Replacement of Aeronautical Ground Lighting and Apron Floodlighting

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1. Description

1.1. General

Cloncurry Airport requires a new/augmented Aeronautical Ground Lighting (AGL) and Apron Floodlighting (AFL) system, to be implemented alongside pavement upgrade and resurfacing works.

The project involves the design and installation of new Runway and Taxiway lights, Apron Floodlights and a new Aeronautical Ground Lighting Control System (AGLCS) with Pilot Activated Lighting (PAL).

The contractor performing the works must be experienced in AGL and AFL systems, and all work must comply with the latest Civil Aviation Safety Authority (CASA) Part 139 MOS, except where allowed herein or as agreed with the Principal.

1.2. Existing Installation

Cloncurry Airport has one lit runway with an existing low intensity AGL system, two lit taxiways and a lit apron, consisting of the following equipment:

Type	Details	No.
Runway 12/30 Edge	ALS PAL omni-directional fittings (white)	41
Runway 12/30 Threshold/End	ALS PAL elevated bi-directional fittings (red/green)	12
	ALS PAL elevated omni-directional fittings (green)	4
Runway 12/30 Turning Node Lights	ALS PAL elevated omni-directional fittings (blue)	8
Runway 12/30 PAPI	Single-sided Precision Approach Path Indicators (PAPI)	8
Taxiway A	Thorn IN inset uni/bi-directional fittings (green/yellow)	21
Taxiway B	ALS PAL elevated omni-directional fittings (blue/yellow)	12
Apron Edge	ALS PAL elevated omni-directional fittings (blue)	6
IWDI Runway 12	See-saw pole structure 240-volt LED floodlights	1 8
IWDI Centre	See-saw pole structure 240-volt LED floodlights	1 8
Apron Floodlighting	Floodlighting Poles Floodlighting Luminaires	7 7
Power & Supply	AGLCS Cubicle located within ALER	1
Standby Power	Emergency Generator	1
PAL System	AFRU / PAALC controller and associated modules	1

The lights are fitted with a Pilot Activated Lighting (PAL) system with Aerodrome Frequency Response Unit (AFRU), activated on air-band radio frequency 126.7 MHz, as well as manual activation from the AGLCS cubicle.

Refer to Appendix A – Existing AGL/AFL Layout for drawings of the existing AGL system.

1.2.1. Condition of Existing Installation

Refer to the recent Annual Electrical Technical Inspection report (July 2024) for details relating to the condition of the existing AGL and AFL systems.

Refer to Appendix D – Photos of Existing AGL & AFL Systems for photos of the existing installation.

1.2.2. Insulation Resistance Measurements

The following insulation resistance measurements were taken during the recent Annual Electrical Technical Inspection (July 2024) using 1,000V DC:

- Runway/Taxiway Primary Circuit: **0.1 MΩ**

This is below the minimum insulation resistance required in the Australian Wiring Rules AS/NZS 3000 of not less than 1 Meg Ohm.

1.3. Project Scope

The project scope includes, but is not limited to, the design, supply, delivery, installation, connection, testing, commissioning and guarantee of the following items to ensure a successful operation of the AGL and AFL systems:

- Replacement of low intensity runway lighting for Runway 12/30
- Supply to existing single-sided Runway 12/30 Precision Approach Path Indicators (PAPIs)
- Replacement of turning node lighting for Runway 12/30
- Replacement of taxiway centreline lighting with taxiway edge lighting for Taxiway A
- Replacement of taxiway edge lighting for Taxiway B
- Replacement of apron edge lighting
- Conversion of existing Runway 12 Illuminated Wind Direction Indicator (IWDI) to non-illuminated Wind Direction Indicator (WDI)
- Replacement of Apron Floodlighting
- New pit and duct system for the AGL and AFL facilities as required
- New primary cable for the Runway/Taxiway Lighting and PAPIs
- New FAA style Series Isolation Transformers (SITs)
- Removal of redundant lighting, cables, SITs, pits and associated infrastructure following the successful commissioning of the new system
- Replacement of Aeronautical Ground Lighting Control System (AGLCS)
- Replacement of Mains Isolation Transformers (MITs), of the appropriate size for the Runway/Taxiway and PAPI lighting
- Purchase of all equipment and materials necessary to complete the works and provision of spares
- Connection and/or integration with new/existing infrastructure where required
- Locating of all existing services prior to commencement of trenching
- Testing and commissioning of the replaced airfield lighting system, including Ground and Flight Checks, in accordance with Part 139 MOS and AC 139.C-11 v1.0
- Supply of minimum spares
- Production and delivery of Operation and Maintenance manuals
- Provide training to the Airport for the maintenance and operation of the installed equipment

Upon completing the construction phase, the Contractor is required to certify all AGL/AFL facilities and infrastructure as fit for purpose, safe, and environmentally compliant before they are accepted for service and operational use at Cloncurry Airport. Final certification shall be provided for both the design and the AGL/AFL installation in accordance with applicable regulations.

An indicative AGL/AFL layout has been included in Appendix B – Indicative AGL/AFL Layout.

1.4. Site Installation

Key activities in the installation phase include:

- Investigate and locate, identify, protect and/or modify, or relocate existing underground services that may be affected by the works
- Install new pit & duct, including underground conduit, SIT pits, pull pits, under pavement duct banks and entry to ALER/AGLCS, to meet compliance as per design requirements and manufacturer installation documentation
- Maintain the existing lighting facilities in operation for the duration of the works, or until such time as the new facilities are commissioned and accepted into service. This may require the AGL contractor to also perform lift and re-instatement works in association with the civil maintenance works proposed
- Coordinate, supervise and manage all persons engaged in the execution of the Works
- Survey and set out of necessary marking points for excavations and final point positions associated with the works
- Maintain the work site in a serviceable and safe condition for existing operations and to ensure the safety of all personnel and other Airport staff and users
- Install all equipment, being housings, primary and secondary cabling systems, cable support systems, light fixtures, bases, mountings, fixings and terminations using specialist alignment tools, and/or equipment necessary for the installation to meet compliance to the design documentation and manufacturers installation manuals
- Perform all calibration, testing, investigations and adjustments necessary to verify and guarantee the required performance of all facilities
- Augment existing AGL/AFL facilities and controls to accommodate new AGL/AFL systems installed and provide all interface to enable the augmentation of existing aerodrome facilities
- Label all installed facilities at all inspection points and termination points
- No alteration to the intent of the design is to be carried out without full acceptance and sign off from the Principal
- Install, Test and Commission all of the electrical works, in accordance with the local supply authorities requirements and include and maintain an ongoing record of all test results for inclusion into the Operation and Maintenance Manual
- Remove and discard all redundant equipment (including foundations, pits and associated infrastructure) and discard in accordance with the local environmental requirements

1.5. Supply & Delivery of AGL/AFL Equipment

The Contractor shall specify all materials and specialised AGL/AFL equipment, including a Bill of Quantities (BOQ) that details all materials and equipment needed to start and complete the construction phase.

To the extent practicable, standardised AGL/AFL components are required for consistency in design and operation, which aids in maximising interchangeability, minimising spare parts inventory, simplifying maintenance training, and maintaining existing standards.

Equipment selection should focus on products that are current and expected to be supported long-term, avoiding outdated or soon-to-be discontinued items. All equipment must be well-supported in Australia and standardised for use in AGL/AFL systems.

1.6. Spares

The Contractor must provide spares on completion of the project, as detailed in the following table. All spare equipment must be to the same conditions, specifications and test requirements as contained within the documents. The minimum quantities to be supplied for minimal spares holdings must be as per the following schedule.

Pack all spares in durable boxes where applicable. Clearly label spares enclosures with their contents and quantities. Pack instruments, lamps, lenses, glassware, relays and other delicate equipment separately. Packing apparatus will become the property of the Airport.

Liaise with the Airport's representative for a suitable location to house all spare parts.

Component	Spares Quantity To be Rounded up to the Next Whole Number Where a Percentage of the Total Supplied and Installed is Specified
Elevated Lights	
Complete assembly	10% of each colour
LED board holder inc. LEDs	100%
LED electronics converter	10%
Base	5%
Frangible coupling	5%
Gasket	50%
Lens	10% of each colour
Holder assembly mounting plate	10%
Lens retaining clip	5%
Inset Lights	
Top assembly complete	10% each colour
LED board holder incl. LEDs	100%
LED electronic converter	10%
Prism gasket	50%
Prism	10%
Protection plate	10% of each colour
Housing gasket	50% of each type
Optical support and accessories	5%
"O" rings top to base seal	50% of each type
"O" rings optical assembly sealing	50% of each type
Base	5%
Illuminated Wind Direction Indicator (IWDI)	
Yellow wind sleeve	1 sleeve
Apron Floodlighting	
Floodlight – Complete assembly	1 of each type
Electronic driver	2 of each type

Component	Spares Quantity To be Rounded up to the Next Whole Number Where a Percentage of the Total Supplied and Installed is Specified
Series Isolation Transformers (SITs)	
Rubber encapsulated FAA style	5% of each rating
Cable	
Primary cable	1 drum
Secondary cable	1 drum
Plug/socket connectors – Primary	10
Plug/socket connectors – Secondary	10
Control System Equipment	
Transient voltage protection devices	5 of each type
Control relays	2 of each type
Fuses	50% each type
Switches	2 of each type
Timers	2 of each type
Indicator lamps	2 of each type
Relays	2 of each type
Contactors	2 of each type
Other control system equipment	10% of all componentry (switches, indicator lamps and sockets, relays, etc.)
Other spares as determined by the manufacturer for ready use in the operation of the AGLCS	

The quantity and variety of the spares shall be determined on the basis of those deemed necessary, by the suppliers of the equipment, for ready use, to maintain the operation of the installed systems and associated equipment.

The Contractor must supply a proposed schedule of spares prior to ordering, for acceptance by the Principal. The schedule must include each equipment type, detailing part numbers, description and quantity with reference to their associated equipment type (e.g. runway light, taxiway light, etc.) correlated with the quantity installed during the project.

1.7. Existing Cables

Before isolating existing airfield primary cables, the contractor must coordinate with the Principal. The contractor is responsible for locating and potentially redirecting cables where required. Any damage to cables caused by the contractor must be repaired at no additional cost. All redundant cables should be removed from ducts and conduits, and any directly buried redundant cables should be cut back to ground level where accessible.

1.8. Continuity of Supply

Where the Works disrupt existing services at the airport, they should be scheduled to minimise inconvenience to airport operations. The duration of any service interruptions must be minimised through careful planning and organisation. If existing services are disturbed, they must be restored to their original condition at the contractor's expense.

A work program aligned with the MOWP must be submitted to the Principal before starting the works.

The existing runway and taxiway lighting system must remain operational during the new light installations and can only be isolated with permission from the Principal's representative.

2. Design Requirements

2.1. Design Responsibility

The AGL/AFL electrical infrastructure must be designed to comply with all relevant Australian standards and legislation for the specific type of installation or equipment used. If Australian standards are unavailable, applicable international or foreign national standards should be adopted, considering their relevance to the type of equipment and Australian installation conditions.

The Contractor is responsible for detailing all standards and legislation used.

The Contractor must evaluate any available design options and select the most cost-effective solution that meets these standards, the specifications of this document, and the specific requirements of the Airport.

2.2. Design Reference Documents

All new AGL/AFL facilities must adhere to the requirements of the Civil Aviation Safety Authority (CASA) Manual of Standards Part 139-Aerodromes (current version), AS/NZS 3000 (current version), and other relevant Australian and International Standards.

The Part 139 MOS incorporates standards from other documents, specifically ICAO Annex 14: Aerodromes (Vol 1) and ICAO Doc 9157/AN901: Aerodrome Design Manuals (All Parts). Furthermore, the design and construction of these facilities should employ Industry Best Standard, utilising up-to-date technology and practices, and may also reference documents from the Federal Aviation Administration (FAA) and the International Electrotechnical Commission (IEC) where applicable.

2.3. Design Life

All equipment shall be designed and installed to operate continuously at full load for 24 hours per day, 365 days per year at the extremes of temperature, humidity and environmental conditions (e.g. corrosive atmospheres) applicable for the installation location with a design and operational life of:

- 50 years for non-electronic components (pits, conduits, poles, etc.)
- 20 years for light fittings
- 20 years for cables and SITs
- 20 years for control equipment

2.4. Corrosion Protection

Consideration shall be given to corrosion protection to prolong the life of the AGL/AFL asset. All equipment and fixings shall be selected and installed so that they are suitable for the corrosive effect of the environment in which they are installed without maintenance requirements beyond that normally performed. Suitable corrosion inhibiting compounds shall be applied.

2.5. Safety in Design

The design of AGL/AFL systems must incorporate the requirements of the Work Health Safety Act 2012 and guidelines and principles set out by Safe Work Australia.

Safety in Design considerations shall also include aspects of maintenance and operations, including issues such as:

- Maintenance of apron floodlights requiring access at heights
- Accessibility to AGL/AFL infrastructure in poor/wet weather conditions

2.6. Design Certification

The Contractor shall provide a certificate of design compliance.

2.7. Electromagnetic Compatibility (EMC)

The AGL/AFL system shall not cause radiated or conducted electromagnetic interference to other systems such as information technology equipment (ITE), or radio navigational aids that may be located on or near the aerodrome, or that may use the same power supply.

The Design shall limit interference created by any AGL/AFL infrastructure in accordance with the requirements of AS/NZS CISPR and AS 61000.

2.8. Cut Over to new AGL Systems

The new AGL/AFL Control System and field equipment must be fully operational before the old systems are decommissioned. Short outages of the AGL/AFL may be allowed following consultation with the Principal's representative, but these must be carefully planned according to the MOWP to accommodate flying operations and weather conditions.

2.9. Retention of redundant materials

All AGL/AFL equipment made redundant at the completion of the works shall be identified to Cloncurry Airport for possible retention.

Equipment to be retained shall be suitably packaged for storage and relocated to a location as directed by the Principal. Pack all fragile equipment (e.g. optical components) in packaging such that they will be protected during long-term storage or transport.

3. Pit and Duct System

3.1. Requirement

All AGL/AFL circuits shall be installed in a new/existing pit and duct system.

Pits are required for cable access to under pavement duct crossings, pulling pits and at significant changes in direction.

3.2. Pit Design

Pits located within close proximity to airfield pavements that undergo regular aircraft movements must have a bearing capacity robust enough to support the most demanding aircraft, specifically the wheel load of an Embraer 190 aircraft that has veered off the pavement. While some bending of the pit lids is allowable, the pits must sustain the designated wheel load without structural failure. Additionally, the design of these pits must comply with all relevant WHS regulations and include necessary accessories.

A transformer stand shall be provided to protect the cables from a SIT "burn up".

3.3. Segregation from other Services

AGL primary cables must be separated from other services in compliance with relevant codes and regulations, with special attention to avoid proximity to copper communications cables and navigation aids. A minimum vertical clearance of 300 mm should be maintained by installing AGL primary cables beneath other services. For parallel installations, a horizontal separation of 500 mm is required to allow for non-intrusive excavation.

In cases where AGL/AFL services are routed through reinforced concrete duct banks beneath aircraft pavements, which also accommodate other services, separation requirements may be relaxed within the duct bank and for up to 4 meters beyond its concrete encasement.

3.4. Depth of Cover for Primary Cabling

Primary cables shall be installed within a pit and duct system with a 500 mm depth of cover.

3.5. Drainage

The pit and duct system shall be designed to minimise the retention of water. There shall be suitable low point connections to allow water to readily drain from the duct network systems. Drain holes shall be included in each pit where the duct entry does not provide free draining of the pit.

3.6. Duct Types

All ducts used for the enclosure of the primary cables shall be Electrical Heavy-Duty type to AS 2053 coloured orange and installed in accordance with AS/NZS 3000.

3.7. Duct Installation

Where cables cross open drains, lower the ducts to pass under the drains to maintain the minimum specified depth of cover. Encase the conduits in a concrete mix across the drain.

The buried entries to ducts and conduits shall be sealed to prevent the ingress of water.

3.8. SIT Pit Installation

Pits must be installed to maintain their bearing capacity. Pit entries should be sealed against backfill ingress. SIT pits are prohibited in pre-threshold areas or RESAs, and typically, only one SIT should be installed per pit unless otherwise approved by the Principal’s representative.

SIT pits should align with primary cables, ensuring secondary cables to lights have a straight, generally perpendicular path to the pavement edge and radial on curves. Pit installation must ensure lids are horizontal and flush with the adjacent surface level. On sloped surfaces, lids should align with the higher side.

Secondary cable conduits must allow for transformer stands to rest securely at the pit's base. In areas subjected to vehicle traffic, pits require reinforcement to support vehicular loads, with structural calculations provided for pits under such conditions.

3.9. Runway/Taxiway Duct Crossings

Where runway or taxiway duct crossings are required, the Contractor shall confirm if a suitable existing duct crossing is located within close proximity to the required location. Should an existing duct crossing exist, the Contractor shall undertake an investigation of the existing duct crossing to determine its suitability for re-use. Provide a report to the Principal outlining the following items:

- Location of existing duct crossing(s) indicated on a drawing
- Quantity, size and depth of existing duct(s)
- Condition of existing duct(s), i.e. good condition, broken, blocked, etc.
- Photos of the existing duct(s)

4. AGL Cabling

4.1. Requirement

The power supply for AGL systems shall be derived from constant current series circuits with a maximum current of 6.6 amps.

4.2. Earthing

The mains isolation transformer series circuits for AGL are not to be referenced to earth. No counterpoise earth or earthing stakes as detailed in the FAA Advisory Circulars are required.

No separate earth is required for the earthing of installed elevated or inset lights.

Floodlighting poles and circuits shall be earthed as per the requirements of AS/NZS 3000.

4.3. Characteristics

4.3.1. Primary Cable

The primary cable should be a 6 mm² copper, single-core, EPR or XLPE, 3 or 5 kV grade insulated cable with termite protection, suitable for long-term submersion in potentially water-filled pits and duct systems. It should feature indelible, contrasting colour markings for unique drum identification and sequential metre markings to aid in cable repair and identification.

The cable must comply with international standards such as the US Department of Transport, Federal Aviation Administration (FAA) AC 150/5345-7 (latest revision). Batch testing by a NATA registered authority is required to confirm cable design, insulation resistance, and conductor continuity for each drum, with test results included in the "As Constructed" documentation.

The manufacturer or supplier must provide a 5-year guarantee covering any defects in materials or workmanship under normal usage, committing to correct or replace any defects discovered during this period.

4.3.2. Secondary Cable

The secondary cable should be a flat twin, 2.5 mm² copper, multi-strand (50/0.25), flexible PVC, 0.6 kV grade insulated cable with a nylon sheath suitable for termite protection. The individual cores must be coloured—one white and one black—and conform to Australian or international standards, such as AS 5000.1.

The manufacturer or supplier must offer a 5-year guarantee to correct or replace any material or workmanship defects that occur under normal usage from the project's completion date.

4.4. Installation Details

4.4.1. Primary Cables

Primary cables must be installed within a pit and duct system in single, unjointed lengths, with joints allowed only in pits and when the route exceeds 1000 meters. In-line joints in ducts are prohibited.

Cables should not be taped or intertwined in ducts, allowing for individual withdrawal. Installation must follow logical procedures with monitored pulling tension to not exceed the manufacturer’s recommendations.

Support for the cables with rollers or other aids is necessary to facilitate installation, prevent surface damage, and avoid bending below the manufacturer’s minimum radius. For long runs or bends in the duct system, a manufacturer-recommended cable lubricant or friction modifier that meets

environmental and WHS standards should be used. All unterminated cable ends must be sealed to prevent moisture penetration.

4.4.2. Allowance for Future Re-Termination

To allow for future joints and fault rectification, a single 500 mm diameter loop shall be made in each primary cable where they pass through a pit other than a SIT pit. The coiled loops shall be tied and installed within the pit such that the coil is in the vertical plane and fixed to the wall of the pit.

To allow for future cutting and re-terminating of SITs, a length of primary cable extending 500 mm above ground level (both legs) should be provided at each SIT location.

4.4.3. Plug and Socket Connectors

Plug and sockets, compliant with FAA specifications, shall be utilised to connect the primary and secondary cables to SITs and lights.

Primary cable plug and sockets may be one of the following configurations:

- FAA type L-823, Type 1 Class A specification AC 150/5345-26 - Preformed, pre-terminated factory moulded plugs and socket provided with connecting “leads” of minimum length of 600 mm. The insulating material on the leads shall be compatible with the primary and secondary cable insulation and the inline cable joints, or
- FAA type L-823, Type 1 Class B specification AC 150/5345-26 - Field attached cable connectors that include the use of silicone compounds to provide a watertight seal and ensure electrical insulation.

Secondary cable plug and sockets shall consist of FAA L-823 Type 2 Class A twin conductor secondary leads.

4.4.4. Primary Cable Joints

Primary cable joints must maintain the insulation and dielectric properties of the primary cable, be waterproof, and capable of installation within SIT pits without damaging or straining the joint. These joints should be suitable for connecting primary cables to SIT plug and socket "connecting leads." Joints typically involve tinned copper crimp links compressed with a hexagonal die.

Heat shrink cable jointing kits are used for insulation and protection, featuring HV putty to alleviate electrical stresses, dual heat shrink sleeves with the outer sleeve bonding homogeneously to the inner sleeve and cable insulation, ensuring an effective waterproof seal with sufficient overlap.

For rejointing existing cables, the insulation must be stripped and cleaned thoroughly to prepare surfaces for optimal adherence. Primary cables connect to pre-moulded "leads" for SIT connections, and any inline joints should mirror SIT joint methods, using pre-moulded sockets with integral 600 mm tails and approved insulated crimped links for joining to the primary cable.

4.4.5. Labelling

All primary cabling and specified equipment must be clearly labelled to support maintenance efforts. Labels should be made from a minimum of 1 mm thick polymeric material, with lettering at least 4 mm high, regularly spaced, and permanently affixed to withstand normal abrasion and service conditions. Labels should not be obscured by sleeves and must be attached to cables with two nylon wire ties, one at each end, ensuring visibility of circuit descriptions and source and destination identifiers.

Cable ties for AGL cables must be made from UV stabilised material that does not harm the cable. Labels should be placed on all primary cables at every access point, such as pits, duct crossings, pull-in pits, and the AGLCS cubicle, and positioned for easy readability without needing to move the cables.

4.4.6. Secondary Cable

Secondary cables must be run in straight, single, unjointed lengths directly from individual SITs to lights, with only one lamp connected per SIT. The cable route should generally be perpendicular to the pavement edge and radial to lights on curves, following the shortest direct path. Installation should occur within conduits in non-pavement areas and within cut slots in sealed pavements.

Adequate compaction and cover are required over secondary cables at transitions between sealed and unsealed areas. Each SIT pit should contain a 2-meter coil of secondary cable to facilitate SIT withdrawal and re-termination.

For long secondary cable routes, consider the additional load on the SIT in conjunction with the lamp load, which may necessitate a higher power SIT or a secondary cable with a larger cross-sectional area to accommodate the increased demand.

4.4.7. Slots in Pavements

Slots shall be sawn into pavements where the secondary cables are required to traverse sealed pavements. The slot shall be aligned such that a minimum angle of 45 degrees is maintained with the sealed pavement edge.

The depth to width ratio of the slot shall meet the slot sealant manufacturers recommended ratio. Slots shall not be more than 12 mm wide.

4.4.8. Sealing Slots

Slots shall incorporate an open cell backing rod above the cable, with the slot filled with a sealant.

Slots in pavements shall be sealed with a self-levelling, fuel resistant bitumen modified moisture-curing polyurethane sealant (DOWSIL 890-SL).

The top surface of the sealant shall match the surrounding pavement level.

4.4.9. Secondary Cable Joints

Secondary cable joints should be compatible for connecting secondary cables together, to the SIT secondary plug/socket lead, and to factory-installed cables in light units, maintaining insulation and dielectric properties. These joints must be waterproof and designed to prevent damage or strain when installed in SIT pits. Joints for secondary twin core cabling shall utilise in-line compression links.

Each joint should include dual layers of heat shrink insulation: an inner sleeve that bonds homogeneously with the cable insulation, and an outer tube that similarly bonds to the cable and the inner sleeve. For connections to factory-installed cables, compression links should be staggered to minimise joint diameter, with each link insulated by heat shrink material.

Certified test certificates, detailing the electrical characteristics of each joint, must be provided. Final light top assembly connections should use FAA style plugs and sockets to simplify maintenance and removal.

4.4.10. Cable Markers

Where the route of underground AGL cabling is not clearly identified by pits, cable route markers shall be installed at changes of direction and at intervals of 100m.

Direction indicators shall be mechanically fastened to cable marker blocks; indicators that have been adhered with glue/silicon have previously become loose resulting in FOD.

5. Series Isolating Transformers (SIT)

5.1. Requirement

SITs shall be installed in pits along the primary cable route adjacent each light location.

5.2. Characteristics

SITs shall be 5 kV insulated 6.6 A to 6.6 A manufactured generally in accordance with the requirements detailed in the current revision of IEC 61823 AGL Series transformers and the current revision of FAA AC 150/5345-47– Isolating Transformers for Airport Lighting Systems.

The SITs shall consist of primary and secondary coils wound upon a core and shall be permanently encapsulated without voids to produce a watertight assembly.

The insulation resistance between the primary circuit and earth shall also apply to that between the primary and secondary windings.

5.3. Configuration

Over a design life of 20 years, the SITs are expected to maintain their thermal and electrical ratings despite temperature build-up in pits.

Both primary and secondary circuit connectors on the SITs shall be equipped with FAA style plugs and sockets, specifically:

- Primary tails with FAA type L-823, Type 1 Class A specification AC 150/5345-26 plug Style 2 and socket Style 9
- Secondary tails with FAA L-823 Type 2 Class A Style 8 connectors

6. Elevated Lights

6.1. Installation

Elevated lights shall be installed on concrete mounting blocks according to the supplier's recommendations and mounted to maintain their position and aiming point reliably. The mounting process should include the use of frangible couplings to ensure proper installation and alignment.

6.1.1. Frangibility

The light mounting shall have an approved frangible coupling where it attaches to the light. The frangible coupling shall comply with the requirements of ICAO Aerodrome Design Manual Part 4 - Visual Aids Chapter 15. Also refer ICAO Document 9157 Aerodrome Design Manual Part 6 – Frangibility.

6.1.2. Secondary Cable Retention

Provision shall be made to retain the female socket of the secondary cable at the base of elevated lights in proximity of the frangible coupling.

The secondary cable shall be retained so that in the event of the light being dislodged from its mounting, associated with the frangible coupling breaking, the secondary cable plug socket connection will be readily disconnected with the socket retained within the mounting base, thus presenting no bare secondary conductor.

7. Inset Lights

7.1.1. Inset Light Bases

The base for inset lights shall be of the shallow inset type, complying with the load and flange torque tests specified in the current revision of FAA AC 150/5345-42 for Type L-868 Class 1A light bases. These bases must provide a "dry" system and pass the air pressurisation test as outlined in AC 150/5345-42 when combined with the light top assembly. Secondary cable entries should allow side access through a factory-installed seal. For installations requiring multiple lamps, individual secondary cables must be used for each lamp, with compatible insulation and size. The bases should also feature fixing studs with self-locking nuts or "vibration proof" washers and stainless-steel anti-rotation pins or other mechanisms to prevent the light top assembly from rotating.

7.1.2. Installation of Light Base

Inset light bases should be secured within a core using Masterflow 618 epoxy grout, or approved equivalent, to block moisture ingress and adhere the light base to the pavement, while meeting Part 139 MOS height requirements. The epoxy grout shall be installed in accordance with the manufacturer's instructions, ensuring the epoxy level is 10 mm below the pavement surface. After the epoxy cures, the top 10 mm of the core hole should be filled with secondary cable slot sealant.

The installation process must not disrupt airside operations or damage surrounding pavement, ensuring the light can withstand aircraft loads.

Inset lights should be installed as recommended by the supplier and aimed correctly. Preparation for the light base installation includes cleaning and degreasing the exterior before fixing it into the cored hole.

For secondary cables jointed outside the base, the joint should be at least 100 mm away from the base to allow access if needed. If the secondary cable runs through the base, it must be installed without damaging the light unit and the entry hole should be sealed to prevent moisture ingress and ensure a watertight seal.

In uneven pavement situations, the light base should be installed level between the highest and lowest points of the cored hole.

7.1.3. Installation Jigs

Installation jigs shall be suitable for retaining the light unit base during its installation within 0.5 degrees of level.

7.1.4. Survey

The design location and orientation (deviation angle) details for lights shall be accurately surveyed and marked on the pavement to indicate the location of the base and the respective orientation of the light. Painted marking for survey shall be kept to a minimum and shall not be overly conspicuous and shall be short life water based.

Nails or pins shall not be used to mark the surveyed locations due to the potential FOD risk.

8. Runway Lighting

8.1. Requirement

The Runway 12/30 lighting shall be a single-stage low intensity system, consisting of edge, threshold and end lights.

All lights shall utilise Light Emitting Diode technology (LED).

8.2. Runway Edge Lights

Light intensity, beam characteristics, colour, configuration and aiming of runway lighting shall be as detailed in Part 139 MOS.

Inset runway edge lights shall have an average main beam intensity within 1.2 and 0.8 of the corresponding elevated edge lights.

Preference shall be given to elevated edge lights where possible. Where elevated edge lights cannot be installed (e.g. due to an intersecting taxiway or a turning node), an inset light shall be installed.

8.3. Runway Threshold and End Lights

Light intensity, beam characteristics, colour and aiming shall be as detailed in Part 139 MOS.

Elevated threshold and end lights shall be installed.

8.4. Runway Outer Threshold Lights

Light intensity, beam characteristics, colour and aiming shall be as detailed in Part 139 MOS.

Elevated outer threshold lights shall be installed.

8.5. Intensity Ratio

The intensity ratio between respective elements of AGL systems shall be as detailed in Part 139 MOS.

9. Taxiway Edge, Apron Edge and Turning Node Lighting

9.1. Requirement

The Taxiway edge, Apron edge and Turning Node Lighting shall consist of blue elevated edge lights. Yellow Taxiway edge lights shall be installed in-line with the runway holding positions.

All lights shall utilise Light Emitting Diode technology (LED).

9.2. Taxiway, Apron and Turning Node Lights

Light intensity, beam characteristics, colour, spacing, configuration and aiming shall be as detailed in Part 139 MOS.

10. Precision Approach Path Indicators

10.1. Runway 12/30 PAPI

The existing single-sided Runway 12/30 PAPI were recently installed in 2023.

Provide a new supply from both Runway 12 and Runway 30 PAPIs within a new/existing pit and duct system, back to the new AGLCS cubicle.

11. Illuminated Wind Direction Indicators

11.1. IWDI Centre

No works required.

11.2. Runway 12 IWDI

The existing illuminated wind direction indicator (IWDI) located in the vicinity of Runway 12 threshold shall be converted to a non-illuminated wind direction indicator (WDI).

Replace the existing white sock with a new compliant yellow sock.

Disconnect the incoming power supply from the supply location and make safe.

Remove the existing LED floodlights and hand them over to the Principal's representative for use as spares.

12. Apron Floodlighting

12.1. Requirement

New apron floodlighting shall be provided on the Apron to adequately illuminate the reconfigured parking Bays 1, 2, 3 and 4.

The parking positions are utilised by the following Code C aircraft:

- Dash 8-400
- Embraer 190
- Fokker 100

12.2. Characteristics

Illumination levels, spectral distribution, configuration, supply, and aiming of apron floodlighting should adhere to Part 139 MOS specifications, tailored for Code C aircraft, wherever possible.

The designer is responsible for choosing suitable LED luminaires. Selected floodlights should emit white light with adequate colour rendering to clearly display aircraft warning labels. Additionally, it is critical to eliminate strobing effects that may cause rotating parts on aircraft and service vehicles to appear stationary, ensuring safety under all operational modes of the apron lighting.

12.3. Design Criteria and Part 139 MOS Compliance

Due to the apron configuration, orientation of the Parking Bays and the Floodlight mast height limitations due to OLS, the minimum illumination levels specified in Part 139 MOS may not be able to be achieved (particularly some of the vertical values). Where compliance with Part 139 MOS is not possible, the contractor shall propose a suitable apron floodlighting solution to the Principal's representative that provides compliant illumination levels wherever possible. Where compliant illumination levels are not possible, illumination levels as high as practicable shall be provided.

The minimum average illuminance of each parking position and other apron areas that should try to be achieved, where possible (in accordance with Part 139 MOS) is as follows:

- for horizontal illuminance— a minimum lux rating in accordance with Table 9.116 (3) for Code C aircraft, with a uniformity ratio (average to minimum) of not more than 4:1
- for vertical illuminance— a minimum lux rating in accordance with Table 9.116 (3) Code C aircraft, at a height of 2m above the apron in the relevant parking direction, along the aircraft centreline over the entire length of the parking position
- at other apron areas — horizontal illuminance at 50% of the average minimum illuminance for the highest code for the associated parking positions on the apron (Code C), in accordance with Table 9.116 (3), with a uniformity ratio (average to minimum) of not more than 4:1

Note: The ground service equipment area independent of the aprons is recommended to have a horizontal illuminance of at least 10 lux with a uniformity ratio (average to minimum) of not more than 4:1.

12.4. Luminaires

Luminaires must be shielded to prevent extraneous light from being emitted above horizontal.

The construction of the light head frames shall be sufficiently rigid to prevent the floodlight beam moving more than five degrees out of line in the prevailing wind conditions.

An appropriate maintenance factor shall be applied to the floodlight luminaires' rated intensity during design, this shall incorporate:

- A lumen depreciation factor (as obtained from the manufacturer of the floodlight luminaire)
- A dirt depreciation factor (reflecting proposed maintenance regime, using AS/NZS 1158.0:2005)

A factor greater than 0.85 shall not be applied.

12.5. Electrical supply

The primary source of electricity supply for apron floodlighting is to be supplied from a local three-phase electricity supply at 400 V 50 Hz. Apron floodlights shall be distributed across the phases of the three-phase electricity to avoid stroboscopic effects associated with the illumination of rotating propellers.

All submains and final subcircuits supplying floodlights shall be installed in a pit and duct system.

Final subcircuits to each floodlight luminaire supplied from the floodlight control board shall be protected using an RCD breaker.

12.6. Control

Control shall be incorporated within the AGLCS cubicle and energised under pilot activated lighting (PAL).

12.7. Management of OLS

Floodlight masts, including head gear and lightning finials (where installed) shall not breach the runway obstacle limitation surface.

The masts shall be located such that they will not constitute an obstruction to aircraft manoeuvring on the apron or adjacent taxiways. In any case the masts shall be located a minimum of 7.5m clearance from the wingtip of the Code C aircraft using the apron (refer Part 139 MOS 6.58).

Obstruction lights are not required to be installed upon floodlight poles.

12.8. Lightning protection

Where lightning finials are installed atop a floodlight pole the additional height must be considered in assessment of proximity to the OLS. Lightning finials shall not breach the OLS.

The floodlight pole structure shall be solidly connected to mass earth at the base of the pole.

12.9. Masts and Maintenance Access

Maintenance access to the lights shall be provided by hinged masts.

Provision for maintenance access shall be provided. Suitable access and ground condition shall be provided for positioning lowering equipment and elevated platforms to access lowered headframes.

Footings provided to mount floodlight poles shall be designed for the local geotechnical and environmental conditions including relevant wind loading conditions. Footings shall be designed and certified by a qualified structural engineer (CPEng).

12.10. Installation Details

The location of each pole shall also take into consideration the orientation of the pole when in its lowered position including any allowance for the back lift of the counter balanced arm.

13. Aeronautical Ground Lighting Control System (AGLCS)

13.1. General

The contractor shall design, supply, install and commission a new Aeronautical Ground Lighting Control System (AGLCS), while ensuring continuity of service to existing equipment, in coordination with the Principal's representative.

The new AGLCS shall power and control all airfield lighting components using simple switch and relay logic. Programmable Logic Controllers (PLC) are prohibited.

The system design must meet fail-safe standards as specified in Part 139 MOS.

Key features of the new AGLCS shall include front panel indicator lamps with a test switch, and a Pilot Activated Lighting (PAL) controller with an external battery backup for at least two hours. An accompanying aerial for the PAL must also comply with Part 139 MOS. The system should be fully operational before decommissioning the existing AGLCS.

The new system shall include Mains Isolation Transformers (MITs) for Runway/Taxiway, and PAPI circuits, all housed in a proprietary painted steel, lockable cabinet. This freestanding cubicle shall replace the old AGLCS in the same location and shall include sufficient dimensions to accommodate all components, including the PAL transceiver and battery. Cabling within the cabinet shall be managed through slotted cable enclosures with removable covers and all external cable entries shall be sealed with glands.

The cabinet shall be installed on a plinth and secured with stainless steel anchors and additional brackets if necessary.

The contractor must consult with the Principal's representative regarding any known future expansions, to ensure the AGLCS can accommodate future needs.

13.2. Removal of Existing AGLCS

After commissioning of the new AGLCS, the existing AGLCS shall be removed from site and disposed of. All old redundant cabling shall be removed. The old Mains Isolating Transformers (MIT) shall be removed from site and disposed of.

All surfaces, floor duct and cable openings exposed by the removal of the existing AGLCS shall be made good.

13.3. Power Supply to the new AGLCS

The contractor shall determine if the existing power supply to the existing AGLCS is adequate to supply the new AGLCS. If required, the existing power supply shall be upgraded to meet the demands of the new AGLCS.

13.4. Control Philosophy

The AGLCS is required to provide control of all the AGL/AFL facilities installed at the Airport, including:

- Runway/Taxiway lights
- PAPI
- IWDI
- Apron Floodlights

The control functionality shall be selectable from a 6-position rotary switch that is accessible from the inside panel of the AGLCS cabinet (accessible without a key).

The control switches shall provide six main states:

1. **PAL** – This state allows each of the circuits to respond to a PAL request such that the AGL/AFL facilities are energised to suit the ambient light conditions as detected by a PE cell. The PE cell shall enable automatic selection of day, twilight or night mode. The PE cell shall be set to operate the AGL/AFL when the ambient lighting level falls below 500 lux. The PE cell shall be calibrated and adjustable such that they will establish the ambient light conditions as defined in Part 139 MOS and not react to short term transient ambient light variations.

2. **AUTO** – When switched to AUTO, all AGL/AFL systems will turn on at the appropriate intensity determined by the current day light conditions. For example, if the switch is turned to AUTO during the day, the Runway/Taxiway lights will only come on as night approaches. They will stay on all night and turn off in the morning. AUTO selection shall activate all of the following lighting facilities installed at the Airport:
    - Runway and Taxiways
    - PAPI
    - IWDI
    - Apron Floodlights

3. **OFF** – All AGL/AFL systems are switched OFF and will not respond to a PAL request.

4. **POSITION 1 (Night)** – Runway/Taxiway lights, IWDI, Floodlights and PAPI Stage 1

5. **POSITION 2 (Twilight)** – Runway/Taxiway lights, IWDI, Floodlights and PAPI Stage 2

6. **POSITION 3 (Day)** – PAPI Stage 3

13.5. Pilot Activated Lighting (PAL)

The Pilot Activated Lighting (PAL) transceiver shall be a propriety-developed item that complies with the requirements as detailed in Part 139 MOS, Chapter 9 Division 3. An audio acknowledge (AFRU) feature shall be incorporated with the PAL transceiver.

The transceiver shall be integrated into the AGLCS such that it is provided with an external battery back-up and associated charger.

The terminations to the transceiver and its antenna shall be via a plug and socket to allow ready removal of the unit for servicing.

13.6. PAL Control

When the control switch is selected for PAL, the AGL/AFL facilities shall be controlled by the action of the PAL transceiver. The lights shall be remotely activated by VHF radio (126.7 MHz).

Receipt of a PAL trigger input from the PAL system shall activate the AGL/AFL facilities for an adjustable time period (initially set to 30 minutes) for day, twilight and night modes. The facilities activated shall be as preset at the predetermined intensities. The IWDI lighting shall flash at a rate of

50 cycles per minute (approximately 0.6 seconds ON and 0.6 seconds OFF) for the last 10 minutes of the cycle.

13.7. Photoelectric (PE) Cell

The PE cell shall be set to the following lux levels:

- Day – Above 500 lux
- Twilight – Between 50 and 500 lux
- Night – Less than 50 lux

The exact lux levels shall be adjusted on site to suit the Airports requirements.

13.8. Intensity Control

Intensity control shall be provided for the following AGL/AFL facilities:

- Runways, Taxiways and Apron edge (combined circuit) – single stage
- PAPI – 3 intensity stages
- IWDI - single stage with flashing to indicate the last 10 minutes of a PAL cycle
- Apron Floodlights - single stage

13.9. Proposed AGLCS Cubicle

Detailed drawings of similar airfield lighting control systems to that proposed by the Contractor shall be provided at the time of tendering. The AGLCS drawings should indicate the layout of all circuitry and shall demonstrate an understanding of what is required.

Provide shop drawings prior to manufacture to the Principal’s representative for approval.

13.10. Wiring and Accessories

All wiring and accessories must comply with AS3000 standards.

Cables should be sized for the maximum continuous rating of equipment or the protective device's 'let-through' energy, whichever is greater.

Apply AS/NZS 3008 Part 1 de-rating factors for conductors in AGLCS and external ducts.

Wiring should be color-coded and installed in PVC ducts or tied with PVC ties. Use galvanised trays or conduits for external cables, following AS/NZS 3000 sizing and segregation guidelines.

Terminal blocks should be spring-loaded, tunnel type, with compression lugs and ordered installation.

13.11. Circuit Breakers

Circuit breakers must include overload and short-circuit protection per AS/NZS 60898, with aligned toggles and accommodations for various breaker sizes and auxiliary contacts.

13.12. Switches

Switches must be labelled clearly with black knobs as per AS 1431 standards.

13.13. Control Relays

Control relays should be suited for continuous operation and interchangeable. They must feature at least four contact sets, include both normally open and closed contacts, and adjustable time delay relays with precise settings.

14. Testing and Commissioning

14.1. General

AGL/AFL systems shall undergo testing and commissioning activities necessary to prove their safety and correct operation.

Commissioning of AGL/AFL systems occurs in seven stages:

1. **Design certification** – Validating the AGL/AFL design against the standards. This is likely to include Compliance by Specific Design and Installation which needs to be acknowledged by the Airport owner/operator.
2. **Product certification** – Type test of equipment to be provided to evidence compliance.
3. **Testing and inspections** – Routine testing and inspections undertaken during the construction works in accordance with the Contractor's inspection and test plans to validate quality assurance compliance. Factory acceptance testing should be considered where complex items have been manufactured off-site.
4. **Pre commissioning** – Checks and testing of each element of the system to validate relevant functionality and compliance against the specification.
5. **Commissioning** – Testing of the system as a whole to validate co-ordinated functionality and compliance against the specification.
6. **System verification and handover** – Testing of the system after completion of the Commissioning, in the presence of the Principal's representative, to validate functionality against the original briefing and project design criteria.
7. **Certificate of compliance (validation)** – Provided by the installation contractor in accordance with electrical regulations with due reference to the Compliance by Specific Design and Installation.

14.2. Product Certification

The contractor shall submit evidence of product compliance in the form of type test certification for key components of the AGL/AFL installation, including:

- Runway lights
- Taxiway/Apron/Turning node lights
- Apron floodlights
- Primary and secondary cables
- SITs
- Pits
- MITs
- PAL/ARFU equipment

Such evidence shall be incorporated in the O&M Manual provided for the installation.

14.3. Testing

Testing shall be conducted in accordance with the relevant Australian, IEC, or other appropriate standard and to the requirements of the Airport.

Testing shall occur on the equipment procured with suitable test records provided including the following:

- Factory inspection and testing for major items of plant and equipment
- Factory Acceptance Testing of the Control System
- Site Acceptance Testing of the Control System
- At completion of individual systems or groups of systems

As a minimum, the following testing shall be conducted for the site installation:

- All tests required by AS/NZS 3000
- Insulation and continuity testing for AGL primary cabling systems
- Correct operation of protection relays and other protective devices
- Instrument configuration and calibration
- Functional tests

Copies of the test records shall be incorporated in the Operations and Maintenance Manual.

14.4. Insulation and Circuit Resistance

The minimum acceptable insulation resistance for completed circuits shall be 1000 mega Ohms to earth. Tests shall be performed using a 1,000 V DC insulation tester with the insulation resistance being recorded at the end of a 1 minute period after the voltage is applied.

14.5. Pre-commissioning

Pre-commissioning shall include checks, tests and the collation of all compliance records of all elements including:

- Pit and duct system
- Lights
- Circuit connection
- Series Isolating Transformers
- Electrical tests including compliance testing results
- Cables/Field circuits
- Electrical characteristics including batch testing results of cables
- Site installation records including drum and meter cable marking for each circuit
- Circuit connections
- Sign of all Quality Documentation including sign off of all test plans and non-conformance corrective actions
- Submission of Operation and Maintenance Manuals and as built drawings excluding the Commissioning results

14.6. Commissioning

The results and documented records of the pre-commissioning activity together with the commissioning plan shall validate the system ready for commissioning.

Commissioning shall include selected critical inspection of randomly selected elements as nominated.

Commissioning tests shall include but not limited to:

- Field installation
- That all lights are operating correctly when their respective circuit is connected and over the range of intensity stages for all control locations
- That all lights are correctly orientated with correct filters and lenses fitted
- That lights are operating at the correct intensities
- The correct operation of the AGL/AFL systems when fully connected to the control system
- AGL/AFL control system compliance and full functional and operational checks on energised control equipment and circuits
- Operation of each circuit and intensity selection with validation of required revertive, validation of alarm and event logging and reporting
- Validation of system response to anticipated failure modes of control system to confirm fail safe operation

- Configuration and operation (selection) of Pilot Activated Lighting control mode
- The simulation of a mains power failure (disconnection of mains supply) to ensure that the system reactivates correctly. Testing shall be undertaken on the system at maximum load (all AGL/AFL facilities energised at maximum intensity)

Commissioning of the AGL systems shall be undertaken in accordance with the requirements of the Part 139 MOS Chapter 9 Division 2 including ground checks and flight checks. Ground and flight checks shall be undertaken in accordance with the requirements of CASA AC 139.C-11 v1.0.

Commissioning shall occur prior to placing the completed installation into service. The contractor shall ensure that an appropriate commissioning plan is provided to ensure that the system is adequately proven and with minimum disruption to the Airport.

Adequate notice of site testing and commissioning activity shall be provided to the Principal's representative so that they can attend commissioning if required. Visual inspection for light location, orientation and visual performance is to be undertaken by both the Principal's representative and the contractor.

Commissioning results shall be included in the Operation and Maintenance manual.

14.7. System Verification and Handover

The AGL/AFL systems must be tested in the presence of the Principal's representative to validate the system's functionality against the original briefing and project design criteria. The results and documented records of the commissioning activity, together with the acceptance testing plan, shall validate the system is ready for acceptance testing with the Airport.

Before equipment is handed over to Cloncurry Airport, the following minimum requirements shall be achieved:

- All required tests have been undertaken with results provided to the Principal
- All necessary compliance certificates are provided
- All lights, switchgear and equipment is correctly labelled and that the new labels for any existing cables, lights, plant and equipment are ready for change or changed as required
- All required safety equipment is provided where required, including all signs and barriers
- Operator training has been conducted to the level that the operators are qualified to operate and maintain the installation
- All appropriate operating and maintenance information is provided
- Documentation is provided reflecting the new system arrangement
- Certification has been received that the new installation meets the requirements of all appropriate legislation and standards and the requirements of this document

The Principal's representative has the right to refuse acceptance of any installation, plant and equipment where it could compromise safety or the above requirements have not been met.

14.8. As-Constructed Information and Operation and Maintenance Manuals

The production of as-constructed information and Operation and Maintenance (O&M) manual is required to be provided to the Principal's representative prior to project completion. The documentation of the AGL/AFL systems will be used as a management tool for the future planning and maintenance of the systems.

Required documentation includes:

- As-Constructed drawings – Hard and soft copies of drawings detailing the "As Constructed" information

- O&M manual containing data, manuals, test results, certification and information regarding the equipment and systems installed

A draft copy of the manual and drawings shall be delivered for review by the Principal's representative prior to the acceptance testing and commissioning phase of the AGL/AFL system.

The manuals shall be further amended to reflect the final "As Constructed" details and incorporate additional testing and certification prior to the end of the 12 months Defect and Liabilities period.

14.9. As Constructed Drawings

The production of as-constructed drawings shall show as a minimum:

- The installed locations and orientation of AGL lights, cables, pits, cable joints, etc
- The installed locations and aiming points of apron floodlights
- Wiring diagrams for all equipment installed including cable management plan and termination diagrams
- General arrangement drawings showing details of all equipment installed, including internal and external panel layouts
- All information required to facilitate operation and maintenance of the equipment

14.10. Operation and Maintenance (O&M) Manual

The O&M manual shall detail the configuration of the installed AGL/AFL and contain technical information sufficient to maintain all equipment. Included in this manual shall be technical descriptions, configuration drawings, single line drawings, control system schematics, equipment schedules, airfield layouts, test results, certification, etc.

Information to be included in the O&M manual shall include, but not limited to the following:

- Equipment schedules for installed and spare equipment including parts listings
- Details of installed equipment including installation, use and maintenance requirements
- Functional description of installed systems
- Details of installed systems including installation, operation and maintenance requirements
- Testing and commissioning results including certification, ground and flight check reports and quality assurance documentation

14.11. Training

The contractor must provide training to Airport staff on how to maintain the new AGL/AFL systems as per the maintenance procedures in the O&M manual provided.

14.12. Inspections during the Defects Liability Period

The Contractor shall allow for inspections during the defects liability period to confirm all infrastructure and equipment is connected and functioning correctly. The Contractor shall provide certification to this effect after each visit.

The following inspections, tests and maintenance activities shall be made at the scheduled inspection intervals as a minimum:

- Confirmation that all equipment is connected and functioning correctly
- Inspection of trenching and excavations, and pit installations for signs of subsidence
- Inspection/maintenance of electrical and control systems in accordance with manufacturer requirements
- Maintenance of associated equipment in the AGLCS cubicle in accordance with manufacturer's requirements

- Testing of circuit series resistance and insulation resistance for all primary circuits installed under this Contract

Where issues arise that relate to quality of materials or workmanship provided under this Contract, a defect shall be raised requiring a response and rectification by the Contractor within three working days.

Co-ordinate the visits and any fault rectification with the Principal's representative so that they can witness the rectification of faults and routine service activities.

14.13. Certification

Submit reports summarising inspection activity, identification of issues and any corrective action taken. At the end of the maintenance period make a final service visit and, upon satisfactory completion of the above procedures, certify in writing that the installation is operating correctly.

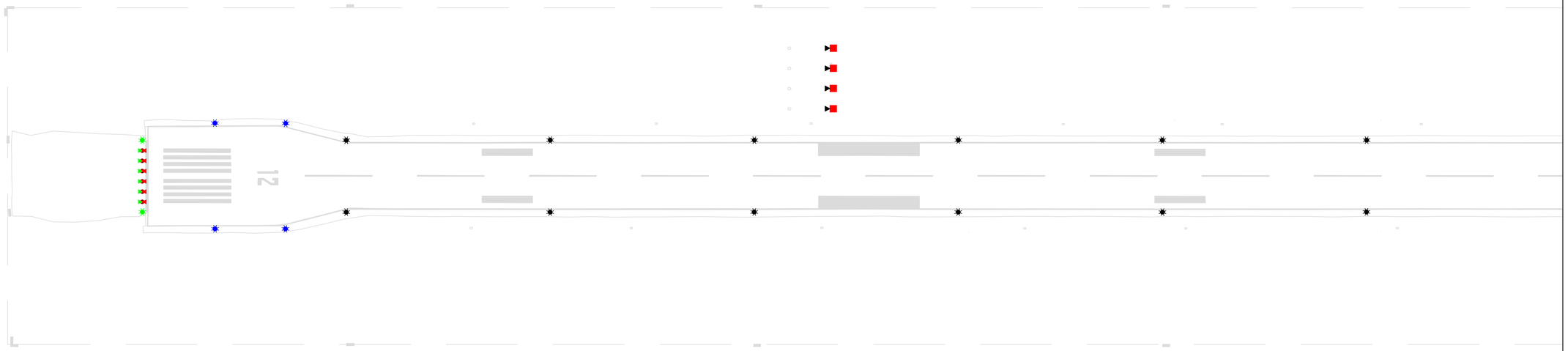
Appendix A – Existing AGL/AFL Layout

LEGEND:

- EXISTING ELEVATED OUTER THRESHOLD LIGHT
- EXISTING ELEVATED THRESHOLD/END LIGHT
- EXISTING ELEVATED RUNWAY EDGE LIGHT
- EXISTING ELEVATED TAXIWAY/APRON EDGE/TURNING NODE LIGHT
- EXISTING ELEVATED TAXIWAY HOLDING POSITION LIGHT
- EXISTING INSET TAXIWAY CENTRELINE LIGHT
- EXISTING ILLUMINATED WIND INDICATOR
- EXISTING PRECISION APPROACH PATH INDICATOR (PAPI)
- EXISTING APRON FLOODLIGHT POLE
- EXISTING PIT AND DUCT
- EXISTING PIT

NOTES:

1. EXISTING SIT PITS, DIRECT BURIED PRIMARY CABLING AND SECONDARY CABLING NOT SHOWN.
2. THE LOCATION OF EXISTING LIGHTS AND THE ROUTE OF EXISTING PIT AND DUCT (WHERE SHOWN) MAY PROVE INACCURATE. HOWEVER, THE INFORMATION HAS BEEN INCLUDED TO PROVIDE AN APPROXIMATE INDICATION. ALL LOCATIONS, ROUTES AND QUANTITIES SHALL BE DETERMINED DURING THE DESIGN PHASE THROUGH SITE INVESTIGATIONS.



1

PRELIMINARY

Rev	Description	Draw	Chk	App	Issue Date
A	ISSUE FOR TENDER	AP	AP		06.11.24

SCALE 1:1000 AT ORIGINAL SIZE

0 5m 12.5m 25m 50m

DO NOT SCALE DRAWING

CLONCURRY SHIRE COUNCIL

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DRAWING MUST BE PRINTED IN COLOUR

Drawn	AIRPORT CONSULT
Checked	AIRPORT CONSULT
Approved	
Scale at A1	AS SHOWN

This drawing must not be used for construction unless signed as approved

Client: CLONCURRY SHIRE COUNCIL

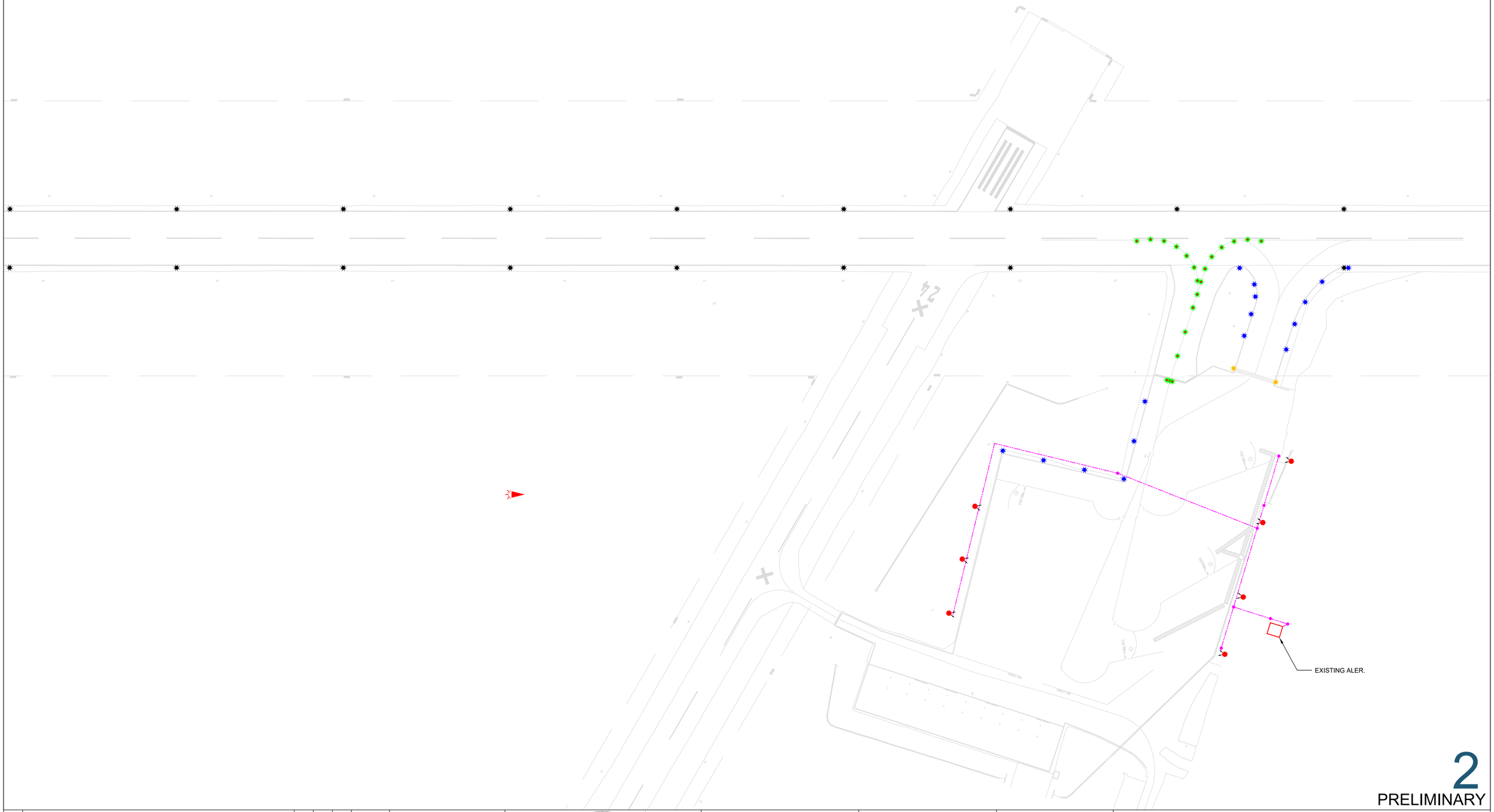
Project: CLONCURRY AIRPORT RESEAL PROJECT

Title: EXISTING AGL LAYOUT FOR D&C RFT
LIGHT AND CABLING PLAN - AREA 1

Drawing No. CLO24-AGL-SK-001 | Revision A | Original Size A1

NOTES:

1. EXISTING SIT PITS, DIRECT BURIED PRIMARY CABLING AND SECONDARY CABLING NOT SHOWN.
2. THE LOCATION OF EXISTING LIGHTS AND THE ROUTE OF EXISTING PIT AND DUCT (WHERE SHOWN) MAY PROVE INACCURATE. HOWEVER, THE INFORMATION HAS BEEN INCLUDED TO PROVIDE AN APPROXIMATE INDICATION. ALL LOCATIONS, ROUTES AND QUANTITIES SHALL BE DETERMINED DURING THE DESIGN PHASE THROUGH SITE INVESTIGATIONS.



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PRELIMINARY

Rev	Description	Draw	Chk	App	Issue Date
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N E S W

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SCALE 1:1000 AT ORIGINAL SIZE

DO NOT SCALE DRAWING

CLONCURRY SHIRE COUNCIL

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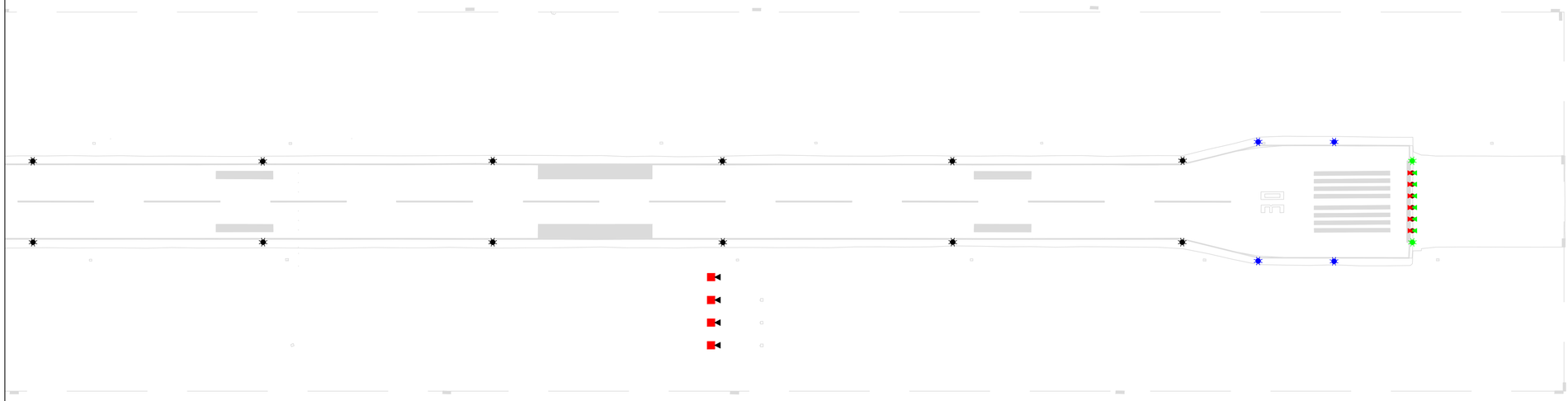
DRAWING MUST BE PRINTED IN COLOUR

Drawn	AIRPORT CONSULT	Client	CLONCURRY SHIRE COUNCIL
Checked	AIRPORT CONSULT	Project	CLONCURRY AIRPORT RESEAL PROJECT
Approved		Title	EXISTING AGL LAYOUT FOR D&C RFT LIGHT AND CABLING PLAN - AREA 2
Scale at A1	AS SHOWN		
This drawing must not be used for construction unless signed as approved		Drawing No.	CLO24-AGL-SK-002
		Revision	A
		Original Size	A1

NOTES:

1. EXISTING SIT PITS, DIRECT BURIED PRIMARY CABLING AND SECONDARY CABLING NOT SHOWN.
2. THE LOCATION OF EXISTING LIGHTS AND THE ROUTE OF EXISTING PIT AND DUCT (WHERE SHOWN) MAY PROVE INACCURATE. HOWEVER, THE INFORMATION HAS BEEN INCLUDED TO PROVIDE AN APPROXIMATE INDICATION. ALL LOCATIONS, ROUTES AND QUANTITIES SHALL BE DETERMINED DURING THE DESIGN PHASE THROUGH SITE INVESTIGATIONS.



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PRELIMINARY

Rev	Description	Draw	Chk	App	Issue Date
A	ISSUE FOR TENDER	AP	AP		06.11.24

SCALE 1:1000 AT ORIGINAL SIZE

DO NOT SCALE DRAWING

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DRAWING MUST BE PRINTED IN COLOUR

Drawn	AIRPORT CONSULT
Checked	AIRPORT CONSULT
Approved	
Scale at A1	AS SHOWN

This drawing must not be used for construction unless signed as approved

Client	CLONCURRY SHIRE COUNCIL
Project	CLONCURRY AIRPORT RESEAL PROJECT
Title	EXISTING AGL LAYOUT FOR D&C RFT LIGHT AND CABLING PLAN - AREA 3
Drawing No.	CLO24-AGL-SK-003
Revision	A
Original Size	A1

Appendix B – Indicative AGL/AFL Layout

LEGEND:

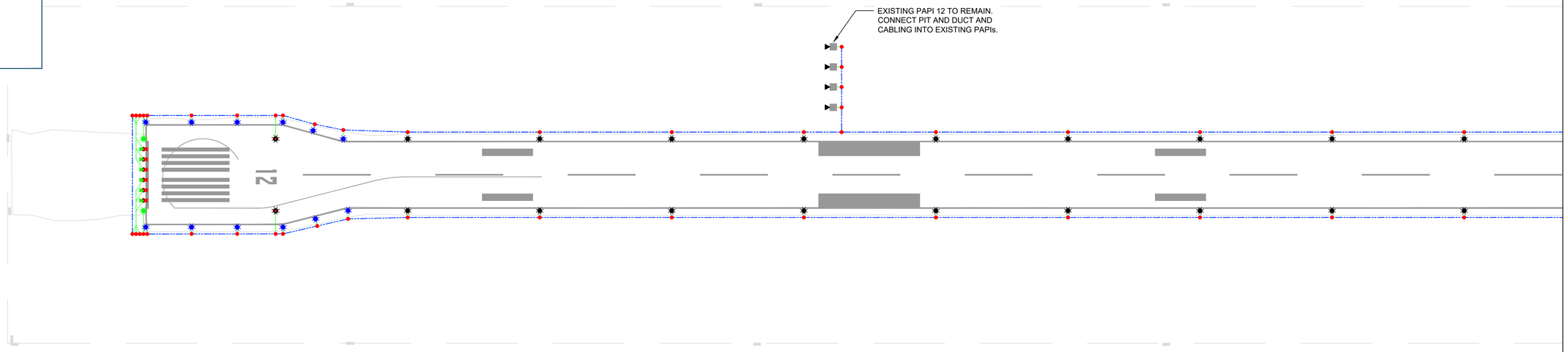
- ELEVATED OUTER THRESHOLD LIGHT
- ELEVATED THRESHOLD/END LIGHT
- ELEVATED RUNWAY EDGE LIGHT
- INSET RUNWAY EDGE LIGHT
- ELEVATED TAXIWAY/APRON EDGE/TURNING NODE LIGHT
- ELEVATED TAXIWAY HOLDING POSITION LIGHT
- EXISTING ILLUMINATED WIND INDICATOR
- EXISTING PRECISION APPROACH PATH INDICATOR (PAPI)
- APRON FLOODLIGHT POLE
- PRIMARY CONDUIT AND CABLE
- SECONDARY CONDUIT AND CABLE
- APRON FLOODLIGHTING CONDUIT AND CABLE
- EXISTING PIT AND DUCT
- NEW PIT
- EXISTING PIT (TO REMAIN)
- RUNWAY / TAXIWAY DUCT CROSSING

NOTES:

1. THE LOCATION OF EXISTING LIGHTS AND THE ROUTE OF EXISTING PIT AND DUCT MAY PROVE INACCURATE. HOWEVER, THE INFORMATION HAS BEEN INCLUDED TO PROVIDE AN APPROXIMATE INDICATION. ALL LOCATIONS AND ROUTES SHALL BE DETERMINED DURING THE DESIGN PHASE THROUGH SITE INVESTIGATIONS.
2. NEW LIGHTS AND PIT AND DUCT LOCATIONS AND QUANTITIES SHOWN INDICATIVELY ONLY. EXACT LOCATIONS AND QUANTITIES TO BE DETERMINED DURING THE DESIGN PHASE IN ACCORDANCE WITH CASA PART 139 MOS REQUIREMENTS.

CONVERT EXISTING ILLUMINATED WIND INDICATOR INTO NON-ILLUMINATED. DISCONNECT POWER SUPPLY AND MAKE SAFE. REPLACE EXISTING WHITE SOCK WITH NEW YELLOW SOCK.

EXISTING PAPI 12 TO REMAIN. CONNECT PIT AND DUCT AND CABLING INTO EXISTING PAPIs.



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PRELIMINARY

Rev	Description	Draw	Chk	App	Issue Date
A	ISSUE FOR TENDER	AP	AP		06.11.24

SCALE 1:1000 AT ORIGINAL SIZE

0 5m 12.5m 25m 50m

DO NOT SCALE DRAWING

CLONCURRY SHIRE COUNCIL

AirportConsult

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DRAWING MUST BE PRINTED IN COLOUR

Drawn	AIRPORT CONSULT
Checked	AIRPORT CONSULT
Approved	
Scale at A1	AS SHOWN

This drawing must not be used for construction unless signed as approved

Client: CLONCURRY SHIRE COUNCIL

Project: CLONCURRY AIRPORT RESEAL PROJECT

Title: INDICATIVE LAYOUT FOR D&C RFT
LIGHT SETOUT AND CABLING PLAN - AREA 1

Drawing No. CLO24-AGL-SK-011 | Revision A | Original Size A1

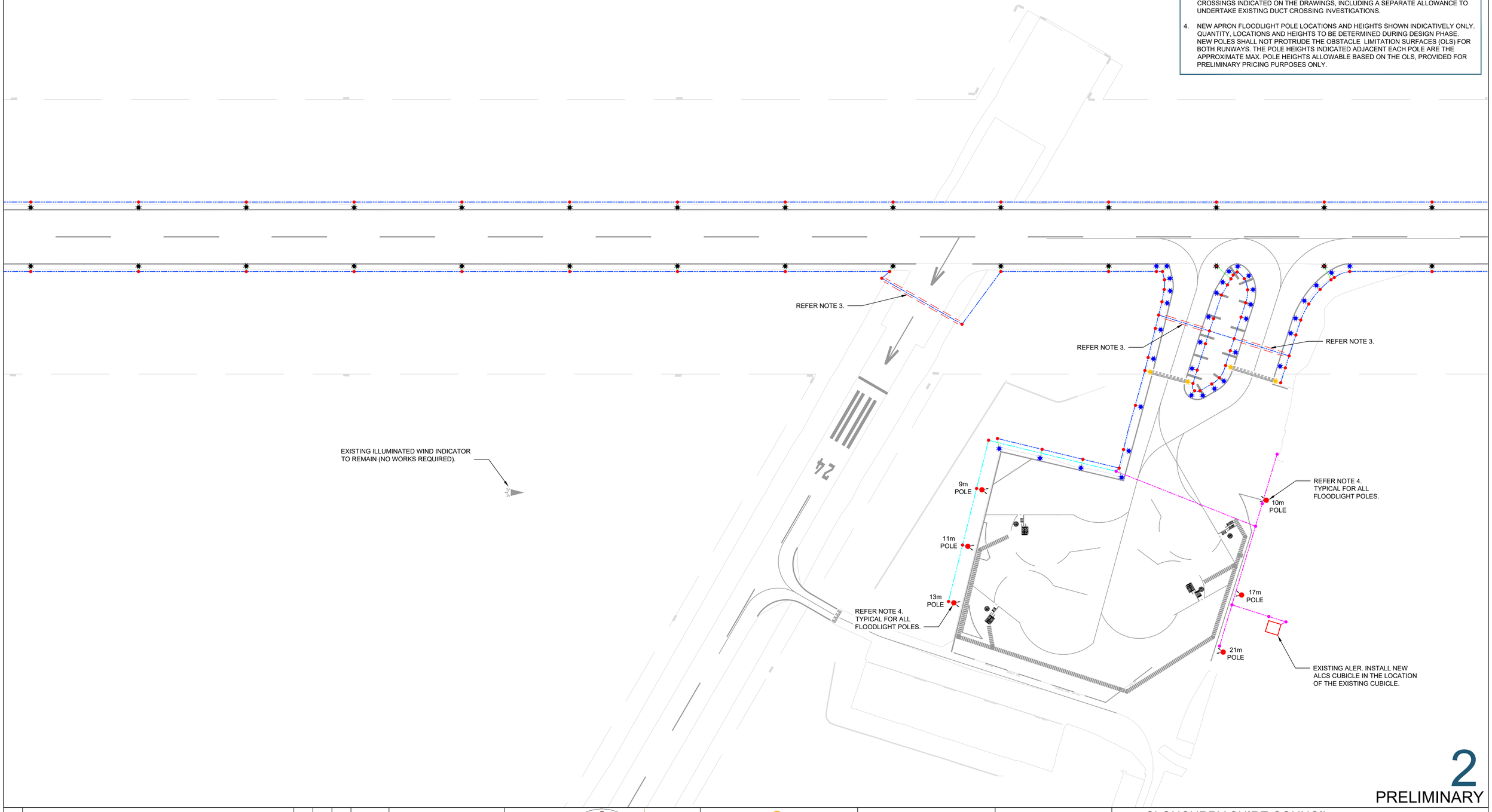
NOTES:

1. THE LOCATION OF EXISTING LIGHTS AND THE ROUTE OF EXISTING PIT AND DUCT MAY PROVE INACCURATE. HOWEVER, THE INFORMATION HAS BEEN INCLUDED TO PROVIDE AN APPROXIMATE INDICATION. ALL LOCATIONS AND ROUTES SHALL BE DETERMINED DURING THE DESIGN PHASE THROUGH SITE INVESTIGATIONS.

2. NEW LIGHTS AND PIT AND DUCT LOCATIONS AND QUANTITIES SHOWN INDICATIVELY ONLY. EXACT LOCATIONS AND QUANTITIES TO BE DETERMINED DURING THE DESIGN PHASE IN ACCORDANCE WITH CASA PART 139 MOS REQUIREMENTS.

3. INDICATIVE LOCATIONS SHOWN FOR NEW RUNWAY/TAXIWAY DUCT CROSSINGS. THE CONTRACTOR SHALL INVESTIGATE AND CONFIRM IF EXISTING DUCT CROSSINGS ARE AVAILABLE AT THE LOCATIONS REQUIRED. IF SO, THE CONTRACTOR SHALL PROVIDE A REPORT TO THE COUNCIL FOR REVIEW, OUTLINING THE NUMBER AND SIZE OF CONDUITS, CONDUIT MATERIAL, CONDITION, DEPTH, ETC. AND INCLUDE PHOTOS. FOR TENDER PURPOSES, THE CONTRACTOR SHALL ALLOW PRICING FOR ALL NEW DUCT CROSSINGS INDICATED ON THE DRAWINGS, INCLUDING A SEPARATE ALLOWANCE TO UNDERTAKE EXISTING DUCT CROSSING INVESTIGATIONS.

4. NEW APRON FLOODLIGHT POLE LOCATIONS AND HEIGHTS SHOWN INDICATIVELY ONLY. QUANTITY, LOCATIONS AND HEIGHTS TO BE DETERMINED DURING DESIGN PHASE. NEW POLES SHALL NOT PROTRUDE THE OBSTACLE LIMITATION SURFACES (OLS) FOR BOTH RUNWAYS. THE POLE HEIGHTS INDICATED ADJACENT EACH POLE ARE THE APPROXIMATE MAX. POLE HEIGHTS ALLOWABLE BASED ON THE OLS, PROVIDED FOR PRELIMINARY PRICING PURPOSES ONLY.



2
PRELIMINARY

Rev	Description	Draw	Chk	App	Issue Date
A	ISSUE FOR TENDER	AP	AP		06.11.24

SCALE 1:1000 AT ORIGINAL SIZE
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Drawn	AIRPORT CONSULT
Checked	AIRPORT CONSULT
Approved	
Scale at A1	AS SHOWN

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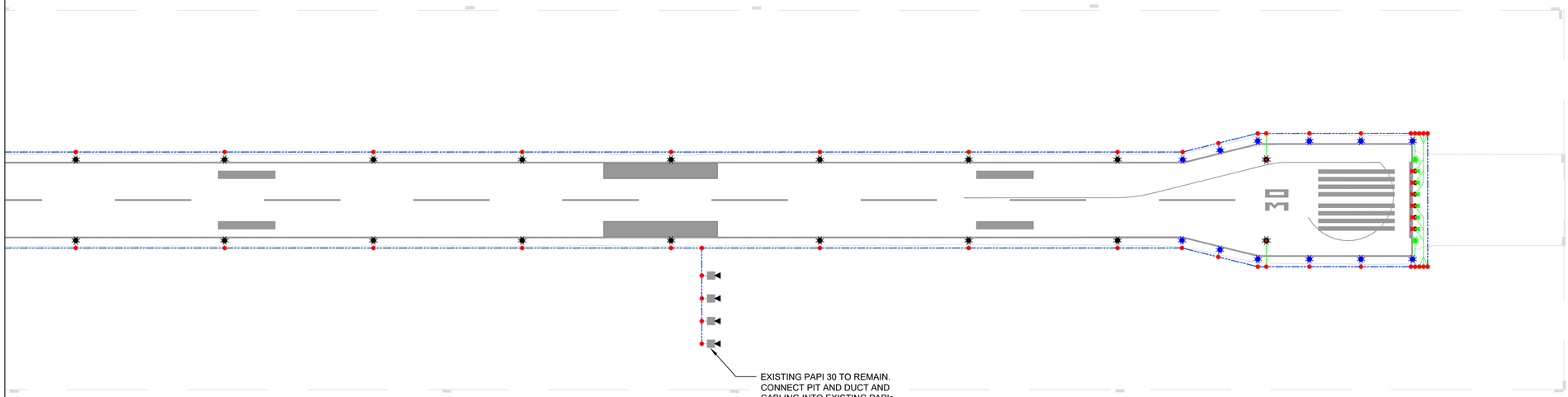
Client	CLONCURRY SHIRE COUNCIL
Project	CLONCURRY AIRPORT RESEAL PROJECT
Title	INDICATIVE LAYOUT FOR D&C RFT LIGHT SETOUT AND CABLING PLAN - AREA 2
Drawing No.	CLO24-AGL-SK-012
Revision	A
Original Size	A1

NOTES:

1. THE LOCATION OF EXISTING LIGHTS AND THE ROUTE OF EXISTING PIT AND DUCT MAY PROVE INACCURATE. HOWEVER, THE INFORMATION HAS BEEN INCLUDED TO PROVIDE AN APPROXIMATE INDICATION. ALL LOCATIONS AND ROUTES SHALL BE DETERMINED DURING THE DESIGN PHASE THROUGH SITE INVESTIGATIONS.

2. NEW LIGHTS AND PIT AND DUCT LOCATIONS AND QUANTITIES SHOWN INDICATIVELY ONLY. EXACT LOCATIONS AND QUANTITIES TO BE DETERMINED DURING THE DESIGN PHASE IN ACCORDANCE WITH CASA PART 139 MOS REQUIREMENTS.



3

PRELIMINARY

Rev	Description	Draw	Chk	App	Issue Date
A	ISSUE FOR TENDER	AP	AP		06.11.24

N E S W

0 5m 12.5m 25m 50m

SCALE 1:1000 AT ORIGINAL SIZE

DO NOT SCALE DRAWING

CLONCURRY SHIRE COUNCIL

AirportConsult

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DRAWING MUST BE PRINTED IN COLOUR

Drawn	AIRPORT CONSULT
Checked	AIRPORT CONSULT
Approved	
Scale at A1	AS SHOWN

This drawing must not be used for construction unless signed as approved

Client CLONCURRY SHIRE COUNCIL

Project CLONCURRY AIRPORT RESEAL PROJECT

Title INDICATIVE LAYOUT FOR D&C RFT
LIGHT SETOUT AND CABLING PLAN - AREA 3

Drawing No. CLO24-AGL-SK-013 | Revision A | Original Size A1

Appendix C – Bill of Quantities

Bill of Quantities

The quantities indicated below are based on the indicative AGL/AFL layout included in Appendix B.

Item	Quantity	Unit
Aeronautical Ground Lighting (AGL) Equipment		
Elevated Threshold/End light (including foundation and SIT)	12	No.
Elevated Outer Threshold light (including foundation and SIT)	4	No.
Elevated Runway Edge light (including foundation and SIT)	60	No.
Inset Runway Edge light (including inset base and SIT)	6	No.
Elevated Taxiway/Apron/Turning Node Edge light (including foundation and SIT)	64	No.
Wind Direction Indicator (WDI) Yellow Sock	1	No.
AGL Spares	1	Item
Aeronautical Ground Lighting (AGL) Cables and Connectors		
Primary Cable	10,000	m
Secondary Cable	700	m
Primary Connector	292	No.
Secondary Connector	146	No.
Aeronautical Ground Lighting (AGL) Pit and Duct		
SIT/Pull Pit	156	No.
Duct Crossing Pit	6	No.
Primary Conduit	4,700	m
Secondary Conduit	700	m
Secondary Pavement Slot Cut	35	m
Runway Duct Crossing	1	No.
Taxiway Duct Crossing	2	No.
Apron Floodlighting (AFL) Equipment		
Apron Floodlight Pole (including foundation)	6	No.
Apron Floodlight Luminaire (including driver)	6	No.
Apron Floodlighting (AFL) Pit and Duct		
Pit	3	No.
Conduit	180	m
Supply Cable	900m	m
Aeronautical Ground Lighting Control System (AGLCS)		
AGLCS Cubicle, including PAL/AFRU, PAL antenna, MITs and all electrical components necessary for operation	1	No.

Item	Quantity	Unit
Testing, Commissioning and Handover		
Testing and Commissioning (including flight check)	1	Item
Operation and Maintenance manual and As-Constructed drawings	1	Item
Defects Liability Period inspections	1	Item

Appendix D – Photos of Existing AGL & AFL Systems

Outer Threshold and Threshold/End Lights

Threshold/End Light

Elevated Runway Edge Light

Elevated Turning Node Light

Runway Edge SIT Pit

Runway Edge SIT Pit (close-up)

Taxiway A Holding Position Centreline Lights

Taxiway A Centreline Light

Taxiway B Edge Light

Taxiway B Edge Light

Apron Edge Light

Runway 12 IWDI

3 x Apron Floodlight Poles (NW edge)

Apron Floodlight Poles (NW edge)

Apron Floodlight Poles (SW edge)

Apron Floodlight Poles (SW edge)

Apron Floodlight Poles (SW edge)

Apron Floodlight Pole (SW edge)

Apron Floodlight Pole (SW edge)

Pit & Duct within Apron (SW edge)

Airfield Lighting Equipment Room (ALER) – Facing SE

Airfield Lighting Equipment Room (ALER) – Facing NW

AGLCS Cubicle (inside ALER)