



## GREEN CAPE LIGHTHOUSE SCOPE OF WORKS





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## 1.0 Background

The Australian Maritime Safety Authority (AMSA) is the Commonwealth statutory body with responsibility for establishing and maintaining Aids to Navigation (AtoN) pursuant to section 190 of the Navigation Act 2012 (Cth). Green Cape is one such AtoN that AMSA maintains.

The Green Cape Lighthouse is located approximately 13 nautical miles southeast of Eden in New South Wales (NSW). A light was first established at Green Cape in 1883. In 1988, AMSA handed the Green Cape Lighthouse to the State under the head of agreement. The Green Cape Lighthouse is currently managed and maintained by NSW National Parks and Wildlife Services (NPWS). It is recognised on the New South Wales State Heritage Register, the Register of the National Estate (non-statutory archive), and the Bega Valley Local Heritage Register.

AMSA erected a 15m tall steel lattice tower in 1988, which currently services as the active AtoN. Following a recent inspection, the lattice tower was identified to be suffering from widespread corrosion and is reaching end of life. The steel lattice tower now requires refurbishment or replacement.

AMSA therefore proposes to undertake a project to reinstate the heritage Green Cape Lighthouse as a functional aid to navigation for mariners as well as demolish/remove the deteriorating steel lattice tower.

## 2.0 Scope of works

The scope of works for re-commissioning of the heritage Green Cape lighthouse is as follows:

- (a) Installation of a high-power LED light source in the traditional lens,
- (b) Installation of power efficient lens drive motor system,
- (c) Installation of a free-standing enclosure in the lantern room to house the LED light source and lens drive motor control equipment,
- (d) Replacement of the existing solar array, utilising the existing solar frame,
- (e) Installation of a dedicated AMSA inverter charger and battery system in a free-standing enclosure within the Powerhouse battery room,
- (f) Utilisation of existing conduits, cable trays and cabling routes (where appropriate),
- (g) Replacement of any damaged or corroded conduits,
- (h) Servicing of the existing mercury-float pedestal, and
- (i) Demolition and removal of the existing lattice tower.



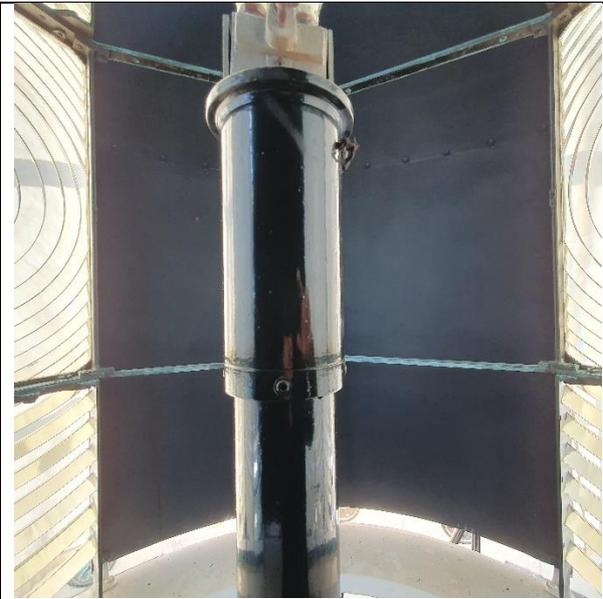
### 3.0 Detailed Scope of Works and Heritage Impacts

#### 3.1 Installation of high-powered LED light source for lens

The existing incandescent lamp mounted on a stem pole will be replaced with a more efficient high-powered LED light source. A new LED mounting assembly is required to allow focusing of the light source and lens, therefore requiring removal of the existing black stem pole. The exact makeup of the mounting will be determined during detailed design.



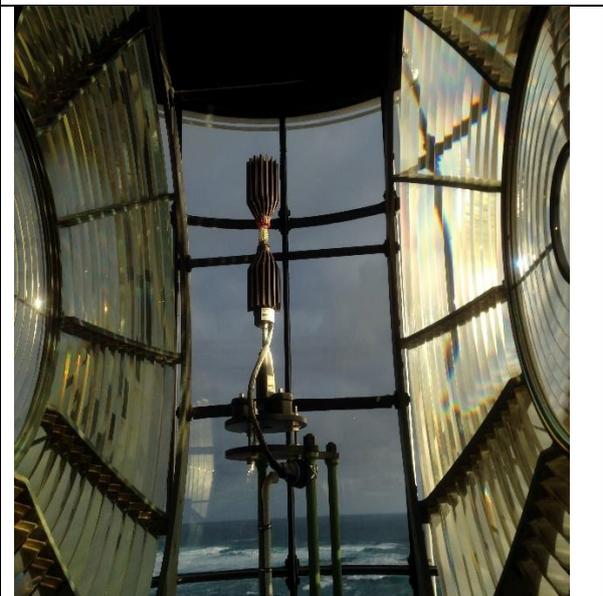
*Photo 1 - Existing Green Cape light source (incandescent lamp)*



*Photo 2 - Existing Green Cape light source stem*



*Photo 3 - Example of mounting bracket for LED light source on a stem*



*Photo 4 - Example of LED light source aligned at correct focal height*



### **Heritage Impact Statement**

The work directly impacts the incandescent lamp and mounting pole which are not the original or early array of Green Cape Lighthouse and have been modernised over the decades. No changes or alterations are proposed for the historic lens and pedestal, and the existing incandescent array can be retained for display purposes. Upgrade of the lamp array is essential to re-commission the lighthouse tower.

### 3.2 Lens Drive Motor System

AMSA proposes to install a twin drive oriental motor assembly for the lens drive system. The twin drive system provides redundancy in the event one motor fails. Perspex screening will be installed around the lens drive system moving parts.

The new drive motor and gearbox system will be assembled on a new base plate and mounted on the existing clockwork mechanism pedestal. Fixing the new base plate in position will utilise existing penetrations/fixings in the clockwork mechanism pedestal where possible, additional fixings may be required however will be minimised in detailed design.

A flat protective screen will be added between the upper catwalk and the edge of the mercury bath to stop people from reaching and touching the rotating lens (refer to Photo 6 below for indication of location of protective screen). The protective screen will be secured to the catwalk opening using a low-profile clamp arrangement (mitigating any trip hazards).

<p><i>Photo 5 - Existing Green Cape lens drive motor</i></p>	<p><i>Photo 6 - Existing Green Cape clockwork mechanism pedestal</i></p>
<p><i>Photo 7 - Example of TECO drive motor system with Perspex enclosure</i></p>	



### **Heritage Impact Statement**

The existing drive motor arrangement is modern equipment and requires replacement in order for the tower to be re-commissioned. The protective Perspex case will be fixed utilising existing fixings/penetrations. In the event additional penetrations are required, they will be limited to the bare amount required for fixing. The existing drive motor can be retained for display purposes.

### 3.3 Enclosure in Lantern Room

A purpose-built free-standing enclosure will be installed in the lantern room situated between the existing drive motor control box and internal catwalk stairs. AMSA proposes to remove the existing drive motor cable. The enclosure will be powder coated white and will house the AMSA equipment circuit breakers, LED light source controller and drive motor control equipment.

The new enclosure will also have a bracket attached towards the top of the enclosure and extend up and be secured through the catwalk opening. A low-profile bolt arrangement will be used mitigating any trip hazards.

The enclosure will have a minimum of two doors. The size of enclosure and orientation of doors to be adjusted to suit location. Depth of enclosure will be approximately 250mm.

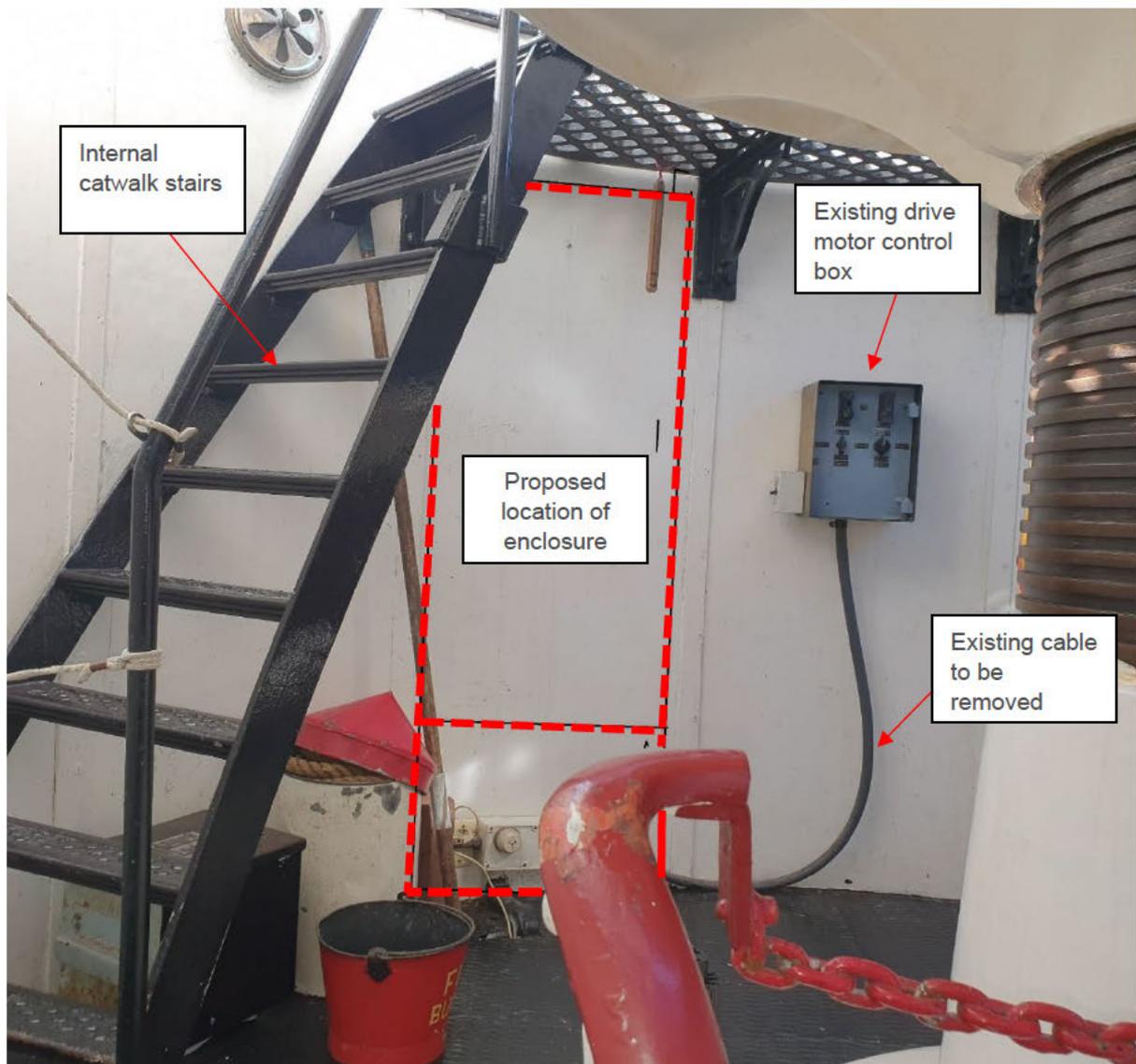


Photo 8 - Proposed location of enclosure in lantern room.



There are two electrical junction boxes situated above and below the lantern room floor at the point where the new enclosure will be positioned. AMSA proposes to remove both junction boxes and rearrange the circuit connection so that access to those is available at the bottom of the new enclosure.



*Photo 9 - Existing conduit arrangement below lantern room. Proposed removal of electrical junction box below floor*



*Photo 10 - Electrical junction box in location of proposed enclosure. Proposed removal of electrical junction box within lantern room*

### **Heritage Impact Statement**

The installation of an enclosure is necessary to house essential electrical equipment in order to re-commission the lighthouse tower. Installing a white enclosure will limit impacts to the visual aesthetics of the lantern room. The junction boxes slated for removal are modern equipment of no heritage significance. The existing drive motor control will be left in situ for display purposes.



### 3.4 Replacement of existing NPWS solar array

AMSA proposes to upgrade the existing NPWS solar panel array, which is currently powering the site. With modern solar panels fitted to the array, the renewable input into the system would increase allowing both NPWS to maintain the existing solar input, and sufficient solar input for AMSA needs.

The existing solar panels and aluminium mounting racking will be removed and replaced with new solar panels and racking. The number of solar panels will be reduced to twenty-seven (27), creating three (3) rows of nine (9) panels. This will allow the new solar panels to fit into a similar footprint as the existing, whilst providing more solar charge power. There will be a minimal change in the overall size and projected surface area of the solar array and it is assumed that the existing solar frame is fit for purpose, is structurally sound and designed to sustain site wind loading.

The existing NPWS solar array is 7.74kw. The top two (2) rows of nine (9) solar panels (18 in total) providing approximately 8kw of solar power will be dedicated to NPWS off grid power supply system. The bottom row of nine (9) solar panels will be dedicated to AMSA (providing 4kw of solar power). The new solar panels and racking will utilise the existing frame and footings. Existing conduits to the Powerhouse will be utilised.



*Photo 11 - Existing NPWS solar array*



*Photo 12 - Existing footings*

### **Heritage Impact Statement**

The solar array and rack is of no heritage significance. No changes are proposed to the footing foundations and surrounding soil.

### 3.5 Inverter / Charger and Batteries

AMSA proposes to install a free-standing purpose-built enclosure to house the inverter / charger and lithium batteries within the existing Powerhouse battery room which currently houses the NPWS batteries.

The new enclosure is proposed to be installed in the opposite corner to the existing NWPS battery enclosure, closest to the door entry. Depending on the final size of the enclosure, the existing power point may need to be relocated.

The AMSA system will have the ability to connect an external generator in the event of a failure of the NPWS off grid power supply system. The external generator will be connected to the AMSA system via an appliance inlet connection point and switched through a changeover switch that is located within the AMSA enclosure.

The appliance inlet connection point will be mounted external to the battery room. AMSA will utilise an existing duct that is located on the outside of the building and routed through the ceiling cavity (refer to Photo 16).

<p><i>Photo 13 – Proposed location for inverter / charger &amp; batteries</i></p>	<p><i>Example enclosure which is to be custom built to suit location and battery quantity</i></p>

### Heritage Impact Statement

The installation of an enclosure is necessary to house essential electrical equipment in order to re-commission the lighthouse tower. Installing a white enclosure will limit impacts to the visual aesthetics of the Powerhouse. Combining the batteries and inverter / charger in the same enclosure reduces the number of cables required to be run externally, and new penetrations required will be limited in number. The existing powerpoint slated for possible removal is of no heritage significance.



### 3.6 Proposed Cabling Routes

#### Powerhouse

The power supply to the AMSA inverter/charger will be provided from the NPWS main switchboard located in the existing Powerhouse power distribution room. The existing cable trays and conduits located within the NPWS power distribution room will be utilised for the supply cable which will then be routed through the ceiling cavity.

	
<p><i>Photo 14 - NPWS power distribution board located in the Powerhouse. Additional circuit to be installed for AMSA equipment</i></p>	<p><i>Photo 15 - Utilisation of cable management in power distribution room</i></p>
	
<p><i>Photo 16 - Utilisation of existing duct between the Powerhouse battery room and power distribution room</i></p>	



Cabling to and from the new enclosure will require the installation of conduits that will run vertically from the enclosure to towards the ceiling cavity. Penetrations through the ceiling will be limited to the cabling required to transition through.

The cabling required to feed the AMSA equipment in the lighthouse will utilise the existing conduits between the Powerhouse and lighthouse and it is assumed that the conduit entry is situated within the ceiling cavity.

	
<p><i>Photo 17 - Utilisation of existing conduit at Powerhouse</i></p>	<p><i>Photo 18 - Utilisation of existing conduit at lighthouse</i></p>

### **Heritage Impact Statement**

Existing penetrations, switchboards, cable trays and conduits will be utilised for the proposed cabling routes. Where new conduits are required, only the minimum amount of penetrations needed will be created.



### Within the Lighthouse

There are two existing conduits that utilise penetrations through the staircases feeding the existing lens drive motor and optic lamp. Both conduits were identified to be damaged from corrosion.

The conduits originate from the ground floor distribution board and run in parallel to each other from the ground floor to the lantern room.

AMSA proposes to remove both conduits and replace with rigid white PVC conduit of a similar size and install using the same path, penetrations and if possible mounting fixing points.



*Photo 19 – Lighthouse ground floor power distribution board*



*Photo 20 – Existing 2 x vertical steel conduit proposed for replacement*



*Photo 21 – Conduits proposed for replacement (showing path towards lantern room)*



*Photo 22 – Conduits proposed for replacement (showing path to underside of lantern room)*



	
<p><i>Photo 23 – Corrosion on conduit proposed for replacement</i></p>	<p><i>Photo 24 – Corrosion on conduit proposed for replacement</i></p>

**Heritage Impact Statement**

Replacement of existing conduits with white PVC of a similar size will limit impacts to the visual aesthetics of the lighthouse tower. No new penetrations are expected to be required as existing routes will be utilised. Where conduit fixing points are damaged, they will be repaired and reused.

### 3.7 Servicing of the Existing Mercury Pedestal

The Green Cape Lighthouse has an existing mercury-float pedestal which is used to rotate the lantern. AMSA will inspect and service the mercury-float pedestal including:

- Service/clean the mercury-float pedestal by draining, filtering and replenishing the mercury,
- Inspect and service the roller wheels (if required), and
- Undertake any paintwork to the pedestal (if required).



*Photo 25 – Existing Green Cape Mercury-Float Pedestal*



*Photo 26 – Existing roller wheels*

### **Heritage Impact Statement**

Works are essential to ensure continued use of the historic mercury bath. No impacts to heritage are anticipated as the work is routine maintenance. Any painting works required will be minor and match the existing colour scheme.



### 3.8 Demolition and Removal of Existing Lattice Tower

AMSA proposes to dismantle and remove the existing steel lattice tower, transfer the materials off site and dispose of at an appropriately approved waste facility. The condition of the tower is dilapidated and deteriorating, and the removal of the lattice tower would therefore significantly increase the visual and scenic landscape of Green Cape.

A helicopter would be utilised for the removal of the steel lattice tower and the existing helipad may be utilised during this process (photo 26 below). The steel lattice tower would be dismantled by ground crew in manageable sections within the helicopters lift capacity, and the tower sections will be sling loaded via helicopter to a truck on standby located on an existing hard stand location (likely to be adjacent to Green Cape Road, north of the study area). It is anticipated that the demolition will be completed within approximately 2 days (weather dependant), and tower fixings will be cut off flush with the slab. If required, refuelling of the helicopter will be limited to the hardstand area and helicopter operation would be during daylight hours only. During helicopter sling loading, public access to the lookout and track may be restricted.

Parking for ASMA and ground crew vehicles would be located adjacent to the keeper's cottage in the existing dedicated NPWS parking area, or in the visitor carpark (photo 26 below).

The concrete foundation slab will be left undisturbed, and no excavation will be undertaken.



*Photo 27 – Existing steel lattice tower with helipad*



*Photo 28 – Dedicated NPWS parking area*

#### **Heritage Impact Statement**

The existing aid to navigation in operation is a modern structure of no heritage significance. The removalist mitigation measures in place will avoid disturbance of the surrounding landscape and vegetation, and no excavation will be undertaken.