

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

Table of Contents

Table of Contents	i
List of Tables	ii
List of Figures.....	ii
List of Abbreviations.....	ii
Background to Cairns Nguma-bada Campus Natural Assets Management Plan (NAMP)	1
Vision	1
Overview of Nguma-bada Campus and the NAMP	1
Goals of the Natural Assets Management Plan, Cairns	2
Benefits of the NAMP to JCU	3
Funding and Resources.....	4
Stakeholder Engagement and Participation	5
Relevant Legislation and Information	5
Action Plans.....	5
Monitoring and Evaluation	5
Goal One of Cairns Natural Assets Management Plan.....	6
1.1 Cultural Heritage Maintenance and Protection.....	6
1.1.1 Objectives for Cultural Heritage Maintenance and Protection.....	6
1.1.2 Scope	6
1.1.3 Management Practices and Procedures.....	7
1.2 Knowledge Sharing, Capacity and Community Development ..	10
1.2.1 Objectives for Knowledge Sharing, Capacity and Community Development	10
1.2.2 Scope	10
1.2.3 Management Practices and Procedures	10
Goal Two of Cairns Natural Assets Management Plan.....	12
2.1 Objectives for Native Fauna and Habitat Protection	12
2.2 Scope.....	12
2.3 Management Practices and Procedures	13
Goal Three of Cairns Natural Assets Management Plan	15
3.1 Objectives for Native Vegetation Management	15
3.2 Scope.....	16
3.3 Management Practices and Procedures	17
Goal Four of Cairns Natural Assets Management Plan.....	19
4.1 Pest Management.....	19
4.1.1 Objectives for Pest Management	19
4.1.2 Scope.....	19
4.1.3 Management Practices and Procedures	20
4.2 Weed Management	24
4.2.1 Objectives for Weed Management.....	24
4.2.2 Scope.....	24
4.2.3 Management Practices and Procedures	24
Goal Five of Cairns Natural Assets Management Plan.....	27
5.1 Objectives for Waterway and Riparian Management	27
5.2 Scope.....	28
5.3 Management Practices and Procedures	28
Goal Six of Cairns Natural Assets Management Plan.....	30
6.1 Objectives for Landscape and Fire Management	30
6.2 Scope.....	30
6.3 Management Practices and Procedures	31
Appendix.....	36
Relevant Legislation	36

List of Tables

Table 1.1 Relevant Information related to Cultural Heritage.....	7
Table 1.2 Cultural Heritage Action Plan.....	8
Table 1.3 Relevant Information related to Knowledge Sharing, Capacity and Community Development	10
Table 1.4 Knowledge Sharing, Capacity and Community Development Action Plan.....	11
Table 2.1 Relevant Information related to Native Fauna and Habitat Protection.....	12
Table 2.2 Native Fauna and Habitat Protection Action Plan.....	14
Table 3.1 Relevant Information related to Native Vegetation Management	16
Table 3.2 Native Vegetation Management Action Plan.....	18
Table 4.1 Relevant Information related to Pest Management	20
Table 4.2 Pest Management Action Plan	23
Table 4.3 Relevant Information related to Weed Management.....	24
Table 4.4 Weed Management Action Plan.....	26
Table 5.1 Relevant Information related to Waterway and Riparian Management	28
Table 5.2 Waterway and Riparian Management Action Plan	29
Table 6.1 Relevant Information related to Landscape and Fire Management	31
Table 6.2 Landscape and Fire Management Action Plan.....	34

List of Figures

Figure 4.1 Electric ant biosecurity zone map for JCU Cairns campus	21
Figure 6.1 Smithfield Mountain Bike Park	32

List of Abbreviations

WTMA	Wet Tropics Management Authority
IERC	Indigenous Education and Research Centre
TCI	The Cairns Institute
ATH	Australian Tropical Herbarium
TOs	Traditional Owners
CRC	Cairns Regional Council
DTES	Division of Tropical Environments and Societies
QPWS	Queensland Parks and Wildlife Services
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
CMBC	Cairns Mountain Bike Club
TMR	Transport and Main Roads

Background to Cairns Nguma-bada Campus Natural Assets Management Plan (NAMP)

Vision

‘Nestled between the Wet Tropics World Heritage Area and the Great Barrier Reef World Heritage Area, the JCU Nguma-bada campus is a world leader in natural asset management for the wet tropics. The University takes a whole of catchment approach to enhancing the campus’ environmental values and creates a sustainable balance between its unique natural environment and sustainable development. Place-based, inter-disciplinary learning, teaching and research is fundamental to managing our natural assets and the University actively engages students, staff, industry and the wider community in best practice environmental management. The campus’ natural assets attract students, the local community, recreational users and tourists, making the campus a vibrant hub for ecological sustainability in the tropics.’

Overview of Nguma-bada Campus and the NAMP

James Cook University’s Nguma-bada campus (Cairns) is situated on 90 hectares across three parcels of land. The campus has been developed on predominately cleared land, previously used for sugar cane farming. Small, isolated patches of remnant vegetation remain on the campus, including an area of endangered regional ecosystem along the downstream reaches of Atika Creek. The campus borders the Smithfield Conservation Park on its northern and western sides, which contains a number of remnant regional ecosystems that continue back to the Kuranda National Park and the Wet Tropics World Heritage Area.

The Campus lies entirely within the catchment of Atika Creek. Three main tributaries to Atika Creek originate in the Smithfield Conservation Park on the Eastern side of Saddle Mountain and join to a single creek that flows through the campus grounds and under the Captain Cook Highway. The catchment to the west of the highway covers approximately 370 ha. East of the highway, the watercourse passes through degraded residential and

development land, passing to the north of Cattana Wetlands before entering the diverse melaleuca swamp and mangrove communities along the Half Moon Creek estuary. Much of Atika Creek and its tributaries on the campus have well established regrowth vegetation along the riparian zones, although some areas remain cleared, have minimal riparian growth or are encroached by buildings or infrastructure. This can impact on the connectivity for fauna through the riparian zones, which act as green corridors for the campus. Atika Creek also has a number of barriers for fish passage in the downstream reaches (mostly off-campus), meaning that some native fish species may not be able to access the upstream reaches of the creek. Tortoises and small fish are regularly seen in the creek during wet season flows.

The maintained areas of the campus contain developed areas with well-established native and introduced plantings and artificially landscaped areas around buildings. Undeveloped areas of campus that were previously

Natural Assets Management Plan, 2021 James Cook University – Nguma-bada Campus, Cairns

used for sugarcane production are either slashed regularly or have been left largely unmanaged and have been colonised by a range of pioneer native and introduced weed species (Worboys, 2016). The abundance and diversity of flora and fauna that the campus supports are a drawcard to students and staff, particularly international students, and has the potential to be utilised as a tool for learning, teaching, research as well as marketing the University. JCU also has a responsibility to protect and enhance the natural assets of the campus and is bound by specific state and federal legislation in relation to this.

The Nguma-bada Campus Natural Assets Management Plan (NAMP) aims to protect and enhance the natural assets on campus, while helping to inform future sustainable development of the campus through the campus master plan refresh. The NAMP should assist the campus master planning process to ensure JCU is an exemplar of best practice in campus planning and development, through a whole of catchment approach. Identifying high value species, habitats and green corridors, and looking to protect and

Goals of the Natural Assets Management Plan, Cairns

The NAMP seeks to guide actions towards the achievement of six main goals which encompass the key areas of managing the natural assets on campus. These goals are:

- 1) Goal One: Maintain and protect cultural assets within the wider catchment of Cairns campus and build and improve upon the knowledge base and capacity of JCU staff and students for a collaborative whole-of-community development.
- 2) Goal Two: Identify, protect, and maintain at ecologically sustainable levels native fauna and their associated habitats on campus
- 3) Goal Three: Ensure efficient and effective management of native vegetation on Cairns campus to enhance contiguous connectivity

enhance these areas where possible, while focusing development in degraded and previously cleared areas is desirable.

As a University with a specific focus and expertise in tropical biodiversity, JCU should utilise its internal resources and use the campus for place-based, inter-disciplinary learning and research while involving government, community and business partners for mutually beneficial outcomes. This will help protect and enhance the natural assets in a way that supports and enriches learning, teaching and research and presents real, field-based learning opportunities for students and the wider community.

Emerging technology will also play a key role in monitoring and managing natural assets into the future and JCU has a unique opportunity to draw on its expertise in eResearch and the new Internet of Things degree to demonstrate innovative practices in this area.

with adjacent flora to improve ecosystem services and other vegetation functions.

- 4) Goal Four: Control and manage pest and weed on Cairns campus for environmental sustainability.
- 5) Goal Five: Protect and manage waterway and riparian areas on Cairns campus to enhance ecological values and movement of terrestrial and aquatic fauna.
- 6) Goal 6: Maintain, manage, and enhance Cairns campus' landscape through ecologically sustainable design principles and actions.

List of actions have been tabulated under each goal for implementation to ensure the sustainable management of the Nguma-bada campus natural assets.

Benefits of the NAMP to JCU

Having a coordinated NAMP for the campus allows JCU to comprehensively plan and develop its unique natural assets in a coordinated and strategic way. There are numerous economic, social, environmental and reputational benefits of developing and implementing the NAMP and showcasing the campus as an exemplar in natural asset management in balance with a sustainable built environment and related infrastructure. JCU has the knowledge and expertise to ensure our natural assets are managed effectively and this can link closely with teaching, learning and research, providing place-based learning for students and staff, and attracting external organisations and businesses with our ability to showcase best practice and innovation in natural asset management.

A Natural Assets Management Plan that clearly articulates the environmental management goals and actions on campus can enhance community relationships. JCU Nguma-bada campus has historically had close links to community organisations who assisted with rehabilitation of Atika Creek, and benefited from student contribution to their rehabilitation projects. Directed environmental management of the campus has positive downstream relationships (both literal and metaphorical) through an aesthetically pleasing campus, clean waters flowing from the campus through downstream communities, and setting an example of positive environmental management.

The NAMP allows JCU to build better linkages with external stakeholders through the development of collaborations and partnerships that have mutual benefits for both parties. The diversity of natural assets on the Cairns Nguma-bada campus provides opportunities for JCU to work with businesses and organisations to develop a range of technologies and best

practice examples in environmental management. This will not only benefit industry but also expose students and staff to hands-on experience in innovative practices, preparing them for the workforce.

It is critical that the University demonstrates good corporate citizenship and acts as a responsible and proactive landholder and neighbour. Historically, local community support led to the purchase of JCU's Lot 13 when it was earmarked for subdivision and development. Local community groups have been involved in rehabilitation plantings along Atika Creek during the early life of the Cairns Campus. The interaction between JCU, its neighbours and the wider community is of great importance not only for the natural environment but the success and public perception of the University itself.

Economic benefits can be clearly defined especially in the areas of sediment and erosion control, pest and weed management and riparian and waterway protection. Well managed natural assets provide a range of ecological and social services and benefits, and minimise the risk of significant environmental damage and associated high costs to repair. Additional economic benefits are expected to flow through attracting new students to our unique and biodiverse campus and the associated courses that link with management and enhancement of these assets. The campus should also be a place for the community to experience the natural assets, while ensuring that high quality buildings, infrastructure and recreational facilities support the visitor experience and integrate seamlessly with the campus' natural assets

Funding and Resources

Current funding for natural asset management is inadequate to address the NAMP objectives. As a minimum, compliance with relevant legislation should be achieved, and this may require additional funding, particularly in relation to weed and pest management obligations. Significant additional resources and funding will be required to ensure the campus can reach its vision to be a world leader in natural asset management for the wet tropics. Current funding allocated to natural asset management comes from the Environmental Maintenance budget within the Estate Directorate and provides \$40,000 annually across the Townsville Bebegu Yumba and Cairns Nguma-bada campuses. This is currently used primarily at the Townsville campus to undertake some weed and pest management, erosion control and revegetation works on a very small scale. A significant increase in funding is required to meet the objectives of the Cairns NAMP and ensure the natural assets on campus are effectively managed.

Due to the nature of its operations, much of the work can be done at relatively low cost by utilising the resources of the university and developing mutually beneficial partnerships and collaborations with external groups and businesses. Many of the actions identified have the potential to link with curriculum and research in order to undertake on-ground projects that benefit both the campus and the students. This has been particularly successful at the Townsville campus with thousands of hours of student volunteer work against NAMP activities through the TropEco Interns program. Although priority for planning and development of projects should be given to JCU students, opportunities exist to link

with local community organisations to assist with projects such as tree planting and waterway restoration.

The amount of funding allocated to the NAMP will significantly affect the outcomes and condition of the campus' natural assets. JCU must weigh up both the benefits of undertaking the program with adequate funding and the risks in not investing in such a program. Where funding becomes available to undertake specific programs that provide benefit to the university's natural assets, and aligns with the objectives of the NAMP, JCU may look to pursue it. Funding applications should look to partner with external organisations where mutual benefits are evident, at the discretion of JCU.

Potential funding avenues identified include:

- National Landcare Program and other State and Federal environmental grants
- Skilling Queenslanders for Work program
- Indigenous Rangers program (in collaboration with local Indigenous groups)
- Opportunity to attract ecotourism students with holiday courses on campus
- Funding to improve the sustainability of recreational facilities (e.g. Mountain bike tracks)
- Corporate funding

Stakeholder Engagement and Participation

Workshops were held with key JCU and external stakeholders to discuss the development of the relevant sections of the NAMP and include feedback from all attendees as well as others that could not attend the workshops. The workshop participants developed a list of actions and activities that should be undertaken under each section of the NAMP that formed the six goals and these have been tabulated as action plans. Due to the number of actions identified and the limited resources required to undertake these actions, only actions that are deemed achievable and of high priority have been included in the NAMP.

There are a wide range of stakeholders that are critical to the successful development and on-going implementation of the NAMP. Relevant stakeholders have been listed against relevant actions in the action plan sections, and stakeholder details have been mapped. Additional stakeholders will be added to future revisions as the NAMP develops.

Relevant Legislation and Information

JCU is required to comply with various federal, state and local government legislation and regulations in its management of the campus' natural assets. This includes but is not limited to areas such as waterway management, cultural heritage protection, flora and fauna protection, biosecurity, sediment and erosion control and sustainable development. Relevant legislation is listed in Appendix 1.

Stakeholders were asked to provide any information such as reports, studies, management plans, strategies or other documentation that would be useful to inform the plan both at JCU and as a catchment wide approach. In particular, any research, surveys or reports in relation to work

that had been conducted previously on the campus or in the local area. It was noted that there is very little information available in this regard but some past documentation is available and is included in the relevant table under each goal.

Action Plans

An action plan has been developed for each goal of the NAMP. The action plans identify specific actions that should be undertaken toward the achievement of each goal of the NAMP within the resources available. A total of 51 actions have been identified from the 2019 Cairns Master Plan and the stakeholder engagement workshop. Due to the number of actions in the plan and limited resources currently available, the actions have been prioritised so that current available resources could be utilised for high priority actions. Any additional funding that would be made available would be channeled into the implementation of medium and low priority actions once the high priority actions are completed.

Monitoring and Evaluation

The NAMP is designed to be a living, flexible document. The NAMP should be reviewed and progress recorded annually with a full review and update every three years. Action plans should be reviewed by the implementation team, with completed actions recorded and reported against, and new actions identified as the plan matures. In developing the action plans under each goal of the NAMP it is important that monitoring and evaluation for each action is clearly defined and measurable so that progress can be identified. It is important that the NAMP is supported by senior management at JCU, in particular the Sustainability Advisory Committee and the Estate Directorate, and appropriate resources are allocated to ensure the campus can meet the objectives of the NAMP.

Goal One of Cairns Natural Assets Management Plan

“Maintain and protect cultural assets within the wider catchment of Cairns campus and build and improve upon the knowledge base and capacity of JCU staff and students for a collaborative whole-of-community development”

Cairns campus’ Indigenous Australian and contemporary cultural heritage is linked to its natural assets. Maintaining and protecting the known cultural heritage for future generations is contingent upon understanding the history of the campus and its wider landscape through local indigenous knowledge and practices. Sharing knowledge on the relevance of the campus’ natural assets and the wider landscape to Indigenous and contemporary cultural heritage is vital to the sustainability of the known cultural heritage. Through teaching, research, and university-community collaboration activities, JCU Cairns seeks to maintain, protect, re-establish, and pass on Indigenous and contemporary cultural heritage associated with the campus’ natural assets.

1.1 Cultural Heritage Maintenance and Protection

1.1.1 Objectives for Cultural Heritage Maintenance and Protection

The key objectives for Cultural Heritage under the NAMP are:

- Document the campus’ Indigenous Australian and contemporary cultural heritage in relation to its natural assets
- Ensure the plan involves and is guided by local Indigenous groups and all documented information and actions are fully endorsed by an agreed working group that represents all relevant stakeholders
- Provide an understanding/narrative of the Indigenous story/history of the campus and the wider landscape at a high level

- Protect and enhance the cultural heritage of the campus in relation to the natural assets/environment
- Encourage inclusion of Indigenous cultural heritage and contemporary heritage in the development of the campus master plan refresh where appropriate
- Enable local Indigenous knowledge and practices to be passed on, undertaken or re-established on campus

1.1.2 Scope

The campus’ natural assets and the wider landscape and its relevance to Australian Indigenous cultural heritage and contemporary cultural heritage.

Table 0.1 Relevant Information related to Cultural Heritage

Document/information source	Author/Contact	Comments
Aerial imagery	https://qimagery.information.qld.gov.au/	Aerial photography of Smithfield dating back to 1951.
Department of Defence	National Switchboard 1300 333 362	Enquiries regarding use of the area as a bombing range during World War II, and issues with unexploded ordinance.

1.1.3 Management Practices and Procedures

Currently no management practices are in place for environmentally related management of cultural heritage. However, the NAMP action plan will aim to address this. JCU is required to comply with relevant legislation including:

- [Aboriginal and Torres Strait Islander Act 2005](#)
- [Aboriginal Cultural Heritage Act 2003](#)
- [Native Title Act 1993](#)

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

Table 0.2 Cultural Heritage Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
1.1	Consultation with Traditional Owners	Commence talks with Traditional Owner groups to develop reference group for cultural heritage and environmental management for the campus and wider catchment.	NA	High	Members willing to meet regularly to develop cultural heritage plan and advance actions	Nil	N/A	<ul style="list-style-type: none"> Local Traditional Owners – Djabugay, Yirrganydji, Gimuy Yidinji Indigenous Education and Research Centre The Cairns Institute Estate Directorate Gavin Singleton WTMA 	Oct 2021	Apr 2022	Reference group developed and meeting regularly
1.2	Develop process to ensure appropriate management of cultural heritage on campus e.g. artefacts, significant sites	Work with TOs to understand significance of campus site to cultural heritage and understand needs of TOs in management of land to preserve and document cultural heritage.		High	Reference group to engage with TOs to develop processes.	Nil	NA	<ul style="list-style-type: none"> Local Traditional Owners - Djabugay, Yirrganydji, Gimuy Yidinji WTMA IERC TCI Estate Directorate 	Oct 2021	Apr 2022	Process developed and relevant information documented through TO engagement
1.3	Develop eco-cultural learning areas along Atika Creek for TO engagement and tours	Spaces to be used by Yirrganydji Traditional Owners to provide education and tours at JCU, such as NAIDOC week, Reconciliation week, O-Week, conference side events and cultural education tours.	Indigenous studies	High	Suitably designed places to conduct tours for; bush foods and medicines (ie. Sapwood, Jamjam); comfortable familiar learning environment.	\$10,000	Nil	<ul style="list-style-type: none"> Yirrganydji Traditional Owners Estate Directorate TCI ATH 	Oct 2021	Dec 2022	Suitably designed spaces made available for TO education
1.4	Establish plantings of culturally significant native flora species	Establish as part of rehabilitation activities to enhance the green corridors on campus and enhance TO education, in line with the Cairns campus master plan.	Indigenous studies; Ecology; Sustainability	High	Access to purchase relevant plant species to include in broader revegetation program.	\$10,000	\$5,000	<ul style="list-style-type: none"> Local Traditional Owners - Djabugay, Yirrganydji, Gimuy Yidinji Estate Directorate Terrain CRC Kuranda Envirocare 	Oct 2021	Dec 2022	Number of trees planted
1.5	Develop Traditional Owner signage and monuments on campus	Traditional Owner signage and monuments (ie. Artists – designs on pavement) to provide education and awareness of cultural and environmental values of the JCU campus and region. Complementary to existing signage created at the initiative of Johanna Kloot, displaying photographs by Tom Cook and words by Gavin Singleton and Gerry Turpin.	Indigenous studies	Medium	Reference group and TOs to liaise with relevant departments within JCU to develop broader plan further.	TBA	TBA	<ul style="list-style-type: none"> Local Traditional Owners - Djabugay, Yirrganydji, Gimuy Yidinji Indigenous Education and Research Centre The Cairns Institute Estate Directorate Gavin Singleton 	Oct 2021	Dec 2022	Signage and artworks planned and implemented in collaboration with TOs
1.6	Map cultural use plants on campus with ATH tree mapping activities and include in JCU GIS system	GIS mapping of cultural use plants undertaken in collaboration with TOs to assist with future trail development and educational resource development. This will add to and complement existing differential GPS mapping undertaken in 2013.	Indigenous studies; GIS	Medium	TOs, staff and students to undertake mapping and record relevant data	\$5,000	TBA	<ul style="list-style-type: none"> Local Traditional Owners - Djabugay, Yirrganydji, Gimuy Yidinji ATH Gerry Turpin Estate Directorate 	Jun 2022	Dec 2022	Mapping completed and stored in the GIS database

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
1.7	Where appropriate, record traditional stories linked to the JCU campus in collaboration with TOs	Understating of the university's place in, and importance to, the Traditional Owners perspective. Development of narrative for the campus and wider landscape to help people understand Place.	Indigenous studies; Arts	Low	Recording of relevant stories with TOs permission and development of documentation and media to share story of Place.	TBA	TBA	<ul style="list-style-type: none"> • Local Traditional Owners - Djabugay, Yirrganydji, Gimuy Yidinji • IERC • TCI • WTMA 	Jun 2022	Jun 2023	Narrative/s documented and communicated. Understanding of TO permissions of usage for each story.

1.2 Knowledge Sharing, Capacity and Community Development

1.2.1 Objectives for Knowledge Sharing, Capacity and Community Development

The key objectives for Knowledge, Capacity and Community Development under the NAMP are:

- JCU Cairns Campus to be a leader in good community citizen.
- Draw on internal and external expertise by utilising the natural assets of the campus to build the capacity of students, staff and the local and wider community for best practice natural asset management for the wet tropics.
- Openly share knowledge on natural asset management both internally and externally through place-based learning and on-ground activities.
- Ensure that JCU, local and wider community feels welcome to participate in knowledge sharing and capacity building activities at JCU related to natural asset management, through inclusive and accessible events and activities.
- Make existing knowledge of the campus’s natural assets easily and freely available to staff, students and the wider community.

1.2.2 Scope

The JCU, local and wider community.

Table 0.3 Relevant Information related to Knowledge Sharing, Capacity and Community Development

Document/information source	Author/Source	Comments
Treeforce	Lisa O’Mara www.treeforce.org.au	Community based tree planting organisation.
SGAP Cairns Branch	secretary@sgapcairns.org.au	Community based organisation with a strong interest in the propagation and promotion of native plants.
Cairns Regional Council		Possible source of locally-source planting stock

1.2.3 Management Practices and Procedures

No management practices or procedures currently exist in relation to this section.

Table 0.4 Knowledge Sharing, Capacity and Community Development Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
1.8	Develop a number of on-ground projects through TropEco to engage and involve the JCU and local community	TropEco to develop and implement 2-3 key projects designed to engage and involve JCU and wider community. TropEco Interns and or WIL students to play a key role in design and implementation of projects alongside TropEco staff.	Indigenous studies; Arts; Ecology; Sustainability	High	Interns/WIL placement students, funding for projects and materials.	\$10,000	\$2000	<ul style="list-style-type: none"> Estate Directorate TropEco Community garden team DTES 	Jan 2022	Dec 2022	Number of projects completed and outcomes of projects
1.9	Promote the campus' natural assets to students, staff, industry and the wider community and encourage active involvement in relevant environmental activities	Active promotion of the campus' unique natural assets and encouraging involvement in relevant activities through effective communication tools.	NA	High	Development of effective communications materials for relevant activities	\$5000	Nil	<ul style="list-style-type: none"> TropEco Students Staff Local Traditional Owners Community garden team CRC Terrain Industry partners JCU Marketing 	Jan 2022	Jun 2022	<ul style="list-style-type: none"> Development of comms materials Engagement through social media Attendance at relevant events
1.10	Review existing Discover Nature platform and investigate opportunities to refresh	Continue to use and promote JCU Discover Nature (or its successor) as the focal point for sharing of knowledge of the campus's natural assets and their management	NA	High	Intern/WIL student to undertake review. Liaison with JCU web management team. Expert input into current and new content.	Nil	N/A	<ul style="list-style-type: none"> TropEco ATH A Prof Betsy Jackes JCU web management team 	Jan 2022	Dec 2022	<ul style="list-style-type: none"> Review and update of Discover Nature completed
1.11	Seek external partners and funding opportunities for high profile environmental restoration projects on campus and within catchment area. e.g Rainforest to Reef – restore connectivity of catchment	Develop list of priority projects for external funding at the campus and catchment scale. Work with stakeholders to develop mutually beneficial partnerships to increase likelihood of funding. See the campus and catchment as a living-laboratory to provide best practice, place-based learning, teaching and research opportunities.	Ecology; Sustainability; Env. Management	Medium	Dependent on projects	TBA	Nil	<ul style="list-style-type: none"> Local Traditional Owners CRC Terrain Industry partners Federal Government State Government Kuranda Envirocare TCI ATH 	Jan 2022	Dec 2023	<ul style="list-style-type: none"> Project plans developed for viable projects Partnerships developed Funding received
1.12	Develop opportunities for students to undertake volunteer placements, training and research in environmental management with external organisations	Liaise with external organisations to develop list of opportunities for environmental management placements, training and research	Indigenous studies; Ecology; Env. Management	Medium	Time to liaise with stakeholders and develop list	Nil	NA	<ul style="list-style-type: none"> JCU W.I.L team CRC Terrain Kuranda Envirocare ATH WTMA QPWS 	Jan 2022	Jun 2022	<ul style="list-style-type: none"> List developed Volunteer placements made
1.13	Establish group of key stakeholders to work on catchment wide approach to environmental management	Develop advisory group with key stakeholders to meet regularly and develop actions to restore the catchment's environmental assets	NA	Low	Stakeholder time. Funding to implement actions arising from group.	TBA	Nil	<ul style="list-style-type: none"> Local Traditional Owners CRC Terrain Kuranda Envirocare ATH TCI Estate Directorate 	Jan 2022	Ongoing	Group established and active

Goal Two of Cairns Natural Assets Management Plan

“Identify, protect, and maintain at ecologically sustainable levels native fauna and their associated habitats on campus”

Native animals are very important for their ecological services. Of particular importance is the role these animals play in teaching, learning and research within and around the Cairns campus. However, native wildlife is faced with threats including new developments, vehicle interactions, and interactions with students, staff, and visitors. Identifying key species and their status will help to set priorities for Cairns campus master plan refresh. This will also help to strategically protect and maintain the known species and their habitats for continued flow of environmental and educational benefits to the campus and its associated surroundings.

2.1 Objectives for Native Fauna and Habitat Protection

The key objectives for Native Fauna and Habitat Protection under the NAMP are:

- Protect native fauna and enhance their associated habitat on campus, including enhancement of green corridors
- Support the protection and enhancement of green corridors downstream of campus
- Ensure native animal populations are maintained at ecologically sustainable levels
- Improve understanding of native animal species and habitat on campus
- Identify key species (including endangered, vulnerable and near threatened species) and their habitats to inform the campus master plan refresh
- Identify priority areas of habitat to protect and enhance
- Take a whole-of-catchment approach to fauna management

2.2 Scope

All native animal species on campus and their associated habitat.

Table 0.1 Relevant Information related to Native Fauna and Habitat Protection

Document/information source	Author	Comments
-----------------------------	--------	----------

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

Environmental Reports - Biodiversity and Conservation Values	Department of Environment and Heritage Protection	Lists threatened and priority species found within 4km of campus. Available online from DEHP website.
Discover Nature - Fauna section	JCU	Lists species found on the Cairns campus.
Atlas of Living Australia	Atlas of Living Australia website	Comprehensive database that lists species occurrence records for the campus including dates and locations.
Birds Australia	Database extract.	93 bird species observed on campus.

2.3 Management Practices and Procedures

Management of native wildlife and associated habitat on campus is currently minimal with legislative compliance the main objective. The Estate Directorate is responsible for wildlife management. The NAMP will help to create specific management practices and procedures for native animal management on campus and improve the current baseline management activities.

The major identified threats to native wildlife and habitat on campus are from new developments, grounds maintenance, vehicle interactions and interactions with students, staff and visitors.

A set of procedures are required to provide guidance on minimising impact on native wildlife and habitat on campus. These will be developed as separate documents to the NAMP but will be referenced in future updates of the NAMP once completed.

Procedures required include:

- General grounds maintenance procedures for protection of native animals and habitat.
- Construction environmental management plan - native animal protection included in design guideline requirements – completed.

- Wildlife handling/relocation procedure for native animals commonly found in buildings, or where trees/habitat needs to be removed (such as reptiles, possums, birds and bats).
- Species management plans for commonly impacted, rare, threatened or problematic species.
- Permanent or temporary signage to enhance awareness and protection of ground nesting birds (i.e. masked lapwings and bush thicknees).

Where possible, the Estate Directorate should work closely with academics and local experts to develop species management plans and implement the actions of the NAMP in relation to native animal and habitat protection and embed activities into teaching, learning and research.

Table 0.2 Native Fauna and Habitat Protection Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
2.1	Undertake camera trap fauna surveys on campus	Undertake camera trap surveying to better understand and manage the mammals and other animals on campus. Explore linkages between Saddle Mountain and Campus.	Ecology	High	Camera traps Staff/student interns to implement	\$1,000	\$1000	<ul style="list-style-type: none"> Estate Directorate CSE - Ecology TropEco Interns 	Oct 2021	Ongoing	<ul style="list-style-type: none"> Number of photos taken Species diversity Uploads to iNaturalist
2.2	Ensure revegetation projects consider fauna habitat enhancement and connectivity	Revegetation can have a significant impact on the diversity and types of fauna species inhabiting an area. Future revegetation projects on campus should ensure species are selected to improve native wildlife habitat and diversity, and ensure food resources (e.g. fruit, flowers) are available year round, ensure connectivity and reduce populations of undesirable or out of balance fauna species.	Ecology; Env. management	High	Input from ecology experts	Nil	Nil	<ul style="list-style-type: none"> TropEco CSE – Ecology Estate Directorate 	Oct 2021	Ongoing	<ul style="list-style-type: none"> All revegetation projects consider impact on fauna species Revegetation projects enhance fauna habitat connectivity
2.3	Ensure that developments and general grounds maintenance do not impact negatively on campus fauna and their habitats	Developmental activities and grounds maintenance should follow guidelines for the protection of fauna located within the activity area. Where faunas are to be relocated, ensure appropriate measures are put in place to prevent any harm to the animals and the people involved in the relocation process.	NA	High	Persons involved; equipment and tools to be used; expert knowledge	NA	NA	<ul style="list-style-type: none"> Estate Directorate 	Oct 2021	Ongoing	<ul style="list-style-type: none"> Guidelines for maintenance activities in fauna habitat developed Guidelines for relocation of fauna developed
2.4	Collate historical fauna survey data	Collate data from historical ecology research activities relating to fauna to inform future research activities and campus planning	Ecology	Medium	Student to collate data	Nil	Nil	<ul style="list-style-type: none"> TropEco CSE – Ecology Estate Directorate Birds Australia (office located in E2:118) 	Jan 2022	Jun 2022	<ul style="list-style-type: none"> Review undertaken and information collated on historical data
2.5	Conduct review of EVNT species on the campus and develop management plans for any species identified	Endangered, vulnerable and near threatened species that may occur on campus should be documented and where appropriate, management plans implemented to protect or encourage reestablishment of the species on campus.	Ecology	Medium	Student to review EVNT species and complete report	Nil	Nil	<ul style="list-style-type: none"> TropEco TropEco Interns CSE – Ecology DES 	Jan 2022	Dec 2022	<ul style="list-style-type: none"> EVNT review completed Management Plans developed for relevant species
2.6	Conduct survey of aquatic fauna during wet season flows.	Atika Creek flows continuously for several months during the wet season. During this period, tortoises, fish and crustaceans have been observed. Baseline assessments of aquatic vertebrate and macroinvertebrate are needed to identify the wildlife present in Atika Creek, and the habitat requirements of these species. At a minimum, water quality needs to be protected to protect these native faunas. Aquatic macroinvertebrate assessments are a standard ecological measure of water quality.	Ecology	Medium	Tropwater to undertake baseline assessment with assistance from students.	Consult with TropWater.		<ul style="list-style-type: none"> Tropwater 	Dec 2021	Apr 2022	<ul style="list-style-type: none"> Aquatic surveys undertaken and species listing created Water quality assessed

Goal Three of Cairns Natural Assets Management Plan

“Ensure efficient and effective management of native vegetation on Cairns campus to enhance contiguous connectivity with adjacent flora to improve ecosystem services and other vegetation functions”

Green corridors on Cairns campus host varieties of fauna with both the flora and fauna playing vital roles in teaching, learning, research, ecosystem services, ecological restorations, and tourism on campus. Management of campus native vegetation will ensure that existing fauna are sustained. Regular monitoring and mapping of campus vegetation will provide insight into the status of significant vegetation species and communities and bio-conditions of priority areas. This will help ensure that the campus master plan is developed at ecologically sustainable scale. Surveying and mapping of green corridors is essential for identifying potential habitats for maintenance, restoration, and protection and this will consequently enhance fauna movement. Surveying and mapping native vegetation will also aid in the identification of indigenous vegetation species used for indigenous learning and cultural activities to promote indigenous engagement on campus. Sustainability and effective management of native vegetation on Cairns campus requires researcher-student-staff engagement approaches including:

- Students’ engagement in GIS mapping of vegetation on campus.
- Linking research and curriculum opportunities for campus vegetation management through students’ projects.
- Software development for automatic identification and monitoring of plant species health and campus vegetation cover change.

While internal management procedures are ensured, the NAMP will also assist in identifying opportunities for collaboration with not-for-profit organizations and local communities to undertake native vegetation management activities including revegetation works.

3.1 Objectives for Native Vegetation Management

The key objectives for Native Vegetation Management under the NAMP are:

- Maintain and enhance contiguous connectivity for native vegetation on campus and adjacent land to provide ecosystem services and effective green corridors for native fauna
- Maintain and enhance native vegetation on campus for learning, teaching and research, including Indigenous engagement, flora mapping, community engagement and ecotourism opportunities
- Demonstrate best practice in native vegetation management and use this to inform the campus master plan
- Ensure no impact on significant flora (or fauna) species and communities through development of the campus master plan

3.2 Scope

Native vegetation on campus with a primary focus on natural areas. However, landscaped areas will be included in this section in conjunction with the campus landscaping plan.

Table 0.1 Relevant Information related to Native Vegetation Management

Document/information source	Author/Source	Comments
Flora surveys – Smithfield Conservation Park	Cairns Regional Council (Leah Nugent).	Surveys undertaken for QPWS and Cairns Mountain Bike Club
Discover Nature - Flora section	JCU	Lists flora species found on the Cairns campus.
Atlas of Living Australia	Atlas of Living Australia website	Comprehensive database that lists species occurrence records for the campus including dates and locations. Many of the specimens on which these records are based are held at the ATH.
Matters of State Environmental Significance	Department of Environment and Heritage Protection	Lists significant vegetation areas found on campus. Available online from DEHP website or from Manager, Environment.
Regional Ecosystems report	Department of Environment and Heritage Protection	Lists broad regional ecosystems found on campus. Available online from DEHP website or from Manager, Environment.
Cairns Campus flora mapping	iNaturalist	
Australian Tropical Herbarium	Bob Jago, Geoff Tracey, Anton van der Schaans, Betsy Jackes, Andrew Small, Kylie Freebody, Tony Roberts, Stuart Worboys	Since 1995, several formal and informal flora surveys have been undertaken on Cairns Campus. Results of these have been compiled and are freely available from the Australian Tropical Herbarium. The list currently comprises 348 species, including cultivated, native and weedy plants.
Vegetation Management Act	Queensland Government	Regulates management of remnant and regrowth vegetation

3.3 Management Practices and Procedures

The Estate Directorate is responsible for vegetation management in natural and landscaped areas at JCU. The Cairns campus is situated on an old sugar cane farm and most of the campus was previously cleared for farming. The campus currently contains approximately 43 hectares of unmaintained areas, which contains a mix of regrowth native vegetation, some remnant vegetation and previously cleared areas with significant weed intrusion. Many areas along Atika Creek and its tributaries have been rehabilitated through the efforts of student and community organisations. Current management of these areas is minimal, with some ad-hoc weed management undertaken and a small amount of historical revegetation occurring in riparian areas. Much of the remnant and regrowth areas are in relatively good condition with the major threats being weed infestation and development influences. Disturbed areas commonly contain a combination of weed species and pioneer native species and require significant resources to rehabilitate and return these areas to good condition.

Relevant procedures will be developed to assist in the management of native and rehabilitated vegetation on the campus (see Action Plan) and a planting list will be developed to inform future revegetation programs and landscaping projects that want to incorporate endemic native species.

A key component of this section of the NAMP will be mapping of regional ecosystems on a smaller scale (to the Department of Environment and Heritage Protection mapping). This will help to inform campus master planning by identifying significant vegetation species and communities, and ensuring ecologically sustainable development of the campus going forward. Maintenance and improvement of green corridors on campus is essential for fauna movement and will also be a high priority for this section of the NAMP.

Collaboration with the Australian Tropical Herbarium will be a key activity of this section of the NAMP and existing collaborations on advice on species suitable for use in native vegetation rehabilitation, tree mapping, vegetation mapping and arboretum development should be expanded.

A Tree Protection Procedure is currently being developed that will sit under the NAMP for the Cairns and Townsville campuses and will provide direction on the process for protection and removal of trees on JCU land.

Table 0.2 Native Vegetation Management Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
3.1	Develop maintenance procedure for vegetated areas in landscaped areas of campus	Maintenance procedures to be developed for vegetation areas in landscaped/ maintained areas of campus to ensure best practice management and retention of suitable flora species	NA	High	Time to develop procedure	Nil	NA	<ul style="list-style-type: none"> Estate Directorate Allan Dale 	Oct 2021	Apr 2022	Procedures developed and implemented by Estate
3.2	Develop revegetation projects through TropEco and in collaboration with relevant academics and local organisations	Work with partner organisations for mutually beneficial outcomes through development of prioritised, high-profile revegetation projects on campus and in the broader catchment as an example of best practice catchment management. Ensure community engagement is a key activity by providing opportunities for the JCU and wider community to volunteer, undertake training and be involved in projects.	Sustainability	High	<ul style="list-style-type: none"> Plan development and stakeholder engagement by staff member. Funding to undertake projects. 	Project dependent	Nil	<ul style="list-style-type: none"> CRC Native Plant Nursery Kuranda Envirocare TropEco Interns DTES – CSE ATH Estate Directorate CMBC 	Oct 2021	Ongoing	<ul style="list-style-type: none"> Number of projects undertaken (each project to have specific M&E targets) Number of people engaged Number of trees planted Land area restored Funding received
3.3	Ensure protection and enhancement of endangered regional ecosystem	Undertake assessment and establish plan to protect and enhance endangered regional ecosystem. Understand TMR and CRC future plans for transport corridor.	Ecology	Medium	ATH engaged to undertake assessment and develop plan for protection and enhancement of RE	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate CRC TMR ATH 	Jun 2022	Dec 2022	<ul style="list-style-type: none"> Assessment undertaken Plan for protection and enhancement completed
3.4	Work with partner organisations and students/TropEco Interns to collect native seeds on campus and develop seed banks	Students to gain on-ground experience in plant identification, seed collection and storage, and propagation techniques through volunteering with support from local organisations such as Cairns Regional Council and Kuranda Envirocare.	Ecology Botany Sustainability	Medium	Time from local organisations to assist on campus	Minimal	Nil	<ul style="list-style-type: none"> CRC Native Plant Nursery Kuranda Envirocare TropEco Interns ATH DTES – CSE 	Jun 2022	Ongoing	<ul style="list-style-type: none"> Number of activities undertaken Number of students involved Number of seeds collected Diversity of species
3.5	Recognise the historical contributions of student and community organisations to the rehabilitation and landscaping of the campus.	Various organisations (e.g. Wet Tropics Tree Planting Scheme, student conferences) and individual students have contributed to rehabilitation of vegetation on JCU Cairns Campus over the years. These contributions should be acknowledged and mapped.	NA	Low	Time to map contributions – record on JCU GIS and in NAMP update	Nil	N/A	<ul style="list-style-type: none"> Alumni 	Jun 2022	Dec 2022	Map forms part of the NAMP

Goal Four of Cairns Natural Assets Management Plan

“Control and manage pest and weed on Cairns campus for environmental sustainability”

Invasive weeds and animal pests on Cairns campus have several negative impacts on the campus’ natural assets as well as the people and the infrastructure. These impacts are further extended to the wider catchment. Weed control, pest control, and maintenance of quality biosecurity practices are extremely important for the campus due to its proximity to the Wet Tropics World Heritage Area and the downstream Cattana Wetlands and Great Barrier Reef World Heritage Area.

4.1 Pest Management

Monitoring pest management activities (including research) on the Cairns campus will offer insight into best practices for controlling invasive species. These practices could be beneficial to the wider community.

4.1.1 Objectives for Pest Management

The key objectives for Pest Management under the NAMP are:

- Control and manage pest animals to minimise impacts on the campus’ natural assets and mitigate harm to all JCU personnel, research and infrastructure.

- Provide opportunities for learning, teaching and research in relation to pest animal management on campus, where appropriate

4.1.2 Scope

- Control of pests that have a negative environmental impact on campus
- Monitoring environmental impacts of pest animals on campus
- Research opportunities on pest animal management

Table 0.1 Relevant Information related to Pest Management

Document/information source	Author/Source	Comments
Feral Cat information page	Department of Agriculture and Fisheries	Includes links for fact sheets, guidelines and control methods
Indian Myna information page	Department of Agriculture and Fisheries	Includes links for fact sheets, guidelines and control methods
Cane Toad information page	Department of Agriculture and Fisheries	Includes links for fact sheets, guidelines and control methods
Declared animals of Queensland	Department of Agriculture and Fisheries	General information on declared pests for Queensland
Pigs		
Pest Management Plan 2015-2018	Cairns Regional Council	
Tramp Ants (both electric ants and yellow crazy ants)	Wet Tropics Management Authority, Lori Lach (DTES)	For more information visit: https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/health-pests-weeds-diseases/pests/electric-ants

4.1.3 Management Practices and Procedures

Pest control and maintenance of quality biosecurity practices is extremely important for the campus due to the proximity to the Wet Tropics World Heritage Area and the downstream Cattana Wetlands and Great Barrier Reef World Heritage Area. Adequate resources should be provided to

ensure JCU demonstrates best practice in biosecurity management of the campus for both pest control and weed control.

There are currently no regular pest management regimes undertaken on the Cairns campus. Ad-hoc pest management is conducted for wild pigs and additional species as required and in line with relevant legislation and local management strategies.

- **Feral dog management**

Feral dogs are a restricted invasive animal under the Biosecurity Act 2014 and thus JCU has a legislated obligation to undertake control programs to manage populations on campus. Historically there has been minimal presence of feral dogs on campus so no recent trapping programs have been undertaken. Where there is a need to undertake wild dog management on campus the procedure from the Townsville campus NAMP will be implemented.

- **Feral pig management**

Feral pigs are a restricted invasive animal under the Biosecurity Act 2014 and thus JCU has a legislated obligation to undertake control programs to manage populations on campus. Feral pigs are known to be present on the campus and in the adjacent Smithfield Conservation Park and some trapping has been undertaken in collaboration with Cairns Regional Council (CRC) in recent years. A regular trapping program and procedure should be established in collaboration with CRC as part of the NAMP.

- **Electric ants and other tramp ants**

Electric ants have been identified as present on campus in recent years, with control programs undertaken by Biosecurity Queensland at JCU and

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

in the wider region to control this invasive species. Electric ants are category 1 restricted matter under the Biosecurity Act 2014. Under the Act, all Queenslanders have a general biosecurity obligation (GBO) to manage biosecurity risks and threats that are under their control, they know about or they are expected to know about.

Figure 0.1 shows the Electric ant biosecurity zone map for the JCU Cairns campus.

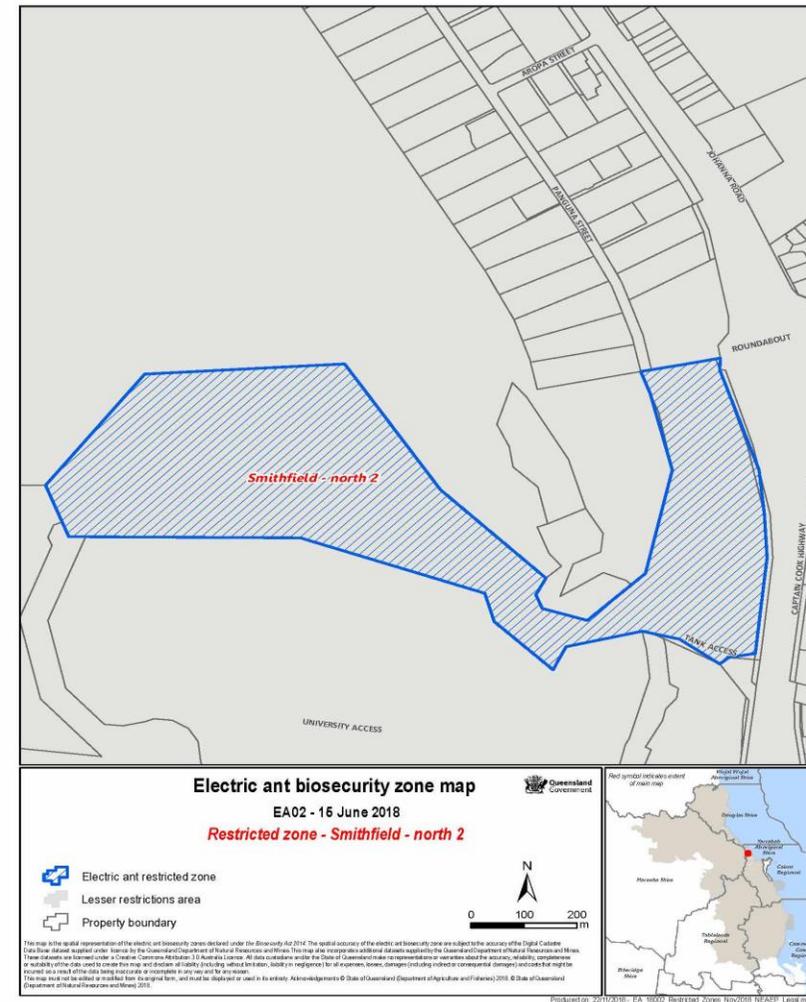


Figure 0.1 Electric ant biosecurity zone map for JCU Cairns campus

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

There are restrictions on the movement of materials that can carry electric ants within the electric ant biosecurity zone. Electric ant carriers include, but are not limited to:

- soil
- potted plants
- cuttings from plants
- fruit from plants
- a thing that has come into contact with the ground (e.g. bee hives, pot plants, garden furniture)
- turf
- mulch
- baled hay or straw
- composted materials
- animal manures
- material that is a product or by-product of mining or quarrying.

When moving electric ant carriers from a property within the restricted zone of the electric ant biosecurity zone, JCU must comply with relevant movement controls.

You must hold a biosecurity instrument permit, which allows you to move an electric ant carrier:

- between properties within the restricted zone, or
- from a property within the restricted zone to a property outside of the restricted zone.

To request a biosecurity instrument permit, complete the request form or phone Biosecurity Queensland on 13 25 23. A permit is not required if the electric ant carrier is moved to an approved waste facility listed in the following table. For more information on Electric ants please visit the [Queensland Government Electric Ant website](#).

- **Other pest animal species**

Other pest animal species that require active management will be identified and procedures developed in the first year of the NAMP. Links to procedures will be provided in this section of the NAMP and made available online.

Table 0.2 Pest Management Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
4.1	Develop campus pest management plan, relevant procedures and prioritise target pests species	Management plan and procedures should be developed for target priority species and funding allocated to manage appropriately	NA	High	Time to develop plan and procedures. Funding to undertake management works	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate CRC WTMA Local Traditional Owners QPWS 	Oct 2021	Mar 2022	<ul style="list-style-type: none"> Development of plan and procedures Adequate funding to implement plan
4.2	Document monitoring and management strategy for Electric ants and ensure key stakeholders understand responsibilities for managing biosecurity controls on campus.	Electric Ants biosecurity strategy should be documented and made publicly available. Key stakeholders should be aware of strategy.	NA	Medium	Dependent on presence of Electric Ants on campus	TBA	TBA	<ul style="list-style-type: none"> CRC WTMA Dr Lori Lach Estate Directorate 	Oct 2021	Mar 2022	<ul style="list-style-type: none"> Electric Ants biosecurity strategy documented and publicly available. Key stakeholders aware of strategy.
4.3	Develop management plan and annual trapping program for feral pig management on campus in collaboration with Cairns Regional Council.	Continue to work with Cairns Regional Council on feral pig management and develop management plan and regular trapping program.	Ecology	Medium	Trapping contractors for annual program	TBA	\$2,000	<ul style="list-style-type: none"> Estate Directorate CRC WTMA 	Jan 2022	Ongoing	<ul style="list-style-type: none"> Incidents of pig sightings or rootings on campus or surrounding area Number of pigs trapped on campus

4.2 Weed Management

JCU envisions that control and management of invasive weeds will take a collaborative approach for the benefit of JCU staff and students, local communities, and external agencies, where possible. This collaborative approach may include the engagement of students and researchers in developing a cost-benefit analysis for weed treatment, with results being beneficial to students' career development and effective environmental management on campus. Local communities may also benefit from the adoption of simple cost-benefit technique for weed management developed on Cairns campus. The NAMP will provide guidelines to assist collaborative research on weed ID and control through AI, GIS, and remote sensing technologies with possible opportunities for curriculum refresh. Opportunities for external collaborations for weed control will also be sought where possible to ensure that best practice on campus is extended to surrounding catchments. The long-term goal of weed control on Cairns campus is to create a campus that is free of invasive and problem weeds.

4.2.1 Objectives for Weed Management

The key objectives for Weed Management under the NAMP are:

- Work with academics and external experts to utilise the latest technology to identify, map, prioritise, and effectively manage environmentally significant weeds, and showcase this to others
- Collaboratively develop biosecurity plans for problem weed species.
- Zone weed species together with bio-condition assessments to ensure that on-grounds control is carried out based on

prioritised objectives and effective monitoring is undertaken to assess the effectiveness of management activities

4.2.2 Scope

- All species recognised as environmentally significant weeds or potential weeds on campus
- All areas of campus and adjoining land

Table 0.3 Relevant Information related to Weed Management

Document/information source	Author/Source	Comments
Weed species information page	Department of Agriculture and Fisheries	List all relevant weed species in Queensland and provides fact sheets.
Pest Management Plan 2015-2018	Cairns Regional Council	
Discover Nature	JCU	Lists weeds for each campus
Australian Tropical Herbarium	JCU	Reference samples for weed species

4.2.3 Management Practices and Procedures

Weed control is a critical activity for the Cairns campus due to the proximity of the campus to the Wet Tropics World Heritage Area and downstream Cattana Wetlands. Weed management is undertaken by the Estate Directorate at JCU. There are a significant number of weed species located on the Cairns campus and a strategic approach is necessary to

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

combat the issue and reduce the ongoing costs to JCU of managing invasive weeds. Some species have been present for many years and have become well established on campus. JCU is required to actively manage Class 1 and 2 weed species found on campus. In addition to recognised Class 1 and Class 2 pest plants, the plan must take into account environmental weeds, not listed but which pose significant threats to natural values of the campus. A well-researched list of locally important environmental weeds can be found in Appendix G of the Cairns Regional Council Pest Management Plan 2015-2018.

Previously, management of weeds in natural areas on campus has relied on a member of grounds to identify and undertake control. While this has been somewhat effective for some species of weeds, the size of the task and lack of resources, along with the retirement of the grounds staff member after many years of service at JCU, has meant there is a lack of knowledge and on-ground work currently occurring with regard to weed management. This has been identified as a significant risk to JCU, both environmentally and economically, and the NAMP aims to address this issue by developing management plans and procedures and seeking resources to undertake weed control on priority species.

The action plan identifies the need to create a list of weed species to be managed on campus as well as prioritisation of weed species based on several important variables. This process will also draw on existing recognised control techniques where they exist, or develop JCU specific procedures if no effective control procedure is available. Known weed populations will be mapped on the JCU GIS. This will be done as a high priority so that on-ground works can be strategised with the resources available. Any weed control works undertaken will be recorded on the GIS so that monitoring of their effectiveness over time can be understood.

The next version of the NAMP will contain reference to the species specific control procedures and priority matrix for weed control.

The Estate Directorate currently has a casual staff member who is qualified to undertake weed control work. However, this position will not have the capacity to meet the requirements of the NAMP in their current position. Where additional work is required, JCU will look to outsource work to qualified contractors or train existing staff so they are qualified to carry out the work required. JCU has also invested in weed control equipment and appropriate PPE to ensure qualified staff have access to the required equipment necessary to undertake works.

Table 0.4 Weed Management Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
4.4	Develop weed management plan for campus	Identify weeds to manage on campus and prioritise with reference to CRC Biosecurity Plan and state and federal priorities. Develop management plan for control or eradication based on resources available.	NA	High	Development of plan by Estate staff Funding to undertake weed control works	\$50,000 per year	\$5,000 per year	<ul style="list-style-type: none"> Estate Directorate WTMA CMBC CRC Terrain DTES – CSE 	Oct 2021	Dec 2021	Management plan, priority list and procedures completed
4.5	Undertake GIS mapping of weed species on campus	Map existing infestations of priority weed species on campus (baseline) and follow up annually. Map treatment activities in GIS system to monitor success of program.	GIS Botany	High	Time to map weed species and treatment activities	Nil	NA	<ul style="list-style-type: none"> Estate Directorate DTES - CSE eResearch Terrain CRC WTMA CMBC 	Oct 2021	Ongoing	Mapping conducted annually Number of weed species mapped Success of treatment activities over time
4.6	Investigate opportunities for TAFE students to undertake weed management program on campus	Woody weeds could be controlled by TAFE students as part of their Conservation and Land Management course or chainsaw course.	TAFE course	Medium	Consultation with TAFE course coordinators Risk assessment	Nil	NA	<ul style="list-style-type: none"> Estate Directorate HSE TAFE course coordinator 	Jun 2022	Ongoing	Relevant practical weed management activities undertaken on campus

Goal Five of Cairns Natural Assets Management Plan

“Protect and manage waterway and riparian areas on Cairns campus to enhance ecological values and movement of terrestrial and aquatic fauna”

Riparian areas and waterways on the Cairns campus are a critical habitat for both flora and fauna species and require special management and protection to ensure campus’ natural assets are maintained. The Cairns campus has significant riparian areas that provide an important buffer between the developed campus and the Atika Creek, the main waterway on campus. These riparian areas help to filter sediment and nutrients, support significant native vegetation, and house important fauna communities.

Atika Creek and the other tributaries that flow into the creek hold significant cultural values to the local Indigenous groups and the creek’s fauna and flora are used for Indigenous education on a regular basis, including the Indigenous Arboretum Walk featuring culturally significant flora species and their local Indigenous uses. However ongoing investment is required to ensure the ecological values of the creek are maintained and enhanced. Three high impact areas that need to be prioritised and managed to ensure protection of Atika Creek water quality are related to:

- Management of the mountain bike trails,
- Sediment and erosion control for construction activities, and
- Management of water quality runoff from existing built up areas.

The Cairns campus NAMP aims to provide coordination and strategic direction on management of waterways and riparian areas which will inform the campus master plan to minimise any impacts from developmental and recreational activities on these critical areas and ensure they are sustainably preserved and enhanced.

5.1 Objectives for Waterway and Riparian Management

The key objectives for Waterway and Riparian Management under the NAMP are:

- Identify significant values of campus waterways and riparian areas for protection and raise awareness of the importance of waterways and riparian areas
- Ensure that waterways and riparian areas provide ecological connectivity (aquatic and terrestrial) and refuge for native plants and animals
- Ensure that waterway and riparian management strategies inform and align with campus master plan and catchment plans and maintain or enhance the quality of the ecosystem within the campus’ catchment
- Create accepted definitions for waterways and associated buffer zones on campus to ensure appropriate and ongoing protection of aquatic habitat and riparian zones
- Protect and enhance water quality leaving campus and entering the Great Barrier Reef

5.2 Scope

- All open waterways and associated flora and fauna within riparian buffer zones on campus
- Fish passage through extent of waterways on campus
- Erosion control in waterways
- Water quality

Table 0.1 Relevant Information related to Waterway and Riparian Management

Document/information source	Author/Source	Comments
Regulated Vegetation Management Map for the campus	Department of Natural Resources and Mines	Contains all waterways and stream level information
	Tropwater	Relevant expertise in water quality assessment, including measurement of physical and chemical

5.3 Management Practices and Procedures

Atika Creek starts in the Smithfield Conservation Park and runs through the heart of the campus, leaving the campus at the border to the Cook Highway. JCU complies with relevant legislation in regard to preserving buffer zones and undertaking works in waterways (i.e. Atika Creek), and has invested considerable resources in managing erosion, re-establishing riparian vegetation and removing weed species in Atika Creek and the associated tributaries.

No formal management plan has existed previously to manage Atika Creek's water quality. Effective management of the Mountain bike trails and effective sediment and erosion control for construction activities are two high impact areas that should be prioritised and managed to ensure protection of the creek water quality. The action plan outlines a number of actions that need to be taken to improve knowledge and baseline data so that effective management of the waterways and riparian areas can take place in coming years. As formal management practices and procedures are developed for this section, they will be added to the NAMP.

Table 0.2 Waterway and Riparian Management Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
5.1	Review and report on impacts of future campus developments on waterways	Work with Estate to review campus Master Plan to understand impacts of any proposed creek crossings and future buildings on waterways.	NA	High	Review of master plan and report on likely impacts	Nil	Nil	<ul style="list-style-type: none"> Estate Directorate Master Plan consultants DTES - CSE 	Oct 2021	Feb 2022	Master plan reviewed and report on likely impacts produced
5.2	Establish management responsibilities and requirements for campus waterways	Define who at JCU is responsible for management of waterways on campus. Establish set of requirements and actions for effective management in collaboration with Allan Dale.	NA	High	Time to develop documentation	Nil	Nil	<ul style="list-style-type: none"> Estate Directorate Allan Dale 	Oct 2021	Apr 2022	Management responsibilities and requirements documented
5.3	Develop and revegetate buffer zones (extension of the established Atika Creek vegetation) for creek protection. This is to be guided by the campus master plan (initiative 4).	Map adequate buffer protection zones from creek high banks to prevent environmentally damaging developments within the Creek's riparian zone. Revegetate the extended and existing riparian zones within buffers where relevant. The planting palette should comprise of those species already naturally established and thriving within the creek area. Integrate with the educational program of JCU as an engagement initiative.	Ecology Sustainability	High	Time for GIS mapping of buffer zones against creek high banks; Time for revegetation works; Funding; Planting materials.	Nil	Nil	<ul style="list-style-type: none"> Estate Directorate DTES – CSE TropEco Interns Terrain NRM CRC Kuranda Envirocare 	Oct 2021	Dec 2022	<ul style="list-style-type: none"> Buffer zones agreed upon and mapped Areas earmarked for rehabilitation mapped Rehabilitation works commenced and completed
5.4	Undertake Revegetation activities in areas with high runoff	Reduce sediment runoff and storm water volumes by planting sloping banks adjoining drainage ways – simultaneously increase biodiversity values. Students to identify the areas and map. To be designed as minor projects for students.	Sustainability; Ecology; GIS	High	Collaboration with Community. Volunteers. In kind support from CRC for plants, mulch, compost etc.	Project dependent (machine, fertilizer, irrigation)	\$2000	<ul style="list-style-type: none"> Community of Gardeners TropEco Interns EnviroCare Terrain Estate 	Mar 2022	Ongoing	<ul style="list-style-type: none"> Increased tree plantings in high runoff areas. High levels of stakeholder engagement.
5.5	Undertake fauna survey on Atika Creek and investigate potential barriers to fish passage within catchment	Survey species diversity within Atika creek and develop understanding of impact of physical barriers to species diversity. Student to undertake survey within creek to identify and understand significant barriers.	Ecology	High	Academic and operational support for student project	Nil	Nil	<ul style="list-style-type: none"> DTES – CSE Estate Directorate WTMA Ross Kapitzke (fish passage design) 	Jan 2022	Dec 2022	Report provided on species diversity and barriers within Atika Creek and recommendations made for remediation.
5.6	Implement measures to protect water quality	Runoff from built up areas carries hydrocarbons, rubbish and sediment. Design and implement measures to prevent pollutants from entering drainage lines (e.g. filters, separators, sediment traps).	NA	Medium	Environmental engineering advice.	Project dependent	NA	<ul style="list-style-type: none"> Estate Directorate CRC Development contractors 	As required	Ongoing	<ul style="list-style-type: none"> Implementation of environmental engineering advice. Improvements of first-flush water quality compared to pre-engineering baselines.
5.7	Develop catchment plan in collaboration with local landholders and stakeholders to create a demonstration of best practice catchment management.	Work with catchment advisory group to develop and implement plan. Seek external funding to implement plan.	Ecology	Low	Time to develop plan and stakeholder commitment	Seek external funding	Nil	<ul style="list-style-type: none"> Local Traditional Owners WTMA & Terrain NRM QPWS & TCI CRC & TMR Kuranda Envirocare Residents in catchment Developers in catchment 	Jan 2022	Dec 2023	<ul style="list-style-type: none"> Advisory group created and active Relevant stakeholders involved Plan developed Funding received to implement plan
5.8	Investigate potential for waterway connectivity works as part of the Smithfield Bypass Upgrade project	Potential for fish passageways and wildlife corridor works to be undertaken to ensure better connectivity between JCU and downstream areas as part of Smithfield Bypass project.	NA	Low	Dependent on interest from TMR	Project dependent	Nil	<ul style="list-style-type: none"> CRC & TMR Terrain (Rowan Shee) Estate Directorate DTES – CSE Ross Kapitzke (fish passage design) 	Jul 2022	Dec 2022	Meeting with TMR and CRC to understand opportunities for environmental projects

Goal Six of Cairns Natural Assets Management Plan

“Maintain, manage, and enhance Cairns campus’ landscape through ecologically sustainable design principles and actions”

The aesthetic features of the Cairns campus and its surrounding landscapes are pull factors that bring people from different parts of the world to Cairns. Maintaining and managing the internal landscape, both artificial and natural (including fire management), will ensure that negative environmental impacts from activities occurring within the landscape is at least minimised if not eliminated. This will also ensure that the multi-functional landscape of JCU Cairns and its wider catchment will not have any significant negative spillover effect on the surrounding landscapes. The Cairns NAMP seeks to guide campus development and operational activities to ensure that campus natural areas and wider catchments are not impacted negatively.

6.1 Objectives for Landscape and Fire Management

The key objectives for Landscape and Fire Management under the NAMP are:

- Maintain and enhance the land condition in natural areas on campus and ensure land is zoned appropriately for its ecological values.
- Ensure campus development and operational activities do not negatively impact natural areas.
- Ensure groundwater resources are utilised sustainably.
- Promote the natural assets of the campus and encourage opportunities to access the campus’ natural assets through leisure,

teaching, learning and research in ways that minimise impact on the land.

- Restore degraded land areas, particularly in areas that are ecologically important or unlikely to be developed.
- Manage the campus’ natural assets as effectively and as close as possible to the natural fire regime, while working in conjunction with the Fire Management Plan (Infrastructure protection).
- Utilize burning for ecological and cultural maintenance purposes in natural areas of campus where appropriate.

6.2 Scope

- Artificial waterways and drains
- Sediment and erosion control
- Groundwater and associated bores
- Soil and mulch stockpiles
- Trails, including fire, walking and mountain biking trails
- Vehicle management related to fire trail access and biosecurity
- Infrastructure management in natural areas
- Restoration of degraded sites
- Fences and borders
- The interface between developed areas and natural areas
- Fire management

Table 0.1 Relevant Information related to Landscape and Fire Management

Document/information source	Author/Source	Comments
Sediment and Erosion Control Plans	Cairns Regional Council	
Mountain bike tracks schedule and maps		
JCU GIS	JCU Estate Directorate	Information on infrastructure and environmental assets
Clean down procedures for vehicles	Department of Agriculture and Fisheries	Checklist for vehicle clean down and inspection procedures and weed hygiene
JCU Design Guidelines - Environmental Management	JCU Estate Directorate	Specifications for JCU contractors to follow in sediment and erosion control
JCU Fire Management Plan – Cairns campus	JCU Estate Directorate	

6.3 Management Practices and Procedures

The Estate Directorate is responsible for management of landscaped natural areas around the campus. The campus contains approximately 43 hectares of land that is not actively maintained. However, this still requires ongoing environmental maintenance. The Landscape and Fire Management section of the NAMP covers all areas related to general land and fire management that are not covered in the other sections. This

includes all the areas included in the scope above. Current management practices are listed below:

- **Sediment and Erosion control**

The Cairns Campus is required to comply with the *Planning Act 2016* and relevant Local Laws in relation to sediment and erosion control for all earthworks being undertaken on campus. This includes soil and mulch stockpiles on campus. JCU has included sediment and erosion control requirements in its Design Guidelines - Environmental Management section and requires all contractors and land users on campus to comply with the relevant legislation.

- **Trail maintenance: Fire access tracks**

Fire access track maintenance occurs annually, with the tracks graded and repaired following the wet season. This is managed by the Estate Directorate.

- **Trail maintenance: Walking tracks**

There are limited maintained walking tracks on campus. Responsibility for walking track maintenance falls under the Estate Directorate.

- **Trail maintenance: Mountain Bike tracks**

Cairns Mountain Bike Club has a Licence to Occupy agreement with JCU for construction, use and maintenance of mountain bike tracks on JCU land. These tracks form part of the [Smithfield Mountain Bike Park](#) (Figure 0.1), with a small number of tracks in the park falling on JCU land. Ensuring best practice in trail maintenance both on JCU land and throughout the park is essential to ensure trails do not have an adverse impact on the surrounding environment.

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

established to minimise any environmental impacts and comply with all relevant legislation.

- **Fire Management**

The Estate Directorate is responsible for fire management at JCU. The Estate Directorate is currently developing a Fire Management Plan (FMP) for the Cairns campus in conjunction with owners/managers of adjoining forested lands. It is envisaged the NAMPs Fire Management section will work alongside the FMP and the plans will complement each other where possible. JCU Cairns Campus vegetation comprises a mix of fire-tolerant (eucalypt and bloodwood-dominated) and fire intolerant (rainforest) ecological communities. While it is expected there is minimal need for ecological burning at the Cairns campus due to the present vegetation types, the NAMP implementation team will work with relevant academics and ecological fire management experts as required to ensure effective management of the campus' vegetation.

Fire is now very rare in the Smithfield lowlands, due to high density urban development, and consequent absence of management burns. Internal correspondence suggests that only one burn has occurred on the Cairns Campus in the last 20 years. Nevertheless, fires are likely to occur (both a result of lightning and arson), and will affect JCU Cairns Campus and adjoining forested lands. Plans for their management must be developed.

Confirmation of the use of the site as a bombing range must be sought (see below section) and hazards associated with unexploded ordnance assessed. During burning in the early 2000s, areas to the west of Campus were closed when the slow moving low intensity bushfire set off unexploded ordnance (UXO).

Providing inclusion for cultural fire practices such as the Kup Murri cooking oven fire would support cultural events and activities to share

traditional practices. A designated Kup Murri Fire Pit could be established to streamline future activities and approvals for fire use on campus. A secure location would need to be identified with minimal fire spreading risk. This could be at the JCU Community Garden.

- **Historical activities**

Parts of Smithfield Conservation Park were used by the Australian armed forces as a bombing range during WWII (some information can be found at <https://parks.des.qld.gov.au/parks/smithfield/culture.html>). During the most recent burns in this area (during the drought of the early 2000s, low intensity fires set off unexploded ordnance in the park bounds. Information about unexploded ordnance should be obtained from the Department of Defence prior to any planned burns being undertaken.

Table 0.2 Landscape and Fire Management Action Plan

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
6.1	Establish lined tropical trees and plants along the streets and walkways throughout the campus. This should be guided by the campus master plan. TUDlab should be involved in the design and implementation	There is significant potential for tropical tree-lined streets throughout the campus to enhance the wayfinding and micro-climate of the campus. Trees along the walkways will provide shade for pedestrians	DTES-TUDlab; Ecology	High	Persons involved in the design and implementation	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate TUDlab TropEco Interns CRC Kuranda EnviroCare 	Jan 2022	Dec 2023	<ul style="list-style-type: none"> Location of trees to be planted along streets marked Trees for planting secured Tropical trees planted along streets
6.2	Mark the campus entrance with large signature trees. This should be guided by the campus master plan (initiative 6).	Signature trees are important to create identity and mark the campus entrance. Spacing of 10 m *10 m should be considered. Root control methods should be integrated.	NA	High	Specified species to be used. Persons involved in demarcations and planting	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate CRC Kuranda EnviroCare 	Jan 2022	Dec 2022	<ul style="list-style-type: none"> Specified species secured Locations for planting earmarked Trees planted and being nurtured
6.3	Create a large shaded area on the library green for study purposes and small gatherings. This should be guided by the campus master plan (initiative 8).	The library green is an empty space with barely no shade. This area can be developed into a shaded space with outdoor seating structures surrounded by tropical trees/plants/vines. Power outlets could be provided in the seating areas for study purposes and minor events.	Planning; TUDlab	High	Materials to be used. Persons involved in design and implementation.	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate DTES-TUDlab Local Traditional Owners Geography and planning students Contractor 	Jan 2022	Dec 2022	<ul style="list-style-type: none"> Designs completed Structures built Shaded trees/vines planted Shaded space in use
6.4	Enhance the arboretum trail to portray the tropical features of the campus. This action should be guided by the campus master plan (initiative 9).	The arboretum trail is used frequently for exercise and other purposes by students, staff, and residents of communities surrounding JCU. Enhancing the trail with tropical plants and indigenous educational elements will showcase the University's place in, and value for the Traditional Owners and the tropics.	Planning; TUDlab	High	Materials and plant species to be used. Persons involved in design and implementation.	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate DTES-TUDlab IERC Local Traditional Owners Kuranda EnviroCare CRC Contractor 	Jan 2022	Dec 2023	<ul style="list-style-type: none"> Designs completed Shaded trees/vines planted Arbour style shade created Enhanced arboretum trail completed
6.5	Develop regular monitoring program and environmental management strategy for mountain bike tracks.	Bike tracks need ongoing management to minimise environmental impact and ensure connectivity between land tenures. Erosion and sediment control must be a prominent aspect of monitoring and management. Work with CMBC to understand management needs and develop monitoring and maintenance procedures (if not already in place)	NA	Medium	Persons to undertake regular monitoring.	TBA	Nil	<ul style="list-style-type: none"> Estate Directorate CMBC QPWS CRC DTES – CSE 	Jan 2022	Ongoing	<ul style="list-style-type: none"> Regular meetings with CMBC held Procedures in place for monitoring and maintenance Regular monitoring reports Remediation works undertaken
6.6	Develop restoration projects between JCU and CMBC as part of curriculum and research activities to address environmental degradation resulting from tracks	Work with JCU academics to develop restoration projects in collaboration with CMBC. Investigate best ways to protect and maintain tracks through vegetation establishment.	Sustainability; Ecology; Env. Management	Medium	Collaboration between JCU and CMBC	TBA	Nil	<ul style="list-style-type: none"> Estate Directorate DTES – CSE CMBC WTMA Terrain 	Jun 2022	Ongoing	<ul style="list-style-type: none"> Restoration projects developed Restoration projects completed Outcomes reported
6.7	Provide, where feasible, appropriate shade over the existing bicycle parking facilities on campus. Consider curtain vine plants around the facilities for added shade.	Bicycle parking is provided throughout the campus and is in good condition. However, most are exposed to weather. An increase in protected bicycle parking facilities would be of benefit to both staff, students, and visitors.	NA	Medium	Materials for mounting the shaded structure. Persons involved in designing and erecting the structure	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate Contractor 	Jan 2023	Dec 2024	<ul style="list-style-type: none"> Shaded structure designed and built Tropical trees/ curtain vines planted around the structure to provide more shade

Natural Assets Management Plan, 2021
James Cook University – Nguma-bada Campus, Cairns

Item number	Action	Details	Links to curriculum or research	Priority	Resources required	Funding required	Funding available	Key stakeholders	Commencement date	Completion date	Measurement and evaluation
6.8	Create Creekside seating and areas of shaded retreat along the Atika Creek. Refer to campus master plan for locations (Initiative 2).	Areas of seating along the Creek as is already provided at the Boathouse will be a unique place for students and staff relaxation, informal study, and retreat within the green space. Consider the feasibility of incorporating student designs.	Planning; TUDlab	Medium	Materials for the structure. Persons involved in design and building.	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate DTES-TUDlab Local Traditional Owners Geography and planning students Contractor 	Jan 2023	Dec 2024	<ul style="list-style-type: none"> Students designs examined and sampled Funding secured Structure built and in use
6.9	Provide seating and shade over the founders green through a combination of trees/vines and a canopied structure to enhance the use of the space. This is to be guided by the campus master plan (Initiative 1).	Shading the founders green will provide additional space for gathering and outdoor interaction. A mix of tropical plants/vines and sprawling canopy trees may be considered for surrounding the seating area.	Planning; TUDlab	Medium	Materials for the structure. Persons involved in design and building.	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate DTES-TUDlab Local Traditional Owners Geography and planning students Contractor 	Jan 2023	Dec 2023	<ul style="list-style-type: none"> Design of the space completed Canopied structure built Shaded trees/vines planted
6.10	Create landscape themed seating zones at forecourts using tropical trees/plants/vines and shade structures to enhance social and study gatherings. This should be guided by the campus master plan (initiative 3).	Forecourts on campus should be developed as landscape themed zones to provide shade for university and public use. The designs should be in a form of arbour structures or landscape pavilions with shaded green. Planning students may be involved in the design of the seating zones as part of the minor projects.	Planning; TUDlab	Medium	Materials to be used. Persons involved in design and implementation.	TBA	TBA	<ul style="list-style-type: none"> Estate Directorate DTES-TUDlab Local Traditional Owners Geography and planning students Contractor 	Jan 2023	Dec 2024	<ul style="list-style-type: none"> Designs completed Structures built Shaded trees/vines planted
6.11	Support cultural use of fire at JCU	Work with IERC and local TOs to choose a location and seek approval for establishment of a permanent Kup Murri site.	NA	Medium	Collaboration with IERC & Local TO's	TBA		<ul style="list-style-type: none"> IERC Local Traditional Owners Estate Directorate 	Oct 2022	Dec 2022	Site selected and approved for Kup Murris
6.12	Investigate and understand historical fire management regimes for the campus and surrounding area including investigation of unexploded ordinance (UXO) on campus	Discussions indicate some areas on campus were historically burned on a regular basis. This should be investigated further and areas previously burned should be mapped. Contact Department of Defence to discuss risks associated with burning and unexploded ordinance.	NA	Low	Time to investigate and map information. Time to liaise with Department of Defence.	Nil	NA	<ul style="list-style-type: none"> Local Traditional Owners Estate Directorate CRC Department of Defence 	Before any burning is undertaken	Before any burning is undertaken	<ul style="list-style-type: none"> Consultation and mapping of historical burn sites completed UXO sites confirmed and mapped
6.13	Ensure campus Bushfire Management Plan considers ecological impacts of fire management	Work with Estate to include ecological considerations and protection in Bushfire management plan. This can be a minor review project for ecology student and included in the plan	Ecology	Low	Persons involved	Nil	NA	<ul style="list-style-type: none"> Estate Directorate Ecology staff and students 	Jun 2022	Dec 2022	Inclusion of ecological impacts section in Bushfire Management Plan

Appendix

Relevant Legislation

- [Aboriginal and Torres Strait Islander Act 2005](#)
- [Aboriginal Cultural Heritage Act 2003](#)
- [Biosecurity Act 2014](#)
- [Environmental Protection Act 1994](#)
- [Environment Protection and Biodiversity Conservation Act 1999](#)
- [Fisheries Act 1994](#)
- [Native Title Act 1993](#)
- [Nature Conservation Act 1992](#)
- [Planning Act 2016](#)
- [Vegetation Management Act 1999](#)
- [Water Act 2000](#)