes*
6. *Documentation Obtained During Assessment*
7. *Photographs*
8. *Routine Maintenance Works*
9. *Recommended Risk Managed Works Program*
10. *Dispensations and MACRIs*
11. **AGL System Audits and Routine Inspection Reports - General Notes**
	1. Each AGL audit report is to be supplied in the following format:
		1. Draft Copy: One (1) Word document soft copy; and
		2. Final Electronic Copies:
			1. PDF copy of full report (including all annexes embedded in this copy) suitable for website upload; and
			2. PDF and Word copy of full report, with annexes separated if file size is greater than 5 megabytes (MB).

**Annex C – Design Services**

1. **Airfield Lighting Systems Design Services**
	* 1. The Consultant may be required to undertake various design activities to support the effective and safe delivery of AGL works. This may include:
			1. collection of all relevant data identifying any shortfalls in information;
			2. requirements gathering for AGL systems from all relevant sources;
			3. development of design documentation (i.e. detailed drawings and reports) for all stages of design development;
			4. development and incorporation of cyberworthiness requirements for the AGL control systems and AGL components;
			5. development of scoping study reports;
			6. preparation of functional design briefs;
			7. AGL design development including preparation of tender documentation and specifications;
			8. design reviews;
			9. preparation of detailed technical assessment reports for equipment tenders;
			10. on-site works monitoring or inspections during the construction phase;
			11. commissioning; and
			12. final inspection of AGL works.
		2. These works may include planned or unplanned maintenance although the majority of these works will be recommended in previous AGL inspection reports, or included within the Defence National Airfields Program or the Defence Estate Works Program (**EWP**).
		3. The types of AGL works may include upgrade or replacement of the AGL control system, fittings and cables, or necessary AGL aspects associated with pavement projects, ie overlays, shoulder reconstruction.
		4. Any design activities undertaken by the Consultant must comply with:
			1. the WHS Legislation and the Consultant must supply to the Commonwealth all information concerning the design required by the WHS Legislation (including that information required to be supplied by a 'designer' under the WHS Legislation); and
			2. the DASR.139 and the Airworthiness Design Requirements Manual for land-based aerodromes and land-based heliports.
		5. analysis and documentation of evidence to support safety case development for any differences between the Consultant’s design and the requirements of the ADRM;
		6. on-site construction quality monitoring and inspections during the construction phase;
		7. final inspection of the work including compliance and conformance checks and defect liability period inspections; and
		8. provision of a certificate that completed works meets the consultant’s design and specification. This certificate is to warranty the design used in construction by the contractor, and for all design changes that are approved by the design consultant during construction (irrespective of who suggested the design change).
	1. **Typical Certificate**

An example of the form of the certificate for para 1.1 (h) above is as follows:

*COMPLIANCE CERTIFICATE for AERONAUTICAL GROUND LIGHTING WORKS INSTALLATION*

*DATE*

*xx xx xxxx*

*CERTIFIER*

*Consultant Company Pty Ltd*

*Address*

*PROJECT DESCRIPTION*

*Project/Estate Number ADF Establishment name*

*E.g. New aircraft parking apron area, with associated drainage, fencing and flood lighting, reconstruction of the existing North/South access road with associated drainage, including an Airfield Lighting Equipment Building. Located off xxxx Drive within [insert ADF Establishment],*

*DESCRIPTION OF COMPONENTS CERTIFIED*

*Certification of the completed civil, AGL, and building works has been constructed in accordance with paragraph 1.1 (h) in the Aeronautical Ground Lighting Scope of Services the [insert consultant company name] approves the design.*

*BASIS OF CERTIFICATION*

*Complete Civil, Electrical and Building works; Compliance with the paragraph 1.1 (h) in the Aeronautical Ground Lighting Scope of Services the [insert consultant company name] and accompanying specifications.*

*COMPLIANCE BY SPECIFIC DESIGN*

*[Where required]The completed and signed Compliance by Specific Design documentation is attached.*

*COMPETENT PERSON*

*[Insert full name]*

*Design office. [Insert address]*

*CERTIFICATION OF COMPETENT PERSON*

*The Consultant certifies that the Completed Civil, Electrical, and Building Works comply or the Works Package specified above (if any) carried out under the Construction Contract complies (as the case may be) with the Design Documentation which has not been rejected by the Contract Administrator.*

*~ [Signature]*

*Registered Professional Engineer Queensland [or wherever registered]. Reference No. xxxx*

* 1. These Services may be required in relation to maintenance or capital works.
1. **Key People**
	1. The Design Consultant must:
		1. employ at a minimum those positions required to provide an expert level of design or as-specified in the scope of work, including the Consultant's Representative, at the experience levels specified;
		2. subject to the following paragraph, not replace the people referred to in paragraph above without the Principal’s Representative's prior written approval;
		3. if any of the people referred to in paragraph above die, become seriously ill or resign from the employment of the Consultant, replace them with persons approved by the Principal’s Representative of at least equivalent experience, ability and expertise; and
		4. put in place sufficient succession planning, to the satisfaction of the Principal, to ensure that the Consultant is able to replace key people under paragraph above without any disruption to the Services.
2. **Removal of Persons**
	1. The Principal’s Representative may by notice in writing direct the Consultant to remove any person from the performance of the Services who in the reasonable opinion of the Principal’s Representative is guilty of misconduct or is incompetent or negligent.
	2. The Consultant must ensure that the person referred to in paragraph above is not again employed for the panel Services.

**Annex D – Technical Advisory Services**

1. **Airfield Lighting Technical Advisory Services**
	* 1. The Consultant must provide technical advice or engineering support related to AGL systems. This may include:
			1. planning and technical feasibility studies such as:
				1. determining suitable replacement lights in an existing system;
				2. light fitting modifications;
				3. strategies for repairs or maintenance; and
				4. strategies for national AGL management and procurement;
			2. updating AGL Configuration Manuals;
			3. assessment of the AGL systems safety and any work health and safety issues arising from the AGL system and its use; and
			4. detailed engineering investigations of AGL systems, subsystems, components and equipment faults.
		2. The objective of updating AGL Configuration Manuals is to ensure that the AGLCMs accurately reflect the physical on-ground configuration in a format that best assists operation and maintenance of the AGL systems, and to configure the manuals so that they are suitable for web based publishing;
		3. The AGL Configuration Manuals must be in a suitable format and content that allows the installation to be certified against the manual;
		4. The above-mentioned activities may involve implementing improvements or overcoming problems in relation to the operation, maintenance and development of AGL systems. Such assistance may also include the provision of appropriate technical literature regarding AGL systems;
		5. reviewing planning and operational documents for compliance with relevant engineering policy, standards and regulations;
		6. preparation of safety case documentation to address aerodrome non-compliances with the ADRM identified during design or inspection;
		7. provision of Technical Director level advice to support any Defence legal matters; and
		8. provision of a ‘Discipline Technical Lead’, being the most senior technical person in the company, for the resolution of difficult technical matters.
	1. The Services may include a role as an independent auditor pursuant to which the Consultant may be required to review design, specification and quality assurance (**QA**) documentation and to audit the construction, as required, to independently confirm the suitability of the design and the compliance of the construction with the design. The Consultant must include in their compliance assessment details of its review, audit and confirmation of the design’s compliance with the requirements of the WHS Legislation and that the design identifies and manages (via risk management strategies) any WHS issues arising from the design.
	2. The Consultant may also be required to provide assistance with policy development, maintenance and interpretation. The Consultant may be required to provide assistance with the development of AGL policy. The types of policy work that may be required includes
	3. This may include the following topics:
		1. AGL safety;
		2. AGL design (pattern/positioning/photometric characteristics of AGL and electrical power supply);
		3. AGL design guidance
		4. AGL design philosophies;
		5. construction and maintenance standards,
		6. AGL maintenance and operation;
		7. Fault finding and fault detection methodologies;
		8. Cybersecurity and cyberworthiness requirements
		9. aerodrome services;
		10. AGL control philosophies
		11. AGL control systems;
		12. standard and bespoke AGL specifications; and
		13. Obsolescence management of AGL systems and components.
2. **Aeronautical Ground Lighting Configuration Manuals and Layout Drawings**
	* 1. There are 20 existing AGLCMs and 20 layout drawings currently in use, one of each for the each of the 20 Defence Aerodromes that incorporate AGL. These documents are managed by Defence, and are checked for accuracy periodically, with updates made following these checks, and, as physical changes are made to airfields through capital maintenance and capital infrastructure projects.
		2. The 20 extant AGLCMs and 20 extant Layout Drawings, available on DEQMS (internal), function as a template to be maintained for their respective aerodromes, and this section serves to provide additional guidance on the format and content to be retained within each of the AGLCMs when updates are made in line with paragraph 2.(a). A typical AGLCM table of contents can be found in paragraph 2.2(b)(vi).
	1. **Purpose**
		1. The purpose of updating the AGL Configuration Manuals is to ensure that they remain up-to-date with current information and to provide manuals that readily allow for web based publishing with the most current data and information relating to the AGL on each relevant aerodrome maintained within them.
		2. The manuals are to include all compliance information in sufficient detail to allow the installation and the maintenance practices to be certified against the AGL Configuration Manual, and each manual should include:
			1. system overview and description;
			2. detailed list of all dispensations and non-conformances together with the agreed actions; and
			3. routine maintenance requirements and an aerodrome specific scheduled maintenance plan.
	2. **Requirements**
		1. The Consultant may be required to review the existing AGLCMs and Layout Drawings, make recommendations on suggested changes.
		2. Required outcomes of the Services include:
			1. Each aerodrome’s manual is to be produced as a single volume manual.
			2. All required detail necessary to certify the installed configuration needs to be included in the manual. Aspects such as the Constant Current Regulator (**CCR**) set up, precision approach path indicator (**PAPI**) setup and other set up information detailing the installed arrangement are to be included in the revised manual.
			3. All necessary updates to reflect the current installation. Where a supervisory control and data acquisition (**SCADA**) system is installed the manual is to include suitable colour screen dumps of each control page.
			4. The current maintenance plan may be required to be revised and updated by the Consultant. Consideration should be given to providing additional information on safety (including work health and safety obligations and identification of work health and safety hazards and management of work health and safety risks) and required maintenance actions to clarify the maintenance responsibilities and address any work health and safety matters that have been identified as requiring addressing. The Consultant may be required to develop these aspects in line with the recommendations arising from its inspections.
			5. The corresponding Aeronautical Ground Lighting Layout drawing shall always be updated to accurately reflect changes to each of the AGLCMs.
			6. A table of contents for a typical AGL Configuration Manual follows:

***Typical Table of Contents***

*1 INTRODUCTION 1-1*

*1.1 Application 1-1*

*1.2 Document Access and Control 1-1*

*1.3 Structure 1-1*

*1.4 Standards and Publications 1-2*

*1.4.1 Standards 1-2*

*1.4.2 Publications 1-2*

*1.6 Work Health and Safety 1-2*

*1.6 Roles and Responsibilities – Defence 1-3*

*1.6.1 Estate Support Division (ESD) 1-3*

*1.6.1.1 Assistant Secretary Environment and Engineering*

 *(ASEE) Branch – Infrastructure Division 1-3*

*1.6.1.2 Directorate of Estate Engineering Policy (DEEP) 1-3*

*1.6.1.3 Directorate of Estate Maintenance and Technical*

 *Regulation (DEMTR) – National Operations Division 1-3*

*1.6.1.4 Capital Facilities and Infrastructure (CFI) Branch*

 *– Infrastructure Division 1-3*

*1.6.1.5 Directorate of National Airfield Projects (DNAP) 1-3*

*1.6.1.6 Regional Director Estate Support 1-3*

*1.6.2 Infrastructure Development Agency - Air Force (IDA-AF) 1-3*

*1.6.3 Detachment Commander (DETCDR) 1-3*

*1.6.3.1 Safety Officer ( Daily Inspections ) 1-3*

*1.6.4 Ground Telecommunications Equipment Special Projects*

 *Office (GTESPO) 1-3*

*1.7 Roles and Responsibilities – Other 1-4*

*1.7.1 AGL Maintenance Agent – EMOS Contractor 1-4*

*1.7.2 AGL Maintenance Manager – EMOS Contractor 1-4*

*1.7.3 AGL Maintenance Personnel – EMOS Contractor 1-4*

*2 DISPENSATIONS 2-1*

*2.1 Requirement 2-1*

*2.2 Dispensation Request and Proforma 2-1*

*2.3 Current Dispensations 2-1*

*3 VISUAL AIDS PROVIDED BY THE AGL SYSTEM 3-1*

*3.1 Aerodrome Beacon 3-2*

*3.2 Approach Lighting 3-2*

*3.4 Precision Approach Path Indication (PAPI) 3-2*

*3.5 Runway Lighting 3-2*

*3.5 Distance To Run / Hook Cable Markers 3-2*

*3.6 Apron Edge Lighting 3-3*

*3.7 Taxiway Segments and Selection 3-3*

*3.8 TACAN & Position Check Signs 3-4*

*3.9 Illuminated Wind Indicators 3-4*

*3.10 Low Intensity Obstacle Lights 3-4*

*3.11 AGL Cabling 3-4*

*3.11.1 Primary Cable 3-4*

*3.11.2 Secondary Cable 3-4*

*3.11.3 Series Isolation Transformers (SITs) 3-4*

*3.12 Emergency Power Supply 3-4*

*3.13 Lighting Circuit Schedule 3-5*

*3.14 AGL Light Fixture Schedule 3-8*

*3.15 Obstacle Light Fixture Schedule 3-10*

*3.16 Information Sign Schedule 3-10*

*3.17 Movement Area Guidance Sign Schedule 3-11*

*4 AIRFIELD LIGHTING EQUIPMENT ROOM (ALER) 4-1*

*4.1 ALER Equipment Layout 4-1*

*4.2 Regulator Schedule 4-4*

*5 CONTROL SYSTEM 5-6*

*5.1 Overview 5-6*

*5.2 ATC Control 5-8*

*5.3 Local Control from Fire Station 5-11*

*5.4 Local Control from ALER 5-11*

*5.4.1 Runway Lighting Control Screen 5-12*

*5.4.2 Taxiway Lighting Control Screen 5-14*

*5.4.3 Status and Fault Conditions 5-15*

*5.5 Manual Control of CCRs 5-16*

*6 MAINTENANCE REQUIREMENT 6-17*

*6.1 Introduction 6-17*

*6.2 Standards and Codes 6-17*

*6.2.1 Defence Requirements 6-17*

*6.2.2 Technical References 6-17*

*6.2.3 Conflicts Between Regulations and Standards 6-18*

*6.3 Maintenance of the AGL System 6-18*

*6.3.1 Aeronautical Ground Lighting System 6-18*

*6.3.2 Extent of Maintenance Requirement 6-18*

*6.3.3 Preventative Maintenance Schedules 6-18*

*6.3.4 Maintenance System Procedures 6-19*

*6.3.4.1 Pre-work Procedures 6-19*

*6.3.4.1.1 Confined Spaces 6-19*

*6.3.4.1.2 Excavations for Underground Essential Services 6-19*

*6.3.4.2 Completion of Work 6-20*

*6.3.4.3 Safety Requirements and Procedures 6-20*

*6.3.4.3.1 Live Working 6-21*

*6.3.4.3.2 Securing the Work Area 6-21*

*6.3.4.3.3 Tools and Test Equipment 6-22*

*6.3.4.3.4 Safety Equipment 6-22*

*6.3.4.3.5 High Voltage 6-22*

*6.3.4.3.6 Redundant Cables 6-22*

*6.3.5 Permits 6-22*

*6.3.5.1 Procedures for 3rd Party Access and Isolation 6-23*

*6.3.5.2 Fault Reporting Procedures 6-24*

*6.3.6 Significant Works–Requirement for MOWP and Works Safety*

 *Officers (WSOs) 6-24*

*6.3.7 Operations and Maintenance Risk/Hazard Assessment Requirements 6-24*

*6.4 AGL Maintenance Agent Personnel and Equipment 6-25*

*6.4.1 AGL Maintenance Manager 6-25*

*6.4.2 AGL Maintenance Personnel and Contractors 6-26*

*6.4.3 Manning Levels 6-26*

*6.4.4 Competency 6-26*

*6.4.5 Test Equipment, Tools and Calibration 6-27*

*6.4.6 Personal Protection Equipment (PPE) 6-27*

*6.5 Documentation and Reporting 6-28*

*6.5.1 Notification 6-28*

*6.5.2 Records and documentation 6-28*

*6.5.3 AGL Maintenance Plan 6-29*

*6.5.4 Maintenance Diary/Logbook 6-29*

*6.5.4.1 Fault Recording 6-30*

*6.5.5 Spares Inventory 6-30*

*6.5.6 System Documentation Management 6-30*

*6.5.7 Software Management 6-30*

*6.5.8 AGL Certification Report 6-30*

*6.5.9 Other Reports 6-31*

*6.5.10 Records and Maintenance Data Management 6-31*

*6.5.10.1Record and Data Deficiencies 6-31*

*6.6 Handover and Takeover 6-31*

*6.6.1 Transfer of Maintenance Records and AGL System Data 6-31*

*6.6.2 Transfer of Defence Spares 6-31*

*6.6.3 Transfer of Defence AGL Tools and Test Equipment 6-31*

*6.6.4 Acceptance of New AGL Assets 6-31*

*7 PREVENTATIVE MAINTENANCE SCHEDULE AND PROCEDURES 7-1*

*7.1 AGL Fortnightly Performance Inspection Report 7-3*

*7.1.1 Serviceability Requirement 7-3*

*7.1.2 Inspection Requirements 7-3*

*7.1.2.1 Fortnightly Performance Inspection 7-3*

*7.2 PAPI Maintenance Requirement 7-5*

*7.2.1 Serviceability Requirement 7-5*

*7.2.2 Inspection Requirements 7-5*

*7.2.2.1 Monthly Technical Inspection 7-5*

*7.2.2.2 Annual Technical Inspection 7-5*

*7.2.2.3 Flight Inspection 7-6*

*7.3 Approach Lighting, Runway Lighting and Guidance Sign Requirement 7-7*

*7.3.1 Serviceability Requirement 7-7*

*7.3.2 Inspection Requirements 7-7*

*7.3.2.1 Annual Technical Inspection 7-7*

*7.4 Threshold/End and High Use Area Maintenance Requirement 7-8*

*7.4.1 Serviceability Requirement 7-8*

*7.4.2 Inspection Requirements 7-8*

*7.4.2.1 6-Monthly Technical Inspection 7-8*

*7.4.2.2 Annual Technical Inspection 7-8*

*7.5 DTRM/HCM/MAGS Maintenance Requirement 7-10*

*7.5.1 Serviceability Requirement 7-10*

*7.5.2 Inspection Requirements 7-10*

*7.5.2.1 Annual Technical Inspection 7-10*

*7.6 Taxiway and Apron Edge Maintenance Requirement 7-11*

*7.6.1 Serviceability Requirement 7-11*

*7.6.2 Inspection Requirements 7-11*

*7.6.2.1 Annual Technical Inspection 7-11*

*7.7 IWI Maintenance Requirement 7-12*

*7.7.1 Serviceability Requirement 7-12*

*7.7.2 Inspection Requirements 7-12*

*7.7.2.1 Annual Technical Inspection 7-12*

*7.8 Obstacle Light Maintenance Requirement 7-13*

*7.8.1 Serviceability Requirement 7-13*

*7.8.2 Inspection Requirements 7-13*

*7.8.2.1 6-Monthly Technical Inspection 7-13*

*7.8.2.2 Annual Technical Inspection 7-13*

*7.8A Aerodrome Beacon Maintenance Requirement 7-13*

*7.8A.1 Serviceability Requirement 7-13*

*7.8A.2 Inspection Requirements 7-13*

*7.8A.2.2 Annual Technical Inspection 7-13*

*7.9 Series Field Circuit Maintenance Procedure 7-14*

*7.9.1 Serviceability Data - Series Circuit Primary Cable 7-14*

*7.9.2 6 Monthly Technical Inspection - Series Circuit Primary Cable 7-14*

*7.9.3 Annual Technical Inspection - Series Circuit Primary Cable 7-15*

*7.9.4 Serviceability Data - Series Isolation Transformer 7-15*

*7.9.5 6-Monthly Technical Inspection - Series Isolation Transformer 7-15*

*7.9.6 Annual Technical Inspection - Series Isolation Transformer 7-16*

*7.10 Parallel Field Circuit Maintenance Requirement 7-17*

*7.10.1 Serviceability Data - Parallel Circuit Primary Cable 7-17*

*7.10.2 6-Monthly Technical Inspection – Parallel Circuit Primary*

 *Cable 7-17*

*7.10.3 Annual Technical Inspection – Parallel Circuit Primary Cable 7-17*

*7.11 ALER Maintenance Requirement 7-18*

*7.11.1 Serviceability Requirement 7-18*

*7.11.2 ALER Annual Technical Inspection 7-18*

*7.11.2.1 General Condition 7-18*

*7.11.2.2 LV Switchboards and Control Panels 7-18*

*7.11.2.3 Constant Current Regulators 7-18*

*7.11.2.4 Lighting Control System 7-18*

*7.11.2.5 Battery And Charger Supply 7-18*

*7.11.2.6 Local Emergency Generator 7-18*

*8 SPARES 8-1*

*8.1 Spares Holding 8-1*

*8.1.1 Ownership 8-1*

*8.1.2 Inventory Management 8-1*

*8.1.2.1 Storage requirements 8-1*

*8.2 Levels of Spares 8-1*

*8.3 Procurement of Spares 8-1*

*8.3.1 Spares Consumption 8-1*

*8.3.2 Spares Obsolescence 8-1*

*9 TECHNICAL DATA SCHEDULE 9-1*

*9.1 Manufacturers O&M Information Listing 9-1*

*9.2 As-Installed Drawings Listing 9-1*

### ***Index to Tables***

*TABLE 2-1: CURRENT DISPENSATIONS 2-2*

*TABLE 3-1: AGL COMPONENTS INSTALLED AT RAAF BASE [insert] 3-2*

*TABLE 3-2: CCR ALLOCATION FOR TAXIWAYS AND APRONS 3-4*

*TABLE 3-3: LIGHT CIRCUIT SCHEDULE 3-5*

*TABLE 3-4: LIGHT FIXTURE SCHEDULE 3-8*

*TABLE 3-5: OBSTACLE LIGHT FIXTURE SCHEDULE 3-10*

*TABLE 3-6: INFORMATION SIGN SCHEDULE 3-10*

*TABLE 3-7: MAGS SCHEDULE 3-11*

*TABLE 4-1: ALER 12 EQUIPMENT LEGEND 4-3*

*TABLE 4-2: ALER 30 EQUIPMENT LEGEND 4-3*

*TABLE 4-3: REGULATOR SCHEDULE – ALER 12 4-4*

*TABLE 4-4: REGULATOR SCHEDULE – ALER 30 4-5*

*TABLE 7-1: PREVENTATIVE MAINTENANCE SCHEDULE SUMMARY 7-2*

*TABLE 8-1: MINIMUM SPARES HOLDING 8-2*

*TABLE 9-1: MANUFACTURERS O&M INFORMATION 9-1*

*TABLE 9-2: AS INSTALLED DRAWINGS 9-1*

### ***Index to Figures***

*FIGURE 3-1: AGL DIAGRAM FOR RAAF BASE [insert] 3-1*

*FIGURE 3-2: TAXIWAY LIGHTING SEGMENTS 3-3*

*FIGURE 4-1: ALER 12 EQUIPMENT LAYOUT 4-1*

*FIGURE 4-2: ALER 30 EQUIPMENT LAYOUT 4-2*

*FIGURE 5-1: CONTROL SYSTEM FUNCTIONAL DIAGRAM 5-6*

*FIGURE 5-2: POWER SYSTEM FUNCTIONAL DIAGRAM FOR ALER 12 AND 30 5-7*

*FIGURE 5-3: TYPICAL ADATS SCREEN LAYOUT (ATC CONTROL)*

 *– RUNWAY/APPROACH 5-8*

*FIGURE 5-4: ADATS TAXIWAY SELECTION SCREEN 5-10*

*FIGURE 5-5: SCADA STATUS AND MONITORING SCREEN 5-11*

*FIGURE 5-6: SCADA RUNWAY/APPROACH SCREEN LAYOUT 5-13*

*FIGURE 5-7: SCADA TAXIWAY SELECTION SCREEN 5-14*

*FIGURE 5-8: CCR STATUS/CONTROL SCREEN 5-15*

### ***Index to Appendices***

*APPENDIX A Request For AGL Dispensation (Proforma)*

*APPENDIX B Airfield Lighting Maintenance Diary*

*APPENDIX C AGL Maintenance Permit To Work*

*APPENDIX D AGL Ground Check Certificate*

*APPENDIX E Spares Procurement Proforma*

*APPENDIX F Notification Of Faults/Obsolete Spares*

*APPENDIX G Preventative Maintenance Guidance*

*APPENDIX H Technical Inspection Check Sheets*

1. **AGL Configuration Manual and Layout Drawing - General Notes**
	1. Each AGL Configuration Manual and Layout Drawing is to be supplied in the following format:
		1. Draft Copy: One (1) Word document soft copy;
		2. Draft Copy: One (1) Excel document soft copy with all AGLCM and Layout Drawing schedules;
		3. Draft Copy: One (1) each of all Raw drawing soft copy files containing AGLCM Figures and the Layout Drawing; and
		4. Final Electronic Copies:
			1. PDF copy of full AGLCM and Layout Drawing (including all annexes embedded in this copy) suitable for website upload;
			2. PDF and Word copy of full AGLCM and Layout Drawing, with annexes separated if file size is greater than 5 megabytes (MB);
			3. Softcopy excel schedules; and
			4. Softcopy Raw drawing files of all AGLCM figures and the Layout Drawing.

**Annexe E – Aeronautical Ground Lighting (AGL) Training and Professional Development Services**

1. **Training Services**
	1. The Consultant may be required to provide training services aimed at transferring specialist technical aircraft pavement knowledge to Commonwealth and civilian maintenance personnel including with respect to the following areas:
		1. AGL inspections;
		2. AGL design;
		3. AGL maintenance; and
		4. Management strategies for AGL systems (including safety).
	2. The Consultant may be required to assist with course development and delivery including on the job training, training packages and delivery of face to face instruction.
2. **Professional Development Services**
	1. The Consultant may be required to provide to Commonwealth employees in engineering fields relevant to Aeronautical Ground Lighting, mentoring and opportunities to develop their knowledge and experience in Aeronautical Ground Lighting systems, subsystems and components in order to aid in their professional development.
	2. The Consultant may be required to undertake industry reviews of engineering competency claims to aid Commonwealth employees in their professional development and achievement of charted status with Engineers Australia.