

# Threatened Species Impact and Translocation Management Plan

**Aldoga Solar Farm – Expansion Area**

**Prepared By:**

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## Acronyms and Abbreviations

Contraction	Description
<b>Cwth</b>	Commonwealth
<b>CTD</b>	Cycad Translocation Database
<b>DCCEEW</b>	(Cwth) Department of Climate Change, Energy, the Environment and Water
<b>DES</b>	(Qld) Department of Environment and Science
<b>Development Footprint</b>	That area of the Project subject to land disturbance and clearing for the establishment of the solar farm
<b>EMP</b>	Environmental Management Plan
<b>EPBC Act</b>	(Cwth) <i>Environment Protection and Biodiversity Conservation Act 1999</i>
<b>GBO</b>	General biosecurity obligation under the <i>Biosecurity Act 2014</i> (Qld)
<b>MNES</b>	Matters of National Environmental Significance under the EPBC Act
<b>MSES</b>	Matters of State Environmental Significance under the <i>Nature Conservation Act 1992</i>
<b>MWp</b>	Megawatt-peak
<b>NC Act</b>	<i>Nature Conservation Act 1992</i>
<b>PPTA</b>	Protected Plant Trigger Map Area
<b>Project</b>	The Aldoga Solar Farm – Expansion area
<b>Project Area</b>	The entire Project boundary for the establishment of the Aldoga Solar Farm – Expansion area
<b>TEC</b>	Threatened ecological community (EPBC Act)
<b>TMP</b>	Translocation and Management Plan
<b>TSITMP</b>	Threatened Species Impact and Translocation Management Plan
<b>VM Act</b>	(Qld) <i>Vegetation Management Act 1999</i>
<b>WoNS</b>	Weeds of national significance

# I Introduction

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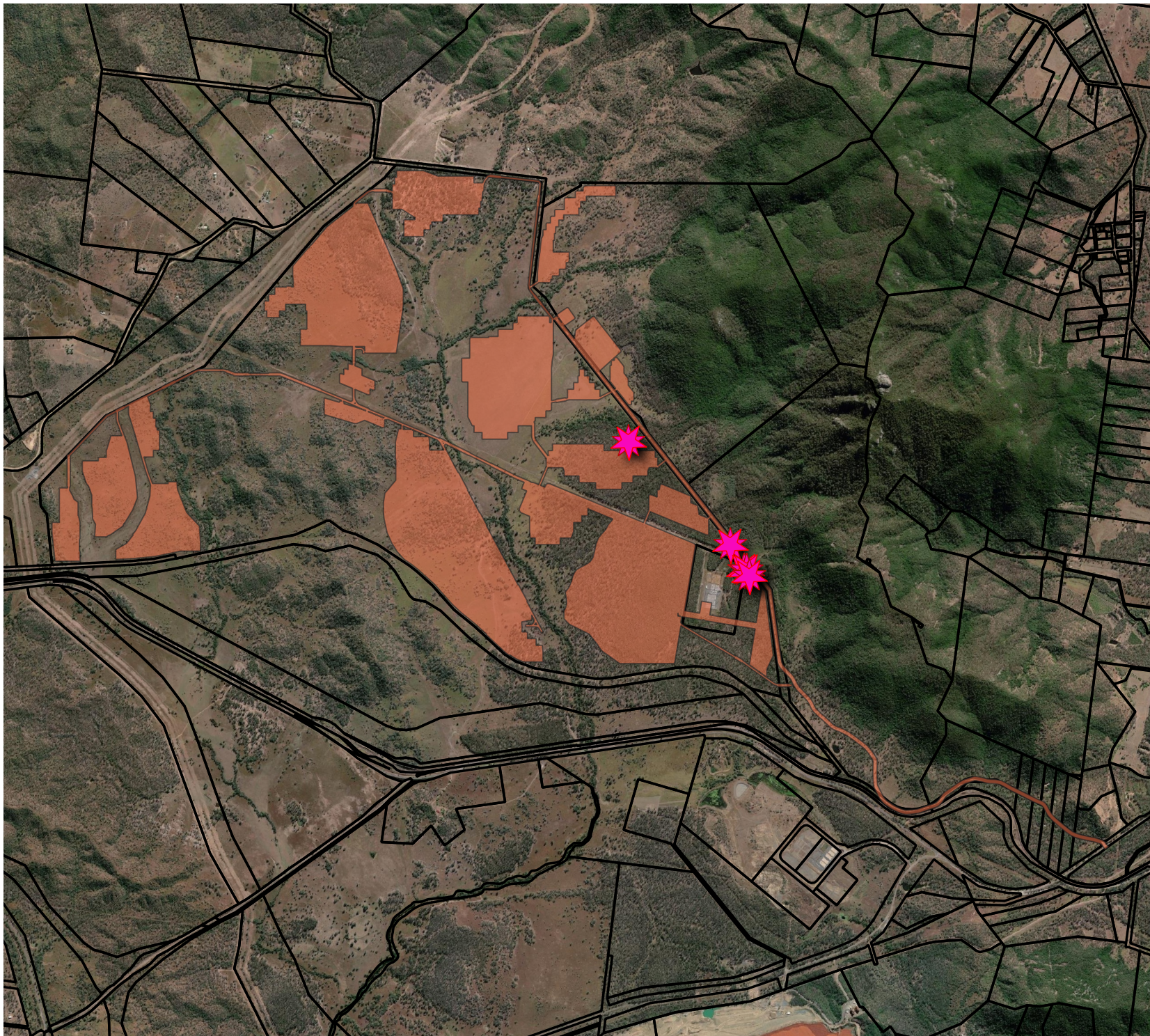
## 1.1 Background Information

ACCIONA Energy are now developing Aldoga Solar Farm – Expansion area (the Project), a new Solar farm in central Queensland, which will contribute 200 MW of renewable power to the national energy grid. The 500,000-module solar capacity will be in addition to the already approved Aldoga Solar Farm, which has capacity for an additional 280 MWp. The Development Footprint is refined to an area of 800.7 ha, and includes new tracks, panels, laydown areas, switchyards, existing road upgrades, powerlines, substations and facilities. The Project Area is situated across two properties, located approximately 20 km northwest of Gladstone, Queensland within the Gladstone State Development Area (Figure 1). The historical and current land use of the Project Area is cattle grazing; however, by virtue of its position within the Gladstone State Development Area, the Project Area is earmarked by the Queensland Government for large-scale industrial development. The Queensland State Government approved the Project in July 2021.

The Project Area is within the Gladstone State Development Area high impact industry development precinct. The purpose of the precinct is to accommodate high impact industrial uses that are difficult to locate in conventional industrial estates. The Project Area and immediate surrounds are modified from the natural condition by existing infrastructure, including an existing Powerlink high voltage powerline, Aurizon freight rail line located south of the Project Area and three high-pressure Coal Seam Gas pipelines. These linear infrastructure projects have contributed to fragmentation of existing habitats. The Project will result in the clearing of up to 166.11 ha of remnant vegetation, 219 ha of regrowth and 414 ha of non-remnant vegetation. Ecological habitat condition within the non-remnant and regrowth areas is poor due to vegetation clearing, stock grazing, establishment of exotic pasture grasses, and weed infestations, particularly by Giant Rats Tail Grass (*Sporobolus natalensis*).




The Project design has sought to avoid ecological features of greatest value by retaining areas of habitat and maintaining ongoing vegetation connectivity and wildlife movement opportunities. The Project has sought to avoid impacts to the identified ecological values by providing buffers to Larcom Creek and Cherry Creek, retaining native vegetation in the areas of highest quality habitat and maintaining a functional wildlife corridor through the centre of the site.

Surveys found *Cycas megacarpa* (cycads) which are listed as Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the Project Area and several plants were within the Development Footprint. *C. megacarpa* is listed as Endangered under both the EPBC Act and the Queensland *Nature Conservation Act 1992* (NC Act). The Development Footprint was redesigned to avoid all known *Cycas megacarpa*; however, it is expected that the plants will be indirectly impacted by the Project. It is possible that additional *C. megacarpa* will be located during clearing works and if these plants cannot be avoided by changes to design, the Project aims to achieve no net loss through direct translocation.



## Figure 1: Development footprint

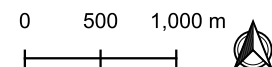
Project: PR21088 - Aldoga Solar Farm

-  *Cycas megacarpa*
-  Development Footprint
-  Lot Boundaries



Notes:  
 - Survey Data by Green Tape Solutions  
 - Base map Copyright (c) Esri and its data suppliers.  
 - Regional Ecosystems and QTopo Base map  
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## 1.2 Purpose

The purpose of this Threatened Species Impact and Translocation Management Plan (TSITMP) (the 'Plan') is to satisfy the requirement for an impact management plan to accompany a protected plants clearing permit under the *Nature Conservation (Plants) Regulation 2020*.

The EPBC Act (2020/8773) approval conditions (dated 29 September 2022) do not require a cycad translocation plan, but Condition 3 states that approval from the Minister must be sought if more than four cycads will require translocation. This Plan will fulfill the requirement of cycad translocation plan if more than four plants are impacted, and a Plan is required by the Minister in the future.

Specifically, the Plan specifies those activities required to mitigate the impacts on retained plants that lie within 100 m of the Development Footprint and translocate any *C. megacarpa* that may be found to occur within the Development Footprint of the Project. This includes impact assessment, management, monitoring and reporting and actions to be implemented before, during and following translocation.

The Plan has been developed in accordance with the Protected Plant Assessment Guidelines (DES, 2021), the *National Multi-Species Recovery Plan for Cycads* (Queensland Herbarium, 2007) and the *Guidelines for the Translocation of Threatened Plants in Australia* (Commander et al., 2018).

As information regarding the ecological values associated with the Project has developed, targeted surveys conducted from June 2020 to March 2023 provided further data of threatened flora occurring within the Development Footprint. The surveys identified eight (8) cycads occurring within the approved Disturbance Footprint. The Development Footprint was redesigned to avoid these individuals, but indirect impacts may still occur. Additional plants (likely to be less than 20) may be found at the time of clearing and these plants, if they cannot be avoided, will be translocated if practicable or replaced to ensure no net loss.

All works undertaken in relation to cycads occurring within the Project Development Footprint and translocation recipient sites must be implemented in accordance with this Plan. The Plan will be implemented and remains in effect until such time as the performance measures within this Plan are achieved.

## 1.3 Objectives

The objectives of this Plan are to:

- Meet the requirements of the Queensland Department of Environment and Science (DES) Protected Plants Assessment Guidelines (2021), particularly the elements of Section 3.2.1 Impact Management Plan under the *Nature Conservation (Plants) Regulation 2020* (NCPR).
- Describe the measures to achieve a "no net loss" of *Cycas megacarpa* due to the development, construction, and operation of the Project in accordance with condition 19c of the controlled action decision .

## 1.4 Compliance with the Protected Plant Assessment Guidelines

This Plan has been prepared in accordance with the requirements of an impact management plan as outlined in the Protected Plant Assessment Guidelines (DES, 2021). This Plan has been prepared in accordance with the criteria described in the Guidelines for the Translocation of Threatened Plants in



Australia (Commander et al., 2018). The sections of this Plan that address each of the requirements are listed in Table 1.

**Table 1: Requirements of a Protected Plant Impact Management Plan.**

Guideline requirement	Specific Requirement	Where addressed in this TSITMP
Attempts to avoid and minimise impact	Can the size and physical capacity of the site to accommodate an alternative development site or location?	The Development Footprint is described in Section 1. The Development Footprint was redesigned to avoid the protected plants (Section 2.2.1).
	Can the size and layout of the proposed development reasonably be modified?	The Development Footprint was redesigned to avoid the protected plants (Section 2.2.1).
	Are there any surrounding land use restrictions?	The Development Footprint is described in Section 1.
	Has the proposal implemented reasonable and practical measures to reduce clearing required during the construction phase?	The Development Footprint was redesigned to avoid the protected plants (Section 2.2.1).
Nature of the impact	A spatial representation of the proposed clearing footprint, the clearing impact area if applicable and the location of any plants to be impacted by the clearing directly or indirectly. A threatened plant or near threatened plant is taken to have been directly impacted if it is proposed to be cleared, and indirectly impacted if clearing is proposed to occur within 100m of that plant.	Figure 1 shows the Development Footprint (the proposed clearing footprint) and the location of the threatened plants in relation to the Development Footprint.
	The extent, number and maturity of threatened plants or near threatened plants that will be impacted by the proposed clearing	The number of plants to be impacted is described in Section 2.2.2.
	List of all impacts on threatened plants or near threatened plants or the supporting habitat of threatened plants or near threatened plants	Section 2.2.2.
	Identify population density and total population number	Section 2.2.2.

Guideline requirement	Specific Requirement	Where addressed in this TSITMP
	Identify quality of habitat	Section 2.2.2.
Management of the impact	Translocation of the species	Translocation of any individual found within the Development Footprint is described in Sections 2.3 to 3.
	Opportunities for propagation of the species	Section 3
	Opportunities for rehabilitation of the species habitat in a particular area	Not relevant as known plants have been avoided, any plants within the Development Footprint that cannot be avoided will be cleared.
	Site rehabilitation programs, such as erosion control and weed management to promote natural regeneration of protected plant species	Not relevant as known plants have been avoided, any plants within the Development Footprint that cannot be avoided will be cleared.
Justification of the impact management	The expected success rate of impact management	Table 2 for mitigation measures for plants indirectly impacted and Section 3.4 for translocated plants
	The limitations or potential threats associated with the impact management	Table 2 and Section 3.4
	A summary of existing and potential threats to the extent and quality of the vegetation.	Section 2.2
Survival of the plant in the wild	Information that demonstrates how the proposed clearing of threatened plant or near threatened plant species will not adversely affect the plants' survival in the wild and will not reduce the viability of local and regional populations.	Section 2.2.1
Offsets	An offset should be clearly distinguished from other impact management activities. Impact management refers to the range of actions that	Not required as the program aims to achieve no net conservation loss.

Guideline requirement	Specific Requirement	Where addressed in this TSITMP
	reduce the level of impacts of clearing on the natural environment, whereas an offset compensates for residual impacts, after impact management requirements of this guideline have been	
	An offset must be in accordance with the relevant Queensland Government offsets policy, in place at the time of the application.	Not required as the program aims to achieve no net conservation loss.

### 1.5 Compliance with translocation guidelines

This Plan has been prepared in accordance with the criteria described in the *Guidelines for the Translocation of Threatened Plants in Australia* (Commander et al., 2018). The specific requirement and how it is to be met is described in Table 2.

**Table 2: Compliance with Guidelines for translocation of threatened plants (Commander et al., 2018)**

Guideline requirement	Relevant Section of the TSTMP where requirement is addressed
For the protection of listed cycads, the approval holder must include within the Environmental Management Plan, a cycad translocation program that is in accordance with the <i>National multi-species recovery plan and the Guidelines for the translocation of threatened plants</i> (the Guideline)	
<ul style="list-style-type: none"> <li>Section 4.2 of the Guideline: Selection of recipient sites</li> </ul>	Section 2.3
<ul style="list-style-type: none"> <li>Section 4.3 of the Guideline: Site selection beyond the known range</li> </ul>	Not applicable as plants will be translocated within the known range for each species / population within the Development Footprint – See Figure 1
<ul style="list-style-type: none"> <li>Section 6.1 of the Guideline: Logistical assessment               <ol style="list-style-type: none"> <li>Personnel</li> <li>Resource requirements</li> </ol> </li> </ul>	Section 2.4.1– Personnel Section 2.4.2 – Resource Requirements
<ul style="list-style-type: none"> <li>Section 6.2 of the Guideline – Scheduling for translocation activities</li> </ul>	Section 2.5– Scheduling translocation planning

Guideline requirement	Relevant Section of the TSTMP where requirement is addressed
<ul style="list-style-type: none"> <li>- 6.2.1 Timeline for translocation planting</li> <li>- 6.2.2 Single verses staggered planting</li> </ul>	
<ul style="list-style-type: none"> <li>• Section 6.3 of the Guideline – Collection of source material               <ul style="list-style-type: none"> <li>- 6.3.1 How much material can be collected from each source plant?</li> <li>- 6.3.2 Collection of material and preparation for whole plant transplantation.</li> <li>- 6.3.3 Collection licence requirements</li> <li>- 6.3.4 Record keeping requirements during propagation</li> </ul> </li> </ul>	Section 3 – Seed collection and propagation
<ul style="list-style-type: none"> <li>• Section 6.4 – Establishment and maintenance of an ex-situ collection               <ul style="list-style-type: none"> <li>- 6.4.1 – Storage and propagation of seeds</li> <li>- 6.4.2 – Vegetative propagation</li> <li>- 6.4.3 – Phytosanitary considerations during propagation</li> <li>- 6.4.4 – Propagation monitoring and recording</li> </ul> </li> </ul>	Section 3.2 – Collection of source material  Section 3.4 – post-translocation management
<ul style="list-style-type: none"> <li>• Section 6.5 – Learning from the translocation – experimental design               <ul style="list-style-type: none"> <li>- 6.5.1 Pilot studies</li> <li>- 6.5.2 Translocation as a scientific experiment</li> <li>- 6.5.3 Designing an experiment</li> </ul> </li> </ul>	Section 4 – Monitoring and Evaluation
<ul style="list-style-type: none"> <li>• Section 6.6 – Identification of post translocation management, monitoring and evaluation methods               <ul style="list-style-type: none"> <li>- 6.6.1 – Ongoing management</li> <li>- 6.6.2 – Monitoring and evaluation</li> </ul> </li> </ul>	Section 5 – Monitoring and Evaluation
<ul style="list-style-type: none"> <li>• Section 6.7: Pre-translocation site preparation</li> </ul>	Section 2.3.1 - Pre-translocation preparation
<ul style="list-style-type: none"> <li>• Section 7.1 – 7.4: Implementing translocation and ongoing maintenance</li> </ul>	Section 2.5 – Scheduling translocation activities  Section 4 – Monitoring and Evaluation

Guideline requirement	Relevant Section of the TSTMP where requirement is addressed
<ul style="list-style-type: none"> <li>Section 8.2 – 8.5: Translocation monitoring and evaluation</li> </ul>	Section 4 – Monitoring and Evaluation

## 2 Measures to Avoid and Minimise Impact

### 2.1 Measures to avoid Cycads

Surveys in 2021 located two *Cycas megacarpa* within the Development Footprint and the EPBC Act controlled action approval conditions allowed for the direct impact to up to four individuals. Post approval protected plant surveys were undertaken in 2022 and 2023 which identified an additional six plants in the Project Area. Previous designs of the Development Footprint directly impacted five known *Cycas megacarpa* and potentially indirectly impacted another three (located within 100 m of the Development Footprint). The directly impacted plants (five) were deliberately avoided in a redesign of the Development Footprint in 2023 (Plate 1). All of the known the plants will still be potentially indirectly impacted by the Project, with seven of the plants within 10 m of a track that will be upgraded as part of the Project.

Surveys have been undertaken throughout the Development Footprint, but it is possible that new individuals will be located during clearing works and these may be directly impacted if they cannot be avoided.

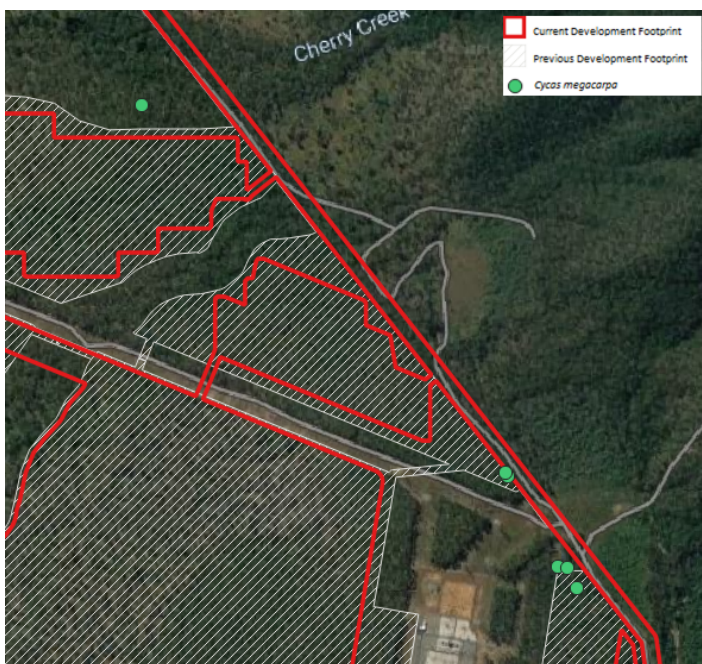


Plate 1: Avoidance of *Cycas megacarpa* through design changes.

### 2.2 Measures to Minimise Impact to Cycads

#### 2.2.1 Initial Design and Development

Measures to avoid or reduce impacts on *Cycas megacarpa* have occurred as part of the initial design for the Project. This includes designs to maximise the solar generation capacity of the site and the identification of ecological values and areas of the site that support habitat for listed threatened species and ecological communities. The Development Footprint submitted represents consideration of the constraints and opportunities of these matters which seeks to avoid high value ecological areas of the site to the greatest practicable extent. A detailed description of this process is provided below.

## 2.2.2 Identified Impacts to Threatened Plants

Threatened flora species are listed under the EPBC Act (Cwlth) as Extinct in the Wild, Critically Endangered (CE), Endangered (E) or Vulnerable (V) and/or under the NC Act as Extinct in the Wild, Critically Endangered, Endangered, Vulnerable and Near Threatened (NT).

Prior to undertaking the field survey, a desktop review of search results from relevant databases pertaining to threatened flora species to identify species potentially present within or in proximity of the site. The desktop assessment was based on the site's central coordinates with a 10 km buffer. The following databases and resources were reviewed:

- EPBC Act Protected Matters Search Tool with a 10 km buffer, Department of the Climate Change Energy, the Environment and Water (DCCEEW);
- Queensland Department of Environmental and Science (DES) WildNet database records within 10 km, (DES, 2021); and,
- Queensland Department of Resources (DoR) *Vegetation Management Act 1999* (VM Act) Vegetation Management Report) (DoR, 2021).

EPBC records (based on a 10 km buffer area of the Project Area boundary) identified the following fourteen (14) threatened flora species as potentially occurring within the study area – *Atalaya collina*, *Bosistoa transversa*, *Bulbophyllum globuliforme*, *Cossinia australiana*, *Cupaniopsis shirleyana*, *Cycas megacarpa*, *Cycas ophiolitica*, bluegrass (*Dichanthium setosum*), black ironbox (*Eucalyptus raveretiana*), *Macadamia integrifolia*, *Marsdenia brevifolia*, *Parsonsia larcomensis*, *Phaius australis*, quassia (*Samadera bidwillii*). Six (6) additional threatened flora species listed under the NC Act) have also been recorded within a 10 km buffer (Qld Wildlife Online) – *Graptophyllum excelsum*, *Sphaeromorphaea major*, *Dansiea elliptica*, *Macropteranthes leiocaulis*, *Hernandia bivalvis* and *Zieria actites*.

Two general ecological surveys along with an additional two threatened flora species surveys were undertaken from June 2020 to March 2023 using the DES Flora Survey Guideline 2014 meander technique<sup>1</sup> through the Development Footprint, within and outside the mapped trigger area (refer to Protected Plant Survey Report NGH (2023) for further details). To achieve the highest rate of success, the meander technique relies on a comprehensive desktop assessment being undertaken to identify threatened species that are known to occur or may potentially occur within the site and site locality before surveying to identify appropriate habitats for EVNT species likely to occur in the study area.

**Table 3: Flora surveys at Aldoga**

Seasonal survey	Aspect	Dates	Survey team	Ecologists	Survey time
Pre wet 2020	Ecological assessment	4 <sup>th</sup> to 6 <sup>th</sup> June 2020	Senior Ecologist, Ecologist	Jason Searle (NGH) Natalie Sheppard (NGH)	3 days

<sup>1</sup> The meander survey is based on the methods described by Cropper (1993) and Goff *et al.* (1982) in accordance with Section 6 of the DES Flora Survey Guidelines – Protected Plants (Version 2.01).

Seasonal survey	Aspect	Dates	Survey team	Ecologists	Survey time
Post wet 2021	Ecological assessment	12 to 16 <sup>th</sup> April 2021	Senior Ecologist, Senior Botanist, Ecologist	Dr Carissa Free (NGH) Carla Perkins (GTS) Natalie Sheppard (NGH)	5 days
Pre wet 2022	Protected Plant survey	25 <sup>th</sup> -29 <sup>th</sup> July 2022	Senior Botanist, Ecologist	Dr Jarrah Willis (NGH) Tegan McKillop (NGH)	4 days
Post wet 2023	Protected Plant survey	15 <sup>th</sup> -18 <sup>th</sup> May 2023	Senior Botanist, Ecologist	Mark McVeigh (GTS) Taylor Hume (NGH)	3.5 days

The following regional ecosystems were identified during the site surveys:

- RE 11.3.4 – *Eucalyptus tereticornis* and/or *Eucalyptus spp.* woodland on alluvial plains;
- RE 11.3.25 – *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines;
- RE 11.3.26 – *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains
- RE 11.7.6 – *Corymbia citriodora* or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust
- RE 11.11.4 – *Eucalyptus crebra* woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Coastal ranges;
- RE 11.11.15 – *Eucalyptus crebra* woodland to open woodland on deformed and metamorphosed sediments and interbedded volcanics;

The presence of threatened cycads within the Disturbance Footprint was confirmed during seasonal ecological surveys described in **Table 3**. These plants were identified and confirmed by the Queensland Herbarium as *C. megacarpa*; listed as Endangered under the EPBC and NC Acts. Eight (8) **C. megacarpa** individuals were recorded during the 2020-2022 surveys. These individuals were scattered and of varying sizes and ages including three juveniles. The habitat that the plants were located in was eucalypt woodland with a grassy understorey, 80 m above sea level. This species usually occurs on undulating to hilly terrain. Condition of the habitat was good away from the edges but poor on the edges where *Lantana camara* and exotic grasses were dense.

The Development Footprint was redesigned and the known individuals will not be directly impacted.

Potential indirect impacts to retained individuals include:

- Inadvertent damage during construction through soil compaction or damage to the plant or roots by machinery.
- Dust smothering leaves impacting photosynthesis.



- Changes in hydrology due to vegetation clearance, soil stockpiling and increase in hard surfaces.
- Changes in the micro-climate for individuals such as increased shading from solar panels or other infrastructure or reduced shading due to removal of canopy trees.
- Inadvertent damage during maintenance activities such as weed control or slashing during operation of the solar farm.

Potential habitat for this species will also be directly impacted inside the Development Footprint. Individuals may be located at the time of clearing and if they cannot be avoided through micrositing, these individuals will be impacted through direct removal.

The number of cycads to be indirectly and directly impacted will be confirmed at the time of clearing.

The population of *C. megacarpa* in the Development Footprint is likely to not be viable in the long term as populations with a minimum 3,500 plants are considered viable in the long-term (Queensland Herbarium 2007). No important populations (populations which are considered viable) are located on Mt Larcom. The *C. megacarpa* located within the Project Area are unlikely to be significant to an important population. Given the low numbers, the removal of any *C. megacarpa* that may be found within the Disturbance Footprint and cannot be avoided is unlikely to significantly impact any population.

The eight individuals found within the Project Area are already partially fragmented from any population on Mt Larcom due to the adjacent Cullen Road. The establishment of the Project will only marginally further isolate the plants by removing vegetation between the plants and Cullen Road (thereby making the existing cleared area bigger).

### **2.2.3 Mitigation measures for individuals indirectly impacted**

The known *Cycas megacarpa* lie within 100 m of the Development Footprint and for some individuals construction will occur within 10 m of the plant. Mitigation measures to protect individuals from indirect impacts by the Project are listed in **Table 4**.

**Table 4: Mitigation measures to reduce impacts on retained *Cycas megacarpa*.**

Potential Impact	Timing of impact	Duration of impact	Mitigation measure	Limitations	Expected success rate	Responsible Person
Inadvertent damage during construction through soil compaction or damage to the plant or roots by machinery	Pre-construction, construction and operation	Short term-construction Long term-operation	<ul style="list-style-type: none"> <li>- Prior to clearing and construction a temporary fence will be installed around each plant (or group of plants) with a 10 m buffer</li> <li>- Signage will be installed at each plant alerting staff to the presence of threatened plants</li> <li>- The location of the plants and information on the plants will be provided to all contractors entering the site and making them aware of the no-go zone</li> </ul>	Fencing or signage may be damaged	High	Construction contractor
Dust smothering leaves impacting photosynthesis	Pre-construction, construction	Short term	<ul style="list-style-type: none"> <li>- Dust suppression will be undertaken in accordance with the CEMP. Dust levels will be monitored by the contractor.</li> <li>- Plants will be monitored regularly during construction to ensure dust is not impacting individuals. Cycads which show excessive dust coverage will be carefully washed down by water cart or similar to remove dust.</li> </ul>	<p>It may be difficult to identify if dust is impacting a plant.</p> <p>Impacts of dust may not be apparent in the short term</p>	Moderate	Construction contractor
Changes in hydrology due to vegetation clearance, soil stockpiling and increase in hard surfaces.	Construction and operation	Long term	<ul style="list-style-type: none"> <li>- Soil and felled vegetation will not be stockpiled within 50 m of individuals.</li> <li>- No hard surfaces will be installed within 10 m of a Cycad,</li> <li>- Plants will be monitored regularly during construction to ensure plants are remaining healthy.</li> </ul>	Impacts of changed hydrology may not be apparent in the short term	High	Construction contractor

Potential Impact	Timing of impact	Duration of impact	Mitigation measure	Limitations	Expected success rate	Responsible Person
Changes in the micro-climate for individuals such as increased shading from solar panels or other infrastructure or reduced shading due to removal of canopy trees.	Operation	Long term	<ul style="list-style-type: none"> <li>- Where possible, remnant vegetation around known plants will remain within 10 m of an individual</li> <li>- Weeds will be controlled around known plants within 10 m (using manual methods rather than chemical control)</li> </ul>	Impacts of changes in micro-climate may not be apparent in the short term	Moderate	<p>Construction contractor</p> <p>Weed management contractor</p>
Inadvertent damage during maintenance activities such as weed control or slashing during operation of the solar farm	Operation	Short term	<ul style="list-style-type: none"> <li>- Permanent signage will be installed near threatened plants within the Project Area to alert contractors and operational staff to the plants' presence</li> <li>- The location of the plants and information on the plants will be provided to all contractors and new staff entering the site and making them aware of the no-go zone</li> </ul>	Signage may not be seen by vegetation management contractors	High	Site supervisor

## 2.2.4 Mitigation measures for individuals directly impacted

It is possible that additional *Cycas megacarpa* will be located at the time of clearing. Where these individual cycads are not able to be avoided, they will be translocated in accordance with this Plan to achieve no net loss of the species. Cycad salvage and translocation is a proven method of mitigating the impacts of land clearing on cycad populations (Queensland Herbarium, 2007). Translocation of cycads from clearing impact areas to establish ex situ populations has been undertaken successfully for cycad species within Central Queensland (Queensland Herbarium, 2007).

The Project is considered unlikely to result in a significant impact to *C. megacarpa* populations within the Development Footprint when the management measures recommended in this Plan are implemented.

## 2.3 Translocation Methodology and Recipient Site

Impacted cycads located within the Development Footprint will be salvaged and translocated as per Section 2.3.3 to 2.5. However, some individuals within the Development Footprint may be inaccessible and unable to be salvaged for translocation due to landform conditions and/or occupational health and safety requirements. These cycads will be destroyed during clearing activities and the location will be recorded along with the justification for the clearing. Cycads which cannot be avoided or translocated and are destroyed will be replaced in the recipient site with a propagated seedling.

Plants salvaged from the Development Footprint and any specimens propagated from seed will be translocated into suitable recipient sites. Recipient sites may be combined with offset areas provided for impacts to other MNES (e.g. offset provided for Koala and Greater Glider). Recipient sites have been located within the immediate surroundings of the impact location outlined in (Figures 1 - 4). The suitability of a recipient site is determined by a range of factors including:

- the number of individual plants to be salvaged from the Development Footprint;
- proximity of recipient site to the salvage site;
- site constraints such as topography and proximity to existing and future infrastructure (in particular, access tracks) which will dictate accessibility for re-location and ongoing management;
- suitable environmental conditions, including suitable habitat and microclimate i.e., similar vegetation community type as the impact site which is to be in good condition and have good connectivity to other patches of supporting habitat and connectivity of individuals within the wider area. Other conditions include the size, structure, condition and status of supporting habitat;
- site slope and aspect;
- the presence of required ecological function e.g., necessary pollinators; and
- any potential threats to translocated individuals (e.g., distance from bushfire-prone vegetation, cattle grazing pressures, current level of weed infestation and pest animal activity, soil stability) and the management effort required to control these potential threats.

Note that suitable sites may include existing *C. megacarpa* plants which would indicate that the above criteria are met.

### 2.3.1 Pre-translocation Assessment

Pre-translocation surveys will be undertaken prior to the commencement of vegetation clearing, including during the infrastructure micro-siting process. These surveys will be done by qualified ecologists and may be combined with pre-clearance surveys. Areas will be surveyed approximately four weeks prior to clearing (or earlier where practicable). The purpose of these surveys is to:

- Determine the number of cycads that are impacted by the Project through direct count surveys.
- Map and tag the extent and individual locations of cycads within the Development Footprint.
- Record baseline data for each individual plant within the impact area, which will be used to monitor individuals following translocation, to inform management actions for translocated plants and to evaluate the ongoing and overall success of the translocation program.
- Confirm suitable location for a temporary storage site (if required); and
- Confirm suitability of habitat for translocation recipient site/s within the Development Footprint.

The pre-translocation surveys of listed flora within the Development Footprint area will consist of a systematic walk-through of the Development Footprint. The location of individuals within the Development Footprint which will be impacted by the development will be recorded with a hand-held GPS receiver. Each individual will be assigned a unique identification number that is to be recorded on fire-proof tags (e.g., aluminium plant tags) that are attached in a secure manner to the plant (e.g., with fine-gauge wire at the base of a mature but not senescent leaf). The Queensland Herbarium will be consulted to confirm the species type where this cannot be confirmed by the on-site qualified ecologist.

The following data will be recorded:

- Geo-location of each plant;
- Individual plant ID number;
- Cluster size and proximity to other clusters;
  - Age class/maturity- seedling, juvenile, adult at reproductive maturity (**Table 5**);
  - For *C. megacarpa*: Seedling, juvenile, adult at reproductive maturity (**Table 5**);
- Presence of fruit, flower and cone maturity (i.e., immature, currently fruiting or old cones);
- Where confirmation can be made, the proximity of seedlings to the maternal parent and the identification number of the maternal parent, this information is useful when undertaking seed collection for propagation purposes;
- Evidence of current disturbance factors e.g., recent fire event, insect damage and defoliation;
- Severity of any damage arising from current disturbance factors; and
- Georeferenced photographs of the individual.

This data will be collated into a database in an appropriate format (e.g., GIS Esri Shapefile, MS Excel spreadsheet or MS Access database).

**Table 5: Definitions of cycad maturity (Australian Pacific LNG, 2014).**

Age class	Definition
Seedling	<ul style="list-style-type: none"> <li>• A newly formed plant that is not attached to an older individual (i.e., is not a 'pup'<sup>2</sup>)</li> <li>• The sub-surface stem and subterranean trunk is less than 5 cm in length;</li> <li>• Does not have an above-ground stem or a formed crown; and</li> <li>• Has less than five (5) active fronds which are usually less than 50 cm in length (total rachis length).</li> </ul>
Juvenile	<ul style="list-style-type: none"> <li>• Is a singular plant that is not attached to an older individual (i.e., is not a 'pup');</li> <li>• The crown has started to gain shape;</li> <li>• The plant has a surface height up to 5 cm (from ground to crown base);</li> <li>• The sub-surface stem and subterranean trunk is usually 5 – 25 cm in length but may be up to 40 cm; and</li> <li>• The plant has 5 or more active fronds.</li> </ul>
Sub-adult	<ul style="list-style-type: none"> <li>• Is a singular plant not attached to an older specimen/individual (not a pup);</li> <li>• The crown has fully developed; and</li> <li>• The plant has a surface height between 5 and 55 cm (from ground to crown base).</li> </ul> <p>Or:</p> <ul style="list-style-type: none"> <li>• Is a pup or multitude of pups attached to an older individual (usually at or near the base); and</li> <li>• The tallest stem has a surface height of 0 – 55 cm (from ground to crown base).</li> </ul>
Adult (of reproductive capacity)	<ul style="list-style-type: none"> <li>• Is a singular plant not attached to an older individual (not a pup);</li> <li>• The crown has fully developed; and</li> <li>• The plant has a surface height greater than 55 cm (from ground to crown base).</li> </ul> <p>Or:</p> <ul style="list-style-type: none"> <li>• Is a pup or multitude of pups attached to an older specimen/individual (usually at or near the base); and / or</li> <li>• The tallest stem has a surface height greater than 55 cm (from ground to crown base).</li> </ul> <p>Or:</p> <ul style="list-style-type: none"> <li>• Has reproductive material</li> </ul>

<sup>2</sup> A 'pup' is the growth of a new Cycad, they are genetic clones of their parent plant, and typically develop around and attached to the parent plant near or just below the soil level. Both male and female plants can produce pups.

### 2.3.2 Translocation Plan

In general, cycads are straightforward to translocate and are widely used as landscape plants in the nursery industry. There have been at least four translocation programs in Central Queensland of *C. megacarpa* and *C. ophiolitica* with varying degrees of success (Calliope Range for *C. megacarpa* and Bajool Quarry, Panorama Drive, Mt Morgan Range, and Mt Archer for *C. ophiolitica*). Green Tape Solutions is currently undertaking the translocation of over 1,200 *C. terryana* as part of the Clarke Creek Wind Farm project. The data collected and work methods utilised in these programs have been adapted for the *C. megacarpa* affected by this Project. This will be used in conjunction with the general policies and guidelines proposed by Commander *et al.* (*Guidelines for the Translocation of Threatened Plants in Australia*; 2018) and the *National Multi-Species Recovery Plan for Cycads* (Queensland Herbarium, 2013).

### 2.3.3 Salvage from Impact Site

Translocation can be undertaken at any time of the year; however, the optimal time is immediately prior to the start of new growth, generally in the cooler months (i.e., winter and spring) and before the onset of the wet season.

Cycads are generally tolerant of some root damage; however, as with most species, better results are achieved with the retention of a solid root ball. Following a review of the available information for cycad species, including the three documented translocation projects for *C. megacarpa* (Australian Pacific LNG, 2014, Santos GLNG, 2013, QGC, 2016) and the Cycad Impact Management Plan for Clarke Creek Wind Farm (Green Tape Solutions and NGH, 2021), a multi-step plan has been developed for the salvage and relocation of cycad individuals.

1. Establish and maintain a “Cycad Translocation Database<sup>3</sup>” (TD) to record actions required for delivery of this Plan. The CTD will record the following:
  - i. the chain of custody for plant salvaged and seeds collected;
  - ii. details of seed collection and propagation;
  - iii. details of translocation to recipient site and final location of translocated or propagated plants.

Appendix 2 details the records which will be collected and retained.

2. Site preparation will be undertaken prior to salvage e.g., preparation to ensure unimpeded access, weed treatment (where relevant) to minimise the risk of transporting weed propagules, collection of data records etc.
3. Mark each plant with metal tag with individual numbers and strong wire.
4. Marker paint or fluorescent dye will be used to mark the north side of each plant. This will ensure that the plants are replanted with a similar north-south orientation. This step will not be applicable to seedlings or juveniles.
5. Clear the area surrounding the individual plants by hand.
6. Trim fronds back to where the rachis is attached to the stems.

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<sup>3</sup> The database acts as a chain of custody identifying each plant and seed used during the project and prevents unlawful transactions in plants and plant parts of an endangered species.

7. For the cycads, Spray trunks and around the crown area (not the crown itself) with an anti-transpirant (e.g. Envy®) to prevent the plants drying out.
8. Removal will entail hand-digging where required, for example on steep slopes or when individuals are located against trees or boulders. Otherwise, mechanical removal using plant equipment will be undertaken where topography and soil characteristics allow for it e.g., on gentle slopes and soft soils.
9. To avoid bruising the trunks/stems of the cycads, care will be taken whilst transporting the plants. Any large or heavy plants will be loaded using a soft sling on a backhoe or excavator bucket and packed using rolls of hessian sacking or similar.
10. Any damaged roots will be trimmed with clean/sterile secateurs and fungicide powder (e.g., Banrot®, Formula 20®) applied to prevent infection.

Any damage incurred to an individual plant as part of the salvage process will be recorded in the translocation database. This will assist in identifying any immediate or future horticultural requirements and will inform the analysis of monitoring results when tracking the progress of individual plants (particularly in the event of plant death following translocation). Where appropriate, damage to cycads will be treated with an appropriate disinfection and/or protection product (e.g., wound sealant or dressing) to minimise the risk of pathology.

#### **2.3.4 Translocation to Recipient Site**

Actions undertaken prior to the translocation of individuals will include, at a minimum:

- Weed management measures implemented as outlined in the project Weed and Pest Management Plan, and rehabilitation measures shall be undertaken in accordance with the project Rehabilitation Protocol (Project BMP, NGH 2020).
- Where present in material numbers, the management of pest animal species from within the immediate vicinity and surrounds of the recipient site through trapping, baiting or exclusion fencing. Note pest animals to cycads include exotic and native species. Exotic species include feral pigs, cattle, horses and deer which may dig up or trample cycad plants and seedlings.
- Firebreaks will be constructed, where deemed beneficial and not already established.
- The recipient site will be fenced with feral proof fences to prevent impact to translocated plants.
- Suitable watering arrangements, for example, the installation of a water tank and watering infrastructure or suitable access for a water cart.

Translocating plant to the permanent recipient site will include the following steps:

1. Ideally plants will be translocated on the same day they are salvaged; however, where this is not practicable, they may be held overnight and planted as soon as practicable the next day.
2. To avoid bruising the trunks/stems of the cycads, care will be taken whilst transporting the plants to the recipient site(s). Any large or heavy plants will be loaded using a soft sling on a backhoe or excavator bucket and packed using rolls of hessian sacking or similar.



3. The transplant holes at the recipient site(s) will be dug either by hand (juveniles) or with an excavator or backhoe (adults). The holes will not be too much deeper than the rootball of the plants being transplanted. The soil within the new holes will also be loosened.
4. If there is any hessian sacking around the plant(s) it will be removed as they are placed into their new location.
5. Where applicable, trim any damaged roots with clean/sterile secateurs and apply fungicide powder (e.g., Banrot®, Formula 20®) to prevent infection. Vitamin B or seaweed will also be applied to encourage root growth.
6. The plants will be positioned with the marked side facing north.
7. Where necessary, the plants will be staked with multiple stakes or rocks as available for stability.
8. The rootball of each plant will be re-packed with soil from the recipient site. This soil will be free of weed seeds. Backfill around the plant using the topsoil removed from the hole.
9. Where necessary, the plants will be staked with multiple stakes or rocks as available for stability.
10. If necessary, spray the trunks of the plants again with an anti-transpirant (e.g., Envy®) to minimise moisture loss.
11. The crown and any remaining foliage on each plant will be sprayed with an insecticide (Confidor® at an application rate of 10ml/9L water or Crown® at an application rate of 5ml/9L water).
12. All planted cycads will be planted with at least 20 litres of water for adult plants and 10 litres for juvenile plants and 5 litres for seedlings.
13. Follow up watering in every fortnight for 2 months, and then monthly for 6 months.

## 2.4 Logistical Assessment

Key roles in delivery of this Plan include:

- The translocation team to oversee the delivery and implementation of the Plan. A qualified ecologist and project manager with the skills and experience will oversee the delivery of the program. This person will be responsible for all data management and recording of translocation activities.
- Horticulturists/ecologists who will undertake seed propagation and maintenance of the ex-situ flora salvaged from the construction footprint.
- Translocation specialists experienced in salvage of plants from the Disturbance Footprint and translocating into the recipient site/s. The translocation team will be responsible for plant maintenance for the maintenance period (up to five years).
- The Queensland Herbarium takes an active interest in the management of these plants and has worked with several personnel engaged in the preparation of this Plan in the past. The aim is to reinstate the plants into the province from which they originate, where this is not possible the Queensland Herbarium will be consulted to ensure there are no genetic suppression or regression impacts to affected population from the proposed translocation arrangements.
- Note: the same person(s) may fulfill one or more of the above roles provided they meet the relevant requirements of each role.

### 2.4.1 Personnel

Arrangements for engaging personnel to implement this Plan are in progress. The proponent will ensure that all elements of the Plan implementation are overseen by a qualified ecologist. A suitably qualified horticulturist will be engaged to provide horticultural advice and be responsible for the maintenance of individuals stored within the temporary storage facility. Seed collection will be undertaken by suitably qualified and experienced seed collectors and propagation will be undertaken by a propagation contractor.

**Table 6** defines suitably qualified personnel to implement the Plan.

**Table 6: Definitions of suitably qualified personnel.**

Terms for the purpose of the TSITMP	Definitions
Ecologist	<p>Qualified ecologist must have professional ecological qualifications, training, skills and experience related to translocation activities.</p> <p>The ecologist will give authoritative independent assessment, advice and analysis on performance relative to the translocation using the relevant protocols, standards, methods and/or literature.</p>
Seed collectors	<p>Persons trained, or have skills, in seed collection of threatened plants, particularly cycads.</p>
Horticulturist/Propagation contractor	<p>Professional with qualifications, training, skills and experience related to the propagation of cycads with knowledge, skills and experience in cycad translocation activities (horticulture or other training considered relevant).</p>

### 2.4.2 Resource Requirements

This section specifically addresses Chapter 6 of the Guidelines for the Translocation of Threatened Plants in Australia (the Guidelines). The Aldoga Solar Farm - Expansion area is a long-term project and as such, will continue to fund and support the implementation of the Plan. Personnel engaged on the Project have considerable experience in threatened species translocation and conservation and a wide range of experience in threatened species conservation projects and delivery.

A financial assessment of the estimated resource requirements to implement the Plan is shown in **Table 7**, noting that costs are indicative and will be subject to a tendering process. These components will be refined as the Project progresses.

**Table 7: High level estimated resource requirements to implement the TSITMP**

Items	Status / comment	Cost (approximate)	Total Cost
<b>Translocation</b>			
Translocation recipient site preparation	Control of threats such as grazing, water tank, fencing, restoration work and feral animal control.	\$15,000 establishment per recipient site (pending size)	\$15,000
Translocation	Translocation of plants from impact to recipient site.	\$1,500 per plant (20 plants)	\$30,000
<b>Propagation</b>			
Collection and where necessary storage of seeds	Seeds collection from the Project Plants that do not survive translocation or those plants that cannot be translocated are replaced with at least one successful seedling to achieve no net loss for the species. (Estimated 34% loss)	\$4,000	\$4,000
Propagation and management of plants	Nursery site & horticulturist will be utilised to propagate cycads from seed.	\$12,000	\$12,000
Personnel training / induction	As required to maintain accreditation currency for the duration of the Project. Includes site inductions.	\$2,000	\$2,000
<b>Maintenance, monitoring and reporting</b>			
After-planting requirements management including watering	Translocation site management and maintenance, water, fence, pest control, etc.	\$8,000 yearly for the first year/ reducing to \$6,000 for next 4 years	\$24,000

Items	Status / comment	Cost (approximate)	Total Cost
Intervention	Allow for three (3) incidents (e.g. insect attack, feral animal damage, bushfire, storms) where intervention is required during the program to ensure survival of the translocated plants.	\$1,000 - \$2000 per incident	\$6,000
<b>Project management and reporting</b>			
Long-term monitoring and evaluation programs	Establish and develop and maintain TSITMP database, monitoring and evaluation.	Quarterly	\$5,000
Project management	Ongoing coordination, delivery and management of the program over 5 years		\$10,000

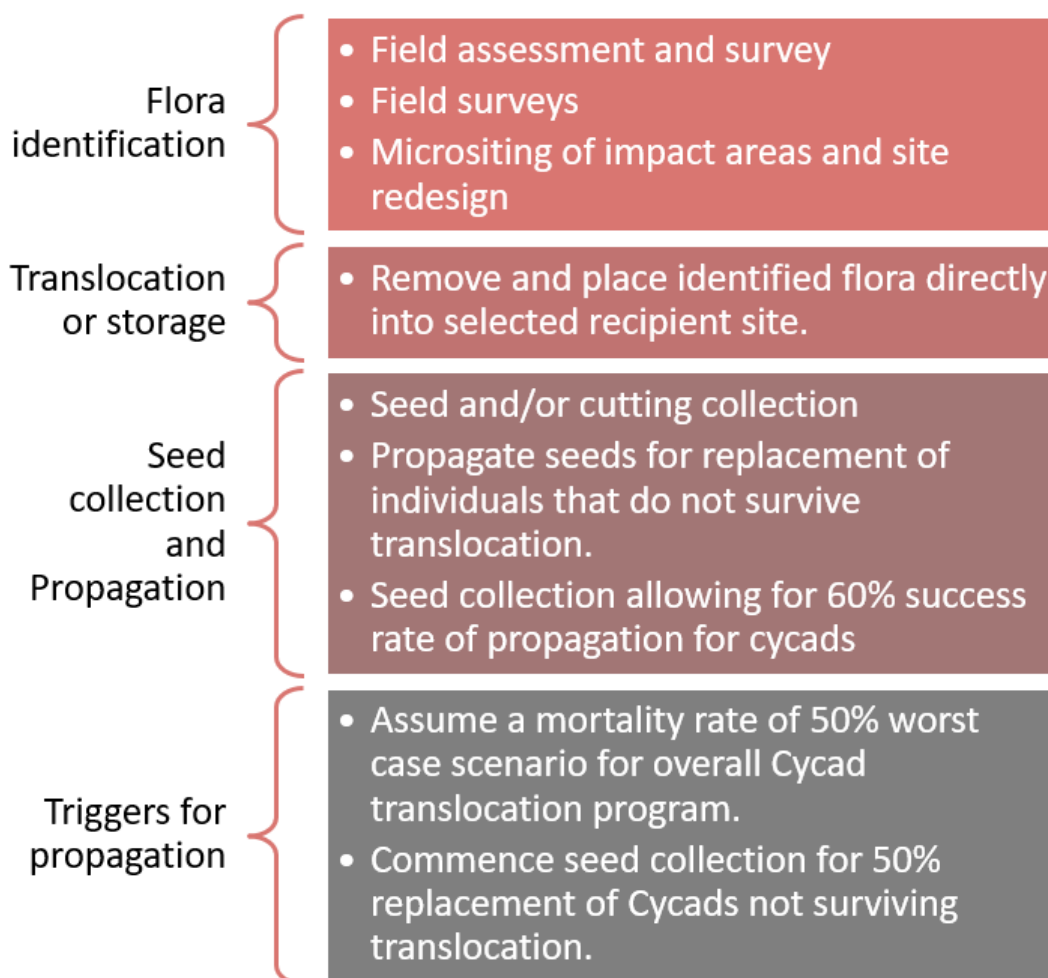
## 2.5 Scheduling Translocation Activities

The timeline for translocation activities is dependent upon finalising the construction timeframes for the Project. The translocation program will be developed to adapt to the construction program and will involve staggered planting if the Project is staged or staggered.

Construction is expected to commence approximately late-2023 and is anticipated to progress over a two (2) year period. Pre-translocation assessment and translocation activities are expected to commence mid-2023, with translocation from impact areas expected within the first year.

The translocation process is summarised in the **Figure 2**.

**Figure 2: Translocation Process**



The schedule to implement the Plan is summarised below (dependent on construction commencement):

- Assessment and identification of listed flora for removal from site: Early 2023. Site access to identified listed flora will be concurrent with pre-clearance surveys.

- Select and secure direct recipient translocation sites within the Development Footprint.
- Prepare collection program: Mid to late 2023
  - Personnel
  - Equipment
  - Vehicles
  - Establish chain of custody procedures
- Prepare recipient sites
- Collect cycads during vegetation clearing
- Translocate suitable flora to recipient sites
  - **NB:** Planting patterns and ratio of respective species relative to composition of species collected from impact sites will be established to ensure that plants are not introduced into incompatible populations and are planted into populations of like species.
- Commence care and management
- Seed collection: inspections (collection from source plants to be translocated and from plants adjacent to the construction footprint) – Commencing mid-late 2023.
  - Seed collection – 2023
  - Propagation of seed 2024 (seeds need to dormant for up to 12 months before germination and propagation for cycads).
- Replanting: Staggered approach
  - Initial – replanting of translocated flora into recipient site/s will be done within few days to removal – late 2023 onwards.
  - Ensure suitable water and maintenance supply for translocated plants.
  - Planting out of seedlings and juvenile plants as available, and climatic conditions are suitable.

### 2.5.1 Timelines for Translocation Planning

**Table 8** shows the likely times and duration for these actions. The schedule may be amended to address construction schedules which are being developed, weather and environmental conditions required to collect suitable seed and planting into the recipient site/s.

**Table 8: Proposed timeline for implementation**

Year 1: 2023 - 24	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Planning	Field investigation Salvage plants and suitable seed.				Seed collection collected for propagation if possible							
Monitoring, care and recipient site mgt.	Establish recipient sites											
Year 2: 2024 -25	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Propagation	Additional collection of seed and seed propagation – number dependant on survival rates.											
Monitoring, care and offset site mgt.	Maintenance of translocated plants in recipient site(s) and site maintenance.											

Seedling care	Care of seedlings in the nursery											
Year 3: 2025 - 26	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Seedling planting into recipient site (if required)	Planting of seedlings into recipient site							Planting of seedlings into recipient site				
Monitoring, care and recipient site management.	Maintenance of translocated plants in recipient site and site maintenance.											
Year 4-5: 2026-27	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Monitoring, care and recipient site management.	Maintenance of translocated plants in recipient site and site maintenance. Final report of Project outcomes and performance.											

### 2.5.2 Single versus Staggered Plantings

Seed propagation and planting is reliant on the ripeness of the seed and seed availability in the vicinity of the Development Footprint. Seed germination and propagation for cycads is likely to take up to 12 months as the seed will need time to pass through a period of dormancy. This is typical of cycad propagation processes. Given the unknown status of seed availability and propagation success planting out of the seedlings into the recipient site will be staged. Planting out is contingent on suitable weather and climatic conditions, being cooler weather and suitable moisture conditions, generally in late Autumn to early Spring. This allows time for the seedlings to establish before the hot summer months. A local water supply will be required in the event of dry weather to water the seedlings during establishment in the first two to three years. Planting additional seedlings into the recipient site/s will aid in ensuring that the necessary number of plants are successfully propagated.

## 3 Seed Collection and Propagation

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This Plan specifies a program for propagating plants to replace any relocated individuals that have not survived the translocation process. This will also address the 'no net loss' requirement under the Queensland protected plants framework and any future DCCEEW translocation plan requirements.

Previous translocation programs undertaken in Central Queensland determined that the mortality rate for translocated cycads was highest within the first 12 months following translocation (Wain, 2018), with 19% of deaths occurring within the first 12 months and approximately 32% after 4 years. Adult plants were noted to take at least 6 months to die; however, numbers within the adult age class stabilised after approximately 18 months.

Based on this observed mortality rate, sufficient seed will be collected to replace a minimum of 50% of the total number of individuals translocated, with additional seed collected to account for other factors such as non-viable seed, seedling mortality and survival rate of propagated stock following planting. Seed will be collected from female cycads across the Project impact area to ensure that the genetic variability of the source population is maximised, while maintaining the provenance of genetic profile of the populations of cycads within their range.

Seeds will be collected, propagated and maintained within the temporary storage facility or suitable alternative location (e.g., offsite nursery) until the replacement plants are planted out within recipient sites. Seed collection will be undertaken by the Project ecologist or other suitably experienced personnel while propagation will be undertaken by a propagation contractor (Table 6). The number of seeds collected will be determined based on available seed and amount required.

### 3.1 Collection Methodology

Collection will be conducted in accordance with the conditions of the licence, any additional DES requirements, collection guidelines and all relevant requirements outlined in the [Code of Practice - For the harvest and use of protected plants \(www.qld.gov.au\)](http://www.qld.gov.au) (DES, 2020). The collection methodology is as follows:

- Under the Regulation, land holder approval is required to collect seed, such approval will be sought in accordance with Project landholder protocols and communication requirements.
- All personnel involved in seed collection will:
  - take care to minimise damage to any understorey plants through trampling or by vehicles.
  - take precautions to prevent the spread of weed seeds, propagules and pathogens into and out of seed collection areas, whether by vehicle or on a person's clothing, footwear etc. This will include measures such as the disinfection of tools and equipment, removal and appropriate disposal of weed seeds and propagules from clothing, cleaning of boots and vehicle wash-downs as per the project requirements.
  - take precautions to minimise damage to soils, roads and tracks, especially in wet conditions.
- To ensure sufficient genetic variation within the translocated population, seed collection will not be restricted to those individuals being directly impacted by the Project. Seed will be taken from five or more maternal parent plants at least 100 metres apart.
- When taking cycad parts—



- i) seed must be ripe and shed from the plant or be on the point of being shed
- ii) remove material evenly from each crown in a plant
- Cuts to remove fruits will be made with clean, disinfected equipment as close to the base as possible.
- No more than 20% of the total number of fruits will be collected from any one plant in any 12-month period.
- Seeds from multiple plants will not be mixed into the one collection bag or container.
- Seeds from adult plants will not be mixed with seeds found on the ground if the origin of seeds on the ground is uncertain.
- At collection, all seed collection bags/containers will be clearly labelled with the species, date, place of collection (GPS coordinates or waypoint), total number of seeds collected from that point, collector's name, and the relevant licence number.
- Seed collection records will be kept at the propagation premises and be made available upon request to a conservation officer appointed under S 127 of the NC Act, EPBC officer, client or the landholder (i.e., maintain the Cycad Translocation Database (CTD)).

Seed collection information will identify the origin of each seed. All seed collection data will be collated into an appropriate data management tool or equivalent system for record keeping, to track the progress and survival rate of propagated individuals through the entire process, from the point of collection. This tool also supports inputs that allows tracing of province, seed viability and fitness for each maternal plant to be tracked over time.

### 3.2 Collection of Source Material

The seed collection methodology is described in Section 3.1. Seed collection will be from the properties where the impact to floras occurs (Table 9).

**Table 9: Properties from which cycad seed will be salvaged as relevant to each Project stage.**

Lot	Plan	Shire
1	SP307522	Gladstone Regional Council
11	SP233094	Gladstone Regional Council
2	SP301578	Gladstone Regional Council
14	SP233094	Gladstone Regional Council
1	SP157677	Gladstone Regional Council
12	SP233094	Gladstone Regional Council

### 3.2.1 Collection Licence Requirements

Plant and seed collection and translocation must only be carried out under a valid Protected Plants Harvesting Licence issued by the DES (Table 10). Authorities are still to be obtained for the Plan. Details will be provided as these are available.

**Table 10: QLD DES Authorities for salvage, seed collection and growing protected plants for this TSITMP**

Responsible person	Authority details (licence / permit)
Contractor	Salvage of protected plant – Clearing permit from DES
Contractor	Licence to grow protected plants from DES

### 3.2.2 Seed Collection Record Keeping

Records to be kept for the Plan are required by Australian and State government agencies (DCCEEW and DES). DES requires that a record must be created and kept by the person or entity when harvesting whole restricted plants or restricted plant parts harvested under a licence or exemption. The harvest record must include the information required in the [Code of practice for the harvest and use of protected plants \(PDF, 260KB\)](#) and be kept in a written or electronic record system. This is to ensure a person or entity undertaking a harvest can maintain specific details of the harvest for compliance purposes, while demonstrating the plant or plant part was lawfully harvested from the wild.

The Queensland DES further requires that details of the [flora survey trigger map](#) used to identify high-risk areas for endangered, vulnerable or near threatened plants is retained by the proponent. Information collected from the flora survey must be reported to the QLD using the DES [WildNet data entry form \(XLS, 543KB\)](#).

Records to be kept for the Plan are described in Appendix 2 which describe records for each plant and seed interacted with during the program. The intent of these records is to ensure relevant data on the implementation of the project is retained for salvage, seed collection and nursery management and translocation into the selected recipient site. This data will ensure the establishment and maintenance of a chain of custody and record the management actions to implement the plan. The data will aid in decision making should adaptive management actions be required during the Project.

## 3.3 Propagation Methodology

Propagation of collected seed must be undertaken in accordance with a valid Protected Plants Growing Licence and the *Code of Practice for the harvest and use of Protected Plants* (DES, 2020).

Seed collection and propagation will be undertaken by suitably qualified and experienced seed collectors and a propagation contractor with experience in propagating native listed species. Propagation will be undertaken off site at a propagation nursery.

The specific methodology for seed collection and propagation will be developed in consultation with the propagation contractor in accordance with the best practice management. This would include watering,

monitoring and management of pest infestation or disease, fertiliser application (as relevant), and appropriate cleanliness and hygiene of nursery.

### **3.4 Post-Translocation Management, Monitoring and Evaluation Methods**

#### **3.4.1 Ongoing Management**

As part of the post translocation management requirements, the nursery seedlings will be monitored by a qualified ecologist(s) for a period of up to 5 years following planting. The monitoring and reporting requirements for these seedlings are provided below. Management and mitigation measures are also outlined in Section 3.4.5.

#### **3.4.2 Monitoring of Salvaged plants and Nursery Grown Seedlings**

As a minimum, each survey will involve the following tasks:

- Visually inspect translocated and propagated plants.
- Visually inspect a sample of seedlings within the control site which is separate from the translocation site. The control site is a reference site to aid in determining performance of the plants in the translocation site.
- Observation data for each specimen will be recorded against its unique identification code on a spreadsheet pro-forma.
- Observation of the general health of the plant – good, fair, dead.
- If a plant appears to have died, a photograph of the individual will be taken during the field inspection.
- Monthly rainfall data from the onsite rain gauge.
- Input of collected survey data into the data management tool for analysis.

If a fire (prescribed or wildfire) occurs in the translocation site, the following information will be collected from each individual noticeably impacted:

- Level of impact to fronds and if plant is still visible.
- Level of stress to plant (i.e. has the plant died; only partially burnt, etc.).
- Rate of recovery (new growth).

#### **3.4.3 Reference Site Suitability Assessment**

Establishment of a reference site allows for comparison between the recipient and reference site plants, translocation outcomes and performance of site management to improve land condition. The reference site will be a representative sample of the naturally occurring population(s) of similar height classes and similar topography and aspect to those translocated as part of the Project works.

This site will be in a nearby area that can be accessed during the life of the monitoring program and will be located in an area not subject to future development.

#### **3.4.4 Correction and Prevention**

The primary management goal of the translocation site is to establish and secure a population of threatened cycads.

Advice will be given to regulators on the following event:

- Severe stress/death of a significant number of plants.
- Bushfire, weather or other event causing the death a significant number of plants.

In each case corrective actions will be targeted to the specific threat to the plant/s if deemed necessary. Where pesticides are to be used, this will be at the direction of the supervising horticulturist and ecologist. Use of any herbicides, insecticides, fungicides and other chemicals will be carefully assessed to ensure suitability of application and does not cause environmental damage or off-target impacts.

Plants will be watered during extremely dry and prolonged weather periods to prevent their death.

### **3.4.5 Monitoring and Evaluation**

Monitoring of recipient site plants once translocated individuals will be monitored by a qualified ecologist for the minimum period specified by the permit conditions. Monitoring and evaluation methods are described in Section 5 and the items to be monitored are described in Appendix 2. Monitoring will be in accordance with the schedule below.

- **0-12 months:** Monthly. The first inspection will take place following the completion of the plants being placed in their permanent recipient site.
- **12-24 months:** Quarterly basis.
- **24-60 months:** Bi-annual basis

## 4 Risk Management and mitigation

**Table 11** illustrates the threats and related management actions identified for the translocated and propagated cycads.

**Table 11: Risk and management actions**

Risks	Detail	Management Actions	Timeframe
<b>Desiccation</b>	Insufficient water can lead to the plants failing to thrive at the storage and recipient sites.	<ul style="list-style-type: none"> <li>Watering each plant at least fortnightly for 3 months and monthly for the next 3 months following translocation (weather dependant)</li> <li>Controlled watering during exceptionally dry periods will aid in ensuring the plants survive.</li> <li>Have water available on site ensuring that translocated plants and seedlings receive necessary water while they are being established during dry seasons, and to provide a fire management capacity.</li> </ul>	Duration of watering will be determined by the contractor to ensure the survival of the plants and establishment of translocated/propagated plants.
<b>Water logging</b>	Over-watering can lead to root rot and loss of plants in storage.	<ul style="list-style-type: none"> <li>Monitor water delivery to ensure that plants are not over watered. Soil in pots / bags will be damp and not wet.</li> <li>Monitor root health periodically to ensure there is no rot occurring. Treat rot with suitable fungicide such as Banrot® Formula 20® or similar.</li> </ul>	Duration of watering will be determined by the contractor to ensure the survival of the plants and establishment of translocated/propagated plants.
<b>Invasive or declared weeds</b>	Dense stands of Lantana ( <i>Lantana camara</i> ) increase the fuel loads which may fuel uncontrolled hot fires at translocation recipient site.	<p><u>Weed control</u></p> <ul style="list-style-type: none"> <li>Manual control and targeted control in accordance with manufacturer's label or an off-label permit issued by the Australian Pesticides and Veterinary Medicines Authority. Splatter gun treatment may be required in heavily infested areas of Lantana. Also, introduced grasses or other competitive weeds will be controlled using selective recommended herbicides.</li> </ul>	Until establishment of translocated/propagated plants

Risks	Detail	Management Actions	Timeframe
		<ul style="list-style-type: none"> <li>Herbicides will only be used by trained personnel, in accordance with manufacturer's instructions and with appropriate Personal Protective Equipment.</li> </ul>	
	Invasive or declared weeds (e.g. Lantana) have the potential to limit the successful recruitment of <i>Cycas sp.</i> at the recipient site.	<p><u>Weed prevention/hygiene</u></p> <ul style="list-style-type: none"> <li>The potential for the introduction or spread of weeds will be minimised by restricting vehicle and livestock access to the recipient site and implementation of weed control measures.</li> <li>Prior to translocations being undertaken, declared weeds will be identified and managed at the recipient location/s with a priority for species that may pose a fire risk or WoNS</li> </ul>	
<b>Grazing</b>	Livestock damage to young plants	<p><u>Fencing</u></p> <ul style="list-style-type: none"> <li>Livestock will be excluded from the recipient site if impacts are considered to be a significant risk at each recipient site.</li> </ul> <p><u>Livestock access / grazing</u></p> <ul style="list-style-type: none"> <li>Pulse grazing for fuel control may be permitted at appropriate times once plantings are sufficiently established, as determined by a suitably qualified Ecologist.</li> <li>At intervals during and at the conclusion of the pulse grazing period a suitably qualified Ecologist will monitor for potential impacts of livestock on the translocated plants and condition of the recipient site.</li> </ul>	Until establishment of translocated/propagated plants.

Risks	Detail	Management Actions	Timeframe
<p><b>Feral animal control</b></p>	<p>Feral animals including pigs, horses, cattle and to a lesser extent wild deer can impact on the translocated or propagated new plants.</p>	<p><u>Pest animal management</u></p> <ul style="list-style-type: none"> <li>Record incidental observations of pest animal impacts on the translocated and naturally regenerating populations. If impacts are considered to be a significant risk specific control measures will be implemented.</li> <li>Controls may include shooting, trapping and/or baiting. Notice of access and proposed pest control methods and/or chemical usage (including material safety data sheets) must be provided to the landholder two weeks prior to any events occurring.</li> </ul> <p><u>Secure fencing</u></p> <ul style="list-style-type: none"> <li>Establishing a fence suitable to restrict access of feral animals where deemed necessary.</li> </ul>	<p>Until establishment of translocated/propagated plants</p>
<p><b>Fire</b></p>	<p>Wildfires have the potential to burn the recipient site and destroy the planting.</p>	<ul style="list-style-type: none"> <li>The recipient area will preferentially be located within the offset site, in which case there will be a maintained fire break. Alternatively, the recipient area will be managed for reduced adjacent fuel load.</li> <li>Fuel loads will be monitored by field personnel to determine if fuel load and climatic conditions have the potential to cause a fire that could be detrimental to the planted population. Where the potential for detrimental fires exists, further actions will be implemented to reduce fuel loads to an acceptable level at appropriate times.</li> <li>Biomass/fuel loads will primarily be managed through a combination of light grazing across the recipient site and where necessary, slashing (hand held equipment) around the <i>Cycas sp.</i></li> </ul>	<p>Until establishment of translocated/propagated plants</p>

Risks	Detail	Management Actions	Timeframe
		<ul style="list-style-type: none"> <li>Grazing will only be undertaken once plants are sufficiently established as determined by a suitably qualified Ecologist based on the results of regular monitoring.</li> <li>Where applicable and feasible, cool (trickle burns) fuel reduction burns in a rotational mosaic pattern will be conducted to reduce the hazard of hot fires.</li> </ul>	
<b>Insect attack and fungal infections</b>	A range of boring insects have potential to attack Cycads and can cause significant damage to the plants.	<ul style="list-style-type: none"> <li>Periodic inspections will be conducted as per the monitoring program outlined in this Plan to identify if significant insects are present and check for other issues.</li> <li>Where fungal infections and damage (likely to cause death) is evident treatment with a fungicide powder (e.g. Banrot®, Formula 20®).</li> <li>Where insect damage occurs apply an insecticide if the insect damage is considered likely to cause death to the cycad individual, (e.g. Crown, Bugmaster, Rogor, Supracide, Dipel but not a pyrethrum based one), and add a wetting agent (e.g. a few drops of dish washing liquid).</li> <li>Insect and fungicide treatment may require removal of leaves and trunk material to remove rotten wood. Where trunk wood is removed it must be covered with a suitable tar solution (e.g., Steri-prune paint) to prevent further damage and drying out.</li> </ul>	Until establishment of translocated/propagated plants
<b>Unauthorised access</b>	Damage caused by unauthorised entry or use of the recipient site	<p><u>Restricted access</u></p> <ul style="list-style-type: none"> <li>Access to the recipient site will be restricted to approved personnel; approved contractors and guests (e.g. DCCEEW and / or DES) and the landholder;</li> </ul>	Until establishment of translocated/propagated plants



Risks	Detail	Management Actions	Timeframe
		<ul style="list-style-type: none"> <li>Access to the recipient site will be within the Development Footprint which will have controlled access points. All access points will be secure and padlocked to restrict entry to authorised personnel.</li> </ul>	
<b>Land degradation</b>	Erosion and sediment related impacts caused by construction activities	<ul style="list-style-type: none"> <li>The recipient site will be located outside the Project disturbance area. Therefore, it is unlikely to be impacted from erosion or sediment resulting from the construction activities. The use of plant during translocation may pose potential impacts. Construction related erosion and sediment will be controlled through the Construction Environmental Management Plan and Bushfire Management Plan.</li> </ul>	Until establishment of translocated/propagated plants
	Erosion and sediment impact from poor agricultural land management practice	<ul style="list-style-type: none"> <li>Erosion and sediment management measures will be implemented if this is considered to be an issue.</li> </ul>	On establishment of recipient site.
<b>Intervention triggers</b>	Triggers for intervention	<ul style="list-style-type: none"> <li>The following criteria are triggers for corrective actions to ensure this plan achieves its objectives:               <ul style="list-style-type: none"> <li>If monitoring shows less than                   <ul style="list-style-type: none"> <li>60% of translocated plants surviving at the translocation site.</li> <li>50% seed propagation success.</li> </ul> </li> </ul> </li> </ul>	Until establishment of translocated/propagated plants
	Corrective actions	<ul style="list-style-type: none"> <li>Corrective actions described in this table above and will be applied as necessary.</li> </ul>	Until establishment of translocated/propagated plants

## 5 Monitoring and Evaluation

### 5.1 Reporting requirement

The implementation of this Plan will be reported as part of the annual performance report. The reporting mechanisms will align with the requirement of this Plan and review to demonstrate compliance with any State Conditions. All monitoring and translocation actions will be recorded in the CTD.

Reports will detail the actions of this translocation program and results of works to achieve a sustaining population of threatened plants. The report will include but not be limited to the following:

- Collection of threatened plants listed under the EPBC Act from the Development Footprint.
- Collection of seed for propagation.
- The progress and success (health) of translocated individuals.
- The permanent recipient site/s for the translocated plants and final planting of seedlings.
- Translocation of plants from Development Footprint into the recipient site.
- Planting of seedlings into recipient site.
- Any issues and actions to address these and the success or otherwise of these measures.
- Persons engaged in the program, including suitably quality horticulturalists and ecologists (Refer to Table 6).
- Management of the storage and recipient sites in accordance with this plan.

Reporting will occur on an annual basis in accordance with the EPBC compliance reporting requirements.

### 5.2 Performance criteria

Table 12 specifies the criteria for measuring the success of management activities within the recipient site, and establishment of translocated/propagated plants. Once the translocation completion criteria have been achieved (see table below), further plant propagation, plantings and site management will not be conducted.

**Table 12: Performance criteria for cycad translocation**

Objectives	Measurable criteria for success
Successful translocation of impacted individuals	<p>At 5 years from the completion of translocation activities, the health of translocated and propagated specimens must be comparable to selected reference populations within the region.</p> <p>Health data for the reference site will be recorded at the start of translocation works, and periodically (biennially) for comparison against the translocated plants.</p> <p><b>Note:</b> The health status of the reference site plants is a guide only as these plants may be impacted by unanticipated deleterious impacts. Data on the</p>

Objectives	Measurable criteria for success
	population health of translocated plants will be the primary metric to determine successful translocation.
	Impacted plants are removed from the impact site prior to clearing where practicable.
	All impacted plants are translocated to a Project recipient site, except if a plant does not survive. Propagated plant/s are planted at the recipient site in place of those plants that have died because of the action, i.e. clearing, or failure to survive translocation.

## 6 References

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## Appendix 1

# Cycad Species Descriptions and General Ecology

## Cycad Ecology

Many cycads rely on fire for successful reproduction (Queensland Herbarium, 2007). Whilst adult plants are generally resistant to most fires, growth may be impacted through the destruction of foliage and the trunks may be scarred. Seed and seedling are fire-sensitive and fire may result in significant impacts to a population through the mortality of seeds and seedlings (Queensland Herbarium, 2007).

Cycads occurring in habitats within the Development Footprint are susceptible to periodic fire events of potentially varying intensities. Appropriate fire management is essential to the long-term success of both retained and translocated individuals within the Development Footprint.

These cycads are thought to be pollinated by small beetles. Fruiting cones (megasporophylls) are usually produced from late autumn to late summer (May to February), with seed dropping from the plant from autumn onwards (March). Due to a delayed fertilisation system that is unique to cycads, the seeds are not ready to germinate for at least nine months after they drop from the plant (Queensland Herbarium, 2007).

While there is little information on cycad seed dispersal and recruitment, it is known that within cycad species there is generally limited dispersal of ripe seed via mammals. Plant distribution is usually strongly clustered because of a limited dispersal distance, with the bulk of seed dispersal localised to around the parent plants (Queensland Herbarium, 2007).

Cycad species have several insect predators which damage the foliage of specimens, including the leaf beetle *Lilioceris nigripes* and the lycaenid butterfly *Theclinesthes onycha* (Queensland Herbarium 2007).

The sections below describe *Cycas megacarpa* which occurs in the Development Footprint. *Cycas megacarpa*'s range does not overlap with any other cycad species apart from *C. media* in its northern range. All cycads found within the project area are most likely to be *C. megacarpa*.

### 6.1 Description of *Cycas megacarpa*

*Cycas megacarpa* is a cycad species from central Queensland from Bouldercombe in the north, to near Woolooga in the south. The species is listed as Endangered under the NC Act and under the EPBC Act. *Cycas megacarpa* is a small to medium sized cycad growing to 8m tall. It has an erect trunk, 8-14cm in diameter and a dense, rounded crown of leaves. Juvenile leaflets are blue-green, with dense orange-brown hairs that later fall off. Mature leaves are 40-110cm long, glossy, mid to dark green, and keeled (V-shaped) in cross-section. The petiole (leaf stalk) is 25-30cm long. Each leaf consists of 120-170 leathery leaflets, 12-20cm long and 0.5-0.75cm wide. The lowest leaflets are reduced to spine like structures, approximately 0.5cm long (Queensland Herbarium, 2007).

The male and female reproductive structures develop on separate plants. Male plants produce brown, hairy cylindrical cones 15-18cm long and 5-7cm in diameter. The female plants produce loose open cone-like structures at the top of the plant. Two to four seeds are borne on female sporophylls (seed bearing structures) 15- 25cm long that have a broad flattened spear shape tip (apical lobe) with an apical spine to 2 cm long. As the seeds mature the stalks lengthen and spread away from the top of

the plant. Seeds are ovoid (egg shaped), 4-6cm long by 3.5-4.5cm in diameter and greenish to light brown, not powdery.

*Cycas megacarpa* occurs in spotted gum (*Eucalyptus citriodora* subsp *citriodora*) and narrow-leaved ironbark (*Eucalyptus crebra*) woodland and open forest with a grassy understorey. It has also been recorded on rainforest margins. The species usually grows on hill tops and steep slopes. It is found on varying top soils; commonly sandy loams or shallow clay loams which are often stony. *C. megacarpa* occurs at altitudes of 40-600m above sea level. (Halford 1995; DEWHA 2008)

**Plate 2: Female *Cycas megacarpa* (Source: - Adair, J., - GTS)**



Plate 3: Male *Cycas megacarpa* (Source: Source: - Adair, J., - GTS)





## Appendix 2

### Database Description and Fields

Cycads salvaged	Description
Plant ID	Sequential ID for each plant salvaged
Latitude (x)	Decimal Degrees
Longitude (y)	Decimal Degrees
Species	<i>C. megacarpa</i>
Health	Health (Good, Fair, Poor, Dead)
Height class	Seedling, Juvenile, Sub-adult, Adult (reproductive capacity)
Crown size	Diameter of the Crown (in metres)
Action taken	Salvaged or Retained
Date salvaged	Date
Damage	Damage to plant during salvage
Risk assessment	Risk assessment required to salvage plant from location (e.g., steep slopes)
Seedling	Is the salvaged plant a Seedling (Yes) Only otherwise leave blank
Comment	Notes about the plant / salvage
Description	Additional information about plant - (pups, subterranean trunk, crown numbers, pests evident, etc...)
Height	In metres
Crown	In metres
Gender	Male / Female (if known)
Fruit present	Yes / No
Cone size	No Cone if none, in millimetres if present (mm)
Insects present	Yes / No

Insect attack	Yes / No
New growth	Yes / No
Parent ID	If seedling note likely parent ID

Nursery management	Details
Plant ID	Number / code
Species	<i>C. megacarpa</i>
Photograph - #	Photo ID - as recorded on camera
Nursery row (plant location)	Row / location
Gender	Male / Female (if known)
Health	Good, Fair, Poor, Dead
Water quantity (l)	Water supplied to plant
Date	Date watered
Steri-prune	Date used / Quantity
Insecticide	Date applied
Fungicide	Date applied
Other	Any other management actions
Av day temp °c	For month
Av night temp °c	For month
Rain mm	For month
Av humidity (rh)	For month
Comments	Other notes of management / resources used / repotting etc...

Seed collection	Description
Collection date	Date

Time	Time
Collector	Name of collector
Species	<i>C. megacarpa</i>
Area number/name	Locality Name / Place descriptor
Latitude (x)	Decimal degrees
Longitude (y)	Decimal degrees
Parent plant id number	Plant ID - Parent if known for seedlings collected.
Bag number	Sequential bag number if from plants salvaged record (S 1, S2, ...) If from wild stock (W1, W1, ...)
Number of seeds in bag	Number of seeds taken from plant / or ground in bag
Number of seeds on plant	Number of seeds on plant before collection
Seeds remaining on parent plant	Number of seeds remaining on plant following collection (Max 20% in each 12 months)
Condition of plant/seeds. Evidence of fauna/fire predation etc	Description of health and condition of seeds and plant
Updated comments on revisit	Any change in plant and seed condition from additional seed collections if needed
Collection date	Second Collection Date
Bag number	Sequential bag number if from plants salvaged record (S 1, S2, ...) If from wild stock (W1, W1, ...)
Number of seeds in bag	Number of seeds taken from plant / or ground in bag
Number of seeds on plant	Number of seeds on plant before collection
Seeds remaining on plant	Number of seeds remaining on plant following collection (Max 20% in each 12 months)
Comments	Any notes

Cycads translocated	Description
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Plant ID (Salvage ID)	Plant ID from salvage site / if propagated - next sequential number
Latitude (x)	Decimal Degrees
Longitude (y)	Decimal Degrees
Species	<i>Cycas megacarpa</i>
Health translocated	Health (Good, Fair, Poor)
Height class	Seedling, Juvenile, Sub-adult, Adult (reproductive capacity)
Crown size	Diameter of the Crown (in metres)
Action taken	Salvaged or Retained
Date translocated	Date cycad placed in recipient site
Damage	Damage to plant during translocation
Risk assessment	Risk assessment required to place plant into recipient location (e.g. steep slopes)
Comment	Notes about the plant / translocation
Description	Additional information about plant - (pups, subterranean trunk, crown numbers, pests evident, etc...)
Height (m)	In metres
Crown (m)	In metres
Gender	Male / Female (if known)
Fruit present	Yes / No
Cone size	No Cone if none, in millimetres if present (mm)
Insects present	Yes / No
Insect attack	Yes / No
New growth	Yes / No
Parent ID	If seedling note likely parent ID
Health final	Health (Good, Fair, Poor) following annual inspections.

